



## IGEL OS Articles

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## Overview: First Steps with IGEL OS 11

The following article provides a short overview of how to get started with an IGEL device or a third-party device that you want to convert to IGEL OS. The steps are generally the same, but in the case of a third-party device you will need to use the IGEL OS Creator.



IGEL Device	3d-Party Device
<p><b>Step 1: Download and install the UMS</b></p> <ul style="list-style-type: none"> <li>• <a href="#">IGEL Download Server</a><sup>1</sup></li> <li>• <a href="#">Instruction: Installing an IGEL UMS Server</a></li> <li>• <a href="#">Video: UMS installation on a Windows Server</a><sup>2</sup></li> <li>• <a href="#">Video: UMS installation on a Linux operating system</a><sup>3</sup></li> </ul> <p><b>Step 2: Activate your IGEL OS 11 with the Setup Assistant (free evaluation license):</b></p> <ul style="list-style-type: none"> <li>• <a href="#">Instruction: Setup Assistant for IGEL OS, section "Register for Demo License". See also Getting a Demo License.</a></li> <li>• <a href="#">Video: Acquire a Demo License Including Workspace Edition and Enterprise Management Pack</a><sup>4</sup></li> </ul> <p><b>via UMS (purchased license):</b></p> <ul style="list-style-type: none"> <li>• <a href="#">Deploy licenses using automatic or manual license deployment method.</a></li> <li>• <a href="#">Video: Register an endpoint in the UMS and assign a license to it</a><sup>5</sup></li> </ul> <p><b>Step 3: Configure your device with the UMS:</b></p> <ul style="list-style-type: none"> <li>• <a href="#">Create a profile with the required settings and assign it to the device. See also Profiles.</a></li> <li>• <a href="#">Video: Configure an endpoint in the UMS using profiles</a><sup>6</sup></li> </ul> <p><b>without the UMS:</b></p> <ul style="list-style-type: none"> <li>• <a href="#">Use the IGEL Setup on the device, e.g. to configure User Interface and Sessions.</a></li> <li>• <a href="#">Video: Configuring an Endpoint with IGEL OS 11</a><sup>7</sup></li> </ul>	<p><b>Step 1: Download and install the UMS</b></p> <ul style="list-style-type: none"> <li>• <a href="#">IGEL Download Server</a><sup>8</sup></li> <li>• <a href="#">Instruction: Installing an IGEL UMS Server</a></li> <li>• <a href="#">Video: UMS installation on a Windows Server</a><sup>9</sup></li> <li>• <a href="#">Video: UMS installation on a Linux operating system</a><sup>10</sup></li> </ul> <p><b>Step 2: Download IGEL OS 11</b></p> <ul style="list-style-type: none"> <li>• <a href="#">IGEL Download Server</a><sup>11</sup>, section <b>OS 11 &gt; OS Creator</b></li> </ul> <p><b>Step 3: Convert your device to IGEL OS 11</b></p> <ul style="list-style-type: none"> <li>• <a href="#">IGEL OS Creator Manual</a></li> <li>• <a href="#">Video: Converting an x86-Endpoint Using the IGEL OS Creator</a><sup>12</sup></li> </ul> <p><b>Step 4: Activate your IGEL OS 11 with the Setup Assistant (free evaluation license):</b></p> <ul style="list-style-type: none"> <li>• <a href="#">Instruction: Setup Assistant for IGEL OS, section "Register for Demo License". See also Getting a Demo License.</a></li> <li>• <a href="#">Video: Acquire a Demo License Including Workspace Edition and Enterprise Management Pack</a><sup>13</sup></li> </ul> <p><b>via UMS (purchased license):</b></p> <ul style="list-style-type: none"> <li>• <a href="#">Deploy licenses using automatic or manual license deployment method.</a></li> </ul>

2 <https://www.youtube.com/watch?v=313m1E1y3w>  
 3 [https://www.youtube.com/watch?v=p52CxtB\\_0ok](https://www.youtube.com/watch?v=p52CxtB_0ok)  
 4 <https://www.youtube.com/watch?v=j31c8dzBMAg>  
 5 <https://www.youtube.com/watch?v=01N-9b3P4wo>  
 6 <https://www.youtube.com/watch?v=Sc38mRv5Z1s>  
 7 <https://www.youtube.com/watch?v=6WfLVgYBTHg>  
 8 <https://www.igel.com/software-downloads/workspace-edition/>  
 9 <https://www.youtube.com/watch?v=3YJnFiE7y5w>  
 10 [https://www.youtube.com/watch?v=p52CxtB\\_0ok](https://www.youtube.com/watch?v=p52CxtB_0ok)  
 11 <https://www.igel.com/software-downloads/workspace-edition/>  
 12 <https://www.youtube.com/watch?v=xVqcX6QTZ5g>  
 13 <https://www.youtube.com/watch?v=j31c8dzBMAg>



IGEL Device	3d-Party Device
	<ul style="list-style-type: none"> <li>• Video: <a href="#">Register an endpoint in the UMS and assign a license to it</a><sup>14</sup></li> </ul> <p><b>Step 5: Configure your device</b></p> <p><b>with the UMS:</b></p> <ul style="list-style-type: none"> <li>• Create a profile with the required settings and assign it to the device. See also Profiles.</li> <li>• Video: <a href="#">Configure an endpoint in the UMS using profiles</a><sup>15</sup></li> </ul> <p><b>without the UMS:</b></p> <ul style="list-style-type: none"> <li>• Use the IGEL Setup on the device, e.g. to configure User Interface and Sessions</li> <li>• Video: <a href="#">Configuring an Endpoint with IGEL OS 11</a><sup>16</sup></li> </ul>

14 <https://www.youtube.com/watch?v=01N-9b3P4wo>

15 <https://www.youtube.com/watch?v=Sc38mRv5Z1s>

16 <https://www.youtube.com/watch?v=6WfLVgYBTHg>

## Update and Upgrade

- [Upgrading UDC3 or UD Pocket from IGEL OS 10.06 to IGEL OS 11 via Universal Firmware Update \(see page 7\)](#)
- [Upgrading from IGEL OS 10 to IGEL OS 11 \(see page 61\)](#)
- [Buddy Update \(see page 221\)](#)
- [Firmware Update \(see page 227\)](#)
- [Updating IGEL OS Using a USB Storage Device \(see page 230\)](#)
- [Updating the Firmware using the Linux Console \(see page 232\)](#)

## Upgrading UDC3 or UD Pocket from IGEL OS 10.06 to IGEL OS 11 via Universal Firmware Update

This document describes how to upgrade UDC3 or UD Pocket devices from IGEL OS 10.06 to IGEL OS 11 via the Universal Firmware Update feature of the UMS (Universal Management Suite).

Since a new licensing model has been introduced with IGEL OS 11, a license from an IGEL Workspace Edition Product Pack must be available for each device. If you have valid maintenance for your devices, you can convert your existing UDC3 or UD Pocket Product Packs to Workspace Edition (WE) Product Packs; see [Converting UDC3 or UD Pocket Licenses for Upgrading to IGEL OS 11](#).

Read all the following chapters in the order given and follow the instructions.

1. [Devices That Can Be Upgraded to IGEL OS 11](#) (see page 8)
2. [Important! Consider This Before Upgrading](#) (see page 21)
3. [Getting the UMS Ready](#) (see page 23)
4. [Deploying the Licenses](#) (see page 24)
5. [Creating the Universal Firmware Update](#) (see page 25)
6. [Creating an Upgrade Profile](#) (see page 36)
7. [Assigning the Upgrade Profile and the Universal Firmware Update to the Test Devices](#) (see page 45)
8. [Testing the Upgrade](#) (see page 49)
9. [Unassigning the Upgrade Profile and the Universal Firmware Update](#) (see page 51)
10. [If Applicable: Restoring Custom Partition and Custom Applications](#) (see page 52)
11. [Upgrading All Devices](#) (see page 53)

## Devices That Can Be Upgraded to IGEL OS 11

In this section, you find the general hardware requirements for IGEL OS 11 and a list of third-party devices officially supported by IGEL OS 11.

### Core Requirements

- CPU with 64-bit support
- CPU speed:  $\geq 1$  GHz
- Memory (RAM):  $\geq 2$  GB

- i RAM size higher than 2 GB is recommended if you use any of the following:
  - Unified Communications optimizations (uses a client-side media engine)
  - High-resolution graphics output
  - More than two monitors

- i With devices that have 2 GB RAM and shared video memory, a maximum of 512 MB may be used as video memory.

- Storage: Depends on the release version of IGEL OS 11. The details are listed below: 2 GB minimum;  $\geq 4$  GB recommended
  - Up to IGEL OS 11.03: 2 GB minimum;  $\geq 4$  GB recommended
  - From IGEL OS 11.04 to IGEL OS 11.07: If the full feature set is applied, at least 2.4 GB of storage is required. For instructions on how to reduce the feature set, see Error: "Not enough space on local drive" when Updating to IGEL OS 11.08 or Higher.
  - From IGEL OS 11.08 onwards: If the full feature set is applied, at least 2.4 GB of storage is required. For instructions on how to reduce the feature set, see Error: "Not enough space on local drive" when Updating to IGEL OS 11.08 or Higher. **TODO Add URL when published**
- No VIA graphic adapter; VIA graphics support is discontinued in IGEL OS.
- Legacy Bios and EFI/UEFI are supported.

### Devices Supported by OSC and UD Pocket with IGEL OS 11

- ⚠ The following list only includes those devices that are **tested by IGEL** (with each major release of IGEL OS). By no means it implies that the devices which are not included in this list but meet the minimum requirements will not function with IGEL OS: Any x86-64 hardware endpoint device that meets the IGEL-stated minimum hardware requirements for IGEL OS (for example, the processor speed and RAM) can be expected to work adequately with IGEL OS and should be considered a candidate for repurposing from another OS. With an IGEL OS subscription or active maintenance, customers can expect IGEL to make any necessary "best effort" to support, regardless of whether the endpoints in question are specifically listed within the IGEL Knowledge Base or elsewhere (e.g. on the IGEL Ready Showcase at <https://www.igel.com/ready/showcase-categories/endpoints/>). For any devices not listed here or on the IGEL Ready showcase, you can contact your hardware vendor and request those devices to be added to the IGEL Ready program.



Integrated drivers and supported peripherals are listed in the [Third-Party Hardware Database](#)<sup>17</sup>. For more solutions compatible with IGEL OS, see Partner Solutions.

**i** HP, Lenovo, and LG device models are available from the factory with pre-installed IGEL OS 11. Please contact [IGEL Ready](#)<sup>18</sup> to get information on which device models are available with pre-installed IGEL OS.

**i** For some of the devices listed here, Flash memory must be extended to  $\geq 2$  GB. For these devices, an appropriate note is added.

**i** On modern computers such as secured-core PCs (see e.g. <https://www.microsoft.com/en-us/windows/business/devices?col=secured-core-pcs>), there may be a BIOS setting related to Secure Boot that allows the use of Microsoft's 3rd party UEFI Secure Boot Certificate. The usual description of such a BIOS setting is "Allow Microsoft 3rd Party UEFI CA". This setting must be set to enabled, as IGEL uses the 3rd party certificate to support UEFI Secure Boot. If UEFI Secure Boot is enabled, but "Allow Microsoft 3rd Party UEFI CA" is not enabled, you may be unable to boot IGEL OS Creator or UD Pocket. Similarly, if the setting "Allow Microsoft 3rd Party UEFI CA" is disabled after a previous installation of IGEL OS, IGEL OS will fail to boot. For how to enable the setting, see Secured-Core PCs: Microsoft 3rd-Party UEFI Certificate for Secure Boot.

**i** [Fn] keys may not work on some supported and listed laptop/notebook models.

#### ADS-Tec

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
DVG-VMT9010	Industrial PC/ Terminal	4 GB 8 GB	64 GB eMMC	Intel Atom® x7-E3950	11.02.100
DVG-VMT9012	Industrial PC/ Terminal	4 GB 8 GB	64 GB eMMC	Intel Atom® x7-E3950	11.02.100
DVG-VMT9015	Industrial PC/ Terminal	4 GB 8 GB	64 GB eMMC	Intel Atom® x7-E3950	11.02.100
DVG-VMT9112	Industrial PC/ Terminal	4 GB 8 GB	64 GB eMMC	Intel Atom® x7-E3950	11.02.100

<sup>17</sup> <https://www.igel.com/linux-3rd-party-hardware-database/>

<sup>18</sup> <https://www.igel.com/technology-partners/>

## Advantech

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
POC-W213L	Medical All in One	4 GB	128 GB	Intel Core i7-7300U	11.01.100
POC-W243L* (see page 19)	Medical All in One	4 GB	32 GB	Intel Kaby Lake Core i5-7300U	11.01.110
POC-W243L* (see page 19)	Medical All in One	4 GB	128 GB	Intel Core i7-7300U	11.01.100

## Advantech-DLoG

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
DLT-V6210	Industrial PC/ Terminal	4 GB	32 GB	Intel Atom	11.01.100
DLT-V7210 K	Industrial PC/ Terminal	4 GB	4 GB	Intel Atom E3845	11.01.100

## Dell / Wyse

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version	Note
5040 / 5212	All in One	2 GB	2 GB	AMD G-T48E	11.01.100	
3040	Thin Client	2 GB	8 GB	Intel Atom x5-Z8350	11.01.100	
5020	Thin Client	2 GB	8 GB	AMD G-Series SoC	11.02.140	
5060	Thin Client	4 GB	8 GB	AMD GX-424CC	11.01.100	
5070	Thin Client	8 GB	32 GB	Intel Celeron J4105	11.01.100	

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version	Note
Latitude 5510	Laptop/ Notebook	8 GB	256 GB	Intel Core i5-10210U	11.05.100	Wake-on-LAN functionality is not supported.
Optiplex 3000	Thin Client	4 GB	32 GB	Intel Celeron N5105	11.08.200	

## Dynabook

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
Portegé X20W-D	Laptop/ Notebook	8 GB	256 GB	Intel Core i5-7200U	11.01.100
Portegé X30-D	Laptop/ Notebook	8 GB	256 GB	Intel Core i5-7300U	11.01.100
Tecra C50	Laptop/ Notebook	4 GB	500 GB	Intel i5-4210U	11.01.100
Tecra Z50-D	Laptop/ Notebook	8 GB	256 GB	Intel Core i5-7200U	11.01.100
SATELLITE R50	Laptop/ Notebook	4 GB	500 GB	Intel i3-6006U	11.01.100

## Elo

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
i2 Touch (15 and 22 inches)	All in One	8 GB	128 GB	Intel Core i3-8100T	11.05.100

## Fujitsu

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
Q957	Desktop PC	8 GB	500 GB	Intel Core i3-6100	11.02.100
FUTRO S740	Thin Client	4 GB	8 GB	Intel Celeron J4105	11.04.100

## HP

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version	Note
HP t420	Thin Client	2 GB	8 GB	AMD Embedded G-Series GX-209JA	11.02.100	
HP t430	Thin Client	2 GB	16 GB	Intel®Celeron® N4020	11.01.110	
HP t530	Thin Client	4 GB	8 GB	AMD GX-215JJ Dual-Core	11.01.100	
HP t630	Thin Client	4 GB	8 GB	AMD GX-420GI	11.01.100	
HP t730	Thin Client	16 GB	8 GB	AMD RX-427BB APU	11.01.100	
HP t820	Thin Client	16 GB	16 GB	Intel Core i5-4570S	11.01.100	
HP t640	Thin Client	4 GB	16 GB	AMD Ryzen R1505G	11.04.100	
HP t540	Thin Client	16 GB	16 GB	AMD Ryzen Embedded R1305G	11.06.100	

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version	Note
HP mt46	Mobile Thin Client	8 GB	32 GB	AMD Ryzen 3 PRO 4450U	11.07.100	Excluding support for WWAN and Wake-on-LAN (both features are planned)
HP Elite t655	Thin Client	4 GB / 8 GB	32 GB	AMD Ryzen Embedded R2314	11.07.160	
HP Elite mt645 G7	Mobile Thin Client	8 GB	256 GB	AMD Ryzen 3 5425U	11.08.230	Support for WWAN Intel XMM 7560 R+ (as of 11.08.330) Excluding support for Wake-on-LAN (feature is planned) Excluding support for built-in fingerprint sensor
				AMD Ryzen 5 5625U	11.08.330	
HP t740	Thin Client	8 GB	16 GB	AMD Ryzen Embedded V1756B	11.08.290	
HP Pro t550	Thin Client	4 GB	32 GB	Intel Celeron J6412	11.08.330	
HP Pro mt440 G3	Mobile Thin Client	8 GB	128 GB	Intel Celeron 7305	11.08.440	Excluding support for WWAN Intel XMM 7560 R+ (feature is planned)

## HP Docking Stations

Name	Supported from IGEL OS Version
HP USB-C Docking Station G5	11.08.230
HP USB-C G5 Essential Dock	11.08.290

## Intel

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
NUC 5i5MYHE	Desktop PC	2 GB	32 GB	Intel i5-5300U	11.01.100
NUC 5i3RYH	Desktop PC	2 GB	2 GB	Intel i3-5010U	11.01.100
NUC 7CJYH	Desktop PC	2 GB	4 GB	Intel Celeron J4005	11.01.100

## Lenovo

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Wi-Fi Chip	Supported from IGEL OS Version	Note
ThinkCentre M625q	Desktop PC	4 GB	32 GB	AMD E2-9000e	Intel AC9260	11.04.100	
		8 GB	128 GB	AMD A4-9120e	QCA6174 802.11ac	11.04.100	
ThinkCentre M75n	Desktop PC	8 GB	256 GB	AMD Ryzen 3 Pro 3300U	Intel AC9260	11.05.100	
ThinkCentre M70q Gen1	Desktop PC	16 GB	256 GB	Intel i5-10500t	Comet Lake PCH CNVi WiFi, Intel	11.05.100	
ThinkCentre M70q Gen 3	Desktop PC	16 GB	256 GB	Intel Core i5-12500T	Intel AX201	11.08.240	
ThinkCentre M75q Gen 2	Desktop PC	4 GB	128 GB	AMD Ryzen 3 Pro 5350GE	Intel AX200	11.08.240	

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Wi-Fi Chip	Supported from IGEL OS Version	Note
K14 AMD Gen 1	Laptop/ Notebook	8 GB	256 GB	AMD Ryzen 5 PRO 5650U	Mediatek MT7921	11.08.240	
ThinkPad L14 AMD Gen 1	Laptop/ Notebook	64 GB	1 TB	AMD Ryzen 7 Pro 4750U	Wi-Fi 6 AX200, Intel	11.05.100	
14w	Laptop/ Notebook	4 GB	64 GB	AMD A6-9220C	QCA6174 802.11ac	11.05.100	
ThinkPad L14 AMD Gen 3	Laptop/ Notebook	16 GB	256 GB	AMD Ryzen 5 5625U	AMD RZ616 2X2AX (WiFi 6E)	11.08.230	Excluding support for WWAN
ThinkCentre Neo50q Gen 4	Thin Client	8 GB	256 GB	Intel Core i3-1215U	Wi-Fi 6 RTL8852BE	11.08.240	
		4 GB	256 GB	Intel Celeron 7305	Wi-Fi 6 AX201		
K14 Intel Gen 1	Laptop/ Notebook	16 GB	256 GB	Intel Core i5-1135G7	Intel AX210 WiFi / BT combo	11.08.290	
ThinkPad L14 Intel Gen 3	Laptop/ Notebook	16 GB	512 GB	Intel Core i5-1235U	Intel Wi-Fi 6 AX201 2x2 AX vPro	11.08.330	LTE support as of 11.08.360
ThinkEdge SE10	Thin Client	8 GB	1 TB	Intel Atom x6425RE	MediaTek MT7921LEN	11.08.360	
			256 GB	Intel Atom x6214RE	Intel AX210	11.08.360	
ThinkPad L14 AMD Gen 4	Thin Client	8 GB	256 GB	AMD Ryzen 3 Pro 7330U	AMD RZ616 Realtek RTL8852CE	11.08.440	Quectel EM05-G 4G CAT4
ThinkPad L15 AMD Gen4	Thin Client	8 GB	256 GB	AMD Ryzen 3 Pro 7330U	AMD RZ616 Realtek RTL8852CE	11.08.440	Quectel EM05-G 4G CAT4

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Wi-Fi Chip	Supported from IGEL OS Version	Note
ThinkPad L14 Intel Gen 4	Laptop/ Notebook	8 GB	256 GB	Intel Core i3-1315U	Intel AX211	11.09.100	Quectel EM05-G 4G CAT4
ThinkPad L15 Intel Gen 4	Laptop/ Notebook	8 GB	256 GB	Intel Core i3-1315U	Intel AX211	11.09.100	Quectel EM05-G 4G CAT4

## Lenovo Docking Stations

Name	Supported from IGEL OS Version
ThinkPad USB-C Hybrid Dock	11.07.100
IOBOX	11.07.100
Lenovo Universal USB-C Dock	11.08.440

## LG

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
24CK550N* * (see page 19)	All in One	4 GB	32 GB	AMD G-Series GX-212JJ	11.01.100
24CK550W* * (see page 19)	All in One	4 GB	32 GB	AMD G-Series GX-212JJ	11.01.100
24CK560N* * (see page 19)	All in One	4 GB	32 GB	AMD G-Series GX-212JJ	11.01.100
CK500W	Thin Client	4 GB	32 GB	AMD G-Series GX-212JJ	11.01.100
38CK950N	All in One	8 GB	128 GB	AMD Ryzen 3	11.02.100
38CK900N	All in One	8 GB	128 GB	AMD Ryzen 3	11.02.100



Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
CL600N	Thin Client	4 GB	16 GB	Intel® Celeron J4105	11.03.100
CL600W	Thin Client	8 GB	128 GB	Intel® Celeron J4105	11.03.100
34CN650N	All in One	4 GB	16 GB	Intel® Celeron J4105	11.05.100
24CN650N	All in One	8 GB	16 GB	Intel® Celeron J4105	11.05.100
27CN650N	All in One	8 GB	16 GB	Intel® Celeron J4105	11.05.100
CQ600I	Thin Client	4 GB	16 GB	Intel Celeron N5105	11.08.330
24CQ650I	All in One	4 GB	16 GB	Intel Celeron N5105	11.08.330
CQ601I	Thin Client	4 GB	16 GB	Intel Pentium Silver N6005	11.08.360
24CR670I	All in One	4 GB	16 GB	Intel Celeron N5105	11.09.110

#### LG Docking Stations

Name	Supported from IGEL OS Version
LG USB Multi Port Hub	11.09.100

#### OnLogic

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
CL210G-10	Industrial PC/ Terminal	4 GB	32 GB	Intel Celeron N3350	11.04.100
KARBON 300	Desktop PC	4 GB	32 GB	Intel Atom x5-E3930	11.04.100

## Onyx Healthcare

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
Venus 223	Medical All in One	4 GB	128 GB	Intel Quad-Core J1900	11.01.100

## Pepperl+Fuchs

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
BTC12N	Industrial Box Thin Client	4 GB	32 GB	Intel Apollo Lake N4200	11.09.100
BTC14N	Industrial Box Thin Client	4 GB	32 GB	AMD Ryzen Embedded V1202B	11.09.100

## Rein Medical

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
Silenio C122	All in One	8 GB	128 GB	Intel® Core™ i5 – 6th Generation	11.01.110
Silenio C124	All in One	8 GB	128 GB	Intel® Core™ i5 – 6th Generation	11.01.110
Clinio S 522TCT	Medical All in One	8 GB	16 GB	Intel® Pentium® Silver J5005	11.04.100
Clinio S 524TCT	Medical All in One	8 GB	16 GB	Intel® Pentium® Silver J5005	11.04.100

## Secunet

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
SINA Workstation S EliteDesk 800 G2	Workstation	16 GB	256 GB	Intel Core i7-6700	11.01.100


## USB Memory Sticks That Can Be Used as Alternative UD Pocket Hardware


## DIGITTRADE

Name	Storage	Supported from IGEL OS Version
Kobra Stick	≥ 4GB	11.05.133

## Officially Supported Virtual Environments

- Tested with Ubuntu (64-bit) and default settings

 Note that the use of a UD Pocket within a virtual machine is **not** supported by IGEL.

 For some features, more than 2 GB RAM is required. Example: if you use dual monitor environments, a virtual machine must have at least 8 GB RAM.

Name	Memory (RAM)	Storage	Type	Supported from IGEL OS Version
Oracle VM VirtualBox	≥ 2 GB	≥ 4 GB	Linux	11.04.100
VMware Workstation	≥ 2 GB	≥ 4 GB	Linux	11.04.100

\* Delock Adapter DP 1.2 to DVI does not work.

\*\* When using an additional 4k screen with this device, please edit the BIOS settings as follows:

1. Go to the **Chipset** screen.
2. Set **Integrated Graphics** to “Force”.
3. Set **UMA Frame Buffer Size** to “256M” or higher

## Check List


- ✔ The devices you want to upgrade meet the hardware requirements for IGEL OS 11.

## Next Step

>> [Important! Consider This Before Upgrading](#) (see page 21)


## Important! Consider This Before Upgrading

To make sure that your upgrade can be successful, check the following warnings and notes; a warning symbol indicates that irreversible damage can be done to your devices.

 **Existing partitions:** Any existing partition on the target drive of your device will be deleted. The installer will repartition the target device. The overall size of the newly created partitions will be calculated based on the available disk space. The minimum disk usage is 2 GB, the maximum is 16 GB.

 **No Downgrade**

You cannot restore your IGEL OS 10 system once you have migrated to IGEL OS 11. The device storage is overwritten completely with a new partitioning scheme.

 **Features (e.g. Clients)**

IGEL OS 11 does not have the complete feature set of IGEL OS 10. Make sure that the current version of IGEL OS 11 meets your requirements. For details, refer to the appropriate release notes.

 **Custom Partitions**

The contents of Custom Partitions will be deleted by the upgrade. Make sure that the Custom Partition is restored after the upgrade has finished. Besides becoming dysfunctional after the upgrade, applications and kernel drivers in a Custom Partition might corrupt the upgrade. For this reason, make sure to first test the upgrade on a characteristic device.

 **Custom Commands**

The persistence of custom commands cannot be guaranteed. Besides becoming dysfunctional after the upgrade, custom commands might corrupt the upgrade. For this reason, make sure to first test the upgrade on a characteristic device. In general, custom commands must be adapted for IGEL OS 11. We recommend that you disable custom commands when upgrading; you can enable them once the upgrade has been successfully completed.

 **Power Supply**

Ensure that the device is not running on battery power, i.e. it must be connected to a power supply during the complete upgrade process.

 **Network**

All devices must be connected to a LAN or WLAN. LAN is the recommended option. The device will not be upgraded if OpenVPN, OpenConnect, mobile broadband, or gencard is configured. To be sure, check if the following parameters are deactivated resp. no session is configured:

- **Network > VPN Open VPN** (registry: `sessions.openvpn%`)

- **Network > VPN > OpenConnect VPN** (registry: `sessions.openconnect%`)
- **Network > Mobile Broadband**, checkbox **Enable Mobile Broadband** (registry: `network.interfaces.mobile_broadband.enabled`)
- **Network > VPN > gencard** (registry: `network.interfaces.gencard_vpn_connector.autostart_enabled`)

When you have changed the settings, restart the device to enable the upgrade.

### Check List

- ✓ The limitations and conditions are understood and do not constitute a problem.

### Next Step

>> [Getting the UMS Ready](#) (see page 23)

## Getting the UMS Ready

To upgrade your devices to IGEL OS 11, you need the appropriate version of the UMS. Also, the devices must be registered with the UMS to receive their licenses.

1. If you have not already done so, update your UMS to version 6.01.130 or higher. For instructions, see [Updating a UMS Installation](#).
2. Make sure that your devices are registered with the UMS. For more information, see the chapter [Registering Devices on the UMS Server](#) in the UMS Manual.

### Check List

- ✔ Your Universal Management Suite (UMS) version is 6.01.130 or higher.
- ✔ All devices that will be upgraded are registered in the UMS.

### Next Step

>> [Deploying the Licenses](#) (see page 24)

## Deploying the Licenses

### Checking If the Required Licenses Are Available

- ▶ Ensure that you have the following licenses:
  - A valid license from an IGEL Workspace Edition (WE) Product Pack for each device.
  - Depending on the features you want to use, you might need IGEL Enterprise Management (EMP) licenses in addition. For further information, see IGEL Software License Overview.

### Deploying the Licenses

- ▶ Choose one of the following methods:
  - If you want to deploy a license quickly on a single device: See Manual License Deployment for IGEL OS without UMS; start from step 5.
  - If you have a smaller or medium number of devices and want to control exactly which device should get a license: See Manual License Deployment for IGEL OS.
  - If you have a medium or greater number of devices, and you are planning to add new devices/licenses regularly: See Set up Automatic License Deployment (ALD) with ALD Token.
  - If you have a medium or greater number of devices, and you are planning to add new devices/licenses frequently (licensing can be managed completely in the IGEL License Portal): See Setting up Automatic License Deployment (ALD).

### Check List

- ✔ The licenses have been purchased.
- ✔ License deployment is set up.

### Next Step

>> [Creating the Universal Firmware Update](#) (see page 25)



## Creating the Universal Firmware Update

In this step, we will create a Universal Firmware Update that will be used for testing the upgrade and for rolling out the upgrade on all relevant machines.

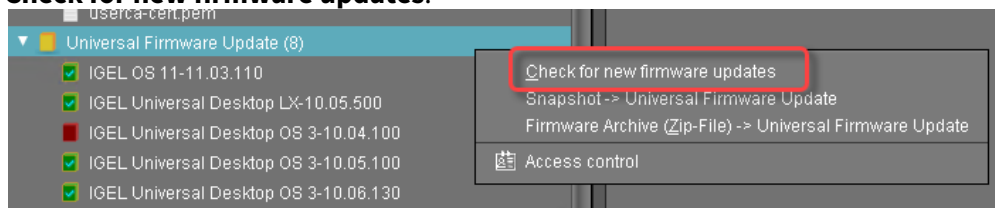
**i** If you use the High Availability Extension, note that Universal Firmware Updates are NOT synchronized, that is why you have to either download them to all HA nodes or configure an external (FTP) server.

Choose the procedure that suits your needs:

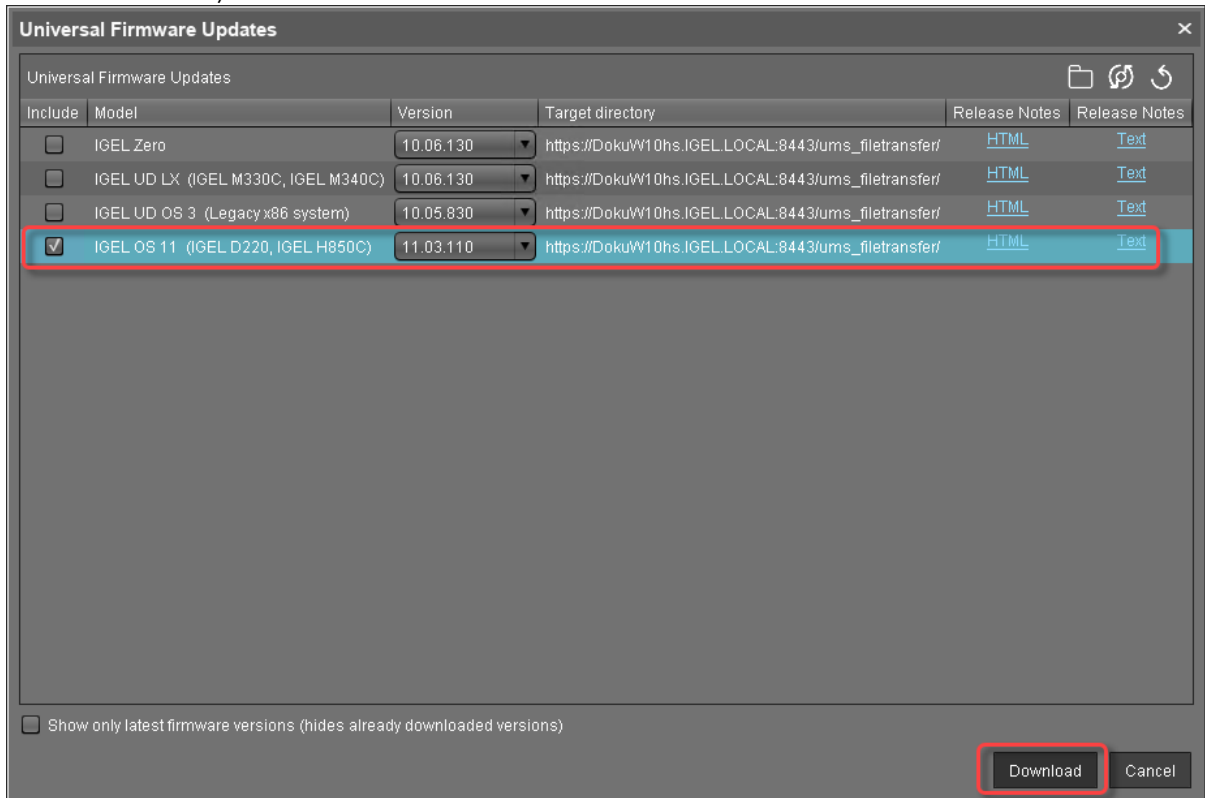
- [Configuring the Universal Firmware Update with Files Hosted by the UMS](#) (see page 25)
- [Configuring the Universal Firmware Update with Files Hosted by FTP Server \(Required for ICG\)](#) (see page 30)

### Configuring the Universal Firmware Update with Files Hosted by the UMS

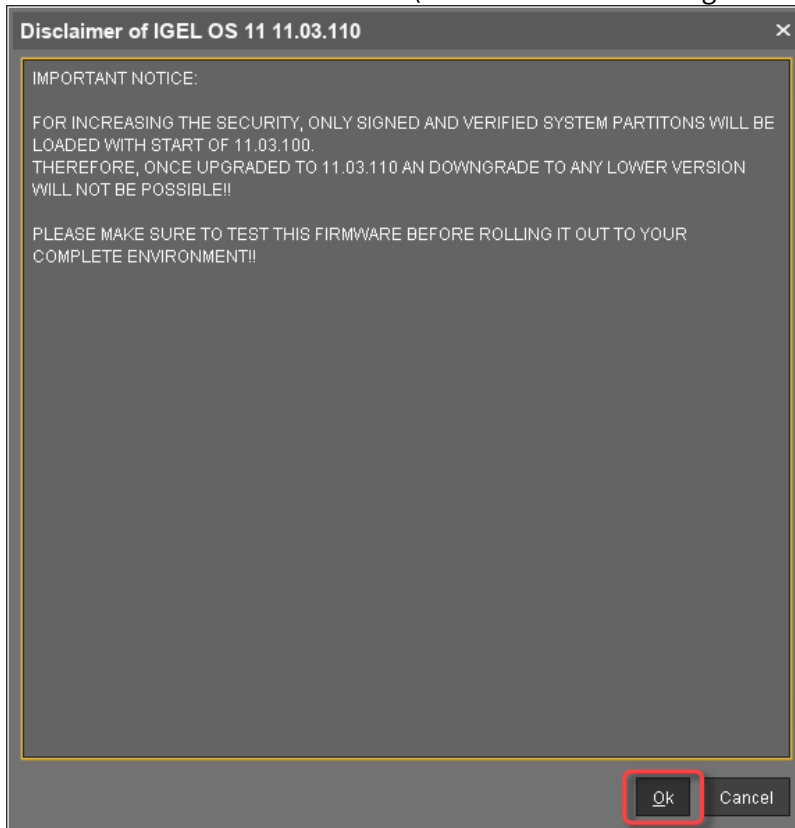
1. Go to **Server - [UMS address] > Universal Firmware Update** and in the context menu, select **Check for new firmware updates**.



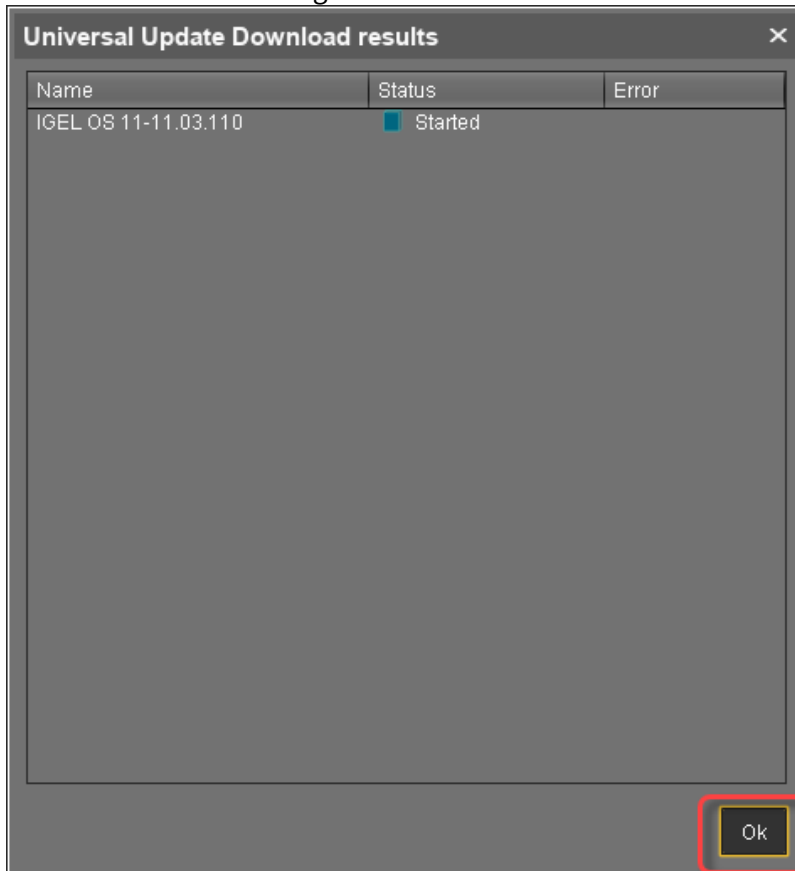
2. Select the entry for the IGEL OS 11 firmware and then select **Download**. (In the example, IGEL OS 11.03.110 is used.)



3. Read and confirm the disclaimer. (IGEL OS 11.03.100 or higher only)



4. Confirm the status message.



In the main window, you can monitor the download process.

/Universal Firmware Update/IGEL OS 11-11.03.110

Product

Version

Release Notes [HTML Text](#)

**Firmware Update Settings**

User

Password

Host



Port

Protocol

Target URL

Snapshot file

**Download Status**

Status  Started  Download the firmware update...

Error

When the status is **Finished**, your Universal Firmware Update is ready for use.

/Universal Firmware Update/IGEL OS 11-11.03.110

Product

Version

Release Notes [HTML Text](#)

**Firmware Update Settings**

User

Password

Host


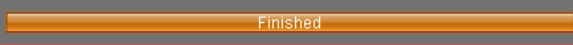
Port

Protocol

Target URL

Snapshot file

**Download Status**

Status  OK  Finished

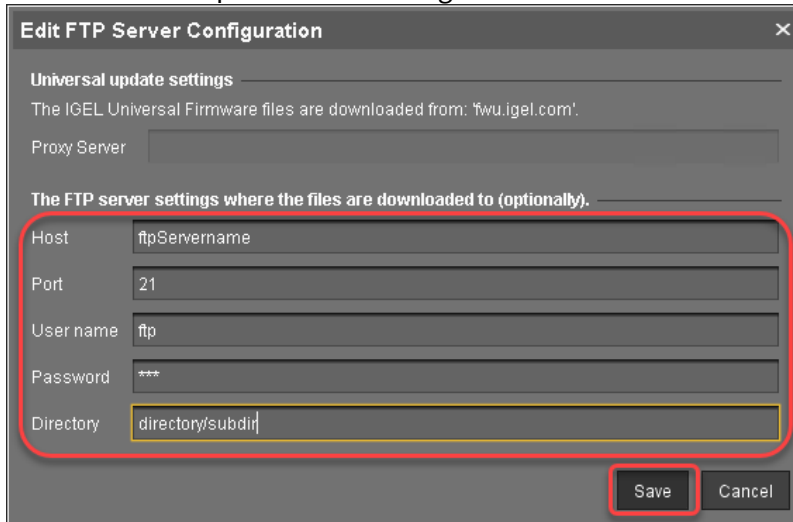
Error

## Configuring the Universal Firmware Update with Files Hosted by FTP Server (Required for ICG)

You can use an FTP server instead of the UMS to host the firmware files. If you are using IGEL Cloud Gateway (ICG), an FTP server is required.

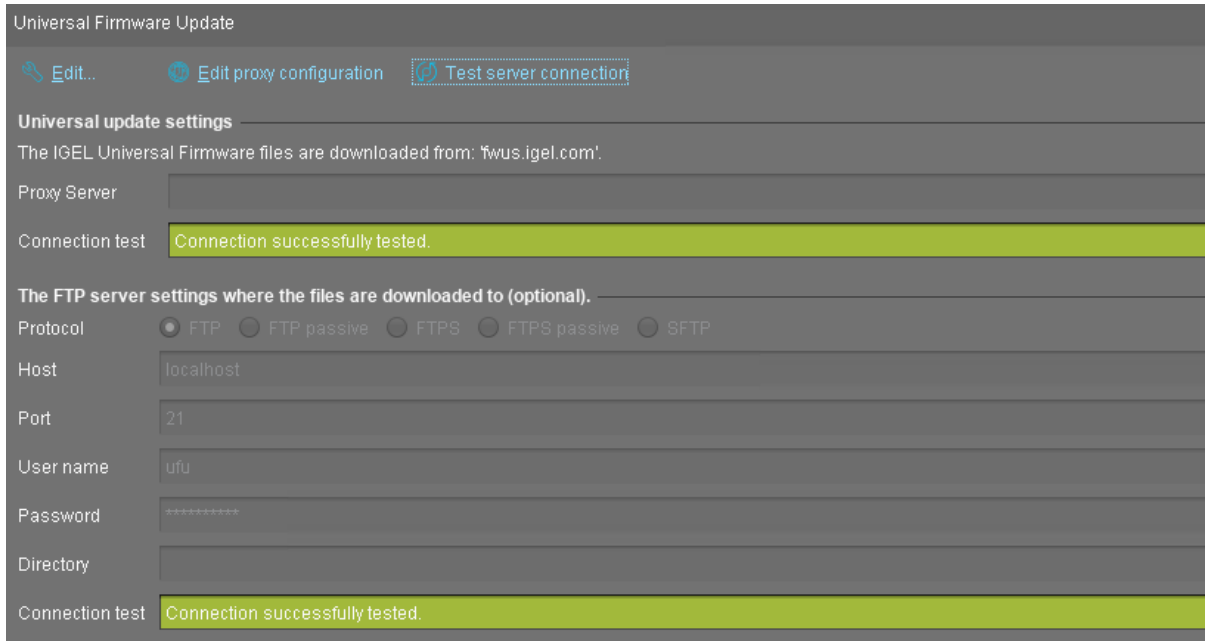
To configure an FTP server as update source:

1. In the UMS, go to **UMS Administration > Universal Firmware Update** and click **Edit**.
2. Enter the data required for accessing the FTP server and click **Save**.

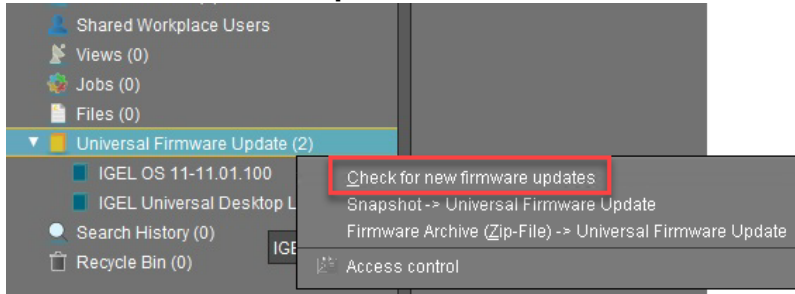



3. Click **Test server connection** to test your settings.

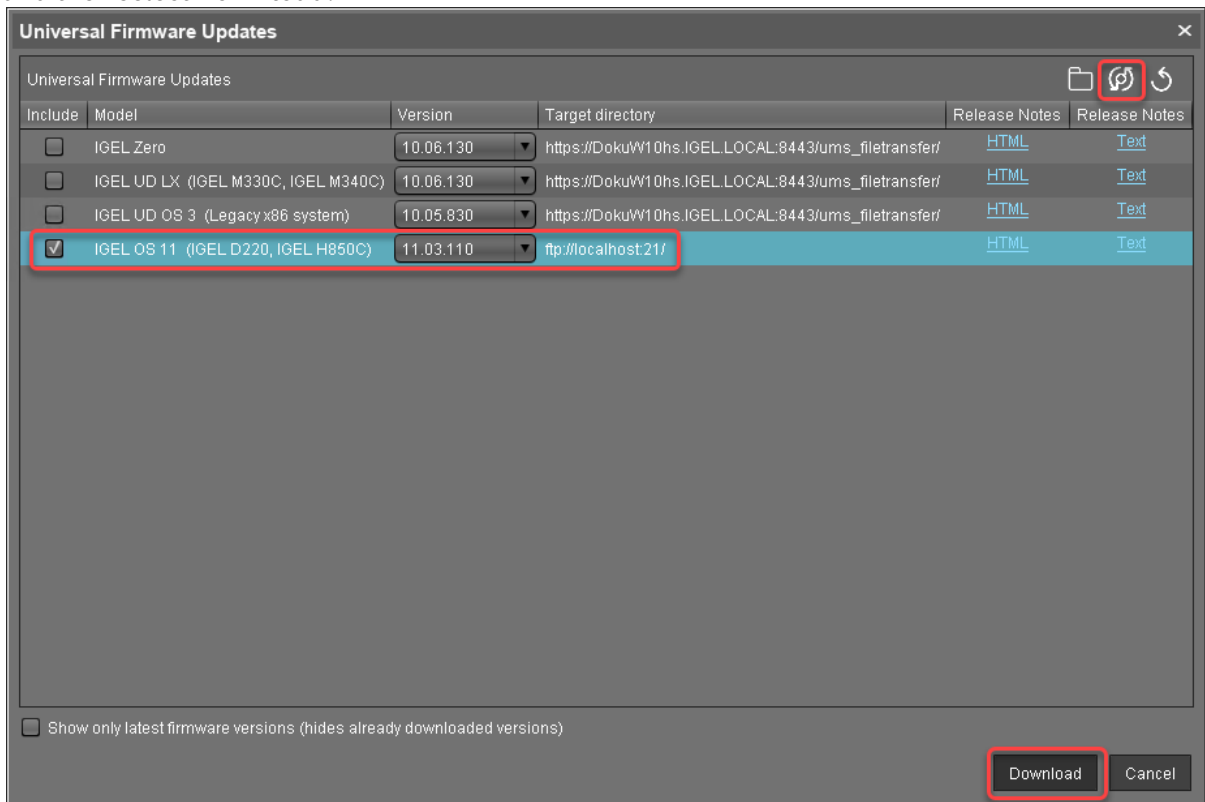
If everything went well, a success message is shown both for the IGEL download server and for the FTP server:



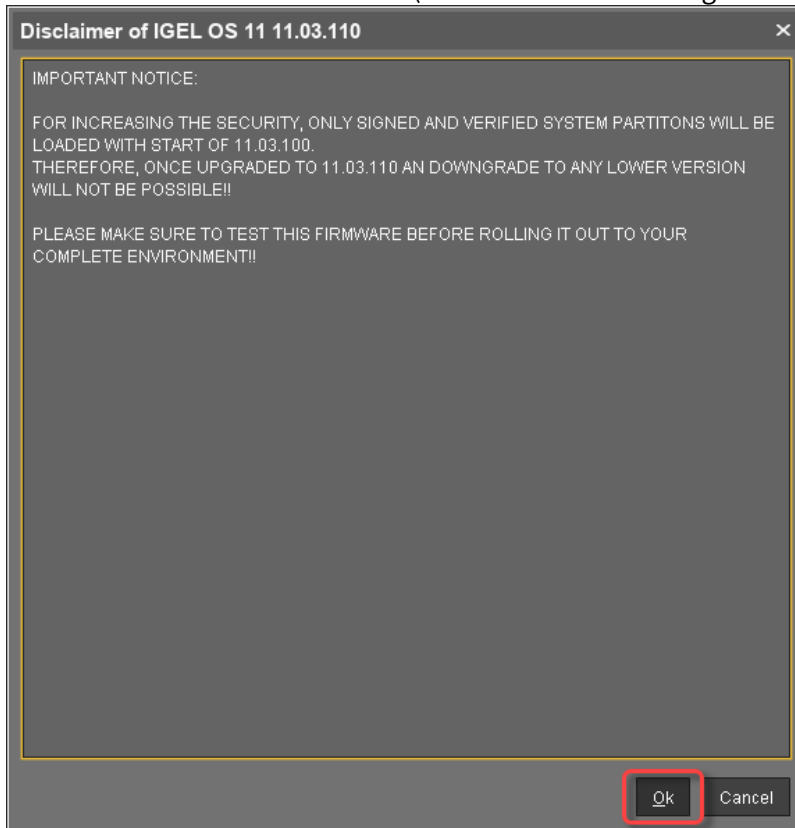
- Go to **Server - [UMS address] > Universal Firmware Update** and in the context menu, select **Check for new firmware updates**.



- Select the entry for the IGEL OS 11 firmware, click  to select the FTP server selected in step 2 and then select **Download**.

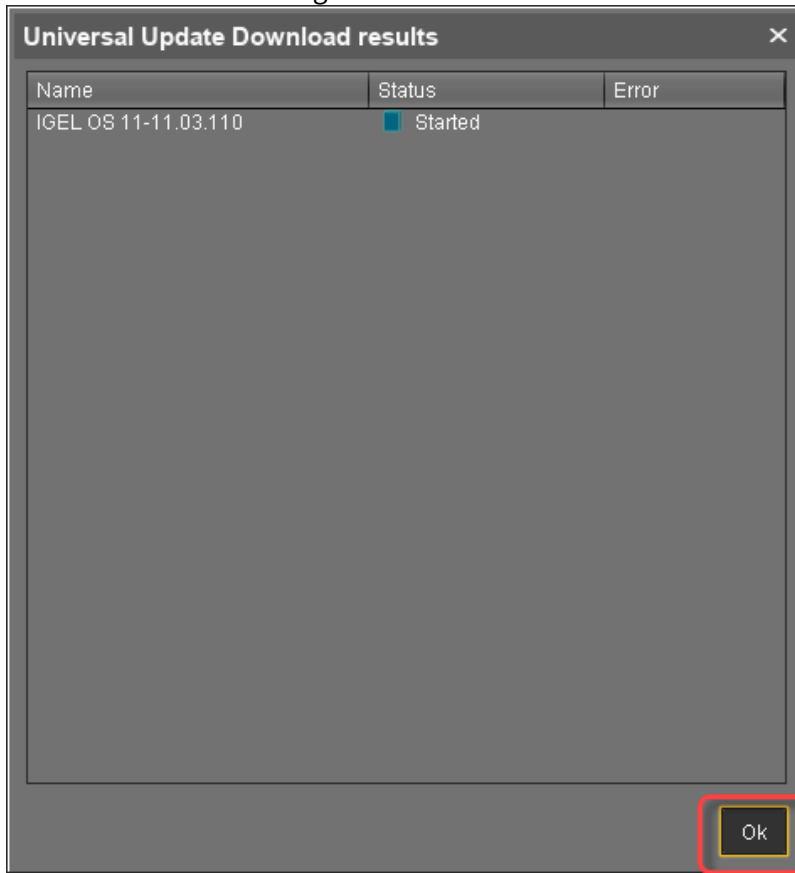


6. Read and confirm the disclaimer. (IGEL OS 11.03.100 or higher only)





7. Confirm the status message.



The firmware is transferred to the FTP server. In the main window, you can monitor the download process.

/Universal Firmware Update/IGEL OS 11-11.03.110

Product

Version

Release Notes [HTML](#) [Text](#)

**Firmware Update Settings**

User

Password

Host



Port

Protocol

Target URL

Snapshot file

**Download Status**

Status  Started  Download the firmware update...

Error

When the status is **Finished**, your Universal Firmware Update is ready for use.

/Universal Firmware Update/IGEL OS 11-11.03.110

Product	IGEL OS 11
Version	11.03.110
Release Notes	<a href="#">HTML Text</a>
<b>Firmware Update Settings</b>	
User	ufu
Password	*****
Host	localhost
Port	21
Protocol	FTP
Target URL	IGEL_OS_11-11.03.110
Snapshot file	
<b>Download Status</b>	
Status	OK  Finished
Error	

### Check List

- ✔ The Universal Firmware Update has been created successfully.

### Next Step

>> [Creating an Upgrade Profile \(see page 36\)](#)

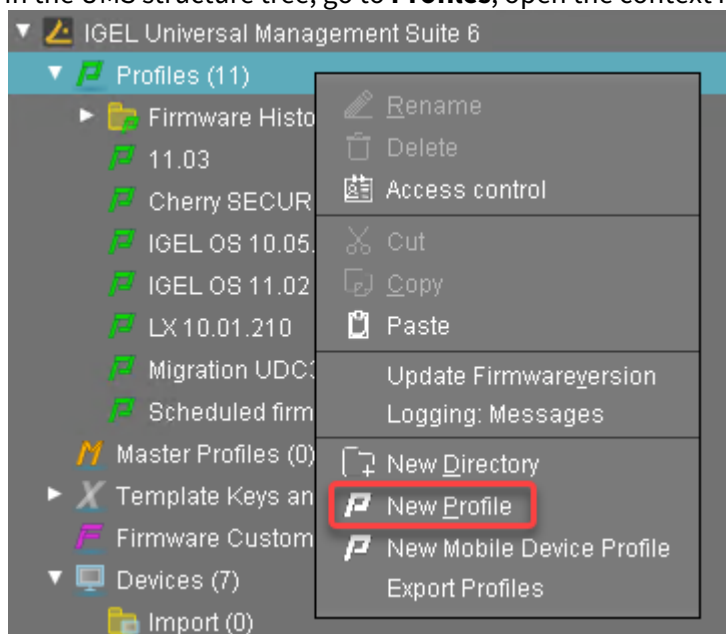
## Creating an Upgrade Profile

The upgrade profile varies, depending on whether the devices are in the same network as the UMS or connected via ICG. Choose the appropriate procedure:

- [For Devices that Are in the UMS Network](#) (see page 36)
- [For Devices that Are Connected via ICG](#) (see page 40)

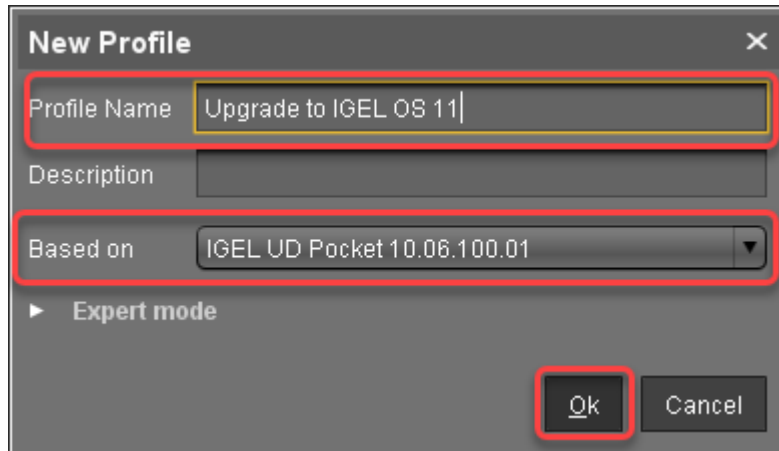
### For Devices That Are in the UMS Network

1. In the UMS structure tree, go to **Profiles**, open the context menu and select **New Profile**.

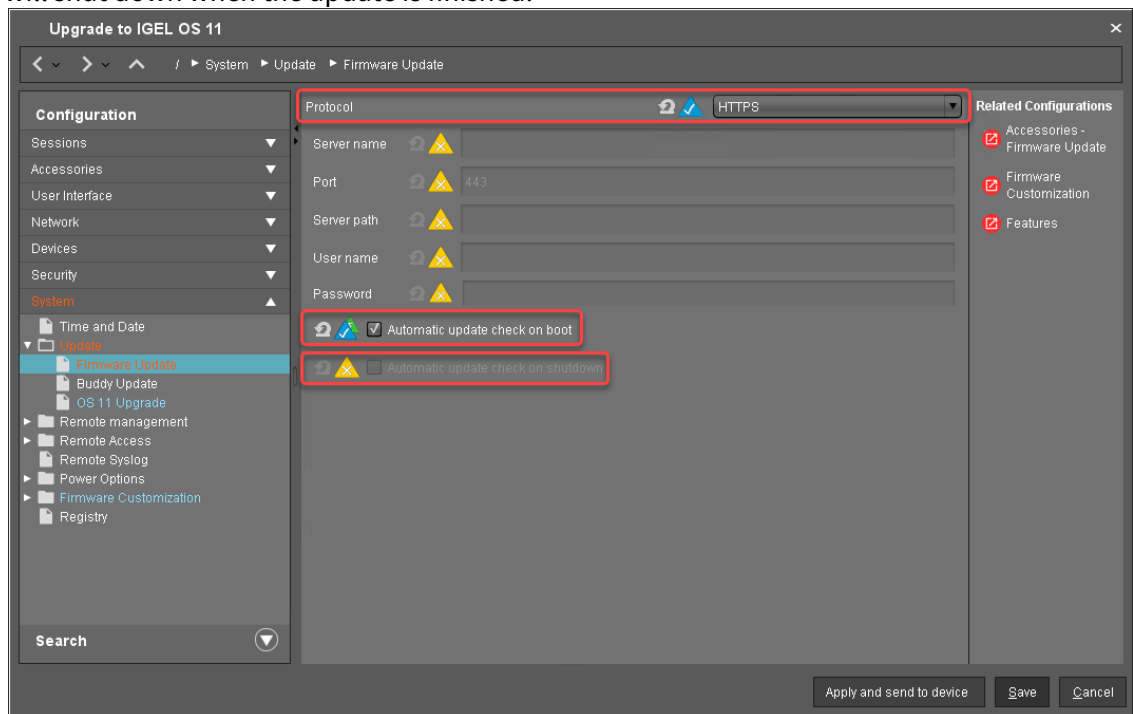


2. Enter the following data:
  - **Profile Name:** Name for the profile, e. g. "Upgrade to IGEL OS 11".
  - **Description:** Optional description for the profile.
  - **Based on:** Firmware version for the profile; select the current firmware of your devices, that is, "IGEL UD Pocket 10.06.100".

- Click **Ok**.

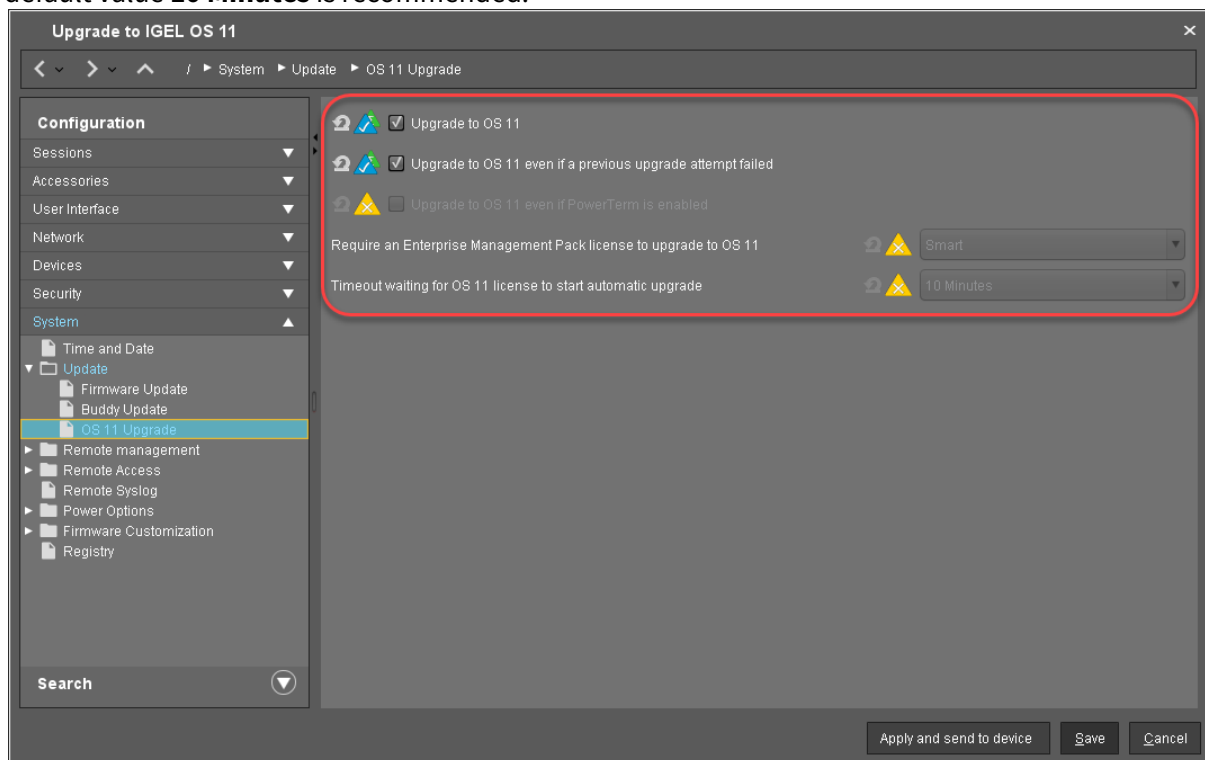


- Go to **System > Update > Firmware Update** and change the settings as follows:
  - Select "HTTPS" as the **Protocol**.
  - Activate **Automatic update check on boot**.
  - Ensure that **Automatic update check on shutdown** is deactivated. Otherwise, the device will shut down when the update is finished.

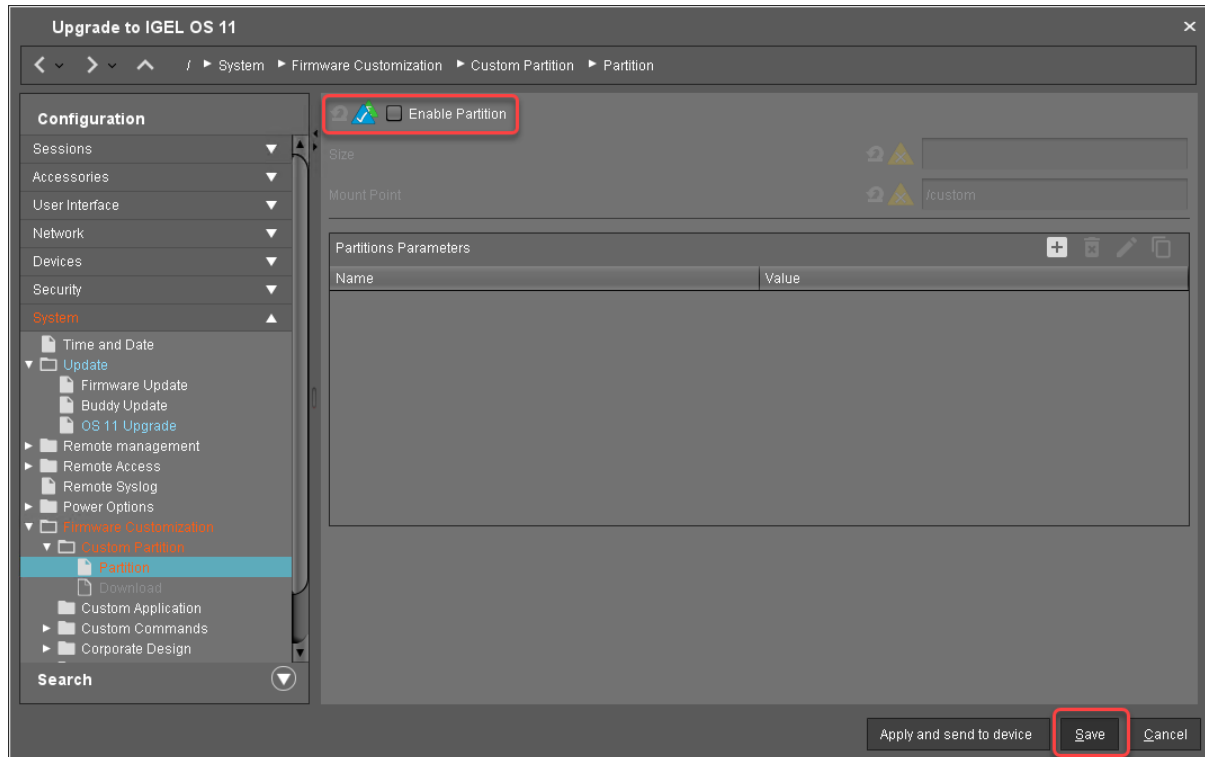


- Go to **System > Update > Firmware Update > OS 11 Upgrade**.
- Activate **Upgrade to OS 11**.
- Make the following settings according to your needs:
  - If you want the device to retry the upgrade immediately after a failed attempt, activate **Upgrade to OS 11 even if a previous upgrade attempt failed**. With this setting, the device will retry the upgrade 5 times. When the 5th attempt has failed, a message will be shown in the upgrade tool window.

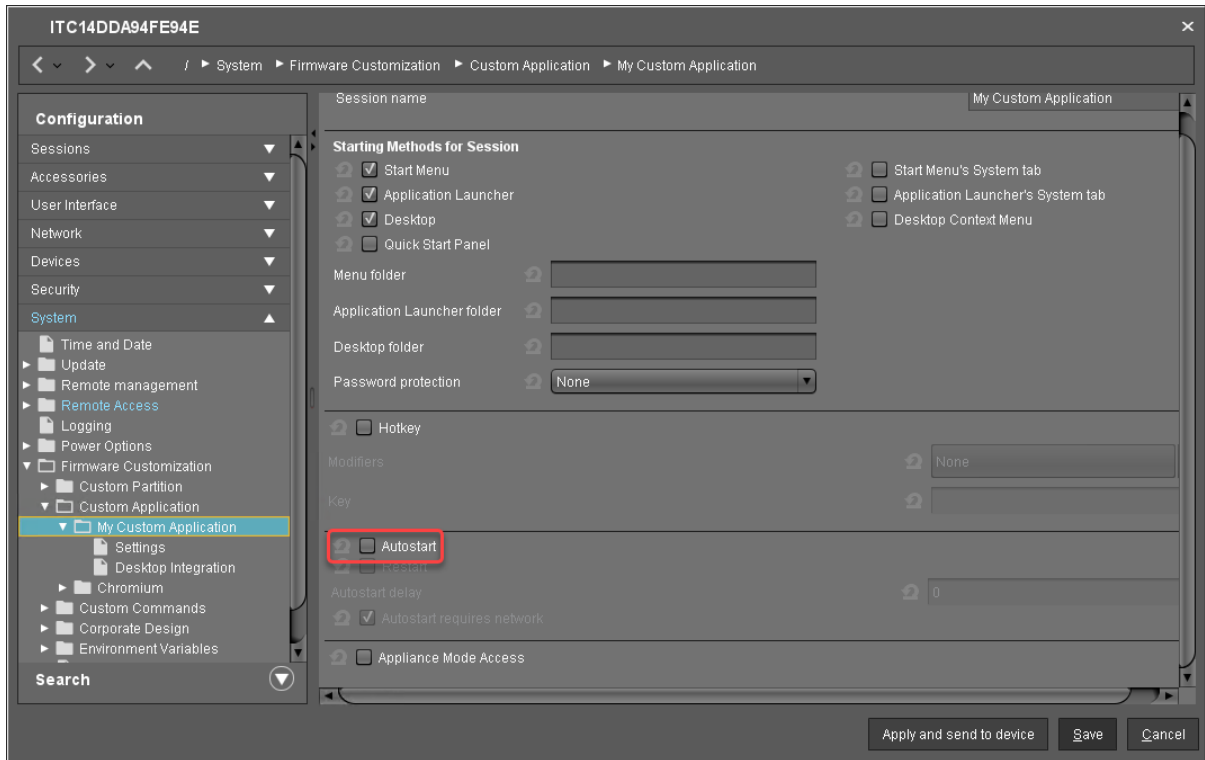
- If your device has a PowerTerm license, and you want to upgrade to IGEL OS 11 even though IGEL OS 11 does not support PowerTerm, you must activate **Upgrade to OS 11 even if PowerTerm is enabled**.
  - Under **Require an Enterprise Management Pack license to upgrade to OS 11**, select the appropriate option:
    - If you are using IGEL Cloud Gateway (ICG) or Shared Workplace (SWP) or a Custom Partition and want to make sure that the upgrade is performed only if these features can be used furthermore, select **Smart**. When **Smart** is selected, and one of these features is activated, the upgrade is performed only if the device succeeded in fetching a license from an Enterprise Management Pack.
    - If you want to force the device to fetch a license from an Enterprise Management Pack and make sure that the upgrade is performed only if this license has been fetched, select **Always**.
    - If you want the device to upgrade to IGEL OS 11 without fetching a license from an Enterprise Management Pack, disregarding the features, select **Never**.
8. Under **Timeout waiting for OS 11 license to start automatic upgrade**, set the time period the device will wait for a license in a mass deployment scenario. This setting prevents the device from starting the upgrade at an inappropriate time as a result of the license just being deployed. This way, the setting prevents unwanted interruptions at work. For a mass deployment scenario, the default value **10 Minutes** is recommended.



9. If you have a Custom Partition, go to **Firmware Customization > Custom Partition > Partition** and deactivate **Enable Partition**.



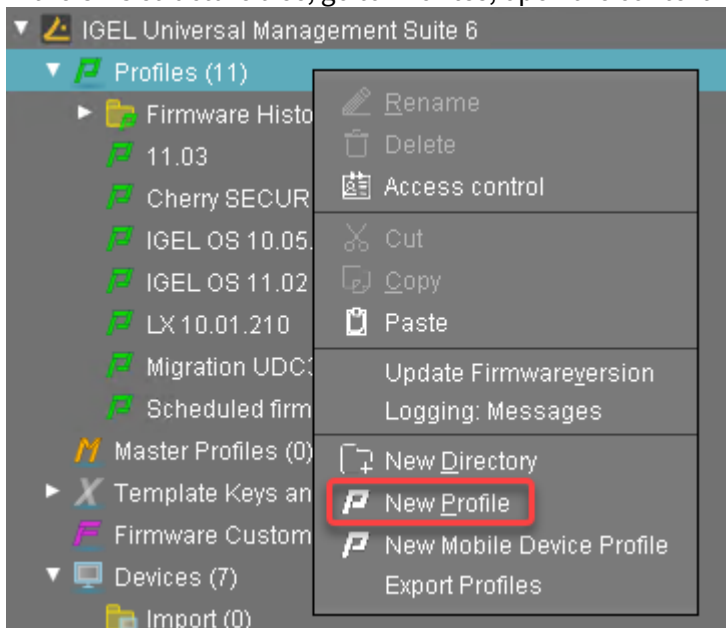
10. If you have custom applications, go to **Firmware Customization > Custom Application** and, for each custom application, deactivate **Autostart**. This is to prevent the custom application from interfering with the device's system before it can be tested properly.



11. Click **Save**.

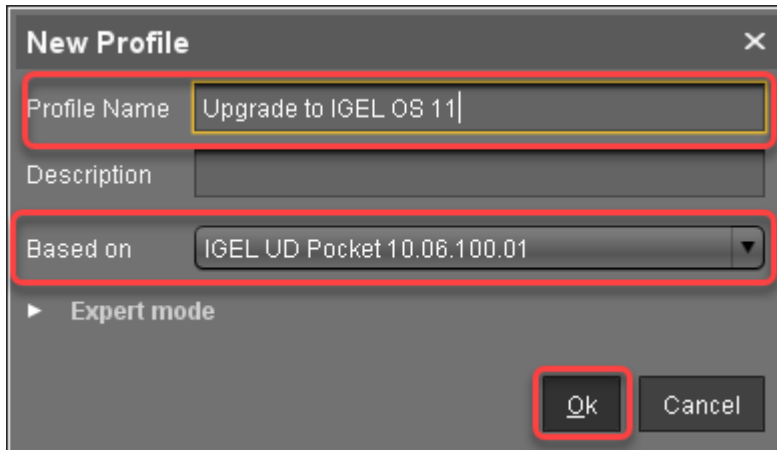
For Devices That Are Connected via ICG

1. In the UMS structure tree, go to **Profiles**, open the context menu and select **New Profile**.





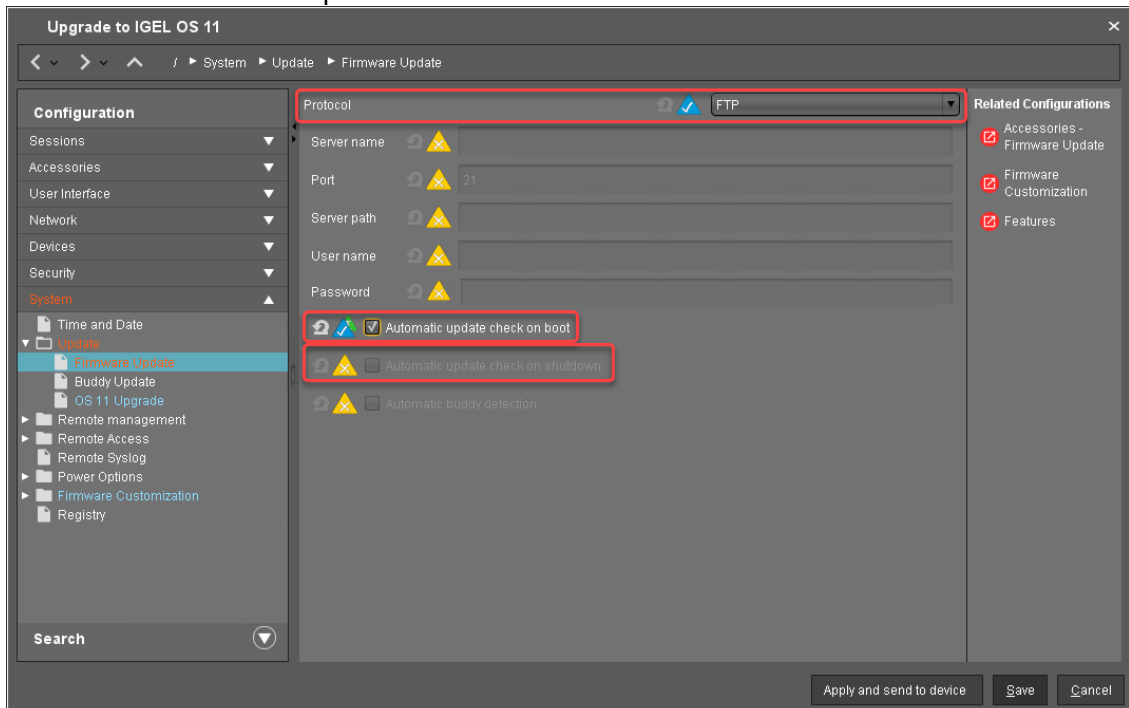
2. Enter the following data:
  - **Profile Name:** Name for the profile, e. g. "Upgrade to IGEL OS 11".
  - **Description:** Optional description for the profile.
  - **Based on:** Firmware version for the profile; select the current firmware of your devices, that is, "IGEL UD Pocket 10.06.100".
3. Click **Ok**.



The screenshot shows a 'New Profile' dialog box with the following fields and settings:

- Profile Name:** Upgrade to IGEL OS 11
- Description:** (Empty)
- Based on:** IGEL UD Pocket 10.06.100.01
- Expert mode:** (Expanded)
- Buttons:** Ok, Cancel

4. Go to **System > Update > Firmware Update** and change the settings as follows:
  - Select "FTP" as Protocol.
  - Activate **Automatic update check on boot**.
  - Ensure that **Automatic update check on shutdown** is deactivated. Otherwise, the device will shut down when the update is finished.



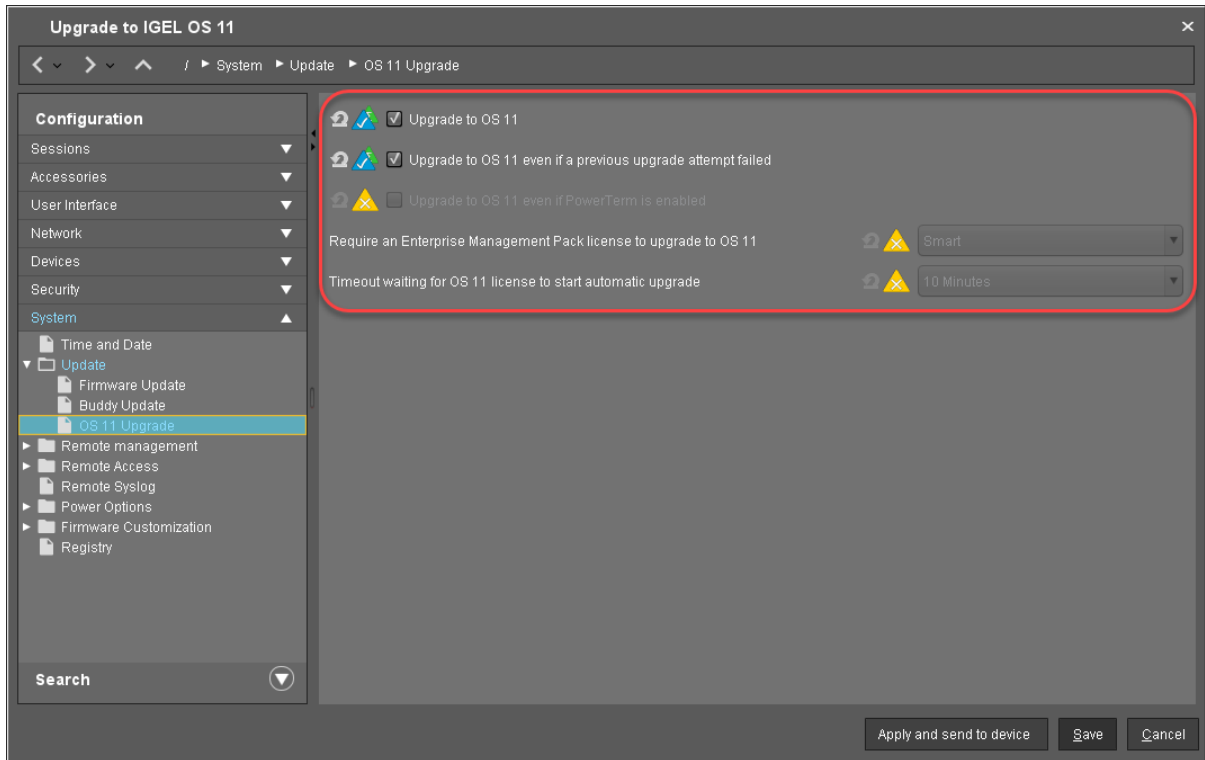
The screenshot shows the 'Upgrade to IGEL OS 11' configuration window with the following settings:

- Protocol:** FTP
- Server name:** (Warning icon)
- Port:** 21 (Warning icon)
- Server path:** (Warning icon)
- User name:** (Warning icon)
- Password:** (Warning icon)
- Automatic update check on boot:**
- Automatic update check on shutdown:**
- Automatic buddy detection:**
- Buttons:** Apply and send to device, Save, Cancel

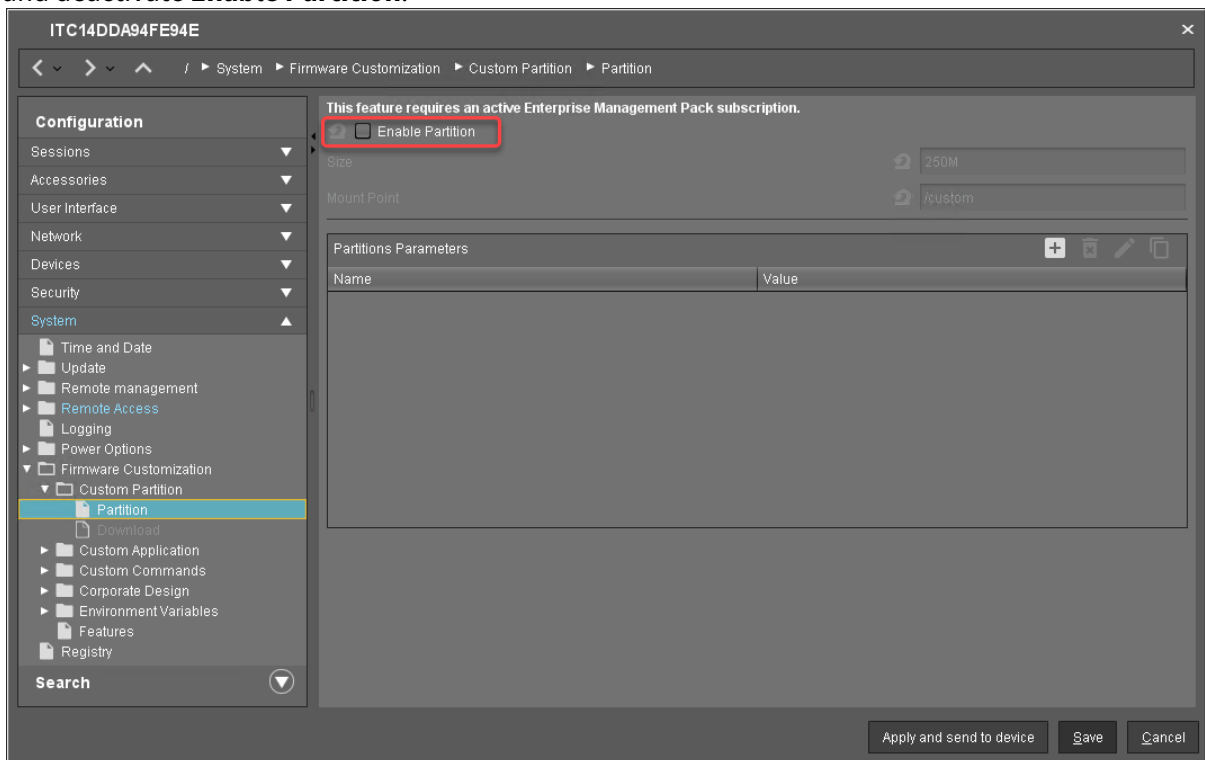
5. Go to **System > Update > Firmware Update > OS 11 Upgrade**.
6. Activate **Upgrade to OS 11**.

7. Make the following settings according to your needs:
  - If you want the device to retry the upgrade immediately after a failed attempt, activate **Upgrade to OS 11 even if a previous upgrade attempt failed**. With this setting, the device will retry the upgrade 5 times. When the 5th attempt has failed, a message will be shown in the upgrade tool window.
  - If your device has a PowerTerm license, and you want to upgrade to IGEL OS 11 even though IGEL OS 11 does not support PowerTerm, you must activate **Upgrade to OS 11 even if PowerTerm is enabled**.
  - Under **Require an Enterprise Management Pack license to upgrade to OS 11**, select the appropriate option:
    - If you are using IGEL Cloud Gateway (ICG) or Shared Workplace (SWP) or a Custom Partition and want to make sure that the upgrade is performed only if these features can be used furthermore, select **Smart**. When **Smart** is selected, and one of these features is activated, the upgrade is performed only if the device succeeded in fetching a license from an Enterprise Management Pack.
    - If you want to force the device to fetch a license from an Enterprise Management Pack and make sure that the upgrade is performed only if this license has been fetched, select **Always**.
    - If you want the device to upgrade to IGEL OS 11 without fetching a license from an Enterprise Management Pack, disregarding the features, select **Never**.
8. Under **Timeout waiting for OS 11 license to start automatic upgrade**, set the time period the device will wait for a license in a mass deployment scenario. This setting prevents the device from starting the upgrade at an inappropriate time as a result of the license just being deployed. This way, the setting prevents unwanted interruptions at work. For a mass deployment scenario, the

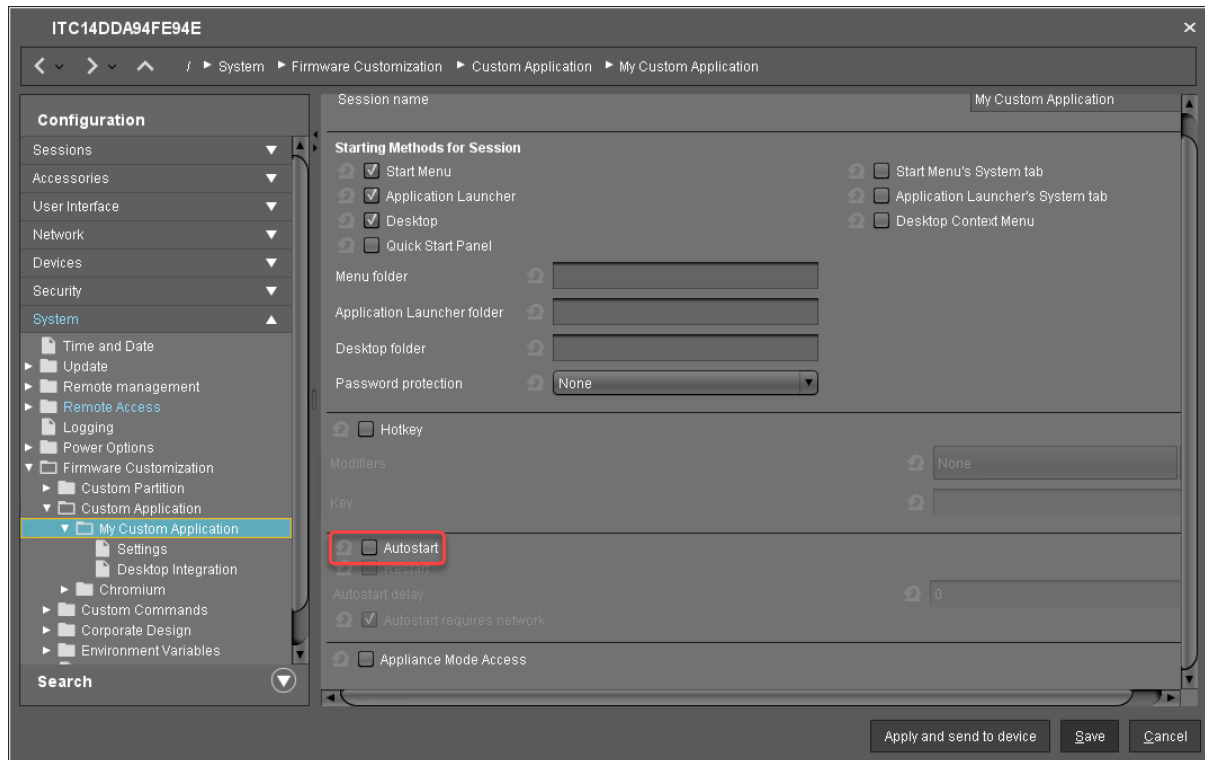
default value **10 Minutes** is recommended.



9. If you have a Custom Partition, go to **Firmware Customization > Custom Partition > Partition** and deactivate **Enable Partition**.



10. If you have custom applications, go to **Firmware Customization > Custom Application** and, for each custom application, deactivate **Autostart**. This is to prevent the custom application from interfering with the device's system before it can be tested properly.



11. Click **Save**.

## Check List

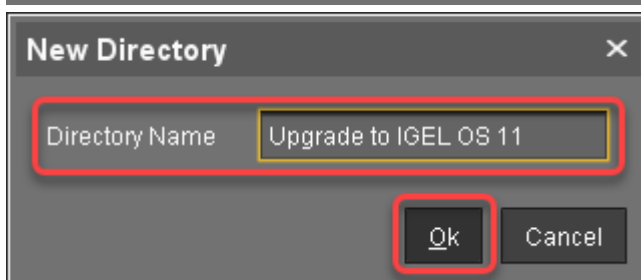
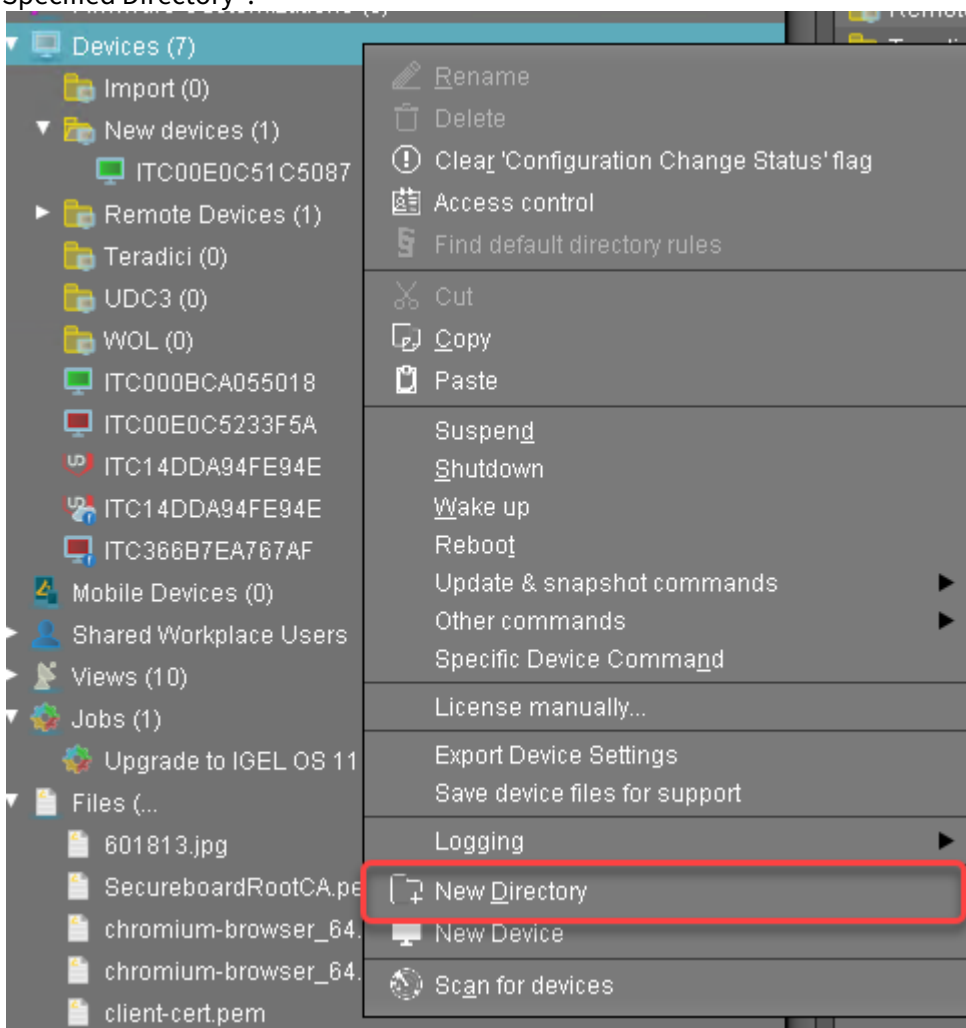
- ✔ The upgrade profile is configured properly for your needs.

## Next Step

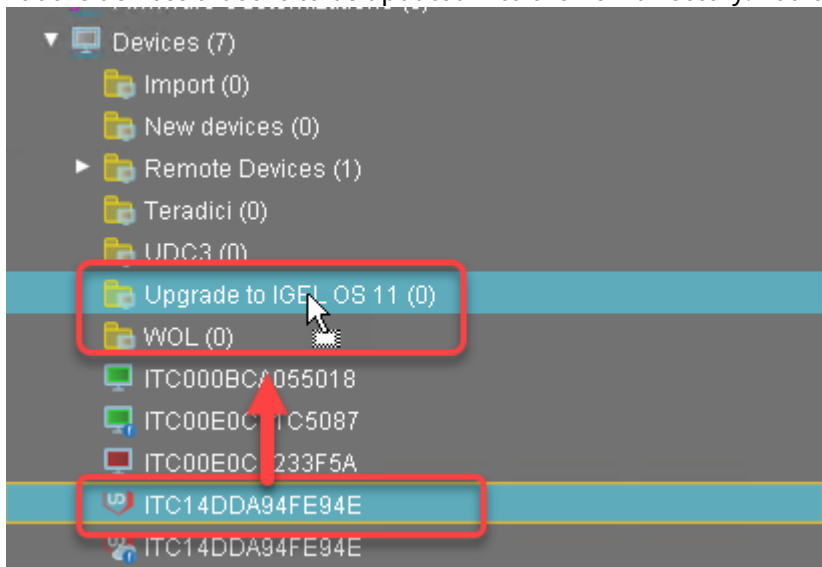
>> [Assigning the Upgrade Profile and the Universal Firmware Update to the Test Devices](#) (see page 45)

## Assigning the Upgrade Profile and the Universal Firmware Update to the Test Devices

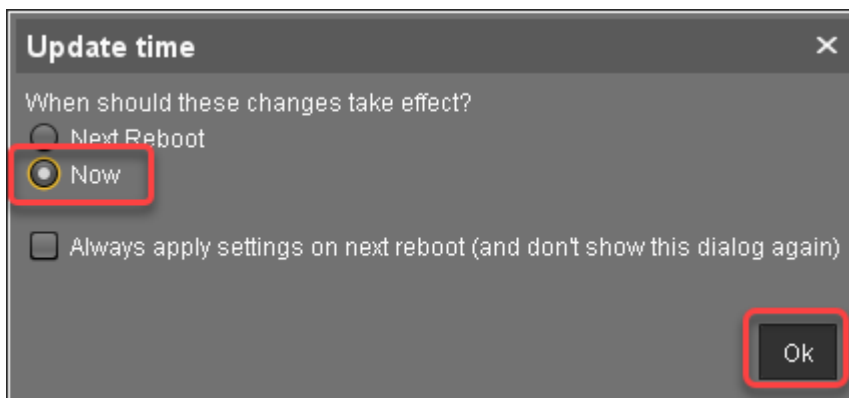
1. If you have not already created a directory as a distribution condition while setting up Automatic License Deployment (ALD): In the **Devices** node of the UMS structure tree, create a directory and name it "Upgrade to IGEL OS 11", for instance. For more information about distribution conditions, see [Configuring the Distribution Conditions](#), section "Distributing Licenses to Devices in a Specified Directory".



- Put the devices that are to be updated into the new directory. You can use drag & drop.



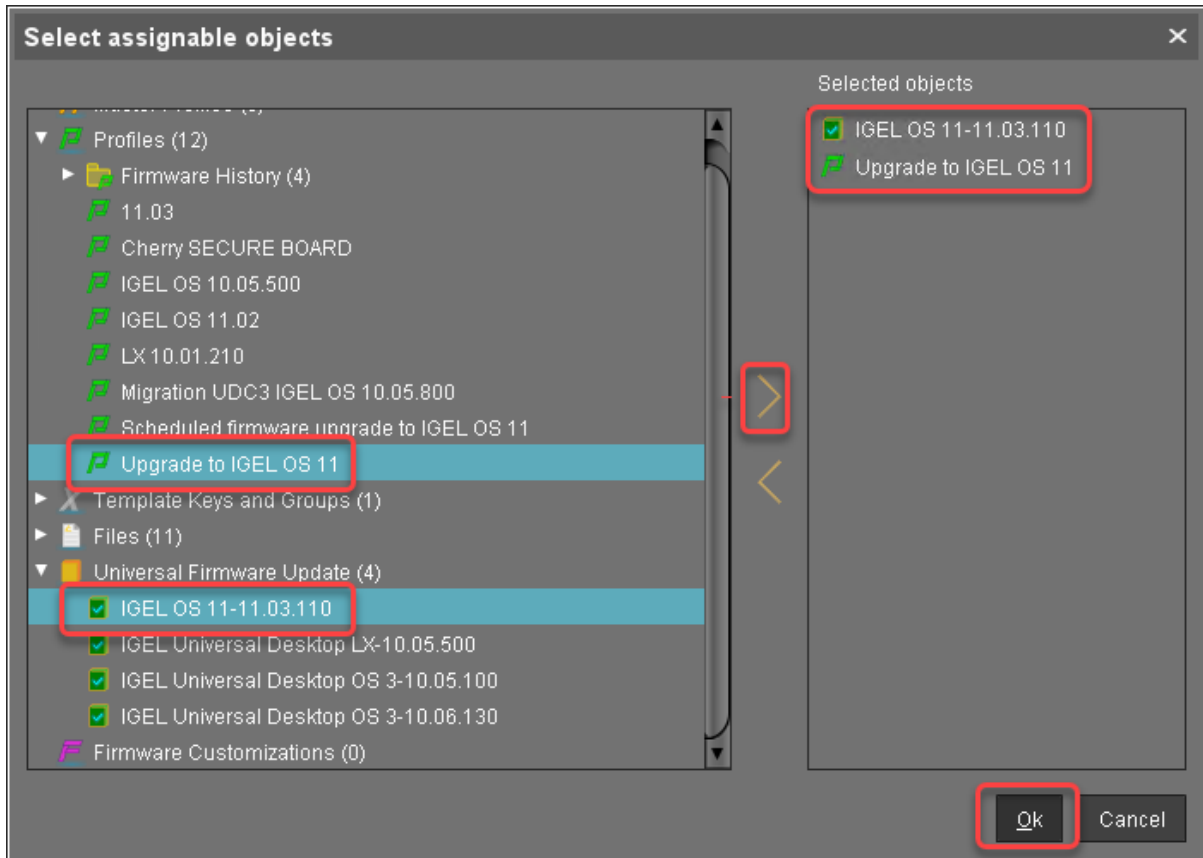
- In the **Update time** dialog, select **Now** and click **Ok**.  
The directory change is communicated immediately to the device.



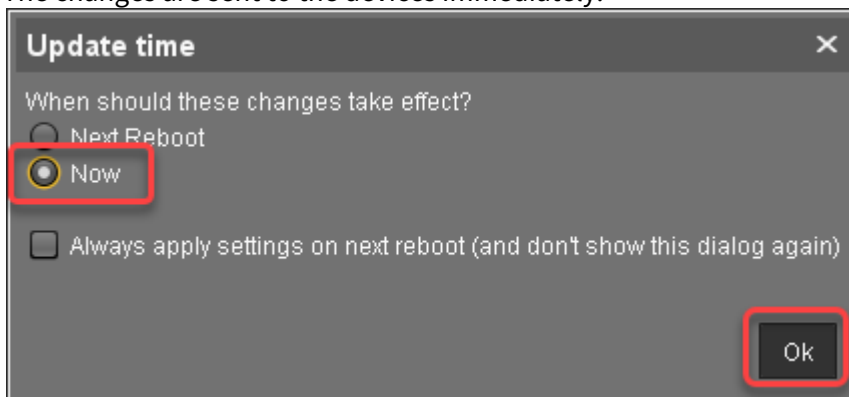
- Select the directory and in the **Assigned objects** area, click .



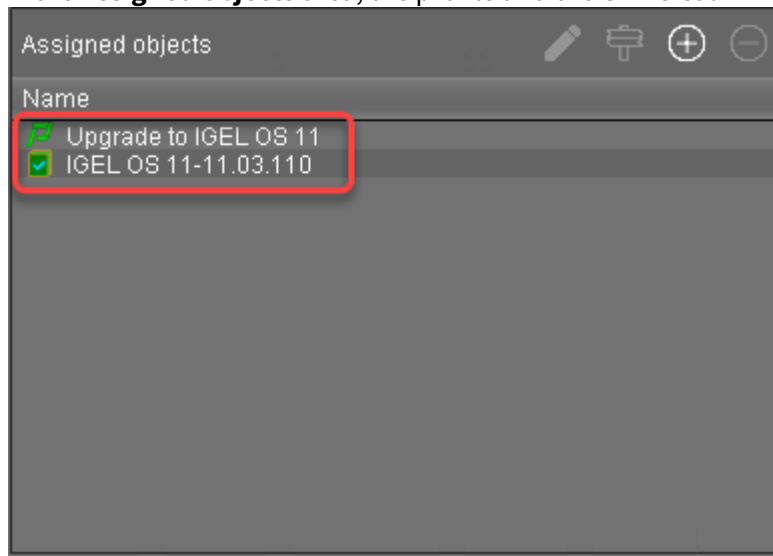
5. Assign the upgrade profile and the Universal Firmware Update for IGEL OS 11.03 to the directory and click **Ok**.




6. In the **Update time** dialog, select **Now** and click **Ok**.  
The changes are sent to the devices immediately.



In the **Assigned objects** area, the profile and the Universal Firmware Update are shown:



-  If you are using Automatic License Deployment (ALD), it might be feasible to confine the distribution of licenses to the current directory. For more information, see [Configuring the Distribution Conditions](#), section "Distributing Licenses to Devices in a Specified Directory".

### Check List

-  The test devices are in a directory to which the upgrade profile and the Universal Firmware Update are assigned.

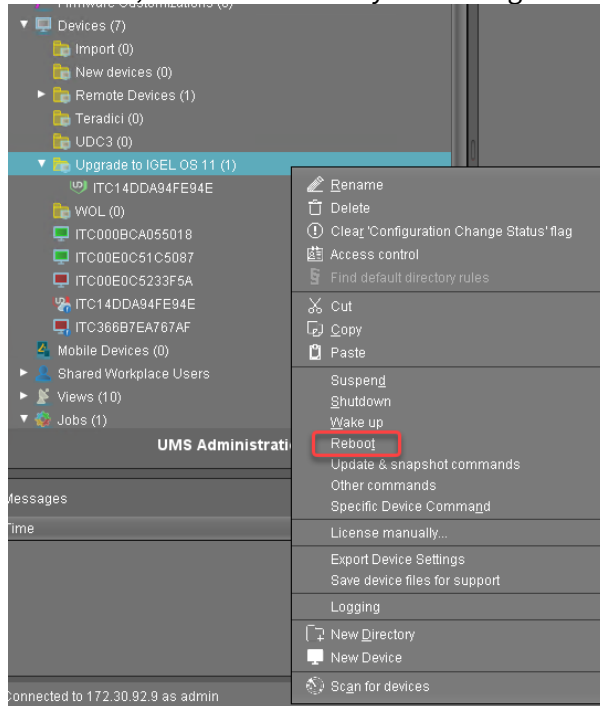
### Next Step

>> [Testing the Upgrade](#) (see page 49)

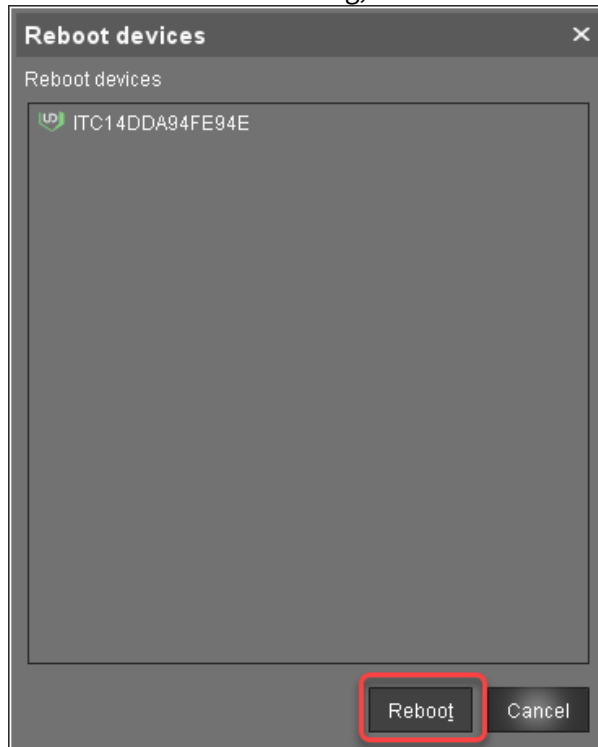


## Testing the Upgrade

1. In the UMS, select the directory containing the test devices and select **Reboot**.



2. In the **Reboot devices** dialog, click **Reboot**.



If no IGEL OS 11 licenses have been deployed on the devices yet, the licenses are deployed within a few minutes. The upgrade will be started when the licenses are deployed. The maximum time period the device will wait for a license is configured by the parameter **Timeout waiting for OS 11 license to start automatic upgrade**; for details, see [Creating an Upgrade Profile \(see page 36\)](#), step 8.

The parameter **Automatic update check on boot** makes the devices look for new firmware again. Although two Universal Firmware Updates are assigned to the devices, the UMS offers the IGEL OS 11 firmware, because the ID of the IGEL OS 11 firmware is higher than the ID of the IGEL OS 10 firmware.

The upgrade is completed.

3. Check whether all features and functions of your test devices are working as expected.

### Check List

- ✔ All features and functions of your test devices are working as expected.

### Next Step

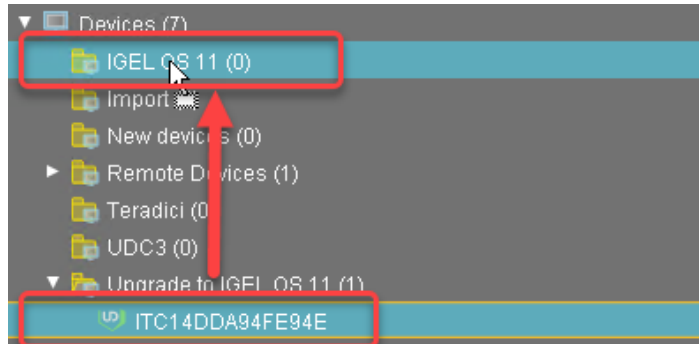
>> [Unassigning the Upgrade Profile and the Universal Firmware Update \(see page 51\)](#)

## Unassigning the Upgrade Profile and the Universal Firmware Update

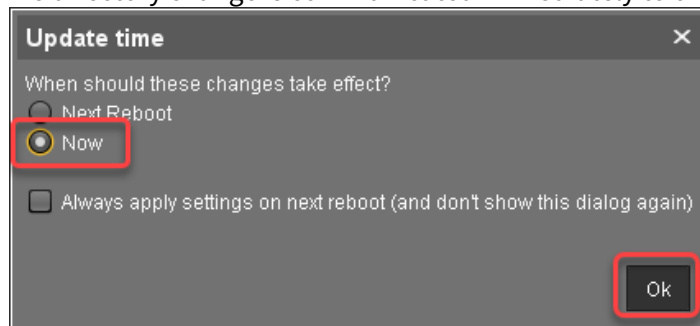
The upgrade profile and the Universal Firmware Update should be unassigned from the devices after they have been upgraded to IGEL OS 11 successfully.

To unassign upgrade profile and the Universal Firmware Update:

1. Move the devices to a different folder.



2. In the **Update time** dialog, select **Now** and click **Ok**.  
The directory change is communicated immediately to the devices.



If a device had a Custom Partition before, it will be downloaded by the device and activated again.

### Check List

If a device had a Custom Partition before:

- ✔ The Custom Partition has been downloaded by the device and activated.

### Next Step

If some devices have a Custom Partition:

>> [If Applicable: Restoring Custom Partition and Custom Application](#) (see page 52)

If no device has a Custom Partition:

>> [Upgrading All Devices](#) (see page 53)

## If Applicable: Restoring Custom Partition and Custom Applications

If a device had a custom partition before the upgrade, it has been downloaded and activated again after the upgrade profile has been unassigned; see [Unassigning the Upgrade Profile and the Universal Firmware Update \(see page 51\)](#). It cannot be ruled out that custom commands and the applications and drivers of a Custom Partition disturb your device's system. Therefore, it is very important to check the Custom Partition, the custom applications, and the device's basic functionality.

1. Test the Custom Partition and the custom applications. If errors should occur, modify the Custom Partition and the custom applications accordingly.
2. Check if all other functions are still working properly.

### Check List

- ✔ The Custom Partition and the custom applications are enabled and can be used.
- ✔ All other functions are working properly.

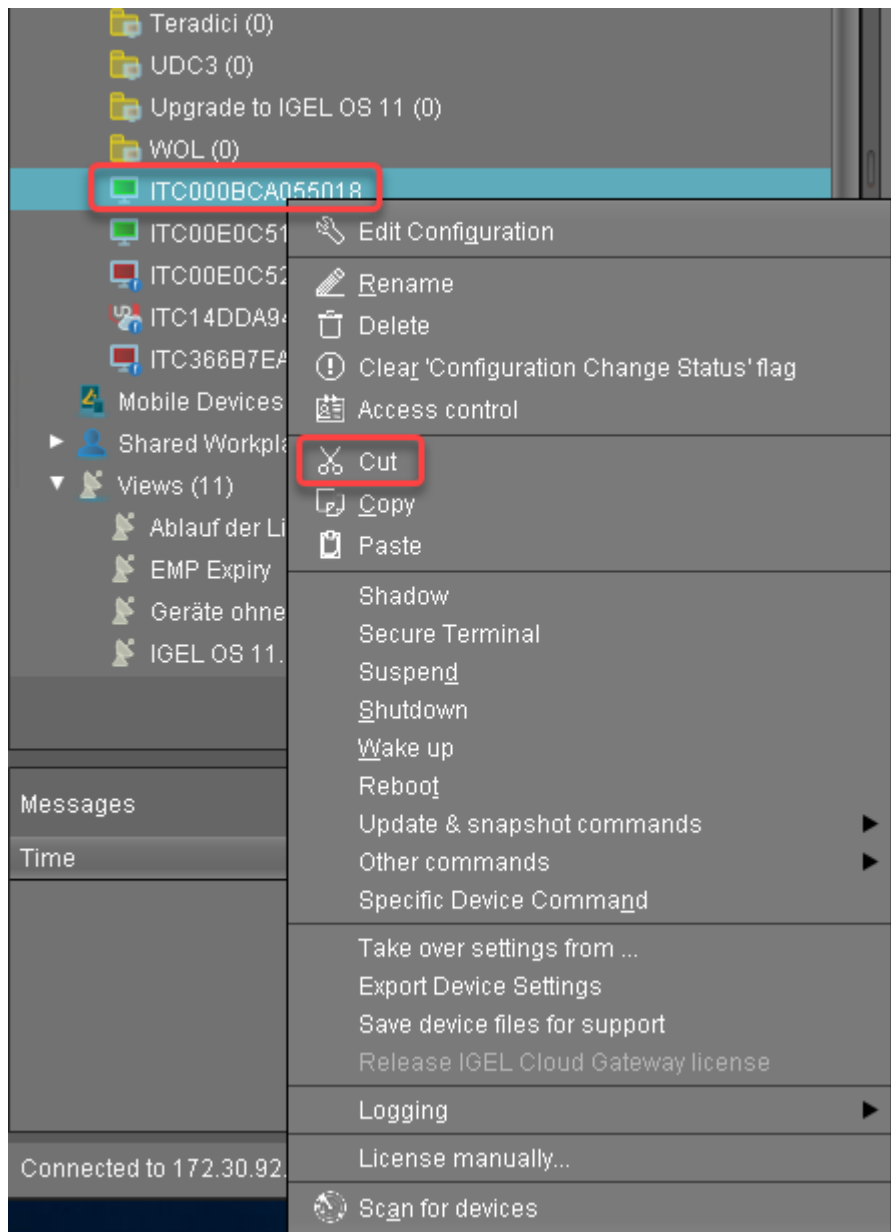
### Next Step

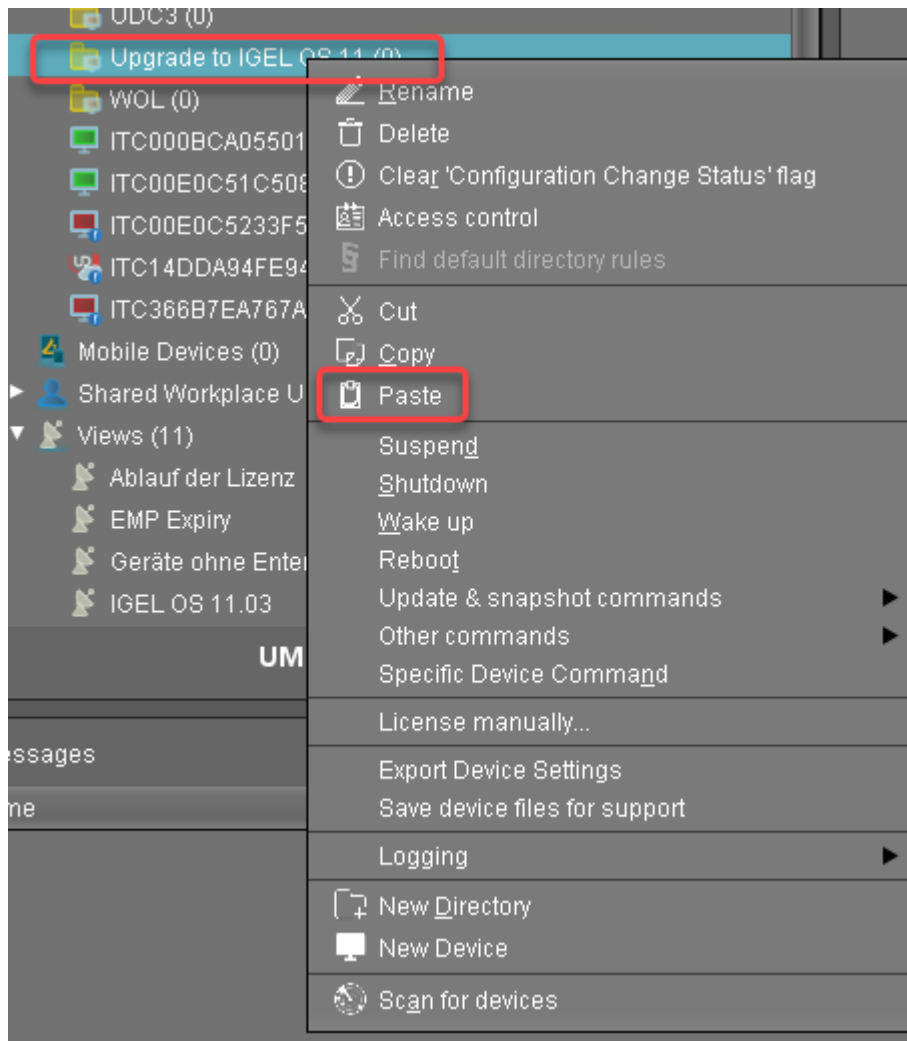
>> [Upgrading All Devices \(see page 53\)](#)

## Upgrading All Devices

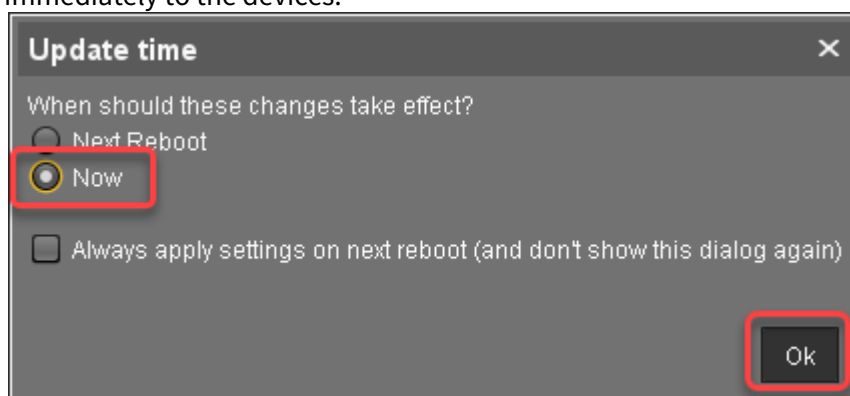
### Assigning the Upgrade Profile and the Universal Firmware Update to the Devices

1. Put the devices that are to be upgraded into the directory you have created for the test devices. It is recommended to use cut and paste.

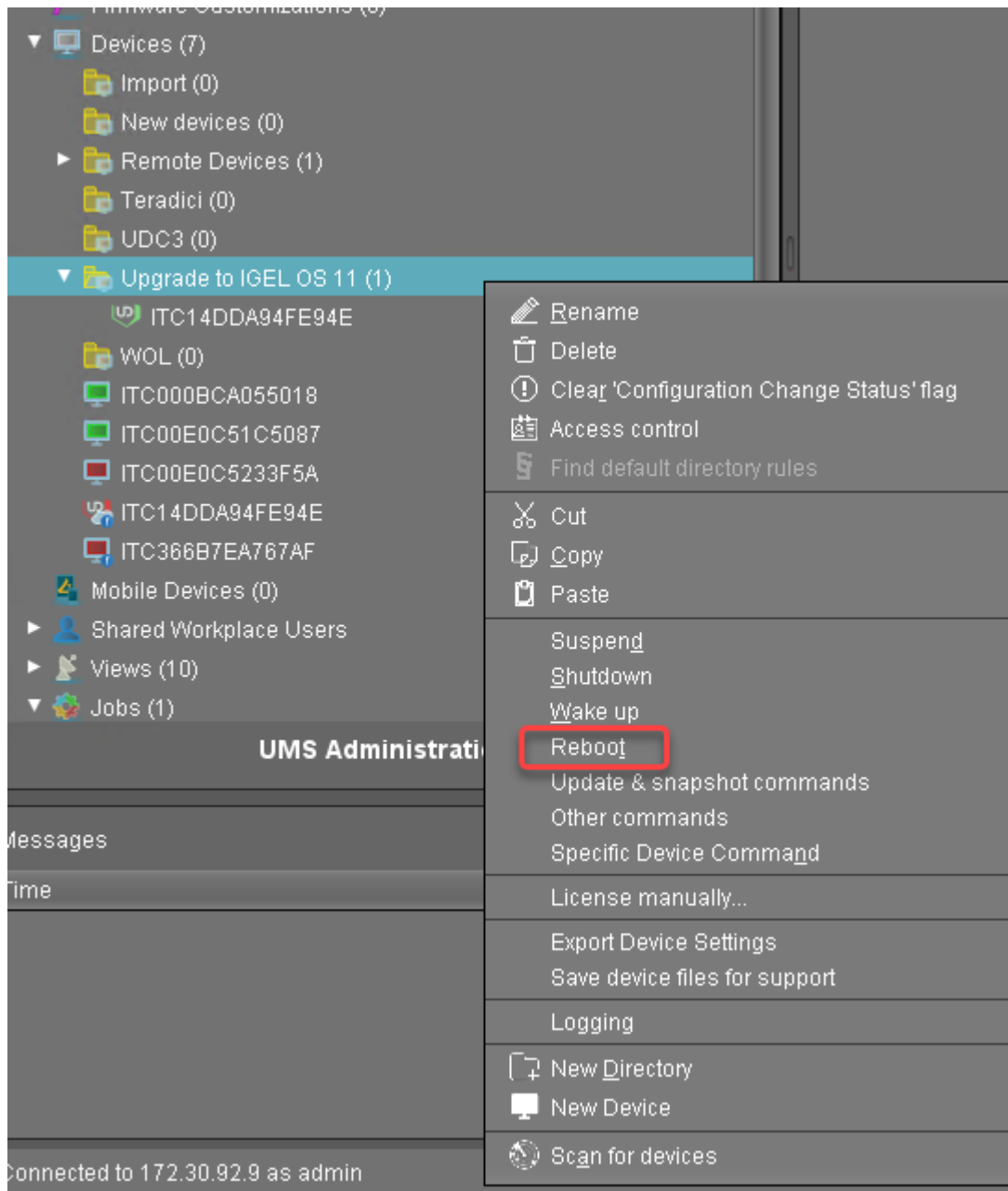




- In the **Update time** dialog, select **Now** and click **Ok**.  
The directory change, the upgrade profile and the Universal Firmware Update are communicated immediately to the devices.



- In the UMS, select the directory with the devices and select **Reboot**.





4. In the **Reboot devices** dialog, click **Reboot**.

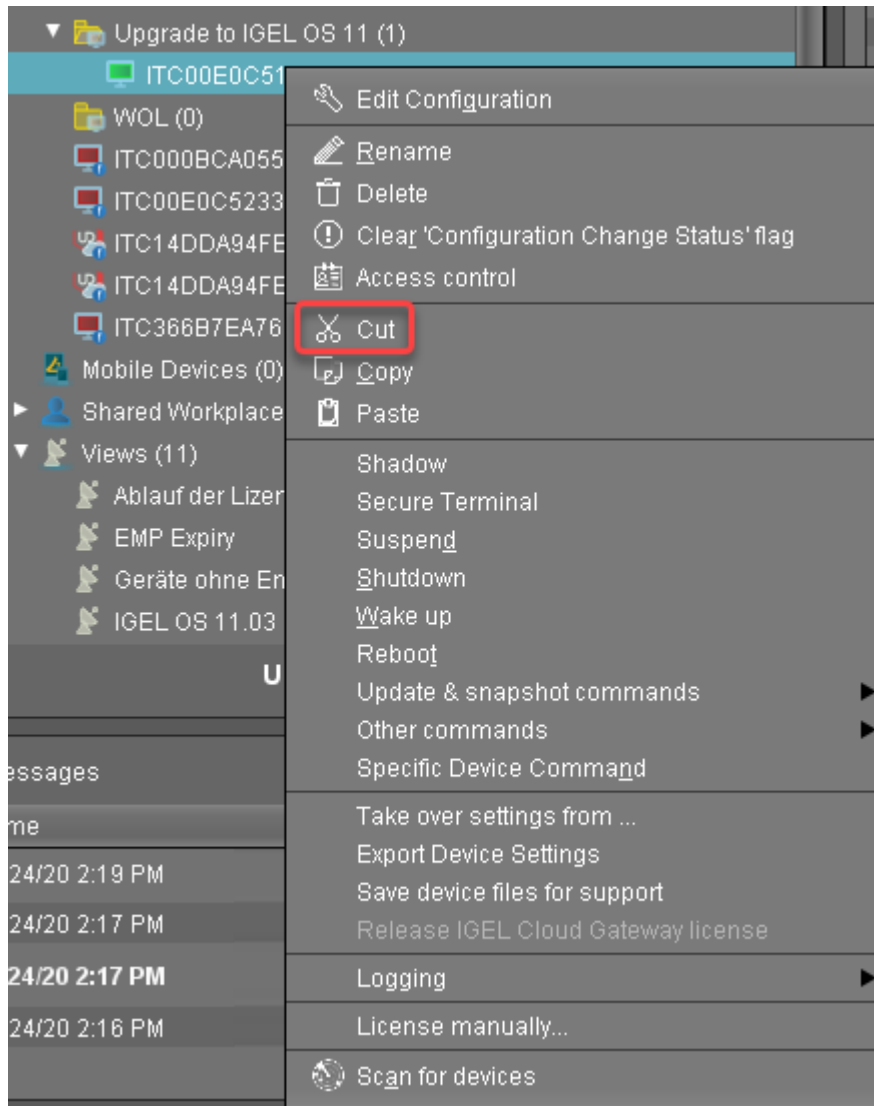


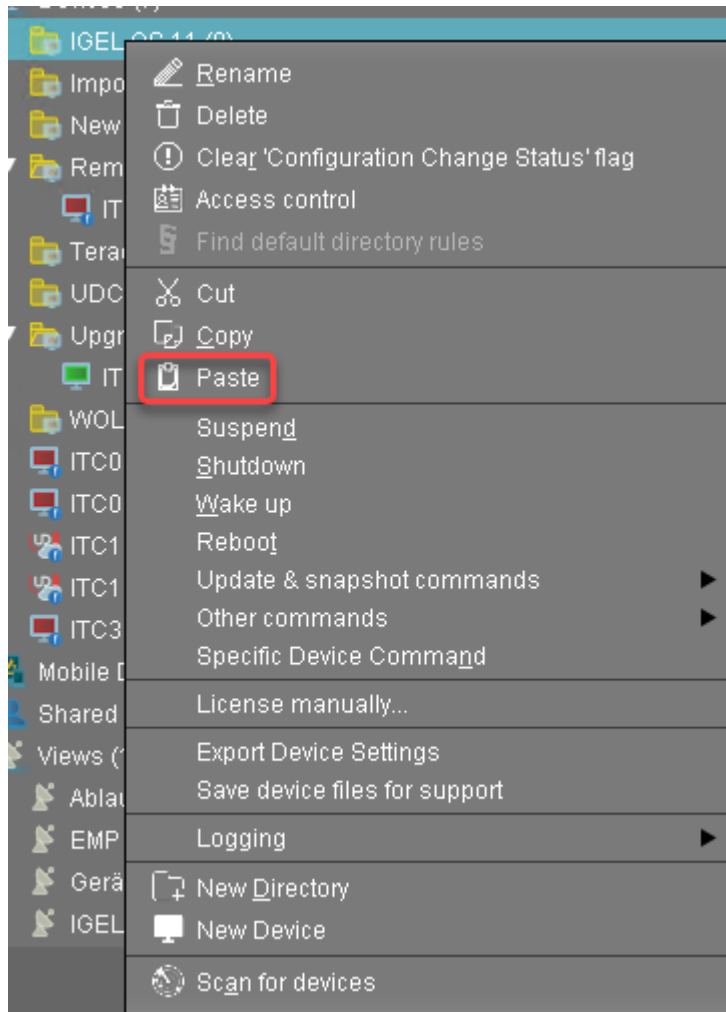
If no IGEL OS 11 licenses have been deployed on the devices yet, the licenses are deployed within a few minutes. The upgrade will be started when the licenses are deployed. The maximum time period a device will wait for a license is configured by the parameter **Timeout waiting for OS 11 license to start automatic upgrade**; for details, see [Creating an Upgrade Profile \(see page 36\)](#), step 8.

The parameter **Automatic update check on boot** makes the devices look for new firmware again. Although two Universal Firmware Updates are assigned to the devices, the UMS offers the IGEL OS 11 firmware, because the ID of the IGEL OS 11 firmware is higher than the ID of the IGEL OS 10 firmware.

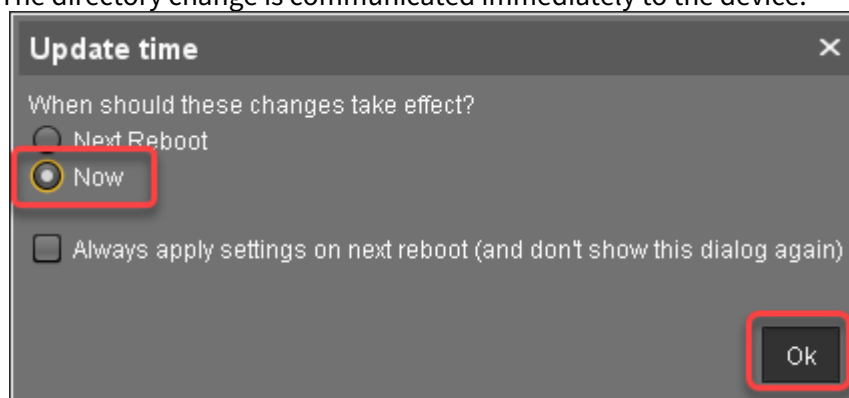
### Unassigning the Upgrade Profile and the Universal Firmware Update

1. To unassign the upgrade profile and the Universal Firmware Update, move the devices to a different folder.





2. In the **Update time** dialog, select **Now** and click **Ok**.  
The directory change is communicated immediately to the device.



If a device had a Custom Partition before the upgrade, it has been downloaded and activated again after the upgrade profile has been unassigned.

3. If applicable, restore the required custom applications; see [If Applicable: Restoring Custom Partition and Custom Applications](#) (see page 52).



### Check List

- ✔ All devices have been upgraded to IGEL OS 11.
- ✔ All required functionality is available, including custom applications.



## Upgrading from IGEL OS 10 to IGEL OS 11

- [Upgrading UDC3 Devices from IGEL OS 10 to IGEL OS 11 \(see page 62\)](#)
- [Upgrading IGEL Devices from IGEL OS 10 to IGEL OS 11 \(see page 151\)](#)

## Upgrading UDC3 Devices from IGEL OS 10 to IGEL OS 11

This document describes how to upgrade any number of devices (UDC3) from IGEL OS 10 to IGEL OS 11.

IGEL OS 10.05.800 or higher is required for upgrading to IGEL OS 11. If you have an older version of IGEL OS 10, you need to update to version 10.05.800 or a higher version first.

Since a new licensing model has been introduced with IGEL OS 11, a license from an IGEL Workspace Edition Product Pack must be available for each device. If you have a valid maintenance for your devices, you can convert your existing UDC3 or UD Pocket Product Packs to Workspace Edition (WE) Product Packs; see [Converting UDC3 or UD Pocket Licenses for Upgrading to IGEL OS 11](#).

The following methods of mass deployment are described here:

- [Zero-Touch Deployment Using Universal Firmware Update](#) (see [page 63](#)): Mass upgrade from any version of IGEL OS 10 to IGEL OS 11 in one step using Universal Firmware Update. This method can be started immediately or as a scheduled job (wake up or reboot).
- [Zero-Touch Deployment Using Buddy Update](#) (see [page 101](#)): Mass upgrade from any version of IGEL OS 10 to IGEL OS 11 in one step using two devices as update buddies. This method can be started immediately or as a scheduled job (wake up or reboot).
- [Zero-Touch Deployment Using a Scheduled Job](#) (see [page 131](#)): Upgrade devices that are already running IGEL OS 10.05.800 (or higher) using a specific scheduled job.

## Zero-Touch Deployment Using Universal Firmware Update

This method is the most convenient way to upgrade from IGEL OS 10 to IGEL OS 11. The method uses the Universal Firmware Update feature of the UMS (Universal Management Suite) and a profile.

Read all the following chapters carefully and follow the instructions.

1. [Devices That Can Be Upgraded to Igel OS 11 \(see page 64\)](#)
2. [Important! Consider This Before Upgrading \(see page 76\)](#)
3. [Preparing the Upgrade \(see page 77\)](#)
4. [Testing the Upgrade \(see page 82\)](#)
5. [Checking the Requirements \(see page 86\)](#)
6. [Creating the Universal Firmware Updates \(see page 87\)](#)
7. [Creating a Profile \(see page 91\)](#)
8. [Deploying the Licenses \(see page 96\)](#)
9. [Putting It All Together \(see page 97\)](#)
10. [Executing the Upgrade \(see page 99\)](#)

## Devices That Can Be Upgraded to Igel OS 11

### Core Requirements

- CPU with 64-bit support
- CPU speed:  $\geq 1$  GHz
- Memory (RAM):  $\geq 2$  GB

- i** RAM size higher than 2 GB is recommended if you use any of the following:
- Unified Communications optimizations (uses a client-side media engine)
  - High-resolution graphics output
  - More than two monitors

- i** With devices that have 2 GB RAM and shared video memory, a maximum of 512 MB may be used as video memory.

- Storage: Depends on the release version of IGEL OS 11. The details are listed below: 2 GB minimum;  $\geq 4$  GB recommended
  - Up to IGEL OS 11.03: 2 GB minimum;  $\geq 4$  GB recommended
  - From IGEL OS 11.04 to IGEL OS 11.07: If the full feature set is applied, at least 2.4 GB of storage is required. For instructions on how to reduce the feature set, see Error: "Not enough space on local drive" when Updating to IGEL OS 11.08 or Higher.
  - From IGEL OS 11.08 onwards: If the full feature set is applied, at least 2.4 GB of storage is required. For instructions on how to reduce the feature set, see Error: "Not enough space on local drive" when Updating to IGEL OS 11.08 or Higher. **TODO Add URL when published**
- No VIA graphic adapter; VIA graphics support is discontinued in IGEL OS.
- Legacy Bios and EFI/UEFI are supported.

### Devices Supported by OSC and UD Pocket with IGEL OS 11

- ⚠** The following list only includes those devices that are **tested by IGEL** (with each major release of IGEL OS). By no means it implies that the devices which are not included in this list but meet the minimum requirements will not function with IGEL OS: Any x86-64 hardware endpoint device that meets the IGEL-stated minimum hardware requirements for IGEL OS (for example, the processor speed and RAM) can be expected to work adequately with IGEL OS and should be considered a candidate for repurposing from another OS. With an IGEL OS subscription or active maintenance, customers can expect IGEL to make any necessary "best effort" to support, regardless of whether the endpoints in question are specifically listed within the IGEL Knowledge Base or elsewhere (e.g. on the IGEL Ready Showcase at <https://www.igel.com/ready/showcase-categories/endpoints/>).
- For any devices not listed here or on the IGEL Ready showcase, you can contact your hardware vendor and request those devices to be added to the IGEL Ready program.
- Integrated drivers and supported peripherals are listed in the [Third-Party Hardware Database](#)<sup>19</sup>. For more solutions compatible with IGEL OS, see Partner Solutions.

<sup>19</sup> <https://www.igel.com/linux-3rd-party-hardware-database/>



**i** HP, Lenovo, and LG device models are available from the factory with pre-installed IGEL OS 11. Please contact [IGEL Ready](#)<sup>20</sup> to get information on which device models are available with pre-installed IGEL OS.

**i** For some of the devices listed here, Flash memory must be extended to  $\geq 2$  GB. For these devices, an appropriate note is added.

**i** On modern computers such as secured-core PCs (see e.g. <https://www.microsoft.com/en-us/windows/business/devices?col=secured-core-pcs>), there may be a BIOS setting related to Secure Boot that allows the use of Microsoft's 3rd party UEFI Secure Boot Certificate. The usual description of such a BIOS setting is "Allow Microsoft 3rd Party UEFI CA". This setting must be set to enabled, as IGEL uses the 3rd party certificate to support UEFI Secure Boot. If UEFI Secure Boot is enabled, but "Allow Microsoft 3rd Party UEFI CA" is not enabled, you may be unable to boot IGEL OS Creator or UD Pocket. Similarly, if the setting "Allow Microsoft 3rd Party UEFI CA" is disabled after a previous installation of IGEL OS, IGEL OS will fail to boot. For how to enable the setting, see Secured-Core PCs: Microsoft 3rd-Party UEFI Certificate for Secure Boot.

**i** [Fn] keys may not work on some supported and listed laptop/notebook models.

#### ADS-Tec

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
DVG-VMT9010	Industrial PC/ Terminal	4 GB 8 GB	64 GB eMMC	Intel Atom® x7-E3950	11.02.100
DVG-VMT9012	Industrial PC/ Terminal	4 GB 8 GB	64 GB eMMC	Intel Atom® x7-E3950	11.02.100
DVG-VMT9015	Industrial PC/ Terminal	4 GB 8 GB	64 GB eMMC	Intel Atom® x7-E3950	11.02.100
DVG-VMT9112	Industrial PC/ Terminal	4 GB 8 GB	64 GB eMMC	Intel Atom® x7-E3950	11.02.100

#### Advantech

<sup>20</sup> <https://www.igel.com/technology-partners/>

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
POC-W213L	Medical All in One	4 GB	128 GB	Intel Core i7-7300U	11.01.100
POC-W243L* (see page 75)	Medical All in One	4 GB	32 GB	Intel Kaby Lake Core i5-7300U	11.01.110
POC-W243L* (see page 75)	Medical All in One	4 GB	128 GB	Intel Core i7-7300U	11.01.100

#### Advantech-DLoG

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
DLT-V6210	Industrial PC/ Terminal	4 GB	32 GB	Intel Atom	11.01.100
DLT-V7210 K	Industrial PC/ Terminal	4 GB	4 GB	Intel Atom E3845	11.01.100

#### Dell / Wyse

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version	Note
5040 / 5212	All in One	2 GB	2 GB	AMD G-T48E	11.01.100	
3040	Thin Client	2 GB	8 GB	Intel Atom x5-Z8350	11.01.100	
5020	Thin Client	2 GB	8 GB	AMD G-Series SoC	11.02.140	
5060	Thin Client	4 GB	8 GB	AMD GX-424CC	11.01.100	
5070	Thin Client	8 GB	32 GB	Intel Celeron J4105	11.01.100	

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version	Note
Latitude 5510	Laptop/ Notebook	8 GB	256 GB	Intel Core i5-10210U	11.05.100	Wake-on-LAN functionality is not supported.
Optiplex 3000	Thin Client	4 GB	32 GB	Intel Celeron N5105	11.08.200	

#### Dynabook

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
Portegé X20W-D	Laptop/ Notebook	8 GB	256 GB	Intel Core i5-7200U	11.01.100
Portegé X30-D	Laptop/ Notebook	8 GB	256 GB	Intel Core i5-7300U	11.01.100
Tecra C50	Laptop/ Notebook	4 GB	500 GB	Intel i5-4210U	11.01.100
Tecra Z50-D	Laptop/ Notebook	8 GB	256 GB	Intel Core i5-7200U	11.01.100
SATELLITE R50	Laptop/ Notebook	4 GB	500 GB	Intel i3-6006U	11.01.100

#### Elo

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
i2 Touch (15 and 22 inches)	All in One	8 GB	128 GB	Intel Core i3-8100T	11.05.100

#### Fujitsu

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
Q957	Desktop PC	8 GB	500 GB	Intel Core i3-6100	11.02.100
FUTRO S740	Thin Client	4 GB	8 GB	Intel Celeron J4105	11.04.100

## HP

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version	Note
HP t420	Thin Client	2 GB	8 GB	AMD Embedded G-Series GX-209JA	11.02.100	
HP t430	Thin Client	2 GB	16 GB	Intel®Celeron® N4020	11.01.110	
HP t530	Thin Client	4 GB	8 GB	AMD GX-215JJ Dual-Core	11.01.100	
HP t630	Thin Client	4 GB	8 GB	AMD GX-420GI	11.01.100	
HP t730	Thin Client	16 GB	8 GB	AMD RX-427BB APU	11.01.100	
HP t820	Thin Client	16 GB	16 GB	Intel Core i5-4570S	11.01.100	
HP t640	Thin Client	4 GB	16 GB	AMD Ryzen R1505G	11.04.100	
HP t540	Thin Client	16 GB	16 GB	AMD Ryzen Embedded R1305G	11.06.100	

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version	Note
HP mt46	Mobile Thin Client	8 GB	32 GB	AMD Ryzen 3 PRO 4450U	11.07.100	Excluding support for WWAN and Wake-on-LAN (both features are planned)
HP Elite t655	Thin Client	4 GB / 8 GB	32 GB	AMD Ryzen Embedded R2314	11.07.160	
HP Elite mt645 G7	Mobile Thin Client	8 GB	256 GB	AMD Ryzen 3 5425U	11.08.230	Support for WWAN Intel XMM 7560 R+ (as of 11.08.330) Excluding support for Wake-on-LAN (feature is planned) Excluding support for built-in fingerprint sensor
				AMD Ryzen 5 5625U	11.08.330	
HP t740	Thin Client	8 GB	16 GB	AMD Ryzen Embedded V1756B	11.08.290	
HP Pro t550	Thin Client	4 GB	32 GB	Intel Celeron J6412	11.08.330	
HP Pro mt440 G3	Mobile Thin Client	8 GB	128 GB	Intel Celeron 7305	11.08.440	Excluding support for WWAN Intel XMM 7560 R+ (feature is planned)

#### HP Docking Stations

Name	Supported from IGEL OS Version
HP USB-C Docking Station G5	11.08.230
HP USB-C G5 Essential Dock	11.08.290

#### Intel

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
NUC 5i5MYHE	Desktop PC	2 GB	32 GB	Intel i5-5300U	11.01.100
NUC 5i3RYH	Desktop PC	2 GB	2 GB	Intel i3-5010U	11.01.100
NUC 7CJYH	Desktop PC	2 GB	4 GB	Intel Celeron J4005	11.01.100

#### Lenovo

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Wi-Fi Chip	Supported from IGEL OS Version	Note
ThinkCentre M625q	Desktop PC	4 GB	32 GB	AMD E2-9000e	Intel AC9260	11.04.100	
		8 GB	128 GB	AMD A4-9120e	QCA6174 802.11ac	11.04.100	
ThinkCentre M75n	Desktop PC	8 GB	256 GB	AMD Ryzen 3 Pro 3300U	Intel AC9260	11.05.100	
ThinkCentre M70q Gen1	Desktop PC	16 GB	256 GB	Intel i5-10500t	Comet Lake PCH CNVi WiFi, Intel	11.05.100	
ThinkCentre M70q Gen 3	Desktop PC	16 GB	256 GB	Intel Core i5-12500T	Intel AX201	11.08.240	
ThinkCentre M75q Gen 2	Desktop PC	4 GB	128 GB	AMD Ryzen 3 Pro 5350GE	Intel AX200	11.08.240	

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Wi-Fi Chip	Supported from IGEL OS Version	Note
K14 AMD Gen 1	Laptop/ Notebook	8 GB	256 GB	AMD Ryzen 5 PRO 5650U	Mediatek MT7921	11.08.240	
ThinkPad L14 AMD Gen 1	Laptop/ Notebook	64 GB	1 TB	AMD Ryzen 7 Pro 4750U	Wi-Fi 6 AX200, Intel	11.05.100	
14w	Laptop/ Notebook	4 GB	64 GB	AMD A6-9220C	QCA6174 802.11ac	11.05.100	
ThinkPad L14 AMD Gen 3	Laptop/ Notebook	16 GB	256 GB	AMD Ryzen 5 5625U	AMD RZ616 2X2AX (WiFi 6E)	11.08.230	Excluding support for WWAN
ThinkCentre Neo50q Gen 4	Thin Client	8 GB	256 GB	Intel Core i3-1215U	Wi-Fi 6 RTL8852BE	11.08.240	
		4 GB	256 GB	Intel Celeron 7305	Wi-Fi 6 AX201		
K14 Intel Gen 1	Laptop/ Notebook	16 GB	256 GB	Intel Core i5-1135G7	Intel AX210 WiFi / BT combo	11.08.290	
ThinkPad L14 Intel Gen 3	Laptop/ Notebook	16 GB	512 GB	Intel Core i5-1235U	Intel Wi-Fi 6 AX201 2x2 AX vPro	11.08.330	LTE support as of 11.08.360
ThinkEdge SE10	Thin Client	8 GB	1 TB	Intel Atom x6425RE	MediaTek MT7921LEN	11.08.360	
			256 GB	Intel Atom x6214RE	Intel AX210	11.08.360	
ThinkPad L14 AMD Gen 4	Thin Client	8 GB	256 GB	AMD Ryzen 3 Pro 7330U	AMD RZ616 Realtek RTL8852CE	11.08.440	Quectel EM05-G 4G CAT4
ThinkPad L15 AMD Gen4	Thin Client	8 GB	256 GB	AMD Ryzen 3 Pro 7330U	AMD RZ616 Realtek RTL8852CE	11.08.440	Quectel EM05-G 4G CAT4

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Wi-Fi Chip	Supported from IGEL OS Version	Note
ThinkPad L14 Intel Gen 4	Laptop/ Notebook	8 GB	256 GB	Intel Core i3-1315U	Intel AX211	11.09.100	Quectel EM05-G 4G CAT4
ThinkPad L15 Intel Gen 4	Laptop/ Notebook	8 GB	256 GB	Intel Core i3-1315U	Intel AX211	11.09.100	Quectel EM05-G 4G CAT4

#### Lenovo Docking Stations

Name	Supported from IGEL OS Version
ThinkPad USB-C Hybrid Dock	11.07.100
IOBOX	11.07.100
Lenovo Universal USB-C Dock	11.08.440

#### LG

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
24CK550N* * (see page 75)	All in One	4 GB	32 GB	AMD G-Series GX-212JJ	11.01.100
24CK550W* * (see page 75)	All in One	4 GB	32 GB	AMD G-Series GX-212JJ	11.01.100
24CK560N* * (see page 75)	All in One	4 GB	32 GB	AMD G-Series GX-212JJ	11.01.100
CK500W	Thin Client	4 GB	32 GB	AMD G-Series GX-212JJ	11.01.100
38CK950N	All in One	8 GB	128 GB	AMD Ryzen 3	11.02.100
38CK900N	All in One	8 GB	128 GB	AMD Ryzen 3	11.02.100



Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
CL600N	Thin Client	4 GB	16 GB	Intel® Celeron J4105	11.03.100
CL600W	Thin Client	8 GB	128 GB	Intel® Celeron J4105	11.03.100
34CN650N	All in One	4 GB	16 GB	Intel® Celeron J4105	11.05.100
24CN650N	All in One	8 GB	16 GB	Intel® Celeron J4105	11.05.100
27CN650N	All in One	8 GB	16 GB	Intel® Celeron J4105	11.05.100
CQ600I	Thin Client	4 GB	16 GB	Intel Celeron N5105	11.08.330
24CQ650I	All in One	4 GB	16 GB	Intel Celeron N5105	11.08.330
CQ601I	Thin Client	4 GB	16 GB	Intel Pentium Silver N6005	11.08.360
24CR670I	All in One	4 GB	16 GB	Intel Celeron N5105	11.09.110

#### LG Docking Stations

Name	Supported from IGEL OS Version
LG USB Multi Port Hub	11.09.100

#### OnLogic

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
CL210G-10	Industrial PC/ Terminal	4 GB	32 GB	Intel Celeron N3350	11.04.100
KARBON 300	Desktop PC	4 GB	32 GB	Intel Atom x5-E3930	11.04.100

## Onyx Healthcare

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
Venus 223	Medical All in One	4 GB	128 GB	Intel Quad-Core J1900	11.01.100

## Pepperl+Fuchs

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
BTC12N	Industrial Box Thin Client	4 GB	32 GB	Intel Apollo Lake N4200	11.09.100
BTC14N	Industrial Box Thin Client	4 GB	32 GB	AMD Ryzen Embedded V1202B	11.09.100

## Rein Medical

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
Silenio C122	All in One	8 GB	128 GB	Intel® Core™ i5 – 6th Generation	11.01.110
Silenio C124	All in One	8 GB	128 GB	Intel® Core™ i5 – 6th Generation	11.01.110
Clinio S 522TCT	Medical All in One	8 GB	16 GB	Intel® Pentium® Silver J5005	11.04.100
Clinio S 524TCT	Medical All in One	8 GB	16 GB	Intel® Pentium® Silver J5005	11.04.100

## Secunet

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
SINA Workstation S EliteDesk 800 G2	Workstation	16 GB	256 GB	Intel Core i7-6700	11.01.100


#### USB Memory Sticks That Can Be Used as Alternative UD Pocket Hardware


##### DIGITTRADE

Name	Storage	Supported from IGEL OS Version
Kobra Stick	≥ 4GB	11.05.133

#### Officially Supported Virtual Environments

- Tested with Ubuntu (64-bit) and default settings

 Note that the use of a UD Pocket within a virtual machine is **not** supported by IGEL.

 For some features, more than 2 GB RAM is required. Example: if you use dual monitor environments, a virtual machine must have at least 8 GB RAM.

Name	Memory (RAM)	Storage	Type	Supported from IGEL OS Version
Oracle VM VirtualBox	≥ 2 GB	≥ 4 GB	Linux	11.04.100
VMware Workstation	≥ 2 GB	≥ 4 GB	Linux	11.04.100

\* Delock Adapter DP 1.2 to DVI does not work.


\*\* When using an additional 4k screen with this device, please edit the BIOS settings as follows:


1. Go to the **Chipset** screen.
2. Set **Integrated Graphics** to “Force”.
3. Set **UMA Frame Buffer Size** to “256M” or higher


When you have confirmed that your devices can be upgraded to IGEL OS 11, make sure to consider [Important! Consider This Before Upgrading](#) (see page 76).


### Important! Consider This Before Upgrading


To make sure that your upgrade can be successful, check the following warnings and notes; a warning symbol indicates that irreversible damage can be done to your devices.


 **Existing partitions:** Any existing partition on the target drive of your device will be deleted. The installer will repartition the target device. The overall size of the newly created partitions will be calculated based on the available disk space. The minimum disk usage is 2 GB, the maximum is 16 GB.


 **No Downgrade**  
You cannot restore your IGEL OS 10 system once you have migrated to IGEL OS 11. The device storage is overwritten completely with a new partitioning scheme.

 **Features (e.g. Clients)**  
IGEL OS 11 does not have the complete feature set of IGEL OS 10. Make sure that the current version of IGEL OS 11 meets your requirements. For details, refer to the appropriate release notes.

 **Custom Partitions**  
The contents of custom partitions will be deleted by the upgrade. Make sure to back up the contents and restore them after the upgrade has finished. Besides becoming dysfunctional after the upgrade, applications and kernel drivers in a custom partition might corrupt the upgrade. For this reason, make sure to first test the upgrade on a characteristic device. We recommend that you disable custom partitions when upgrading; you can enable them once the upgrade has been successfully completed.

 **Custom Commands**  
The persistence of custom commands cannot be guaranteed. Besides becoming dysfunctional after the upgrade, custom commands might corrupt the upgrade. For this reason, make sure to first test the upgrade on a characteristic device. In general, custom commands must be adapted for IGEL OS 11. We recommend that you disable custom commands when upgrading; you can enable them once the upgrade has been successfully completed.

 **Power Supply**  
Ensure that the device is not running on battery power, i.e. it must be connected to a power supply during the complete upgrade process.

 **Network**  
All devices must be connected to a WLAN or LAN. LAN is the recommended option. The device will not be upgraded if connected to OpenVPN, OpenConnect, gencard or mobile broadband.

When you have considered everything that is relevant, continue with [Preparing the Upgrade](#) (see page 77).

### Preparing the Upgrade

This section describes the required preparations and tests before any productive devices can be updated. The testing should be done with at least one device that is characteristic of your environment. This device should have every custom partition and every custom command that may possibly exist in any of your devices.

To prepare the upgrade, perform the following steps:

1. [Preparing the UMS \(see page 78\)](#)
2. [Adjusting the Setup \(see page 79\)](#)
3. [Deploying a License \(see page 80\)](#)
4. [Configuring the Update Source \(see page 81\)](#)

### Preparing the UMS

To upgrade your devices to IGEL OS 11, you need the appropriate version of the UMS. Also, the devices must be registered with the UMS to receive their licenses.


1. If you have not already done so, update your UMS to version 6.01.130 or higher. For instructions, see [Updating UMS](#).
2. Make sure that your devices are registered with the UMS. For more information, see the chapter [Registering IGEL OS Devices on the UMS Server](#) in the UMS Manual.

When the UMS is ready, continue with [Adjusting the Setup](#) (see page 79).

## Adjusting the Setup

Depending on the features that are in use now or will be used in the future, a specific set of parameters must be set in the device's Setup.

1. In the Setup, go to **System > Firmware Update > OS 11 Upgrade**.
2. Make your settings as appropriate:
  - Activate **Upgrade to OS 11**.

 When **Upgrade to OS 11** is activated, the device checks for a Workspace Edition license and stops checking for a legacy UDC3 or UD Pocket license. Therefore, in the UMS, it is displayed as an unlicensed device until a Workspace Edition license has been deployed.

- If you want the device to retry the upgrade immediately after a failed attempt, activate **Upgrade to OS 11 even if a previous upgrade attempt failed**. The device will retry the upgrade 5 times. When the 5th attempt has failed, a message will be shown in the upgrade tool window.
  - If your device has a PowerTerm license, and you want to upgrade to IGEL OS 11 even though it does not support PowerTerm, you must activate **Upgrade to OS 11 even if PowerTerm is enabled**.
  - Under **Require an Enterprise Management Pack license to upgrade to OS 11**, select the appropriate option:
    - If you are using IGEL Cloud Gateway (ICG) or Shared Workplace (SWP) or a Custom Partition and want to make sure that the upgrade is performed only if these features can be used furthermore, select **Smart**. When this option is selected, and any of these features is activated, the upgrade is performed only if the device could fetch a license from an Enterprise Management Pack.
    - If you want to force the device to fetch a license from an Enterprise Management Pack and make sure that the upgrade is performed only if the license could be fetched, select **Always**.
    - If you want the device to upgrade to IGEL OS 11 without fetching an Enterprise Management Pack, disregarding the features that might be activated, select **Never**.
  - Under **Timeout waiting for OS 11 license to start automatic upgrade**, set the time period the device will wait for a license in a mass deployment scenario (see [Zero-Touch Deployment Using Universal Firmware Update](#) (see page 63), [Zero-Touch Deployment Using Buddy Update](#) (see page 101) and [Mass Deployment Using a Scheduled Job](#) (see page 204)). This setting prevents the device from starting the upgrade at an inappropriate time as a result of the license just being deployed. This way, the setting prevents unwanted interruptions at work. For a mass deployment scenario, the default value **10 Minutes** is recommended.
3. Click **Apply**.

When the Setup is adjusted, continue with [Deploying a License](#) (see page 80).

### Deploying a License

To upgrade from IGEL OS 10 to IGEL OS 11, you need an appropriate license. Depending on your requirements, one or more of these licenses will be needed for each device:

- One Workspace Edition license for basic functionality. For further information, see Workspace Edition
- If IGEL Cloud Gateway (ICG), or Shared Workplace (SWP) will be used: One Enterprise Management Pack license. For further information, see Enterprise Management Pack.
- Custom Partition - if IGEL OS 11.03.100 or lower is the target version; in IGEL OS 11.03.500 or higher, the Custom Partition feature is included in the Workspace Edition.

▶ Deploy the licenses for IGEL OS 11 using the method that suits your needs:

- Manual License Deployment: Licenses are created and deployed manually. For instructions, see Manual License Deployment for IGEL OS.
- Automatic License Deployment (ALD): Licenses are created and deployed automatically to each device that needs a license. For instructions, see Setting up Automatic License Deployment (ALD).
- Download three demo licenses from <https://www.igel.com/download/>.

When the device has a license, continue with [Configuring the Update Source](#) (see page 81).





### Configuring the Update Source

1. In the Setup, go to **System > Update > Firmware Update** and configure the update source for IGEL OS 11. For more information, see the Firmware Update chapter in the IGEL OS Manual.
2. Click **Ok**.



When the correct update source is configured, continue with [Testing the Upgrade](#) (see page 82).

## Testing the Upgrade

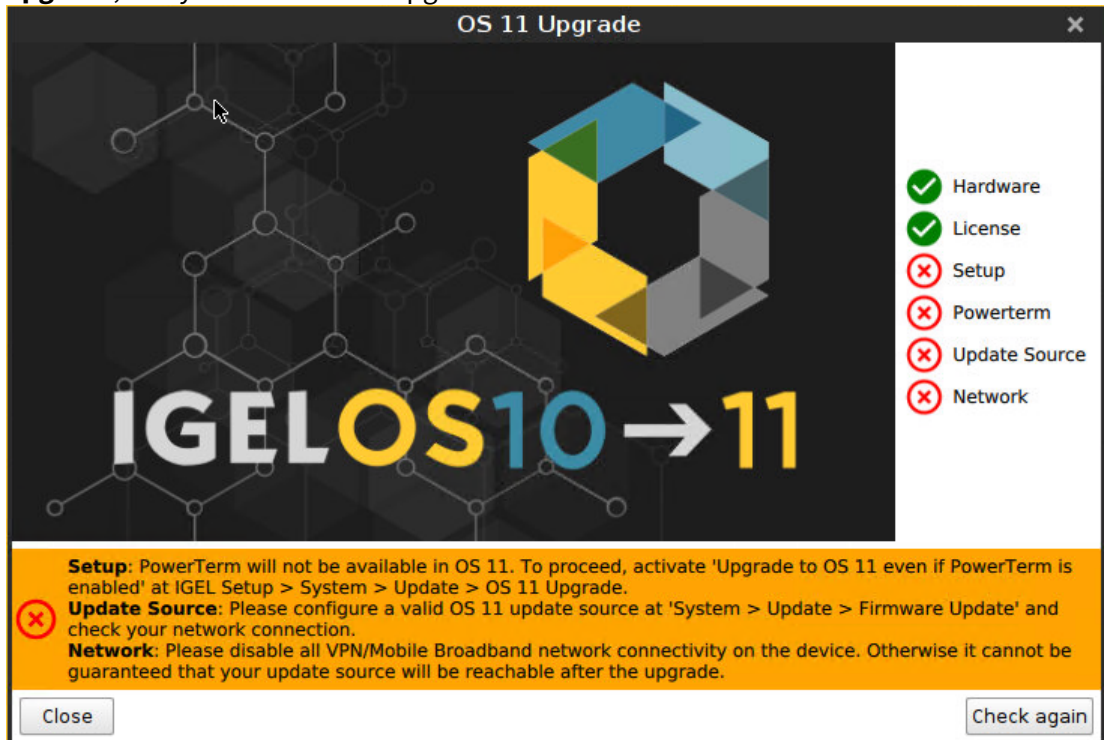
1. Click  System and then **Upgrade to OS 11**. The OS 11 Upgrade Tool starts and indicates whether all requirements are met.

 You can change the starting the starting methods for the OS 11 Upgrade Tool in the Setup under **Accessories > OS11 Upgrade**.



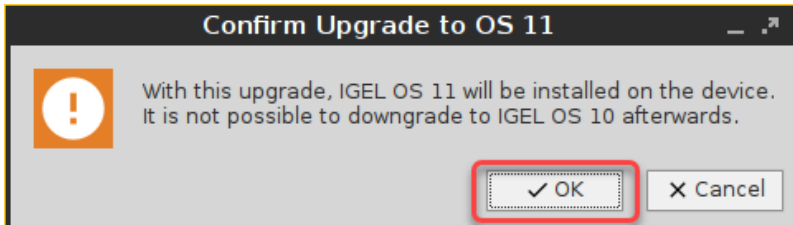
2. Check the output of the OS 11 Upgrade Tool and continue appropriately:
  - If each requirement has an  icon, click **OS Upgrade** to start the upgrade process.
  - If one or more requirements have an  icon, check the messages and resolve the issues. Afterwards, click **Check again**. If all requirements are met, the button changes to **OS**

**Upgrade**, and you can start the upgrade.

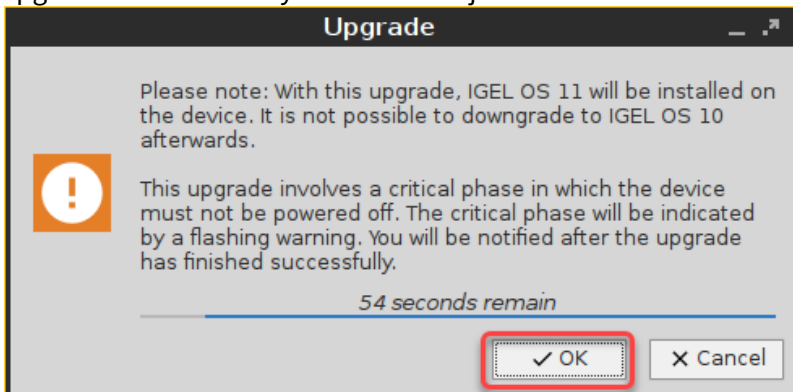


When you start the upgrade, a warning dialog is shown.

- 3. Click **OK** to continue.



A warning dialog with a timeout is shown. If you click **Cancel** before the timeout expires, the upgrade is canceled. If you click **OK** or just wait for the timeout to expire, the upgrade is started

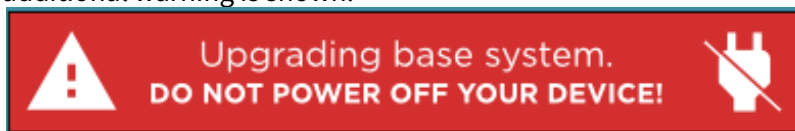


After the warning dialog has been confirmed or the timeout has expired, the device reboots into a special IGEL OS 10 environment, in which the system upgrade is executed. The **Upgrade** window

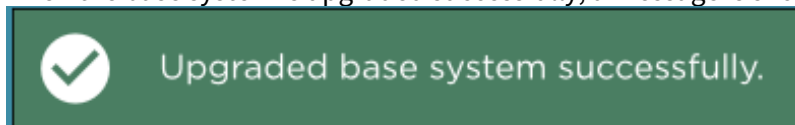
show the progress.



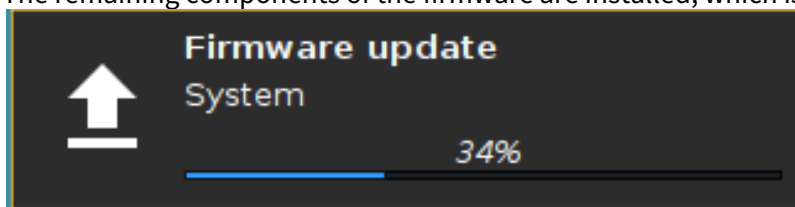
During the critical phase, the device must not be powered off. At this stage in the progress, an additional warning is shown.



When the base system is upgraded successfully, a message is shown.



The remaining components of the firmware are installed, which is indicated by update messages.



When the installation is completed, the **Upgrade** window looks like this:



After a few seconds the device reboots into IGEL OS 11.



When the upgrade test has been successful, you are ready to set up the mass upgrade. Continue with [Checking the Requirements](#) (see page 86).

## Checking the Requirements

The following requirements must be met:

- The upgrade has been tested with characteristic devices.
- UMS 6.01.130 or higher is available.
- The firmware IGEL OS 10.05.800 (or higher) is known to the UMS. For this purpose, a device with this firmware version must be registered in the UMS. This is already the case if you tested the upgrade with the same UMS with which you are about to do the mass upgrade. If not, you must register a device with the appropriate firmware version now.
- All devices are connected to a regular LAN (not OpenVPN, OpenConnect, genucard, NCP VPN or mobile broadband).
- All devices are in a safe environment where the upgrade process cannot be disrupted, e.g. by powering off the devices.

When all requirements are met, continue with [Creating the Universal Firmware Updates](#) (see page 87).

### Creating the Universal Firmware Updates

For detailed information, see the chapter Universal Firmware Update in the UMS Manual.

**i** If you use the High Availability Extension, note that Universal Firmware Updates are NOT synchronized, that is why you have to either download them to all HA nodes or configure an external (FTP) server.

1. Create a Universal Firmware Update for IGEL OS 10.05.800 (or higher).
2. After you have created the Universal Firmware Update for IGEL OS 10.05.800 (or higher), create a Universal Firmware Update for IGEL OS 11.

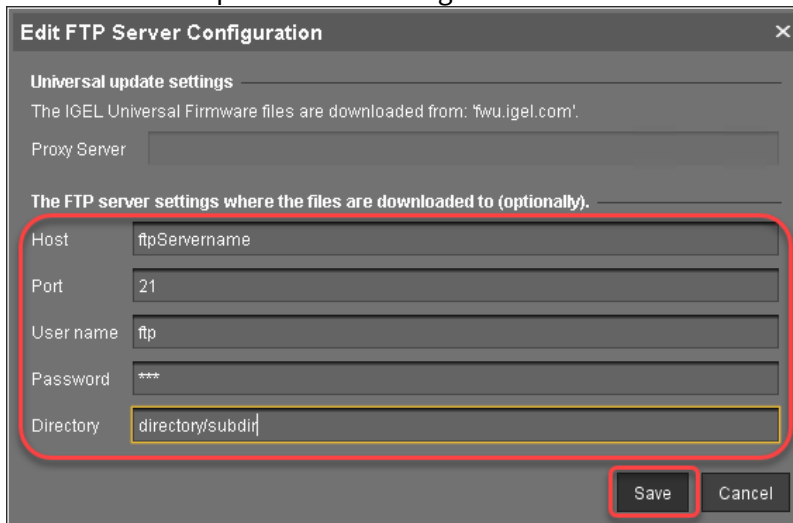
**!** The order of creation is crucial because the IGEL OS 11 firmware must have a higher ID in order to be chosen by the device. For details, see [Executing the Upgrade](#) (see page 99).

### Configuring the Universal Firmware Update for ICG

If you are using IGEL Cloud Gateway (ICG), an FTP server that is accessible to all devices must be configured as an update source.

To configure an FTP server as update source:

1. In the UMS, go to **UMS Administration > Universal Firmware Update** and click .
2. Enter the data required for accessing the FTP server and click **Save**.



**Edit FTP Server Configuration**

**Universal update settings**

The IGEL Universal Firmware files are downloaded from: 'fwu.igel.com'.

Proxy Server

**The FTP server settings where the files are downloaded to (optionally).**

Host: ftpServername

Port: 21

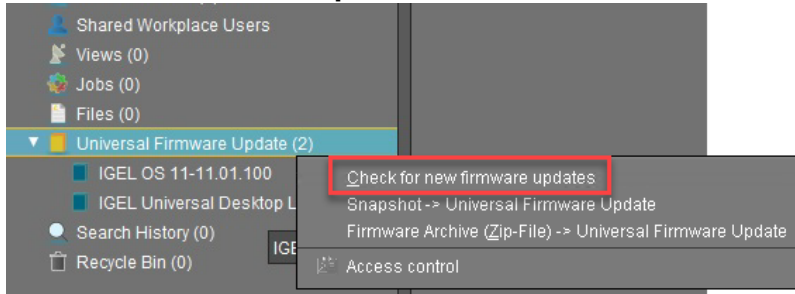
User name: ftp


Password: \*\*\*

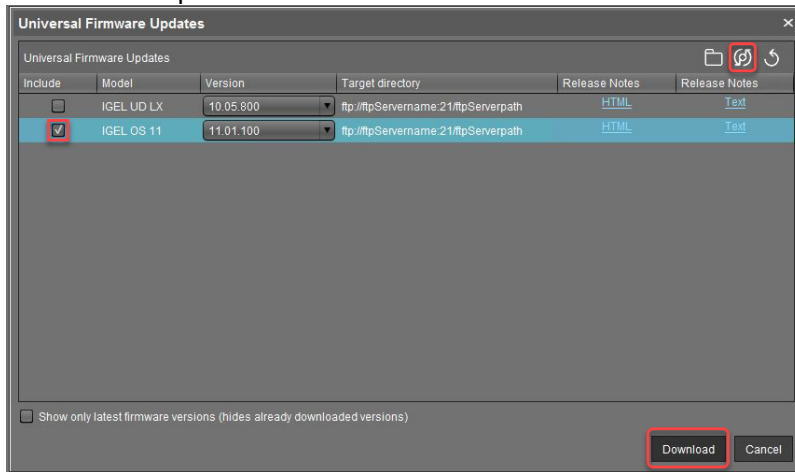
Directory: directory/subdir

Save Cancel

3. Go to **Server - [UMS address] > Universal Firmware Update** and in the context menu, select **Check for new firmware updates**.

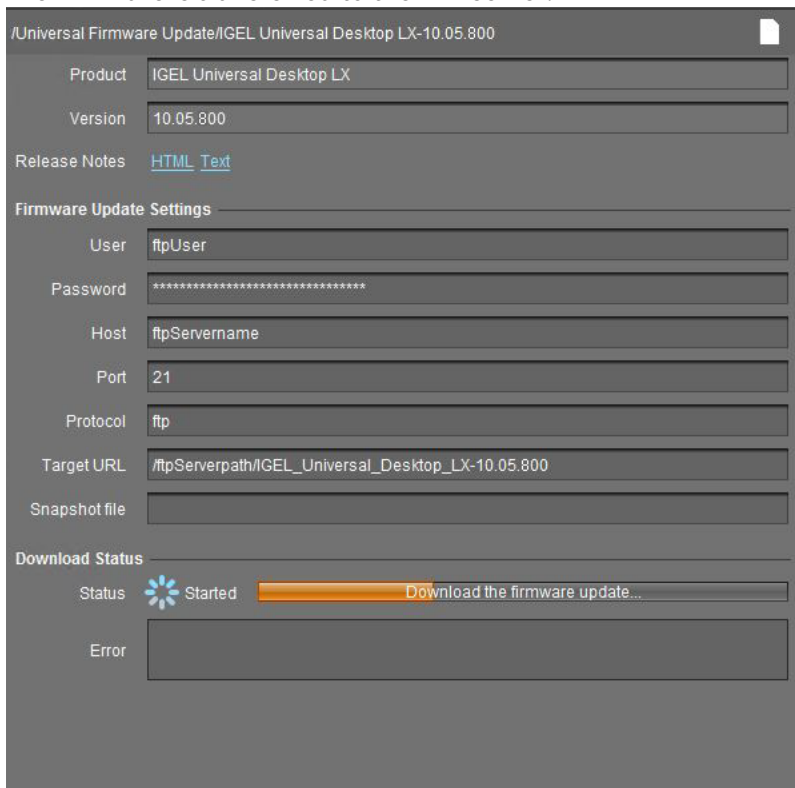


4. Select the entry for the IGEL OS 10.05.800 (or higher) firmware, click  to select the FTP server selected in step 2 and then select **Download**.

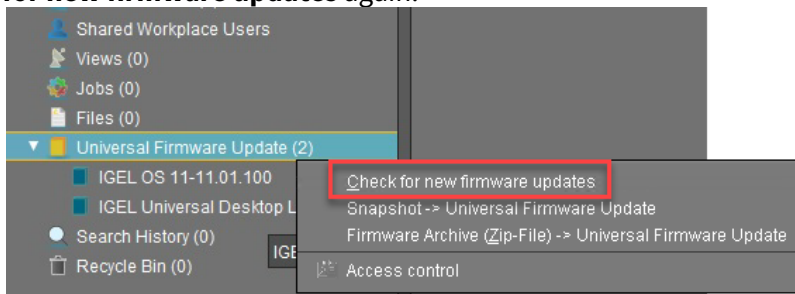





- 5. The firmware is transferred to the FTP server.



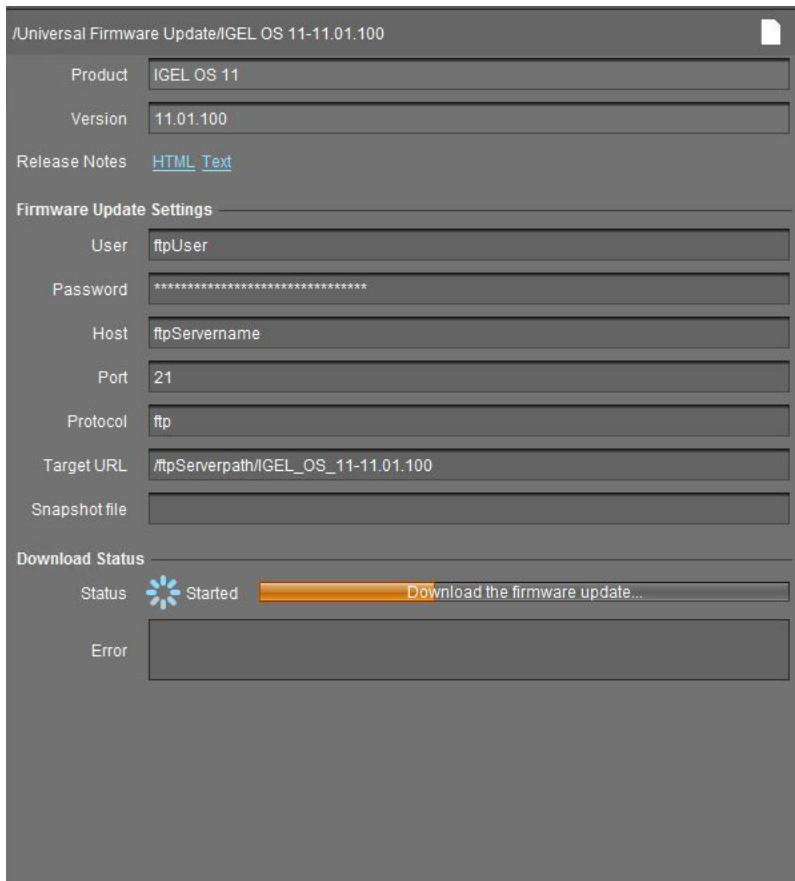
- 6. Under **Server - [UMS address] > Universal Firmware Update**, in the context menu, select **Check for new firmware updates** again.



7. Select the entry for the IGEL OS 11 firmware, click  to select the FTP server selected in step 2 and select **Download**.



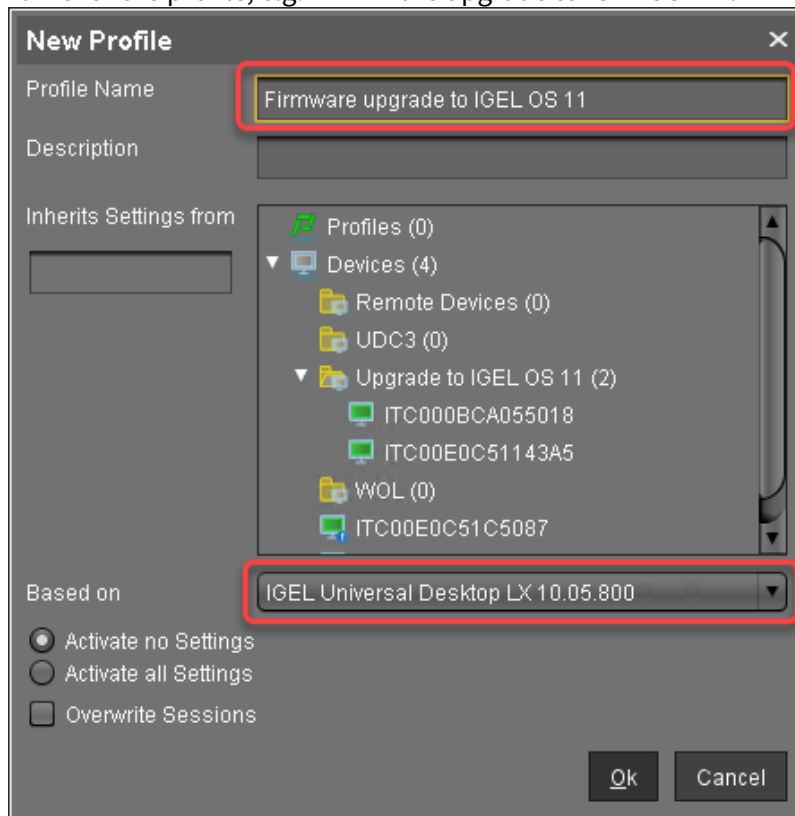
8. The firmware is transferred to the FTP server.



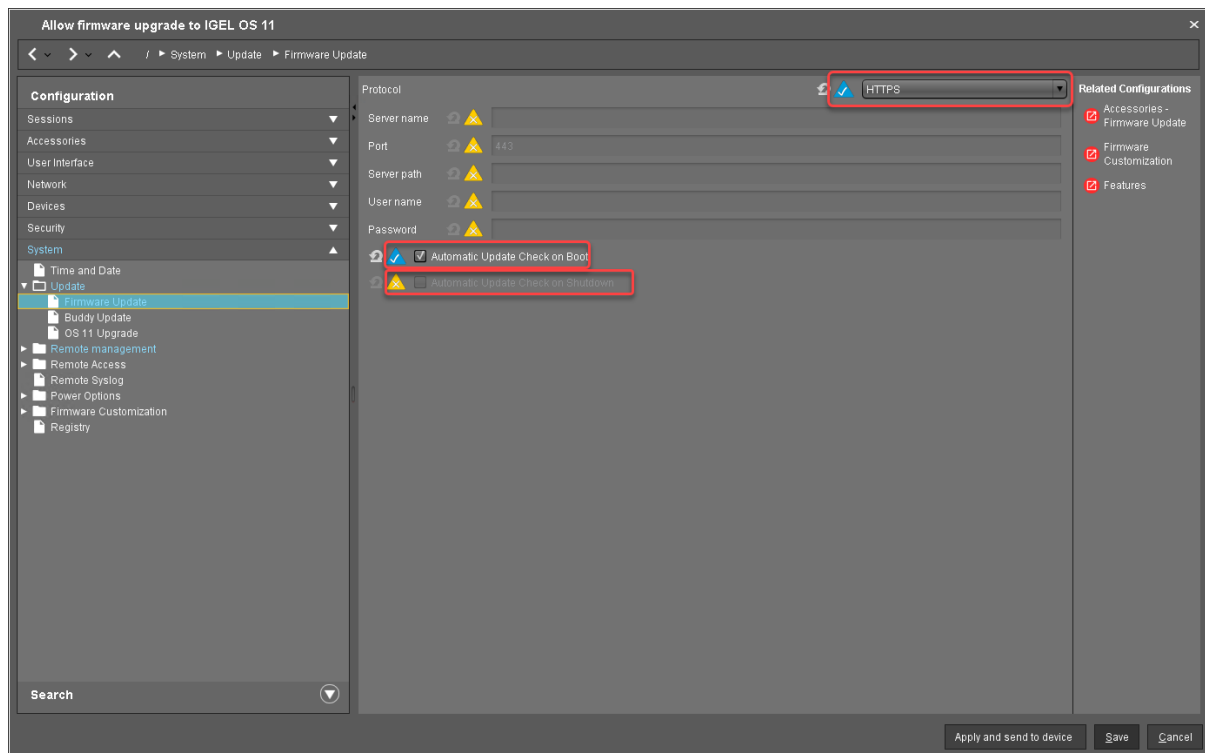
The devices can download the firmware from the FTP server,  
 When the Universal Firmware Update is ready, continue with [Creating a Profile](#) (see page 91).

### Creating a Profile

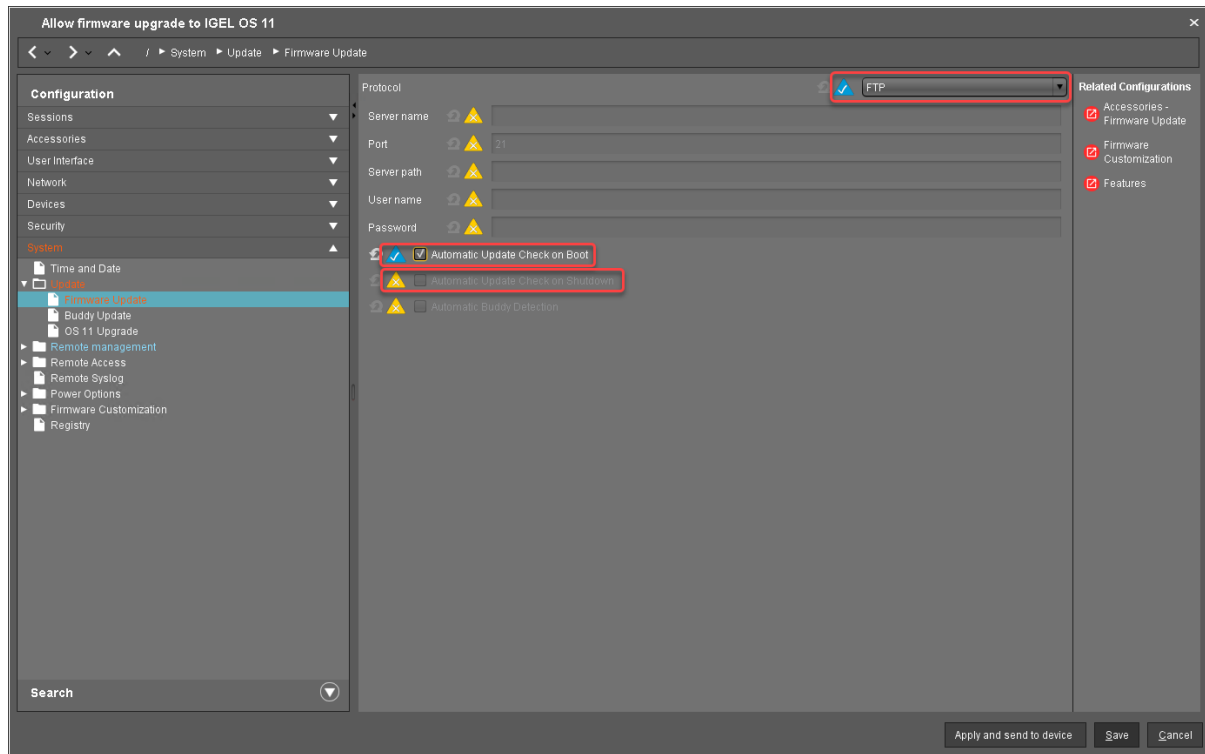
1. Create a profile that is based on the IGEL OS 10 firmware (10.08.800 or higher). Find a suitable name for the profile, e.g. "Firmware upgrade to IGEL OS 11".



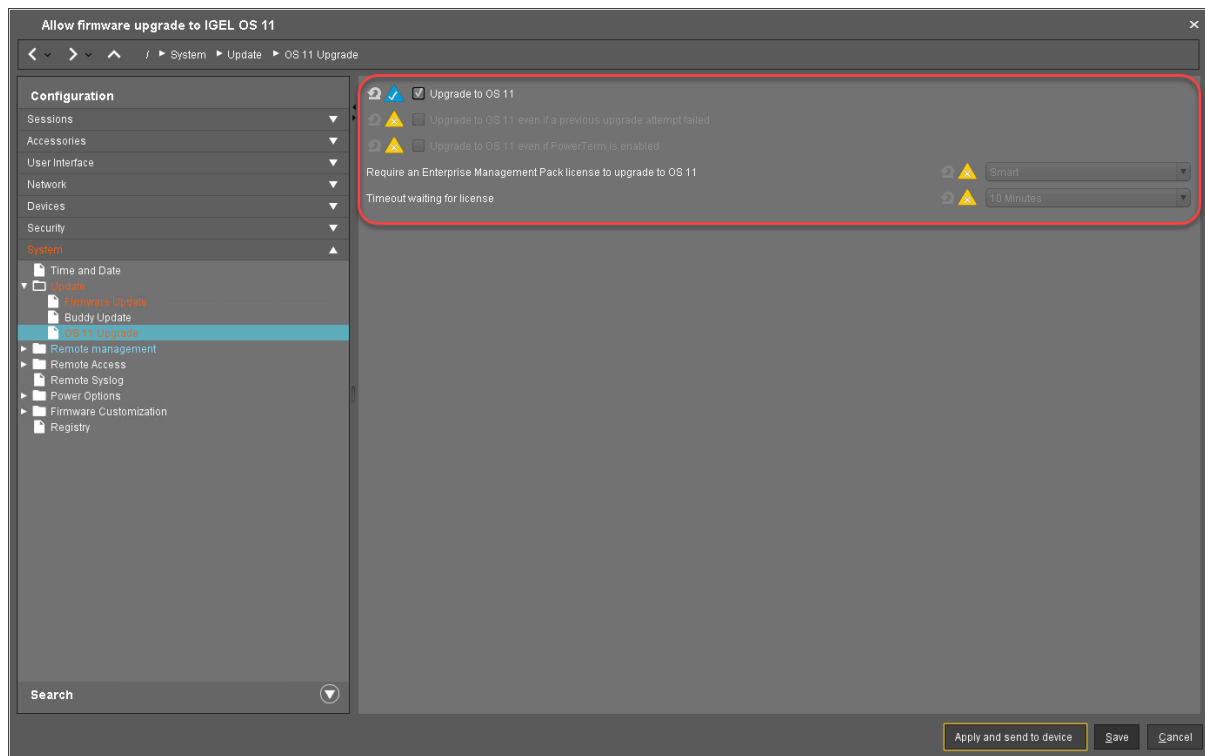
2. In the profile's configuration dialog, go to **System > Update > Firmware Update** and change the settings according to your environment:
  - If the UMS and the devices are in one and the same network and no IGEL Cloud Gateway (ICG) is used:
    - Select "HTTPS" as **Protocol**.
    - Activate **Automatic Update Check on Boot**.
    - Ensure that **Automatic Update Check on Shutdown** is deactivated. Otherwise, the device will shut down when the update is finished.



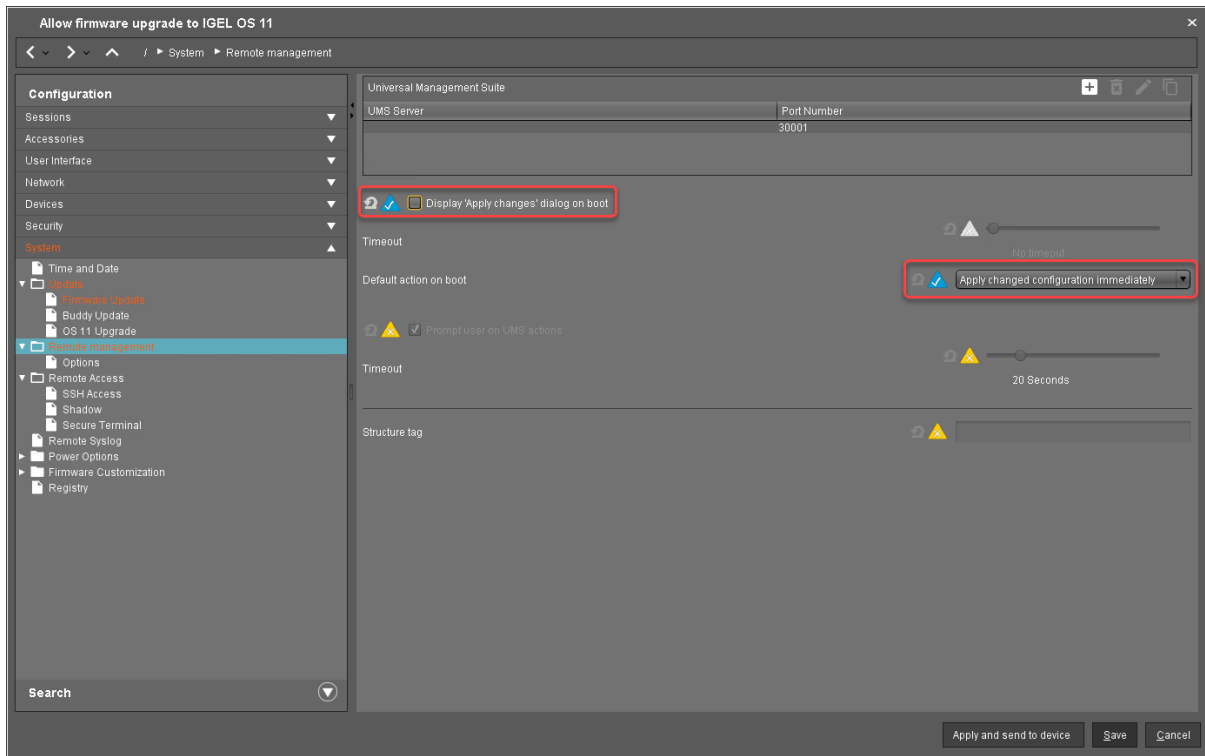
- If IGEL Cloud Gateway (ICG) is used:
  - Select "FTP" as **Protocol**.
  - Activate **Automatic Update Check on Boot**.
  - Ensure that **Automatic Update Check on Shutdown** is deactivated. Otherwise, the device will shut down when the update is finished.



3. Go to **System > Update > OS 11 Upgrade** and change the following settings according to your successful upgrade test (for details of the settings, see [Adjusting the Setup](#) (see page 79)):
  - Activate **Upgrade to OS 11**.
  - Set **Upgrade to OS 11 even if PowerTerm is enabled** according to your needs.
  - Set **Upgrade to OS 11 even if a previous upgrade attempt failed** according to your needs.
  - Set **Require an Enterprise Management Pack license to upgrade to OS 11** according to your needs.
  - Ensure that the **Timeout waiting for OS 11 license to start automatic upgrade** is set to **10 Minutes**.



4. Go to **System > Remote Management** and change the settings as follows:
  - Deactivate **Display 'Apply changes' dialog on boot**.
  - Set **Default action on boot** to **Apply changed configuration immediately**.



5. Click **Save**.

When the profile is created, continue with [Deploying the Licenses](#) (see page 96).

## Deploying the Licenses

Deploy the licenses for IGEL OS 11 using the method that suits your needs:

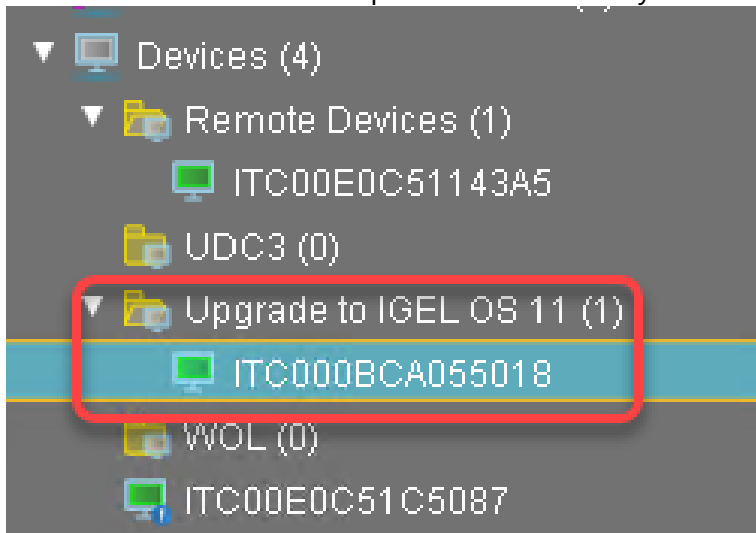
- Automatic License Deployment (ALD): Licenses are created and deployed automatically to each device that needs a license. For instructions, see [Setting up Automatic License Deployment \(ALD\)](#).
- Manual License Deployment: Licenses are created and deployed manually. For instructions, see [Manual License Deployment for IGEL OS](#).

When the license deployment is set up, continue with [Putting It All Together](#) (see page 97).



Putting It All Together

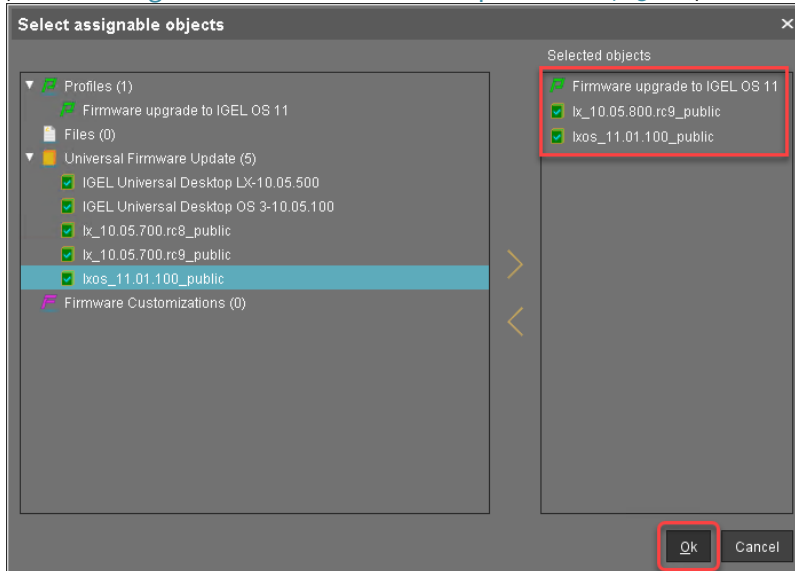
1. Put all devices that are to be updated into a directory.



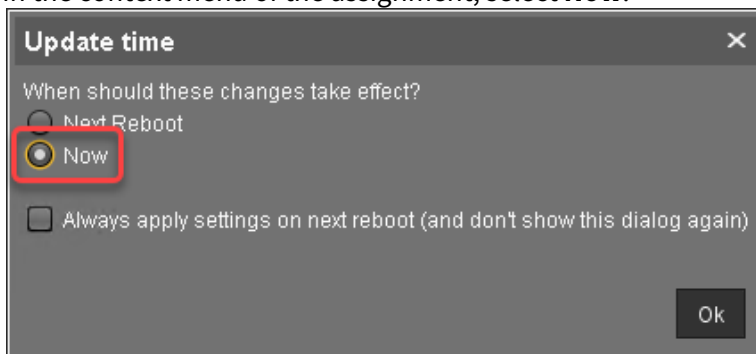
2. Select the directory and in the **Assigned objects** area, click .



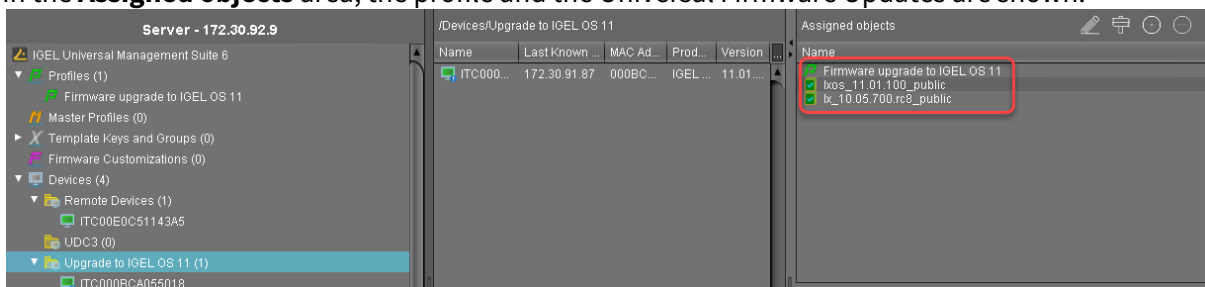
- Assign the profile (see [Creating a Profile](#) (see page 91)) and the two Universal Firmware Updates (see [Creating the Universal Firmware Updates](#) (see page 87)) to the directory and click **Ok**.



- In the context menu of the assignment, select **Now**.



In the **Assigned objects** area, the profile and the Universal Firmware Updates are shown:



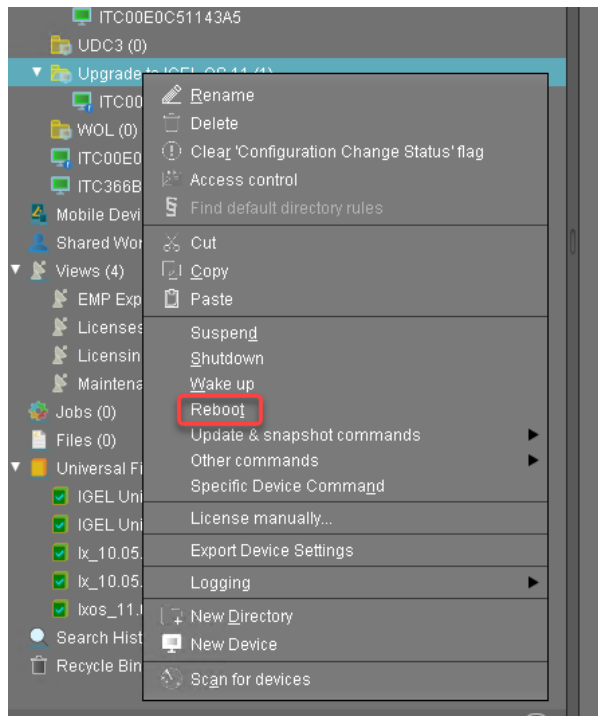
- If you are using Automatic License Deployment (ALD), it might be feasible to confine the distribution of licenses to the current directory. For more information, see [Configuring the Distribution Conditions](#), section "Distributing Licenses to Devices in a Specified Directory".

When everything is in place, continue with [Executing the Upgrade](#) (see page 99).

## Executing the Upgrade

1. In the UMS, select the directory containing all devices that are to be upgraded and reboot them.

**i** Alternatively, you can create a scheduled job for reboot or wake up and assign it to the devices or the directory containing these devices. For more information, see [Jobs](#)

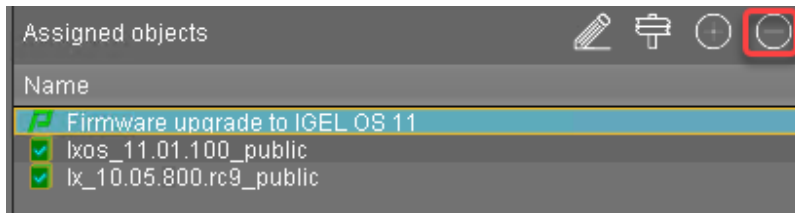


On reboot or wake up, the devices update to the appropriate IGEL OS 10 firmware (10.05.800 or higher). With this version, the **Upgrade to OS 11** parameter is recognized by the devices; also, the devices request IGEL OS 11 licenses from the UMS (Workspace Edition and, if required, Enterprise Management Pack).

If no IGEL OS 11 licenses have been deployed on the devices yet, the licenses are deployed within a few minutes. The upgrade will be started when the licenses are deployed. The maximum time period the device will wait for a license is configured by the parameter **Timeout waiting for OS 11 license to start automatic upgrade**; for details, see [Adjusting the setup](#) (see page 79).

The parameter **Automatic update check on boot** causes the devices look for new firmware again. Although two Universal Firmware Updates are assigned to the devices, the UMS offers the IGEL OS 11 firmware, because the ID of the IGEL OS 11 firmware is higher than the ID of the IGEL OS 10 firmware.

2. When all devices have been upgraded successfully, remove the "Firmware upgrade to IGEL OS 11" profile and the two Universal Firmware Updates from the directory.



The upgrade is completed.

## Zero-Touch Deployment Using Buddy Update

This method uses the buddy update feature of IGEL OS. One or more devices that are configured as an update buddy access the main server and download the firmware. The other devices are configured to download their firmware from an update buddy.

Read all the following chapters carefully and follow the instructions.

1. [Devices That Can Be Upgraded to IGEL OS 11](#) (see page 102)
2. [Important! Consider This Before Upgrading](#) (see page 114)
3. [Preparing the Upgrade](#) (see page 115)
4. [Testing the Upgrade](#) (see page 120)
5. [Checking the Requirements](#) (see page 124)
6. [Configuring Two Update Buddies](#) (see page 125)
7. [Creating a Profile](#) (see page 126)
8. [Deploying the Licenses](#) (see page 128)
9. [Putting It All Together](#) (see page 129)
10. [Executing the Upgrade](#) (see page 130)

## Devices That Can Be Upgraded to IGEL OS 11

### Core Requirements

- CPU with 64-bit support
- CPU speed:  $\geq 1$  GHz
- Memory (RAM):  $\geq 2$  GB

- i** RAM size higher than 2 GB is recommended if you use any of the following:
- Unified Communications optimizations (uses a client-side media engine)
  - High-resolution graphics output
  - More than two monitors

- i** With devices that have 2 GB RAM and shared video memory, a maximum of 512 MB may be used as video memory.

- Storage: Depends on the release version of IGEL OS 11. The details are listed below: 2 GB minimum;  $\geq 4$  GB recommended
  - Up to IGEL OS 11.03: 2 GB minimum;  $\geq 4$  GB recommended
  - From IGEL OS 11.04 to IGEL OS 11.07: If the full feature set is applied, at least 2.4 GB of storage is required. For instructions on how to reduce the feature set, see Error: "Not enough space on local drive" when Updating to IGEL OS 11.08 or Higher.
  - From IGEL OS 11.08 onwards: If the full feature set is applied, at least 2.4 GB of storage is required. For instructions on how to reduce the feature set, see Error: "Not enough space on local drive" when Updating to IGEL OS 11.08 or Higher. **TODO Add URL when published**
- No VIA graphic adapter; VIA graphics support is discontinued in IGEL OS.
- Legacy Bios and EFI/UEFI are supported.

### Devices Supported by OSC and UD Pocket with IGEL OS 11

- ⚠** The following list only includes those devices that are **tested by IGEL** (with each major release of IGEL OS). By no means it implies that the devices which are not included in this list but meet the minimum requirements will not function with IGEL OS: Any x86-64 hardware endpoint device that meets the IGEL-stated minimum hardware requirements for IGEL OS (for example, the processor speed and RAM) can be expected to work adequately with IGEL OS and should be considered a candidate for repurposing from another OS. With an IGEL OS subscription or active maintenance, customers can expect IGEL to make any necessary "best effort" to support, regardless of whether the endpoints in question are specifically listed within the IGEL Knowledge Base or elsewhere (e.g. on the IGEL Ready Showcase at <https://www.igel.com/ready/showcase-categories/endpoints/>).
- For any devices not listed here or on the IGEL Ready showcase, you can contact your hardware vendor and request those devices to be added to the IGEL Ready program.
- Integrated drivers and supported peripherals are listed in the [Third-Party Hardware Database](#)<sup>21</sup>. For more solutions compatible with IGEL OS, see Partner Solutions.

<sup>21</sup> <https://www.igel.com/linux-3rd-party-hardware-database/>

**i** HP, Lenovo, and LG device models are available from the factory with pre-installed IGEL OS 11. Please contact [IGEL Ready<sup>22</sup>](#) to get information on which device models are available with pre-installed IGEL OS.

**i** For some of the devices listed here, Flash memory must be extended to  $\geq 2$  GB. For these devices, an appropriate note is added.

**i** On modern computers such as secured-core PCs (see e.g. <https://www.microsoft.com/en-us/windows/business/devices?col=secured-core-pcs>), there may be a BIOS setting related to Secure Boot that allows the use of Microsoft's 3rd party UEFI Secure Boot Certificate. The usual description of such a BIOS setting is "Allow Microsoft 3rd Party UEFI CA". This setting must be set to enabled, as IGEL uses the 3rd party certificate to support UEFI Secure Boot. If UEFI Secure Boot is enabled, but "Allow Microsoft 3rd Party UEFI CA" is not enabled, you may be unable to boot IGEL OS Creator or UD Pocket. Similarly, if the setting "Allow Microsoft 3rd Party UEFI CA" is disabled after a previous installation of IGEL OS, IGEL OS will fail to boot. For how to enable the setting, see Secured-Core PCs: Microsoft 3rd-Party UEFI Certificate for Secure Boot.

**i** [Fn] keys may not work on some supported and listed laptop/notebook models.

#### ADS-Tec

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
DVG-VMT9010	Industrial PC/ Terminal	4 GB 8 GB	64 GB eMMC	Intel Atom® x7-E3950	11.02.100
DVG-VMT9012	Industrial PC/ Terminal	4 GB 8 GB	64 GB eMMC	Intel Atom® x7-E3950	11.02.100
DVG-VMT9015	Industrial PC/ Terminal	4 GB 8 GB	64 GB eMMC	Intel Atom® x7-E3950	11.02.100
DVG-VMT9112	Industrial PC/ Terminal	4 GB 8 GB	64 GB eMMC	Intel Atom® x7-E3950	11.02.100

#### Advantech

<sup>22</sup> <https://www.igel.com/technology-partners/>

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
POC-W213L	Medical All in One	4 GB	128 GB	Intel Core i7-7300U	11.01.100
POC-W243L* (see page 113)	Medical All in One	4 GB	32 GB	Intel Kaby Lake Core i5-7300U	11.01.110
POC-W243L* (see page 113)	Medical All in One	4 GB	128 GB	Intel Core i7-7300U	11.01.100

#### Advantech-DLoG

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
DLT-V6210	Industrial PC/ Terminal	4 GB	32 GB	Intel Atom	11.01.100
DLT-V7210 K	Industrial PC/ Terminal	4 GB	4 GB	Intel Atom E3845	11.01.100

#### Dell / Wyse

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version	Note
5040 / 5212	All in One	2 GB	2 GB	AMD G-T48E	11.01.100	
3040	Thin Client	2 GB	8 GB	Intel Atom x5-Z8350	11.01.100	
5020	Thin Client	2 GB	8 GB	AMD G-Series SoC	11.02.140	
5060	Thin Client	4 GB	8 GB	AMD GX-424CC	11.01.100	
5070	Thin Client	8 GB	32 GB	Intel Celeron J4105	11.01.100	



Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version	Note
Latitude 5510	Laptop/ Notebook	8 GB	256 GB	Intel Core i5-10210U	11.05.100	Wake-on-LAN functionality is not supported.
Optiplex 3000	Thin Client	4 GB	32 GB	Intel Celeron N5105	11.08.200	

#### Dynabook

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
Portegé X20W-D	Laptop/ Notebook	8 GB	256 GB	Intel Core i5-7200U	11.01.100
Portegé X30-D	Laptop/ Notebook	8 GB	256 GB	Intel Core i5-7300U	11.01.100
Tecra C50	Laptop/ Notebook	4 GB	500 GB	Intel i5-4210U	11.01.100
Tecra Z50-D	Laptop/ Notebook	8 GB	256 GB	Intel Core i5-7200U	11.01.100
SATELLITE R50	Laptop/ Notebook	4 GB	500 GB	Intel i3-6006U	11.01.100

#### Elo

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
i2 Touch (15 and 22 inches)	All in One	8 GB	128 GB	Intel Core i3-8100T	11.05.100

#### Fujitsu

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
Q957	Desktop PC	8 GB	500 GB	Intel Core i3-6100	11.02.100
FUTRO S740	Thin Client	4 GB	8 GB	Intel Celeron J4105	11.04.100

## HP

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version	Note
HP t420	Thin Client	2 GB	8 GB	AMD Embedded G-Series GX-209JA	11.02.100	
HP t430	Thin Client	2 GB	16 GB	Intel®Celeron® N4020	11.01.110	
HP t530	Thin Client	4 GB	8 GB	AMD GX-215JJ Dual-Core	11.01.100	
HP t630	Thin Client	4 GB	8 GB	AMD GX-420GI	11.01.100	
HP t730	Thin Client	16 GB	8 GB	AMD RX-427BB APU	11.01.100	
HP t820	Thin Client	16 GB	16 GB	Intel Core i5-4570S	11.01.100	
HP t640	Thin Client	4 GB	16 GB	AMD Ryzen R1505G	11.04.100	
HP t540	Thin Client	16 GB	16 GB	AMD Ryzen Embedded R1305G	11.06.100	

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version	Note
HP mt46	Mobile Thin Client	8 GB	32 GB	AMD Ryzen 3 PRO 4450U	11.07.100	Excluding support for WWAN and Wake-on-LAN (both features are planned)
HP Elite t655	Thin Client	4 GB / 8 GB	32 GB	AMD Ryzen Embedded R2314	11.07.160	
HP Elite mt645 G7	Mobile Thin Client	8 GB	256 GB	AMD Ryzen 3 5425U	11.08.230	Support for WWAN Intel XMM 7560 R+ (as of 11.08.330) Excluding support for Wake-on-LAN (feature is planned) Excluding support for built-in fingerprint sensor
				AMD Ryzen 5 5625U	11.08.330	
HP t740	Thin Client	8 GB	16 GB	AMD Ryzen Embedded V1756B	11.08.290	
HP Pro t550	Thin Client	4 GB	32 GB	Intel Celeron J6412	11.08.330	
HP Pro mt440 G3	Mobile Thin Client	8 GB	128 GB	Intel Celeron 7305	11.08.440	Excluding support for WWAN Intel XMM 7560 R+ (feature is planned)

#### HP Docking Stations

Name	Supported from IGEL OS Version
HP USB-C Docking Station G5	11.08.230
HP USB-C G5 Essential Dock	11.08.290

#### Intel

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
NUC 5i5MYHE	Desktop PC	2 GB	32 GB	Intel i5-5300U	11.01.100
NUC 5i3RYH	Desktop PC	2 GB	2 GB	Intel i3-5010U	11.01.100
NUC 7CJYH	Desktop PC	2 GB	4 GB	Intel Celeron J4005	11.01.100

#### Lenovo

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Wi-Fi Chip	Supported from IGEL OS Version	Note
ThinkCentre M625q	Desktop PC	4 GB	32 GB	AMD E2-9000e	Intel AC9260	11.04.100	
		8 GB	128 GB	AMD A4-9120e	QCA6174 802.11ac	11.04.100	
ThinkCentre M75n	Desktop PC	8 GB	256 GB	AMD Ryzen 3 Pro 3300U	Intel AC9260	11.05.100	
ThinkCentre M70q Gen1	Desktop PC	16 GB	256 GB	Intel i5-10500t	Comet Lake PCH CNVi WiFi, Intel	11.05.100	
ThinkCentre M70q Gen 3	Desktop PC	16 GB	256 GB	Intel Core i5-12500T	Intel AX201	11.08.240	
ThinkCentre M75q Gen 2	Desktop PC	4 GB	128 GB	AMD Ryzen 3 Pro 5350GE	Intel AX200	11.08.240	

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Wi-Fi Chip	Supported from IGEL OS Version	Note
K14 AMD Gen 1	Laptop/ Notebook	8 GB	256 GB	AMD Ryzen 5 PRO 5650U	Mediatek MT7921	11.08.240	
ThinkPad L14 AMD Gen 1	Laptop/ Notebook	64 GB	1 TB	AMD Ryzen 7 Pro 4750U	Wi-Fi 6 AX200, Intel	11.05.100	
14w	Laptop/ Notebook	4 GB	64 GB	AMD A6-9220C	QCA6174 802.11ac	11.05.100	
ThinkPad L14 AMD Gen 3	Laptop/ Notebook	16 GB	256 GB	AMD Ryzen 5 5625U	AMD RZ616 2X2AX (WiFi 6E)	11.08.230	Excluding support for WWAN
ThinkCentre Neo50q Gen 4	Thin Client	8 GB	256 GB	Intel Core i3-1215U	Wi-Fi 6 RTL8852BE	11.08.240	
		4 GB	256 GB	Intel Celeron 7305	Wi-Fi 6 AX201		
K14 Intel Gen 1	Laptop/ Notebook	16 GB	256 GB	Intel Core i5-1135G7	Intel AX210 WiFi / BT combo	11.08.290	
ThinkPad L14 Intel Gen 3	Laptop/ Notebook	16 GB	512 GB	Intel Core i5-1235U	Intel Wi-Fi 6 AX201 2x2 AX vPro	11.08.330	LTE support as of 11.08.360
ThinkEdge SE10	Thin Client	8 GB	1 TB	Intel Atom x6425RE	MediaTek MT7921LEN	11.08.360	
			256 GB	Intel Atom x6214RE	Intel AX210	11.08.360	
ThinkPad L14 AMD Gen 4	Thin Client	8 GB	256 GB	AMD Ryzen 3 Pro 7330U	AMD RZ616 Realtek RTL8852CE	11.08.440	Quectel EM05-G 4G CAT4
ThinkPad L15 AMD Gen4	Thin Client	8 GB	256 GB	AMD Ryzen 3 Pro 7330U	AMD RZ616 Realtek RTL8852CE	11.08.440	Quectel EM05-G 4G CAT4

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Wi-Fi Chip	Supported from IGEL OS Version	Note
ThinkPad L14 Intel Gen 4	Laptop/ Notebook	8 GB	256 GB	Intel Core i3-1315U	Intel AX211	11.09.100	Quectel EM05-G 4G CAT4
ThinkPad L15 Intel Gen 4	Laptop/ Notebook	8 GB	256 GB	Intel Core i3-1315U	Intel AX211	11.09.100	Quectel EM05-G 4G CAT4

#### Lenovo Docking Stations

Name	Supported from IGEL OS Version
ThinkPad USB-C Hybrid Dock	11.07.100
IOBOX	11.07.100
Lenovo Universal USB-C Dock	11.08.440

#### LG

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
24CK550N* * (see page 113)	All in One	4 GB	32 GB	AMD G-Series GX-212JJ	11.01.100
24CK550W* * (see page 113)	All in One	4 GB	32 GB	AMD G-Series GX-212JJ	11.01.100
24CK560N* * (see page 113)	All in One	4 GB	32 GB	AMD G-Series GX-212JJ	11.01.100
CK500W	Thin Client	4 GB	32 GB	AMD G-Series GX-212JJ	11.01.100
38CK950N	All in One	8 GB	128 GB	AMD Ryzen 3	11.02.100
38CK900N	All in One	8 GB	128 GB	AMD Ryzen 3	11.02.100

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
CL600N	Thin Client	4 GB	16 GB	Intel® Celeron J4105	11.03.100
CL600W	Thin Client	8 GB	128 GB	Intel® Celeron J4105	11.03.100
34CN650N	All in One	4 GB	16 GB	Intel® Celeron J4105	11.05.100
24CN650N	All in One	8 GB	16 GB	Intel® Celeron J4105	11.05.100
27CN650N	All in One	8 GB	16 GB	Intel® Celeron J4105	11.05.100
CQ600I	Thin Client	4 GB	16 GB	Intel Celeron N5105	11.08.330
24CQ650I	All in One	4 GB	16 GB	Intel Celeron N5105	11.08.330
CQ601I	Thin Client	4 GB	16 GB	Intel Pentium Silver N6005	11.08.360
24CR670I	All in One	4 GB	16 GB	Intel Celeron N5105	11.09.110

#### LG Docking Stations

Name	Supported from IGEL OS Version
LG USB Multi Port Hub	11.09.100

#### OnLogic

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
CL210G-10	Industrial PC/ Terminal	4 GB	32 GB	Intel Celeron N3350	11.04.100
KARBON 300	Desktop PC	4 GB	32 GB	Intel Atom x5-E3930	11.04.100

#### Onyx Healthcare

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
Venus 223	Medical All in One	4 GB	128 GB	Intel Quad-Core J1900	11.01.100

#### Pepperl+Fuchs

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
BTC12N	Industrial Box Thin Client	4 GB	32 GB	Intel Apollo Lake N4200	11.09.100
BTC14N	Industrial Box Thin Client	4 GB	32 GB	AMD Ryzen Embedded V1202B	11.09.100

#### Rein Medical

Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
Silenio C122	All in One	8 GB	128 GB	Intel® Core™ i5 – 6th Generation	11.01.110
Silenio C124	All in One	8 GB	128 GB	Intel® Core™ i5 – 6th Generation	11.01.110
Clinio S 522TCT	Medical All in One	8 GB	16 GB	Intel® Pentium® Silver J5005	11.04.100
Clinio S 524TCT	Medical All in One	8 GB	16 GB	Intel® Pentium® Silver J5005	11.04.100

#### Secunet



Name	Endpoint Type	Minimum Memory (RAM) Size	Storage Size	Processor	Supported from IGEL OS Version
SINA Workstation S EliteDesk 800 G2	Workstation	16 GB	256 GB	Intel Core i7-6700	11.01.100


#### USB Memory Sticks That Can Be Used as Alternative UD Pocket Hardware


##### DIGITTRADE

Name	Storage	Supported from IGEL OS Version
Kobra Stick	≥ 4GB	11.05.133

#### Officially Supported Virtual Environments

- Tested with Ubuntu (64-bit) and default settings

 Note that the use of a UD Pocket within a virtual machine is **not** supported by IGEL.

 For some features, more than 2 GB RAM is required. Example: if you use dual monitor environments, a virtual machine must have at least 8 GB RAM.

Name	Memory (RAM)	Storage	Type	Supported from IGEL OS Version
Oracle VM VirtualBox	≥ 2 GB	≥ 4 GB	Linux	11.04.100
VMware Workstation	≥ 2 GB	≥ 4 GB	Linux	11.04.100

\* Delock Adapter DP 1.2 to DVI does not work.


\*\* When using an additional 4k screen with this device, please edit the BIOS settings as follows:


1. Go to the **Chipset** screen.
2. Set **Integrated Graphics** to “Force”.
3. Set **UMA Frame Buffer Size** to “256M” or higher


When you have confirmed that your devices can be upgraded to IGEL OS 11, make sure to consider [Important! Consider This Before Upgrading](#) (see page 114).


### Important! Consider This Before Upgrading


To make sure that your upgrade can be successful, check the following warnings and notes; a warning symbol indicates that irreversible damage can be done to your devices.


 **Existing partitions:** Any existing partition on the target drive of your device will be deleted. The installer will repartition the target device. The overall size of the newly created partitions will be calculated based on the available disk space. The minimum disk usage is 2 GB, the maximum is 16 GB.


 **No Downgrade**  
You cannot restore your IGEL OS 10 system once you have migrated to IGEL OS 11. The device storage is overwritten completely with a new partitioning scheme.

 **Features (e.g. Clients)**  
IGEL OS 11 does not have the complete feature set of IGEL OS 10. Make sure that the current version of IGEL OS 11 meets your requirements. For details, refer to the appropriate release notes.

 **Custom Partitions**  
The contents of custom partitions will be deleted by the upgrade. Make sure to back up the contents and restore them after the upgrade has finished. Besides becoming dysfunctional after the upgrade, applications and kernel drivers in a custom partition might corrupt the upgrade. For this reason, make sure to first test the upgrade on a characteristic device. We recommend that you disable custom partitions when upgrading; you can enable them once the upgrade has been successfully completed.

 **Custom Commands**  
The persistence of custom commands cannot be guaranteed. Besides becoming dysfunctional after the upgrade, custom commands might corrupt the upgrade. For this reason, make sure to first test the upgrade on a characteristic device. In general, custom commands must be adapted for IGEL OS 11. We recommend that you disable custom commands when upgrading; you can enable them once the upgrade has been successfully completed.

 **Power Supply**  
Ensure that the device is not running on battery power, i.e. it must be connected to a power supply during the complete upgrade process.

 **Network**  
All devices must be connected to a WLAN or LAN. LAN is the recommended option. The device will not be upgraded if connected to OpenVPN, OpenConnect, gencard or mobile broadband.

When you have considered everything that is relevant, continue with [Preparing the Upgrade](#) (see page 115).

### Preparing the Upgrade

This section describes the required preparations and tests before any productive devices can be updated. The testing should be done with at least one device that is characteristic of your environment. This device should have every custom partition and every custom command that may possibly exist in any of your devices.

To prepare the upgrade, perform the following steps:

1. [Preparing the UMS \(see page 116\)](#)
2. [Adjusting the Setup \(see page 117\)](#)
3. [Deploying a License \(see page 118\)](#)
4. [Configuring the Update Source \(see page 119\)](#)

### Preparing the UMS

To upgrade your devices to IGEL OS 11, you need the appropriate version of the UMS. Also, the devices must be registered with the UMS to receive their licenses.


1. If you have not already done so, update your UMS to version 6.01.130 or higher. For instructions, see [Updating UMS](#).
2. Make sure that your devices are registered with the UMS. For more information, see the chapter [Registering IGEL OS Devices on the UMS Server](#) in the UMS Manual.

When the UMS is ready, continue with [Adjusting the Setup](#) (see page 117).

## Adjusting the Setup

Depending on the features that are in use now or will be used in the future, a specific set of parameters must be set in the device's Setup.

1. In the Setup, go to **System > Firmware Update > OS 11 Upgrade**.
2. Make your settings as appropriate:
  - Activate **Upgrade to OS 11**.

 When **Upgrade to OS 11** is activated, the device checks for a Workspace Edition license and stops checking for a legacy UDC3 or UD Pocket license. Therefore, in the UMS, it is displayed as an unlicensed device until a Workspace Edition license has been deployed.

- If you want the device to retry the upgrade immediately after a failed attempt, activate **Upgrade to OS 11 even if a previous upgrade attempt failed**. The device will retry the upgrade 5 times. When the 5th attempt has failed, a message will be shown in the upgrade tool window.
- If your device has a PowerTerm license, and you want to upgrade to IGEL OS 11 even though it does not support PowerTerm, you must activate **Upgrade to OS 11 even if PowerTerm is enabled**.
- Under **Require an Enterprise Management Pack license to upgrade to OS 11**, select the appropriate option:
  - If you are using IGEL Cloud Gateway (ICG) or Shared Workplace (SWP) or a Custom Partition and want to make sure that the upgrade is performed only if these features can be used furthermore, select **Smart**. When this option is selected, and any of these features is activated, the upgrade is performed only if the device could fetch a license from an Enterprise Management Pack.
  - If you want to force the device to fetch a license from an Enterprise Management Pack and make sure that the upgrade is performed only if the license could be fetched, select **Always**.
  - If you want the device to upgrade to IGEL OS 11 without fetching an Enterprise Management Pack, disregarding the features that might be activated, select **Never**.
- Under **Timeout waiting for OS 11 license to start automatic upgrade**, set the time period the device will wait for a license in a mass deployment scenario (see [Zero-Touch Deployment Using Universal Firmware Update](#) (see page 63), [Zero-Touch Deployment Using Buddy Update](#) (see page 101) and [Mass Deployment Using a Scheduled Job](#) (see page 204)). This setting prevents the device from starting the upgrade at an inappropriate time as a result of the license just being deployed. This way, the setting prevents unwanted interruptions at work. For a mass deployment scenario, the default value **10 Minutes** is recommended.

3. Click **Apply**.

When the Setup is adjusted, continue with [Deploying a License](#) (see page 118).

### Deploying a License

To upgrade from IGEL OS 10 to IGEL OS 11, you need an appropriate license. Depending on your requirements, one or more of these licenses will be needed for each device:

- One Workspace Edition license for basic functionality. For further information, see [Workspace Edition](#)
- If IGEL Cloud Gateway (ICG), or Shared Workplace (SWP) will be used: One Enterprise Management Pack license. For further information, see [Enterprise Management Pack](#).
- Custom Partition - if IGEL OS 11.03.100 or lower is the target version; in IGEL OS 11.03.500 or higher, the Custom Partition feature is included in the Workspace Edition.

▶ Deploy the licenses for IGEL OS 11 using the method that suits your needs:

- **Manual License Deployment:** Licenses are created and deployed manually. For instructions, see [Manual License Deployment for IGEL OS](#).
- **Automatic License Deployment (ALD):** Licenses are created and deployed automatically to each device that needs a license. For instructions, see [Setting up Automatic License Deployment \(ALD\)](#).
- Download three demo licenses from <https://www.igel.com/download/>.


When the device has a license, continue with [Configuring the Update Source](#) (see page 119).


#### Configuring the Update Source

1. In the Setup, go to **System > Update > Firmware Update** and configure the update source for IGEL OS 11. For more information, see the Firmware Update chapter in the IGEL OS Manual.
2. Click **Ok**.



When the correct update source is configured, continue with [Testing the Upgrade](#) (see page 120).

## Testing the Upgrade

1. Click  System and then **Upgrade to OS 11**. The OS 11 Upgrade Tool starts and indicates whether all requirements are met.

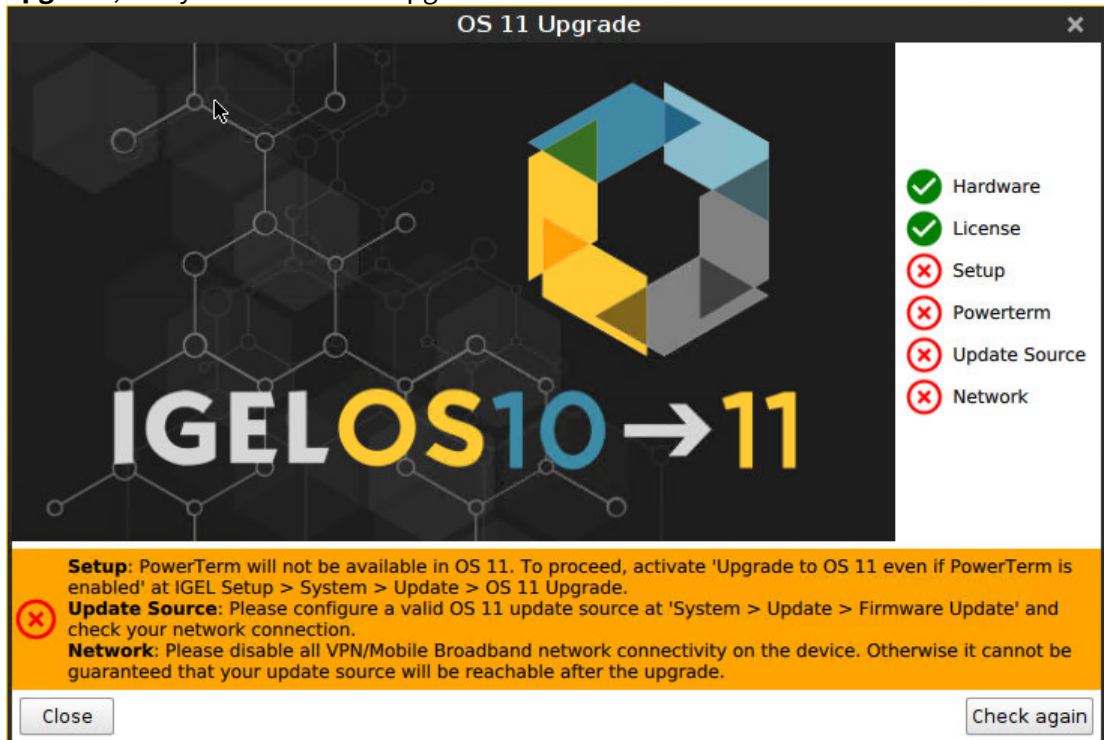
 You can change the starting the starting methods for the OS 11 Upgrade Tool in the Setup under **Accessories > OS11 Upgrade**.



2. Check the output of the OS 11 Upgrade Tool and continue appropriately:
  - If each requirement has an  icon, click **OS Upgrade** to start the upgrade process.
  - If one or more requirements have an  icon, check the messages and resolve the issues. Afterwards, click **Check again**. If all requirements are met, the button changes to **OS**

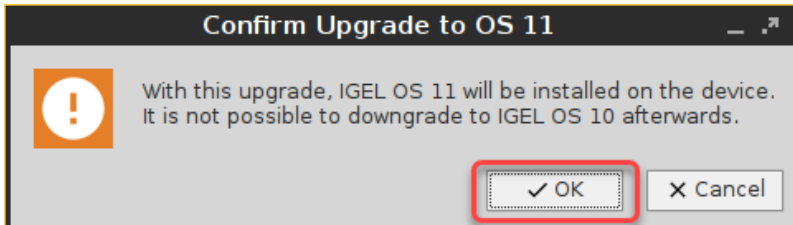


**Upgrade**, and you can start the upgrade.

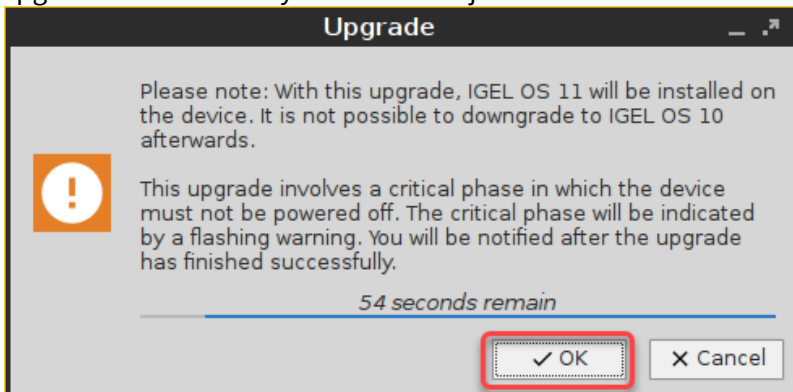


When you start the upgrade, a warning dialog is shown.

- 3. Click **OK** to continue.



A warning dialog with a timeout is shown. If you click **Cancel** before the timeout expires, the upgrade is canceled. If you click **OK** or just wait for the timeout to expire, the upgrade is started

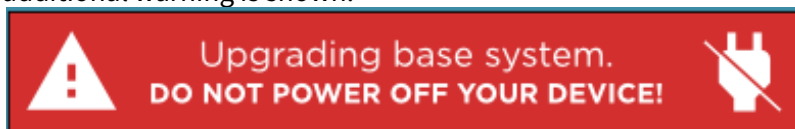


After the warning dialog has been confirmed or the timeout has expired, the device reboots into a special IGEL OS 10 environment, in which the system upgrade is executed. The **Upgrade** window

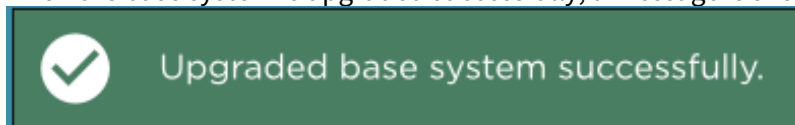
show the progress.



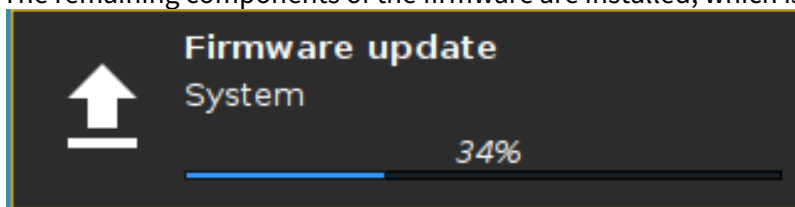
During the critical phase, the device must not be powered off. At this stage in the progress, an additional warning is shown.



When the base system is upgraded successfully, a message is shown.



The remaining components of the firmware are installed, which is indicated by update messages.



When the installation is completed, the **Upgrade** window looks like this:



After a few seconds the device reboots into IGEL OS 11.



When the upgrade test has been successful, you are ready to set up the mass upgrade. Continue with [Checking the Requirements](#) (see page 124).

## Checking the Requirements


The following requirements must be met:

- The upgrade has been tested with characteristic devices.
- UMS 6.01.130 or higher is available.
- The firmware IGEL OS 10.05.800 (or higher) is known to the UMS. For this purpose, a device with this firmware version must be registered in the UMS. This is already the case if you tested the upgrade with the same UMS with which you are about to do the mass upgrade. If not, you must register a device with the appropriate firmware version now.
- All devices are connected to a regular LAN (not OpenVPN, OpenConnect, genucard, NCP VPN or mobile broadband).
- All devices are in a safe environment where the upgrade process cannot be disrupted, e.g. by powering off the devices.

When all requirements are met, continue with [Configuring Two Update Buddies](#) (see page 125).

## Configuring Two Update Buddies

For setting up buddy updates, see the how-to [Buddy Update](#) (see page 221).

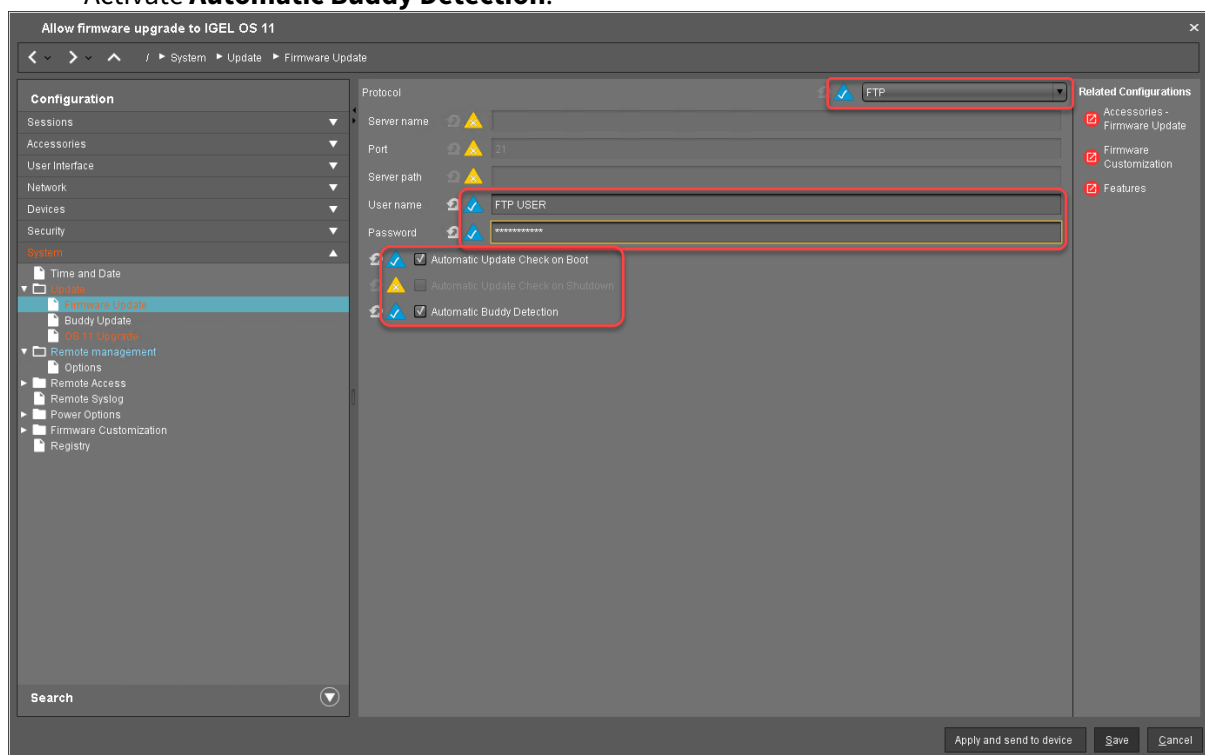
 Ensure that the network contains only the update buddies and the devices that are to be updated. This prevents other devices from updating inadvertently.

1. Update one device to the appropriate IGEL OS 10 firmware (10.05.800 or higher) and configure it as an update buddy.
2. Upgrade another device to IGEL OS 11 and configure it as an update buddy. Make sure that the IGEL OS 11 update buddy has the same **User Name** and **Password** in **System > Update > Buddy Update** as the IGEL OS 10 update buddy.

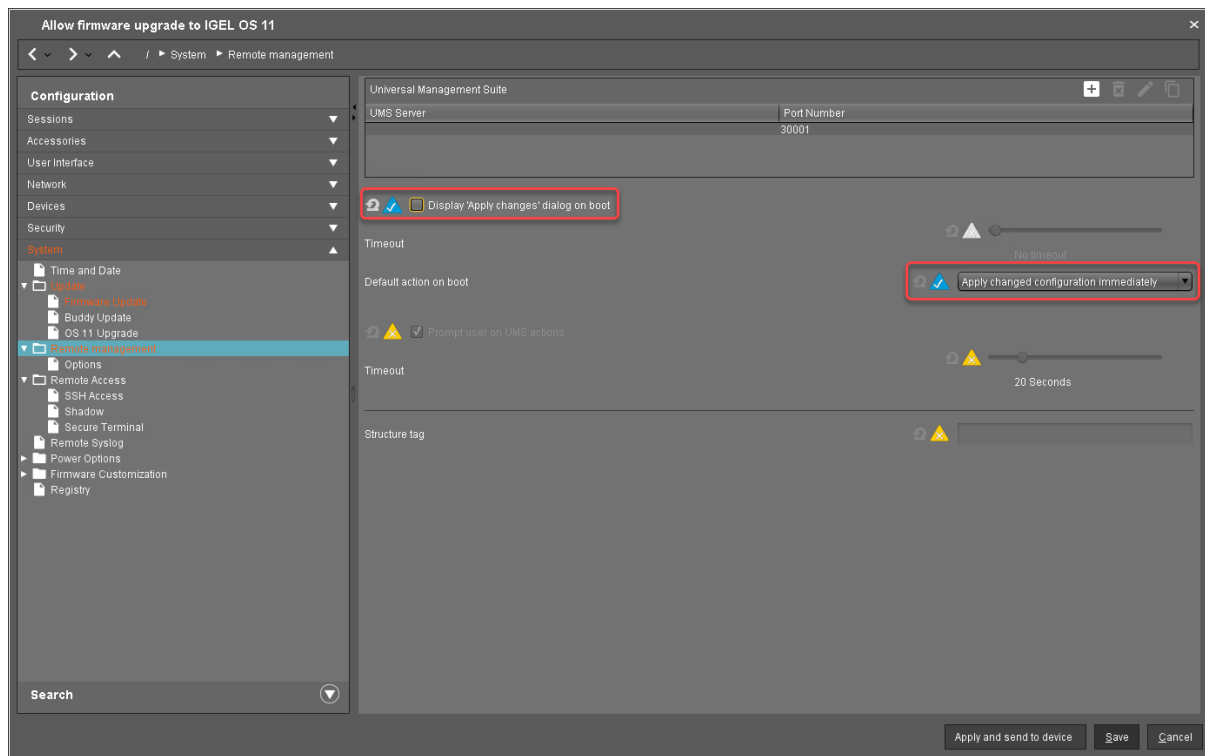
When the update buddies are configured, continue with [Creating a Profile](#) (see page 126).

### Creating a Profile

1. Create a profile that is based on the appropriate IGEL OS 10 version (10.05.800 or higher). Find a suitable name for the profile, e.g. "Firmware upgrade to IGEL OS 11".
2. In the profile's configuration dialog, go to **System > Update > Firmware Update** and change the settings as follows:
  - Select "FTP" as **Protocol**.
  - Enter **User Name** and **Password** according to the update buddy server.
  - Activate **Automatic Update Check on Boot**.
  - Ensure that **Automatic Update Check on Shutdown** is deactivated. Otherwise, the device will shut down when the upgrade to OS 10.05.800 is finished.
  - Activate **Automatic Buddy Detection**.



3. Go to **System > Update > OS 11 Upgrade** and change the following settings according to your successful upgrade test (for details, see [Adjusting the Setup](#) (see page 117)):
  - Activate **Upgrade to OS 11**.
  - Set **Upgrade to OS 11 even if PowerTerm is enabled** according to your needs.
  - Set **Require an Enterprise Management Pack license to upgrade to OS 11** according to your needs.
  - Set **Timeout waiting for OS 11 license to start automatic upgrade to 10 Minutes**.
4. Go to **System > Remote Management** and change the settings as follows:
  - Deactivate **Display 'Apply changes' dialog on boot**.
  - Set **Default action on boot to Apply changed configuration immediately**.



5. Click **Save**.

When the profile is created, continue with [Deploying the Licenses](#) (see page 128).

## Deploying the Licenses

Deploy the licenses for IGEL OS 11 using the method that suits your needs:


- Automatic License Deployment (ALD): Licenses are created and deployed automatically to each device that needs a license. For instructions, see [Setting up Automatic License Deployment \(ALD\)](#).
- Manual License Deployment: Licenses are created and deployed manually. For instructions, see [Manual License Deployment for IGEL OS](#).

When the license deployment is set up, continue with [Putting It All Together](#) (see page 129).



### Putting It All Together

1. Assign the profile to all devices that are to be upgraded. This can be done by assigning the profile to the directory that contains these devices.


 Do not assign the profile to the update buddies.

2. In the context menu of the assignment, select **Now**.
3. For Automatic license deployment, a condition can be set to the directory. For more information, see [Configuring the Distribution Conditions](#), section "Distributing Licenses to Devices in a Specified Directory".

When everything is in place, continue with [Executing the Upgrade](#) (see page 130).

## Executing the Upgrade

1. In the UMS, select all devices that are to be upgraded and reboot them.

 Alternatively, you can create a scheduled job for reboot or wake up and assign it to the devices or the directory containing these devices; for more information, see Jobs.

On reboot or wake up, the devices choose the IGEL OS 10 buddy. They ignore the IGEL OS 11 buddy at this stage because this version is not known to them yet. The devices update to the appropriate IGEL OS 10 version (10.05.800 or higher). With this version, the **Upgrade to OS 11** parameter is recognized by the devices; also, the devices request IGEL OS 11 licenses from the UMS (Workspace Edition and, if required, Enterprise Management Pack).

If no IGEL OS 11 licenses have been deployed on the devices yet, the licenses are deployed within a few minutes. The upgrade will be started when the licenses are deployed. The maximum time period the device will wait for a license is configured by the parameter **Timeout waiting for OS 11 license to start automatic upgrade**; for details, see [Adjusting the Setup](#) (see page 117).

The parameters **Automatic update check on boot** and **Automatic buddy detection** cause the devices to look for a new firmware and wait for an IGEL OS 11 update buddy to reply. When an IGEL OS 11 update buddy is found, the devices start the upgrade process.

2. When all devices have been upgraded successfully, remove the "Firmware upgrade to IGEL OS 11" profile.

The upgrade is completed.

## Mass Deployment Using a Scheduled Job

This scenario is appropriate if you already have a working environment with IGEL OS 10.05.800 (or higher) and want to update all devices to IGEL OS 11 at a defined time.

Read all the following chapters carefully and follow the instructions.

1. [Checking the Requirements](#) (see page 132)
2. [Creating a Profile](#) (see page 133)
3. [Deploying the Licenses](#) (see page 137)
4. [Assigning the Profile](#) (see page 138)
5. [Creating the Scheduled Job](#) (see page 140)

## Checking the Requirements

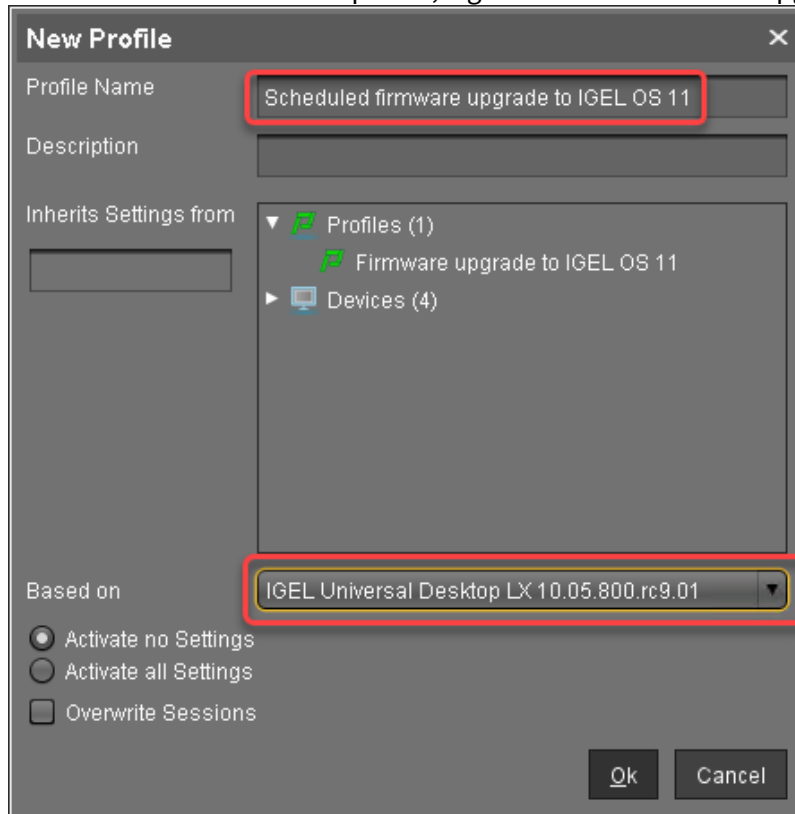
The following requirements must be met:

- The upgrade has been tested with characteristic devices.
- UMS 6.01.130 or higher is available.
- The firmware IGEL OS 10.05.800 (or higher) is known to the UMS. For this purpose, a device with this firmware version must be registered in the UMS. This is already the case if you tested the upgrade with the same UMS with which you are about to do the mass upgrade. If not, you must register a device with the appropriate firmware version now.
- All devices are connected to a regular LAN (not OpenVPN, OpenConnect, genucard, NCP VPN or mobile broadband).
- All devices are in a safe environment where the upgrade process cannot be disrupted, e.g. by powering off the devices.

When all requirements are met, continue with [Creating a Profile](#) (see page 133).

## Creating a Profile

1. Create a profile that is based on the appropriate IGEL OS 10 firmware version (10.05.800 or higher). Find a suitable name for the profile, e.g. "Scheduled firmware upgrade to IGEL OS 11".



2. In the profile's configuration dialog, go to **System > Update > Firmware Update** and change the settings according to your environment:

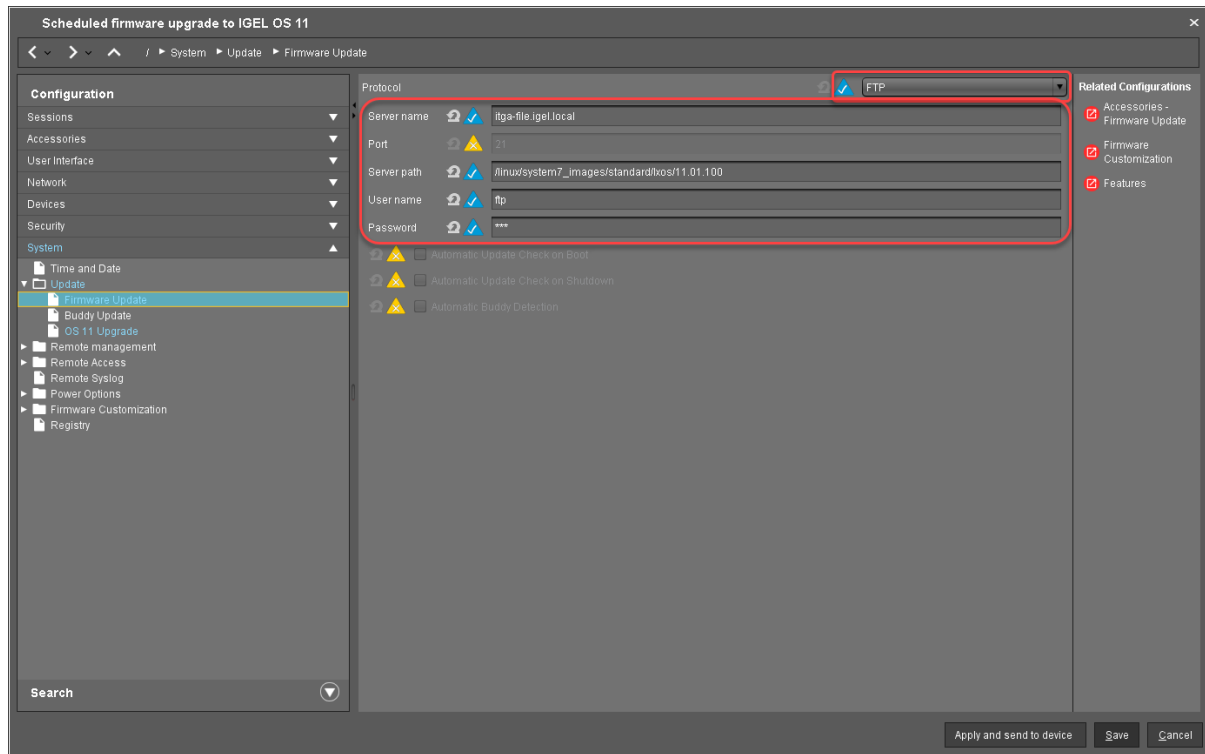
**i** If you use [Universal Firmware Update](#) (see page 167) for OS 11, you do not need to configure the settings described in this step.

- Select an update source for IGEL OS 11. For further information, see [Firmware Update](#).

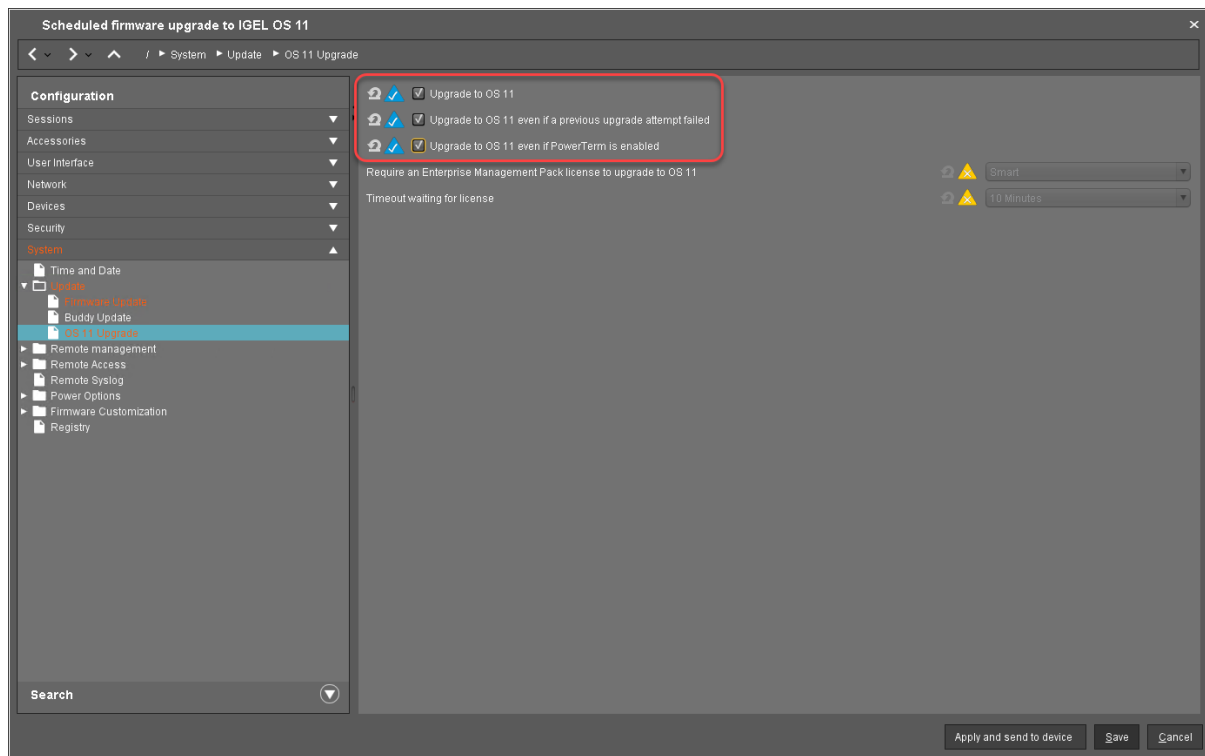
**i** If you use **FILE** as the protocol (local file or network drive), the device will show an error message and go through an additional reboot. Apart from that, the upgrade will work normally.

- Ensure that **Automatic Update Check on Boot** and **Automatic Update Check on Shutdown** are deactivated.

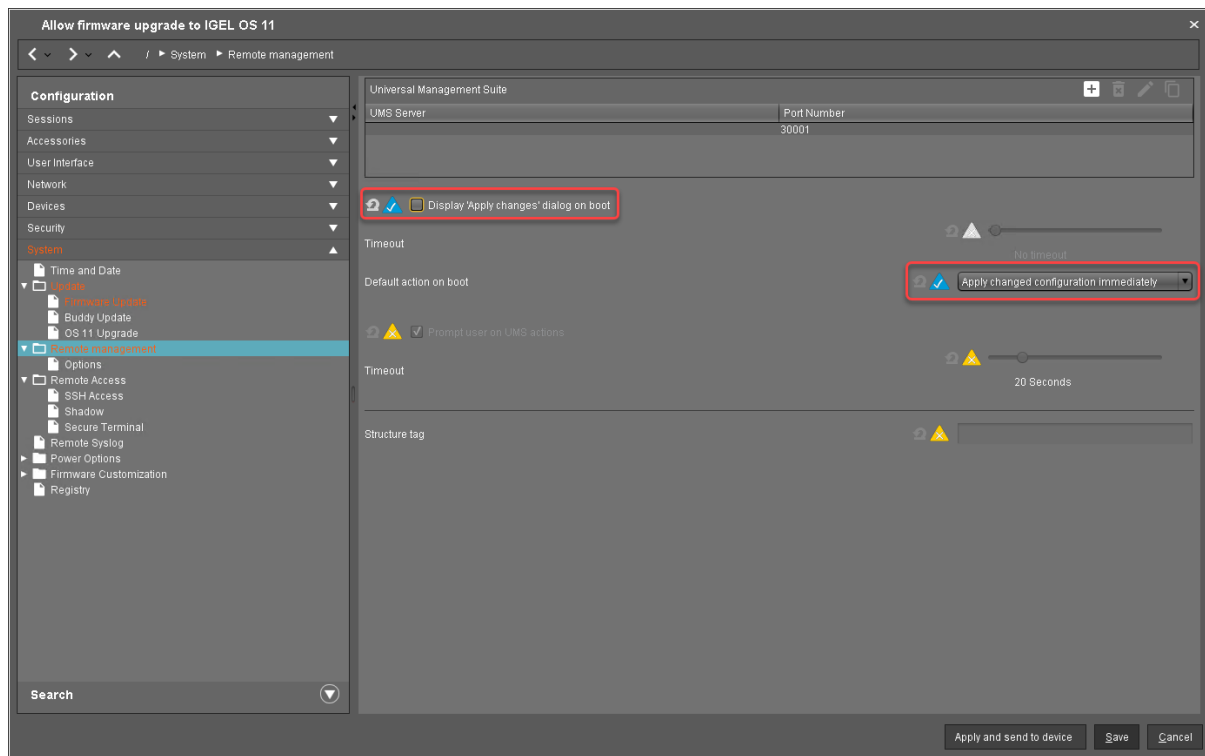
**i** In the following screenshot, FTP is used as an example. The other protocols can be used as well.



3. Go to **System > Update > OS 11 Upgrade** and change the following settings according to your successful upgrade test:
  - Activate **Upgrade to OS 11**.
  - Set **Upgrade to OS 11 even if PowerTerm is enabled** according to your needs.
  - Set **Upgrade to OS 11 even if a previous upgrade attempt failed** according to your needs.
  - Set **Require an Enterprise Management Pack license to upgrade to OS 11** according to your needs.
  - Ensure that the **Timeout waiting for OS 11 license to start automatic upgrade** is set to **10 Minutes**.



4. Go to **System > Remote Management** and change the settings as follows:
  - Deactivate **Display 'Apply changes' dialog on boot**.
  - Set **Default action on boot** to **Apply changed configuration immediately**.



5. Click **Save**.

When the profile is created, continue with [Deploying the Licenses](#) (see page 96).



## Deploying the Licenses

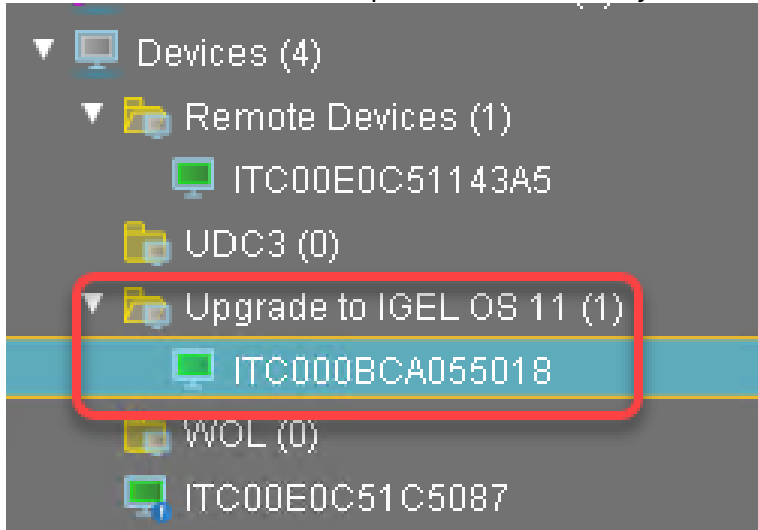
Deploy the licenses for IGEL OS 11 using the method that suits your needs:

- Automatic License Deployment (ALD): Licenses are created and deployed automatically to each device that needs a license. For instructions, see [Setting up Automatic License Deployment \(ALD\)](#).
- Manual License Deployment: Licenses are created and deployed manually. For instructions, see [Manual License Deployment for IGEL OS](#).

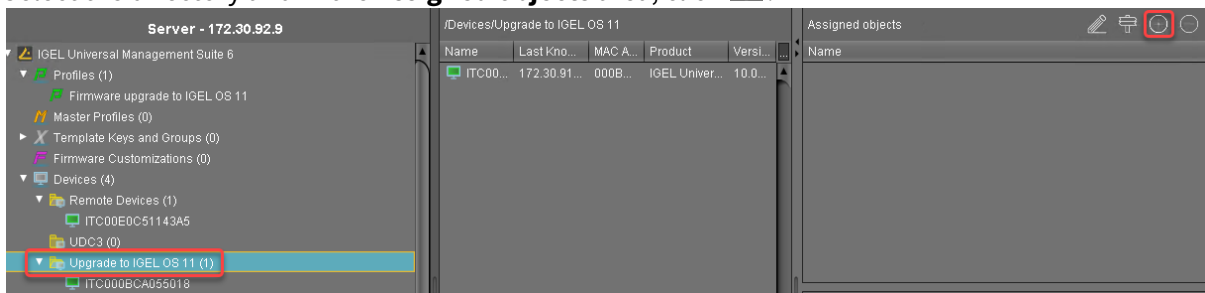
When the license deployment is set up, continue with [Assigning the Profile](#) (see page 138).

### Assigning the Profile

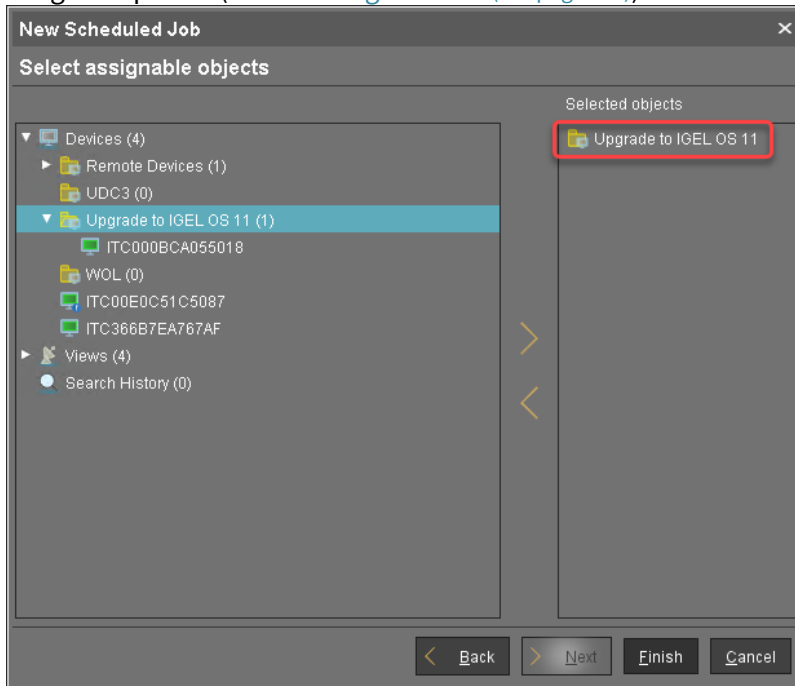
1. Put all devices that are to be updated into a directory.



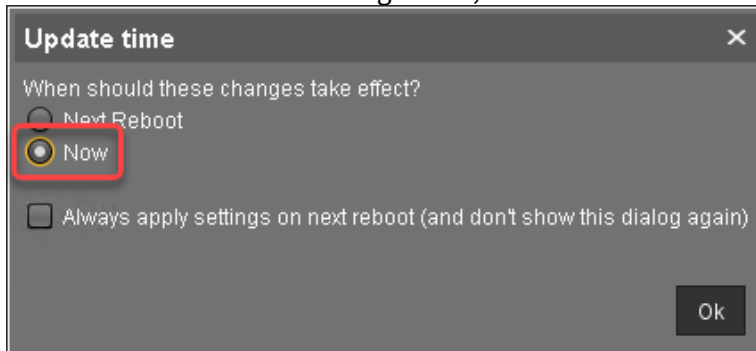
2. Select the directory and in the **Assigned objects** area, click .



3. Assign the profile (see [Creating a Profile \(see page 133\)](#)) to the directory and click **Ok**.



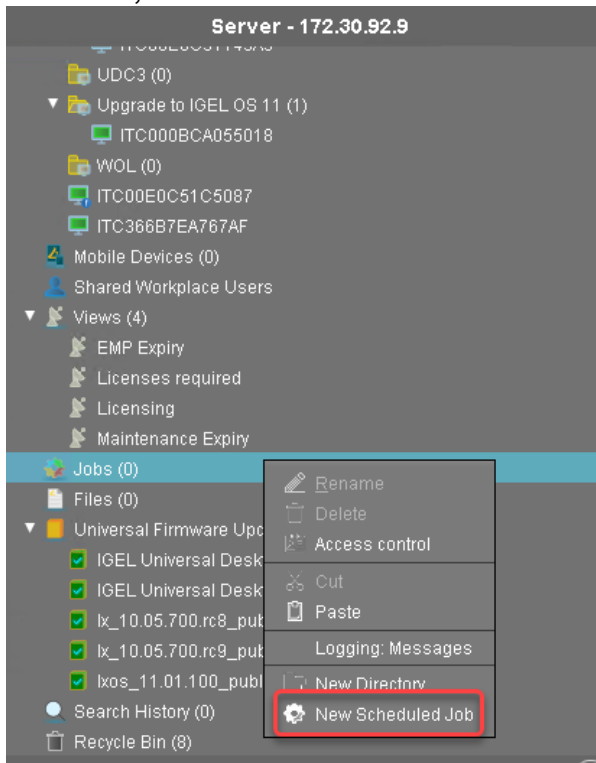
4. In the context menu of the assignment, select **Now**.



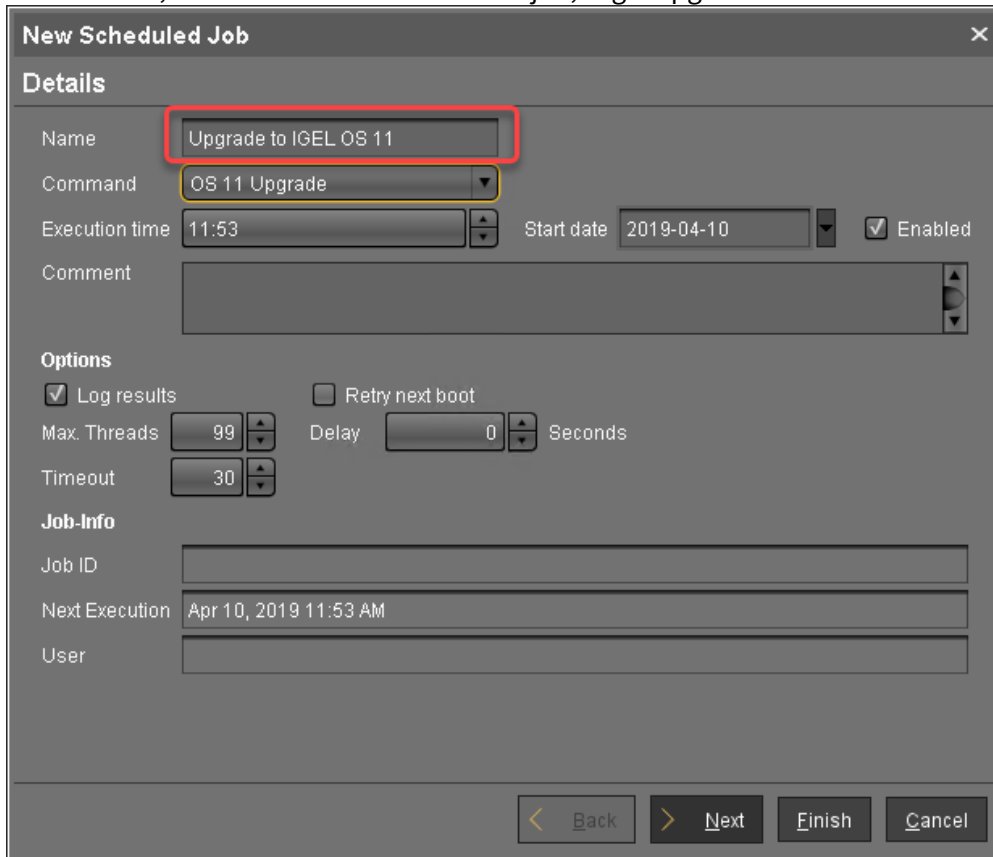
When the profile is assigned, continue with [Creating the Scheduled Job \(see page 140\)](#).

### Creating the Scheduled Job

1. In the UMS, select **Jobs > New Scheduled Job**.



2. Under **Name**, enter a suitable name for the job, e. g. "Upgrade to IGEL OS 11".



**New Scheduled Job**

**Details**

Name: Upgrade to IGEL OS 11

Command: OS 11 Upgrade

Execution time: 11:53 Start date: 2019-04-10  Enabled

Comment:

**Options**

Log results  Retry next boot

Max. Threads: 99 Delay: 0 Seconds

Timeout: 30

**Job-Info**

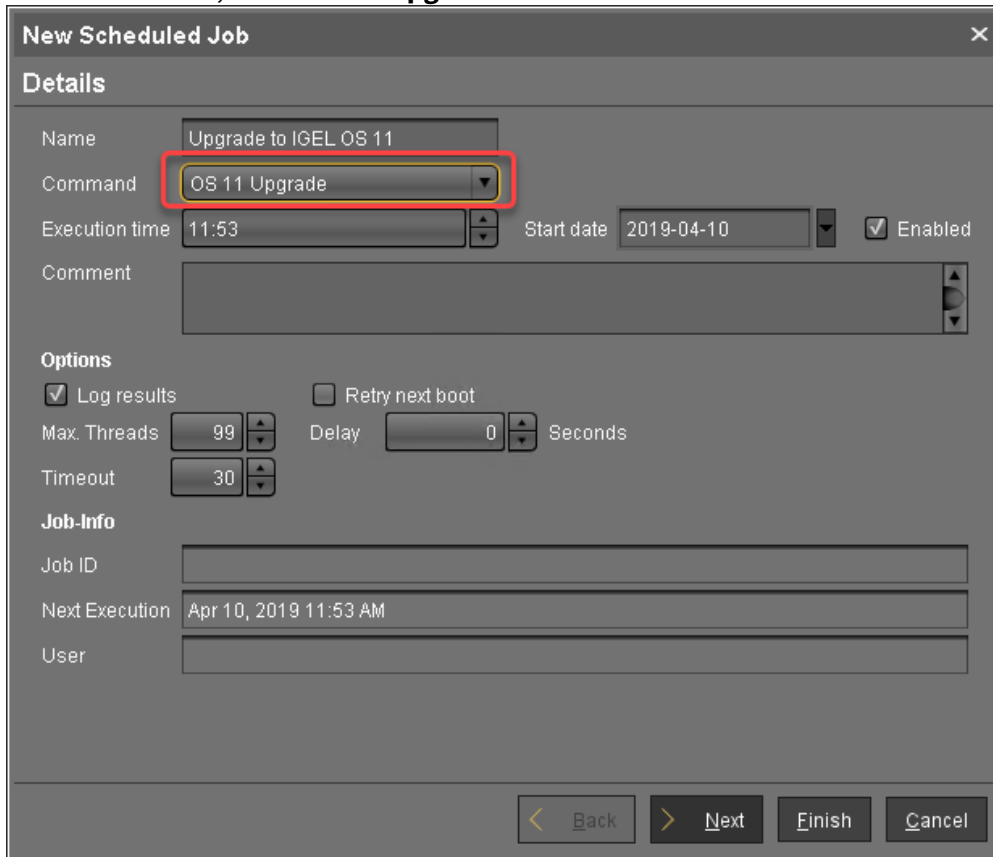
Job ID:

Next Execution: Apr 10, 2019 11:53 AM

User:

< Back > Next Finish Cancel

3. Under **Command**, select **OS 11 Upgrade**.



**New Scheduled Job**

**Details**

Name: Upgrade to IGEL OS 11

Command: OS 11 Upgrade

Execution time: 11:53 Start date: 2019-04-10  Enabled

Comment:

**Options**

Log results  Retry next boot

Max. Threads: 99 Delay: 0 Seconds

Timeout: 30

**Job-Info**

Job ID:

Next Execution: Apr 10, 2019 11:53 AM

User:

< Back > Next Finish Cancel

4. Under **Execution time** and **Start date**, set the time at which the upgrade should be executed, and click **Next**.

**New Scheduled Job**

**Details**

Name: Upgrade to IGEL OS 11

Command: OS 11 Upgrade

Execution time: 11:53 Start date: 2019-04-10  Enabled

Comment:

**Options**

Log results  Retry next boot

Max. Threads: 99 Delay: 0 Seconds

Timeout: 30

**Job-Info**

Job ID:

Next Execution: Apr 10, 2019 11:53 AM

User:

< Back **> Next** Finish Cancel

5. Review the execution time and click **Next**.

**New Scheduled Job** [X]

**Schedule**

Execution time: 11:53 Start date: 2019-04-10

Expiration date: [ ] Time: 11:49

**Repeat Job**

Never

Every: 0 day 0 hour

Weekdays:  Mon  Tue  Wed  Thu  Fri  Sat  Sun

Exclude Public Holidays: [ ] ...

Date	Comment
------	---------

**Cancel job execution**

Never

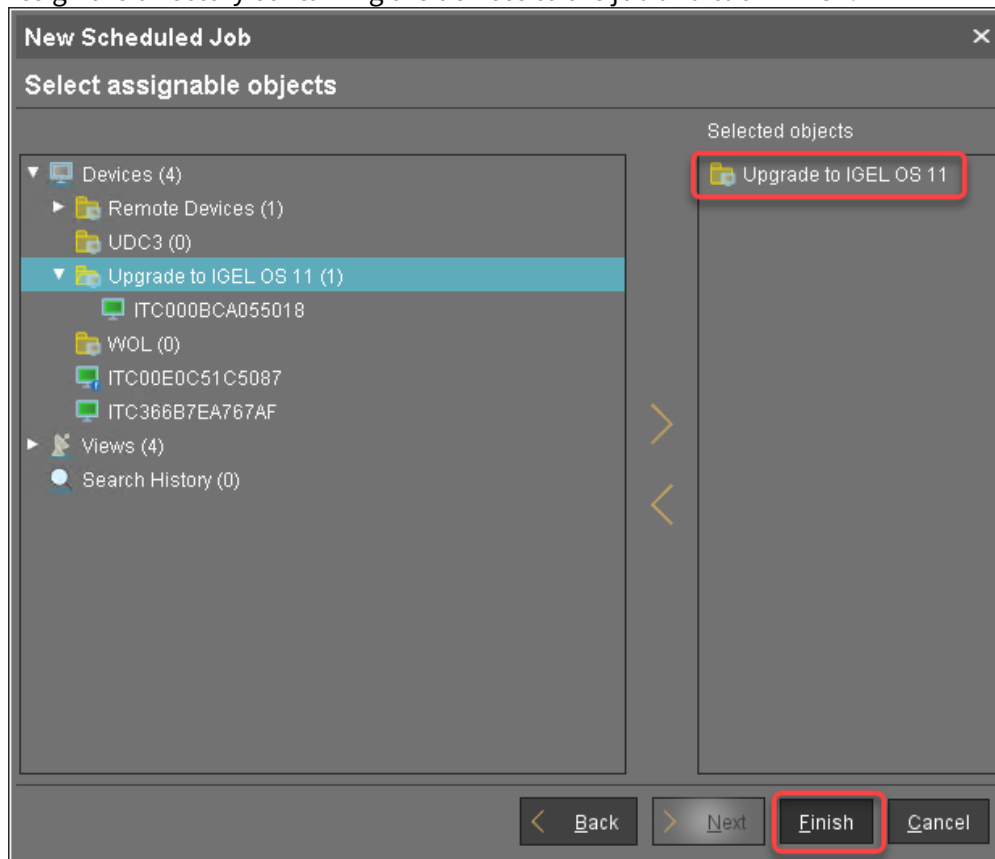
Time: 00:00

Max. duration: 00:00

< Back **> Next** Finish Cancel



6. Assign the directory containing the devices to the job and click **Finish**.



The upgrade is completed.

## Troubleshooting

This section describes possible error cases and solutions.

- [Regaining a Usable System](#) (see page 147)
- [Getting Error Messages](#) (see page 148)
- [Starting an New Upgrade Attempt](#) (see page 149)
- [Starting Another Upgrade Attempt after 5 Retries](#) (see page 150)

## Regaining a Usable System

Here you can find typical upgrade failures and the appropriate methods to regain a usable system.

### Device Has Upgraded to Igel OS 11, but Does Not Boot Any More

To get a working IGEL OS 11 system:

- ▶ Use the IGEL OS Creator to recover the IGEL OS 11 system. For more information, see the IGEL OS Creator Manual.

### IGEL OS 10 Rescue System Fails to Update Missing Partitions

If a severe error has occurred during the upgrade process, the device boots into a minimal IGEL OS 10 (10.05.800 or higher) rescue system. If unattended, the device tries to download and update the missing partitions and reboots on failure.


To regain a full IGEL OS 10 system, you have two possibilities:

- ▶ In the rescue system, start the Setup, go to **System > Update > Firmware Update** and set a valid update source for the appropriate IGEL OS 10 firmware (10.05.800 or higher).

Or:

- ▶ Configure a UMS profile that contains a valid update source for the appropriate IGEL OS 10 firmware (10.05.800 or higher) under **System > Update > Firmware Update** and assign it to the device.


## Getting Error Messages

- ▶ Open the OS 11 Upgrade Tool (default path: click  System and then **Upgrade to OS 11**).

The OS 11 Upgrade Tool shows the error messages. The most important message is prefixed with **Retries**; see the example below:



- ▶ For more information, review the main migration log under `/wfs/migration.log`

 You can use the system log viewer to review the migration log (see the chapter System Log Viewer in the IGEL OS Manual) or save the log files in order to send them to the IGEL Support Team (see the chapter Save Device Files for Support support).

### Starting an New Upgrade Attempt

If you want the device to start multiple upgrade attempts (and the device is not already configured to do so):

1. In the UMS profile or in the Setup, go to **System > Update > OS 11 Upgrade** and activate **Upgrade to OS 11 even if a previous upgrade attempt failed**.
2. Reboot the device.

#### Starting Another Upgrade Attempt after 5 Retries

When the **Upgrade to OS 11 even if a previous upgrade attempt failed** option is set and the upgrade has failed each time, the system will stop trying after 5 attempts.

To reset the retry counter:

1. In the Setup or the UMS profile, go to **System > Update > OS 11 Upgrade** and deactivate **Upgrade to OS 11 even if a previous upgrade attempt failed**.
2. When the setting is effective on the devices, go to **System > Update > OS 11 Upgrade** again and activate **Upgrade to OS 11 even if a previous upgrade attempt failed**.

The retry counter is reset, and the devices will try upgrading another 5 times, if necessary.

## Upgrading IGEL Devices from IGEL OS 10 to IGEL OS 11

This document describes how to upgrade any number of IGEL Universal Desktop devices (UD) from IGEL OS 10 to IGEL OS 11.

IGEL OS 10.05.700 or higher is required for upgrading to IGEL OS 11. If you have an older version of IGEL OS 10, you need to update to version 10.05.700 or a higher version first.

The following methods of mass deployment are described here:

- [Zero-Touch Deployment Using Universal Firmware Update \(see page 152\)](#): Mass upgrade from any version of IGEL OS 10 to IGEL OS 11 in one step using Universal Firmware Update. This method can be started immediately or as a scheduled job (wake up or reboot).
- [Zero-Touch Deployment Using Buddy Update \(see page 183\)](#): Mass upgrade from any version of IGEL OS 10 to IGEL OS 11 in one step using two devices as update buddies. This method can be started immediately or as a scheduled job (wake up or reboot).
- [Mass Deployment Using a Scheduled Job \(see page 204\)](#): Upgrade devices that are already running IGEL OS 10.05.700 (or higher) using a specific scheduled job.

## Zero-Touch Deployment Using Universal Firmware Update

This method is the most convenient way to upgrade from IGEL OS 10 to IGEL OS 11. The method uses the Universal Firmware Update feature of the UMS (Universal Management Suite) and a profile.

Read all the following chapters carefully and follow the instructions.

1. [IGEL Devices That Can Be Upgraded to IGEL OS 11](#) (see page 153)
2. [Important! Consider This Before Upgrading](#) (see page 155)
3. [Preparing the Upgrade](#) (see page 157)
4. [Testing the Upgrade](#) (see page 162)
5. [Checking the Requirements](#) (see page 166)
6. [Creating the Universal Firmware Updates](#) (see page 167)
7. [Creating a Profile](#) (see page 172)
8. [Deploying the Licenses](#) (see page 177)
9. [Putting It All Together](#) (see page 178)
10. [Executing the Upgrade](#) (see page 181)



## IGEL Devices That Can Be Upgraded to IGEL OS 11

### Core Requirements for IGEL OS 11

- CPU with 64-bit support
- CPU speed:  $\geq 1$  GHz
- Memory (RAM):  $\geq 2$  GB

- i** RAM size higher than 2 GB is recommended if you use any of the following:
- Unified Communications optimizations (uses a client-side media engine)
  - High-resolution graphics output  
For details on the supported graphics-related characteristics of IGEL devices, see Graphics on IGEL Devices or, for older devices, Graphics on Legacy IGEL Devices.
  - More than two monitors

- Storage: 2 GB minimum;  $\geq 4$  GB recommended

- i** **Storage Requirements for IGEL OS 11.04 or Higher**
- IGEL OS 11.04.100 or higher requires at least 2.4 GB storage if the full feature set is applied. Thus, the feature set must be modified accordingly; for more information, see Error: "Not enough space on local drive" when Updating to IGEL OS 11.04 or Higher.

## IGEL Devices Supported by IGEL OS 11

### IGEL UD (Universal Desktop)

Product Line	Device Type	Hardware ID	64 Bit	Memory (RAM)	Storage	HW Video Acceleration
UD2	D220	40	Yes	2 GB	4 GB	Yes
UD2	M250C	50	Yes	2 GB	4 GB	Yes
UD2	M250C	51 / 52*** (see page 154)	Yes	2 or 4 GB	8 GB	Yes
UD3* (see page 154)	M340C	50	Yes	2 GB	4 GB	Yes
UD3	M340C	51	Yes	2 GB	4 GB	Yes
UD3	M350C	60	Yes	4 GB	8 GB	Yes
UD5* (see page 154)	H830C	50	Yes	2 GB	4 GB	Yes

Product Line	Device Type	Hardware ID	64 Bit	Memory (RAM)	Storage	HW Video Acceleration
UD6	H830C	51	Yes	2 GB	4 GB	Yes
UD7	H850C	10	Yes	4 GB	4 GB	Yes
UD7** (see page 154)	H850C	11	Yes	4 GB	4 GB	Yes
UD7	H860C	20	Yes	8 GB	8 GB	Yes
UD9* (see page 154)	TC215B	40 / 41 (Touch)	Yes	2 GB	4 GB	Yes

\* IGEL UD3-LX 50 and UD5-LX 50 are officially supported up to IGEL OS 11.05, incl. private builds. IGEL UD9-LX 40 / 41 (Touch) devices are officially supported up to IGEL OS 11.07.910.

\*\* As of December 2019, IGEL UD7 model H850C is equipped with the AMD Secure Processor; for further information, see UD7 Model H850C.

\*\*\* IGEL UD2-LX 52 is supported with IGEL OS 11.06.140 and later.

#### IGEL Zero

##### Note on IZ Devices

The IZ devices listed below can be upgraded to IGEL OS 11. To upgrade your IZ devices to IGEL OS 11, please contact your IGEL sales representative. See also <https://www.igel.com/os11migration/>.

Product Line	Device Type	Hardware ID	64 Bit	Memory (RAM)	Storage	UEFI Secure Boot Support	HW Video Acceleration
IZ2	D220	40	Yes	2 GB	4 GB	Yes	Yes
IZ3	M340C	50	Yes	2 GB	4 GB	Yes	Yes
IZ3	M340C	51	Yes	2 GB	4 GB	Yes	Yes

When you have confirmed that your devices can be upgraded to IGEL OS 11, make sure to consider [Important! Consider This Before Upgrading](#) (see page 155).

### Important! Consider This Before Upgrading

To make sure that your upgrade can be successful, check the following warnings and notes; a warning symbol indicates that irreversible damage can be done to your devices.

#### **No Downgrade**

You cannot restore your IGEL OS 10 system once you have migrated to IGEL OS 11. The device storage is overwritten completely with a new partitioning scheme.

#### **Features (e.g. Clients)**

IGEL OS 11 does not have the complete feature set of IGEL OS 10. Make sure that the current version of IGEL OS 11 meets your requirements. For details, refer to the appropriate release notes.

#### **Custom Partitions**

The contents of custom partitions will be deleted by the upgrade. Make sure to back up the contents and restore them after the upgrade has finished. Besides becoming dysfunctional after the upgrade, applications and kernel drivers in a custom partition might corrupt the upgrade. For this reason, make sure to first test the upgrade on a characteristic device. We recommend that you disable custom partitions when upgrading; you can enable them once the upgrade has been successfully completed.

#### **Custom Commands**

The persistence of custom commands cannot be guaranteed. Besides becoming dysfunctional after the upgrade, custom commands might corrupt the upgrade. For this reason, make sure to first test the upgrade on a characteristic device. In general, custom commands must be adapted for IGEL OS 11. We recommend that you disable custom commands when upgrading; you can enable them once the upgrade has been successfully completed.

#### **Network**

All devices must be connected to a WLAN or LAN. LAN is the recommended option. The device will not be upgraded if connected to OpenVPN, OpenConnect, genucard, NCP VPN or mobile broadband.

#### **Hardware Support**

Make sure that your devices support IGEL OS 11; please refer to IGEL Devices Supported by IGEL OS 11. This document describes upgrading methods for IGEL UD and IGEL IZ devices. Upgrading methods for IGEL UDC3 and UD Pocket are described under Upgrading UDC3 Devices from IGEL OS 10 to IGEL OS 11.

#### **License**

- A valid license from an IGEL Workspace Edition (WE) Product Pack must be available for each device. For general information, see IGEL Software License Overview. For deploying licenses, see [Setting up Automatic License Deployment \(ALD\)](#) or [Manual License Deployment for IGEL OS](#).
- IZ devices are not allowed to upgrade to IGEL OS 11. Please contact your IGEL sales representative for a UD Upgrade License which allows you to upgrade your IZ devices.

 **UMS Version**

UMS version 6.01.130 or higher is required for upgrading from IGEL OS 10 to IGEL OS 11.

When you have considered everything that is relevant, continue with [Preparing the Upgrade](#) (see page 157).

### Preparing the Upgrade

This section describes the required preparations and tests before any productive devices can be updated. The testing should be done with at least one device that is characteristic of your environment. This device should have every custom partition and every custom command that may possibly exist in any of your devices.

First of all, you should check thoroughly if IGEL OS 11 has all features required for your purposes.

- ▶ Continue with [Preparing the UMS \(see page 158\)](#).

### Preparing the UMS

To upgrade your devices to IGEL OS 11, you need the appropriate version of the UMS. Also, the devices must be registered with the UMS to receive their licenses.

1. If you have not already done so, update your UMS to version 6.01.130 or higher. For instructions, see [Updating a UMS Installation](#).
2. Make sure that your devices are registered with the UMS. For more information, see the chapter [Registering Devices on the UMS Server](#) in the UMS Manual.

When the UMS is prepared, continue with [Adjusting the Setup](#) (see [page 159](#)).

## Adjusting the Setup

Depending on the features that are in use now or will be used in the future, a specific set of parameters must be set in the device's Setup.

1. In the Setup, go to **System > Update > OS 11 Upgrade**.
2. Make your settings as appropriate:
  - Activate **Upgrade to OS 11**.
  - If you want the device to retry the upgrade immediately after a failed attempt, activate **Upgrade to OS 11 even if a previous upgrade attempt failed**. The device will retry the upgrade 5 times. When the 5th attempt has failed, a message will be shown in the upgrade tool window.
  - If your device has a PowerTerm license, and you want to upgrade to IGEL OS 11 even though it does not support PowerTerm, you must activate **Upgrade to OS 11 even if PowerTerm is enabled**.
  - Under **Require an Enterprise Management Pack license to upgrade to OS 11**, select the appropriate option:
    - If you are using IGEL Cloud Gateway (ICG) or Shared Workplace (SWP) or a Custom Partition and want to make sure that the upgrade is performed only if these features can be used furthermore, select **Smart**. When this option is selected, and any of these features is activated, the upgrade is performed only if the device could fetch a license from an Enterprise Management Pack.
    - If you want to force the device to fetch a license from an Enterprise Management Pack and make sure that the upgrade is performed only if the license could be fetched, select **Always**.
    - If you want the device to upgrade to IGEL OS 11 without fetching an Enterprise Management Pack, disregarding the features that might be activated, select **Never**.
  - Under **Timeout waiting for OS 11 license to start automatic upgrade**, set the time period the device will wait for a license in a mass deployment scenario (see [Zero-Touch Deployment Using Universal Firmware Update](#) (see page 152), [Zero-Touch Deployment Using Buddy Update](#) (see page 183) and [Mass Deployment Using a Scheduled Job](#) (see page 204)). This setting prevents the device from starting the upgrade at an inappropriate time as a result of the license just being deployed. This way, the setting prevents unwanted interruptions at work. For a mass deployment scenario, the default value **10 Minutes** is recommended.
3. Click **Apply**.
4. Continue with [Deploying a License](#) (see page 160).

### Deploying a License

To upgrade from IGEL OS 10 to IGEL OS 11, you need an appropriate license. Depending on your requirements, one or more of these licenses will be needed for each device:

- One Workspace Edition license for basic functionality; see [Workspace Edition](#)
- If one of the following features is used, one Enterprise Management Pack license is required (see [Enterprise Management Pack](#)):
  - IGEL Cloud Gateway (ICG)
  - Shared Workplace (SWP)
  - Custom Partition - if IGEL OS 11.03.100 or lower is the target version; in IGEL OS 11.03.500 or higher, the Custom Partition feature is included in the Workspace Edition.

Proceed as follows:

- ▶ Deploy the licenses for IGEL OS 11 using the method that suits your needs:
  - **Manual License Deployment:** Licenses are created and deployed manually. For instructions, see [Manual License Deployment for IGEL OS](#).
  - **Automatic License Deployment (ALD):** Licenses are created and deployed automatically to each device that needs a license. For instructions, see [Setting up Automatic License Deployment \(ALD\)](#).
  - Download three demo licenses from <https://www.igel.com/download/>.

When the device has a license, continue with [Configuring the Update Source](#) (see page 161).





#### Configuring the Update Source

1. In the Setup, go to **System > Update > Firmware Update** and configure the update source for IGEL OS 11. For more information, see the Firmware Update chapter in the IGEL OS Manual.
2. Click **Ok**.



When the correct update source is configured, continue with [Testing the Upgrade](#) (see page 162).

## Testing the Upgrade

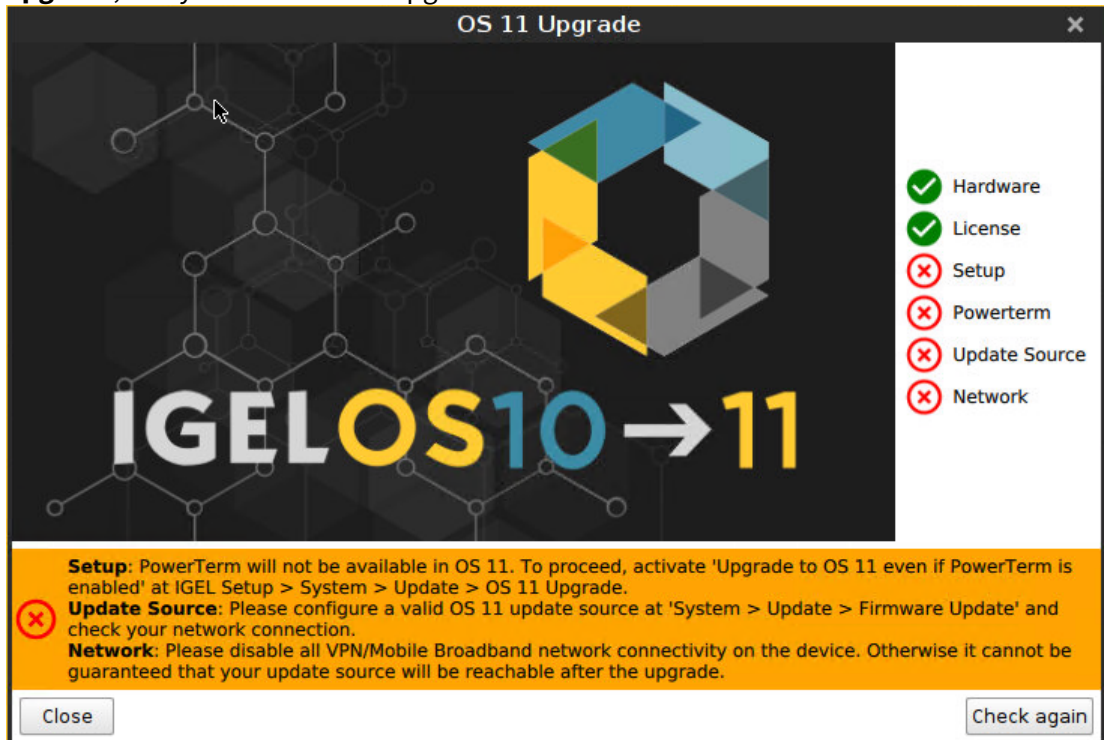
1. Click  System and then **Upgrade to OS 11**. The OS 11 Upgrade Tool starts and indicates whether all requirements are met.

 You can change the starting the starting methods for the OS 11 Upgrade Tool in the Setup under **Accessories > OS11 Upgrade**.



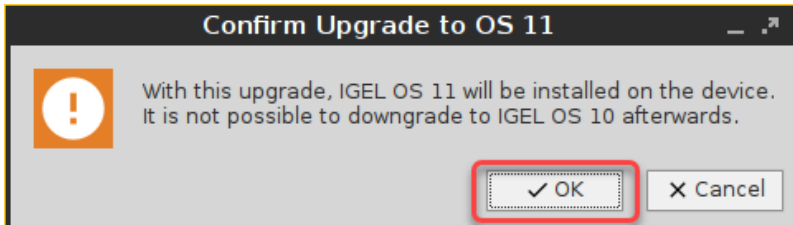
2. Check the output of the OS 11 Upgrade Tool and continue appropriately:
  - If each requirement has an  icon, click **OS Upgrade** to start the upgrade process.
  - If one or more requirements have an  icon, check the messages and resolve the issues. Afterwards, click **Check again**. If all requirements are met, the button changes to **OS**

**Upgrade**, and you can start the upgrade.

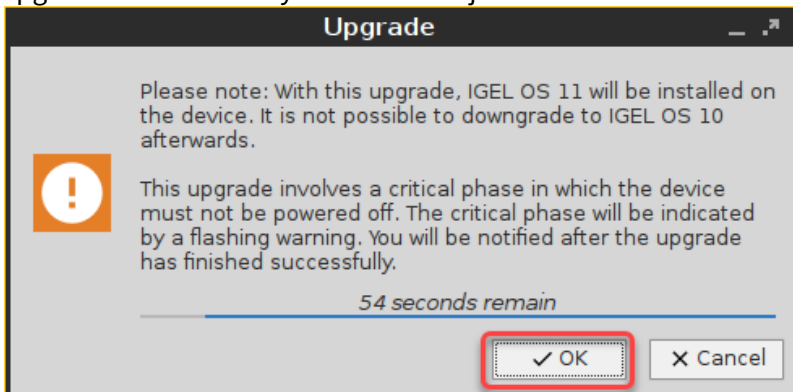


When you start the upgrade, a warning dialog is shown.

- 3. Click **OK** to continue.



A warning dialog with a timeout is shown. If you click **Cancel** before the timeout expires, the upgrade is canceled. If you click **OK** or just wait for the timeout to expire, the upgrade is started



After the warning dialog has been confirmed or the timeout has expired, the device reboots into a special IGEL OS 10 environment, in which the system upgrade is executed. The **Upgrade** window

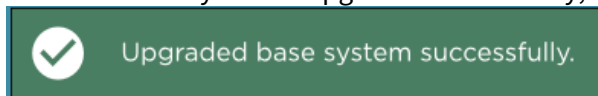
shows the progress.



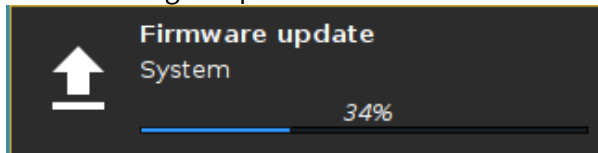
During the critical phase, the device must not be powered off. At this stage in the progress, an additional warning is shown.



When the base system is upgraded successfully, a message is shown.



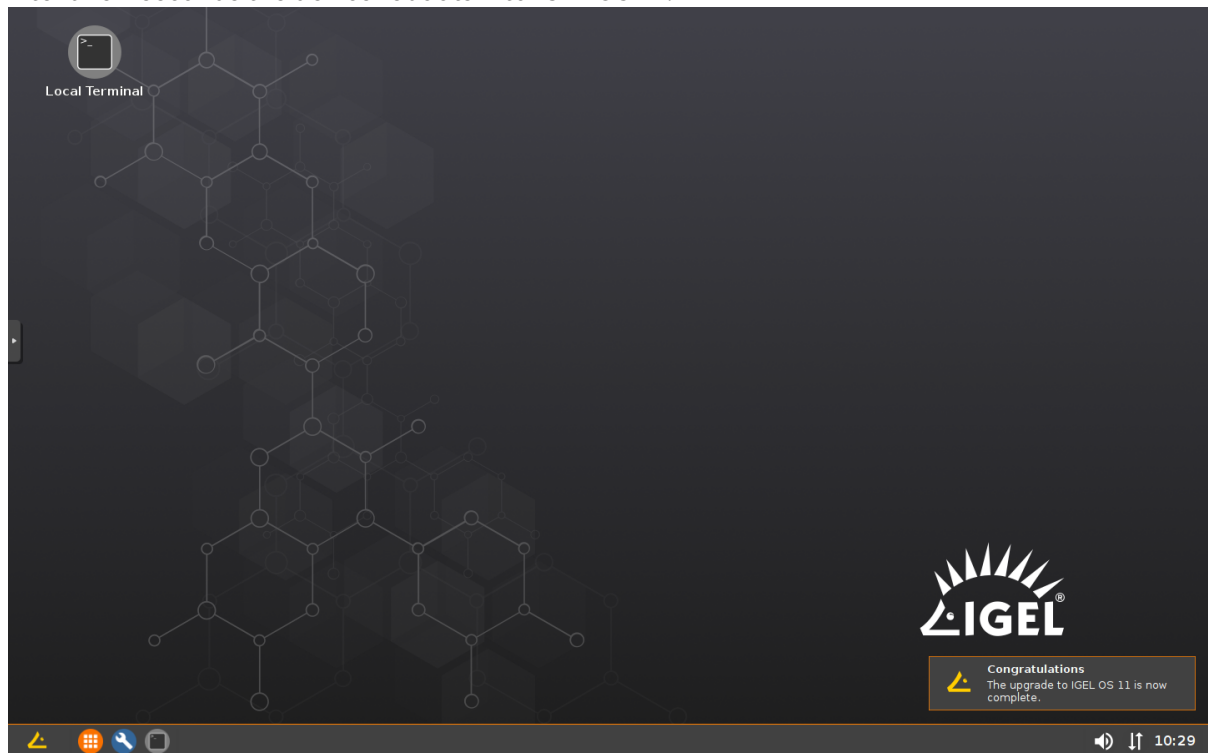
The remaining components of the firmware are installed, which is indicated by update messages.



When the installation is completed, the **Upgrade** window looks like this:



After a few seconds the device reboots into IGEL OS 11.



When the upgrade test has been successful, you are ready to set up the mass upgrade. Continue with [Checking the Requirements](#) (see page 166).

## Checking the Requirements

The following requirements must be met:

- The upgrade has been tested with characteristic devices.
- UMS 6.01.130 or higher is available.
- The appropriate IGEL OS 10 firmware version (10.05.700 or higher) is known to the UMS. For this purpose, a device with this firmware version must be registered in the UMS. This is already the case if you tested the upgrade with the same UMS with which you are about to do the mass upgrade. If not, you must register a device with the appropriate IGEL OS 10 firmware version now.
- All devices are connected to a regular LAN (not OpenVPN, OpenConnect, genucard, or mobile broadband).
- All devices are in a safe environment where the upgrade process cannot be disrupted, e.g. by powering off the devices.

When all the requirements are met, continue with [Creating the Universal Firmware Updates](#) (see page 167).

### Creating the Universal Firmware Updates

For detailed information, see the chapter Universal Firmware Update in the UMS Manual.

**i** If you use the High Availability Extension, note that Universal Firmware Updates are NOT synchronized, that is why you have to either download them to all HA nodes or configure an external (FTP) server.

1. Create a Universal Firmware Update for the appropriate IGEL OS 10 firmware (10.05.700 or higher).
2. After you have created the Universal Firmware Update for IGEL OS 10, create a Universal Firmware Update for IGEL OS 11.

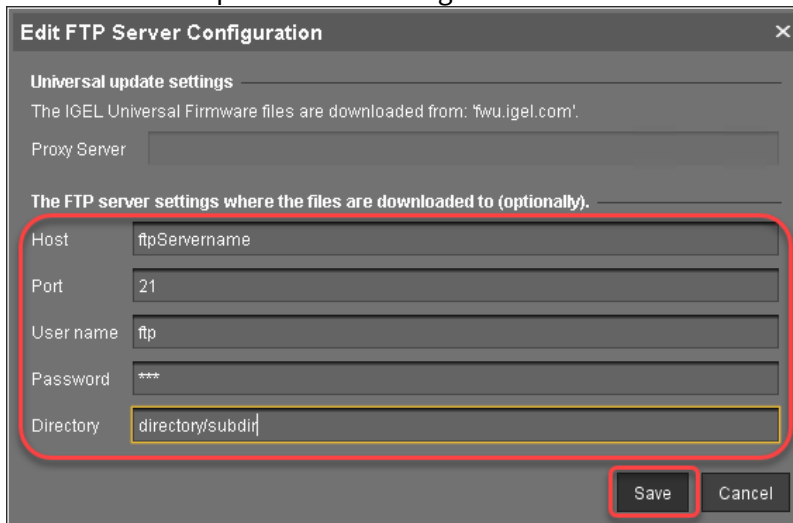
**!** The order of creation is crucial because the IGEL OS 11 firmware must have a higher ID in order to be chosen by the device. For details, see [Executing the Upgrade](#) (see page 181).

### Configuring the Universal Firmware Update for ICG

If you are using IGEL Cloud Gateway (ICG), an FTP server that is accessible to all devices must be configured as the update source.

To configure an FTP server as update source:

1. In the UMS, go to **UMS Administration > Universal Firmware Update** and click .
2. Enter the data required for accessing the FTP server and click **Save**.



**Edit FTP Server Configuration**

**Universal update settings**

The IGEL Universal Firmware files are downloaded from: 'fwu.igel.com'.

Proxy Server

**The FTP server settings where the files are downloaded to (optionally).**

Host: ftpServername

Port: 21

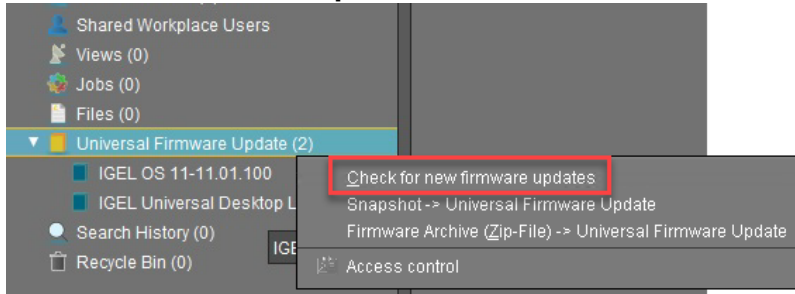
User name: ftp


Password: \*\*\*

Directory: directory/subdir

Save Cancel

- Go to **Server - [UMS address] > Universal Firmware Update** and in the context menu, select **Check for new firmware updates**.

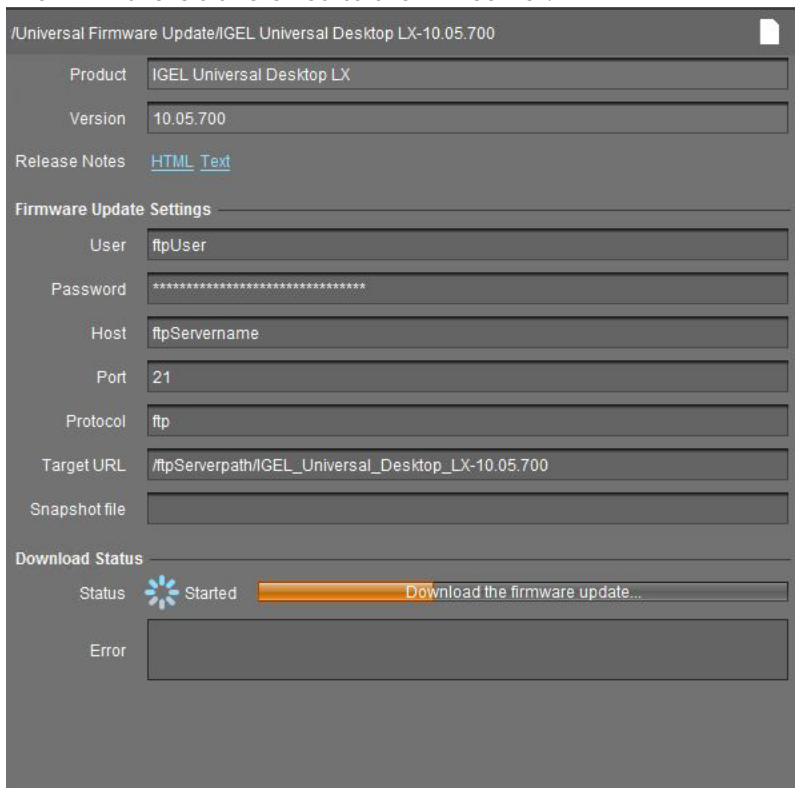


- Select the entry for the appropriate IGEL OS firmware, click  to select the FTP server selected in step 2 and select **Download**.

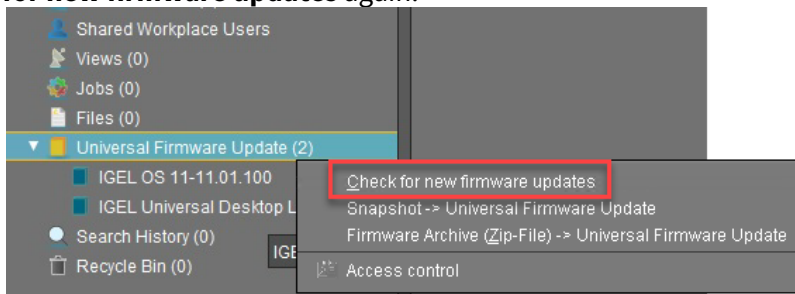





- 5. The firmware is transferred to the FTP server.



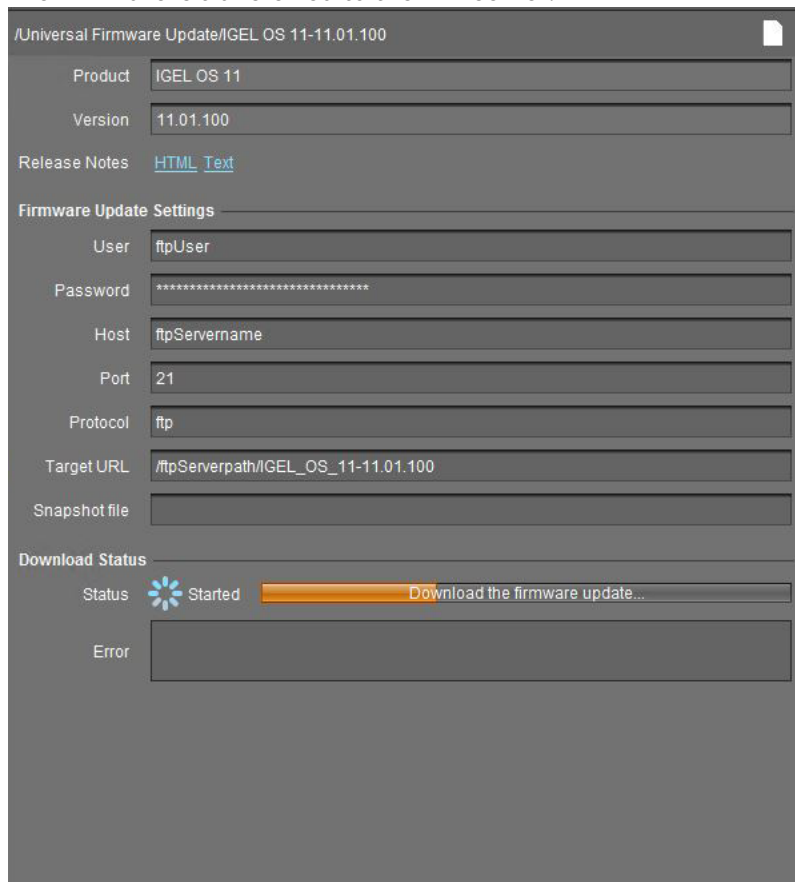
- 6. Under **Server - [UMS address] > Universal Firmware Update**, in the context menu, select **Check for new firmware updates** again.



7. Select the entry for the IGEL OS 11 firmware, click  to select the FTP server selected in step 2 and select **Download**.



8. The firmware is transferred to the FTP server.



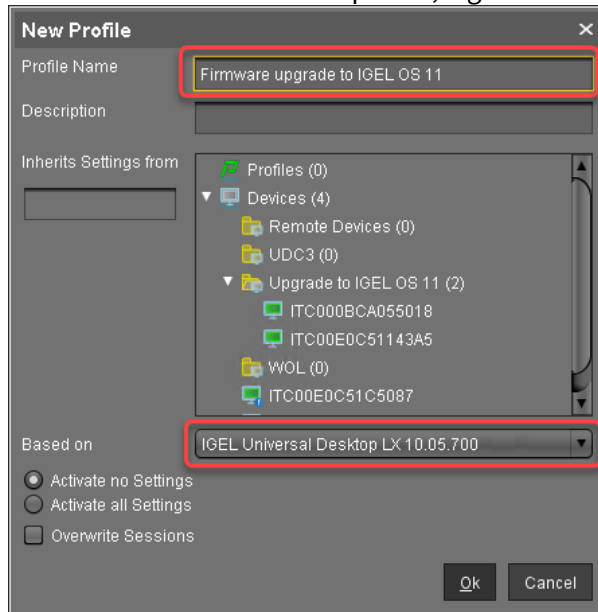
The screenshot shows the 'Universal Firmware Update' interface for IGEL OS 11-11.01.100. It includes fields for Product (IGEL OS 11), Version (11.01.100), and Release Notes (HTML Text). Under 'Firmware Update Settings', there are fields for User (ftpUser), Password (masked with asterisks), Host (ftpServername), Port (21), Protocol (ftp), Target URL (/ftpServerpath/IGEL\_OS\_11-11.01.100), and Snapshot file. The 'Download Status' section shows a 'Status' of 'Started' with a progress bar labeled 'Download the firmware update...' and an empty 'Error' field.

The devices can download the firmware from the FTP server.

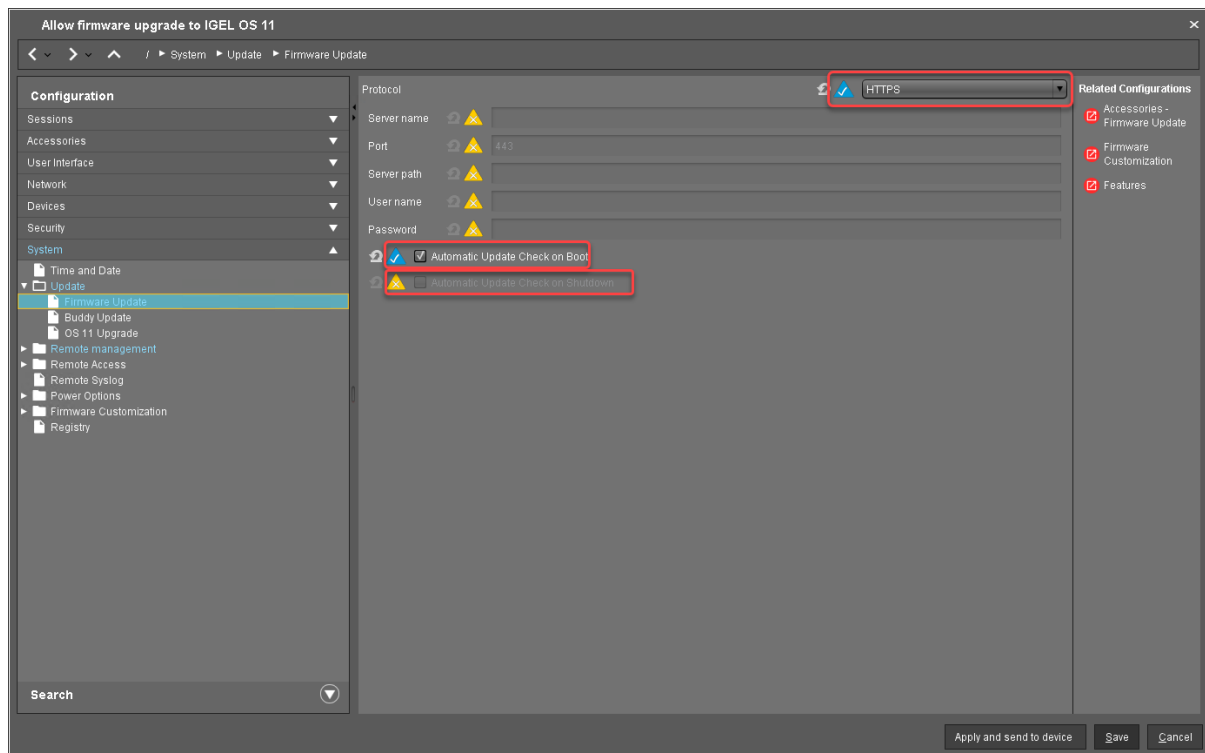
When the Universal Firmware Update is ready, continue with [Creating a Profile](#) (see page 172).

### Creating a Profile

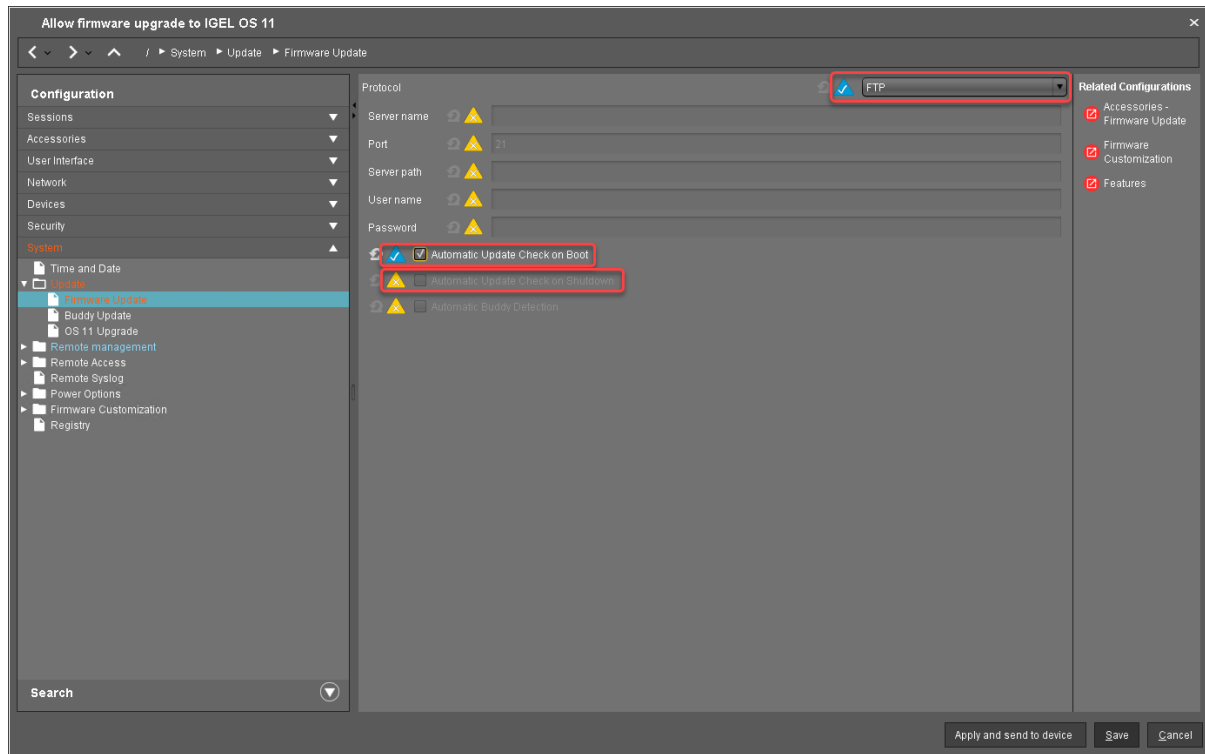
1. Create a profile that is based on the appropriate IGEL OS 10 firmware version (10.05.700 or higher). Find a suitable name for the profile, e.g. "Firmware upgrade to IGEL OS 11".



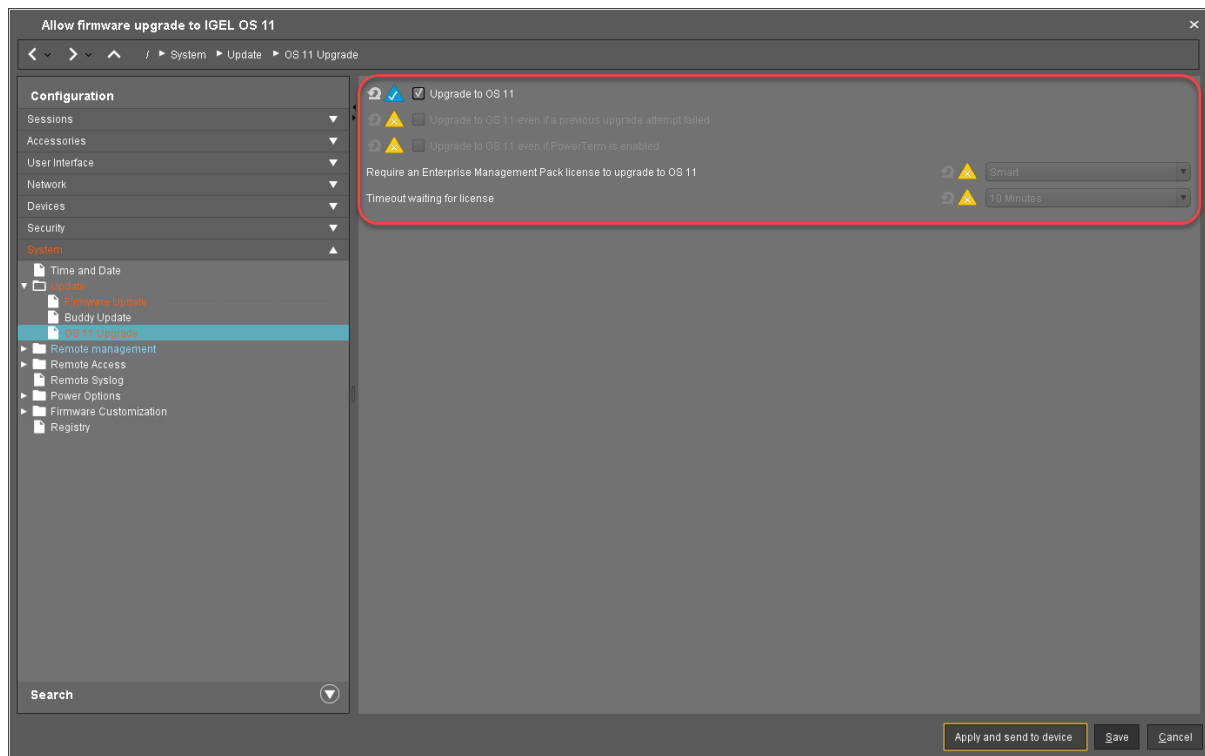
2. In the profile's configuration dialog, go to **System > Update > Firmware Update** and change the settings according to your environment:
  - If the UMS and the devices are in one and the same network, and no IGEL Cloud Gateway (ICG) is used:
    - Select "HTTPS" as **Protocol**.
    - Activate **Automatic Update Check on Boot**.
    - Ensure that **Automatic Update Check on Shutdown** is deactivated. Otherwise, the device will shut down when the update is finished.



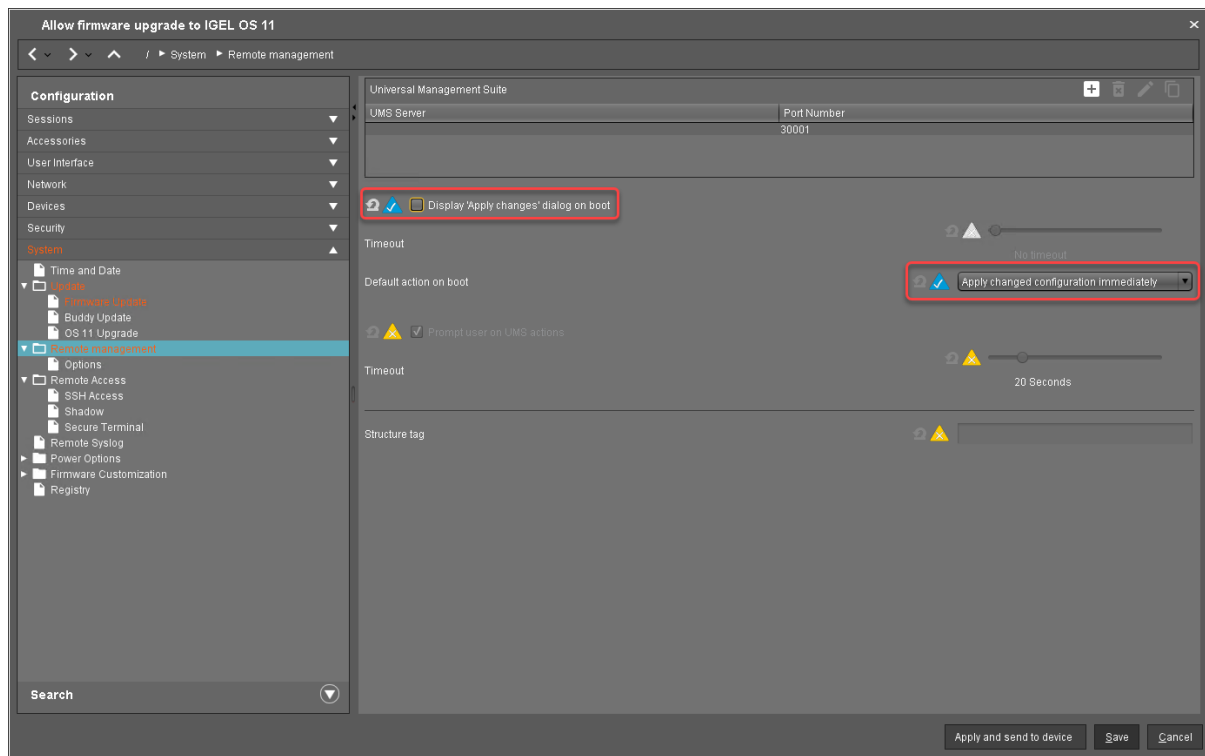
- If IGEL Cloud Gateway (ICG) is used:
  - Select "FTP" as **Protocol**.
  - Activate **Automatic Update Check on Boot**.
  - Ensure that **Automatic Update Check on Shutdown** is deactivated. Otherwise, the device will shut down when the update is finished.



3. Go to **System > Update > OS 11 Upgrade** and change the following settings according to your successful upgrade test:
  - Activate **Upgrade to OS 11**.
  - Set **Upgrade to OS 11 even if PowerTerm is enabled** according to your needs.
  - Set **Upgrade to OS 11 even if a previous upgrade attempt failed** according to your needs.
  - Set **Require an Enterprise Management Pack license to upgrade to OS 11** according to your needs.
  - Ensure that the **Timeout waiting for OS 11 license to start automatic upgrade** is set to **10 Minutes**.



4. Go to **System > Remote Management** and change the settings as follows:
  - Deactivate **Display 'Apply changes' dialog on boot**.
  - Set **Default action on boot** to **Apply changed configuration immediately**.



5. Click **Save**.

When the profile is created, continue with [Deploying the Licenses](#) (see page 177).



## Deploying the Licenses

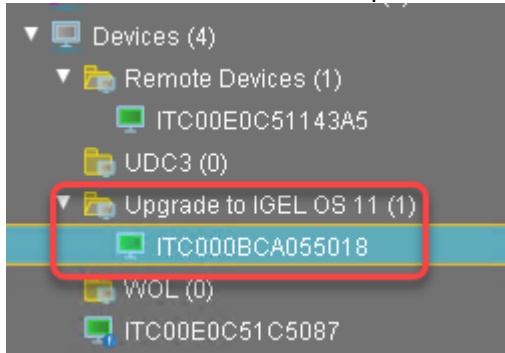
Deploy the licenses for IGEL OS 11 using the method that suits your needs:

- Automatic License Deployment (ALD): Licenses are created and deployed automatically to each device that needs a license. For instructions, see [Setting up Automatic License Deployment \(ALD\)](#).
- Manual License Deployment: Licenses are created and deployed manually. For instructions, see [Manual License Deployment for IGEL OS](#).

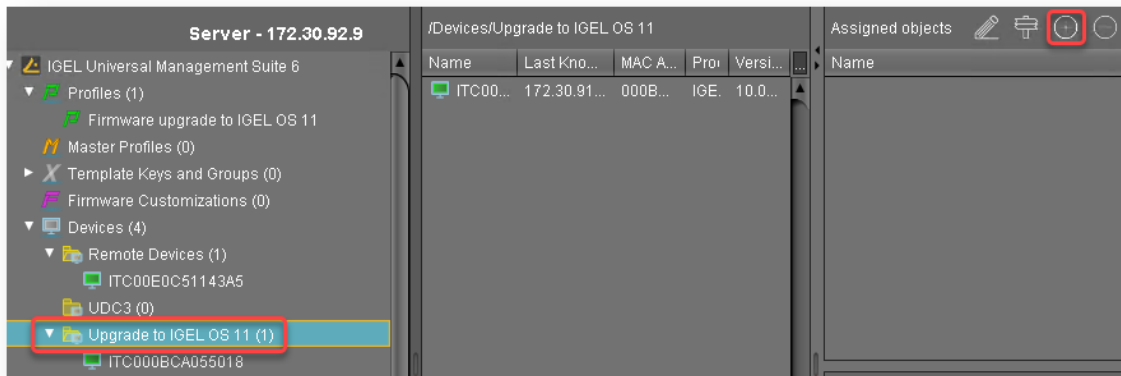
When the license deployment is setup up, continue with [Putting It All Together](#) (see page 178).

### Putting It All Together

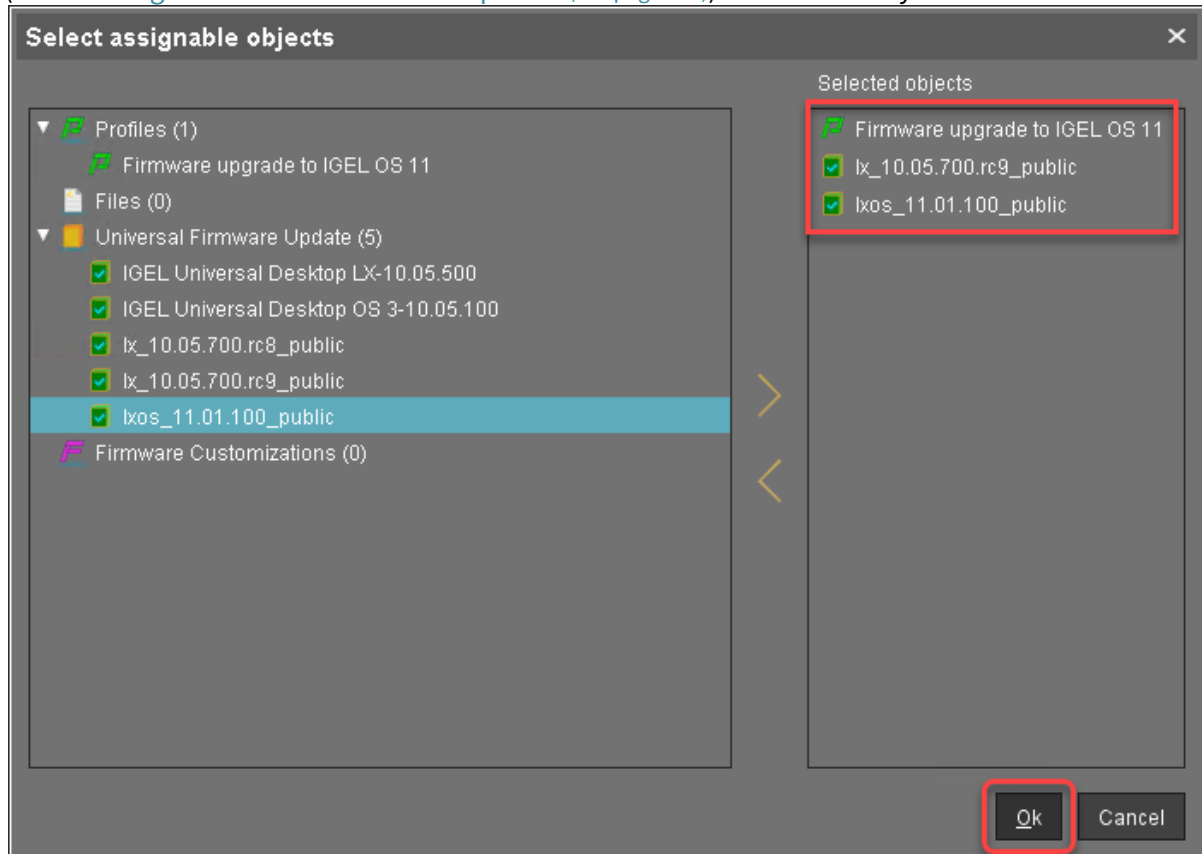
1. Put all devices that are to be updated into a directory.



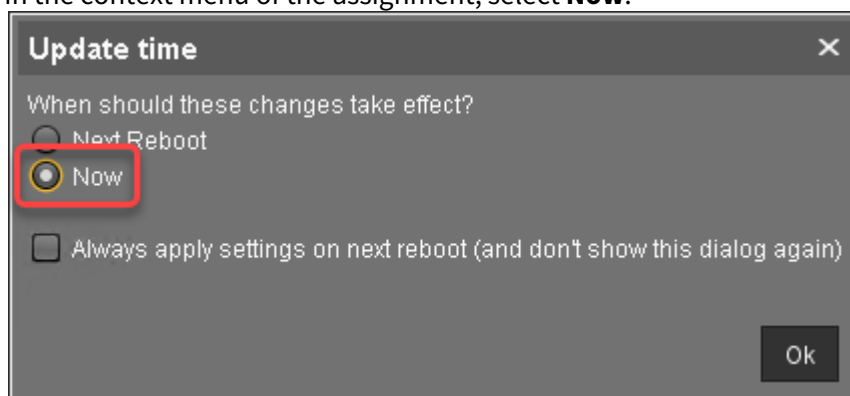
2. Select the directory and in the **Assigned objects** area, click .



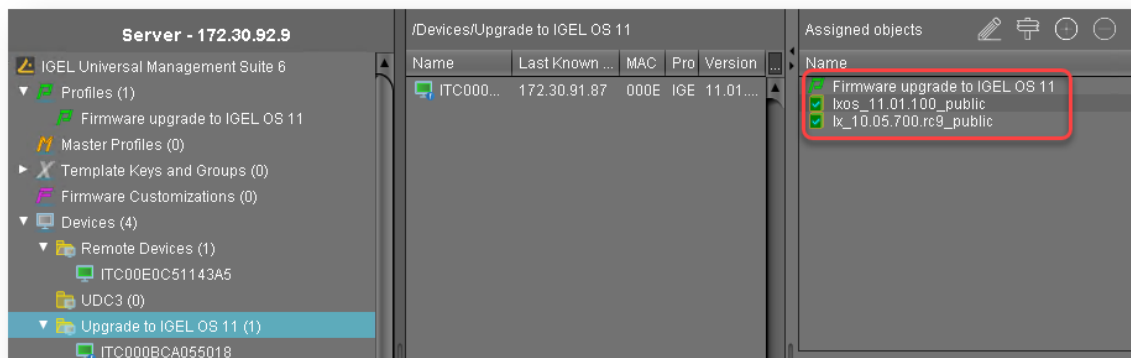
- Assign the profile (see [Creating a Profile](#) (see page 172)) and the two Universal Firmware Updates (see [Creating the Universal Firmware Updates](#) (see page 167)) to the directory and click **Ok**.



- In the context menu of the assignment, select **Now**.



In the **Assigned objects** area, the profile and the Universal Firmware Updates are shown:



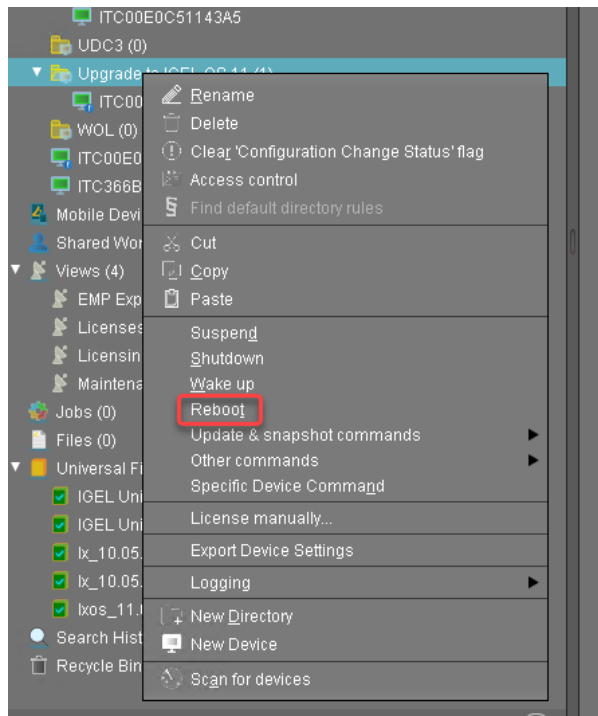
5. If you are using Automatic License Deployment (ALD), it might be feasible to confine the distribution of licenses to the current directory. For more information, see [Configuring the Distribution Conditions](#), section "Distributing Licenses to Devices in a Specified Directory".

When everything is in place, continue with [Executing the Upgrade](#) (see page 181).

## Executing the Upgrade

1. In the UMS, select the directory containing all devices that are to be upgraded and reboot them.

**i** Alternatively, you can create a scheduled job for reboot or wake up and assign it to the devices or the directory containing these devices. For more information, see [Jobs](#).

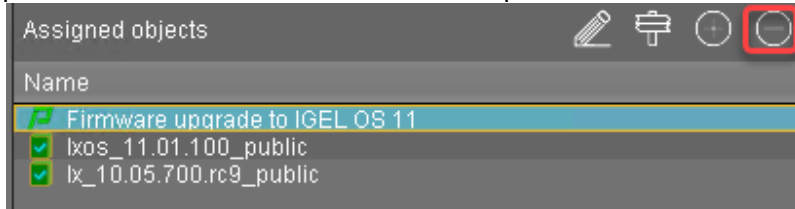


On reboot or wake up, the devices update to the appropriate IGEL OS firmware version (10.05.700 or higher). With this version, the **Upgrade to OS 11** parameter is recognized by the devices; also, the devices request IGEL OS 11 licenses from the UMS (Workspace Edition and, if required, Enterprise Management Pack).

If no IGEL OS 11 licenses have been deployed on the devices yet, the licenses are deployed within a few minutes. The upgrade will be started when the licenses are deployed. The maximum time period the device will wait for a license is configured by the parameter **Timeout waiting for OS 11 license to start automatic upgrade**; for details, see [Adjusting the Setup](#) (see page 159).

The parameter **Automatic update check on boot** causes the devices to look for new firmware again. Although two Universal Firmware Updates are assigned to the devices, the UMS offers the IGEL OS 11 firmware, because the ID of the IGEL OS 11 firmware is higher than the ID of the IGEL OS 10 firmware.

2. When all devices have been upgraded successfully, remove the "Firmware upgrade to IGEL OS 11" profile and the two Universal Firmware Updates from the directory.



The upgrade is completed.

## Zero-Touch Deployment Using Buddy Update

This method uses the buddy update feature of IGEL OS. One or more devices that are configured as an update buddy access the main server and download the firmware. The other devices are configured to download their firmware from an update buddy.

Read all the following chapters carefully and follow the instructions.

1. [IGEL Devices That Can Be Upgraded to IGEL OS 11 \(see page 184\)](#)
2. [Important! Consider This Before Upgrading \(see page 155\)](#)
3. [Preparing the Upgrade \(see page 157\)](#)
4. [Testing the Upgrade \(see page 162\)](#)
5. [Checking the Requirements \(see page 166\)](#)
6. [Configuring Two Update Buddies \(see page 198\)](#)
7. [Creating a Profile \(see page 199\)](#)
8. [Deploying the Licenses \(see page 201\)](#)
9. [Putting It All Together \(see page 202\)](#)
10. [Executing the Upgrade \(see page 203\)](#)

## IGEL Devices That Can Be Upgraded to IGEL OS 11

### Core Requirements for IGEL OS 11

- CPU with 64-bit support
- CPU speed:  $\geq 1$  GHz
- Memory (RAM):  $\geq 2$  GB

- i** RAM size higher than 2 GB is recommended if you use any of the following:
- Unified Communications optimizations (uses a client-side media engine)
  - High-resolution graphics output  
For details on the supported graphics-related characteristics of IGEL devices, see Graphics on IGEL Devices or, for older devices, Graphics on Legacy IGEL Devices.
  - More than two monitors

- Storage: 2 GB minimum;  $\geq 4$  GB recommended

- i** **Storage Requirements for IGEL OS 11.04 or Higher**
- IGEL OS 11.04.100 or higher requires at least 2.4 GB storage if the full feature set is applied. Thus, the feature set must be modified accordingly; for more information, see Error: "Not enough space on local drive" when Updating to IGEL OS 11.04 or Higher.

## IGEL Devices Supported by IGEL OS 11

### IGEL UD (Universal Desktop)

Product Line	Device Type	Hardware ID	64 Bit	Memory (RAM)	Storage	HW Video Acceleration
UD2	D220	40	Yes	2 GB	4 GB	Yes
UD2	M250C	50	Yes	2 GB	4 GB	Yes
UD2	M250C	51 / 52*** (see page 185)	Yes	2 or 4 GB	8 GB	Yes
UD3* (see page 185)	M340C	50	Yes	2 GB	4 GB	Yes
UD3	M340C	51	Yes	2 GB	4 GB	Yes
UD3	M350C	60	Yes	4 GB	8 GB	Yes
UD5* (see page 185)	H830C	50	Yes	2 GB	4 GB	Yes



Product Line	Device Type	Hardware ID	64 Bit	Memory (RAM)	Storage	HW Video Acceleration
UD6	H830C	51	Yes	2 GB	4 GB	Yes
UD7	H850C	10	Yes	4 GB	4 GB	Yes
UD7** (see page 185)	H850C	11	Yes	4 GB	4 GB	Yes
UD7	H860C	20	Yes	8 GB	8 GB	Yes
UD9* (see page 185)	TC215B	40 / 41 (Touch)	Yes	2 GB	4 GB	Yes

\* IGEL UD3-LX 50 and UD5-LX 50 are officially supported up to IGEL OS 11.05, incl. private builds. IGEL UD9-LX 40 / 41 (Touch) devices are officially supported up to IGEL OS 11.07.910.

\*\* As of December 2019, IGEL UD7 model H850C is equipped with the AMD Secure Processor; for further information, see UD7 Model H850C.

\*\*\* IGEL UD2-LX 52 is supported with IGEL OS 11.06.140 and later.

#### IGEL Zero

##### Note on IZ Devices

The IZ devices listed below can be upgraded to IGEL OS 11. To upgrade your IZ devices to IGEL OS 11, please contact your IGEL sales representative. See also <https://www.igel.com/os11migration/>.

Product Line	Device Type	Hardware ID	64 Bit	Memory (RAM)	Storage	UEFI Secure Boot Support	HW Video Acceleration
IZ2	D220	40	Yes	2 GB	4 GB	Yes	Yes
IZ3	M340C	50	Yes	2 GB	4 GB	Yes	Yes
IZ3	M340C	51	Yes	2 GB	4 GB	Yes	Yes

When you have confirmed that your devices can be upgraded to IGEL OS 11, make sure to consider [Important! Consider This Before Upgrading](#) (see page 186).

### Important! Consider This Before Upgrading

To make sure that your upgrade can be successful, check the following warnings and notes; a warning symbol indicates that irreversible damage can be done to your devices.

#### **No Downgrade**

You cannot restore your IGEL OS 10 system once you have migrated to IGEL OS 11. The device storage is overwritten completely with a new partitioning scheme.

#### **Features (e.g. Clients)**

IGEL OS 11 does not have the complete feature set of IGEL OS 10. Make sure that the current version of IGEL OS 11 meets your requirements. For details, refer to the appropriate release notes.

#### **Custom Partitions**

The contents of custom partitions will be deleted by the upgrade. Make sure to back up the contents and restore them after the upgrade has finished. Besides becoming dysfunctional after the upgrade, applications and kernel drivers in a custom partition might corrupt the upgrade. For this reason, make sure to first test the upgrade on a characteristic device. We recommend that you disable custom partitions when upgrading; you can enable them once the upgrade has been successfully completed.

#### **Custom Commands**

The persistence of custom commands cannot be guaranteed. Besides becoming dysfunctional after the upgrade, custom commands might corrupt the upgrade. For this reason, make sure to first test the upgrade on a characteristic device. In general, custom commands must be adapted for IGEL OS 11. We recommend that you disable custom commands when upgrading; you can enable them once the upgrade has been successfully completed.

#### **Network**

All devices must be connected to a WLAN or LAN. LAN is the recommended option. The device will not be upgraded if connected to OpenVPN, OpenConnect, genucard, NCP VPN or mobile broadband.

#### **Hardware Support**

Make sure that your devices support IGEL OS 11; please refer to IGEL Devices Supported by IGEL OS 11. This document describes upgrading methods for IGEL UD and IGEL IZ devices. Upgrading methods for IGEL UDC3 and UD Pocket are described under Upgrading UDC3 Devices from IGEL OS 10 to IGEL OS 11.

#### **License**

- A valid license from an IGEL Workspace Edition (WE) Product Pack must be available for each device. For general information, see IGEL Software License Overview. For deploying licenses, see [Setting up Automatic License Deployment \(ALD\)](#) or [Manual License Deployment for IGEL OS](#).
- IZ devices are not allowed to upgrade to IGEL OS 11. Please contact your IGEL sales representative for a UD Upgrade License which allows you to upgrade your IZ devices.

 **UMS Version**

UMS version 6.01.130 or higher is required for upgrading from IGEL OS 10 to IGEL OS 11.

When you have considered everything that is relevant, continue with [Preparing the Upgrade](#) (see page 188).

### Preparing the Upgrade

This section describes the required preparations and tests before any productive devices can be updated. The testing should be done with at least one device that is characteristic of your environment. This device should have every custom partition and every custom command that may possibly exist in any of your devices.

To prepare the upgrade, perform the following steps:

1. [Preparing the UMS \(see page 189\)](#)
2. [Adjusting the Setup \(see page 190\)](#)
3. [Deploying a License \(see page 191\)](#)
4. [Configuring the Update Source \(see page 192\)](#)

### Preparing the UMS

To upgrade your devices to IGEL OS 11, you need the appropriate version of the UMS. Also, the devices must be registered with the UMS to receive their licenses.

1. If you have not already done so, update your UMS to version 6.01.130 or higher. For instructions, see [Updating a UMS Installation](#).
2. Make sure that your devices are registered with the UMS. For more information, see the chapter [Registering Devices on the UMS Server](#) in the UMS Manual.

When the UMS is ready, continue with [Adjusting the Setup](#) (see page 190).

## Adjusting the Setup

Depending on the features that are in use now or will be used in the future, a specific set of parameters must be set in the device's Setup.

1. In the Setup, go to **System > Update > OS 11 Upgrade**.
2. Make your settings as appropriate:
  - Activate **Upgrade to OS 11**.
  - If you want the device to retry the upgrade immediately after a failed attempt, activate **Upgrade to OS 11 even if a previous upgrade attempt failed**. The device will retry the upgrade 5 times. When the 5th attempt has failed, a message will be shown in the upgrade tool window.
  - If your device has a PowerTerm license, and you want to upgrade to IGEL OS 11 even though it does not support PowerTerm, you must activate **Upgrade to OS 11 even if PowerTerm is enabled**.
  - Under **Require an Enterprise Management Pack license to upgrade to OS 11**, select the appropriate option:
    - If you are using IGEL Cloud Gateway (ICG) or Shared Workplace (SWP) or a Custom Partition and want to make sure that the upgrade is performed only if these features can be used furthermore, select **Smart**. When this option is selected, and any of these features is activated, the upgrade is performed only if the device could fetch a license from an Enterprise Management Pack.
    - If you want to force the device to fetch a license from an Enterprise Management Pack and make sure that the upgrade is performed only if the license could be fetched, select **Always**.
    - If you want the device to upgrade to IGEL OS 11 without fetching an Enterprise Management Pack, disregarding the features that might be activated, select **Never**.
  - Under **Timeout waiting for OS 11 license to start automatic upgrade**, set the time period the device will wait for a license in a mass deployment scenario (see [Zero-Touch Deployment Using Universal Firmware Update](#) (see page 152), [Zero-Touch Deployment Using Buddy Update](#) (see page 183) and [Mass Deployment Using a Scheduled Job](#) (see page 204)). This setting prevents the device from starting the upgrade at an inappropriate time as a result of the license just being deployed. This way, the setting prevents unwanted interruptions at work. For a mass deployment scenario, the default value **10 Minutes** is recommended.
3. Click **Apply**.

When the Setup is adjusted, continue with [Deploying a License](#) (see page 191).

### Deploying a License

To upgrade from IGEL OS 10 to IGEL OS 11, you need an appropriate license. Depending on your requirements, one or more of these licenses will be needed for each device:

- One Workspace Edition license for basic functionality; see [Workspace Edition](#)
- If one of the following features is used, one Enterprise Management Pack license is required (see [Enterprise Management Pack](#)):
  - IGEL Cloud Gateway (ICG)
  - Shared Workplace (SWP)
  - Custom Partition - if IGEL OS 11.03.100 or lower is the target version; in IGEL OS 11.03.500 or higher, the Custom Partition feature is included in the Workspace Edition.

Proceed as follows:

- ▶ Deploy the licenses for IGEL OS 11 using the method that suits your needs:
  - **Manual License Deployment:** Licenses are created and deployed manually. For instructions, see [Manual License Deployment for IGEL OS](#).
  - **Automatic License Deployment (ALD):** Licenses are created and deployed automatically to each device that needs a license. For instructions, see [Setting up Automatic License Deployment \(ALD\)](#).
  - Download three demo licenses from <https://www.igel.com/download/>.

When the device has a license, continue with [Configuring the Update Source](#) (see page 192).


#### Configuring the Update Source


1. In the Setup, go to **System > Update > Firmware Update** and configure the update source for IGEL OS 11. For more information, see the Firmware Update chapter in the IGEL OS Manual.
2. Click **Ok**.

When the correct update source is configured, continue with [Testing the Upgrade](#) (see page 193).





## Testing the Upgrade

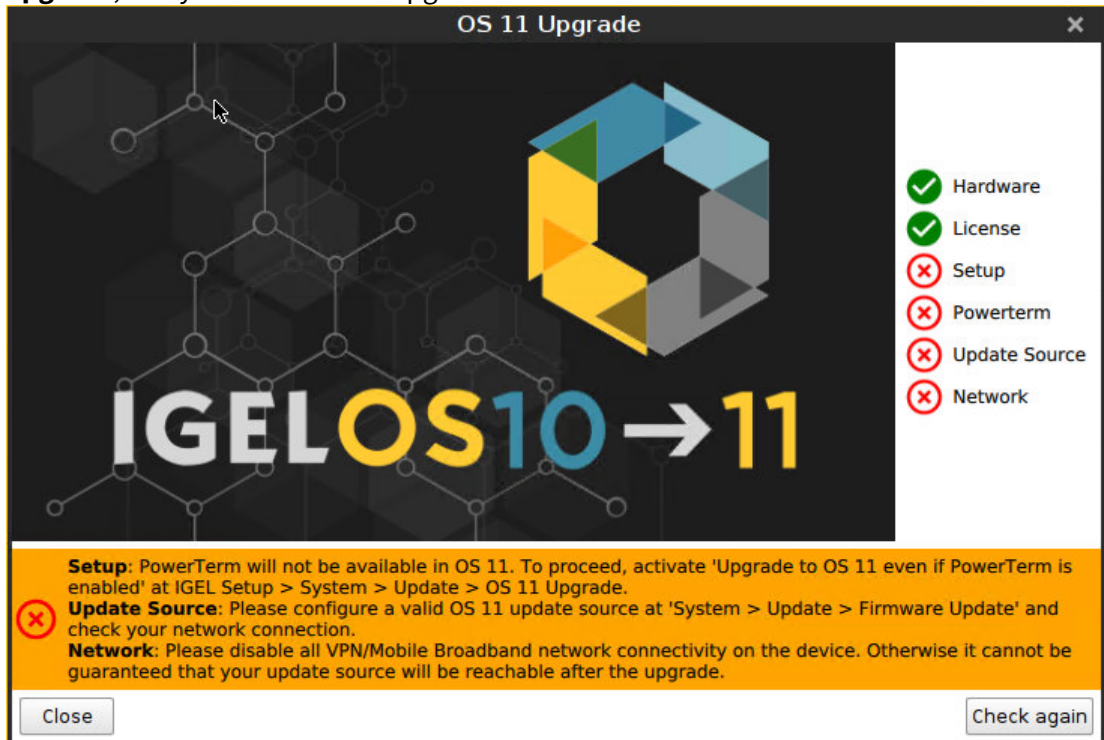
1. Click  System and then **Upgrade to OS 11**. The OS 11 Upgrade Tool starts and indicates whether all requirements are met.

 You can change the starting the starting methods for the OS 11 Upgrade Tool in the Setup under **Accessories > OS11 Upgrade**.



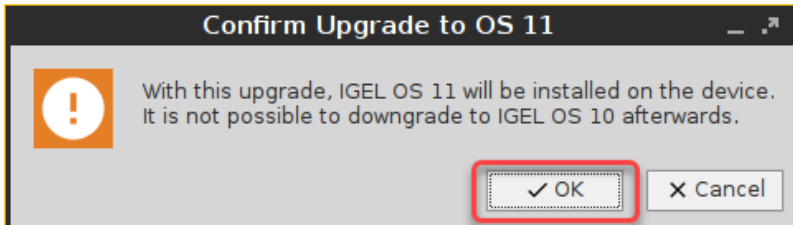
2. Check the output of the OS 11 Upgrade Tool and continue appropriately:
  - If each requirement has an  icon, click **OS Upgrade** to start the upgrade process.
  - If one or more requirements have an  icon, check the messages and resolve the issues. Afterwards, click **Check again**. If all requirements are met, the button changes to **OS**

**Upgrade**, and you can start the upgrade.

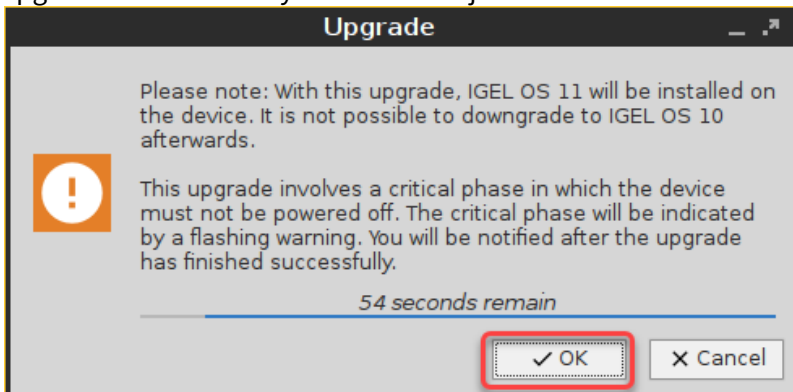


When you start the upgrade, a warning dialog is shown.

- 3. Click **OK** to continue.



A warning dialog with a timeout is shown. If you click **Cancel** before the timeout expires, the upgrade is canceled. If you click **OK** or just wait for the timeout to expire, the upgrade is started



After the warning dialog has been confirmed or the timeout has expired, the device reboots into a special IGEL OS 10 environment, in which the system upgrade is executed. The **Upgrade** window

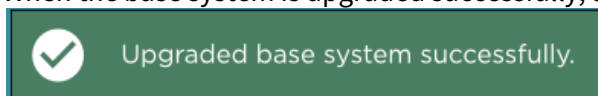
shows the progress.



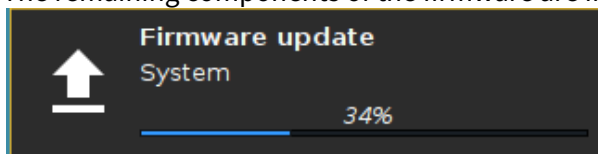
During the critical phase, the device must not be powered off. At this stage in the progress, an additional warning is shown.



When the base system is upgraded successfully, a message is shown.



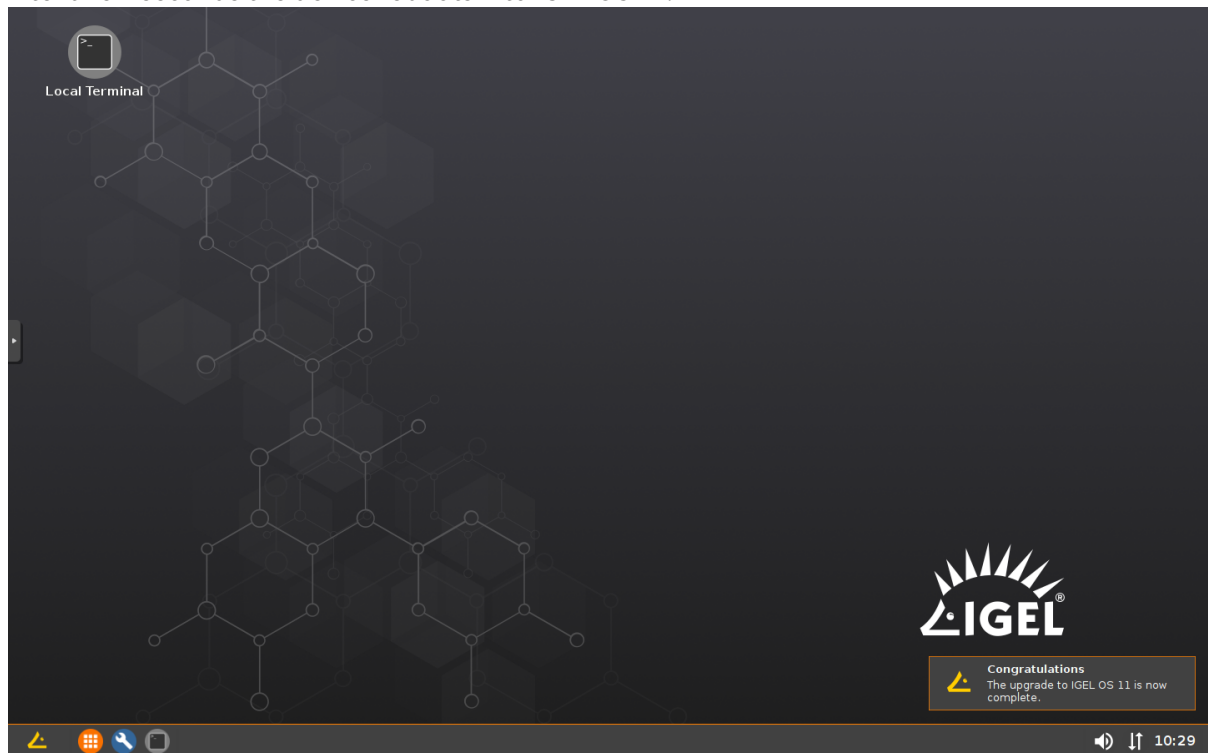
The remaining components of the firmware are installed, which is indicated by update messages.



When the installation is completed, the **Upgrade** window looks like this:



After a few seconds the device reboots into IGEL OS 11.



When the upgrade test has been successful, you are ready to set up the mass upgrade. Continue with [Checking the Requirements](#) (see page 197).


## Checking the Requirements

The following requirements must be met:

- The upgrade has been tested with characteristic devices; see [Testing the Upgrade \(see page 162\)](#).
- UMS 6.01.130 or higher is available.
- The firmware IGEL OS 10.05.700 or 10.05.800 is known to the UMS. For this purpose, a device with OS 10.05.700 or 10.05.800 must be registered in the UMS. This is already the case if you tested the upgrade (see [Testing the Upgrade \(see page 162\)](#)) with the same UMS with which you are about to do the mass upgrade. If not, you must register a device with OS 10.05.700 or 10.05.800 now.
- All devices are connected to a regular LAN (not OpenVPN, OpenConnect, genucard, NCP VPN or mobile broadband).
- All devices are in a safe environment where the upgrade process cannot be disrupted, e.g. by powering off the devices.

## Configuring Two Update Buddies

For setting up buddy updates, see the How-To [Buddy Update](#) (see page 221).

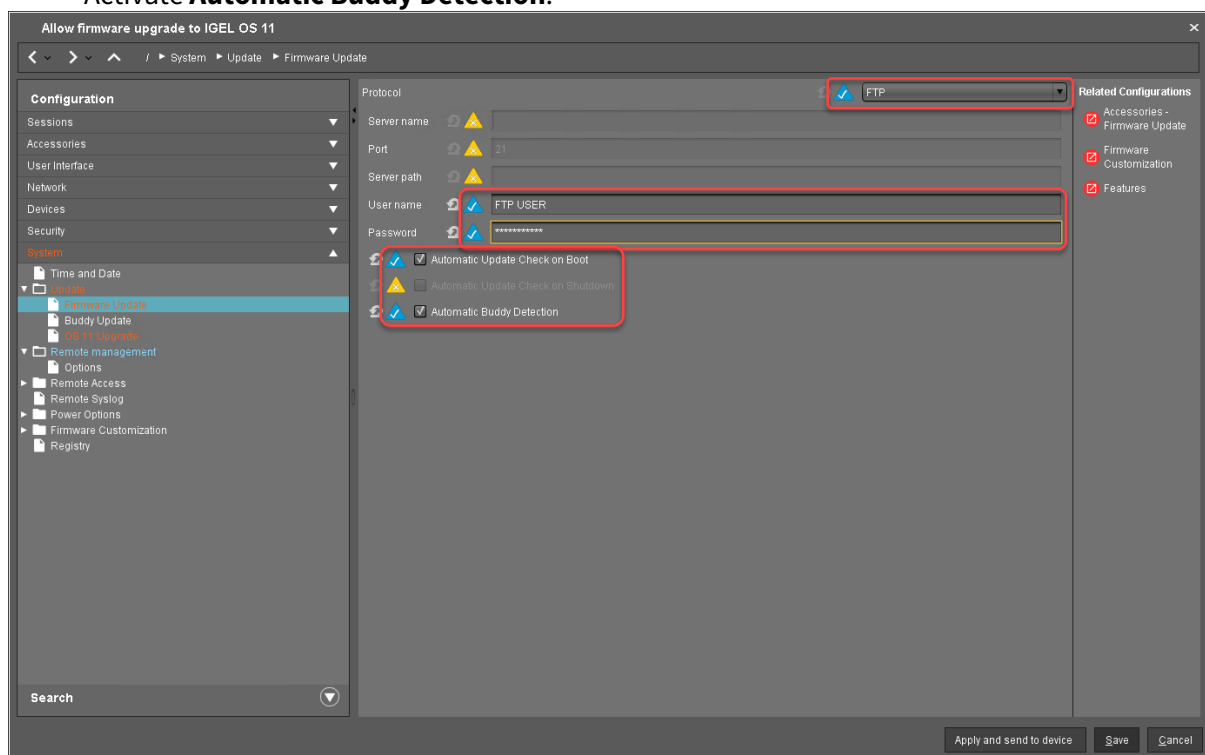
 Ensure that the network contains only the update buddies and the devices that are to be updated. This prevents other devices from updating inadvertently.

1. Update one device to the appropriate IGEL OS 10 firmware (10.05.700 or higher) and configure it as an update buddy.
2. Upgrade another device to IGEL OS 11 and configure it as an update buddy. Make sure that the IGEL OS 11 update buddy has the same **User Name** and **Password** in **System > Update > Buddy Update** as the IGEL OS 10 update buddy.

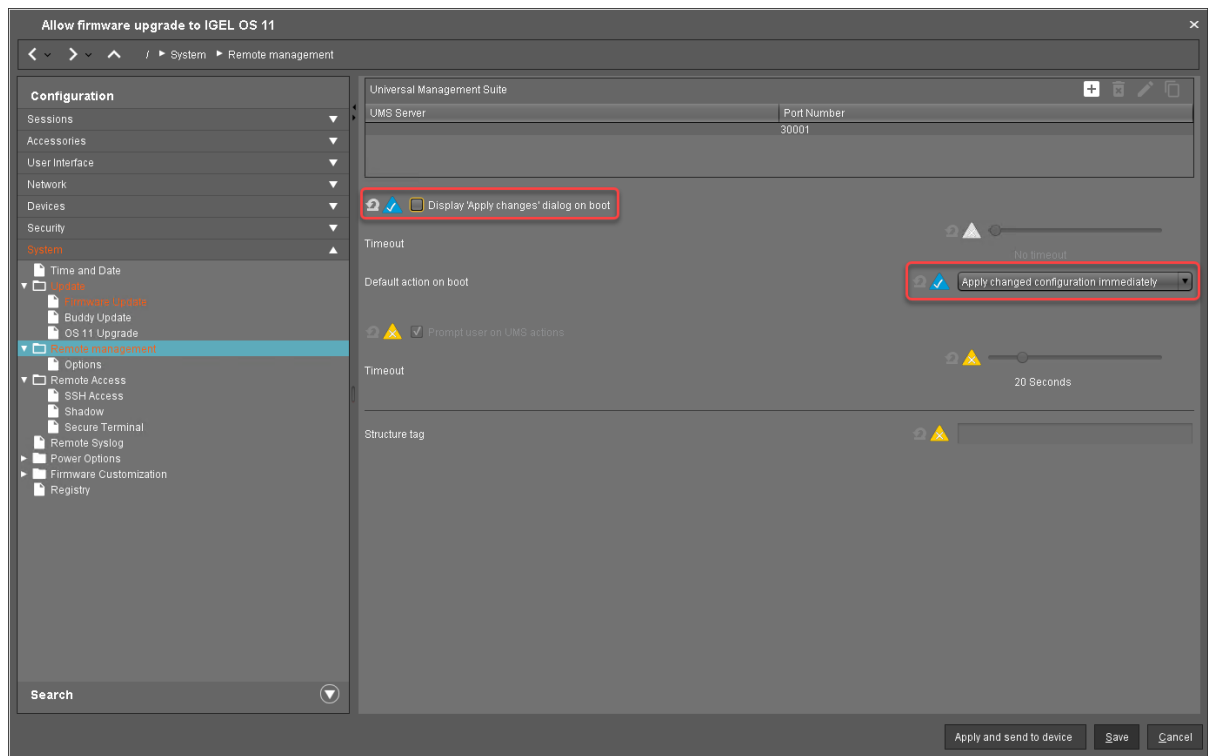
When the update buddies are configured, continue with [Creating a Profile](#) (see page 199).

### Creating a Profile

1. Create a profile which is based on the appropriate IGEL OS 10 firmware version (10.05.700 or higher). Find a suitable name for the profile, e.g. "Firmware upgrade to IGEL OS 11".
2. In the profile's configuration dialog, go to **System > Update > Firmware Update** and change the settings as follows:
  - Select "FTP" as **Protocol**.
  - Enter **User Name** and **Password** according the update buddy server.
  - Activate **Automatic Update Check on Boot**.
  - Ensure that **Automatic Update Check on Shutdown** is deactivated. Otherwise, the device will shut down when the update is finished.
  - Activate **Automatic Buddy Detection**.



3. Go to **System > Update > OS 11 Upgrade** and change the following settings according to your successful upgrade test:
  - Activate **Upgrade to OS 11**.
  - Set **Upgrade to OS 11 even if PowerTerm is enabled** according to your needs.
  - Set **Require an Enterprise Management Pack license to upgrade to OS 11** according to your needs.
  - Set **Timeout waiting for OS 11 license to start automatic upgrade to 10 Minutes**.
4. Go to **System > Remote Management** and change the settings as follows:
  - Deactivate **Display 'Apply changes' dialog on boot**.
  - Set **Default action on boot to Apply changed configuration immediately**.



5. Click **Save**.

When the profile is created, continue with [Deploying the Licenses](#) (see page 201).



## Deploying the Licenses


Deploy the licenses for IGEL OS 11 using the method that suits your needs:

- Automatic License Deployment (ALD): Licenses are created and deployed automatically to each device that needs a license. For instructions, see [Setting up Automatic License Deployment \(ALD\)](#).
- Manual License Deployment: Licenses are created and deployed manually. For instructions, see [Manual License Deployment for IGEL OS](#).

When the license deployment is set up, continue with [Putting It All Together](#) (see page 202).

### Putting It All Together

1. Assign the profile to all devices that are to be upgraded. This can be done by assigning the profile to the directory that contains these devices.


 Do not assign the profile to the update buddies.

2. In the context menu of the assignment, select **Now**.
3. For Automatic license deployment, a condition can be set to the directory. For more information, see [Configuring the Distribution Conditions](#), section "Distributing Licenses to Devices in a Specified Directory".

When everything is in place, continue with [Executing the Upgrade](#) (see page 203).

## Executing the Upgrade

1. In the UMS, select all devices that are to be upgraded and reboot them.

 Alternatively you can create a scheduled job for reboot or wake up and assign it to the devices or the directory containing these devices; for more information, see Jobs.

On reboot or wake up, the devices choose the IGEL OS 10 buddy. They ignore the IGEL OS 11 buddy at this stage because this version is not known to them yet. The devices update to the appropriate version of IGEL OS 10 (10.05.700 or higher). With this version, the Upgrade to OS 11 parameter is recognized by the devices; also, the devices request IGEL OS 11 licenses from the UMS (Workspace Edition and, if required, Enterprise Management Pack).

If no IGEL OS 11 licenses have been deployed on the devices yet, the licenses are deployed within a few minutes. The upgrade will be started when the licenses are deployed. The maximum time period the device will wait for a license is configured by the parameter **Timeout waiting for OS 11 license to start automatic upgrade**; for details, see [Adjusting the Setup](#) (see page 159).

The parameters **Automatic update check on boot** and **Automatic buddy detection** cause the devices to look for a new firmware and wait for an IGEL OS 11 update buddy to reply. When an IGEL OS 11 update buddy is found, the devices start the upgrade process.

2. When all devices have been upgraded successfully, remove the "Firmware upgrade to IGEL OS 11" profile.

The upgrade is complete.

## Mass Deployment Using a Scheduled Job

This scenario is appropriate if you already have a working environment with IGEL OS 10.05.700 (or higher) and want to update all devices to IGEL OS 11 at a defined time.

Read all the following chapters carefully and follow the instructions.

1. [Checking the Requirements](#) (see page 205)
2. [Creating a Profile](#) (see page 206)
3. [Deploying the Licenses](#) (see page 210)
4. [Assigning the Profile](#) (see page 211)
5. [Executing the Upgrade](#) (see page 181)

## Checking the Requirements

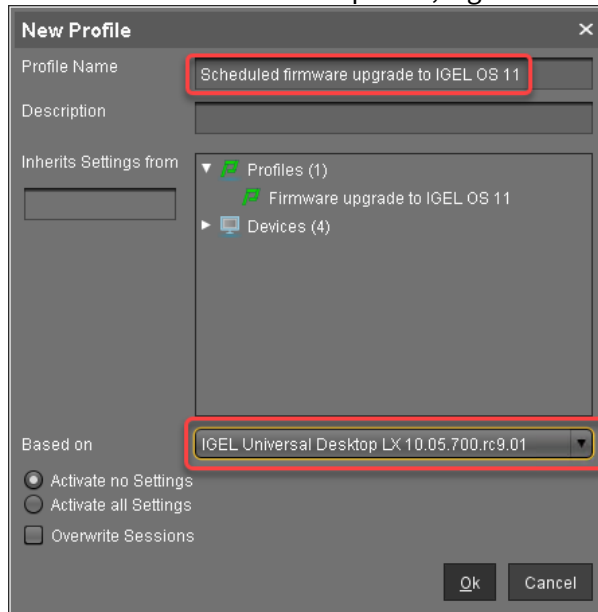
The following requirements must be met:

- The upgrade has been tested with characteristic devices.
- UMS 6.01.130 or higher is available.
- The appropriate IGEL OS 10 firmware version (10.05.700 or higher) is known to the UMS. For this purpose, a device with this firmware version must be registered in the UMS. This is already the case if you tested the upgrade with the same UMS with which you are about to do the mass upgrade. If not, you must register a device with the appropriate IGEL OS 10 firmware version now.
- All devices are connected to a regular LAN (not OpenVPN, OpenConnect, gencard, or mobile broadband).
- All devices are in a safe environment where the upgrade process cannot be disrupted, e.g. by powering off the devices.

When all requirements are met, continue with [Creating a Profile](#) (see page 206).

## Creating a Profile

1. Create a profile that is based on the appropriate IGEL OS 10 firmware version (10.05.700 or higher). Find a suitable name for the profile, e.g. "Scheduled firmware upgrade to IGEL OS 11".



2. In the profile's configuration dialog, go to **System > Update > Firmware Update** and change the settings according to your environment:

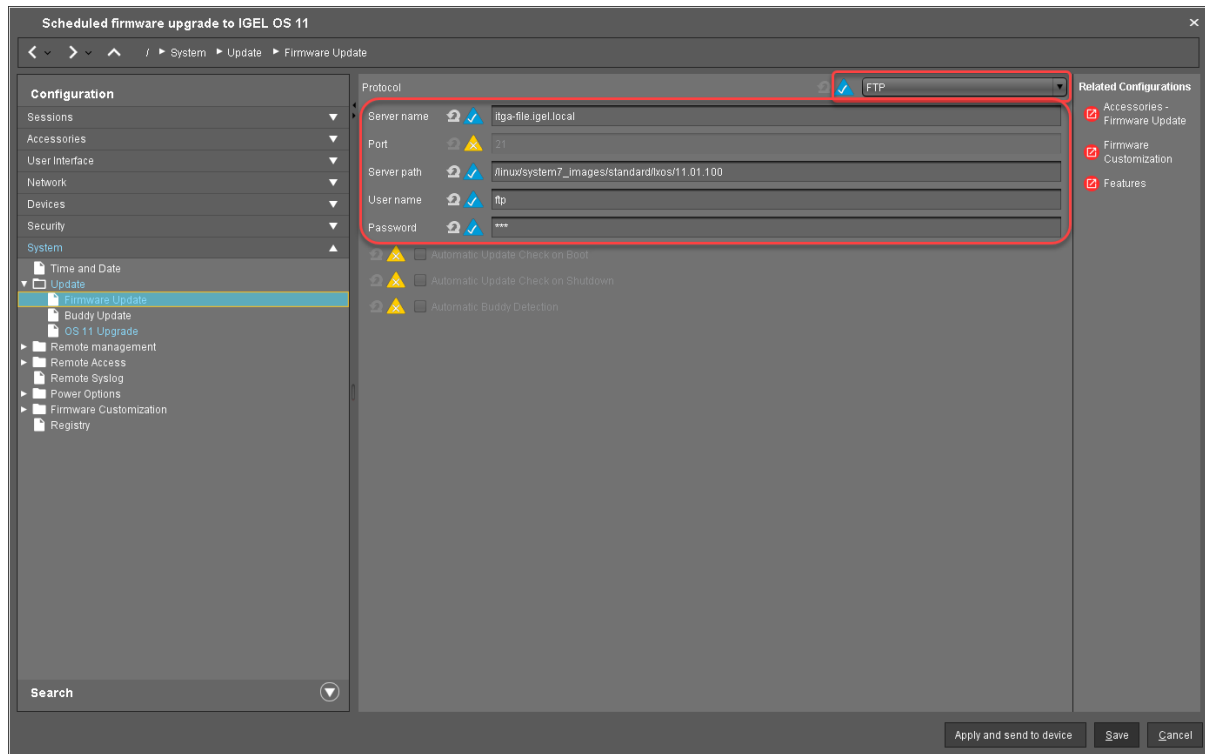
**i** If you use [Universal Firmware Update](#) (see page 167) for OS 11, you do not need to configure the settings described in this step.

- Select an update source for IGEL OS 11. For further information, see [Firmware Update](#).

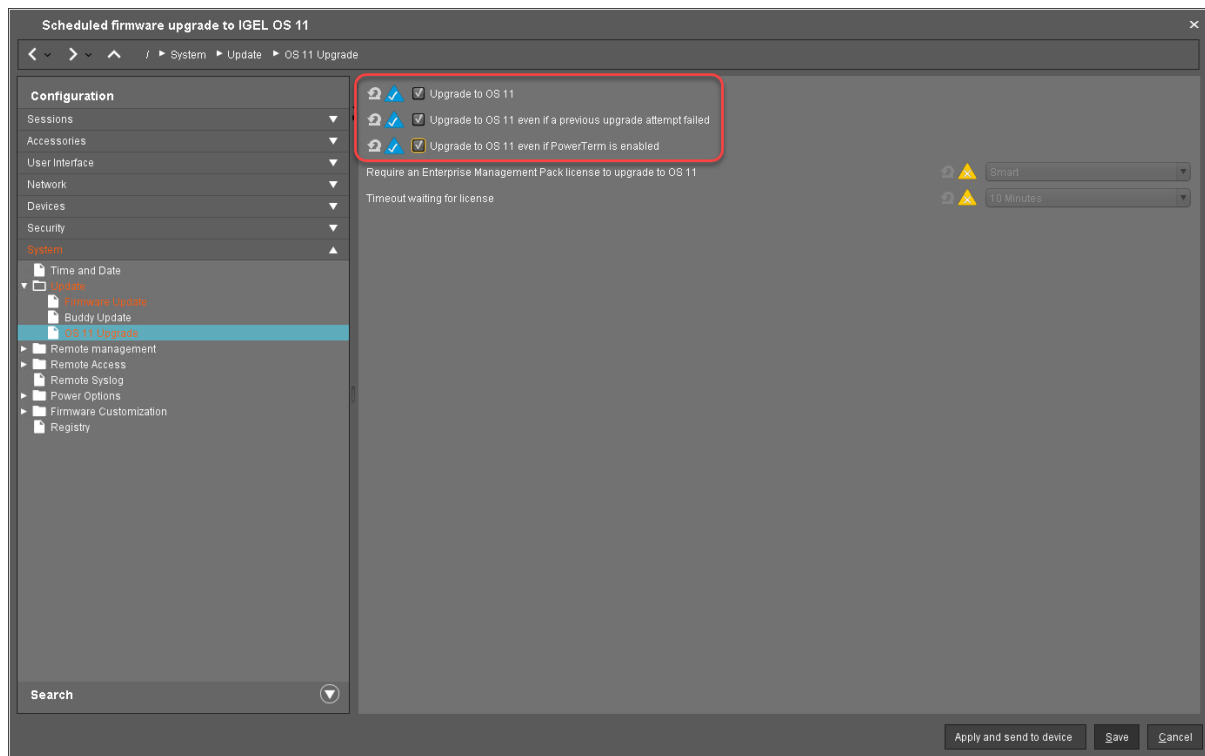
**i** If you use **FILE** as the protocol (local file or network drive), the device will show an error message and go through an additional reboot. Apart from that, the upgrade will work normally.

- Ensure that **Automatic Update Check on Boot** and **Automatic Update Check on Shutdown** are deactivated.

**i** In the following screenshot, FTP is used as an example. The other protocols can be used as well.

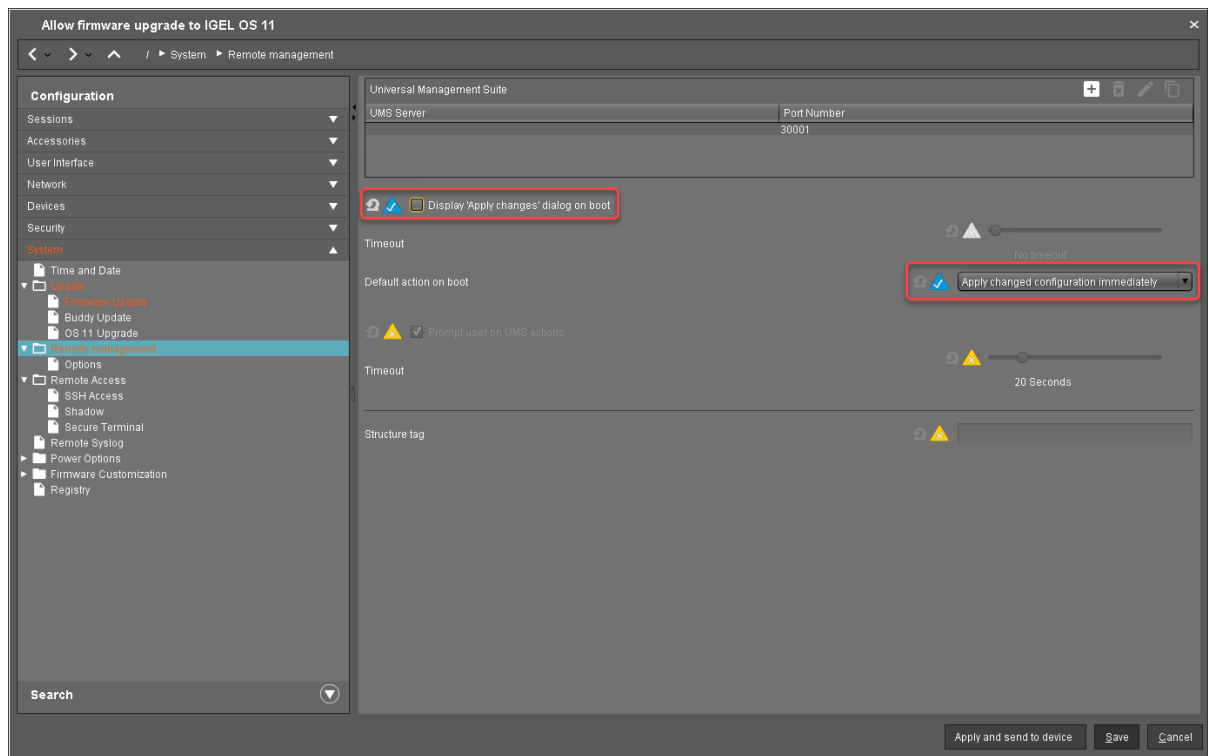


3. Go to **System > Update > OS 11 Upgrade** and change the following settings according to your successful upgrade test (for details of the settings, see [Adjusting the Setup](#) (see page 159)):
  - Activate **Upgrade to OS 11**.
  - Set **Upgrade to OS 11 even if PowerTerm is enabled** according to your needs.
  - Set **Upgrade to OS 11 even if a previous upgrade attempt failed** according to your needs.
  - Set **Require an Enterprise Management Pack license to upgrade to OS 11** according to your needs.
  - Ensure that the **Timeout waiting for OS 11 license to start automatic upgrade** is set to **10 Minutes**.



4. Go to **System > Remote Management** and change the settings as follows:
  - Deactivate **Display 'Apply changes' dialog on boot**.
  - Set **Default action on boot** to **Apply changed configuration immediately**.





5. Click **Save**.

When the profile is created, continue with [Deploying the Licenses](#) (see page 210).

## Deploying the Licenses

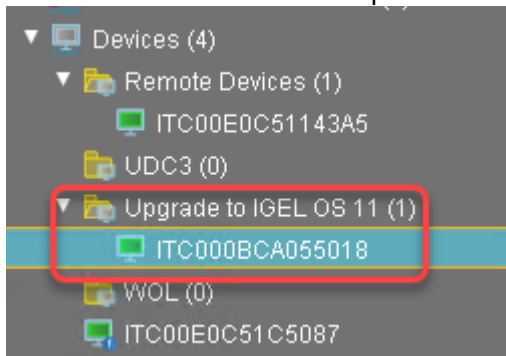
Deploy the licenses for IGEL OS 11 using the method that suits your needs:

- Automatic License Deployment (ALD): Licenses are created and deployed automatically to each device that needs a license. For instructions, see [Setting up Automatic License Deployment \(ALD\)](#).
- Manual License Deployment: Licenses are created and deployed manually. For instructions, see [Manual License Deployment for IGEL OS](#).

When the license deployment is set up, continue with [Assigning the Profile](#) (see page 211).

### Assigning the Profile

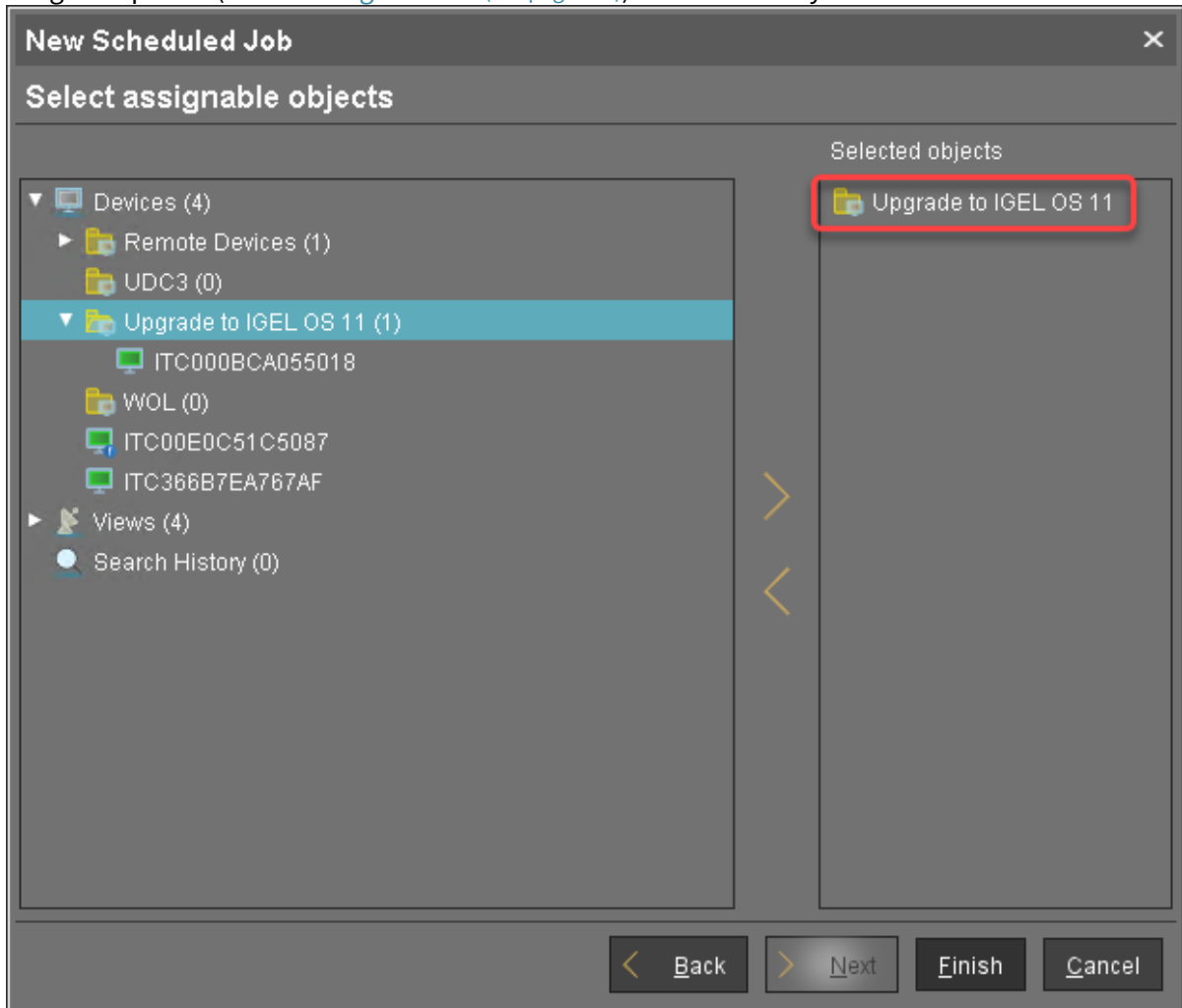
1. Put all devices that are to be updated into a directory.



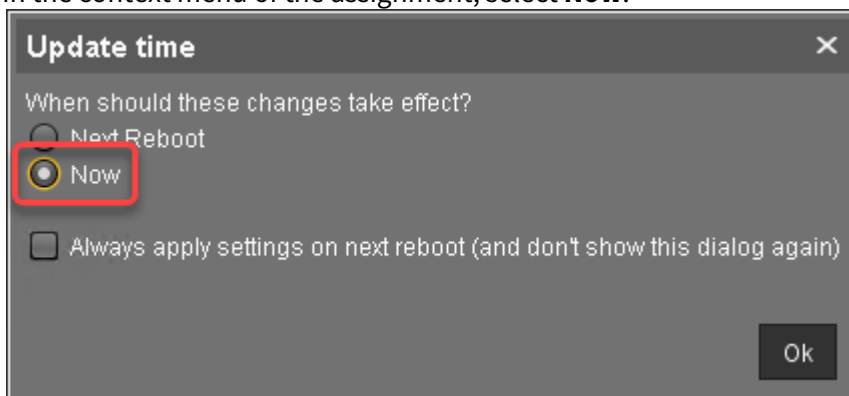
2. Select the directory and in the **Assigned objects** area, click .



3. Assign the profile (see [Creating a Profile](#) (see page 206)) to the directory and click **Ok**.



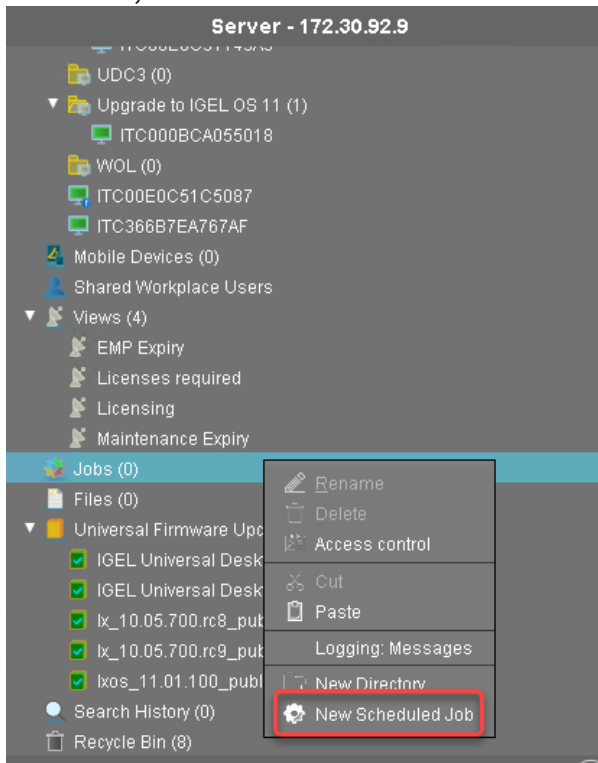
4. In the context menu of the assignment, select **Now**.



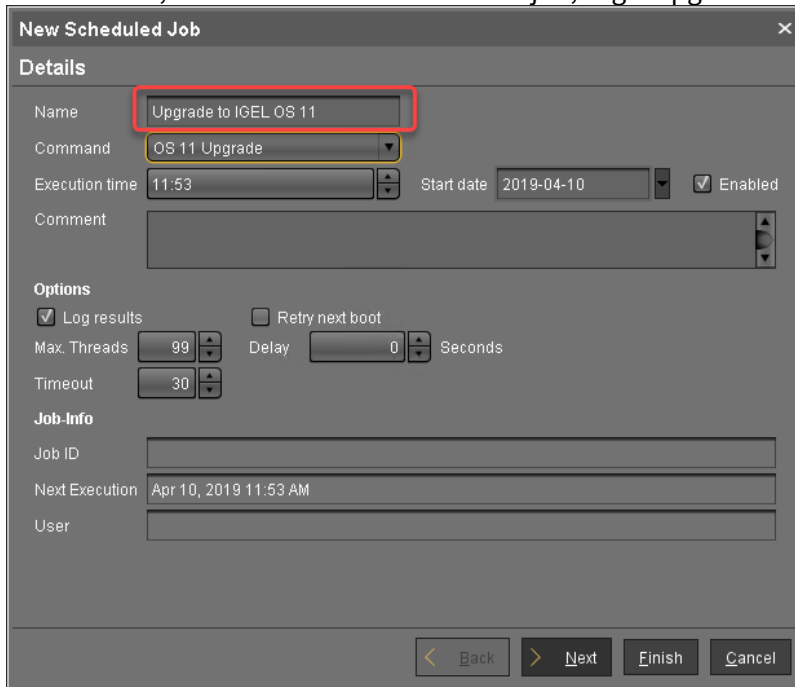
When the profile is assigned, continue with [Creating the Scheduled Job](#) (see page 213).

### Creating the Scheduled Job

1. In the UMS, select **Jobs > New Scheduled Job**.



2. Under **Name**, enter a suitable name for the job, e. g. "Upgrade to IGEL OS 11".



- 3. Under **Command**, select **OS 11 Upgrade**.

**New Scheduled Job**

**Details**

Name: Upgrade to IGEL OS 11

Command: OS 11 Upgrade

Execution time: 11:53 Start date: 2019-04-10  Enabled

Comment:

**Options**

Log results  Retry next boot

Max. Threads: 99 Delay: 0 Seconds

Timeout: 30

**Job-Info**

Job ID:

Next Execution: Apr 10, 2019 11:53 AM

User:

< Back > Next Finish Cancel

- 4. Under **Execution time** and **Start date**, set the time at which the upgrade should be executed, and click **Next**.

**New Scheduled Job**

**Details**

Name: Upgrade to IGEL OS 11

Command: OS 11 Upgrade

Execution time: 11:02 Start date: 2019-08-12  Enabled

Comment:

**Options**

Log results  Retry next boot

Max. Threads: 99 Delay: 0 Seconds

Timeout: 30

**Job-Info**

Job ID:

Next Execution:

User:

< Back > Next Finish Cancel

5. Review the execution time and click **Next**.

The screenshot shows the 'New Scheduled Job' dialog box with the 'Schedule' tab selected. The 'Execution time' is set to 11:53 and the 'Start date' is 2019-04-10. Under 'Repeat Job', 'Never' is selected. At the bottom, the 'Next' button is highlighted with a red box.

6. Assign the directory containing the devices to the job and click **Finish**.

The screenshot shows the 'New Scheduled Job' dialog box with the 'Select assignable objects' tab selected. The 'Upgrade to IGEL OS 11' directory is selected in the left pane and also appears in the 'Selected objects' pane on the right. The 'Finish' button at the bottom is highlighted with a red box.

## Troubleshooting

This section describes possible error cases and solutions.

- [Regaining a Usable System \(see page 217\)](#)
- [Getting Error Messages \(see page 218\)](#)
- [Starting a New Upgrade Attempt \(see page 219\)](#)
- [Starting Another Upgrade Attempt after 5 Retries \(see page 220\)](#)



## Regaining a Usable System

Here you can find typical upgrade failures and the appropriate methods to regain a usable system.

### Device Has Upgraded to Igel OS 11, but Does Not Boot Any More

To get a working IGEL OS 11 system:

- ▶ Use the IGEL OS Creator to recover the IGEL OS 11 system. For more information, see the IGEL OS Creator Manual.

### IGEL OS 10 Rescue System Fails to Update Missing Partitions

If a severe error has occurred during the upgrade process, the device boots into a minimal 10.05.700 (or higher) rescue system. If unattended, the device tries to download and update the missing partitions and reboots on failure.


To regain a full IGEL OS 10 system, you have two possibilities:

- ▶ In the rescue system, start the Setup, go to **System > Update > Firmware Update** and set a valid update source for the appropriate IGEL OS 10 firmware version (10.05.700 or higher).

Or:

- ▶ Configure a UMS profile that contains a valid update source for the appropriate IGEL OS 10 firmware version (10.05.700 or higher) under **System > Update > Firmware Update** and assign it to the device.


## Getting Error Messages

- ▶ Open the OS 11 Upgrade Tool (default path: click  System and then **Upgrade to OS 11**).

The OS 11 Upgrade Tool shows the error messages. The most important message is prefixed with **Retries**; see the example below:



- ▶ For more information, review the main migration log under `/wfs/migration.log`

 You can use the system log viewer to review the migration log (see the chapter System Log Viewer in the IGEL OS Manual) or save the log files in order to send them to the IGEL Support Team (see the chapter Save Device Files for Support support).

### Starting a New Upgrade Attempt

If you want the device to start multiple upgrade attempts (and the device is not already configured to do so):

1. In the UMS profile or in the Setup, go to **System > Update > OS 11 Upgrade** and activate **Upgrade to OS 11 even if a previous upgrade attempt failed**.
2. Reboot the device.

#### Starting Another Upgrade Attempt after 5 Retries

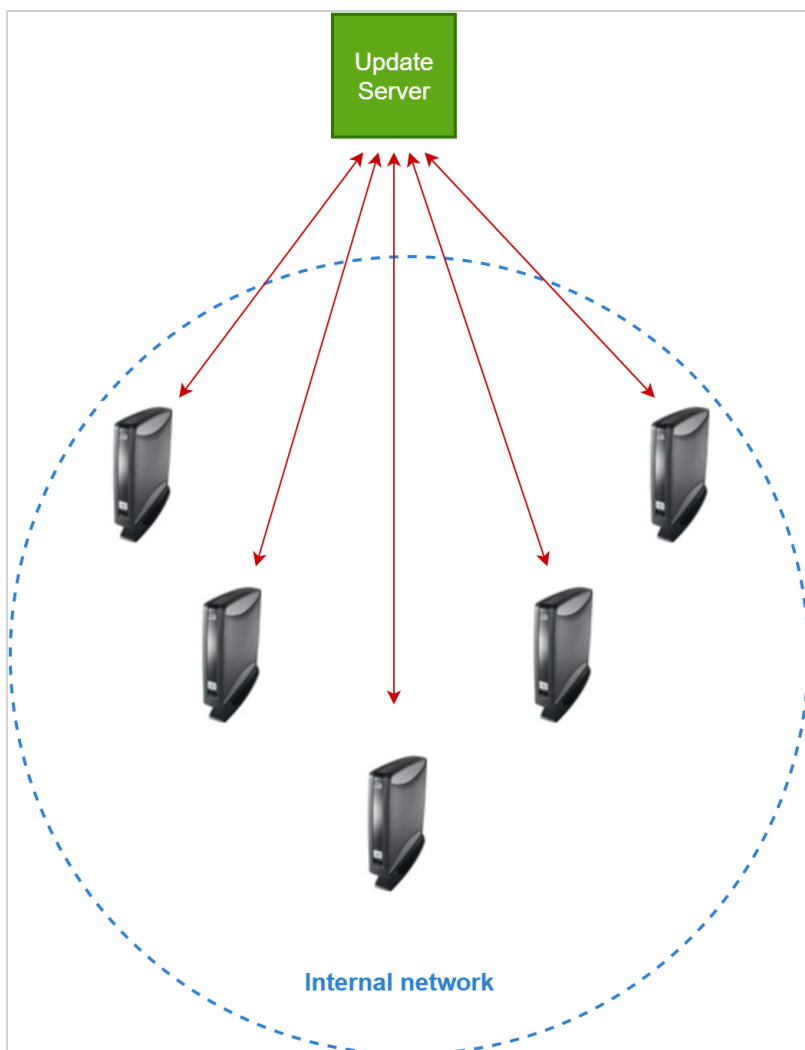
When the **Upgrade to OS 11 even if a previous upgrade attempt failed** option is set and the upgrade has failed each time, the system will stop trying after 5 attempts.

To reset the retry counter:

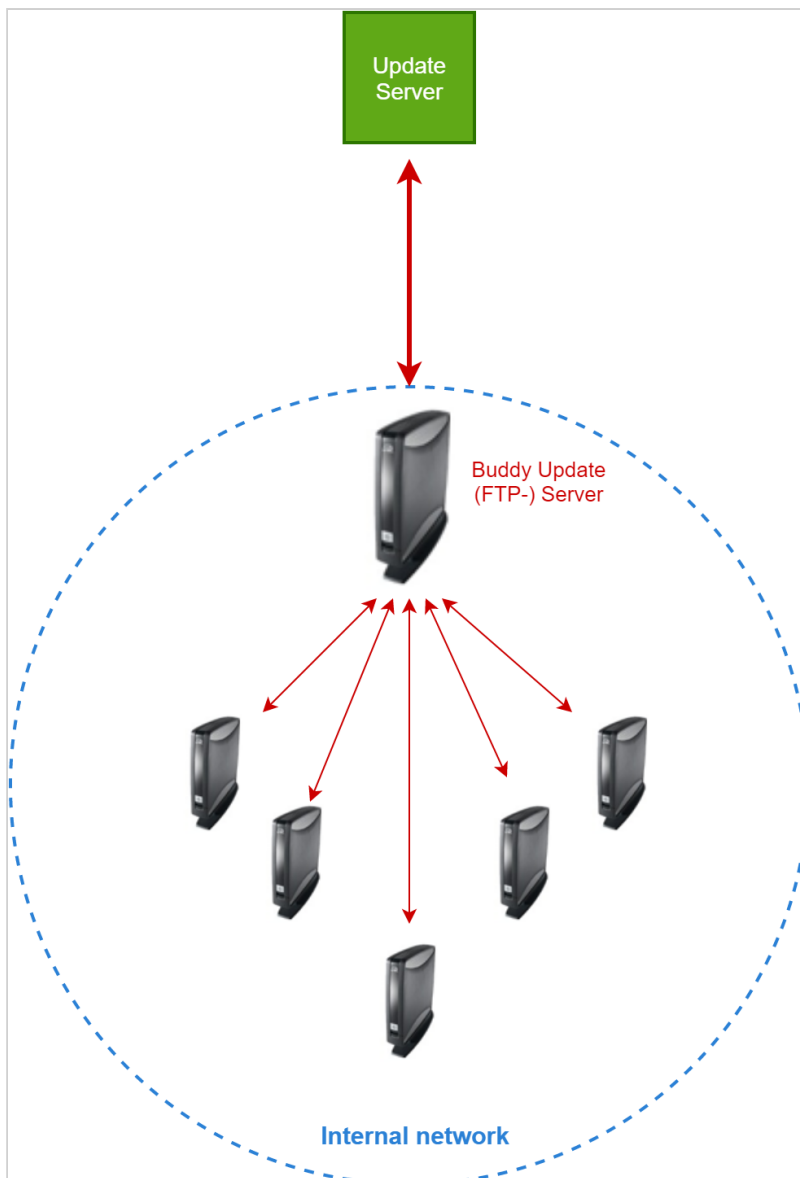
1. In the Setup or the UMS profile, go to **System > Update > OS 11 Upgrade** and deactivate **Upgrade to OS 11 even if a previous upgrade attempt failed**.
2. When the setting is effective on the devices, go to **System > Update > OS 11 Upgrade** again and activate **Upgrade to OS 11 even if a previous upgrade attempt failed**.  
The retry counter is reset, and the devices will try upgrading another 5 times, if necessary.

## Buddy Update

A certain number of devices that are running IGEL OS in your company regularly need to be updated. If every device accesses the main update server individually, maybe even over a great geographical distance, the update could take quite a long time and might overload the entire connection.



Set up one of your devices as a so-called buddy update server. In the future, only this client will access the main server to download the updates. All other clients access the local buddy update server from within the network and will no longer offload the network outside.



The buddy update server is always an FTP server.

For the configuration details, see:

- [Configuring the Buddy Update Server](#) (see page 224)
- [Configuring the Buddy Update Client](#) (see page 225)

## TechChannel




Sorry, the widget is not supported in this export.  
But you can reach it using the following URL:

<https://www.youtube.com/watch?v=IVUIFtOT5uE>

## Configuring the Buddy Update Server

### Basic Configuration

1. In the Setup, go to **System > Update > Buddy Update**.
2. Activate **Enable Update Server**.
3. Enter the credentials **User Name** and **Password**.
4. Specify the maximum number of **Concurrent Logins** allowed.
5. Click **Save** to confirm the changes.
6. Perform a complete firmware update on the server.
7. Reboot the server.

 Whenever a buddy update server has received a firmware update, it needs to be rebooted before it can distribute the new firmware to other devices.

### Configuration for Different Firmware Versions

This feature is available for the following versions of IGEL OS:

- IGEL OS 10: 10.06.100 or higher
- IGEL OS 11: 11.02.100 or higher

If you have an environment which requires two or more different firmware versions running simultaneously, you can use the buddy update method to provide each buddy update client device with the appropriate firmware version. A typical use case might be two groups of employees, of which one requires an older version of the browser, or an older version of the Citrix receiver, whereas the other group should get the newest version of IGEL OS. This is achieved by dividing both the clients and the servers into groups. To each group, a specific firmware version is assigned by first installing that version on the group's update servers. As an example, you can assign group 1 to IGEL OS 10.07.100, and group 2 to IGEL OS 10.08.100.

In the following description, the local Setup is used for simplicity reasons; however, in a productive environment, it is recommended to use profiles. For further information, see Profiles.

To assign a server to a group:

1. Configure the server as described above ([Basic Configuration \(see page 224\)](#)), using the firmware that is to be assigned to this group.
2. In the Setup, go to **Registry > update > ftp > buddy\_group\_id**.
3. In the field **Buddy Group ID**, set the appropriate group id. Unsigned integers are allowed.
4. Click **Ok**.
5. Reboot the device.

The device will provide the firmware update for the group it is assigned to.


For client configuration, see [Configuring the Buddy Update Client \(see page 225\)](#), "Configuration for Different Firmware Versions".



## Configuring the Buddy Update Client

### Basic Configuration

1. In the Setup, go to **System > Update > Firmware Update**.
2. Set the following parameters:
  - Server Name:** IP address of the buddy update server
  - Port:** 21 (default with FTP protocol)
  - Server Path:** -
  - User Name:** User name of the buddy update server
  - Password:** Password of the buddy update server

 Ensure that all servers in the network use the same credentials. For security reasons, you have to enter them in the upper mask, even if you did not specify a server.

3. Activate **Automatic Update Check** if you want the client to check automatically during the boot process whether new updates are available on the server.
4. Activate **Automatic Buddy Detection** if you want the client to look for a buddy update server on its own.

This is useful if you work with more than one buddy update server and do not wish to determine a specific one.

In this case, you do not need to define the **Server Name**, **Port** and **Server Path**. If you enter a server name anyway, the system treats this server as a fall-back. Thus, you can be sure that the system accesses at least this one server if it cannot find any others.
5. Click **Ok**.
6. Continue with further configuration changes or reboot the device.

### Configuration for Different Firmware Versions

The feature is available for the following versions of IGEL OS:

- IGEL OS 10: 10.06.100 or higher
- IGEL OS 11: 11.02.100 or higher

This feature is described under [Configuring the Buddy Update Server](#) (see page 224), "Configuration for Different Firmware Versions".

In the following description, the local Setup is used for simplicity reasons; however, in a productive environment, it is recommended to use profiles. For further information, see Profiles.

To assign a client to a group:

1. In the Setup, go to **Registry > update > ftp > buddy\_group\_id**.
2. In the field **Buddy Group ID**, set the id of the group to which the desired firmware is assigned.
3. Click **Ok**.
4. Reboot the device.

The device will use the firmware update for the group it is assigned to.

## Balancing the Server Load

This feature is available for the following versions of IGEL OS:

- IGEL OS 10: 10.06.100 or higher
- IGEL OS 11: 11.02.100 or higher

It is possible to balance the load between several buddy update servers. If **System > Update > Firmware Update > Automatic Buddy Detection** is activated, the clients send a broadcast in their network to determine which buddy servers are available. Each server that responds within a fixed timeout is added to a list whose maximum length can be defined. When the list is complete, either because its maximum length is reached or because the timeout has expired, the client selects a random server from the list. This way, the load of the buddy servers is distributed evenly.

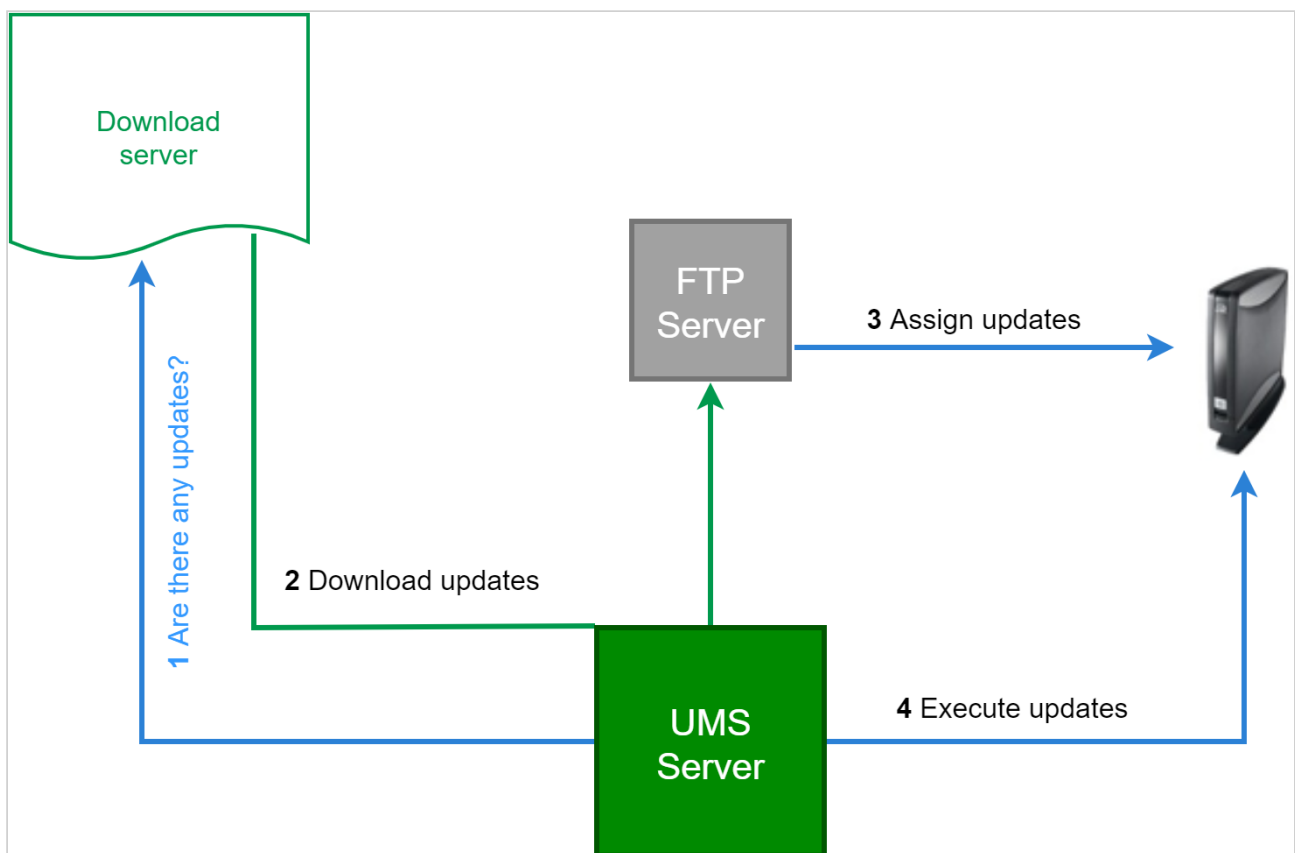
To configure a client for balancing the server load:

1. In the Setup, go to **Registry > update > ftp > buddy\_server\_candidates**.
2. In the field **Buddy Update Server Candidates**, enter the maximum number of servers the client should collect. If the number is 1, the server that responds first is selected.
3. Click **Ok**.
4. Reboot the device.

## Firmware Update

Here we show you the best practice of downloading a firmware update from our download server and distributing it to various devices in your company:

1. Check our [download server](#)<sup>23</sup> to see whether there are new updates which are relevant for your applications.
2. Download the relevant update files.
3. Install an update directory for them on the UMS server or on your FTP server.
4. Assign this update directory to your devices.
5. Start the update process manually or via a [Scheduled Job](#) (see page 229).



- [Downloading Updates and Storing them on an FTP Server](#) (see page 228)
- [Executing an Update Process](#) (see page 229)

<sup>23</sup> <https://www.igel.com/software-downloads/>

## Downloading Updates and Storing them on an FTP Server

You can save the update files either directly on the UMS server or you can put them on your captive FTP server. If you have many devices to be updated, you should work with the FTP server because it makes it easier to distribute large amounts of data in the local network.

### Preparation

1. Click **Universal Firmware Update** in the UMS Administration area of *UMS* console.
2. Click **Edit...**
3. Enter your FTP server under **Host**, to save the update files in this location.
4. Add further details like storage path and access data for the server.
5. Save your settings and click **Test Server Connection**.

### Downloading updates


1. Right-click **Universal Firmware Update** on the UMS console tree.
2. Choose **Check for new firmware updates** from the context menu.  
A window opens with a list of all updates associated with the firmware versions registered in the UMS database.
3. Choose a **Version** in the drop-down-list.
4. Click **Information** to see the release notes of each update.
5. Activate the check box **Include** for downloading a certain update.
6. Click **Download** to start the process.  
The update will be added to the tree and the current processing status will be shown.  
The unpacked firmware files are finally in the target directory on the FTP server.

### Assigning updates to the thin clients

Assign the downloaded update by dragging and dropping to your device directory. Now, if you click this directory you can see the firmware update in the right window under **Assigned objects**. The devices will now know where to find the firmware update in the event of an update command.

## Executing an Update Process

1. Create one or more new **Views** to distinguish which thin clients will get the new update.
2. Create a new **Job**, called "firmware update" for example.
3. Specify on the **Schedule** tab when you want the update to be performed.

 The **Repeat job** option should not be activated for **Update**, **Update on boot** or **Update on shutdown** commands.

4. Add one or more **Views** on the **Assignment tab**.
5. Save the job.

The update process will be performed according to the schedule specified in the job.

## Updating IGEL OS Using a USB Storage Device

You can use a USB storage device to update IGEL OS locally. This method is particularly suitable if only one device or only a few devices are to be updated and it would not be worth installing an FTP or HTTP server purely for the update.

To update the device's firmware without having access to the local setup, follow [Updating the Firmware using the Linux Console](#) (see page 232).

---

To update IGEL OS using a USB storage device, proceed as follows:


1. Download the update file (.zip) for your device from the [IGEL download server](#)<sup>24</sup>.
2. Unpack the update files and save them to a USB storage device.

 You can find the officially supported file systems under Storage Hotplug.

3. Open the IGEL Setup on the device and select **Devices > Storage Devices > Storage Hotplug**.
4. Set **Client Drive Mapping** to **Static**.
5. Enable **Private drive letter for each storage drive**.
6. Set **Number of drives** to at least 1.
7. **Apply** the changes so that they are effective for the device.

 You can find more information under Storage Hotplug.

8. Connect the USB storage device to the device and wait until the device has been detected.
9. Go to **System > Update > Firmware Update**.
10. Set **Protocol** to **FILE**.
11. Start the file chooser (**Server path**) and navigate to `/userhome/media/label` of the USB storage device / `lxos.inf` and click **Open**.

 Do NOT use spaces in the USB device name.

---

<sup>24</sup> <https://www.igel.com/software-downloads/workspace-edition/>

12. Click **Update firmware** and confirm the warning message.  
The device will reboot while updating the firmware. Do not remove the USB device until the update has finished.

 Make sure you do not boot from the USB storage device. You might need to change the boot order in the BIOS/UEFI.

## Updating the Firmware using the Linux Console

### Issue

You have to update the device's firmware without *IGEL Universal Management Suite* or local *IGEL Setup* application.

### Solution

The device's firmware update can also be carried out directly on the Linux console itself without IGEL Setup:

1. Restart the device.
2. Press [ESC ]key during booting to bring up the boot menu.
3. Select **Verbose Boot** from the boot menu.
4. When instructed, switch to the console by pressing [CTRL-ALT-F11] or [CTRL-ALT-F12].
5. Press [RETURN ]key to log in.  
You may have to enter your password.

Carry out the update. The exact procedure varies according to the protocol which is to be used, that is, FILE, HTTP, or FTP; see the instructions below. You can check whether the correct parameter values have been passed using the `get` command, e.g. `get update.protocol`

### HTTP

1. If necessary, set up a static IP address (DHCP is active by default)

```
setparam network.interfaces.ethernet.device0.usedhcp false
setparam network.interfaces.ethernet.device0.manual true
setparam network.interfaces.ethernet.device0.ipaddr
setparam network.interfaces.ethernet.device0.netmask
```

2. Configure the update server

```
setparam update.protocol http
setparam update.http.server
setparam update.http.port
```

 The default UMS port is 9080

```
setparam update.http.path
setparam update.http.user
setcryptparam update.http.crypt_password
```



3. Start the update process in the `/` directory using the command `update`

## FTP

1. If necessary, set up a static IP address (DHCP is active by default)
 

```
setparam network.interfaces.ethernet.device0.usedhcp false
setparam network.interfaces.ethernet.device0.manual true
setparam network.interfaces.ethernet.device0.ipaddr
setparam network.interfaces.ethernet.device0.netmask
```
2. Configure the update server
 


```
setparam update.protocol ftp
setparam update.ftp.server
setparam update.ftp.port
```

 The default port is `21`

```
setparam update.ftp.path
setparam update.ftp.user
setcryptparam update.ftp.crypt_password
```

3. Start the update process in the `/` directory using the command `update`

## FILE

 Requirement: The unpacked update files are available in the root directory of a USB storage device.

1. Configure at least one hotplug USB device:
 

```
setparam devices.hotplug.usb-storage.numdevices 1
```
2. Apply your changes:
 

```
kill_postsetupd
```
3. Connect the USB storage device to the device.
4. Wait for the USB storage device to be mounted automatically.
5. Determine the mount point:
 

```
ls /media/
```
6. Configure the update parameters:
 

```
setparam update.protocol file
setparam update.file.path /media/<name of USB storage device>
```

7. Start the update process in the `/` directory using the command `update`

## Citrix

- [Performance](#) (see page 236)
- [Mouse](#) (see page 243)
- [How to Configure Citrix Native USB Redirection](#) (see page 249)
- [Mapping USB Storage Media into Citrix Sessions](#) (see page 251)
- [Auto-Hide Toolbar in Appliance Mode](#) (see page 253)
- [Create a Seamless, Transparent User Experience with Appliance Mode](#) (see page 254)
- [Connecting to a Citrix Farm](#) (see page 255)
- [Create a Self-Service Setup for the User with Quick Settings](#) (see page 262)
- [Login Failed because of the Expired AD Password](#) (see page 264)
- [Configuring Auto Logon for Citrix Virtual Desktops](#) (see page 266)
- [Force Citrix Logout Using Hotkey](#) (see page 270)
- [Citrix: Freeze at Logout](#) (see page 271)
- [Warning Message: \[Citrix Store\] Could Not Connect to the Citrix Server](#) (see page 273)
- [Setting up Citrix Sessions with Hardware-Accelerated H.264 Deep Compression Codec](#) (see page 275)
- [Using Font Smoothing \(ClearType\) in Citrix Sessions](#) (see page 277)
- [Highly Secured XenServer Has Problems with LD\\_BIND\\_NOW Workaround](#) (see page 279)
- [Workaround for Citrix Receiver X Error](#) (see page 280)
- [Citrix HTML5 Receiver Issue](#) (see page 281)
- [Macbook Keyboard Layout inside Citrix Session](#) (see page 282)
- [Using Lync / Skype for Business with Citrix HDX RealTime Optimization Pack](#) (see page 283)

## Performance

- [Poor Performance: Black Blocks and Stripes in Citrix Sessions \(see page 237\)](#)
- [Poor Performance with Citrix XenDesktop 7.6 Deep Compression \(see page 238\)](#)
- [Citrix Receiver: Grey Blocks in Excel 2013 \(see page 239\)](#)
- [Bar Code Scanning is Slow via Citrix \(see page 240\)](#)
- [Slow Performance of Citrix Session in a Cloud Environment \(see page 241\)](#)

## Poor Performance: Black Blocks and Stripes in Citrix Sessions

### Symptom

In the Citrix session, you sometimes experience a problem with black blocks, frames, or stripes.

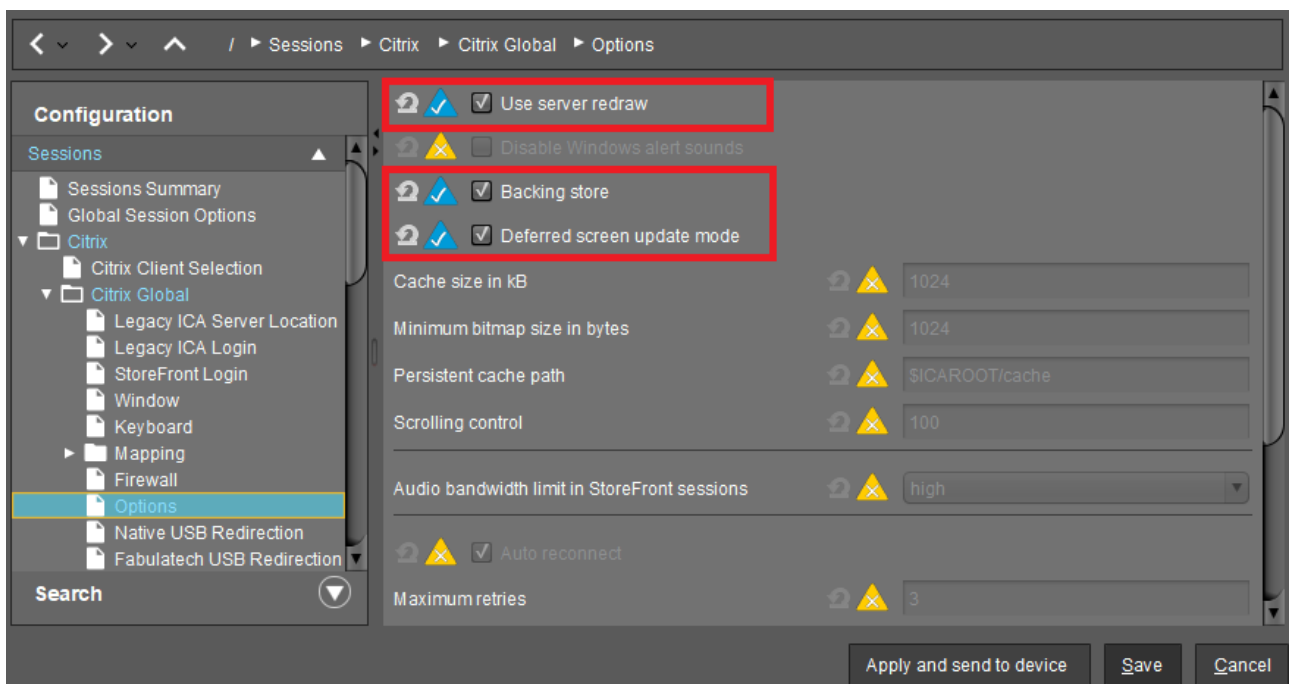
### Problem

Poor performance is often connected with the delayed or slow refreshing of the screen content.

### Solution

► In the IGEL Setup or the configuration dialog in the UMS, activate one of the following parameters or all of them under **Sessions > Citrix > Citrix Global > Options**:

- **Use server redraw**
- **Backing store**
- **Deferred screen update mode**



See also Options in the manual chapter for Citrix.

## Poor Performance with Citrix XenDesktop 7.6 Deep Compression

### Symptom

When using XenDesktop 7.6 on Windows Server 2008R2 with Citrix Receiver 13.0.4, 13.1.4 or 13.2.1 with H.264 Deep Compression Codec, dragged Windows lag and the performance is generally poor.

### Problem

Server and/or client do not have enough computing power for the H.264 Deep Compression Codec.

### Solution

Enable the legacy graphics mode on the XenDesktop 7.6 server via a policy.

## Citrix Receiver: Grey Blocks in Excel 2013

### Symptom

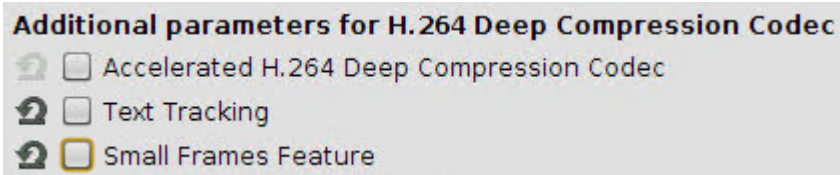
When using Microsoft Excel 2013 on XenDesktop 7.6 with Citrix Receiver 13.1.3, 13.1.4 or 13.2, grey blocks appear especially if you mark multiple cells.

### Problem

Codec parameters may not be optimal for this use case.

### Solution

1. In IGEL Setup, go to **Sessions > Citrix > Citrix Global > Codec**.
2. Disable **Text Tracking**.
3. Disable **Small Frames Feature**.



## Bar Code Scanning is Slow via Citrix

### **Solution Based on Experience from the Field**

This article provides a solution that has not been approved by the IGEL Research and Development department. Therefore, official support cannot be provided by IGEL. Where applicable, test the solution before deploying it to a productive environment.

### Issue

Bar code scanning is slow via Citrix.

### Environment

- Firmware version: any
- UMS version: any

### Description

USB attached bar code scanner is very slow via Citrix.

### Solution

In order to pass the Bar Code scanner through correctly, you want it to be a HID so it passes through as a HID instead of using Native USB Redirection. A quick way to determine that would be to open a terminal in IGEL OS and simply scan something. If it populates data in the terminal, then it is configured as HID. Also, check the configuration guide for the particular scanner that you are using. The config guide is simply a bunch of barcodes that the device can scan. Once a code is scanned, the device beeps twice, and that changes the config on the scanner. On some devices, there is a setting for Alternate OS Linux/MACOS. The default setting for the scanner usually doesn't enable this. Once the setting was set, everything scanned very fast and that same speed was shown in Citrix.



## Slow Performance of Citrix Session in a Cloud Environment

### Symptom

Your cloud-based Citrix session is very slow.

### Environment

- IGEL OS 10.05 or higher, up to IGEL OS 11.05 (with IGEL OS 11.06 or higher, the default setting has changed)
- Citrix client is connected to a cloud server. NOT affected: On-premises and Netscaler environments

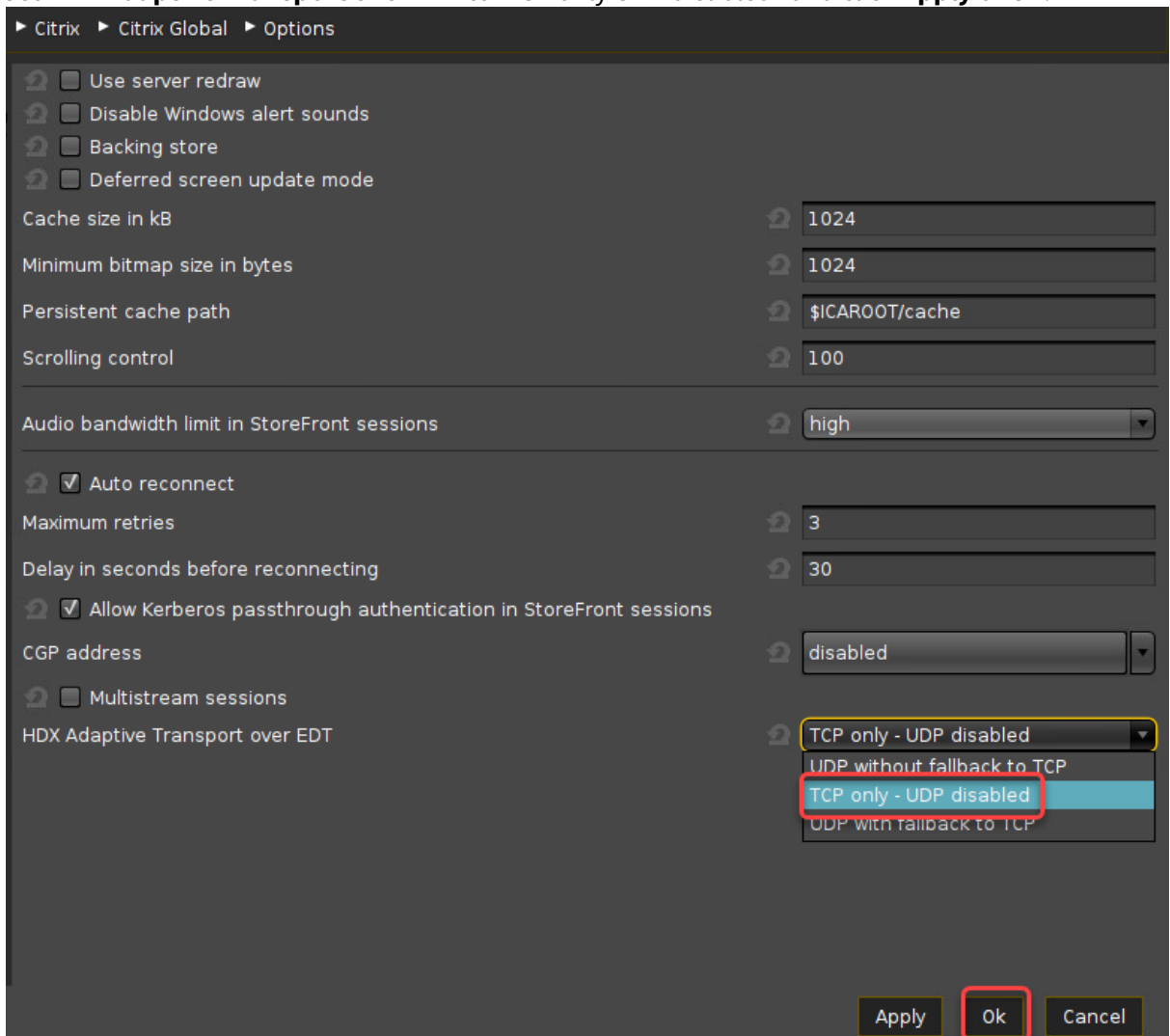
### Problem

The HDX transport protocol is set to "UDP with fallback to TCP", which causes slow performance.

### Solution

1. Open the UMS configuration dialog or the local Setup and go to **Citrix > Citrix Global > Options**.

2. Set **HDX Adaptive Transport over EFT** to "TCP only UDP disabled" and click **Apply** or **Ok**.



When the Citrix client is started again, the performance should be better.

## Mouse

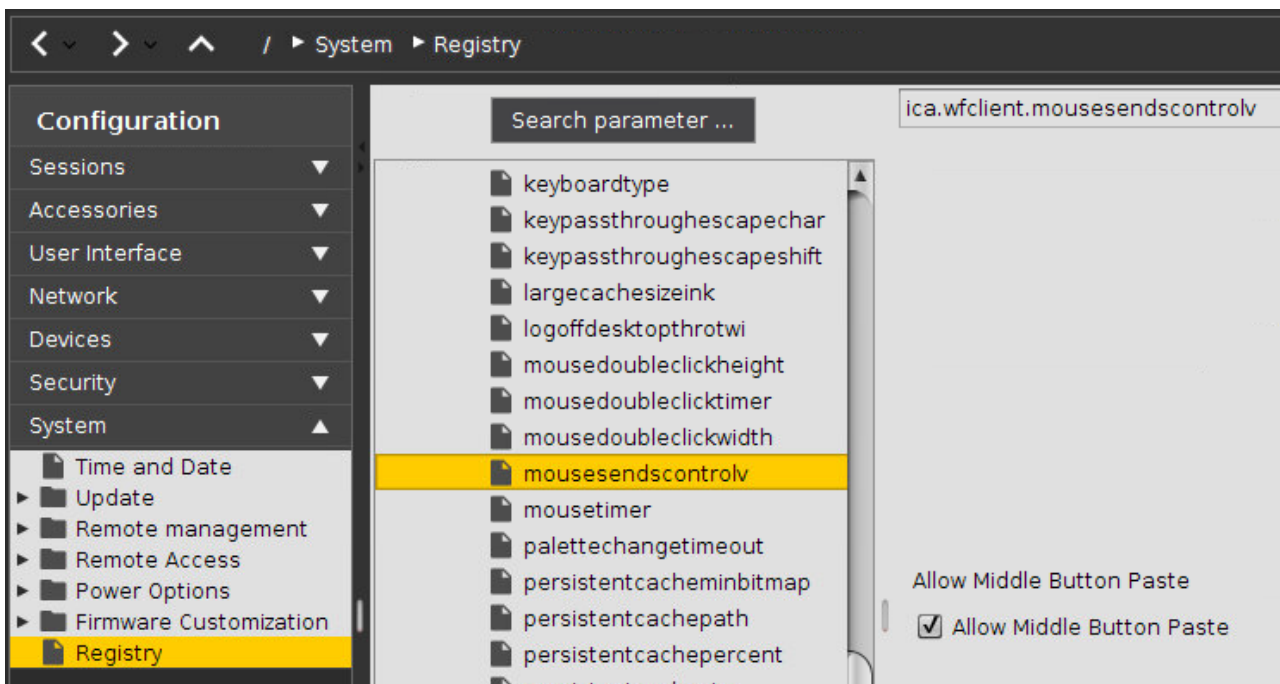
- [Changing Middle Mouse Button Function for Citrix Session and Local Firefox Browser \(see page 244\)](#)
- [How to Connect a SpaceMouse with a Citrix Session \(see page 246\)](#)
- [Solve SpaceMouse USB Reset Problem \(see page 248\)](#)

## Changing Middle Mouse Button Function for Citrix Session and Local Firefox Browser

Middle mouse button cannot be used for smooth scrolling within applications like *Excel* or *Internet Explorer* within a Citrix session or with the local *Firefox* browser.

The default function of the middle mouse button is *copy and paste*.

- ▶ Open IGEL registry in local client setup or UMS.



- ▶ For Citrix sessions change:
  - **System > Registry > ica.wfclient.mousesendscontrolv**
  - **System > Registry > sessions.ica%.appsrv.mousesendscontrolv**
- ▶ For local Firefox browser change:
  - **System > Registry > browserglobal.app.middlemouse\_contentloadurl**
  - **System > Registry > browserglobal.app.middlemouse\_paste**

More information on the Firefox parameters can be found at

<http://kb.mozillazine.org/Middlemouse.contentLoadURL>

<http://kb.mozillazine.org/Middlemouse.paste>

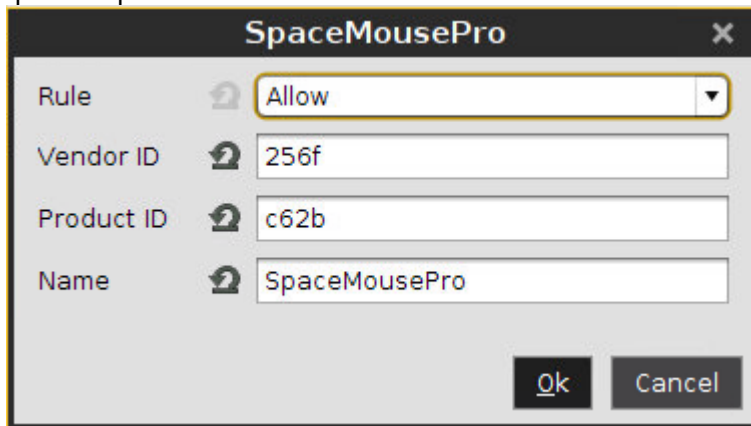
The changes will take effect after rebooting the thin client.

## How to Connect a SpaceMouse with a Citrix Session

This article describes how to use a *3Dconnexion SpaceMouse* in a Citrix HDX Session.

⚠ Citrix Workspace App 13.9 or older: Do not redirect the SpaceMouse if it is the only mouse connected to your thin client! After redirecting, the local system would be without a mouse. Make sure to use a second mouse for the local device in this scenario.

1. In Setup, go to **Sessions > Citrix > Citrix Global > Native USB Redirection**.
2. Activate the checkbox **Native USB redirection**.
3. Set the **Default rule** to **Deny**.
4. Add a device exception rule as in the following screenshot with the Product- and Vendor-ID of your specific SpaceMouse:



ℹ In order to find out the Vendor ID and Product ID, open a **Local Terminal** and issue the command `lsusb`. This will show a list containing the connected USB devices and their IDs.

The SpaceMouse is ready for use.

### Additional Steps for IGEL Linux 10

If your device has IGEL Linux 10 / IGEL OS 10, the SpaceMouse is used as an additional mouse for the local system. Because of this, the SpaceMouse will interfere with the local mouse pointer. You can prevent this by denying local USB access.

To prevent the SpaceMouse from interfering:

1. In Setup, go to **Devices > USB Access Control** and activate **Enable**.
2. In the **Device Rules** area, click **+** to add a new device rule.
3. Set the device rule as follows:
  - **Rule:** Deny
  - **Vendor ID:** 256f
  - **Product ID:** c62b

4. Click **Ok** in the dialog and then **Apply** or **Ok** in the Setup.

See also: [Solve SpaceMouse USB Reset Problem](#) (see page 248).

## Solve SpaceMouse USB Reset Problem

### Environment

Valid for IGEL hardware H850C, H830C, and M340C


### Problem

After a previous Citrix session, the SpaceMouse does not function properly (e.g. after the end of the Citrix session, the reset of the SpaceMouse does not take place; as a result, the display of the SpaceMouse always remains bright).

### Solution

Use a power cycle command to automatically turn all USB devices off and on again:

1. In IGEL Setup, go to **System > Firmware Customization > Custom Commands > Post Session**.
2. Under **Session type**, select **Citrix**.
3. Under **Post session command**, enter the following command: `/etc/igel/usb-power-reset/igel-usb-power-ctl -p cycle`

 You do not need root permissions for this action.

As a result of the configured USB power cycle, after the end of the Citrix session, the display of the SpaceMouse should become dark for about 1 second and then bright again.

See also [How to Connect a SpaceMouse with a Citrix Session](#) (see page 246).



## How to Configure Citrix Native USB Redirection

**Native USB Redirection** redirects most popular USB devices to the Citrix session. To use this feature, you must have at least **XenDesktop 7.6** installed. In addition, the guidelines for USB redirection must be defined. More information can be found on the following pages

- [Citrix Generic USB Redirection Configuration Guide](#)<sup>25</sup>
- [Generic USB redirection and client drive considerations](#)<sup>26</sup>

The following types of USB device are **not** supported by default for use in a **Citrix Virtual Apps and Desktops** session:

- Bluetooth dongles
- Integrated NICs
- USB hubs

The following types of device are supported directly in a **Citrix Virtual Apps and Desktops** session, and so do not use USB support:

- Keyboards
- Mice
- Smart cards
- Headsets
- Webcams

In addition to the server policies, the USB redirection must also be activated at the client:

1. In Setup, go to **Sessions > Citrix > Citrix Global > Native USB Redirection**.
2. Enable **Native USB Redirection**.
3. Set the **Default rule** to **Deny** or **Allow**:
  - **Allow**: All devices that are allowed by default are redirected.
  - **Deny**: No device is redirected.



### Tip

To secure your endpoint, it is generally recommended to set **Default rule** to **Deny** and to configure **Allow** rules only for the required USB devices and USB device classes.

4. To customize the USB redirection, you can create classes or device rules to redirect e.g. Bloomberg keyboards or 3D Spacemouse.

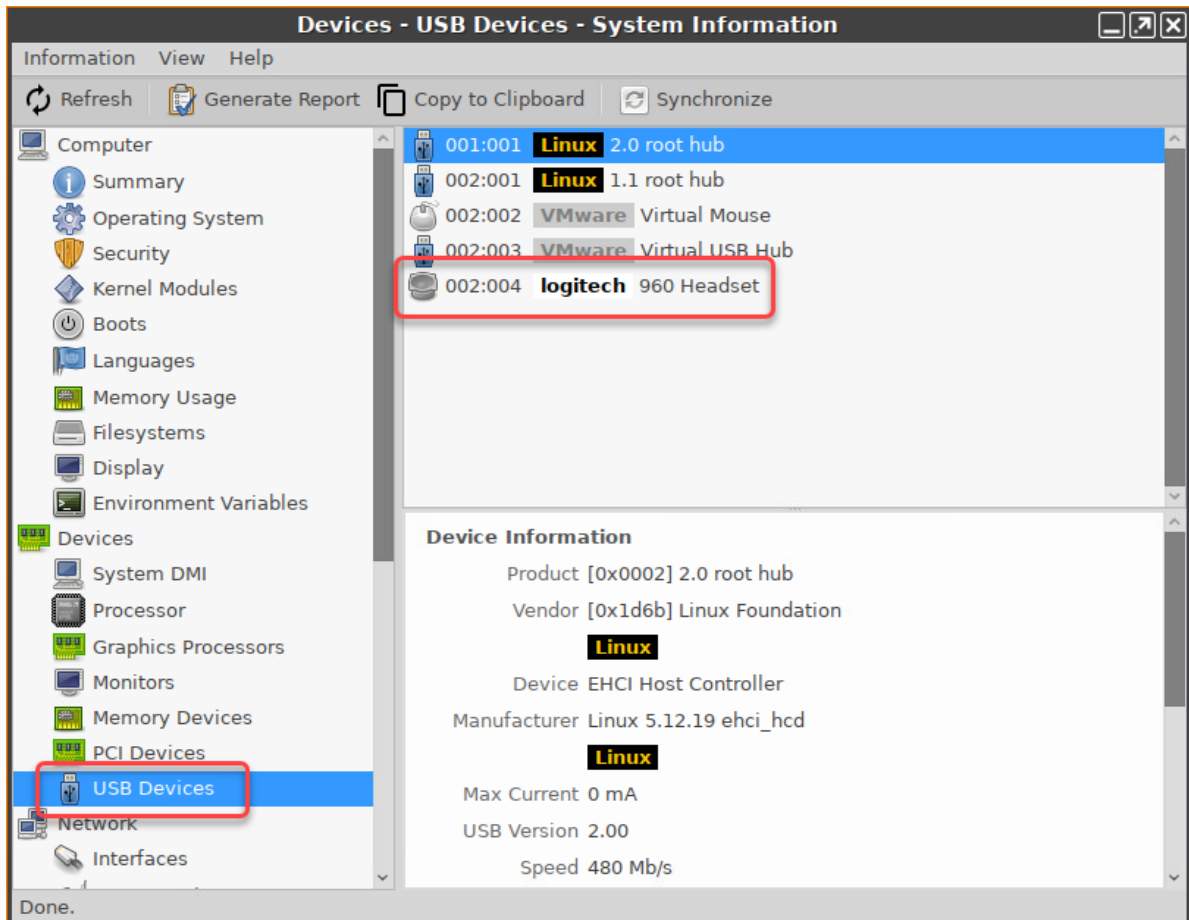


### Getting USB Device Information

To find out the **Class ID**, **Subclass ID**, **Vendor ID** and **Product ID** of the connected USB device, you can use the **System Information** tool. For further information, see Using “System Information” Function.  
System Information example:

<sup>25</sup> <https://support.citrix.com/article/CTX137939>

<sup>26</sup> <https://docs.citrix.com/en-us/citrix-virtual-apps-desktops/general-content-redirection/usb.html>



Alternatively, you can use the command `lsusb` (or `lsusb | grep -i [search term]`) in the terminal.

Example for `lsusb` :

```

Local Terminal
File Edit View Terminal Tabs Help
root@ITC005056930CAD:~# lsusb | grep -i logitech
Bus 002 Device 004: ID 046d:0a45 Logitech, Inc. 960 Headset
root@ITC005056930CAD:~#

```

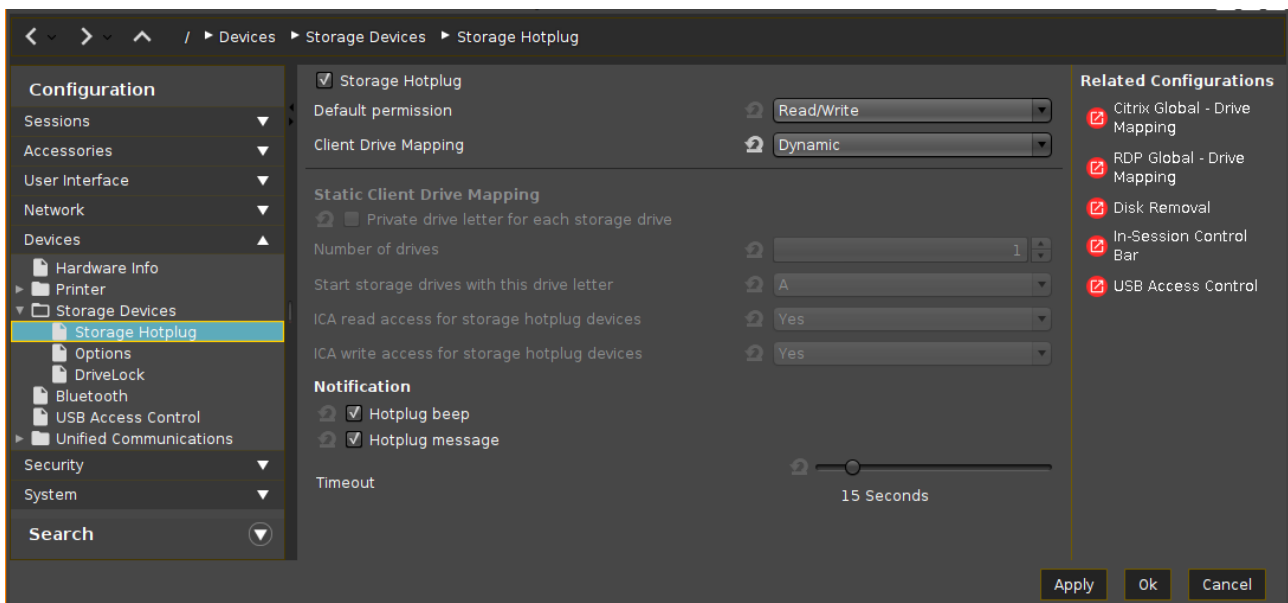
- i** For a device exception rule, use the [SpaceMouse Guide](#) (see page 246).  
For more information about USB redirection rules, see [Native USB Redirection](#) and the documentation of the respective Citrix Workspace app.

## Mapping USB Storage Media into Citrix Sessions

How to configure USB storage mapping so that users can access USB storage media attached to the IGEL OS device within Citrix sessions?

**i** The mapping of USB storage devices is possible for "USB mass storage class" devices. The storage of smartphones and digital cameras is usually accessed via the MTP protocol. Mobile device access via MTP is available with IGEL Linux 10.04.100 or higher; for more information see the how-to [Using Mobile Device Access](#) (see page 746).

### Basic Configuration of the Client



Within the IGEL Setup or a UMS profile, you basically need to configure these parameters:

► Activate **Devices > Storage Devices > Storage Hotplug > Client drive mapping > Dynamic**. This option activates dynamic client drive mapping. It automatically recognizes new storage media as they are connected to the endpoint device. The endpoint device beeps and shows a notification while it mounts the new device. The storage devices automatically become usable on the endpoint and in Citrix ICA Sessions.

**!** Mounted devices need to be unmounted before they are removed to ensure data integrity. This can be done via the **Disk Utility**, the **Disk Removal** tool, or a tray icon.

### Additional Parameters to Check

► The following parameters are set by default, thus storage mapping will work, but maybe for some reason you have changed these and need to adjust them to allow the storage mapping:

**Sessions > Citrix > Citrix Global > Mapping > Drive Mapping > Drive mapping** (set checkmark)

**Sessions > Citrix > Citrix Global > Native USB Redirection > Native USB redirection** (remove checkmark)

**Sessions > Citrix > Citrix Global > Fabulatech USB Redirection > Fabulatech USB redirection** (remove checkmark)

**Devices > USB access control > Enable** (remove checkmark)

**Sessions > RDP > RDP Sessions > [session name] > USB Redirection > Enable Native USB Redirection** (set to **Global setting**)

**Sessions > RDP > RDP Sessions > [session name] > Mapping > Enable Drive Mapping** (set to **Global setting**)

## Assigning a Drive Letter within the Session (Optional)

► In case you not only want to see the drive in the session as e.g. "A on IGEL-123456789", but want to address the drive with a real drive letter within the session, you may run one of these commands:

```
subst T: \\tsclient\t
```

or

```
net use T: \\tsclient\t
```

In this example, "T on IGEL-123456789" is assigned to drive letter T: within the session. You may also assign the mapped drive to another drive letter than is used in its name.

## Configuration on the Server Side

On the server side, e.g. with Windows Server 2008R2, a user in the group "Users" with access to the terminal server will have the mapping default. This is true for a newly installed server. But the mapping can be prevented by changing the policies:

**i Do not allow drive redirection** specifies whether to prevent the mapping of client drives in a Remote Desktop Services session (drive redirection). By default, an RD Session Host server maps client drives automatically upon connection. Mapped drives appear in the session folder tree in Windows Explorer or Computer in the format [driveletter] on [computername]. You can use this setting to override this behavior." Source: <https://technet.microsoft.com/de-de/library/ee791794%28v=ws.10%29.aspx>

## Auto-Hide Toolbar in Appliance Mode

### Environment

IGEL Linux v5.x or newer


### Problem

In the appliance mode, the toolbar at the top of the screen is permanently displayed.

You want to configure the toolbar to hide automatically after it loses the focus of the mouse pointer.

### Solution

1. In IGEL Setup, go to **System > Registry > `userinterface.igel_toolbar.show_always_in_appliance_mode`**.
2. Disable **Show toolbar always in appliance mode**.
3. Click **Ok** to save the changes.

 For the changes to take effect, you need to restart active appliance mode sessions.

## Create a Seamless, Transparent User Experience with Appliance Mode

With appliance mode, you can confine a device to a specific session. In appliance mode, the device itself fades in the background, and the session is presented to the user in the most straightforward way. The user will not have to deal with a Linux desktop, multiple login procedures, switching between windows, or device configuration.

Use the appliance mode to allow access only to one specific session. On device startup, the user is directed immediately to the login screen of the virtual desktop.

The appliance mode can be applied to the following session types:

- VMware Horizon
- Citrix Self-Service (for published desktops only, not for published applications)
- RHEV/Spice
- Imprivata
- RDP MultiPoint Server
- XDMCP for this display

To configure a session that runs in appliance mode:

1. Open the setup and go to **Sessions > Appliance mode**.
2. Choose the session type of the desired session using the drop-down menu **Appliance mode**.
3. Configure your appliance mode session as appropriate.

For further information, see the manual chapter Appliance Mode.

## Connecting to a Citrix Farm

By connecting a Citrix farm, your data and applications are kept centrally on a Citrix farm. Applications must now be delivered instantly to users anywhere on any device.

There are several ways of connecting to a Citrix farm and starting sessions. We describe three best practice variants below:

- [Citrix StoreFront \(see page 256\)](#): Integrates published applications into the IGEL GUI.
- [Citrix Self-Service \(see page 257\)](#): Users will be directed to a web interface where they will find pre-defined published applications and they will be able to add more published applications the server provides.
- [Appliance Mode \(see page 261\)](#): Shows only the web interface of the farm and hides the IGEL GUI completely.

## Citrix StoreFront

### Prerequisites:

- Trust root certificate in directory /wfs/ca-certs (see Deploying Trusted Root Certificates)

### Connecting via **StoreFront**:

1. Click **Sessions** in the configuration tree of the IGEL setup.
2. Click **Citrix > Citrix StoreFront > Server**.
3. Click the **ADD** icon in the **Server location** window.  
The **ADD** mask opens.
4. Enter the names or IP addresses of the services sites.
5. Confirm with **OK**.
6. Click **Citrix StoreFront > Desktop Integration**.
7. Enter "Citrix Storefront" under **Login Session Name**.
8. Choose **Desktop** as the starting method.
9. Click **OK** to save the changes.  
Setup closes.
10. Doubleclick the Citrix icon on the desktop.  
The login window opens.
11. Enter the credentials of a user in the login window.  
The published applications of the Citrix farm will appear on the desktop.
12. Doubleclick an application icon on the desktop to start the program.



## Citrix Self-Service

### Prerequisites:

- Trust root certificate in directory /wfs/ca-certs (see Deploying Trusted Root Certificates)

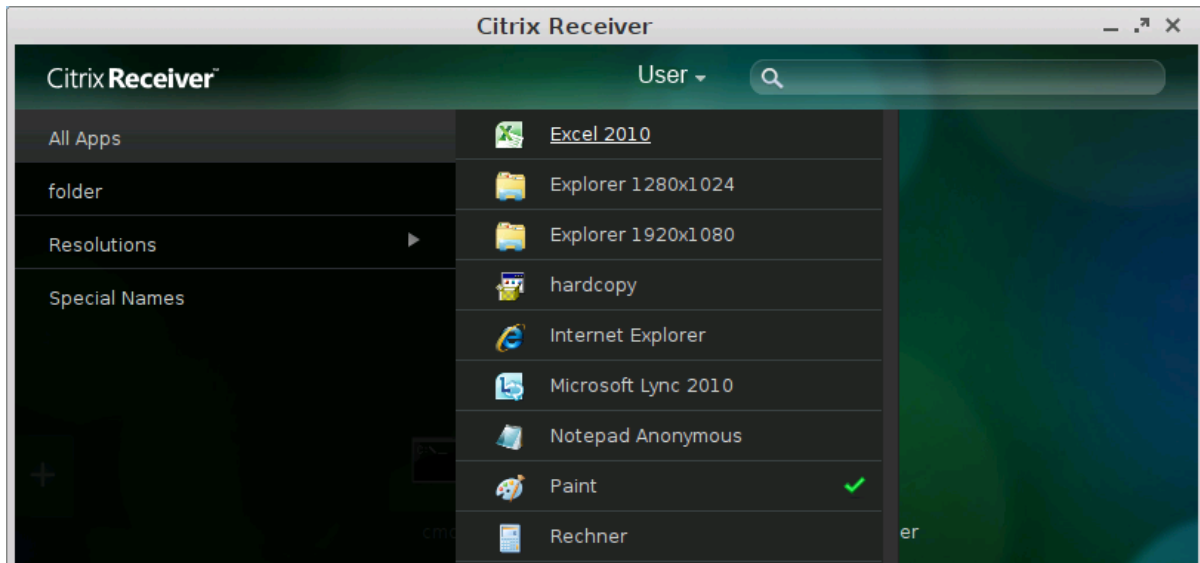
### Connecting via **StoreFront**:

1. Click **Sessions** in the configuration tree of the IGEL setup.
2. Click **Citrix > Citrix Self-Service > Server**.
3. Enter the **Server**, the **Path to Store** and the **Store name** of the services sites.
4. Confirm with **OK**.
5. Click **Citrix Self-Service > Desktop Integration**.
6. Enter "Citrix Self-Service" under **Login Session Name**.
7. Choose **Desktop** as the starting method.
8. Click **OK** to save the changes.  
Setup closes.
9. Doubleclick the Citrix icon on the desktop.  
The login window opens.
10. Enter the credentials of a user in the login window.  
The published application icons of the Citrix farm will appear in the Self-Service UI.
11. Doubleclick an application icon to start the program.

## Using Citrix Self-Service

1. Start **Citrix Self-Service** e.g. with desktop icon.
2. Log on to the server.
3. Add published applications to the list (+-button on the left).
4. Click a published application to start.
5. Use the search bar to find a published application.
6. Use the user's menu to change preferences, server etc.





- [Configure Full-Screen Mode \(see page 260\)](#)

### Configure Full-Screen Mode

Use following parameter in your Custom Command script to activate the full-screen mode for *Citrix Self-Service*:

▶ `$ICADIR/storebrowse -c FullscreenMode=[0/1/2]`

With following options:

- `0` = The window is not displayed full-screen
- `1` = The window is displayed full-screen
- `2` = The window is displayed maximized and undecorated, which does not mask the desktop environment's taskbar

## Appliance Mode

Connecting Citrix via Selfservice:

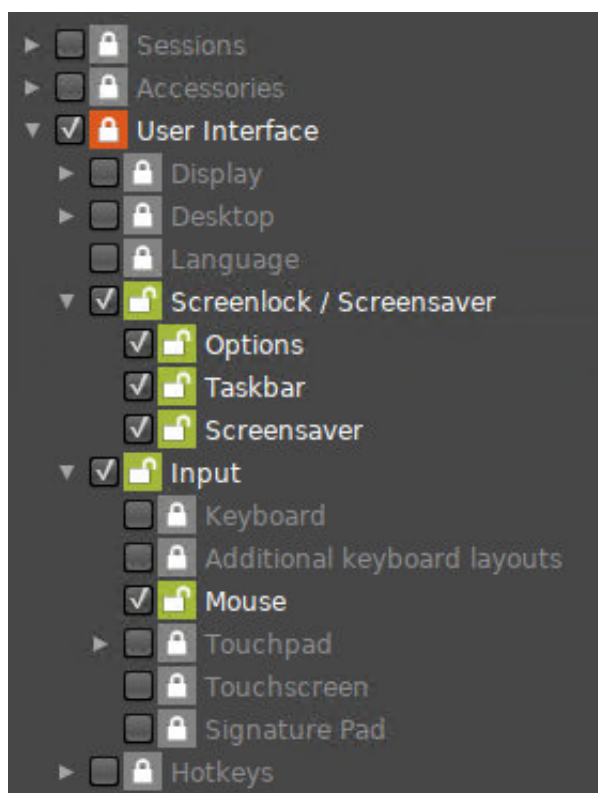
1. Click **Sessions > Appliance Mode** in the configuration tree of the IGEL setup.
2. Select **Citrix Self-Service** under **Appliance mode**.
3. Enter the **URL** of the delivery server.
4. Click **OK** to save the changes and close setup.
5. Follow the instructions on the screen.

## Create a Self-Service Setup for the User with Quick Settings

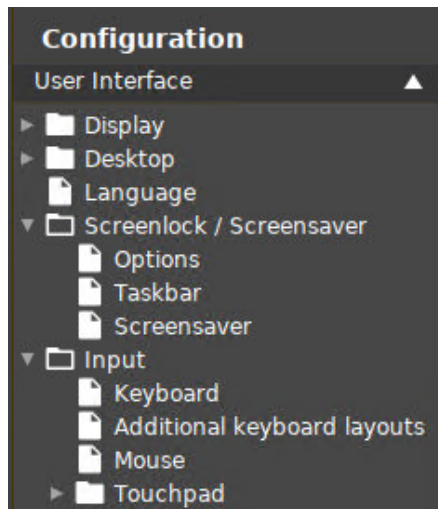
Usually, the user should not have full access to the thin client's setup. However, it may prove useful to enable users to quickly change certain settings by themselves, without even needing a password. Typical examples are settings for keyboard, mouse, or screen. This can be done using the **Quick Settings**.

Here is how to select setup pages for quick setup:

1. Open the setup and go to **Accessories > Quick Settings > Setup User Permissions**.
2. Select the setup pages to which the user should have access, e. g. **User Interface > Input > Mouse**, or **Screenlock / Screensaver**.



3. Click **Apply** or **Ok**.  
When the user starts **Quick Settings**, the previously selected options are presented.




Quick settings set permissions for setup screens. If you want to set permissions for individual parameters, you can use UMS profiles. For more information, see Profiles.

## Login Failed because of the Expired AD Password

### Problem

When you try to log in to a native **Citrix Storefront** session, you get the error message "Login Failed!" because your Active Directory password expired.

You are unable to change your password, because the local login does not provide an option for that.

 Before you follow these instructions, check that the ports are open, maybe you can fix the problem by that:


- Login to Client -> Port: 88
- Change password -> Port: 464

Here you find an overview of ports of the domain controller: [Required Ports to Communicate with Domain Controller<sup>27</sup>](#)

### Solution


Enable **Active Directory/Kerberos** authentication for the **Storefront** session. The next time you try to log in to IGEL OS, you will be prompted to change your expired password.

## Changing an Expired Active Directory Password

 When using sessions with passthrough authentication, it is essential that you lock your device's screen when leaving it unattended.

### Enabling Active Directory/Kerberos Authentication for Storefront Sessions

1. In IGEL setup, go to **Security > Login > Active Directory/Kerberos**.
2. Enable **Login to Active Directory domain**.
3. Go to **Security > Active Directory/Kerberos**.
4. Activate **Enable**.
5. Fill in the **Default domain (fully qualified domain name)**.
6. Go to **Sessions > Citrix > Citrix Storefront > Login**.
7. Enable **Use passthrough authentication**.
8. Click **Apply** or **Ok**.

 Please note that the client must now be locked locally and no longer in the session to prevent another person from entering the session via the passthrough without specifying the password.

<sup>27</sup> <https://social.technet.microsoft.com/Forums/windows/en-US/1c6a59de-c1fe-4946-bb4e-1fe36fd40b08/required-ports-to-communicate-with-domain-controller?forum=winserverDS>



## Enabling Screenlock

1. In the IGEL setup go to **User Interface > Screenlock / Screensaver**.
2. Enable **Use hotkey**.
3. Under **Modifiers** select **Win**.
4. Under **Hotkey** enter "L".
5. Got to **User Interface > Screenlock / Screensaver > Options**.
6. Enable **User password**.

So the "Win + L" hotkey locks the IGEL client instead of the session desktop.

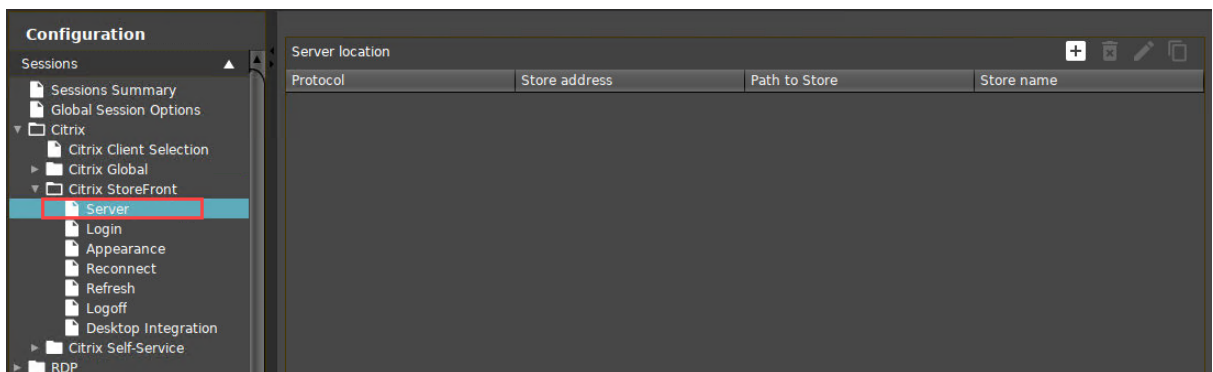
The AD password must be entered to activate the IGEL clients.

## Configuring Auto Logon for Citrix Virtual Desktops

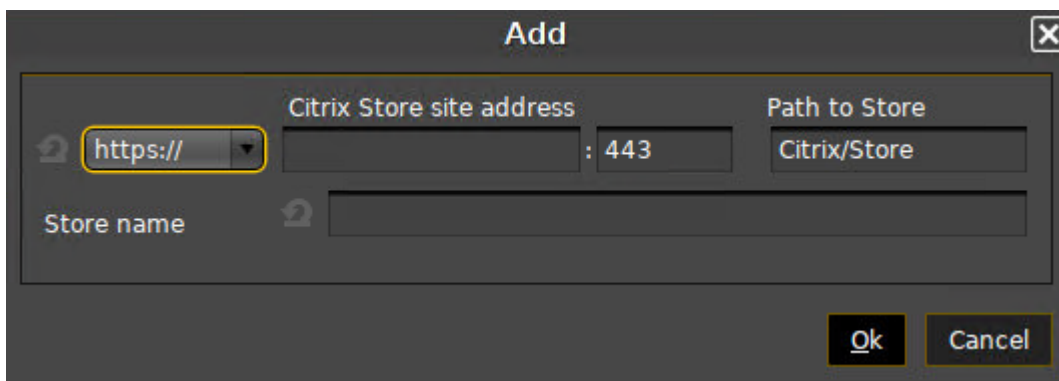
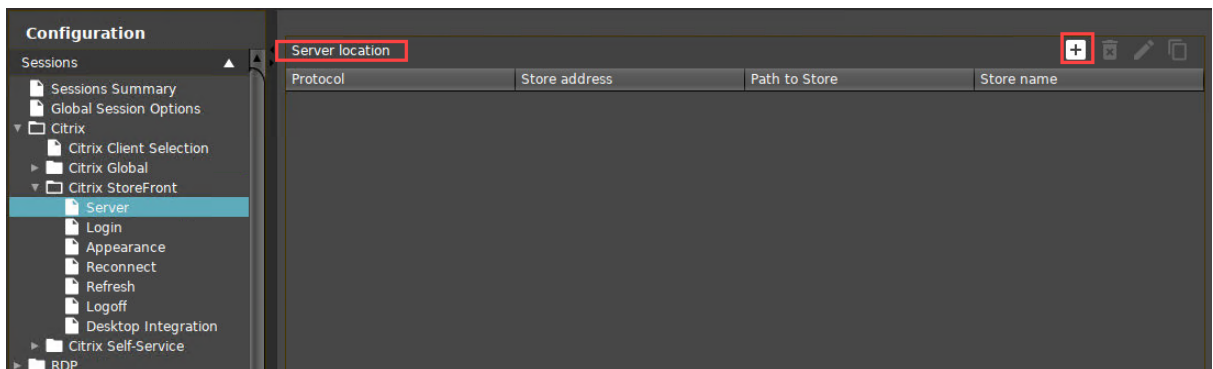
This how-to describes how to configure Auto Logon for Citrix Virtual Desktops.

### Steps

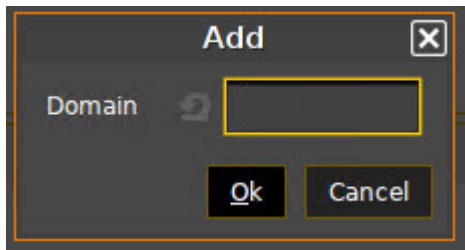
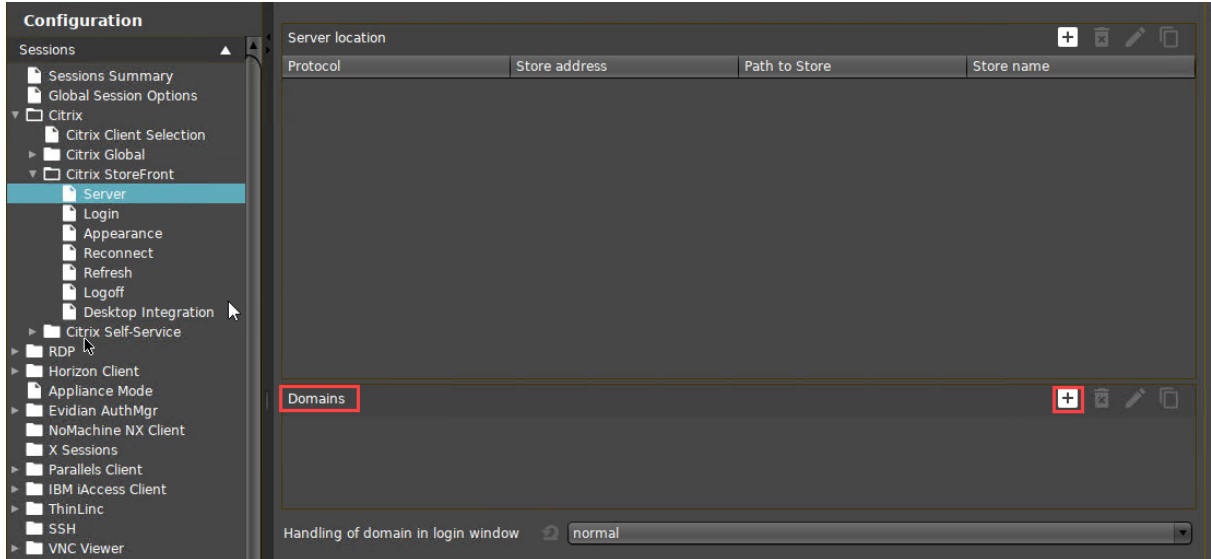
1. In IGEL Setup, go to **Sessions > Citrix > Citrix StoreFront > Server**.



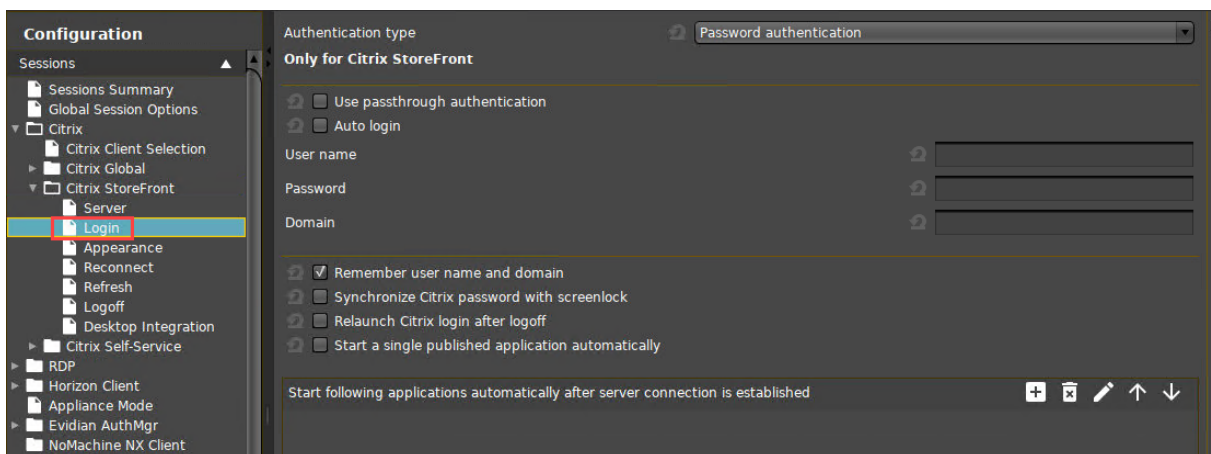
2. Add your **Server Location**.



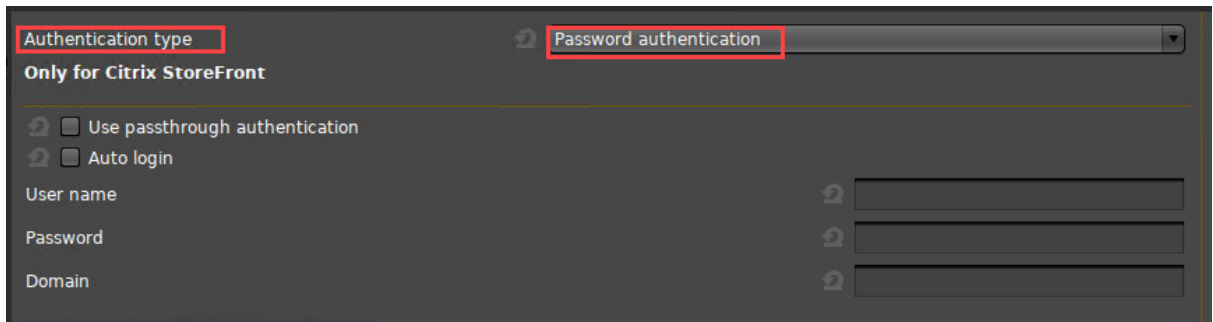
3. Add your Active Directory domain to **Domains**, making sure that you use its Fully Qualified Domain Name (FQDN).



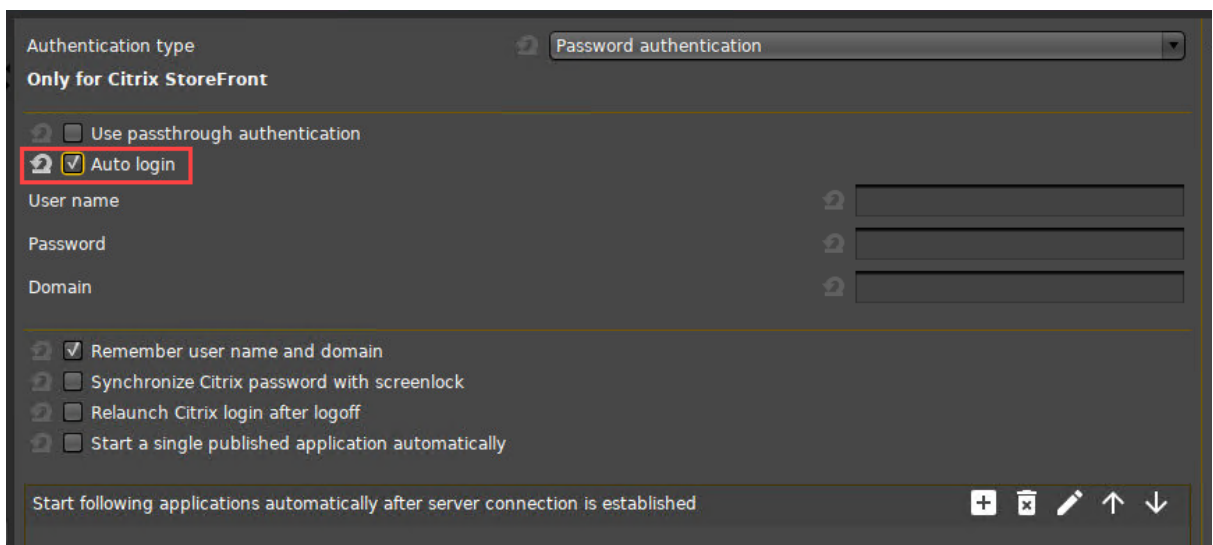
4. Go to **Sessions > Citrix > Citrix StoreFront > Login**.



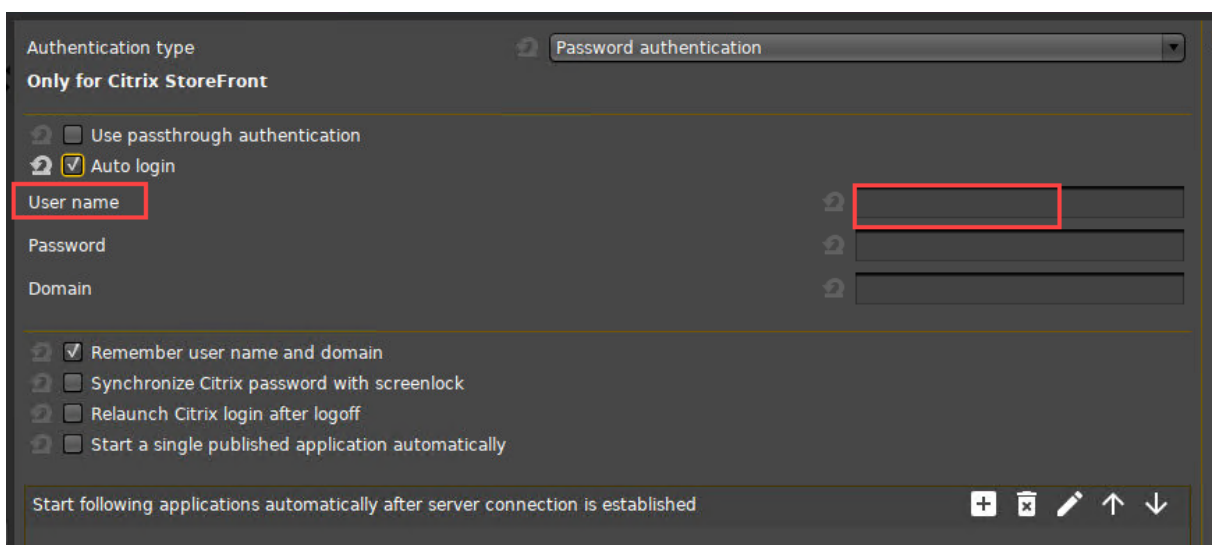
5. Set **Authentication type** to **Password authentication**.



6. Activate **Auto Login**.



7. Set **User Name** to the Active Directory user name.



8. Set the **Password**.


The screenshot shows the Citrix authentication configuration interface. At the top, 'Authentication type' is set to 'Password authentication'. Below this, the section 'Only for Citrix StoreFront' contains several options: 'Use passthrough authentication' (unchecked), 'Auto login' (checked), 'User name' (empty field), 'Password' (empty field, highlighted with a red box), and 'Domain' (empty field). Below these fields are four checkboxes: 'Remember user name and domain' (checked), 'Synchronize Citrix password with screenlock' (unchecked), 'Relaunch Citrix login after logoff' (unchecked), and 'Start a single published application automatically' (unchecked). At the bottom, there is a section for 'Start following applications automatically after server connection is established' with icons for adding, deleting, editing, and sorting.

9. Set **Domain** to your Active Directory domain's FQDN, the same as in step 3.

This screenshot is identical to the previous one, showing the same Citrix authentication configuration interface. However, in this step, the 'Domain' field is highlighted with a red box, indicating that the user is now setting the Active Directory domain's FQDN.

## Force Citrix Logout Using Hotkey

You will find the instructions under [Citrix: Freeze at Logout](#) (see page 271).

 This page is due for deletion. Please check the above link and use it in the future.

## Citrix: Freeze at Logout

### Symptom

A user tries to log out from a Citrix session but the session does not respond.

Example: Once you connect to a Citrix session, everything works. After having reconnected and disconnected several times, you log out. The window freezes while the logout screen is shown.

### Solution

▶ Select **TCP only - UDP disabled** under **Sessions > Citrix > Citrix Global > Options > HDX Adaptive Transport over EDT**.

OR

▶ Try to use another Citrix Receiver version: **Sessions > Citrix > Citrix Client Selection > Citrix client version**.

OR

▶ Troubleshoot the issue with your Citrix infrastructure to discover why the session is not closing when the `wfica` process makes the call for disconnection.

### Workaround

As a less recommended alternative, you can configure a hotkey to force a logout in such situations. Note, however, that this workaround can cause issues with hung sessions on the Citrix servers.

To configure a logout hotkey:

1. In IGEL Setup, go to **System > Firmware Customization > Custom Application**.
2. Click  to create a new **Custom Application** and name it e.g. "Kill Citrix Sessions".
3. Disable all **Starting Methods** for this session.
4. Enable **Hotkey**.
5. Choose e.g. `Ctrl|Alt` as **Modifiers** and define `C` (for "Citrix") as **Key**.
6. Go to **System > Firmware Customization > Custom Application > Kill Citrix Sessions > Settings**.
7. Enter an **Icon name**.
8. Enter `/tmp/kill_citrix` as **Command**.
9. Go to **System > Firmware Customization > Custom Commands > Desktop**.
10. In the field **Desktop initialization** enter following command in one line:
 

```
echo -e "#! /bin/bash\n\nps -eo comm,pid | grep ^wfica | while read  
c p tail; do echo \$p; done | xargs -r kill -TERM" >/tmp/  
kill_citrix; chmod 755 /tmp/kill_citrix
```
11. Click **Apply** and reboot the device.

To configure the hotkey for a group of devices, you can alternatively create a profile or use this one: [profile\\_KillCitrixSessionsViaHotkey.xml](#).

Here you can learn how to import a profile: [Importing a Profile and Firmware](#).



## Warning Message: [Citrix Store] Could Not Connect to the Citrix Server

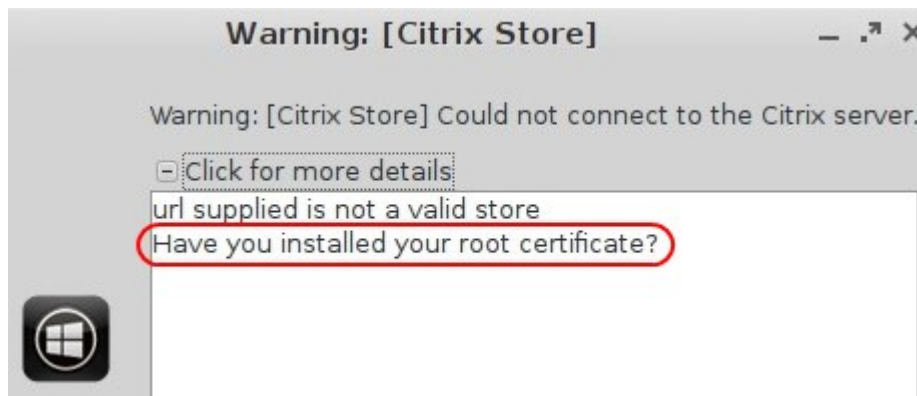
### Environment

- You are using Citrix Receiver 13.0.x or newer.
- You have a session of the type Citrix StoreFront configured.

### Symptom

- When establishing the connection, a warning message appears:

Warning: [Citrix Store] Could not connect to the Citrix server.



or



## Problem

Citrix Receiver 13.0.x or newer on Linux only supports connections via HTTPS, and you have to make sure the device has a valid root certificate of the Certificate Authority (CA) available. If the root certificate is missing, the connection will fail.

## Solution

Install an appropriate root certificate on the device to allow HTTPS connections to your Citrix Server.

For information on how to distribute the certificate, see [Deploying Trusted Root Certificates](#) (see page 485).

## Setting up Citrix Sessions with Hardware-Accelerated H.264 Deep Compression Codec

This document describes how to activate a hardware-accelerated H.264 deep compression codec for Citrix sessions.

### Prerequisites

- Licensed IGEL Multimedia Codec Pack
- IGEL UD device offering hardware video acceleration, see the FAQ Hardware Video Acceleration on IGEL OS.
- Citrix XenApp / XenDesktop server with active H.264 display mode  
See <http://support.citrix.com/article/CTX200370> to learn how to determine the display mode.

### Activating the Codec

1. In Setup, go to **System > Firmware Customization > Features**.
2. Enable **Hardware Video Acceleration**.
3. Go to **Sessions > Citrix > Citrix Client Selection**.
4. Select the **Citrix Client Version**.
5. Go to **Sessions > Citrix > Citrix Global > Codec**.
6. Set **Graphical Codec** to **H.264 Deep Compression Codec**.
7. Enable **Accelerated H.264 Deep Compression Codec**.

- i** Known issues on VIA-based IGEL devices UD3-LX 40/41/42 and UD10-LX:
- Hardware-accelerated HDX only works with 256 MB video memory or more. Video memory must be adjusted in the system BIOS. The default is 128 MB.
  - Seamless window mode is not supported.
  - Desktop sessions spanning 2 monitors are not supported.
  - Desktop sessions on rotated screens may flicker (depending on the screen resolution).

- i** If you use the **Citrix Receiver 13.5** or older in combination with a **Citrix Server 7.15**, the **Always Lossless** option for the **Visual Quality** policy will not work under Linux. With IGEL Linux version 10.05.100 the **Build to Lossless** option for the **Visual Quality** policy will work on the condition that you are using **Citrix Receiver 13.6** or younger and the **Use Video Codec** policy is set to **For actively changing regions**.

- i** If your Desktop sessions on rotated screens flicker or the graphic is not good enough, you can **Enable HW accelerated H264 vdpau codec (experimental)** in the IGEL Setup under **System > Registry > ica > hw-accelerated-h264-vdpau-codec** (Search parameter: **ica.hw-accelerated-h264-vdpau-codec**)

Important is, that you activate **Use video codec for compression** → **For the entire screen** in the citrix server policy.

## Using Font Smoothing (ClearType) in Citrix Sessions

### Symptom

- You have set **Font Smoothing** to *ClearType* in **IGEL Setup > Sessions > Citrix > Citrix Global > Window > Font smoothing (Off / Standard / ClearType)**
- *ClearType* does not work for *Citrix PNAgent / Webinterface* sessions.

### Problem

*ClearType* is not supported in *PNAgent / Webinterface* sessions because *Citrix Receiver* uses *Windows* settings which are not present on the Linux client.

### Solution


All *Citrix Receivers* up to version 12.x do not use `wfclient.ini` to configure **Font Smoothing**. To force *Webinterface, PNAgent/XenApp* to enable **Font Smoothing** proceed as follows:

*PNAgent / XenApp:*

1. On the *Citrix* server open `C:\inetpub\wwwroot\citrix\pnagent\config\default.ica`.
2. Go to section **Application**.
3. Add new line `FontSmoothingType=3`.
4. Save and close the file.

*Webinterface:*

1. On the *Citrix* server open `C:\inetpub\wwwroot\citrix\xenapp\config\default.ica`.
2. Go to section **Application**.
3. Add new line `FontSmoothingType=3`.
4. Save and close the file.

 If you installed the *Webinterface* site to a different location, please change the path accordingly.

**FontSmoothingType** parameter options:

- `0` = No smoothing
- `1` = No smoothing

- 2 = Standard smoothing
- 3 = *ClearType* (horizontal sub-pixel) smoothing (default)

 **Legal Note**

IGEL's [Terms & Conditions](https://www.igel.com/terms-conditions/)<sup>28</sup> apply.

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<sup>28</sup> <https://www.igel.com/terms-conditions/>


## Highly Secured XenServer Has Problems with LD\_BIND\_NOW Workaround

### Problem

You want to launch multiple desktop sessions with RTME and H.264 acceleration, but it doesn't work.

### Solution

1. In **IGEL Setup**, go to **System > Registry > ica > workaround-dual-rtme** (Search parameter: **ica.workaround-dual-rtme**)
2. Enable **Activate workaround for dual RTME sessions and H264 acceleration**.
3. Click **Apply** or **Ok** to save the changes.

 This registry key should not be used if "Enable Secure ICA" is active for the specific delivery group. You have to decide if you want to use the registry key or to reduce security.

## Workaround for Citrix Receiver X Error

### Problem

When starting Citrix XenApp you get the following Citrix Receiver errors on your IGEL OS devices:

```
The X Request 55.0 caused error: "9: BadDrawable (invalid Pixmap or Window parameter)"
```

```
The X Request 60.0 caused error: "13: BadGC (invalid GC parameter)".
```

### Environment

- Citrix XenApp 7.15
- Citrix Receiver e.g. 13.2, 13.3, 13.7, 13.8

### Solution

Two parameters have to be activated in IGEL Setup:

1. Go to **System > Registry > ica > forceignoreerrors**.
2. Activate **Suppress X error message boxes**.
3. Go to **System > Registry > ica > wfclient > ignoreerrors**.
4. Activate **IgnoreXErrors** and pass the parameters: 55.0/9, 60.0/13

See also the corresponding entry in the [Citrix forum](#)<sup>29</sup>.

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<sup>29</sup> <https://discussions.citrix.com/topic/393872-possible-workaround-citrix-receiver-x-error-on-linux-thin-clients/>



## Citrix HTML5 Receiver Issue

### Affected Versions

- IGEL OS 10.05.100 or higher
- IGEL OS 11.01.100 or higher

### Issue

Due to the abolition of plugin technology in Firefox 60+, the Workspace app installed under Linux is no longer automatically recognized.


### Solution

1. If your device has IGEL OS 10.05, update to IGEL OS 10.06; if applicable, you can also upgrade to IGEL OS 11.02. If your device has IGEL OS 11.01, update to IGEL OS 11.02. IGEL OS 10.06 and IGEL OS 11.02 have been adapted for a workaround that requires server-side modifications.
2. Change the server-side settings according to the instructions under <https://support.citrix.com/article/CTX237727>.

## Macbook Keyboard Layout inside Citrix Session

To get the Macbook keyboard layout working correctly inside Citrix sessions, proceed as follows:

1. Under **Sessions > Citrix > Citrix Global > Keyboard > Keyboard mapping file**, select "Linux".
2. Under **User Interface > Input > Keyboard > Keyboard type**, select "Macbook".  
All other keyboard layout settings can be left unchanged, i.e. as set by default.

 In order to type special characters like € and #, use the right-hand Alt/Option key, not the left-hand key.

## Using Lync / Skype for Business with Citrix HDX RealTime Optimization Pack

### Issue

You want to use Microsoft Lync or Skype for Business via a Citrix session with IGEL OS devices.

### Solution

IGEL OS comes with Citrix HDX RealTime Media Engine (RTME) preinstalled: Setup > **Sessions > Citrix > Citrix Global > Unified Communications > Skype for Business**. See also HDX Multimedia.

- IGEL OS 11.02.100 and higher contains RTME 2.8 (activated by default).
- IGEL OS 11.01.100 contains RTME 2.7 (disabled by default).
  
- IGEL OS 10.06.100 contains RTME 2.8 (disabled by default).
- IGEL OS 10.05.500 contains RTME 2.6 (disabled by default).
- IGEL OS 10.05.100 contains RTME 2.6 (disabled by default).

For further information, see [Citrix HDX RealTime Optimization Pack](#)<sup>30</sup>.

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<sup>30</sup> <https://docs.citrix.com/en-us/hdx-optimization/>

## RDP

- [Mapping USB Storage Media into RDP Sessions](#) (see page 285)
- [What Is the String for Token-Based Load Balancing?](#) (see page 288)
- [RDP RemoteApp Parameter Settings](#) (see page 289)
- [RDP Performance Enhancements](#) (see page 290)
- [RDP Session playing Sound: Error RDPSND\\_NEGOTIATE](#) (see page 291)
- [Login Failed Because of Expired AD Password](#) (see page 292)
- [User Has to Provide Credentials Twice for RDP Logon](#) (see page 294)

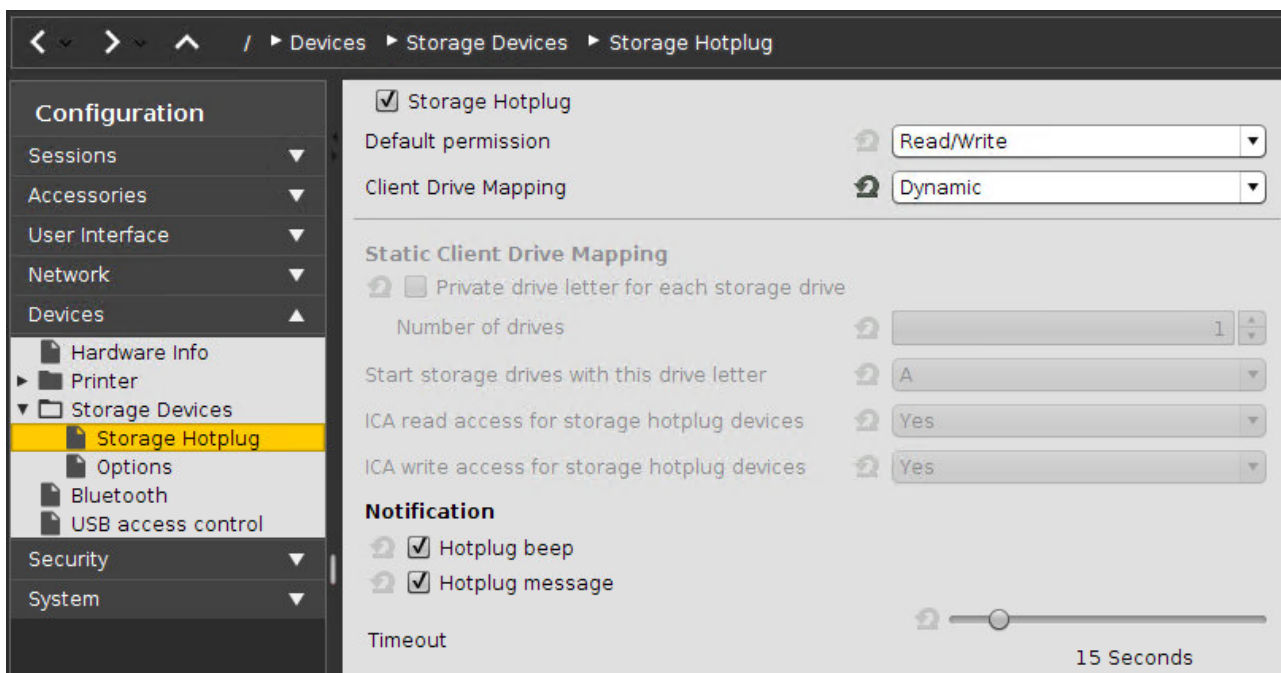
## Mapping USB Storage Media into RDP Sessions

How to configure USB Storage mapping so that users can access USB storage media attached to the IGEL LX Client within RDP sessions?

### Solution:

**i** The mapping of USB storage devices is possible for "usb mass storage class" devices. The storage of smartphones and digital cameras is usually accessed via the MTP protocol. Mobile device access via MTP is available with IGEL Linux 10.04.100 or higher; for more information see the how-to Using Mobile Device Access.

### Basic Configuration of the Client



Within the IGEL Setup or an UMS profile you basically need to configure these parameters:

▶ Activate **Devices > Storage Devices > Storage Hotplug > Client drive mapping > Dynamic**. This option activates dynamic client drive mapping. It automatically recognizes new storage media as they are connected to the thin client. The thin client beeps and shows a notification while it mounts the new device. The storage devices automatically become usable on the thin client and in Citrix ICA Sessions.

**!** Mounted devices need to be unmounted before they are removed to ensure data integrity. This can be done via the **Disk Utility**, the new **Safely Remove Hardware** Tool or a tray icon.

## Additional Parameters to Check

► The following parameters are set by default, thus storage mapping will work, but maybe for some reason you have changed these and need to adjust them to allow the storage mapping:

**Sessions > RDP > RDP Global > Mapping > Drive Mapping > Enable Drive mapping (set checkmark)**

**Sessions > RDP > RDP Global > Native USB Redirection > Enable Native USB redirection (remove checkmark)**

**Sessions > RDP > RDP Global > Fabulatech USB Redirection > Enable Fabulatech USB redirection (remove checkmark)**

**Devices > USB access control > Enable (remove checkmark)**

**Sessions > RDP > RDP Sessions > [session name] > USB Redirection > Enable Native USB Redirection (global setting)**

**Sessions > RDP > RDP Sessions > [session name] > Mapping > Enable Drive Mapping (global setting)**

## Assigning a Drive Letter within the Session (Optional)

► In case you not only want to see the drive in the session as e.g. "A on IGEL-123456789", but want to address the drive with a real drive letter within the session, you may run one of these commands:

```
subst T: \\tsclient\t
```

or

```
net use T: \\tsclient\t
```

In this example "T on IGEL-123456789" is assigned to drive letter T: within the session. You may also assign the mapped drive to another drive letter than is used in its name.

## Configuration on the Server Side

On the server side, e.g. with Windows Server 2008R2, a user in the group "Users" with access to the terminal server will have the mapping default. This is true for a newly installed server. But the mapping can be prevented by changing the policies:

**i Do not allow drive redirection** Specifies whether to prevent the mapping of client drives in a Remote Desktop Services session (drive redirection). By default, an RD Session Host server maps client drives automatically upon connection. Mapped drives appear in the session folder tree in Windows Explorer or

Computer in the format [driveletter] on [computername]. You can use this setting to override this behavior." Source: <https://technet.microsoft.com/de-de/library/ee791794%28v=ws.10%29.aspx>

## What Is the String for Token-Based Load Balancing?

### Environment

A token-based mechanism is used as a load balancing method. This document does not apply to other load balancing methods.

### Question

What string should be entered in **Sessions > RDP > RDP Sessions > [Session name] > Options** to make token-based load balancing work?

### Answer

IGEL OS 10.01 to 10.05.500, 11.01.100

► Under **Sessions > RDP > RDP Sessions > [Session name] > Options > Load balancing routing token**, enter `tsv://MS Terminal Services Plugin.1.[collection name]`, where

- `tsv://MS Terminal Services Plugin.1.` is the routing token and
- `[collection name]` is the name of the RDS collection, defined by the server administrator.

IGEL OS 10.05.700 or Higher, IGEL OS 11.01.110 or Higher

► Under **Sessions > RDP > RDP Sessions > [Session name] > Options > Collection**, simply enter the name of your RDS collection. The collection name has been defined by the server administrator.



## RDP RemoteApp Parameter Settings

### Symptom

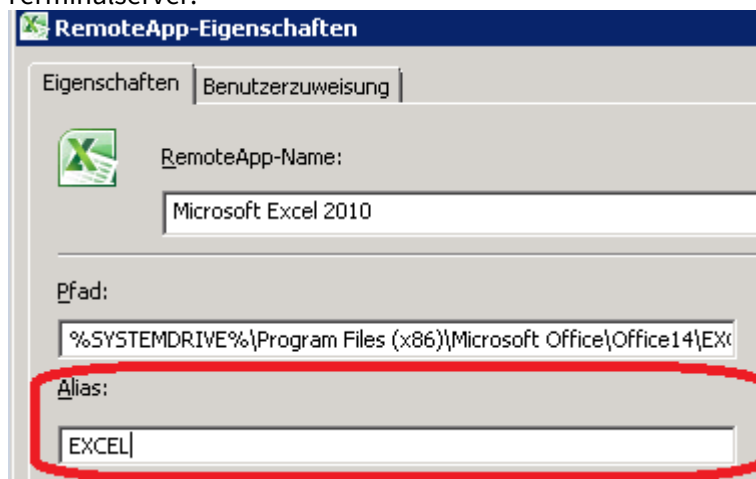
RemoteApp is not starting or closes immediately after login.

### Problem

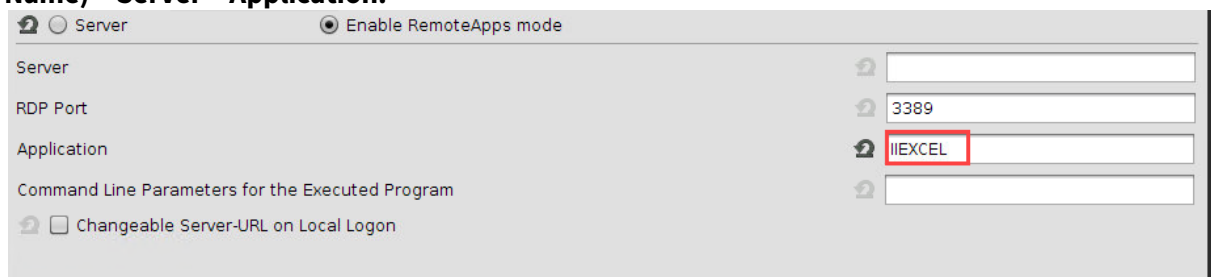
Missing or incomplete session settings on server or device

### Solution

1. Set an ALIAS for the RemoteApp with the **RemoteApp Management Console** on the Terminalserver.



2. Use that ALIAS value in the device's setting in **Setup > Sessions > RDP > RDP Sessions > (Session Name) > Server > Application**.



**i** Add two pipe-characters ( || ) at the beginning of the ALIAS value.

## RDP Performance Enhancements

### Symptom

RDP users have performance issues (bad user experience).

For example:

- Mouse is lagging
- Screen is building up very slow
- Session uses high bandwidth
- Several other performance issues

### Problem

There are many different causes that can result in bad performance.

### Solution

The following settings can be used as a single option and also in combination.

#### Basics

- The color depth should be the same on the server, the device, and in the session (best: 32 bit).
- In the BIOS, set the VGA shared memory to 64 MB or more.

#### Optimizations for a LAN Environment

- Under **Sessions > RDP > RDP Global > Performance**, edit the settings as follows:
  - Disable **Compression**. (Increases performance, generates about 30% more traffic)
  - If RemoteFX 8 is available, activate **Enable RemoteFX**.
  - If RemoteFX 8 is available, set **RemoteFX codec mode** to "Optimized for LAN".
- If Windows Server 2012 R2 or lower or Windows 8.1 or lower is used: Under **Sessions > RDP > RDP Global > Multimedia**, activate **Enable Video Redirection**.

#### Optimization for a WAN Environment

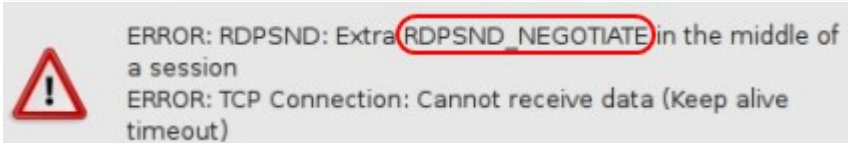
- Under **Sessions > RDP > RDP Global > Performance**, edit the settings as follows:
  - Enable **Compression**. (Generates about 30% less traffic, consumes more local resources)
  - If RemoteFX 8 is available, activate **Enable RemoteFX**.
  - If RemoteFX 8 is available, set **RemoteFX codec mode** to "Optimized for WAN".

## RDP Session playing Sound: Error RDPSND\_NEGOTIATE

### Symptom

If the user plays some sound within the RDP session the connection terminates on some devices with error message:

```
ERROR: RDPSND: Extra RDPSND_NEGOTIATE in the middle of a session  
ERROR: TCP Connection: Cannot receive data (Keep alive timeout)
```



### Problem

This may happen if during data transmission the connection fails.

### Solution

Try a different sound driver for RDP session:


1. Go to **System > Registry > rdp.winconnect.sound-driver**
2. Choose **OSS** or **ALSA**

## Login Failed Because of Expired AD Password

### Issue

When you try to log in to a **RDP** session, you get the error message "Login Failed!" because your Active Directory password expired.

You are unable to change your password because the local logon does not provide an option for that.

 Before following these instructions, check the ports:


- Login to Client -> Port 88
- Change password -> Port 464

Here you find an overview of ports of the Domain Controller: [Required Ports to Communicate with Domain Controller](https://social.technet.microsoft.com/Forums/windows/en-US/1c6a59de-c1fe-4946-bb4e-1fe36fd40b08/required-ports-to-communicate-with-domain-controller?forum=winserverDS)<sup>31</sup>

### Solution


Enable **Active Directory/Kerberos** authentication for the **RDP** session. The next time you try to log in to IGEL OS, you will be prompted to change your expired password.

## Changing an Expired Active Directory Password

 When using sessions with passthrough authentication, it is essential that you lock your device's screen when leaving it unattended.

### Enabling Active Directory/Kerberos Authentication for RDP Sessions

1. In IGEL setup, go to **Security > Logon > Active Directory/Kerberos**.
2. Enable **Login to Active Directory Domain**.
3. Go to **Security > Active Directory/Kerberos**.
4. Activate **enable**.
5. Fill in the **Default Domain (Fully Qualified Domain Name)**.
6. Go to **Sessions > RDP > RDP sessions > [RDP session] > Logon**.
7. Enable **Use passthrough authentication for this session**.
8. Click **Apply** or **Ok**.

 Please note that the client must now be locked locally and no longer in the session to prevent another person from entering the session via the passthrough without specifying the password.

<sup>31</sup> <https://social.technet.microsoft.com/Forums/windows/en-US/1c6a59de-c1fe-4946-bb4e-1fe36fd40b08/required-ports-to-communicate-with-domain-controller?forum=winserverDS>

## Enabling Screen Lock

1. In the IGEL setup go to **User Interface > Screenlock / Screensaver**.
2. Enable **Use Hotkey**.
3. Under **Modifiers** select **Win**.
4. Under **Hotkey** enter "l".
5. Got to **User Interface > Screenlock / Screensaver > Options**.
6. Enable **User Password**.

So the "Win + L" hotkey locks the IGEL client instead of the session desktop.

The AD password must be entered to activate the IGEL clients.

## User Has to Provide Credentials Twice for RDP Logon

### Issue

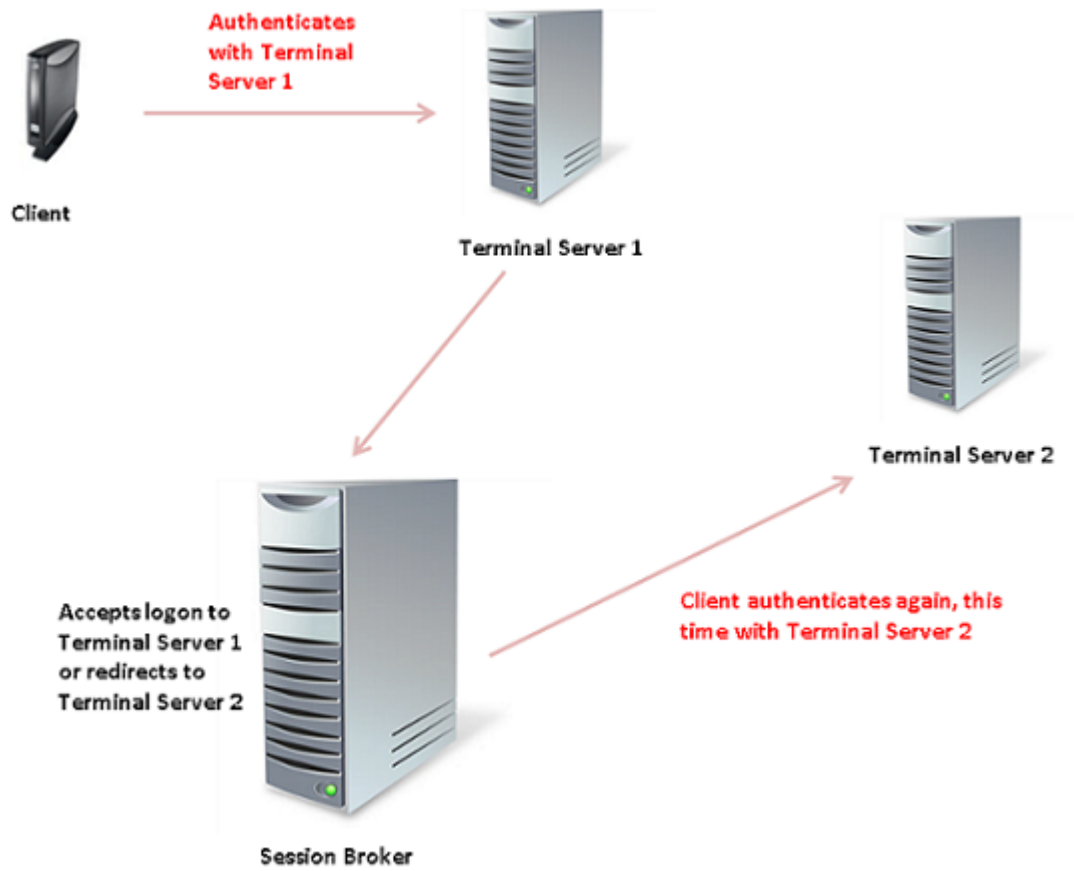
When you connect to a Windows terminal server, you are asked to provide your credentials twice.

### Cause

This behavior is caused by the way RDS load balancing works. The crucial point to understand is that the terminal server does not communicate with the session broker directly.

Instead, the scenario is the following:

1. The client connects to terminal server 1 and authenticates with terminal server 1. This is the first time the user is asked for their credentials.
2. Since we have a load balancing setup, terminal server 1 will talk to the session broker and ask if the client can use terminal server 1 or if it should be redirected to a different terminal server.
3. If redirection occurs, the client will also have to authenticate with the terminal server the client was redirected to (terminal server 2 in the figure below). This is the second time the user is asked for their credentials.



### Solution

The issue can be resolved by activating Kerberos/Active Directory authentication. For further information, see Active Directory/Kerberos.

## VMware Horizon

- [Setting up VMware Blast Sessions \(see page 297\)](#)
- [Use NLA \(Network Layer Authentication\) for Logon with Horizon Client Sessions \(see page 298\)](#)
- [Workaround for Hotkeys in Horizon Sessions \(see page 299\)](#)
- [Multimedia Acceleration with VMware Horizon View in VESA Mode \(see page 300\)](#)
- [Troubleshooting the Horizon Client \(see page 301\)](#)



## Setting up VMware Blast Sessions

### Prerequisites

- Device offering hardware video acceleration, see the FAQ Hardware Video Acceleration on IGEL OS.
- VMware Horizon 7 Server  
For further information about the server configuration, refer to VMware's documents at <http://pubs.vmware.com/horizon-7-view/index.jsp>

### Activating VMware Blast

1. In Setup, go to **System > Firmware Customization > Features**.
2. Enable **Hardware Video Acceleration**.
3. Go to **Sessions > Horizon Client > Horizon Client Global > Server Options**.
4. Set **Preferred desktop protocol** to **VMware Blast**.
5. Click **Apply** or **Ok**.

## Use NLA (Network Layer Authentication) for Logon with Horizon Client Sessions

Starting a session, even just presenting a logon screen, has quite an impact on resources. Each time a user tries to logon, processes are started on the remote machine, no matter whether the user's credentials are valid or not. You can save resources and prevent Denial of Service (DoS) attacks by using Network Layer Authentication (NLA). NLA checks whether a user is the right person before any logon processes is started.

For more information about NLA, see <https://technet.microsoft.com/en-us/magazine/hh750380.aspx>.

NLA for *Horizon Client* Sessions is available from *IGEL* Linux version 5.08.100 upwards.

To use NLA for a *Horizon Client* session:

1. Open the setup and go to **Sessions > Horizon Client > Horizon Client Sessions > [Session Name] > Options**.
2. Activate **Network Level Authentication**.

## Workaround for Hotkeys in Horizon Sessions


### Issue

You want to switch from the VMware Horizon session to the IGEL desktop with the key combination [Ctrl] + [Windows] + [D]. But, by default, hotkeys have no effect in VMware Horizon sessions.

### Solution

Create a custom command that adds the hotkey to the system. It is recommended to use a profile:

1. Create a new profile. For more information about profiles, see Profiles.
2. Go to **System > Firmware Customization > Custom Commands > Base**.
3. Under **Initialization** enter this command: `echo '<ctrl><super>0x020' >> /etc/vmware/view-keycombos-config`

 For more information about hotkeys, see [VMware Docs](#)<sup>32</sup>.

4. Assign the profile to your device and reboot.

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<sup>32</sup> <https://docs.vmware.com/en/VMware-Horizon-Client-for-Linux/4.6/linux-client-installation/GUID-05FE2CCC-9D84-4B37-AC9B-D8CEC43D8567.html>

## Multimedia Acceleration with VMware Horizon View in VESA Mode

### Symptom

You did install IGEL Universal Desktop OS 2 on not fully supported hardware using IGEL Universal Desktop Converter 2. Multimedia acceleration is not working within a VMware Horizon View session.

### Problem

The graphics chip of your hardware is not supported and as a fallback the VESA mode is used.

### Solution

There is no other solution to the problem than using fully supported hardware. Information on supported hardware can be found [in the UDC2 manual](#).<sup>33</sup>

You can also access [IGEL's 3rd party hardware support database](#)<sup>34</sup> to find fully supported graphic chips.

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<sup>33</sup> <http://edocs.igel.com/index.htm#11873.htm>

<sup>34</sup> <https://www.igel.com/linux-3rd-party-hardware-database/>

## Troubleshooting the Horizon Client

### **Solution Based on Experience from the Field**

This article provides a solution that has not been approved by the IGEL Research and Development department. Therefore, official support cannot be provided by IGEL. Where applicable, test the solution before deploying it to a productive environment.

### Symptom

There are some issues with the performance of the Horizon client.

### Environment

- IGEL OS 10 or higher

### Problem

You don't know how to collect the log files and send them to the IGEL Support team.

### Solution

1. In the Setup, go to **System > Registry > sessions > vdmclient% > options > debug** and activate **Save debug information** (registry parameter: `sessions.vdm_client%.options.debug`).
2. Go to **System > Registry > vmware > USB > log** and set **Set VMware Horizon USB debug level** to "debug" (registry parameter: `vmware.view.usb.log`).
3. Go to **System > Registry > vmwarevdmapp > debug** and activate **Save debug informations** (registry parameter: `vmwarevdmapp.debug`).

The log files are created in the `/tmp` directory and can be found using the following patterns:

```
/tmp/vvdm *
```

```
/tmp/vmware-*
```

4. Change to `/tmp` and put the log files into a compressed tar file: `tar -czf vmware-logs.tar.gz [logfile]`
5. In the structure tree of the UMS Console, go to the device and select **Device File->UMS** the context menu.
6. Under **Devices file location**, enter `"/tmp/vmware-logs.tar.gz"`.
7. Under **Target URL**, select the location on the UMS Server where the file is to be stored.
8. Click **Device->UMS**.

## Evidian

- [Authenticating with Evidian Authentication Manager \(see page 303\)](#)

## Authenticating with Evidian Authentication Manager


You can connect to Citrix, RDP and VMware Horizon roaming sessions using RFID badges with Evidian Authentication Manager (AuthMgr). Custom commands are supported as well.

### Prerequisites


- IGEL Universal Desktop Linux 5.06.100 or newer on the device.
- An installed and running Evidian SSO Controller.
- When using HTTPS (IGEL Linux 5.07.100 or newer), the User Access Server's CA root certificate saved locally on the device.
- The device and the server(s) have to be part of the same Active Directory domain.
- A supported RFID reader (e.g. *OMNIKEY 5022 CL*, *OMNIKEY 5421*), connected to the device.
- RFID badges that are already enrolled.

### Configuring an Evidian Authentication Manager Session

1. In IGEL Setup, go to **Sessions > Evidian AuthMgr > Evidian AuthMgr Sessions**.
2. Add a new session.
3. Go to **Sessions > Evidian AuthMgr > Evidian AuthMgr Sessions > [Session Name] > Connection**.
4. Choose the **Protocol** used for the user access service (e.g. HTTP).
5. Enter the IP address or DNS name used for the user access service under **Server**.
6. Choose the **Port** for the user access service (e.g. 9764).
7. Under **Path to service**, enter the path for the user access service (e.g. `/soap`).
8. Under **CA certificate**, enter the path to the CA certificate, including its name, or path of the certification authority (e.g. `/wfs/ca-certs/ca.crt`). The certificate is required for HTTPS connections.
9. Enter the secret for the **Roaming session secret**.
10. When using HTTPS, select **CA certificate** as the user access server's CA root certificate on the device.
11. Under **Evidian AuthMgr > Evidian AuthMgr Sessions > [Session Name] > Options**, select the desired **Session type**.  
This will make Evidian Authentication Manager use the first configured session of its type, e.g. RDP. Make sure that a session is configured.

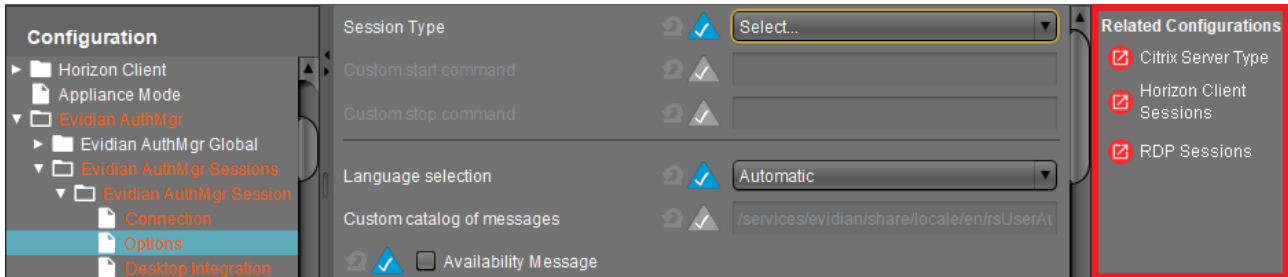
 If you choose the user-defined session type, you need to supply the custom commands; see [Custom Commands \(see page 305\)](#). For further options, see Options in the IGEL OS Reference Manual.

12. Start the new session by clicking on its icon in the **Start Menu**. Alternatively, reboot the device. In the default autostart setting the Evidian Authentication Manager for your session will start automatically and wait for an RFID badge to be placed on the reader.

 You can only start a single instance of an Evidian Authentication Manager session.

## Configuring Citrix/RDP/VMware Horizon Sessions

► Configure the session that you want to use with Evidian Authentication Manager as the first session of its kind. The shortcuts to the session settings are provided in the Setup section **Related Configurations**:



### Using a Custom Configuration File

Instead of using the settings provided by IGEL Setup, you can enable a custom configuration file under **Sessions > Evidian AuthMgr > Evidian AuthMgr Sessions > [Session Name] > Options > Use configuration file**. Then all the other session settings will be ignored. You find a commented template for the configuration file at `/etc/rsUserAuth/rsUserAuth.ini`.

### Logging in with Evidian Authentication Manager

1. Place your RFID badge on the RFID reader (or tap the reader with it if you configured **Tapping Mode**)
2. Your Citrix/RDP/VMware Horizon session will open if an active roaming session for your user already exists. If it does not, you will be presented with a password prompt for the user's Active Directory password.
3. Remove your RFID badge (or tap the reader again) to disconnect from the session.



## Custom Commands

The following simple shell scripts illustrate how to write custom commands that receive username and domain as parameters from *Evidian Authentication Manager*.

In order to use them

1. Save the scripts in `/wfs/.`
2. Make them executable with `chmod a+x [filename]`.
3. Enter their full path (e.g. `/wfs/start.sh`) in **Sessions > Evidian > [Session name] > Options**.

### Start Script

```
#!/bin/sh
# Sample start script
if [ $# -eq 3 ] ; then
    # Start "session"
    gtkmessage -t "Evidian Authentification Manager Login" -m "Login as user '$1'
with domain '$3'."
else
    exit 1
fi
exit 0
```


### Stop Script

```
#!/bin/sh
# Sample stop script
# Close running "session"
pkill gtkmessage
gtkmessage -t "Evidian Authentication Manager Logout" -s 5 -S -m "Logout user
'$1'."
exit 0
```

## Debugging and Troubleshooting

### Debugging

1. Enable **Debug mode** in **Sessions > Evidian > [Session Name] > Options** in **Setup** and set the level of detail.
2. Kill the *Evidian Authentication Manager* process (see Further Troubleshooting).
3. Start the desired Evidian session from the **Start Menu**.
4. Watch the output with `tail -F /var/log/user/rsuserauth[Session Number].debug` in **Local Terminal**. Alternatively, add the file to **System Log Viewer**.

 The session number starts with 0, not 1. To watch the output of the first configured session, use thus `tail -F /var/log/user/rsuserauth0.debug`

### Further Troubleshooting

1. Open **Local Terminal**
2. Enter `ps fax | grep rsuserauth | grep -v grep` to look for *Evidian Authentication Manager* processes.
3. Use the **Evidian AuthMgr Restart** session to restart all Evidian sessions if necessary OR kill unwanted processes by entering `kill [process ID]` in the terminal, start desired processes via the Evidian entries in the **Start Menu**.

## IBM iAccess

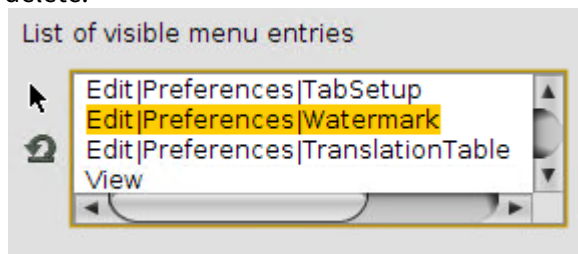
- [Editing the List of Visible Menu Entries for IBM iAccess \(see page 308\)](#)
- [Key Mapping for IBM iAccess Client \(see page 310\)](#)

## Editing the List of Visible Menu Entries for IBM iAccess

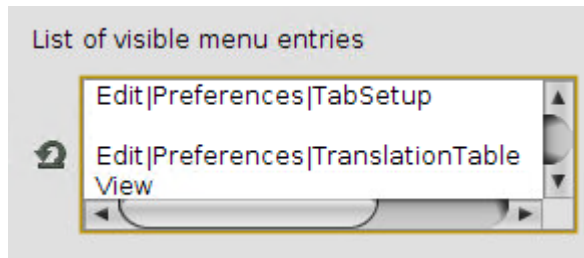
You can simplify the menu of an IBM iAccess client session by removing items from the menu tree. You also can restore the original menu.


### Removing Menu Items

1. In the IGEL Setup, go to **System > Registry > sessions > iaccess[NUMBER] > options > deletemenus** (Registry key: `sessions.iaccess[NUMBER].options.deletemenus`). [NUMBER] is the instance number of the session you want to configure; 0, for instance, stands for the first session, 1 for the the second session, etc.
2. In the **List of visible menu entries**, using the mouse, mark the line with the entry you want to delete:



3. Press the backspace [ ← ] or delete [Del] key. The menu item is deleted:



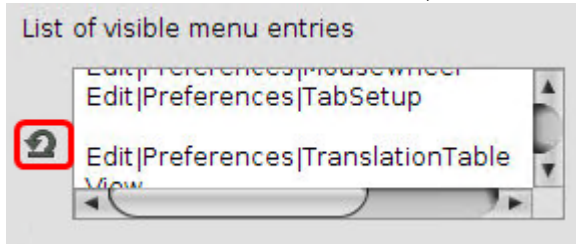
 If you delete a menu item that has subitems, the subitems will be invisible, too.

4. To remove further menu items, repeat steps 2 and 3.
5. Click **Apply** or **Ok**.
6. Start or restart the IBM iAccess client to check your changes.

### Restoring the Original Menu

1. In the IGEL Setup, go to **System > Registry > sessions > iaccess[NUMBER] > options > deletemenus** (Registry key: `sessions.iaccess[NUMBER].options.deletemenus`). [NUMBER] is the instance number of the session whose menu you want to restore; 0, for instance, stands for the first session, 1 for the the second session, etc.

2. In the **List of visible menu entries**, click the following symbol:



The original menu is restored.

3. Click **Apply** or **Ok**.

## Key Mapping for IBM iAccess Client

### Problem

When you change the key mapping in the IBM iAccess client, the changes are not retained when the client is restarted.

Applying the changes via IGEL Setup is not possible.

### Environment/Prerequisites

- IGEL OS 10.05.100 or higher
- UMS 5.09.110 or higher
- IBM iAccess Client session is set up

### Solution

Save the settings made in the IBM iAccess client in a file and distribute that file via the UMS.

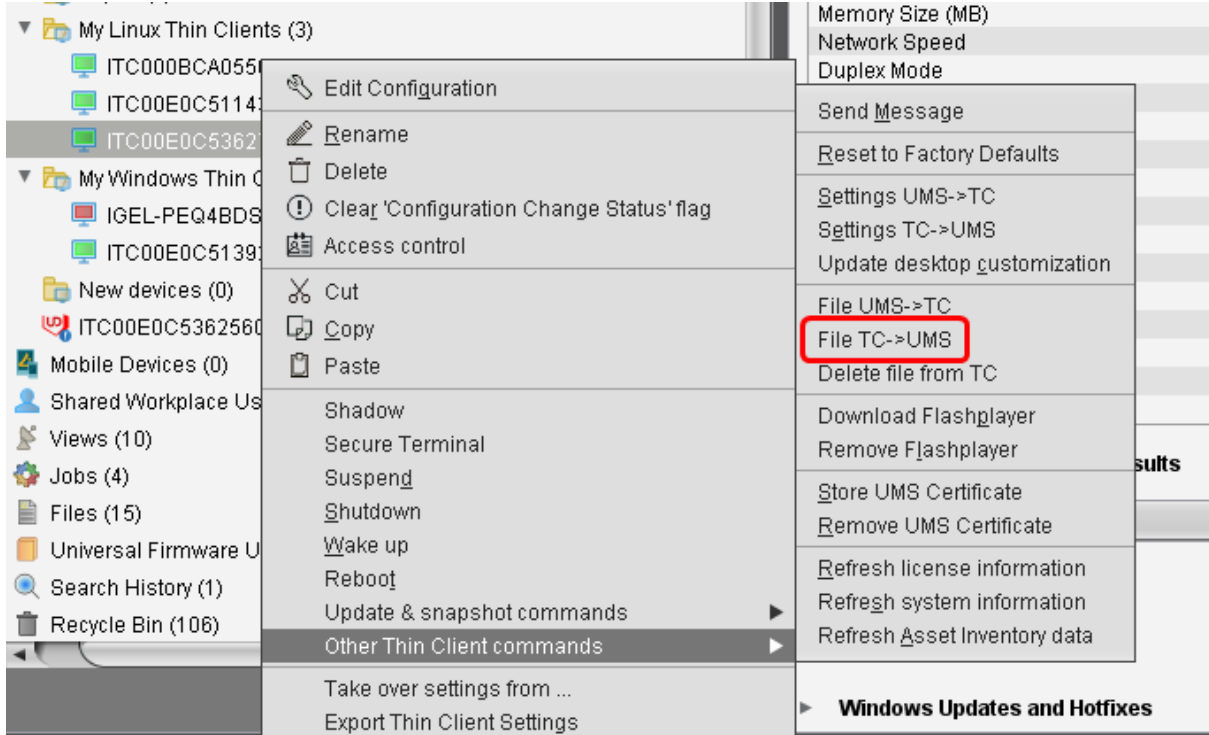
### Editing the Key Mappings

1. Open the IBM iAccess session and log on to your remote environment.
2. In the IBM iAccess client, go to **Edit > Preferences > Keyboard**.
3. On the **Key Assignment** tab, create the desired key bindings.
4. When you are finished creating key bindings, click **Save as....**
5. In the save dialog, choose **File** and edit the file path as follows: `/userhome/IBM/iAccessClient/Emulator/IBMi.kmp`
6. Click **OK**.  
The IBM iAccess client will recognize the file `IBMi.kmp` as the default key.

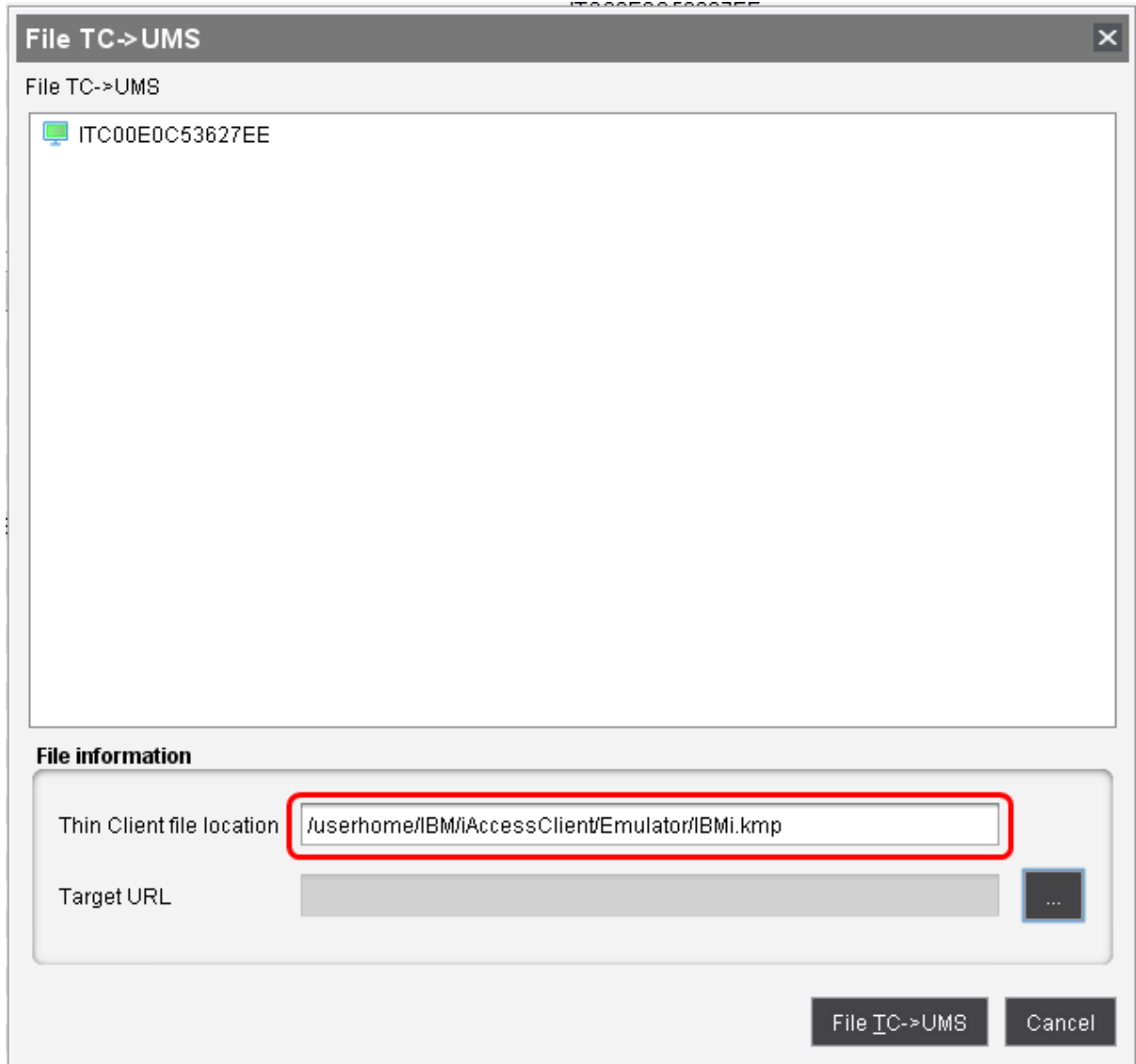
### Importing the Configuration File to the UMS

1. Open the UMS.


2. In the navigation tree, find the thin client with the `IBMi.kmp` file and select **Other Thin Client commands > File TC->UMS** in the context menu.

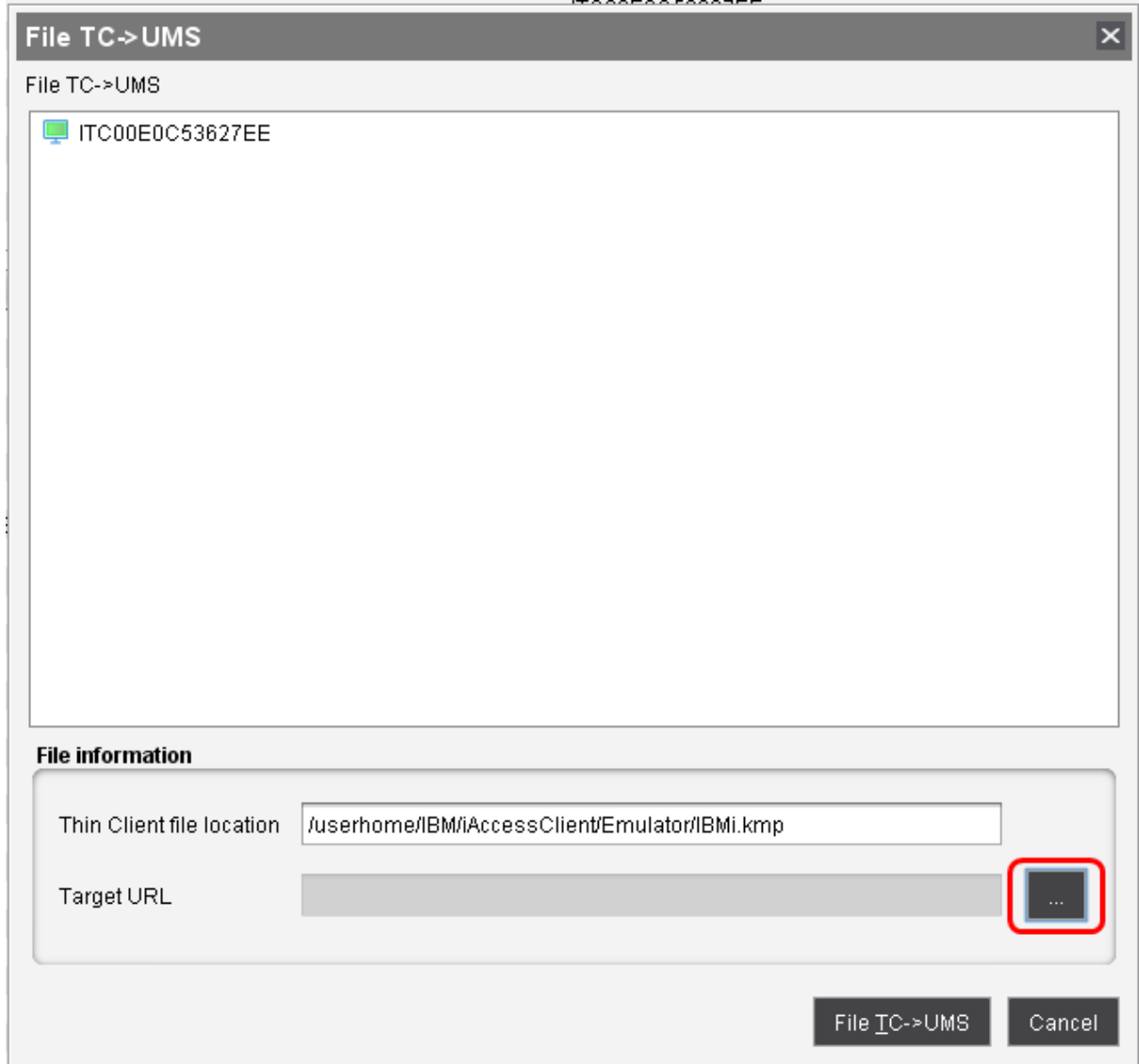


3. Under **Thin Client file location**, enter `/userhome/IBM/iAccessClient/Emulator/IBMi.kmp`

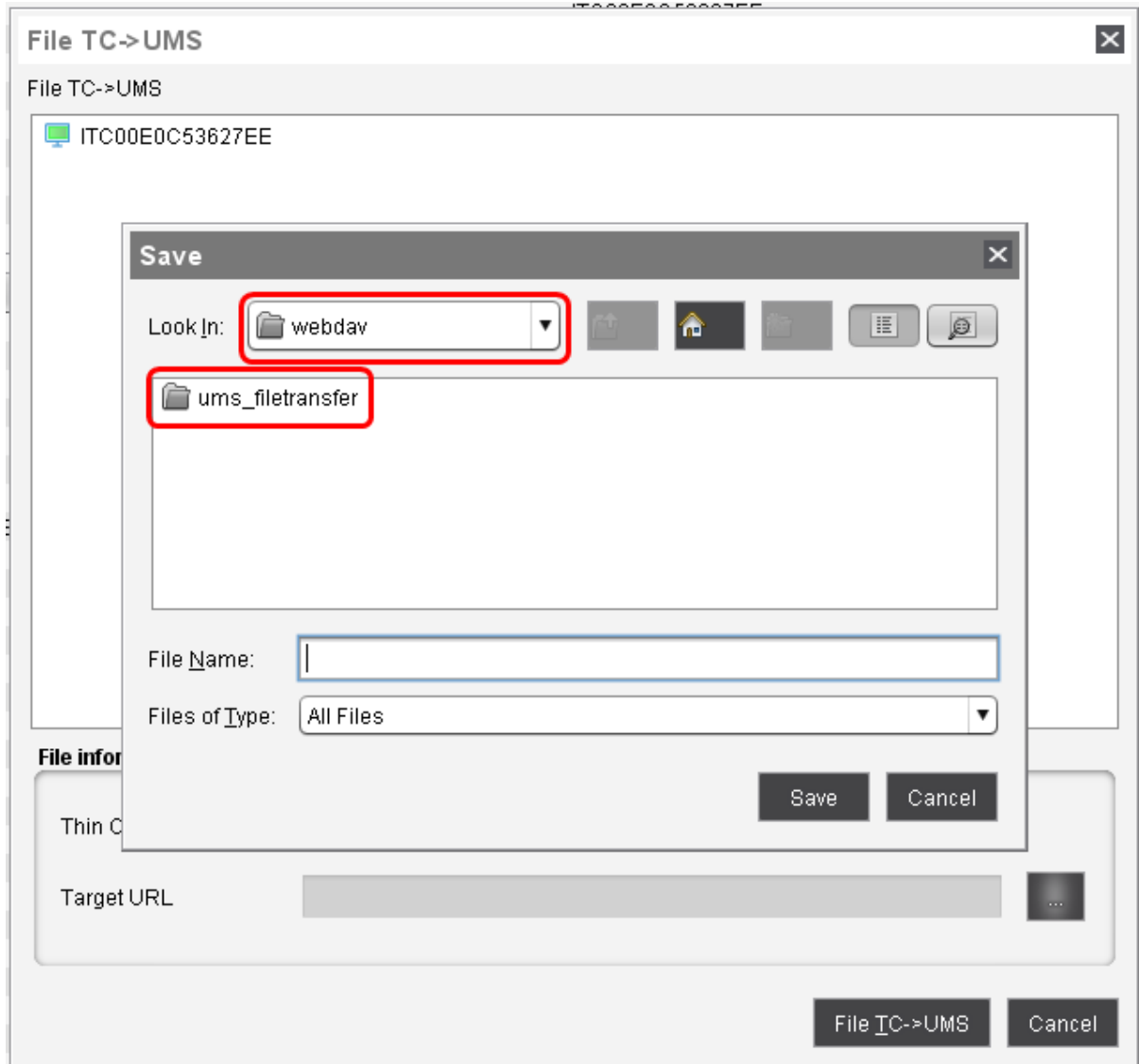




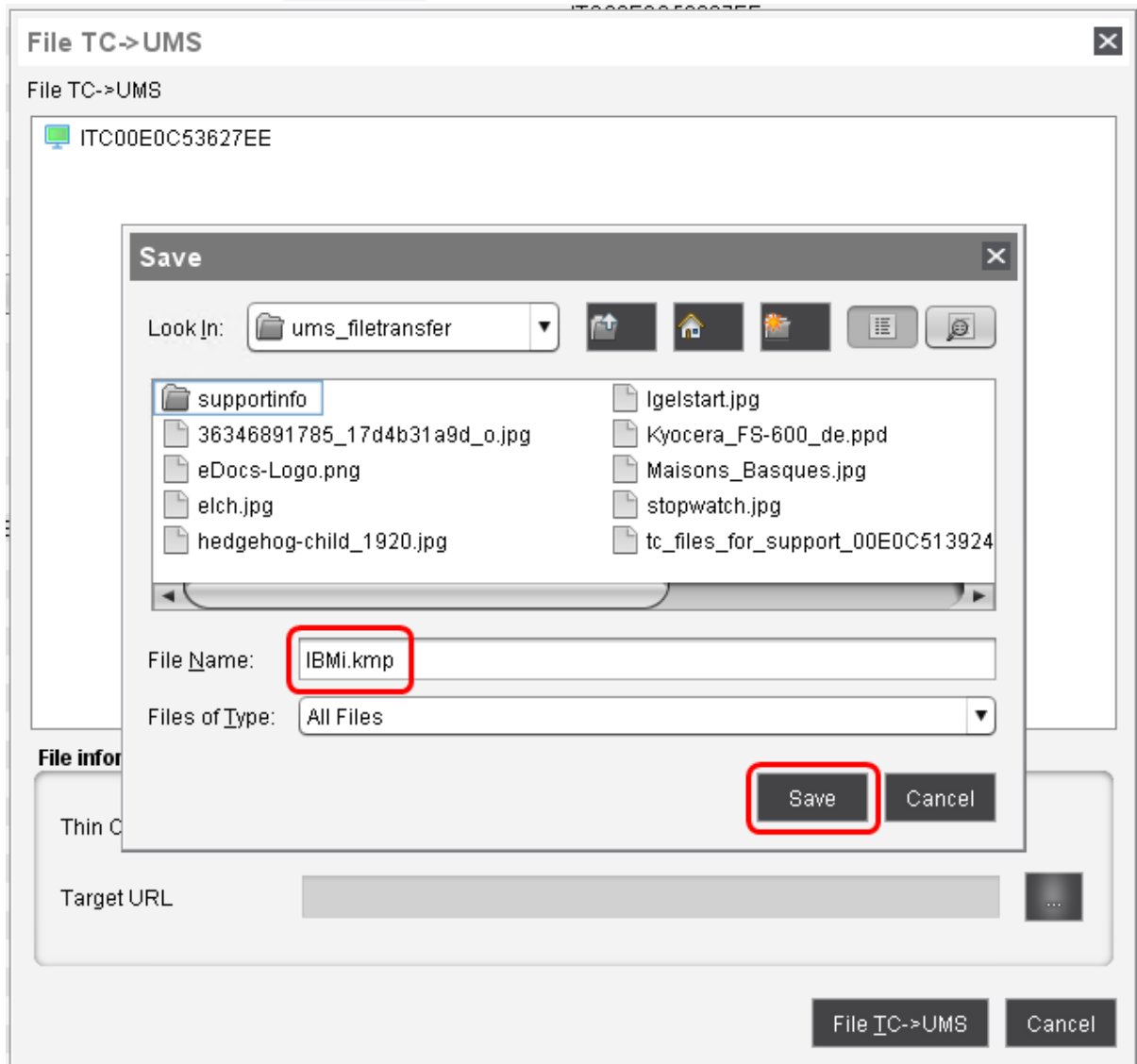
- 4. Click  to open the **Save** dialog.



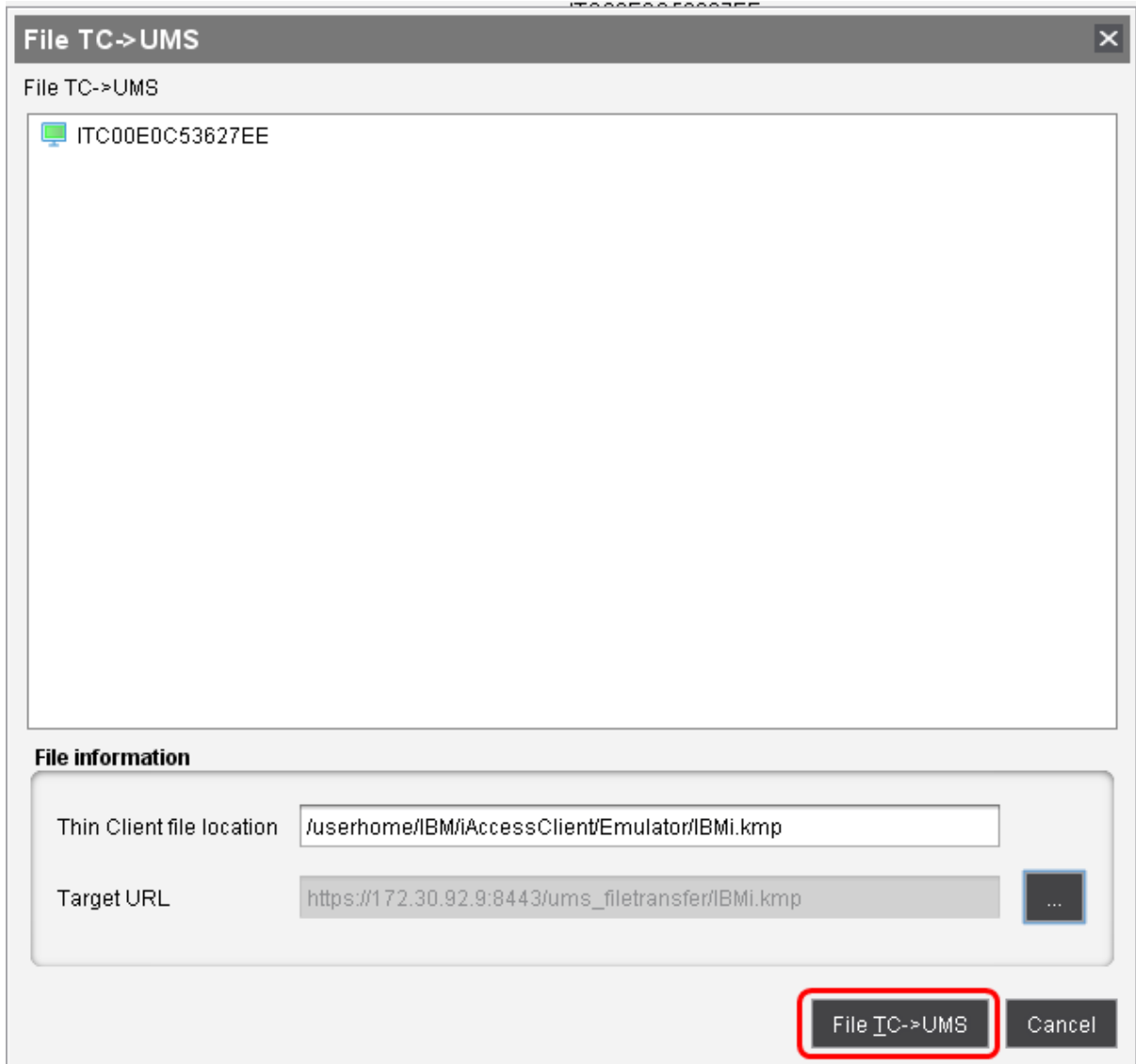
- 5. Choose a file location within the `ums_filetransfer` folder.



- Under **File Name**, enter `IBMi.kmp` and click **Save**.



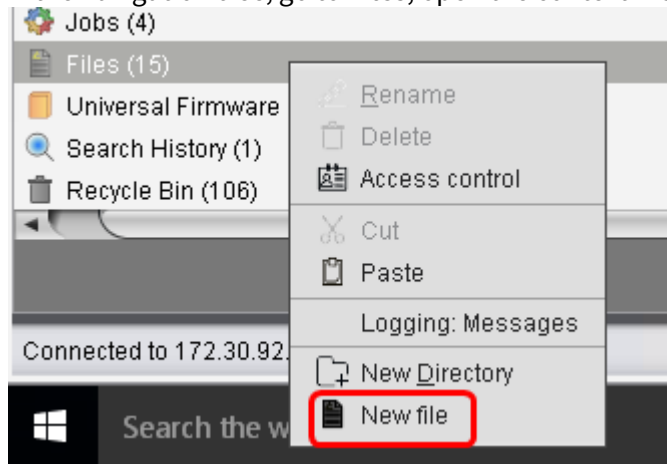
7. Click **TC->UMS**.



The file is stored within the UMS. Next, we will make it available as an object.

## Creating the File Object in the UMS

1. In the navigation tree, go to **Files**, open the context menu and choose **New file**.



2. In the **New file** dialog, choose **Select file from UMS server** and click  to open the file dialog.

**New file**

**File source**

Upload local file to UMS server

Local file

Upload location (URL)

**Select file from UMS server**

File location (URL)

**File target**

Classification

Thin Client file location

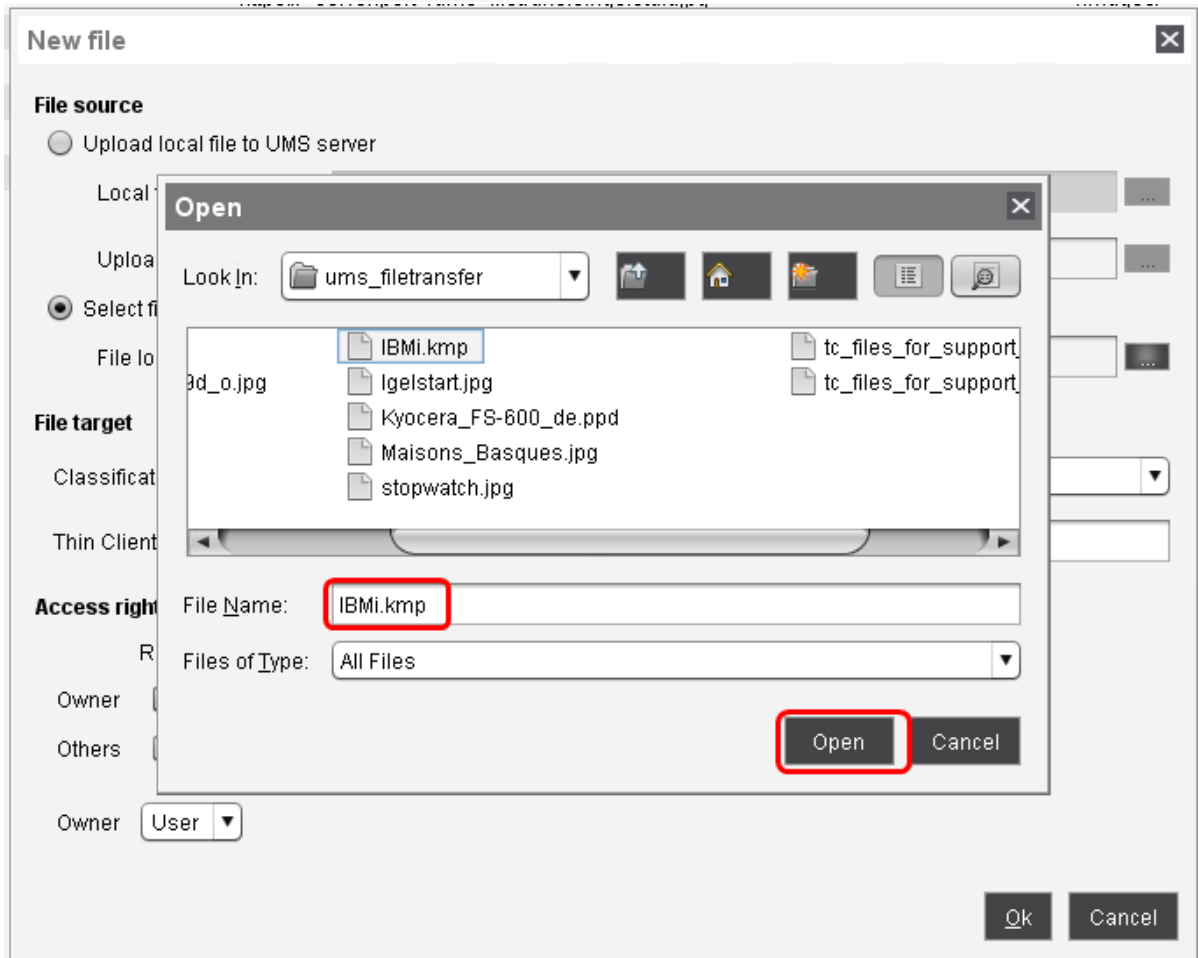
**Access rights**

	Read	Write	Execute
Owner	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Others	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

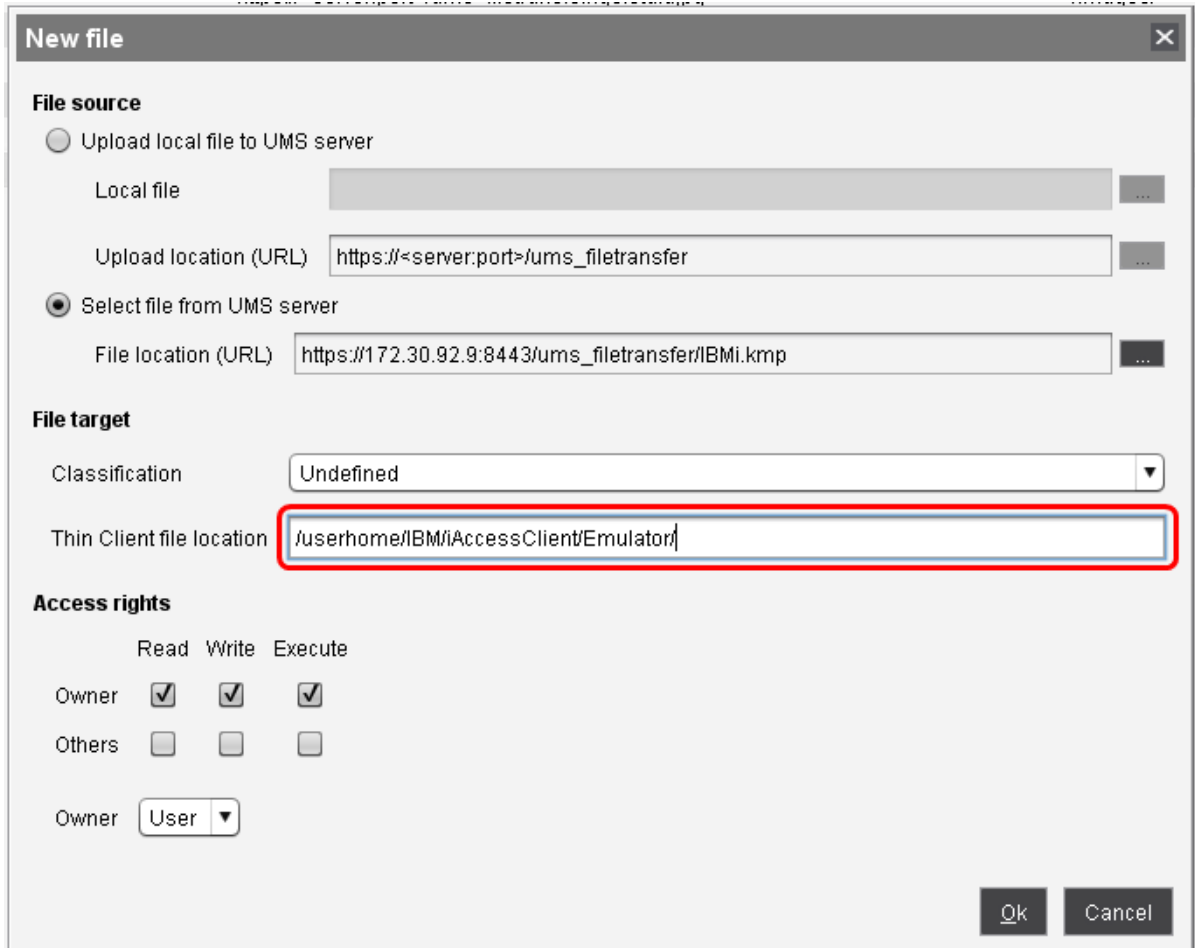
Owner

Ok Cancel

3. In the file dialog, find the file `IBMi.kmp` you created previously, and click **Open**.



4. Back in the **New file** dialog, enter the **Thin Client file location** as follows: `/userhome/IBM/iAccessClient/Emulator/`



**New file**

**File source**

Upload local file to UMS server

Local file

Upload location (URL)

Select file from UMS server

File location (URL)

**File target**

Classification

Thin Client file location

**Access rights**

	Read	Write	Execute
Owner	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Others	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Owner

5. Ensure that the **Access rights** and **Owner** are set as follows:
- **Owner** rights: **Read, Write, Execute**
  - **Owner**: "User"



**New file** [X]

**File source**

Upload local file to UMS server

Local file [Browse]

Upload location (URL)  [Browse]

Select file from UMS server

File location (URL)  [Browse]

**File target**

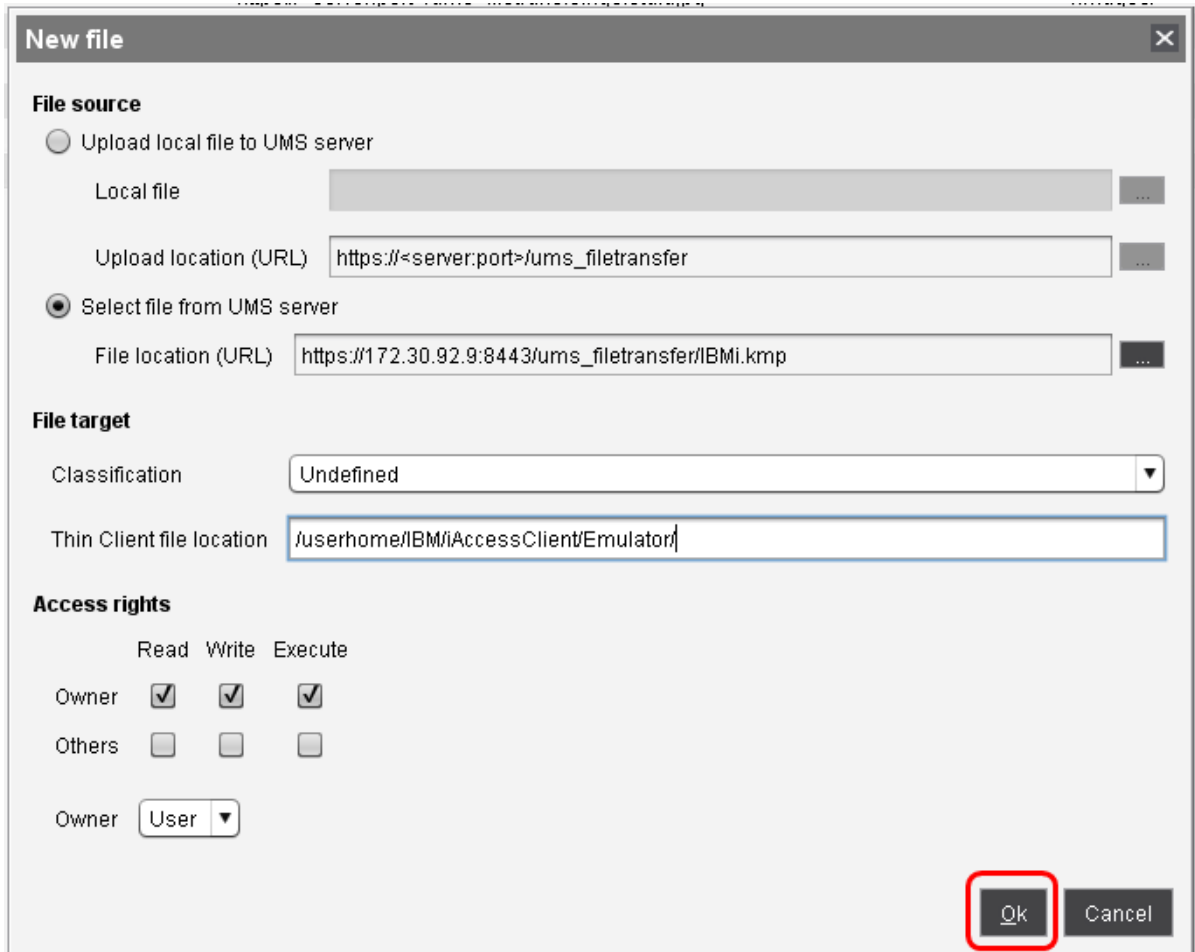
Classification  [v]

Thin Client file location

**Access rights**

	Read	Write	Execute
Owner	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Others	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Owner	<input type="text" value="User"/> [v]		

[Ok] [Cancel]

6. Click **Ok**.


**New file**

**File source**

Upload local file to UMS server

Local file

Upload location (URL)

Select file from UMS server

File location (URL)

**File target**

Classification

Thin Client file location

**Access rights**

	Read	Write	Execute
Owner	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Others	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

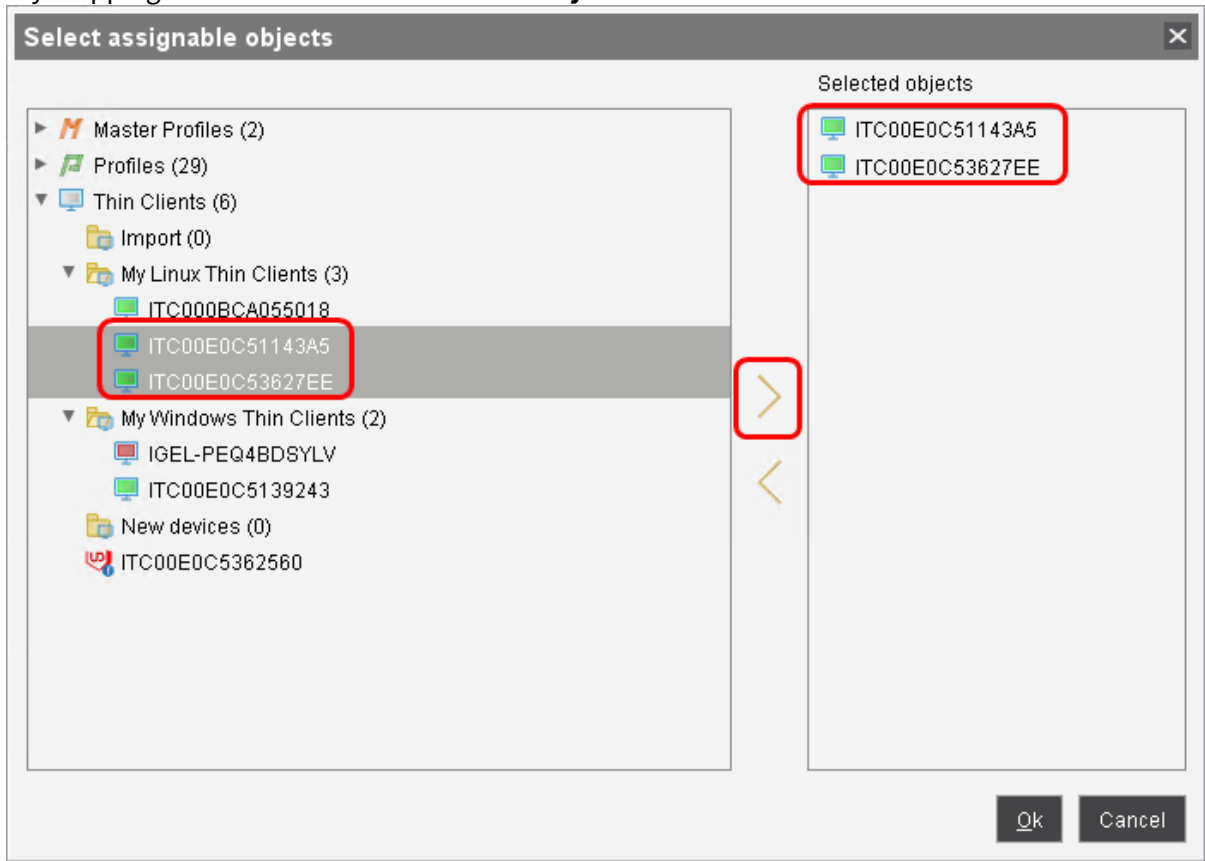
Owner

The file object "IBMi.kmp" is created.

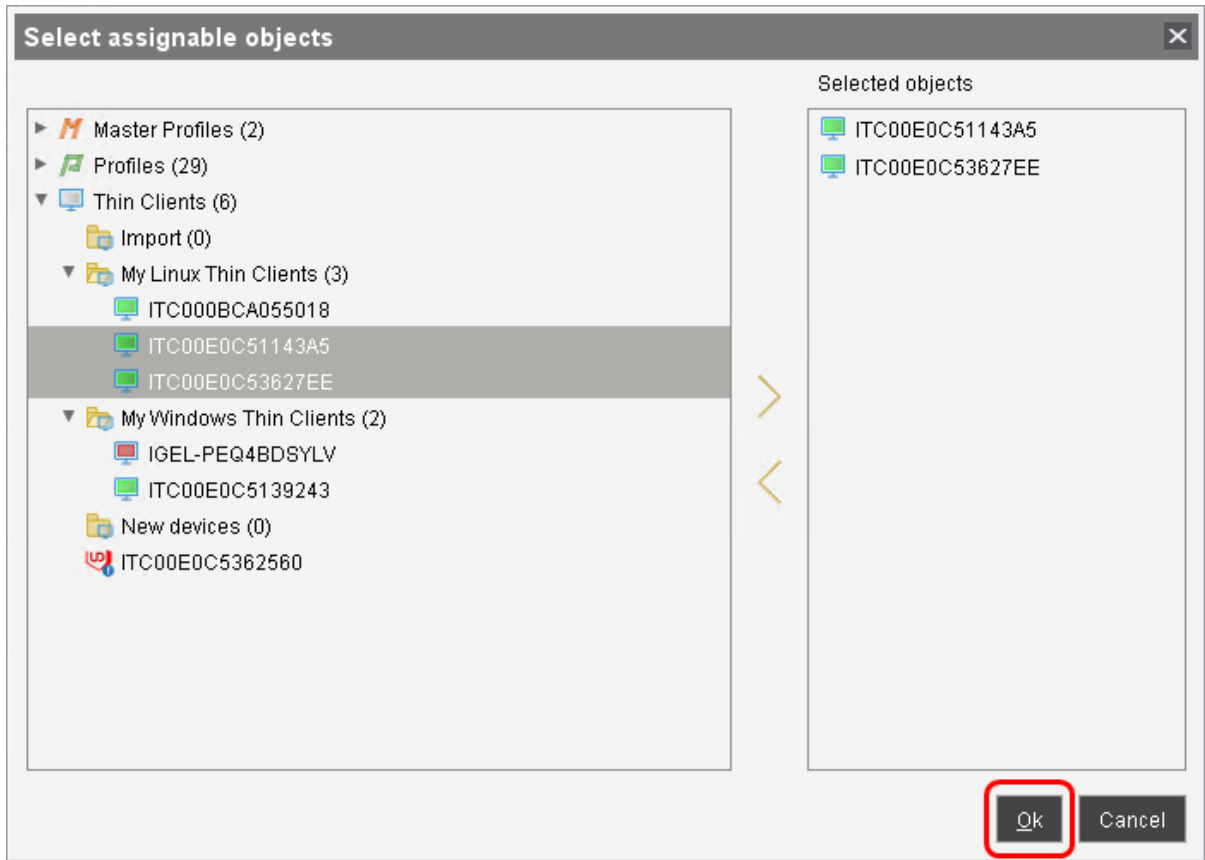
### Assigning the File Object to Thin Clients

1. In the navigation tree, select the file object "IBMi.kmp" and click  in the **Assigned objects** area (upper right).

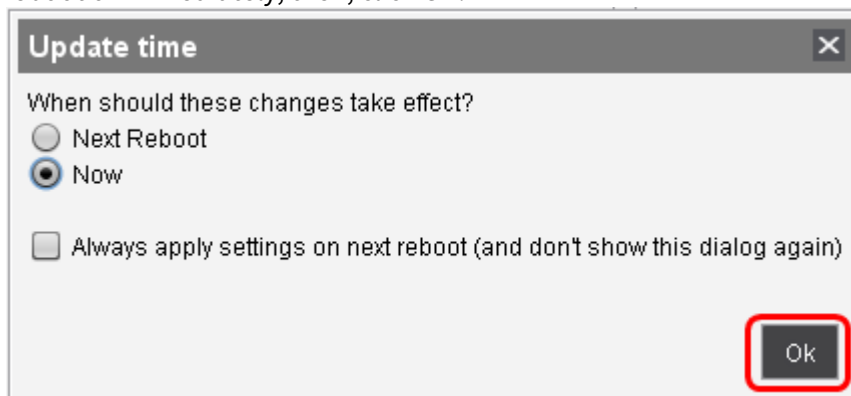
2. In the **Select assignable objects** dialog, select the thin clients to which you want to assign the new key mapping and add them to the **Selected objects** area.



3. Click **Ok**.



4. In the **Update time** dialog, choose whether the file should be assigned to the thin clients at next reboot or immediately; then, click **Ok**.



The file is transferred to the thin clients.

## Imprivata

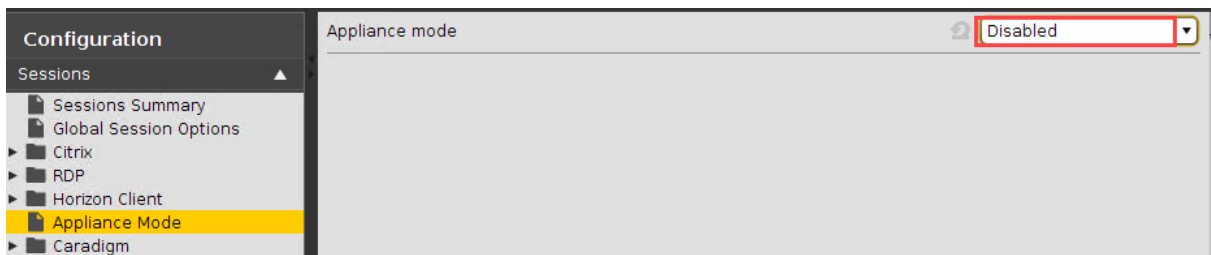
- [Imprivata: Clear the Imprivata Data Partition \(see page 326\)](#)
- [Imprivata: Session Customization \(see page 327\)](#)

## Imprivata: Clear the Imprivata Data Partition

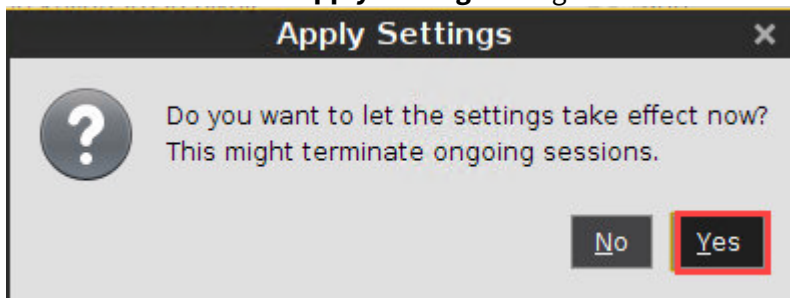
The function that explicitly clears the Imprivata data partition has been removed. However, you can simply emulate this feature by disabling and re-enabling the Imprivata appliance mode.

If you already have a valid appliance running and want to delete the Imprivata data partition, take the following steps:

1. In the IGEL Setup, go to **Sessions > Appliance Mode**.
2. Set **Appliance mode** to "Disabled".

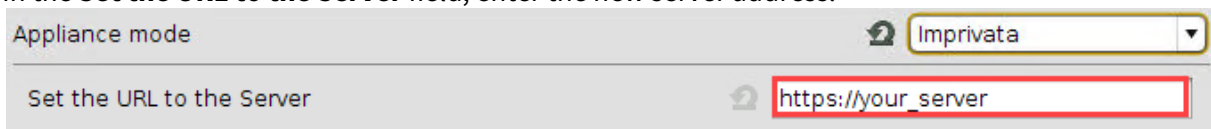


3. Click **Ok** to save the setting.
4. Click **Yes** to confirm the **Apply Settings** dialog.



Normal desktop mode is active. The Imprivata data partition is void now.

5. In the IGEL Setup, go to **Sessions > Appliance Mode**.
6. Set **Appliance Mode** to "Imprivata".
7. In the **Set the URL to the Server** field, enter the new server address.



8. Click **Ok** and confirm the **Apply Settings** dialog.  
Now you have a fresh Imprivata appliance mode without any outdated data.

## Imprivata: Session Customization

You can make the same settings in the **IMPRIVATA\_RDP** (**IGEL Setup > RDP > RDP Sessions > Imprivata\_RDP**) and **IMPRIVATA\_VMware** (**IGEL Setup > Horizon Client > Horizon Client Sessions > IMPRIVATA\_VMware**) sessions as in the standard sessions (see the description for RDP Session and Horizon Client Session).

**i** **IMPRIVATA\_RDP** and **IMPRIVATA\_VMware** will be shown in the IGEL Setup when **Imprivata** is selected under **Setup > Sessions > Appliance Mode**, see Imprivata.

However, the changes under the following subsections will be ignored:

### Imprivata\_VMware Session

- **Connection Settings**

### Imprivata\_RDP Session

- **Server**
- **Logon**

## SSH

- [Enable Weaker Algorithms in the Built-in OpenSSH Server](#) (see page 329)
- [Enable Weaker Algorithms in the SSH Client](#) (see page 330)
- [SSH: Deprecation of Weak Algorithms as of IGEL Linux 10.04.100](#) (see page 331)



## Enable Weaker Algorithms in the Built-in OpenSSH Server

### Problem

You are trying to connect to the built-in OpenSSH server of IGEL OS with an SSH client which does not support the strong algorithms of the server.

### Solution

To enable weaker encryption algorithms, proceed as follows:

1. In Setup, go to **System > Registry > network > ssh\_server**.
2. Change the settings according to your requirements:
  - **disable\_weak\_encryption:** Disable this option to enable weaker encryption.
  - **disable\_weak\_hostkey\_algos:** Disable this option to enable weaker host key algorithms.
  - **disable\_weak\_kexalgorithms:** Disable this option to enable weaker key exchange algorithms.
  - **disable\_weak\_mac:** Disable this option to enable weaker MACs.
  - **minimal\_encryption\_level:** The minimal level of encryption

## Enable Weaker Algorithms in the SSH Client

### Environment

IGEL Linux 10.04.100 or higher

### Problem

You are trying to connect to an SSH server which does not support the strong algorithms enabled by default in the SSH client.

### Solution

To enable weaker encryption algorithms, proceed as follows:

1. In Setup, go to **System > Registry > network > ssh\_client**.
2. Change the settings according to your requirements:
  - **disable\_weak\_encryption**: Disable this option to enable weaker encryption.
  - **disable\_weak\_hostkey\_algos**: Disable this option to enable weaker host key algorithms.
  - **disable\_weak\_kexalgorithms**: Disable this option to enable weaker key exchange algorithms.
  - **disable\_weak\_macs**: Disable this option to enable weaker MACs.
  - **minimal\_encryption\_level**: The minimal level of encryption

## SSH: Deprecation of Weak Algorithms as of IGEL Linux 10.04.100

As of IGEL Linux 10.04.100, certain older, less secure algorithms are deprecated in both the SSH client and server.

The following table shows the algorithms enabled by default as of IGEL Linux version 10.04.100.

Key exchange algorithms	<ul style="list-style-type: none"> <li>• curve25519-sha256@libssh.org</li> <li>• ecdh-sha2-nistp521</li> <li>• ecdh-sha2-nistp384</li> <li>• ecdh-sha2-nistp256</li> <li>• diffie-hellman-group-exchange-sha256</li> </ul>
Message authentication codes (MACs)	<ul style="list-style-type: none"> <li>• hmac-sha2-512-etm@openssh.com</li> <li>• hmac-sha2-256-etm@openssh.com</li> <li>• umac-128-etm@openssh.com</li> <li>• hmac-sha2-512</li> <li>• hmac-sha2-256</li> <li>• umac-128@openssh.com</li> </ul>
Host keys	<ul style="list-style-type: none"> <li>• ssh-ed25519-cert-v01@openssh.com</li> <li>• ssh-rsa-cert-v01@openssh.com</li> <li>• ssh-ed25519</li> <li>• ssh-rsa</li> <li>• ecdsa-sha2-nistp521-cert-v01@openssh.com</li> <li>• ecdsa-sha2-nistp384-cert-v01@openssh.com</li> <li>• ecdsa-sha2-nistp256-cert-v01@openssh.com</li> <li>• ecdsa-sha2-nistp521</li> <li>• ecdsa-sha2-nistp384</li> <li>• ecdsa-sha2-nistp256</li> </ul>

If you need to enable weaker algorithms, see [Enable Weaker Algorithms in the SSH client \(see page 330\)](#) and/or [Enable Weaker Algorithms in the Built-in OpenSSH Server \(see page 329\)](#).

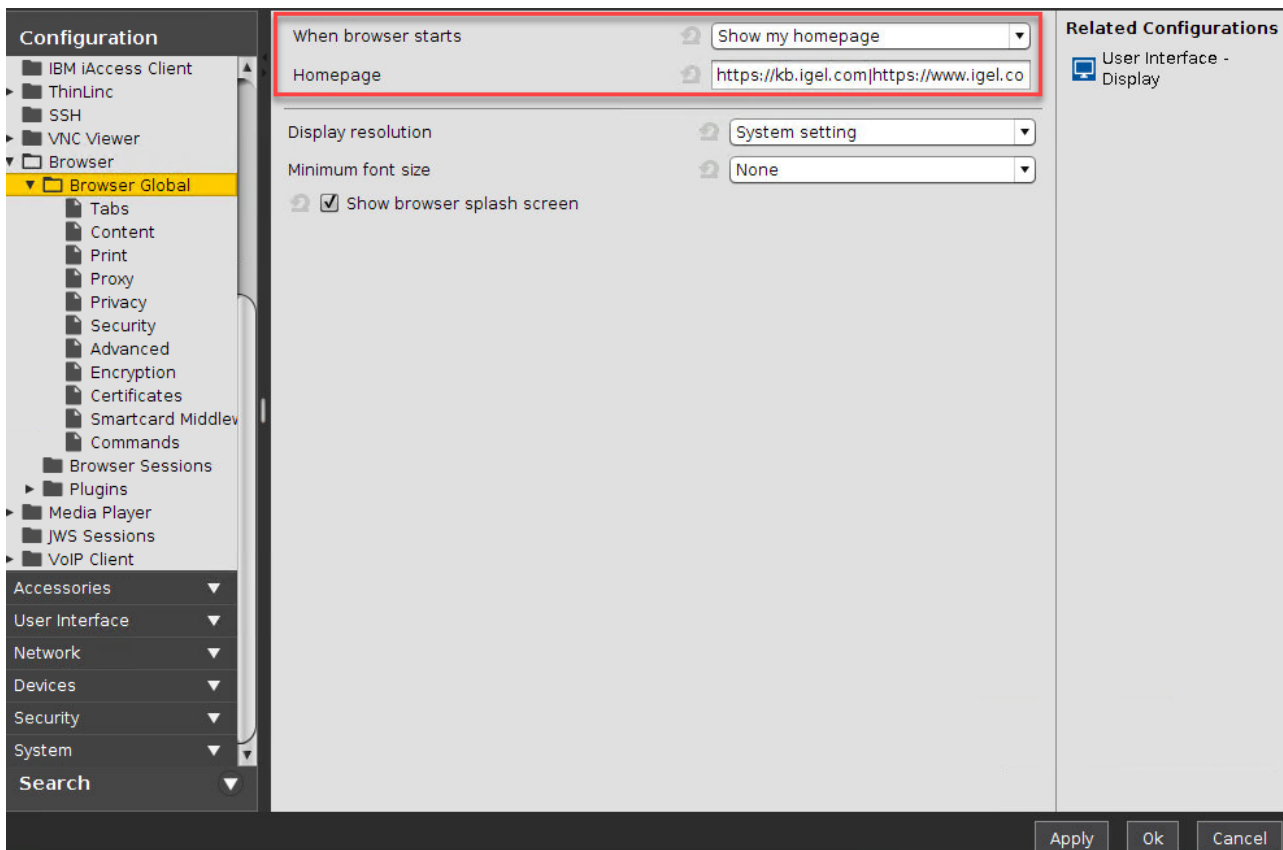
## Browser

- [Define Multiple Start Pages for Your Browser](#) (see page 333)
- [Touchscreen: Multitouch/Gesture Support for Firefox](#) (see page 334)
- [Set Advanced User Preferences for the Browser](#) (see page 335)
- [Use the Browser in Kiosk Mode](#) (see page 337)
- [SSL/TLS Error with Firefox in Appliance Mode](#) (see page 340)
- [Browser Cannot Download Files](#) (see page 341)
- [Some PDFs are not opened by Firefox](#) (see page 342)
- [Can I Install Firefox Extensions?](#) (see page 344)

## Define Multiple Start Pages for Your Browser

In some cases, a fixed set of start pages displayed in separate tabs may prove useful. For instance, if the browser is working in kiosk mode, reusing a set of tabs from an earlier session is not an option.

Here is how to define multiple start pages to be opened at browser startup:



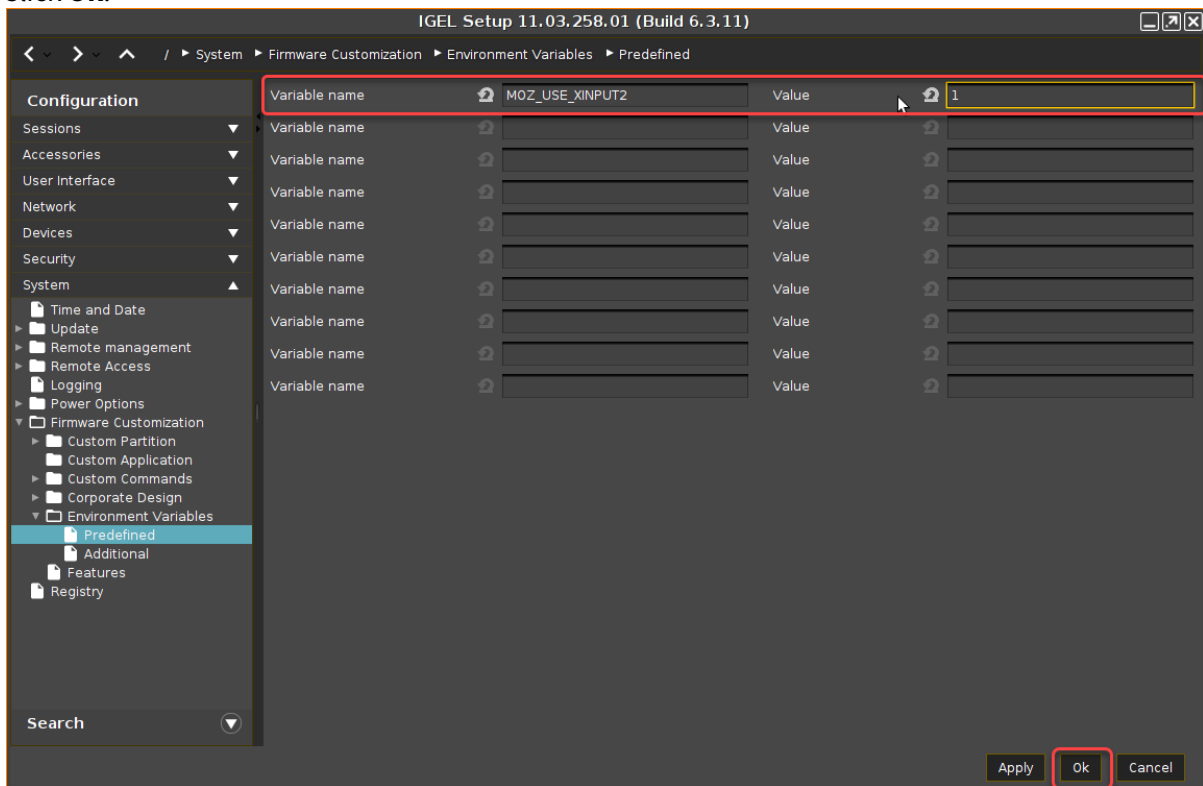
1. Open the setup and go to **Browser > Browser Global**.
2. Set **When Firefox starts** to **Show my home page**.
3. Set **Homepage** to the URLs that the browser should open at startup. Use "|" as a separator.
4. Click **Apply** or **Ok**.

## Touchscreen: Multitouch/Gesture Support for Firefox

You can use multitouch/gestures in the Firefox browser that is built into IGEL OS 10 and IGEL OS 11. This is done by adding an environment variable.

To enable multitouch:

1. Open the local Setup or the UMS configuration dialog and go to **System > Firmware Customization > Environment Variables > Predefined**.
2. In the first free **Variable name** field, enter `MOZ_USE_XINPUT2`
3. In the corresponding **Value** field, enter `1`
4. Click **Ok**.



5. Reboot the device.
6. To check if multitouch is working, open the Firefox browser and go to <https://www.paulirish.com/demo/multi>.

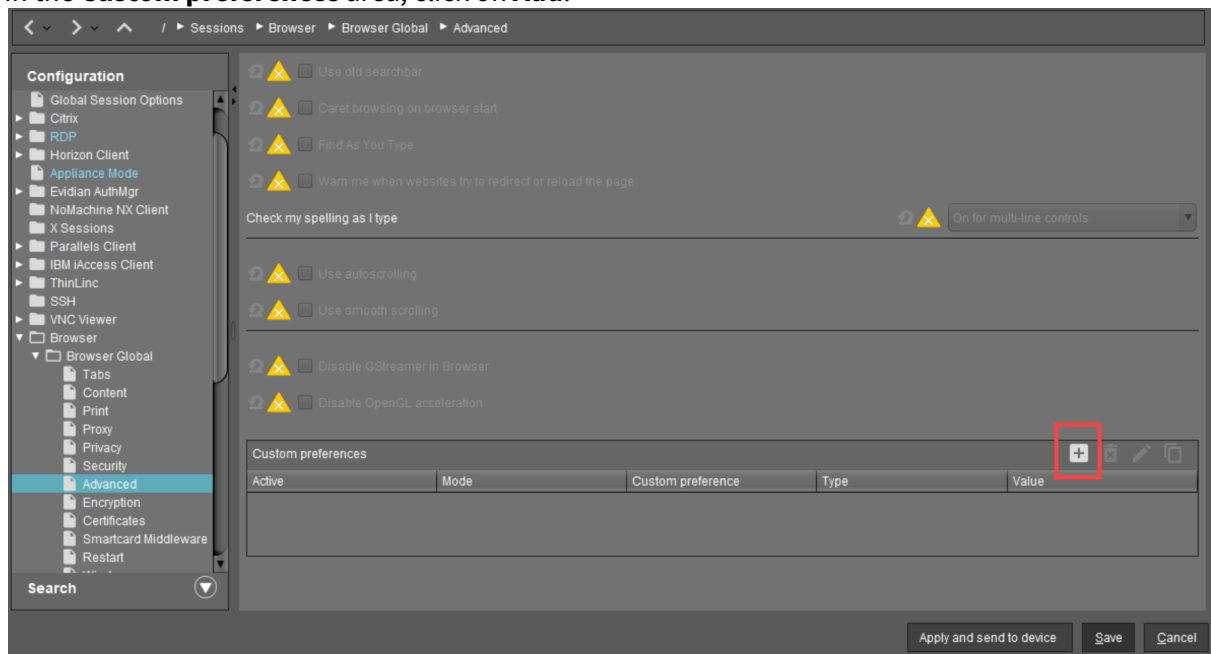
## Set Advanced User Preferences for the Browser

The Mozilla Firefox browser included in IGEL OS offers a vast array of configuration options. They range from the sorting order of bookmarks over encryption algorithms to fixing quirks in web applications that are important to you. In total, they are too many to present them as individual items in IGEL Setup. However, as of IGEL Linux version 5.09.100, IGEL Setup lets you set any browser user preference in a generic way.

⚠ Changes to the advanced Firefox browser settings can impair its stability, security, and speed. IGEL Support is not responsible for problems caused by changing the browser configuration, even if the browser configuration was changed in IGEL Setup.

You will find information regarding the configuration parameters for Firefox in the MozillaZine Knowledge Base under [Firefox About:config entries](http://kb.mozillazine.org/About:config_entries)<sup>35</sup>.

1. In Setup, go to **Sessions > Browser > Browser Global > Advanced**.
2. In the **Custom preferences** area, click on **Add**.



3. Using the **Active** option, specify whether the configuration parameter is to be active.
4. Specify the **Mode** of the configuration parameter - for many cases **pref** will do.
5. Under **Custom preference**, give the name of the configuration parameter. Example: `ui.textSelectBackground`
6. Specify the **Type** of the configuration parameter.  
Possible values:
  - **String**: The value is a string of characters.
  - **Integer**: The value is a whole number.
  - **Boolean**: The value is a Boolean value, i.e. `true` or `false`.

<sup>35</sup> [http://kb.mozillazine.org/About:config\\_entries](http://kb.mozillazine.org/About:config_entries)

7. Specify the **Value** of the configuration parameter. The possible entries depend on the **Type** selected.
8. Click **Ok**.  
The configuration parameter will take effect the next time that the browser is launched.  
For more details on browser configuration, refer to the section Browser Global in the IGEL OS reference manual.



## Use the Browser in Kiosk Mode

Browser kiosk mode is an option when you are operating any kind of public terminal with anonymous access, e.g.:

- Educational service in a museum
- Service terminals or ticket vending machines for public transport
- Entry portal for a corporate intranet

Albeit configuring an IGEL OS device for browser kiosk mode may seem quite extensive, you have the possibility to define your own flavor of kiosk mode. Consider the following settings.

### Settings under Sessions > Browser > Browser Sessions > [Session Name]

- ▶ Activate **Autostart**.

### Settings under Sessions > Browser > Browser Sessions > [Session Name] > Settings

- ▶ Set **When browser starts** to **Show my home page**.
- ▶ Set **Homepage** to the desired home page.
- ▶ If necessary, select the correct **Start Monitor**.

### Settings under Sessions > Browser > Browser Global > Tabs

- ▶ Set **New pages should be opened in** to **the current window** or to **a new tab**.

### Settings under Sessions > Browser > Browser Global > Content

- ▶ If applicable, activate **Block pop-up windows**.
- ▶ Activate **Load images automatically**.
- ▶ Activate **Enable JavaScript** if desired, and adapt the actions permitted for JavaScript according to your needs.

### Settings under Sessions > Browser > Browser Global > Privacy

- ▶ Set **Save Browsing History (in days)** to **Do not save History**.
- ▶ Deactivate **Save information entered in forms and the Search bar**.
- ▶ Deactivate **Remember Passwords**.
- ▶ Activate **Clear private data when closing browser**.
- ▶ Activate all items in the area **Select the items to be cleared**.

- ▶ If you want to suppress any tracking of the user's activities, activate **Allow private browsing feature** and **Always start in private browsing mode**.
- ▶ If applicable, activate **Enable "Do Not Track" feature**.
- ▶ To make the browser block domains and websites which are known for tracking users, activate **Enable built-in tracking protection**.

### Settings under Sessions > Browser > Browser Global > Security

- ▶ To enable phishing protection, activate **Safe Browsing**.
- ▶ To enable protection against malicious downloads, activate **Malware Protection**.

### Settings under Sessions > Browser > Browser Global > Restart

- ▶ Activate **Restart**. The browser will restart automatically if a user closes the browser window.
- ▶ If you want the browser to restart automatically after some idle time, activate **Restart after idle time** and set **Idle time after which a restart occurs** in minutes or seconds.

### Settings under Sessions > Browser > Browser Global > Window

- ▶ If the browser shall run in full-screen mode, activate **Start in fullscreen mode**.
- ▶ Activate **Hide local filesystem**.
- ▶ Activate **Hide configuration page of the browser**.

### Settings under Sessions > Browser > Browser Global > Menus & Toolbars

- ▶ Activate **Hide App Menu/Menu Bar**.
- ▶ Select which menus and toolbars are to be hidden.
- ▶ Deactivate **User Customization of toolbars**.

### Disabling Access to Developer Tools

To disable access to the developer tools, add the following custom preference.

For general instructions on adding custom preferences, see [Set Advanced User Preferences for the Browser \(see page 335\)](#).

<b>Mode</b>	pref
<b>Custom preference</b>	devtools.toolbox.host

<b>Type</b>	String
<b>Value</b>	(leave the value field empty)

## Disabling Crash Reports

To disable crash reports, add the following three custom preferences.

For general instructions on adding custom preferences, see [Set Advanced User Preferences for the Browser](#) (see page 335).

<b>Mode</b>	pref
<b>Custom preference</b>	datareporting.policy.dataSubmission
<b>Type</b>	Boolean
<b>Value</b>	false
<b>Mode</b>	pref
<b>Custom preference</b>	datareporting.healthreport.upload
<b>Type</b>	Boolean
<b>Value</b>	false
<b>Mode</b>	pref
<b>Custom preference</b>	toolkit.telemetry
<b>Type</b>	Boolean
<b>Value</b>	false

## SSL/TLS Error with Firefox in Appliance Mode

### Symptom

Firefox on IGEL Linux 5.07.100 warns of an SSL/TLS error in appliance mode that does not occur in normal window mode. The error code is `ssl_error_unsupported_version`. This does not happen on IGEL Linux 5.06.x.

### Problem

You cannot connect to the affected HTTPS service.

### Solution

As a workaround you can instruct Firefox to ignore issues with SSL/TLS versions:

1. In IGEL Setup, go to **System > Firmware Customization > Custom Commands > Base Commands**
2. Enter the following command into the **After Session Configuration** input field:

```
echo "clearPref(\"security.tls.version.min\");" >> /services/fbrw/  
firefox/firefox.cfg
```

There is also an IGEL Linux private build that addresses this issue.

## Browser Cannot Download Files

### Symptom

You are trying to view or download a file with the browser, but you get error messages instead.

### Problem

The browser has no permissions for the file path you have selected for download. This is because the Firefox browser is being guarded by AppArmor for security reasons.

### Solution

Check whether one of the following possibilities for downloading files is applicable/available:

- Storage hotplug device (USB flash drive) which is mounted to `/media/[device name]` or `/userhome/media/[device name]`  
For hotplug storage configuration, see Storage Hotplug.
- Network drive which is mounted to `/mnt/[folder name]`
- Folder `/userhome` in the local file system; not persistent

## Some PDFs are not opened by Firefox

### Symptom

When opening some PDFs from the Internet, the Mozilla Firefox browser opens a new window or tab, but fails to display the PDF contents.

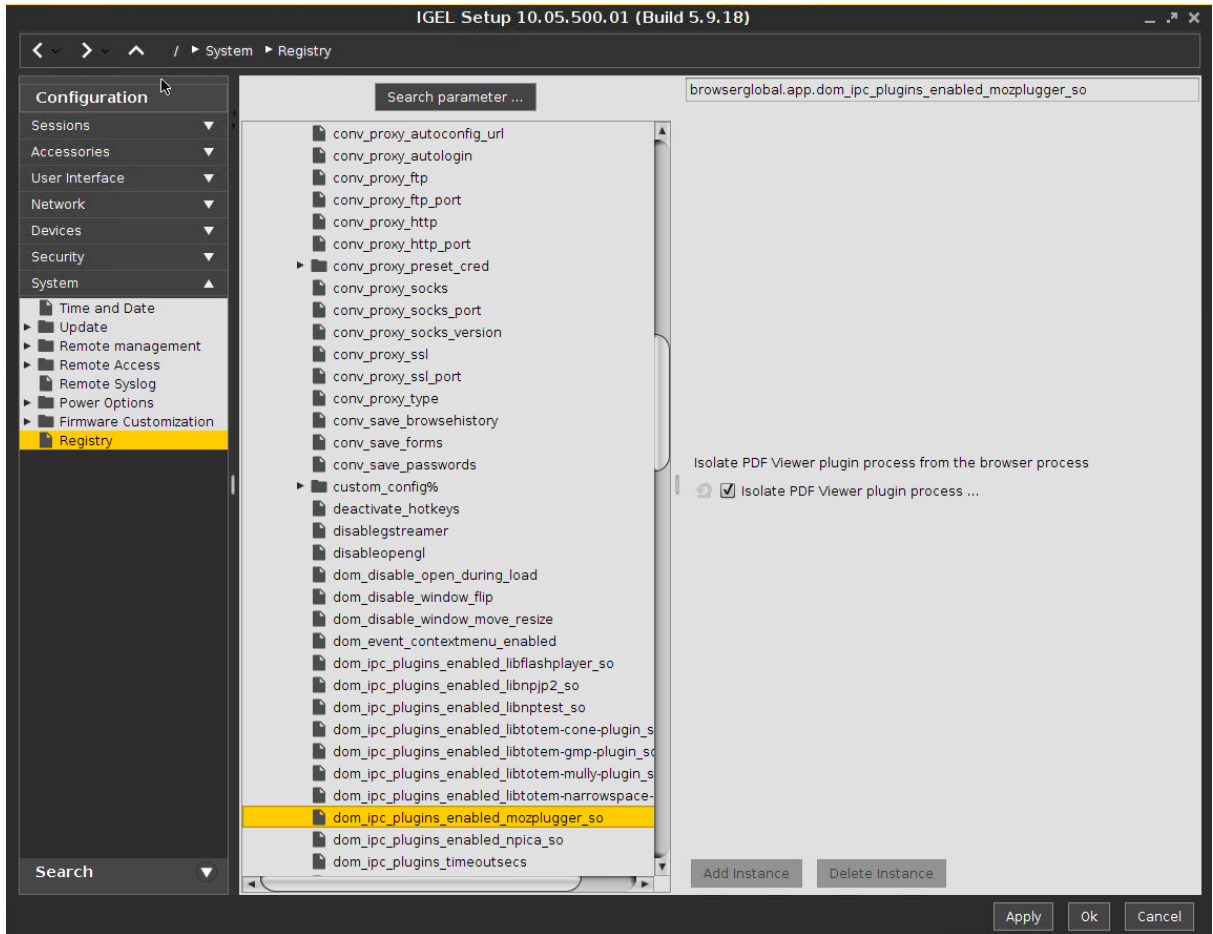
### Problem

This can be due to a malfunction of the mozplugger Firefox component.

### Solution

Disable mozplugger. Firefox will download the PDF document and open it with a local application (*IGEL Linux* 5.07.100 or newer):

1. Go to **System > Registry** in *IGEL Setup*.
2. Use **Search Parameter ...** to find the parameter  
`browserglobal.app.dom_ipc_plugins_enabled_mozplugger_so`.
3. Check **Completely disable mozplugger**.
4. Confirm the setting with **Apply** or **OK**.
5. Restart Firefox.



## Can I Install Firefox Extensions?

### Question

Can Firefox extensions be installed?

### Answer

The installation of Firefox extensions is not possible. This applies to any version of both IGEL Linux v5.x and IGEL OS.



## System

- [Resetting a Device with Unknown Administrator Password \(see page 346\)](#)
- [Custom Boot Commands Are Still Active after Factory Reset \(see page 348\)](#)
- [How to Show the Boot Mode of IGEL OS \(see page 349\)](#)
- [Disabling Features to Reduce Firmware Size \(see page 350\)](#)
- [Fabulatech USB Redirection Server Component \(see page 351\)](#)
- [Which Features of IGEL OS Will Be Affected If the UMS Is Down? \(see page 352\)](#)

## Resetting a Device with Unknown Administrator Password

### Symptom

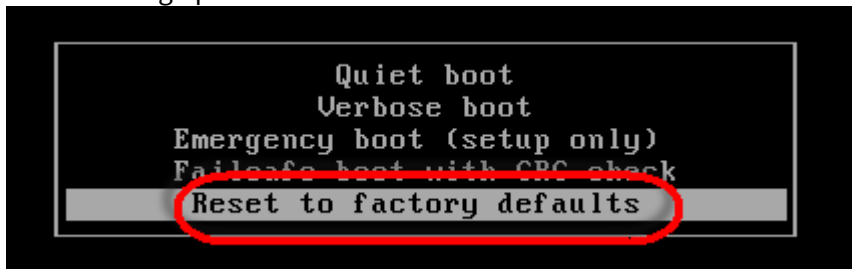
An administrator password has been set on IGEL OS (via **Setup > Security > Password > Administrator**) but it has been lost.

### Problem

The local setup is not accessible without the password. Also, resetting the device to factory defaults seems impossible.

### Solution

- Change the administrator password using IGEL UMS via **Setup > Security > Password > Administrator Administrator**
  - or
  - Reset the device using IGEL UMS via **Devices > Other commands > Reset to Factory Defaults** in the UMS menu.
  - or
  - Reset the thin client locally using a reset to defaults key provided by IGEL (as described below):
1. Press the [ESC] key repeatedly in rapid succession while the device is booting. This will bring up the boot menu.



2. Choose **Reset to factory defaults** and press [Enter].

The following will be displayed:

```

Loading "German" keyboard layout.
The Administrator Password is required to reset the terminal settings.
If your Administrator Password is not available anymore, enter 3 times return.

Password:
Authentication: Authentication failure
Password:
Authentication: Authentication failure
Password: _

```

3. Press [Enter] three times without supplying a password.

```

Enter <n> if you want to reboot and type the password again.
Enter <c> if you want to continue and reset the terminal settings
in case your Administrator Password is not available anymore.
<r> or <c>: _

```

4. Enter [c] and press [Enter].  
The software will then display a terminal key. Make a note of it, as you need it for requesting the reset to defaults key from IGEL.
5. Request a reset to defaults key from IGEL. Write an email to [license@igel.com](mailto:license@igel.com)<sup>36</sup> containing
  - your terminal key
  - your email address as registered with IGEL support
  - your company address
  - your phone number

IGEL will send you the reset to defaults key.

6. In the current session, enter [e] and press [Enter] to shut down the device.
7. On receiving the reset to defaults key, repeat steps 1 to 3 to boot the device with the same terminal key.
8. Enter [c] and press [Enter]. You will be prompted to enter the reset to defaults key.

```

3) enter now the "reset to defaults key", you got by the service team
for "terminal key" 39099-53083-29440-48934 and firmware version 5.03.100.01
(you have only three tries to enter the key correctly!) :
1. Try: _

```

9. Enter the reset to defaults key. Enter `yes` and press [Enter] to confirm resetting the client. All local thin client settings will be lost.

Should you enter the wrong key or mistype the key you will have to resume from step 1.

---

<sup>36</sup> <mailto:license@igel.com>

## Custom Boot Commands Are Still Active after Factory Reset

### Symptom

You have reset your device to factory defaults, but the custom boot commands are still active.

### Problem

After a factory reset, the following settings will still be available:

- `boot_id`
- `uptime_total`
- `product`
- `force_Legacy`
- The bootreg entry `Splash` will be set to `1`

### Solution

You can delete these settings manually with the following command:

1. Open a local terminal and log in as root.
2. Enter the following command to delete the settings:  

```
bootreg delete /dev/igfdisk boot_cmd
```

For further information about custom boot commands, see [Custom Boot Command](#).

## How to Show the Boot Mode of IGEL OS

To check the boot mode of IGEL OS, proceed as follows:

1. Open the IGEL start menu.
2. Click the i-icon.  
The **About** dialog opens.
3. Find the parameter **Boot Mode** under the **Hardware** section.  
Example: BIOS

## Disabling Features to Reduce Firmware Size

### Symptom

You want to update your IGEL OS firmware to a higher release version, but the firmware update requires more disk space. Updating devices with less disk space than required leads to an error: `Not enough space on local drive`.

### Problem

The size of the new firmware

- with all enabled software features included
- with the NVIDIA graphics driver
- with the Firefox profile partition
- possibly with a custom partition
- possibly with custom wallpaper and bootsplash

exceeds the device's disk space (e.g. 2 GB).

### Solution

Disable firmware features not needed for productive operation to reduce the size of the firmware:

1. In IGEL Setup, go to **System > Firmware Customization > Features**.
2. Disable features not needed in your environment.
3. Activate your settings with **Apply** or **OK**.
4. Reboot the device.
5. Update the device.

 Use profiles with UMS in order to deactivate features on a group of devices.

## Fabulatech USB Redirection Server Component

### Issue

For Fabulatech USB Redirection, a special Fabulatech server component must be installed on the *Citrix* or RDP server (USB for Remote Desktop IGEL Edition). More detailed information on the function can be found on the [Fabulatech partner site](#)<sup>37</sup>. On this site the server component is available for download.

Current versions are (as of 2017-05-29):

- USB for Remote Desktop IGEL Edition Ver.3.1.5
- USB for Remote Desktop IGEL Edition V5 Ver. 5.0.2

### Problem

Which version is suitable for which IGEL Linux device?

Release notes of IGEL Linux only name the version of the *Fabulatech* client included but miss out the necessary server component version.

### Solution

- ▶ All Fabulatech clients version 3.x require server component version 3.x
- ▶ All Fabulatech clients version 5.x require server component version 5.x

So for IGEL Linux thin clients following requirements apply:

- IGEL Linux v4 devices up to current version 4.13.270 require server component version 3.x
- IGEL Linux v5 devices up to version 5.02.100 require server component version 3.x
- IGEL Linux v5 devices from version 5.03.100 and later require server component version 5.x
- IGEL Linux 10.x requires server component version 5.x.

---

<sup>37</sup> <http://www.usb-over-network.com/partners/igel/>

## Which Features of IGEL OS Will Be Affected If the UMS Is Down?

### Overview

In general, IGEL OS works independently of the Unified Management Suite (UMS). This includes, for instance, all remote desktop clients like Citrix, RDP, or VMware Horizon, and browsers.

Any configuration changes that are made via the UMS are stored on the device and thus remain stable when the UMS is down.

However, the Shared Workplace (SWP) feature and administration functions are affected by a UMS outage.

The following sections list the details.

### Productivity Features That Are Affected If the UMS Is Down

- Login via Shared Workplace (SWP); see Shared Workplace (SWP)

### Administration Functions That Are Affected If the UMS Is Down

- Configuration changes
- License Management
- Secure Shadowing
- Secure Terminal
- Universal Firmware Update
- Firmware Customizations
- Transfer of files to the device, including Custom Partitions
- Remote commands, such as Wake-on-LAN or restart



## Network

- [Configuring Open VPN Sessions \(see page 354\)](#)
- [Running the OpenVPN Client with a Preconfigured Configuration File \(see page 366\)](#)
- [Configuring Wi-Fi Network Roaming \(see page 368\)](#)
- [Connecting to a Wi-Fi Network with Hidden SSID \(see page 370\)](#)
- [Improving WiFi Connectivity \(see page 371\)](#)
- [Preventing Permanent Storage of Wireless Network Keys \(see page 375\)](#)
- [Using WPA Enterprise / WPA2 Enterprise with TLS Client Certificates \(see page 376\)](#)
- [IPv6 Settings \(see page 380\)](#)
- [Extended Logging With Syslog, Tcpdump and Netlog \(see page 384\)](#)
- [Making a Telnet Connection from IGEL Linux \(see page 398\)](#)
- [Configuring Dynamic DNS Updates via DDNS \(see page 399\)](#)
- [Changing the SMB protocol version \(see page 401\)](#)
- [How to Launch the Wireless Manager within IGEL OS when the Taskbar Is Hidden \(see page 402\)](#)

## Configuring Open VPN Sessions

This document describes how to configure the *OpenVPN* Client on *IGEL Linux*.

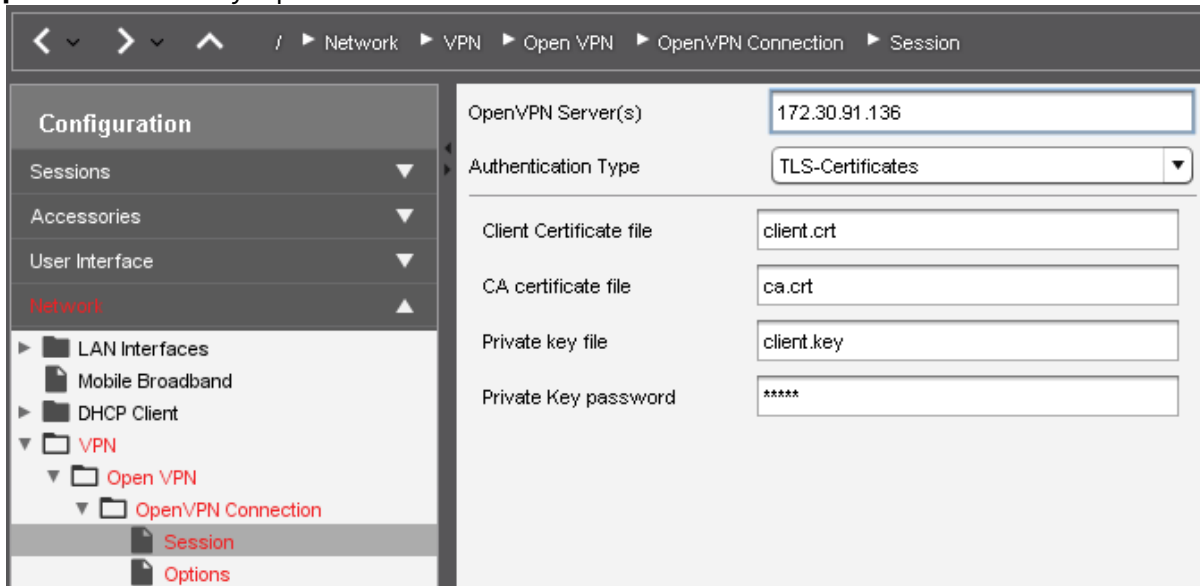
### Prerequisites

- A configured and running *OpenVPN* 2.x server
- Information about the *OpenVPN* server configuration (e.g. authentication method)
- A thin client with *IGEL Linux* 10.01.100 or newer
- The certificate and private key files for the client, along with the root certificate of the CA that signed the client and server certificates.
- Optionally, a Smartcard or eToken supported by *IGEL Linux*.  
To learn how to distribute keys and certificates to the thin clients, refer to the How-To document "[Securely Distributing Keys and Certificates \(see page 365\)](#)".

- 
- [Authenticating with TLS Certificates \(see page 355\)](#)
  - [Authenticating with Name/Password \(see page 356\)](#)
  - [Authenticating with Name/Password with TLS Certificates \(see page 357\)](#)
  - [Authenticating with Static Key \(see page 358\)](#)
  - [Options and TLS Options \(see page 359\)](#)
  - [DNS and Routing Options \(see page 360\)](#)
  - [Proxy \(see page 361\)](#)
  - [Checking the VPN Connection \(see page 362\)](#)
  - [Automatically Starting the VPN During Boot \(see page 363\)](#)
  - [Further Information \(see page 364\)](#)
  - [Securely Distributing Keys and Certificates for OpenVPN \(see page 365\)](#)

## Authenticating with TLS Certificates

1. Go to **Network > VPN > OpenVPN** and create a new connection.
2. In the **Session** section for the new connection, enter the name or public IP address of the **OpenVPN Server**.
3. Select **TLS-Certificates** as the **Authentication Type**.
4. Select the client certificate as the **Client Certificate file**.
5. Select the root certificate of the CA as the **Certificate Authority (CA) file**.
6. Select the client's private key as the **Private Key file**. Enter the passphrase in **Private Key password** if the key is protected with one.



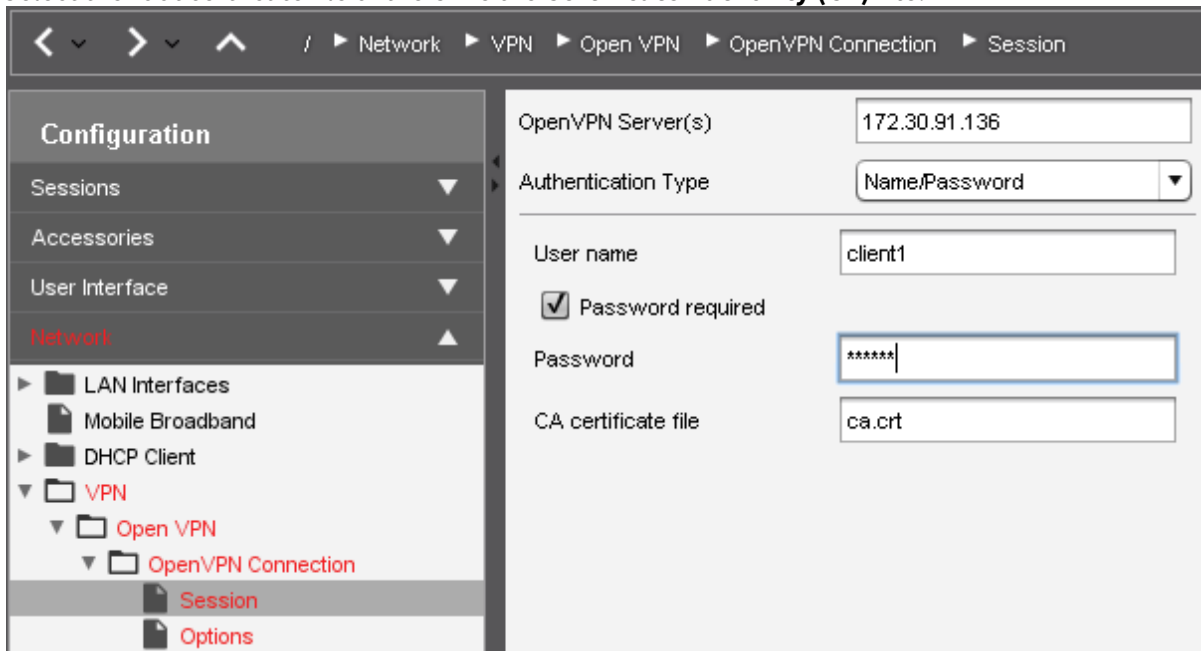
OpenVPN Server(s)	172.30.91.136
Authentication Type	TLS-Certificates
Client Certificate file	client.crt
CA certificate file	ca.crt
Private key file	client.key
Private Key password	*****

7. Click an icon for the newly created session (e.g. in the Start Menu) to initiate the connection.

**i** If a PKCS12 file is available, which includes the client certificate, the certificate authority and the private key, then you just need to enter the PKCS12 file name in the three corresponding fields. The advantage is that you only have to roll out one single file instead of three different files.

## Authenticating with Name/Password

1. Go to **Network > VPN > OpenVPN** and create a new connection.
2. In the **Session** section for the new connection, enter the name or public IP address of the **OpenVPN Server**.
3. Select **Name/Password** as the **Authentication Type**.
4. Enter the **Username**. If you leave this field blank the user will be prompted for the Username when connecting.
5. Check **Password required**.
6. Enter the **Password**. If you leave this field blank the user will be prompted for the password when connecting.
7. Select the root certificate file of the CAAs the **Certificate Authority (CA) file**.



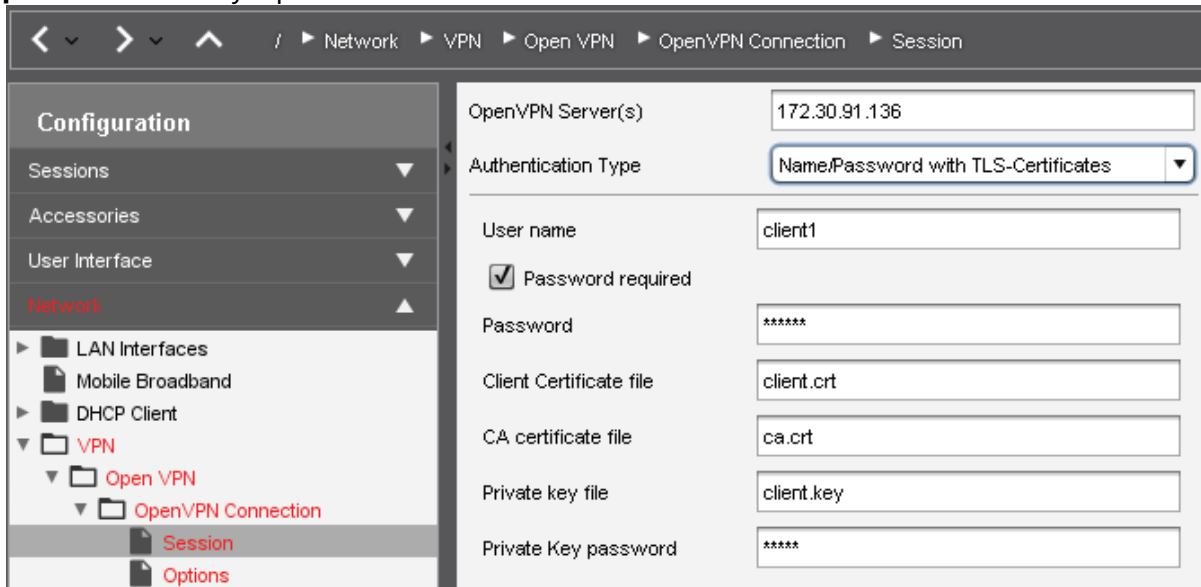
The screenshot shows the IGEL Network configuration interface. The breadcrumb navigation at the top reads: / > Network > VPN > Open VPN > OpenVPN Connection > Session. On the left, a sidebar menu shows the following structure: Configuration (Sessions, Accessories, User Interface, Network), Network (LAN Interfaces, Mobile Broadband, DHCP Client, VPN, Open VPN, OpenVPN Connection, Session, Options). The main configuration area is titled 'OpenVPN Connection' and contains the following fields:

OpenVPN Server(s)	172.30.91.136
Authentication Type	Name/Password
User name	client1
<input checked="" type="checkbox"/> Password required	
Password	*****
CA certificate file	ca.crt

8. Click an icon for the newly created session (e.g. in the Start Menu) to initiate the connection.

## Authenticating with Name/Password with TLS Certificates

1. Go to **Network > VPN > OpenVPN** and create a new connection.
2. In the **Session** section for the new connection, enter the name or public IP address of the **OpenVPN Server**.
3. Select **Name/Password with TLS-Certificates** as the **Authentication Type**.
4. Enter the **Username**. If you leave this field blank the user will be prompted for the username when connecting.
5. Check **Password required**.
6. Enter the **Password**. If you leave this field blank the user will be prompted for the password when connecting.
7. Select the client certificate as the **Client Certificate file**.
8. Select the root certificate of the CA as the **Certificate Authority (CA) file**.
9. Select the client's private key as the **Private Keyfile**. Enter the passphrase in **Private Key password** if the key is protected with one.



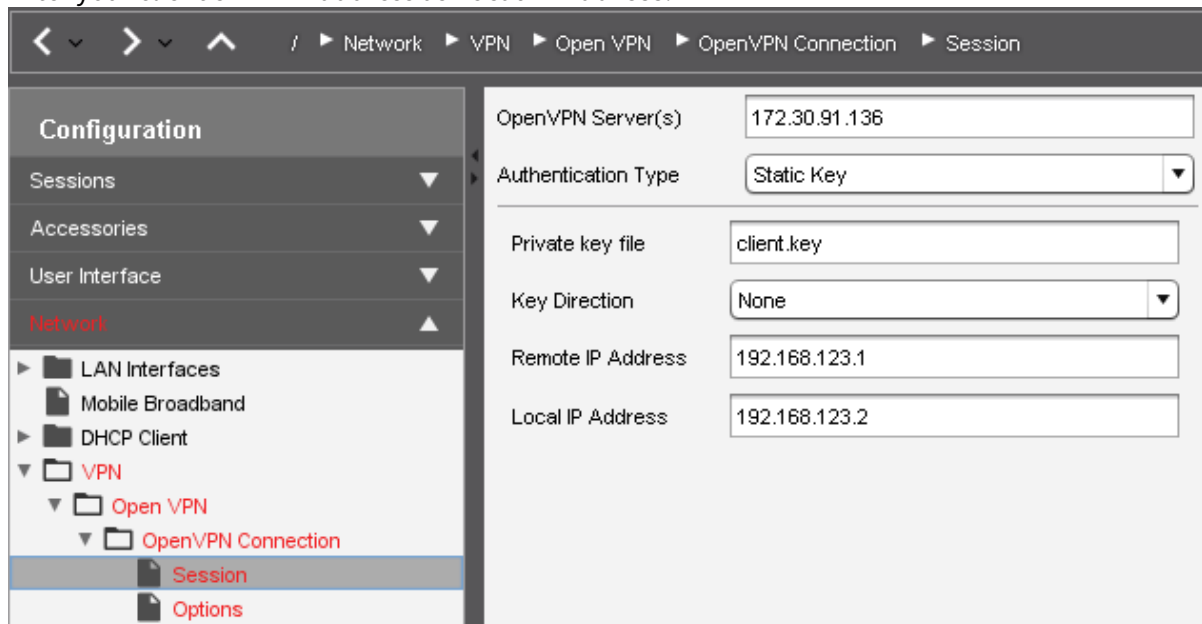
OpenVPN Server(s)	172.30.91.136
Authentication Type	Name/Password with TLS-Certificates
User name	client1
<input checked="" type="checkbox"/> Password required	
Password	*****
Client Certificate file	client.crt
CA certificate file	ca.crt
Private key file	client.key
Private Key password	*****

10. Click an icon for the newly created session (e.g. in the Start Menu) to initiate the connection.

**i** If a PKCS12 file is available, which includes the client certificate, the certificate authority and the private key, then you just need to enter the PKCS12 file name in the three corresponding fields. The advantage is that you only have to roll out one single file instead of three different files.

## Authenticating with Static Key

1. Go to **Network > VPN > OpenVPN** and create a new connection.
2. In the **Session** section for the new connection, enter the name or public IP address of the **OpenVPN Server**.
3. Select **Static Key** as the **Authentication Type**.
4. Select the static key file as the **Private Key**.
5. Select **None** as the **Key Direction**.
6. Enter the server's VPN IP address as **Remote IP Address**.
7. Enter your client's VPN IP address as **Local IP Address**.



8. Click an icon for the newly created session (e.g. in the Start Menu) to initiate the connection.

## Options and TLS Options

### Options

Under **Network > VPN > OpenVPN > [Session Name] > Options**, you can set various options for the OpenVPN client. Usually, you can leave the default settings as they are. If the server uses compression, enable **Use LZO data compression**.

 When using a proxy, set **Protocol used for communication to the host** to **tcp-client**.

### TLS Options

Under **Network > VPN > OpenVPN > [Session Name] > TLS-Options**, you can set various TLS-related options. In particular, you can configure whether the **remote peer certificate** will be verified.

For details about these settings, refer to [Configuring Open VPN Sessions \(see page 354\)](#) or OpenVPN.

## DNS and Routing Options

By default, OpenVPN automatically uses the server's settings for DNS and routing.

If you want to change these settings, go to **Network > VPN > Open VPN > [Session Name] > IPv4**. Here you can:

- Deactivate **Automatic DNS**
- Add **Extra nameserver(s)**
- Add **Extra search domains**
- Deactivate **Automatic Routes**
- Deactivate **VPN is the default route**

Additionally, you can enable three custom routes in **Network > VPN > Open VPN > [Session Name] > Route [0,1,2]**. For each enabled route you can configure:

- whether it is a **Network Route** or a **Host Route**
- **Network/Host IP**
- **Network Mask** (for Network Route only)
- Optional: **Gateway**
- Optional: **Metric** (a quality rating used for routing decisions, 0 being the best)



## Proxy


If you wish to configure a proxy for your VPN connection, go to **Network > VPN > OpenVPN > [Session Name] > Proxy**. Here you can configure:

- **Proxy Type: SOCKS** or **HTTP**, by default this is set to **None**
- **Proxy Address** and **Proxy Port**
- **Retry indefinitely when errors occur**

If you select the **HTTP** proxy type you can configure:

- **Proxy Username**
- **Proxy Password**

 When using a proxy, set **Options > Protocol used for communication to the host** to **tcp-client**.

 When experiencing issues with OpenVPN, read the messages in `/var/log/messages`, e.g. using the **System Log Viewer**.

## Checking the VPN Connection

As soon as a VPN connection is established, a lock icon with connected plugs is shown in the panel:



However, this only serves as an indicator. To be sure that the VPN connection really exists:

1. Open a **Local Terminal**.
2. Run the command `ifconfig`.
3. Check whether the output contains a `tun` device with an IP address from the private network.

```

Terminal
user@IGEL-000BCA050027:~$ ifconfig
eth0      Link encap:Ethernet  HWaddr 00:0b:ca:05:00:27
          inet addr:172.30.91.219  Bcast:172.30.255.255  Mask:255.255.0.0
          inet6 addr: fe80::20b:caff:fe05:27/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:1091674 errors:0 dropped:47 overruns:0 frame:0
          TX packets:125138 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:79070067 (79.0 MB)  TX bytes:58744380 (58.7 MB)
          Interrupt:105 Base address:0xa000

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:108954 errors:0 dropped:0 overruns:0 frame:0
          TX packets:108954 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:45078307 (45.0 MB)  TX bytes:45078307 (45.0 MB)

tun0      Link encap:UNSPEC  HWaddr 00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00
          inet addr:192.168.123.10  P-t-P:192.168.123.9  Mask:255.255.255.255
          UP POINTOPOINT RUNNING NOARP MULTICAST  MTU:1500  Metric:1
          RX packets:23080 errors:0 dropped:0 overruns:0 frame:0
          TX packets:48007 errors:0 dropped:74 overruns:0 carrier:0
          collisions:0 txqueuelen:100
          RX bytes:1266538 (1.2 MB)  TX bytes:63784736 (63.7 MB)

user@IGEL-000BCA050027:~$

```

4. Additionally, check whether you can ping the VPN server's private IP address.

## Automatically Starting the VPN During Boot

**i** If you want to update the firmware via the VPN, you need to enable **Autostart During Boot**. Enabling Autostart of the control application in **Network > VPN > OpenVPN > [session name]** is not adequate!

1. Go to **Network > VPN > OpenVPN**.
2. Check **Enable Autostart During Boot**.
3. Select one of the configured sessions.
4. Click **Set Auto**.

The session will be marked in the **Auto** column.

Click **Set Auto** again to deactivate autostarting the session.

**i** The system will prompt you for key pass phrases or the eToken/smartcard PIN if necessary.

## Further Information

Further information about *OpenVPN* can be found in

- the [OpenVPN how-to](#)<sup>38</sup> and
- the [OpenVPN manual page](#)<sup>39</sup>

maintained by the *OpenVPN* project.

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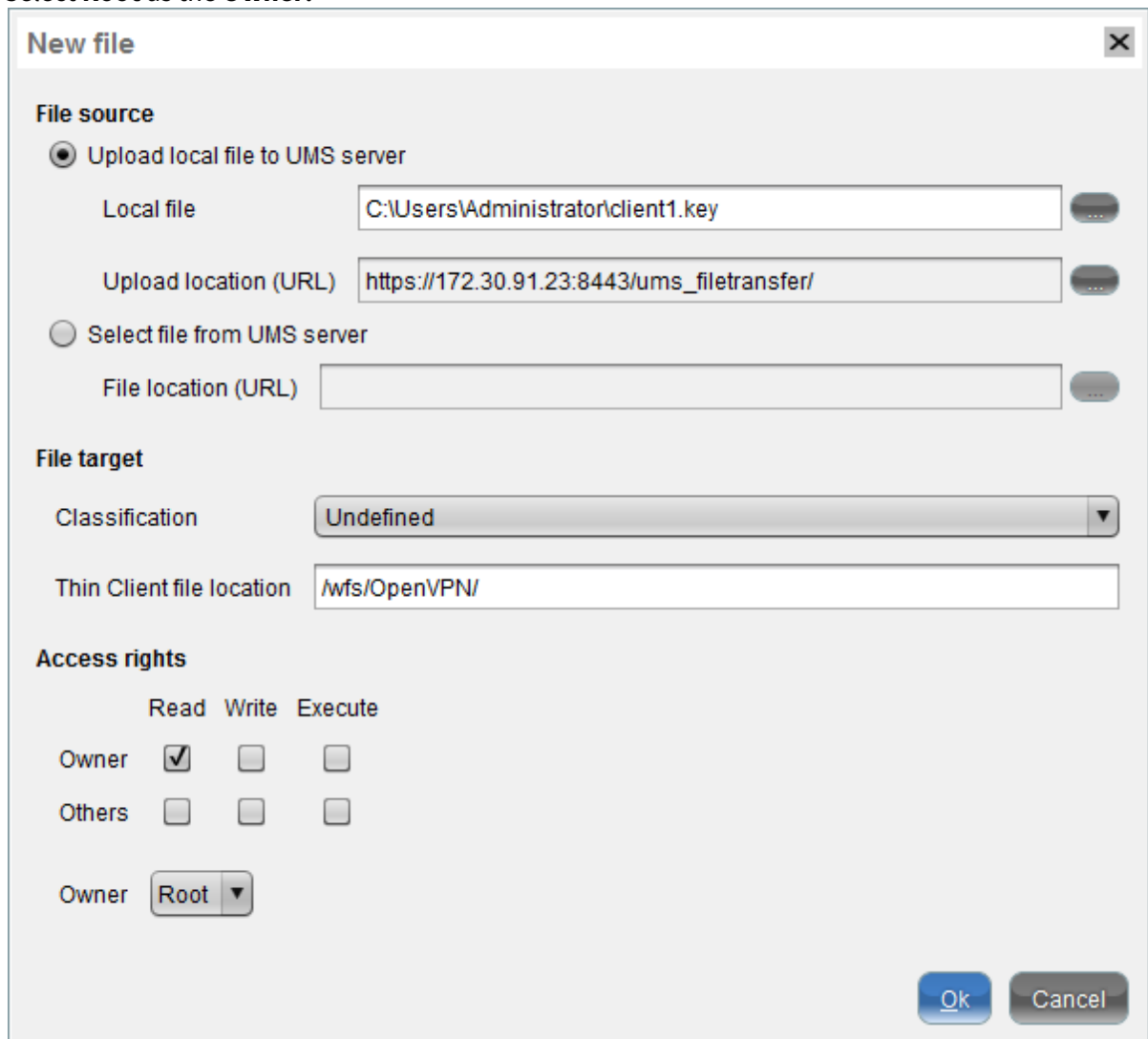
<sup>38</sup> <https://openvpn.net/index.php/open-source/documentation/howto.html>

<sup>39</sup> <https://openvpn.net/community-resources/reference-manual-for-openvpn-2-0/>

## Securely Distributing Keys and Certificates for OpenVPN

Use the file distribution mechanism in the *Universal Management Suite (UMS)* to securely distribute keys and certificates to the thin clients:

1. Select **Undefined** as the **Classification**.
2. Enter `/wfs/OpenVPN/` as the **thin client file location**.
3. Enable the **Read** permission for the **Owner** exclusively, and uncheck all remaining permissions.
4. Select **Root** as the **Owner**.



**New file** [X]

**File source**

Upload local file to UMS server

Local file: C:\Users\Administrator\client1.key

Upload location (URL): https://172.30.91.23:8443/ums\_filetransfer/

Select file from UMS server

File location (URL):

**File target**

Classification: Undefined

Thin Client file location: /wfs/OpenVPN/

**Access rights**

	Read	Write	Execute
Owner	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Others	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Owner: Root

Ok Cancel

## Running the OpenVPN Client with a Preconfigured Configuration File

### Solution Based on Experience from the Field

This article provides a solution that has not been approved by the IGEL Research and Development department. Therefore, official support cannot be provided by IGEL. Where applicable, test the solution before deploying it to a productive environment.

This article describes a basic solution for getting the built-in OpenVPN client running with a preconfigured configuration file. This is an alternative to using the Setup for configuration.

### Environment

This article is valid for the following environment:

- IGEL OS 10 or higher
- OpenVPN server

### Setting up an OpenVPN Connection with a Preconfigured Configuration File

1. In the UMS Console, open the context menu on **Files** and select **New File**.
2. Select your `.ovpn` file in the file system.
3. In the **File target** section, under **Devices file location**, enter `"/wfs/"`.
4. Click **Ok**.  
The file is uploaded to the UMS.
5. Assign the file object to your device by clicking the "+" symbol in the **Assigned objects** area (upper right).
6. Create a profile with a suitable name, e. g. "OpenVPN Connection".
7. In the profile, go to **System > Firmware Customization > Custom Commands > Network**.
8. In the **Final network command** field, enter the following code, replacing `example.ovpn` with the correct filename:

```
while ;; do if [ -z $(pgrep openvpn) ]; then echo "openvpn is not running"; openvpn --config /wfs/example.ovpn --auth-user-pass <(echo -e $(zenity --forms --text="Enter your VPN credentials" --add-entry=Username --add-password=Password --title=OpenVPN) | sed 's/|/\n/'); else echo "openvpn is running"; fi; sleep 1; done &
```

9. Click **Save** to save the profile.
10. Assign the profile to your device by clicking the "+" symbol in the **Assigned objects** area.
11. Reboot the device.  
After reboot, you should see a login window for OpenVPN.

12. Enter your OpenVPN credentials.

If the login was successful, a **Network connecting** popup appears briefly. No other indicator is shown. You can disconnect only by rebooting the device.

If the login has failed, the login window reappears.

## Removing the OpenVPN Connection

- ▶ To remove the OpenVPN connection from the settings, unassign the profile from the device and reboot it.

## Configuring Wi-Fi Network Roaming

### Issue

Different wireless network instances have been configured for a mobile device. The device should switch over to the strongest network automatically.

### Solution

Parameters to configure Wi-Fi roaming options can be found in the IGEL registry (**Setup > System > Registry**). These settings should be changed by experts only.

- Parameters for better control of Wi-Fi roaming capabilities with access points that share the same SSID:

**network.interfaces.wirelesslan.device0.lock\_initial**

Default: `false`

If `true`, the device will stick to the access point it is connected to even if candidates with better signal quality are present.

Setting this parameter to `true` is a last resort for problems that are caused by too much roaming.

**network.interfaces.wirelesslan.device0.bgscan.module**

Default: `default` (Preserving the unpacted NM's behaviour)

Possible values:

`default` : No background scanning is done.

`simple` : The Wi-Fi module tries to scan for a potentially better signal in the background.

**bgscan.module** `simple` provides following options:

**network.interfaces.wirelesslan.device0.bgscan.simple.signal\_strength** (default: `-45 dBm`)

This defines a threshold that determines which of the following two parameters shall be effective:

**network.interfaces.wirelesslan.device0.bgscan.simple.short\_interval** (default: `30 s`)

Interval between background scans (in seconds) if the actual signal level of the currently connected access point is worse than `signal_strength`.

**network.interfaces.wirelesslan.device0.bgscan.simple.long\_interval** (default: `300 s`)

Interval between background scans (in seconds) if the actual signal level of the currently connected access point is better than `signal_strength`.



 If parameter **lock\_initial** is `true` , it is recommended to set **bgscan.module** to `none` .

- Parameters to control Wi-Fi roaming between Wi-Fi networks with different SSIDs:

**network.interfaces.wirelesslan.device0.mssid\_check\_interval** (default: `10 s` )

The interval in seconds between checking if automatic roaming might be necessary. This includes detecting that a connection has been lost and a new one should be established.

**network.interfaces.wirelesslan.device0.mssid\_quality\_threshold** (default: `20` )

If the current connection's quality percentage is below this value, scanning will be performed to find a potentially better network.

**network.interfaces.wirelesslan.device0.mssid\_quality\_difference\_threshold** (default: `40` )

A candidate for automatic roaming is only considered if its quality percentage is this much better than the current connection's quality.

**network.interfaces.wirelesslan.device0.mssid\_previously\_used\_threshold** (default: `55` )

During boot: If the previously used SSID's quality percentage is above this threshold, it is preferred.

**network.interfaces.wirelesslan.device0.mssid\_user\_selection** (default: `false` )

If `true` , the user can initiate roaming to a network via the Wi-Fi tray icon's context menu (must be enabled).

If automatic roaming shall not interfere with the user's choice, the following values are appropriate:

**network.interfaces.wirelesslan.device0.mssid\_quality\_threshold** = `0`

**network.interfaces.wirelesslan.device0.mssid\_quality\_difference\_threshold** = `101`

**network.interfaces.wirelesslan.device0.mssid\_previously\_used\_threshold** = `0`

## Connecting to a Wi-Fi Network with Hidden SSID

### Symptom

The device does not connect to a wireless network with hidden SSID.

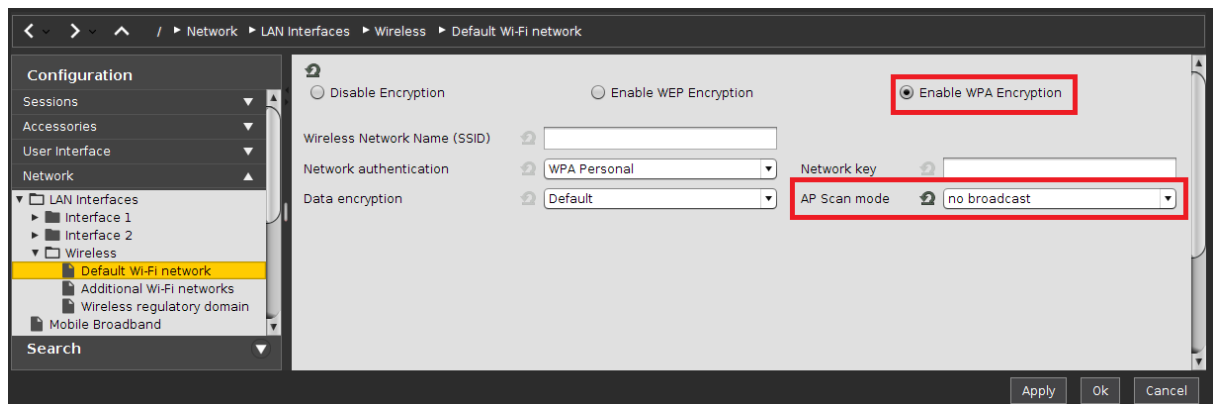
### Problem

An option in the device's network configuration is missing.

### Solution

If you need to configure a hidden access point, proceed as follows:

1. Start IGEL Setup or open the device configuration dialog in the UMS.
2. Go to **Network > LAN Interfaces > Wireless > Default Wi-Fi network** (or **Additional Wi-Fi networks** depending on your configuration).
3. Choose **Enable WPA Encryption**.
4. Set parameter **AP Scan mode** to "no broadcast".
5. Click **Apply** or **Ok** to save the settings.



## Improving WiFi Connectivity

### Problem

Your WiFi connection is unstable, or weak, or both.

### Environment

- UDC with IGEL Linux v5??? or IGEL OS??? or higher???
- UD Pocket IGEL Linux v5??? or IGEL OS??? or higher???

### Possible Causes and Solutions

There are many circumstances and parameters which influence the quality of a device's WiFi connection. To find a suitable solution to your problem, check out the following collection of possible causes and suggested solutions, workarounds and hints for debugging.

#### Several Access Points (APs) Are Using the Same Channel

If more than one Access Points visible to the thin client are using the same WiFi channel, interference issues may arise.

- ▶ Reconfigure the Access Point (AP) in question to use different channels.

#### Roaming within One Network (Same SSID)

When the device is configured to roam within its network, it tries to make sure that it is using the strongest/nearest Access Point (AP) within its network. Dependent on the given situation, it might be feasible to disable or to optimize roaming.

See also [Configuring Wi-Fi Network Roaming](#) (see page 368).

#### Avoid Roaming

- ▶ In the Setup, go to **System > Registry > network > interfaces > wirelesslan > device0 > lock\_initial** (Registry key: `network.interfaces.wirelesslan.device0.lock_initial`) and activate **Avoid roaming within the same network**.

 If roaming is deactivated, **System > Registry > network > interfaces > wirelesslan > device0 > bgscan > module** should be set to **none**.

### Select the Access Point with the Best Signal

With the following setting, the thin client selects the Access Point that emits the best signal when the device starts up.

► In the Setup, go to **System > Registry > network > interfaces > wirelesslan > device0 > bssid** (Registry key: `network.interfaces.wirelesslan.device0.bssid`) and enter `bestsignal` in the **BSSID** field.

### Automatic Roaming

Automatic roaming is feasible if the device is moved around frequently, and several Access Points are available.

In the following example, the device is configured to start scanning for another Access Point 10 seconds after the signal of the current Access Point has dropped below -78 db, while a routine scan is executed every 60 seconds, :

1. In the Setup, go to **System > Registry > network > interfaces > wirelesslan > device0 > bgscan > module** (Registry key: `network.interfaces.wirelesslan.device0.bgscan.module`) and select **simple**.
2. Set **System > Registry > network > interfaces > wirelesslan > device0 > bgscan > module > simple > long\_interval** (Registry key: `network.interfaces.wirelesslan.device0.bgscan.module.simple.long_interval`) to 60.
3. Set **System > Registry > network > interfaces > wirelesslan > device0 > bgscan > module > simple > short\_interval** (Registry key: `network.interfaces.wirelesslan.device0.bgscan.module.simple.short_interval`) to 10.
4. Set **System > Registry > network > interfaces > wirelesslan > device0 > bgscan > module > simple > signal\_strength** (Registry key: `network.interfaces.wirelesslan.device0.bgscan.module.simple.signal_strength`) to -78.

### 40 MHz Bandwidth in the 2.4 GHz Band

With some Access Points, it may be feasible to disable the 40 MHz bandwidth in the 2.4 GHz band.

► In the Setup, go to **System > Registry > network > interfaces > wirelesslan > device0 > driver > cfg80211 > cfg80211\_disable\_40mhz\_24ghz** (Registry key: `network.interfaces.wirelesslan.device0.driver.cfg80211.cfg80211_disable_40mhz_24ghz`) and deactivate **Disable 40 MHz channel bandwidth in 2.4 GHz band**.

### High Throughput Option

In some environments, the high throughput functionality built into the driver may not produce optimal results. You can disable this functionality and check if the connection has improved.

► In the Setup, go to **System > Registry > network > interfaces > wirelesslan > device0 > driver > disable\_ht** (Registry key: `network.interfaces.wirelesslan.device0.driver.disable_ht`) and deactivate **Disable HT**.

## 2.4 GHz Band Only

In some environments, it might be better to use only the 2.4 GHz band.

► In the Setup, go to **System > Registry > network > interfaces > wirelesslan > device0 > band** (Registry key: `network.interfaces.wirelesslan.device0.band`) and select **2.4 GHz**.

If one or more alternative WiFi networks (SSIDs) are configured, do the following for each alternative SSID:

► In the Setup, go to **System > Registry > network > interfaces > wirelesslan > device0 > alt\_ssid[number] > band** (Registry key: `network.interfaces.wirelesslan.device0.alt_ssid[number].band`) and select **2.4 GHz**.

## Frame Aggregation

It might be helpful to disable the frame aggregation feature of IEEE 802.11n.

► Disable frame aggregation on your Access Point (AP).

**i** On your Access Point, this feature may have a different name. Also note that IGEL cannot give a guarantee that the Access Point will function properly after the suggested configuration changes.

## WiFi Driver Scans And Selects Access Point

By default, the WPA supplicant initiates scanning and the selection of an Access Point. You can change this behavior and assign this task to the driver.

1. In the Setup, go to **System > Registry > network > interfaces > wirelesslan > device0 > wpa > ap\_scan** (Registry key: `network.interfaces.wirelesslan.device0.wpa.ap_scan`) and select **WLAN driver initiates scanning and AP selection**.
2. Restart the thin client.

## Whitelist of BSSIDs

You can restrict the number of Access Points to be scanned by creating a whitelist. This whitelist contains only the BSSIDs of those Access Points that the device should scan.

In the Setup, go to **System > Registry > network > interfaces > wirelesslan > device0 > bssid\_whitelist** (Registry key: `network.interfaces.wirelesslan.device0.bssid_whitelist`) and enter the BSSIDs of those Access Points that should be scanned, separated by whitespaces.

## Debugging

If none of the methods described above work, you can create a log file and send it to the IGEL Support Team.

1. In the Setup, go to **System > Registry > network > interfaces > wirelesslan > device0 > wpa > debug** (Registry key: `network.interfaces.wirelesslan.device0.wpa.debug`) and select **very verbose**.
2. Restart the thin client.
3. Send the file `/tmp/wpa_debug.all` to the IGEL Support Team.

## Preventing Permanent Storage of Wireless Network Keys

This document describes how to prevent users from storing wireless network keys/passwords for **Wireless Manager** on the endpoint device.

1. In Setup, go to **System > Registry**.
2. Go to the `network.applet.wireless.allow_storing_credentials` parameter.
3. Uncheck **Allow permanently storing credentials**, which is checked by default.
4. Click **Apply**.

This will affect the **Wireless Manager** dialogs for wireless networks with the network authentication methods in their variants requiring passwords:

- WPA Personal
- WPA Enterprise
- WPA2 Personal
- WPA2 Enterprise

In particular, users will not have check boxes labeled **Permanently store identity and password** or **Permanently store network key** available.

## Using WPA Enterprise / WPA2 Enterprise with TLS Client Certificates

This document describes how to use UMS to configure Wi-Fi connections on IGEL OS with WPA Enterprise / WPA2 Enterprise and TLS client certificates.

There are two options for supplying client certificates and keys to devices:

### Via SCEP (NDES)

SCEP allows the automatic provisioning of client certificates via an SCEP server and a certification authority (CA).

Learn how to configure it, using How-To [Certificate Enrollment and Renewal with SCEP \(NDES\)](#) (see page 465).

### Via Files Served from UMS

You need:

- a client certificate in PEM (base64) format
- a client private key (needs to be passphrase-protected) in PEM (base64) format

Alternatively,

- a PKCS#12 file containing both client certificate and private key (needs to be passphrase-protected).

**i** In both cases, SCEP and files from UMS, the device needs to have a working Ethernet or Wi-Fi connection to the SCEP server or the UMS first, so that it can fetch the necessary certificates before it can connect to the target Wi-Fi.

- 
- [Deploying Client Certificates and Keys](#) (see page 377)
  - [Configuring the Network Interface](#) (see page 378)



## Deploying Client Certificates and Keys

To deploy client certificates and keys via UMS, follow these steps for the client certificate and client private key files (or the PKCS#12 files containing both):

1. In the **UMS Console** navigation tree, right-click **Files** and select **New file** from the context menu. The **New file** dialog opens
2. Under **File source**, use the file chooser to choose the file as the **Local file**.
3. Under **File target**, leave the classification as **Undefined**.
4. Set the **Thin Client file location** to `/wfs/wpa-tls/`
5. Under **Access rights**, set check **Read** and **Write** for the **Owner** and none for **Others**.
6. Set the **Owner** to **Root**.
7. Click **OK** to upload the file.
8. Drag the file icon onto a thin client or thin client directory in order to assign the file.

## Configuring the Network Interface

This describes how to configure the Wi-Fi interface.

**i** In both cases, SCEP and files from UMS, the device needs to have a working Ethernet or Wi-Fi connection to the SCEP server or the UMS first, so that it can fetch the necessary certificates before it can connect to the target Wi-Fi.

### Using SCEP (NDES)

1. In Setup go to **Network > LAN Interfaces > Wireless**.
2. Check **Activate Wireless Interface**.
3. Go to **Default WiFi-network**.
4. Select **Enable WPA Encryption**.
5. Enter the **Wireless Network Name (SSID)**.
6. Select **WPA Enterprise** or **WPA2 Enterprise** according to your preferences.
7. Set **EAP Type** to **TLS**  
or set **EAP Type** to **PEAP** and **Auth Method** to **TLS**.

**i** IGEL OS supports both EAP-TLS and PEAP-EAP-TLS. Choose one that is supported by your infrastructure.

8. Leave **Validate Server Certificate** enabled.
9. Enter the path to a **CA Root Certificate** if you use a CA other than [those supported by IGEL OS](#) (see [page 485](#)).
10. Check **Manage Certificates with SCEP (NDES)**.
11. Click **Save**.

### Using Certificate and Key Files

1. In Setup go to **Network > LAN Interfaces > Wireless**.
2. Check **Activate Wireless Interface**.
3. Go to **Default Wi-Fi network**.
4. Select **Enable WPA Encryption**.
5. Enter the **Wireless Network Name (SSID)**.
6. Select **WPA Enterprise** or **WPA2 Enterprise** according to your preferences.
7. Set **EAP Type** to **TLS**  
or set **EAP Type** to **PEAP** and **Auth Method** to **TLS**

**i** IGEL OS supports both EAP-TLS and PEAP-EAP-TLS. Choose one that is supported by your infrastructure.

8. Leave **Validate Server Certificate** enabled. Enter the path to a **CA Root Certificate** if you use a CA other than [those supported by IGEL OS](#) (see [page 485](#)).

9. Enter the path to the **Client Certificate** file in PEM (base64) format, e.g. `/wfs/wpa-tls/client.crt`.  
Leave this field blank if you use a PKCS#12 file containing both certificate and private key.
10. Enter the path to the **Private Key** file in PEM (base64) format.  
If you use a PKCS#12 file containing both certificate and private key, enter its path here.
11. Specify the **Identity** to be used if your key/certificate contains more than one entry.
12. Enter the **Private Key Password**.
13. Click **Save**.

## IPv6 Settings

*IGEL Linux version 5.07.100* or newer and *IGEL Linux version 10.01.100* or newer offer new options for configuring network interfaces for IPv6.

### Application Scenario

IGEL devices cannot so far communicate with the UMS via IPv6. Therefore, the major application scenario for IPv6 is as follows:

- Devices still receive their IPv4 configuration and potentially *IGEL*-specific DHCP options from a DHCPv4 server.
- Most of the settings are received from the *UMS* via IPv4.
- Only the default options are requested from the DHCPv6 server. These are as follows:
  - IPv6 address
  - nameservers
  - DNS search list.
- Regarding DNS, only IPv6 nameserver addresses should be delivered (in router advertisements or DHCPv6 options). The resolver should be able to use these for retrieving AAAA records and also A records if necessary.
- Clients and servers use IPv6 if they are prepared to do so.

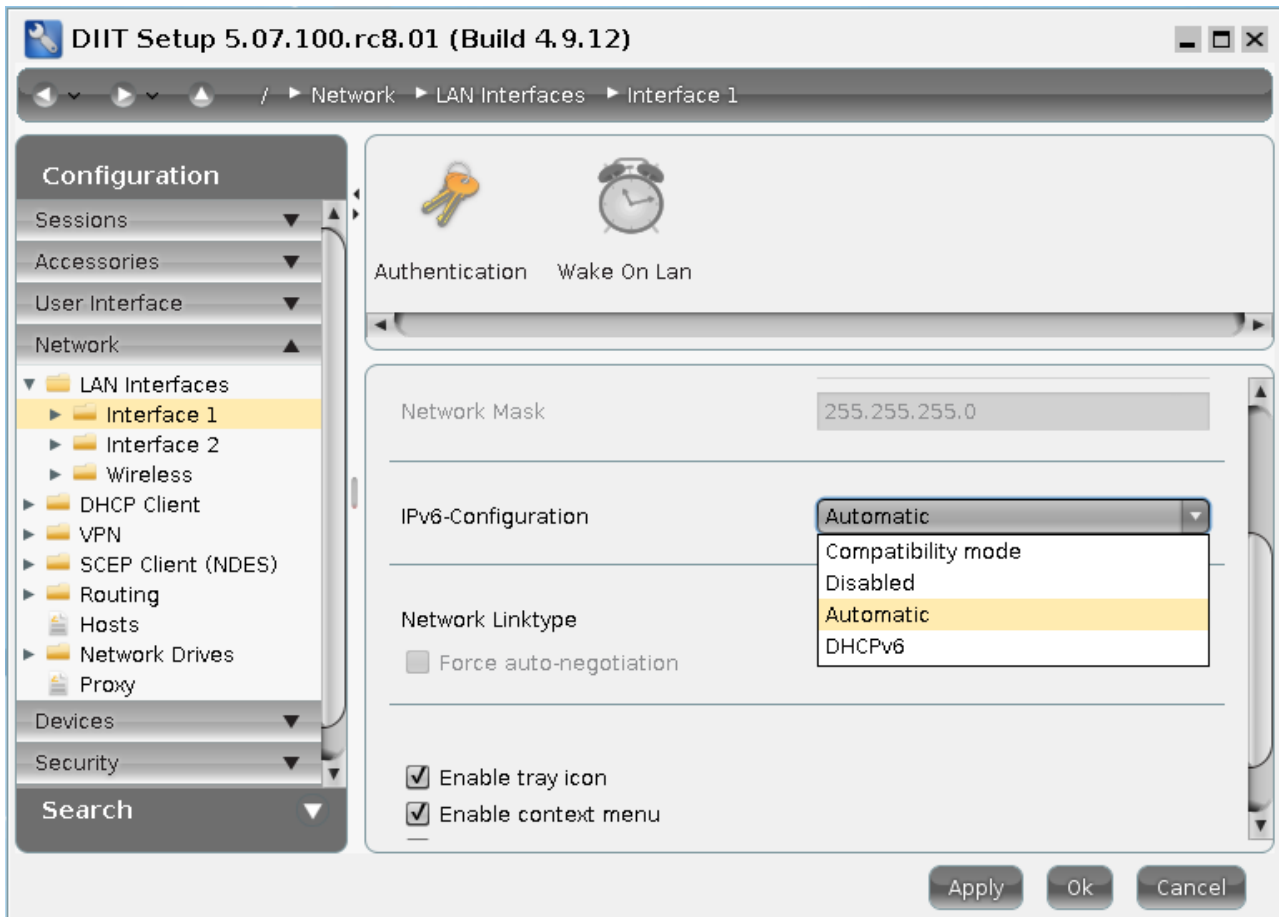
Examples:

- An NTP server (**System > Time and date > NTP time server**) can be specified as an IPv6 address or as a name for which the DNS has only an AAAA record available.
- Similarly, in a web browser session, IPv6 will be used when the DNS has AAAA records available for servers.

- 
- [Available Configurations](#) (see page 381)
  - [Timeouts in Automatic Configuration](#) (see page 383)

## Available Configurations

IPv6 support is configured by network interface in **Network > LAN Interfaces:**




The following configurations are available:

Value	Effect
<b>Compatibility mode</b>	Equivalent to former versions of IGEL Linux: NetworkManager ignores the device, but the kernel performs some basic configuration. In particular, it assigns an IPv6 link local address to the device.
<b>Disabled</b>	IPv6 is disabled completely.
<b>Automatic</b>	The device tries to perform an IPv6 stateless or stateful autoconfiguration based on router advertisements. Depending on the router advertisements, this involves DHCPv6 (see RFC 4861).

**DHCPv6**

This option is supported by NetworkManager. It can be used when a DHCPv6 server is available but no router advertisements. Routing has to be configured by other means. In most cases **Automatic** will be preferable.


 In all cases IPv4 is configured in the usual way.

## Timeouts in Automatic Configuration

If **Automatic** is selected, there is a configurable timeout for the dual stack mode. This is the time that the system waits after the first of the stacks IPv4 or IPv6 has completed its configuration for the other stack to complete its own configuration. After this time has elapsed, it runs the scripts that depend on the network being up. The default timeout value is 15 seconds.

The timeout can be configured with the following parameters in **System > Registry**:

Parameter	Device
<code>network.interfaces.ethernet.device0.dual_stack_timeout</code>	First ethernet device
<code>network.interfaces.ethernet.device1.dual_stack_timeout</code>	Second ethernet device
<code>network.interfaces.wirelesslan.device0.dual_stack_timeout</code>	Wireless LAN device

 Use the **Search parameter ...** function with the string `dual_stack` to find these parameters quickly.

## Extended Logging With Syslog, Tcpdump and Netlog

The IGEL OS **Registry** offers a number of extended logging options that can help customers, Support and PreSales debug system and network issues.

For instructions on how to send log files to the IGEL support team via the UMS, see [Sending Device Log Files to IGEL Support](#) (see page 783).

- [Debuglog Partition](#) (see page 385)
- [Syslog](#) (see page 387)
- [Tcpdump](#) (see page 388)
- [Netlog](#) (see page 391)



## Debuglog Partition


Logfiles can get very large quite fast. This is why they are stored in a separate partition. It is mounted at `/debuglog`.

### Enabling and Configuring the Debuglog Partition

The partition is enabled and configured in the **Registry**:

IGEL Setup > System > Registry		
> <b>Enable debuglog partition</b>	debug.tools.log_partition.enabled	enabled / <u>disabled</u>
Enables the debuglog partition.		

IGEL Setup > System > Registry		
> <b>Size of debuglog partition in MiB</b>	debug.tools.log_partition_size	50 ... 500 / <u>100</u>

 Resizing the debuglog partition will delete its contents!

### Debuglog Partition Contents

Depending on which logging options you enable (see the following topics), you may find the following files in the debuglog partition:

- Syslog
  - `messages` (the current syslog)
  - `messages[1-9].gz` (compressed and rotated syslog)
- Ethtool
  - `netlog-ethtool-[device].log`
- Ping
  - `netlog-host-[0-9]-ping.log` (ping log)
  - `netlog-host-[0-9]-ping[n].log.gz` (compressed and rotated ping log)
- Ifconfig
  - `netlog-ifconfig-[device].log`
- Netstat

- `netlog-netstat.log` (netstat log)
- `netlog-netstat[n].log.gz` (compressed and rotated netstat log)
- Socket Status
  - `netlog-socket_status.log` (socket status log)
  - `netlog-socket_status[n].log.gz` (compressed and rotated socket status log)
- Tcpdump
  - `tcpdump[0-3]_capture_current[n]` (tcpdump capture)
  - `tcpdump[0-3]_capture-[n].pcap.{lzo,gz,bzip2,xz}` (compressed and rotated tcpdump captures)
- Tcpdump triggered by an error
  - `ERROR_[timestamp]/tcpdump[0-3]_capture-[n].pcap.{lzo,gz,bzip2,xz}` (compressed and preserved tcpdump captures)

## Syslog

It is possible to send all syslog messages that are written to `/var/log/message` (IGEL Linux *version 5.10.250 and versions 5.11.x*) or to the systemd journal (IGEL Linux *version 10.01.100*) to the debuglog partition as well. The logfile will be rotated and compressed as needed. This preserves the log if the thin client crashes, and logs from several previous boots.

Configure it in the **Registry**:

<b>IGEL Setup &gt; System &gt; Registry</b>		
<b>&gt; Enable syslog log to debuglog partition</b>	debug.tools.syslog0.enabled	true/ <u>false</u>
<b>IGEL Setup &gt; System &gt; Registry</b>		
<b>&gt; Number of Rotate Files</b>	debug.tools.syslog0.num_rotate_files	<u>2</u> ... 9
Number of files to be kept while rotating.		
<b>IGEL Setup &gt; System &gt; Registry</b>		
<b>&gt; Logfile rotate size in MiB</b>	debug.tools.syslog0.rotate_size	<u>2</u> , 4, 8, 16
Rotate when the size of the compressed file reaches this size in MiB.		

## Tcpdump

Tcpdump will help you debug network issues by capturing packets from up to 4 individual network interfaces.

**i** Using the [Netlog](#) (see page 391) facility, it is possible to copy capture files to a subdirectory, triggered by an error in another log, so the captures before and after the error will be preserved for your analysis.

**i** You can use Wireshark on an external system for analyzing capture files.

[Find out more about Tcpdump from its homepage<sup>40</sup>.](#)

<b>IGEL Setup &gt; Registry</b>		
<b>&gt; Resolve addresses/ports to names</b>	<code>debug.tools.tcpdump[0-3].address_resolution</code>	enabled / <u>disabled</u>
<b>IGEL Setup &gt; Registry</b>		
<b>&gt; Compression Method</b>	<code>debug.tools.tcpdump[0-3].compression</code>	<u>lzop</u> , gzip, bzip2, xz
The compression method affects file size as well as system performance while compressing. The default lzop method is relatively light on the CPU.		
<b>IGEL Setup &gt; Registry</b>		
<b>&gt; Interface for tcpdump logging</b>	<code>debug.tools.tcpdump[0-3].interface</code>	user editable string / <u>eth0</u>
<b>IGEL Setup &gt; Registry</b>		
<b>&gt; Number of Rotate Files</b>	<code>debug.tools.tcpdump[0-3].rotate_files</code>	<u>3</u> ... 10
Number of files to be kept while rotating.		
<b>IGEL Setup &gt; Registry</b>		

<sup>40</sup> <http://www.tcpdump.org>

<b>&gt; Only Log Package Headers</b>	<code>debug.tools.tcpdump[0-3].only_headers</code>	enabled / <a href="#">disabled</a>
<b>IGEL Setup &gt; Registry</b>		
<b>&gt; Enable promisc tcpdump logging</b>	<code>debug.tools.tcpdump[0-3].promisc</code>	enabled / <a href="#">disabled</a>
Enable promiscuous mode on the network interface to also capture packets not intended for this host.		
<b>IGEL Setup &gt; Registry</b>		
<b>&gt; Logfile rotate size in MiB</b>	<code>debug.tools.tcpdump[0-3].rotate_size</code>	<a href="#">10</a> , 15, 20, 25, 30, 40
Rotate when the size of the uncompressed file reaches this size in MiB.		
<b>IGEL Setup &gt; Registry</b>		
<b>&gt; Logfile rotate time in s</b>	<code>debug.tools.tcpdump[0-3].rotate_time</code>	0 / user editable integer
Time in seconds after which the logfile is rotated and compressed. If set to 0 no time-based rotation happens.		
<b>IGEL Setup &gt; Registry</b>		
<b>&gt; Additional Parameters for tcpdump</b>	<code>debug.tools.tcpdump[0-3].tcpdump_additional_parameters</code>	user editable string
Use with care.		
<b>IGEL Setup &gt; Registry</b>		
<b>&gt; Enable tcpdump</b>	<code>debug.tools.tcpdump[0-3].tcpdump_enabled</code>	enabled / <a href="#">disabled</a>
<b>IGEL Setup &gt; Registry</b>		
<b>&gt; tcpdump filter expression</b>	<code>debug.tools.tcpdump[0-3].tcpdump_filter</code>	user editable string

Tcpdump filter expression. For the expression syntax, see the [pcap-filter\(7\)](#)<sup>41</sup> manpage.

---

<sup>41</sup> <http://www.tcpdump.org/manpages/pcap-filter.7.html>

## Netlog

The netlog facility combines the following network diagnosis tools:

- `ethtool`
- `ifconfig`
- `netstat`
- `ping`
- `ss` (socket status)

It can also trigger `tcpdump`.

IGEL Setup > Registry		
> <b>Enable netlog logging</b>	debug.tools.netlog.enabled	enabled / <u>disabled</u>
IGEL Setup > Registry		
> <b>period between netlog logs in s</b>	debug.tools.netlog.period	<u>1</u> , 5, 10, 20, 30, 60, 120
Ping logging is not affected by this and uses its own timing.		

- [Ethtool](#) (see page 392)
- [Ifconfig](#) (see page 393)
- [Netstat](#) (see page 394)
- [Ping](#) (see page 395)
- [Socket Status \(ss\)](#) (see page 397)

## Ethtool

Ethtool is the standard Linux utility for getting diagnostic information about wired Ethernet devices and their drivers.

<b>IGEL Setup &gt; Registry</b>		
<b>&gt; Disable ethtool logging</b>	debug.tools.netlog.ethtool.disabled	true / <u>false</u>
By default Ethtool logging is included in Netlog logging. However, you can disable it here.		
<b>IGEL Setup &gt; Registry</b>		
<b>&gt; Log only if ethtool output changes</b>	debug.tools.netlog.ethtool.log_on_changes_only	<u>true</u> / false
Log only if ethtool output changes (on bootup there will always be at least one log entry)		
<b>IGEL Setup &gt; Registry</b>		
<b>&gt; Number of Rotate Files</b>	debug.tools.netlog.ethtool.num_rotate_files	<u>2</u> ... 4
Keep up to this number of rotated files (also compressed), the current log not included (which is limited to 600 lines)		
<b>IGEL Setup &gt; Registry</b>		
<b>&gt; Logfile rotate size in MiB</b>	debug.tools.netlog.ethtool.rotate_size	<u>2</u> , 4, 6
Rotate when the size of the uncompressed file reaches this size in MiB.		



## Ifconfig

### Ifconfig

Apart from configuring network devices, ifconfig also gives diagnostic information such as RX bytes, TX bytes and dropped packets.

<b>IGEL Setup &gt;</b>		
<b>&gt; Disable ifconfig logging</b>	debug.tools.netlog.ifconfig.disabled	true / <u>false</u>
By default Ifconfig logging is included in Netlog logging. However, you can disable it here.		
<b>IGEL Setup &gt;</b>		
<b>&gt; Log only if ifconfig output changes</b>	debug.tools.netlog.ifconfig.log_on_changes_only	no, <u>error_counter</u> , all
<ul style="list-style-type: none"> <li>• <b>no</b>: log on every netlog run</li> <li>• <b>error_counter</b>: log only if an error counter or the address changes</li> <li>• <b>all</b>: log on every change of ifconfig output</li> </ul>		
<b>IGEL Setup &gt;</b>		
<b>&gt; Number of Rotate files</b>	debug.tools.netlog.ifconfig.num_rotate_files	<u>2</u> ... 4
Keep up to this number of rotated files (also compressed), the current log not included (which is limited to 600 lines).		
<b>IGEL Setup &gt;</b>		
<b>&gt; Logfile rotate size in MiB</b>	debug.tools.netlog.ifconfig.rotate_size	<u>2</u> , 4, 6
Rotate when the size of the uncompressed file reaches this size in MiB.		
<b>IGEL Setup &gt;</b>		
<b>&gt; Trigger tcpdump log</b>	debug.tools.netlog.ifconfig.trigger_tcpdump_save	true / <u>false</u>
Trigger the saving of tcpdump logs if an error counter increases or if the IP address changes.		

## Netstat

Netstat displays a variety of network statistics for the local machine.

<b>&gt; Disable netstat logging</b>	debug.tools.netlog.netstat.disabled		true / <u>false</u>
By default <code>netstat -s</code> logging is included in Netlog logging. However, you can disable it here.			
<b>&gt; Number of Rotate files</b>	debug.tools.netlog.netstat.num_rotate_files		2 ... 4
Keep up to this number of rotated files (also compressed), the current log not included (which is limited to 600 lines).			
<b>&gt;Logfile rotate size in MiB</b>	debug.tools.netlog.netstat.rotate_size		2, 4, 6
Rotate when the size of the uncompressed file reaches this size in MiB.			
<b>&gt;Log only if triggered</b>	debug.tools.netlog.netstat.trigger_log		<u>net_error_changes</u> , net_changes, ifconfig_changes, ethtool_changes, no_trigger
<ul style="list-style-type: none"> <li>• <b>net_error_changes</b>: log if ethtool output changes or ifconfig error counter or address changes</li> <li>• <b>net_changes</b>: log if ethtool or ifconfig output changes</li> <li>• <b>ifconfig_changes</b>: log if ifconfig output changes</li> <li>• <b>ethtool_changes</b>: log if ethtool output changes</li> <li>• <b>no_trigger</b>: log on every netlog run</li> </ul>			

## Ping

<b>IGEL Setup &gt;</b>		
<b>&gt; Enable ping check</b>	debug.tools.netlog.ping_host[0-9].enabled	true / <u>false</u>
Log only if any one of the configures pings [0-9 fails.]		
<b>IGEL Setup &gt;</b>		
<b>&gt; Log only if ping fails</b>	debug.tools.netlog.ping_host[0-9].log_only_on_error	true / <u>false</u>
Log only if any one of the configures pings [0-9 fails.]		
<b>IGEL Setup &gt;</b>		
<b>&gt; Number of Rotate Files</b>	debug.tools.netlog.ping_host[0-9].num_rotate_files	<u>2</u> ... 4
Keep up to this number of rotated files (also compressed), the current log not included (which is limited to 600 lines).		
<b>IGEL Setup &gt;</b>		
<b>&gt; Logfile rotate size in MiB</b>	debug.tools.netlog.ping_host0.rotate_size	<u>2</u> ... 4
Rotate when the size of the uncompressed file reaches this size in MiB.		
<b>IGEL Setup &gt;</b>		
<b>&gt; Trigger tcpdump save</b>	debug.tools.netlog.ping_host0.trigger_tcpdump_save	<u>2</u> ... 4
Trigger the saving of tcpdump logs if an error counter increases or if the IP address changes.		
<b>IGEL Setup &gt;</b>		
<b>&gt; Ping target</b>	debug.tools.netlog.ping_host0.ping_target	user-editable string
Target IP/hostname to ping (if none is given ping will be considered as disabled!)		
<b>IGEL Setup &gt;</b>		
<b>&gt; Time between pings</b>	debug.tools.netlog.ping_host0.ping_time	<u>1</u> , 5, 10, 30, 60, 120
Time between pings in seconds.		

<b>IGEL Setup &gt;</b>		
<b>&gt; Type of ping</b>	debug.tools.netlog.ping_host0.type	icmp, http request, https request
<ul style="list-style-type: none"><li>• <b>icmp:</b> use normal ping command</li><li>• <b>http request:</b> send an http request (fails if no HTTP/*.* * OK answer is received)</li><li>• <b>https request:</b> send an https request (fails if no CONNECTED is returned by openssl)</li></ul>		

## Socket Status (ss)

### Socket Status (ss)

<b>IGEL Setup &gt;</b>		
<b>&gt; Disable socket status Logging</b>	debug.tools.netlog.socket_status.disabled	true / <a href="#">false</a>
By default socket_status logging is included in Netlog logging. However, you can disable it here.		
<b>IGEL Setup &gt;</b>		
<b>&gt; Number of Rotate Files</b>	debug.tools.netlog.socket_status.num_rotate_files	true / <a href="#">false</a>
Keep up to this number of rotated files (also compressed), the current log not included (which is limited to 600 lines).		
<b>IGEL Setup &gt;</b>		
<b>&gt; Logfile rotate size in MiB</b>	debug.tools.netlog.socket_status.rotate_size	true / <a href="#">false</a>
Rotate when the size of the uncompressed file reaches this size in MiB.		
<b>IGEL Setup &gt;</b>		
<b>&gt; Log only if triggered</b>	debug.tools.netlog.socket_status.trigger_log	<a href="#">ping_errors</a> , <a href="#">no_trigger</a>
<ul style="list-style-type: none"> <li>• <b>ping_errors</b>: log only if ping test fails</li> <li>• <b>no_trigger</b>: log on every netlog run</li> </ul>		

## Making a Telnet Connection from IGEL Linux

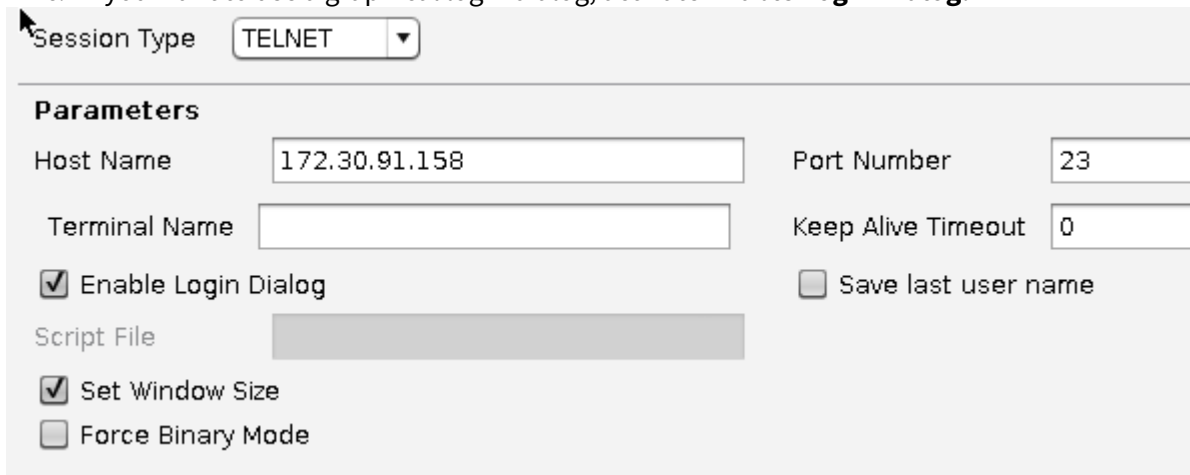
### Issue

You want to connect to a Telnet service and can't find a Telnet command on the device.

### Solution

Using Ericom Powerterm (Requires the Ericom Powerterm Firmware Feature):

1. In Setup, go to **Sessions > PowerTerm Terminal Emulation > PowerTerm Sessions**.
2. Create a new session.
3. Edit the session.
4. Under **Connection**, make the following settings:
  - a. Select **TELNET** as **Session Type**.
  - b. Enter an IP address or a name in **Host Name**.
  - c. If you want to use a graphical login dialog, activate **Enable Login Dialog**.



The screenshot shows the configuration interface for a PowerTerm session. At the top, the 'Session Type' is set to 'TELNET'. Below this, the 'Parameters' section contains the following fields and options:

Host Name	172.30.91.158	Port Number	23
Terminal Name		Keep Alive Timeout	0
<input checked="" type="checkbox"/> Enable Login Dialog		<input type="checkbox"/> Save last user name	
Script File			
<input checked="" type="checkbox"/> Set Window Size			
<input type="checkbox"/> Force Binary Mode			

5. Under **Desktop Integration** enter a **Session Name** and enable the desired **Starting Methods for the Session**.
6. Click **Apply** to save your settings or **OK** to save and exit.
7. Start the new session and enter your username and password.

## Configuring Dynamic DNS Updates via DDNS

### Issue

You want to register a device's IP address with your DNS server.

You are not using DHCP.

### Solution

Use the DDNS tools contained in *IGEL Linux*, which can be configured by Setup.

 This only works for BIND9 or other nameservers supporting TSIG, not for Microsoft Active Directory servers.

Distribute your nameserver's shared TSIG key with the UMS:

1. Create a **New File**.
2. Set the **Device Storage Path** to `/wfs/ddns`.
3. Enable **Read** permission for the **Owner** and disable all other permissions.
4. Set the **Owner** to **Root**.

Set up Dynamic DNS Registration:

1. Go to **Network > LAN Interfaces** in Setup.
2. Enable **Specify an IP Address**.
3. Enter an **IP Address** and **Network Mask**.
4. Enter a **Terminal Name**.
5. Check **Enable DNS**.
6. Enter a **Default Domain**.
7. Enter at least one **Nameserver** IP address.
8. Enable **Dynamic DNS Registration**.
9. Select **DNS** as **Dynamic DNS Registration Method**.
10. If the nameserver expects a TSIG key: Select the **TSIG key file**.  
Otherwise, leave the input field blank.
11. Click **Apply** or **OK** to confirm your settings.

Activate default interface (Ethernet)

---

Get IP from DHCP Server  
 Specify an IP Address

IP Address

Network Mask

---

Default Gateway  enable

Terminal Name

---

Enable DNS

Default Domain

Nameserver

Nameserver

---

Manually overwrite DHCP settings  
 Dynamic DNS Registration

Dynamic DNS Registration Method

TSIG key file for additional DNS authentication



## Changing the SMB protocol version

Depending on which Windows (Samba) server you are using, you will need a specific SMB protocol version.

**i** Due to security reasons, Microsoft recommends to disable SMB version 1.0 support on Windows ,so you need to switch to at least version 2.0 to be further able to access systems with disabled SMBV1.

IGEL Linux *version 10.04.100* and higher offer several SMB protocol versions.

To change the version setting:

1. In the IGEL Setup go to **System > Registry**.
2. Go to parameter `network.smbmount.smb_version`.
3. Select the appropriate **SMB protocol version**.  
Possible options:
  - 1.0
  - 2.0
  - 2.1
  - 3.0
4. Click **Save** or **Apply and send to thin client**.  
The windows shares are configurable at **IGEL Setup > Network > Network Drives > Windows Drive**.

## How to Launch the Wireless Manager within IGEL OS when the Taskbar Is Hidden

### Problem


The taskbar or system tray has been disabled for some reason (**User Interface > Desktop > Taskbar / Taskbar Items**; also **User Interface > Screenlock / Screensaver > Taskbar**). As a result, a systray icon for the Wireless Manager can't be accessed anymore, and the user can't manage wireless networks.

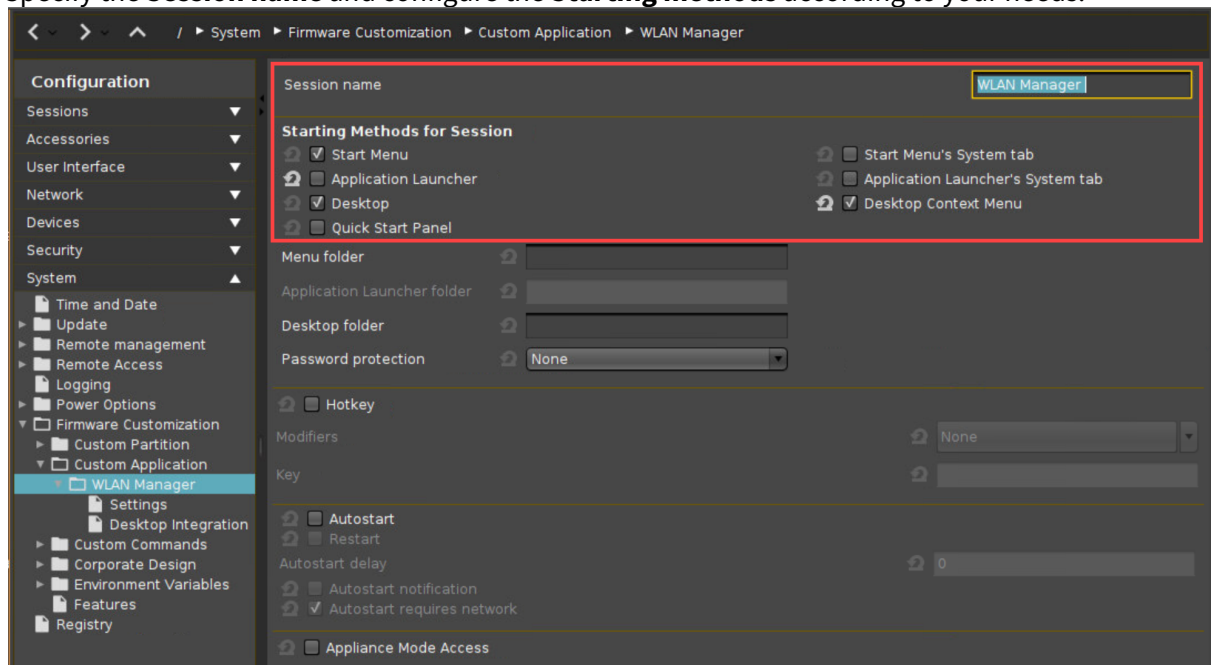
### Environment

- IGEL OS 10.06 or higher

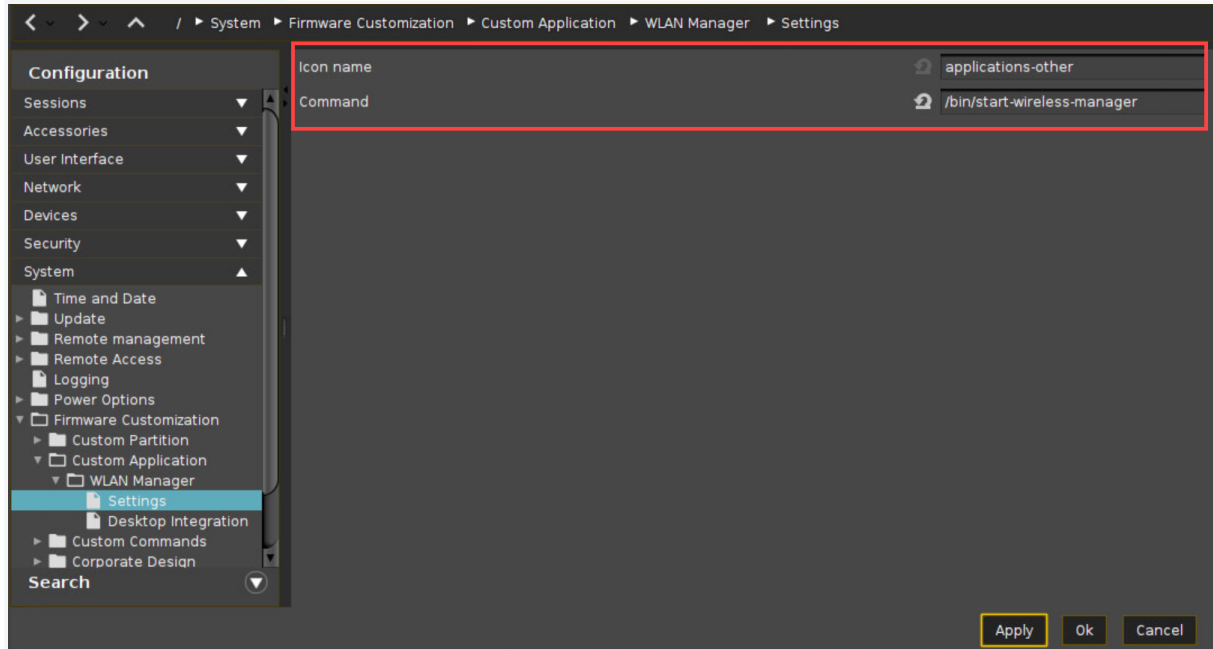
### Solution

You can configure the Wireless Manager as a custom application and define the way it can be launched.

1. Go to **Network > LAN Interfaces > Wireless** and check that the wireless interface and the Wireless Manager are enabled.
2. Go to **System > Firmware Customization > Custom Application** and click .
3. Specify the **Session name** and configure the **Starting methods** according to your needs.



- Under **Settings**, specify the **Icon name** and enter the following **Command**: `/bin/start-wireless-manager`



- Click **Apply** or **OK**.  
The Wireless Manager can now be launched via the configured starting methods.

## Security

- [Securing IGEL OS Endpoints](#) (see page 405)
- [Secure Shell \(SSH\) Access to IGEL OS with Keys](#) (see page 447)
- [Secure Terminal \(Telnet with TLS/SSL\)](#) (see page 453)
- [Secure Shadowing \(VNC with TLS/SSL\)](#) (see page 454)
- [Cherry eGK Channel Substitution](#) (see page 458)
- [Single Sign-on for the Browser Proxy](#) (see page 460)
- [Limiting the Number of Permitted Login Attempts](#) (see page 463)

## Securing IGEL OS Endpoints

This document describes settings for IGEL OS that will increase security.

It applies to the following types of devices:

- IGEL UD devices
- Devices which are temporarily converted by UD Pocket
- Devices which are permanently converted by IGEL OS Creator (OSC)

- 
- [Introduction](#) (see page 406)
  - [Setting Passwords](#) (see page 407)
  - [Keeping the System Up-To-Date](#) (see page 414)
  - [Disabling Access to Components](#) (see page 419)
  - [Minimizing the Attack Surface](#) (see page 424)
  - [Configuring Remote Access and Management](#) (see page 435)
  - [Wi-Fi and Bluetooth](#) (see page 443)
  - [Using UD Pocket for BYOD Devices](#) (see page 446)

## Introduction

This document describes various settings to make IGEL OS more secure. In general, the more of these settings you apply, the better device security will be. However, it is up to you to strike a balance between security and enabling your users to do their work. Some settings may even be inappropriate for your use case, e.g. if you use Bluetooth peripherals, it does not make sense to disable Bluetooth.

In order to configure multiple devices, put the relevant settings into a Universal Management Suite (UMS) master profile, which you can assign to any number of devices. For more information, see Master Profiles.

## Setting Passwords

You can restrict access to various system components by setting passwords.

- [Setting Local Passwords](#) (see page 408)
- [Password-Protecting Sessions and Accessories](#) (see page 409)
- [Using Screenlock](#) (see page 410)
- [Do Not Save Session Passwords](#) (see page 411)
- [Setting a UEFI Password](#) (see page 412)
- [Using Two-Factor Authentication \(2FA\)](#) (see page 413)

## Setting Local Passwords

### Rationale

Passwords protect the system against local changes. They restrict access to the Local Terminal, Setup, and to the rescue shells on the virtual consoles. The administrator password is also needed to reset the system to factory defaults.

These passwords are saved in a way (salted and hashed) that prevents them from being recovered from the local storage.

By default, no passwords are set on IGEL OS. Set at least an administrator password:

### Instructions

1. In IGEL Setup go to **Security > Password**.
2. In the **Administrator** area, check **Use Password**.
3. Enter a password twice when prompted.
4. Optional: If you want to grant unprivileged user access to IGEL Setup check **Use Password** in the **Setup user** area and enter a password twice when prompted.
5. Click **Apply**.

For configuration of the **User Account for Remote Access**, see [Using Secure SSH Settings \(see page 441\)](#).

Find further information in the IGEL OS manual under Password - Restrict Access to IGEL OS Components.



## Password-Protecting Sessions and Accessories

### Rationale

Sessions can be used to access corporate resources, while the accessories in IGEL OS can be used to make changes to the local system. If you do not want to disable certain sessions or accessories completely, you can set passwords to restrict access to them.

### Instructions

By default, sessions do not have passwords set. In IGEL Setup, you can set a password on the **Desktop Integration** page of a session or accessory.

To enable password protection:

1. In the Setup, go to the relevant **Desktop Integration** page. The path has the following pattern: **Sessions > [session type] > [session name] > Desktop Integration**.  
For accessories, go to **Accessories > [accessory name]**.
2. Set **Password Protection** to
  - **Administrator** to require the Administrator password, or
  - **User** to require the User password, or
  - **Setup User** to require the Setup User password.
3. Click **Apply**.

## Using Screenlock

### Rationale

Leaving a screen unlocked enables attackers to access the system with the logged-in user's privileges. Manual or automatic locking the screen with a password prevents such access.

### Instructions for Enabling Manual Locking

By default, there is no way for the user to manually lock the screen. To enable manual locking, follow these steps:

1. In the Setup, go to **User Interface > Screenlock / Screensaver**.
2. Do one or both of the following:
  - Activate the **Quick start panel** starting method to give the user a button for locking the screen manually.
  - Activate **Use hotkey** and set a combination of keys that lets the user lock the screen manually, e.g. [Ctrl+Shift+L].
3. Click **Apply**.

### Instructions for Automatic Locking

By default, the screensaver is started automatically after 5 minutes, but the screen is not locked with a password. To enable locking, follow these instructions:

1. Go to **User Interface > User Interface > Screenlock / Screensaver > Options**.
2. Activate **Start automatically**.
3. Set the **Timeout**, i.e. the number of minutes of user inactivity before the screensaver starts automatically.
4. As a password, select **User password** (see [Setting Local Passwords \(see page 407\)](#)) or a separate **Screenlock password** (and set one).
5. If applicable, activate **Allow administrator password** to allow the administrator to unlock the screen.
6. Click **Apply**.

## Do Not Save Session Passwords

### Rationale

Passwords for sessions should not be stored on the endpoint device.

### Instructions

- ▶ When configuring a session, on the login page, leave the **Password** field empty. The user will then be prompted interactively for the password.
- ▶ Wherever possible use [Two-Factor Authentication \(2FA\)](#) (see page 413).

## Setting a UEFI Password

### Rationale

In the UEFI settings you can modify very fundamental system properties, e.g. disable booting from USB. Access to these settings should be protected by a password.

### Instructions for IGEL Devices


- ▶ If UEFI is not enabled, see the instructions under UEFI Secure Boot Enabling Guides.

By default no UEFI password is set on IGEL UD devices. To set a password, do the following:

1. Hold down the [Del] key ([F2] key for UD2) while booting.  
The UEFI menu opens.
2. Using the arrow and return keys, go to **SCU**.  
The **Setup Utility** opens.
3. Using the arrow and return keys, go to **Security**.
4. Use the arrow keys to select **Set Supervisor Password**.
5. Hit [Return].
6. Enter the desired UEFI password and hit [Return]
7. Enter the same UEFI password again and hit [Return] twice.
8. Hit [F10] in order to save and exit.
9. Confirm **Exit Saving Changes?** by hitting [Return].  
The system boots, and the UEFI settings are now password-protected.

### Instructions for 3rd-Party Devices Converted with OS Creator (OSC)

- ▶ Refer to the instructions of your BIOS/UEFI vendor.

 Alternatively, try pressing [F12] (in general), [F10] (Intel devices), or [F9] (Hewlett-Packard devices) to access the BIOS/UEFI settings. If this does not work, try pressing [Del], [F1], or [F2] during booting.

## Using Two-Factor Authentication (2FA)

### Rationale

Two-factor authentication (2FA) combines two different factors to prove the user's identity, often a hardware device such as smartcard or smart token and a password or PIN. This improves protection against impostors, as they would have to gain both possession of the hardware device and knowledge of the password or PIN.

### Instructions

Use two-factor authentication with a smartcard or smart token where possible. IGEL OS supports this for the following sessions:

- [Smartcard authentication for sessions \(see page 507\)](#)
  - [Citrix Storefront \(see page 519\)](#)
  - [RDP Sessions \(see page 520\)](#)
  - [Horizon Sessions \(see page 521\)](#)
  - [Web browser \(see page 522\)](#)
- [\(Kerberos\) Passthrough Authentication \(see page 803\)](#)

## Keeping the System Up-To-Date

### Rationale

Software updates fix newly discovered vulnerabilities in IGEL OS and applications. This means that keeping up with updates is one of the most important measures in securing IGEL OS systems.

To start and configure updates, you can use IGEL Setup and/or the Universal Firmware Update feature of the Universal Management Suite (UMS).

The instructions described on this page use the Universal Firmware Update feature of the UMS. For defining a scheduled job, see the section "As a Job" in Assigning Updates; for configuring the update on a device, see Firmware Update.

### Instructions

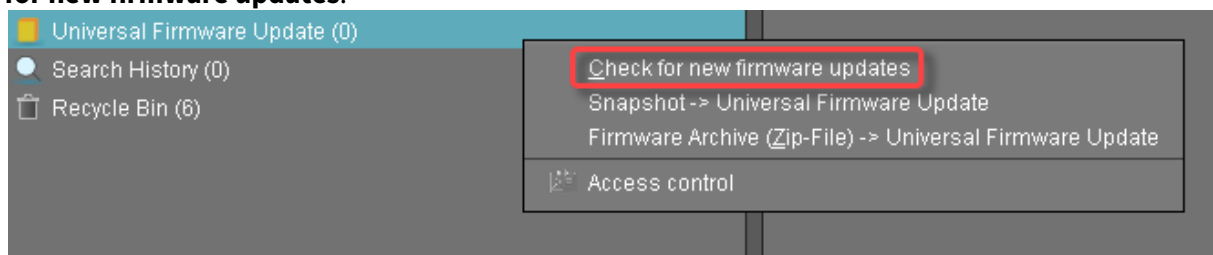
► To be notified of security-critical IGEL OS updates and to receive the IGEL Technical Newsletter, subscribe to IGEL communications on [www.igel.com](http://www.igel.com)<sup>42</sup>.

The upgrade procedure consists of the following steps:

- Getting the update from the IGEL download server
- Testing the update on one or a few devices
- Rolling out the update on all devices

Getting the Update from the IGEL Download Server

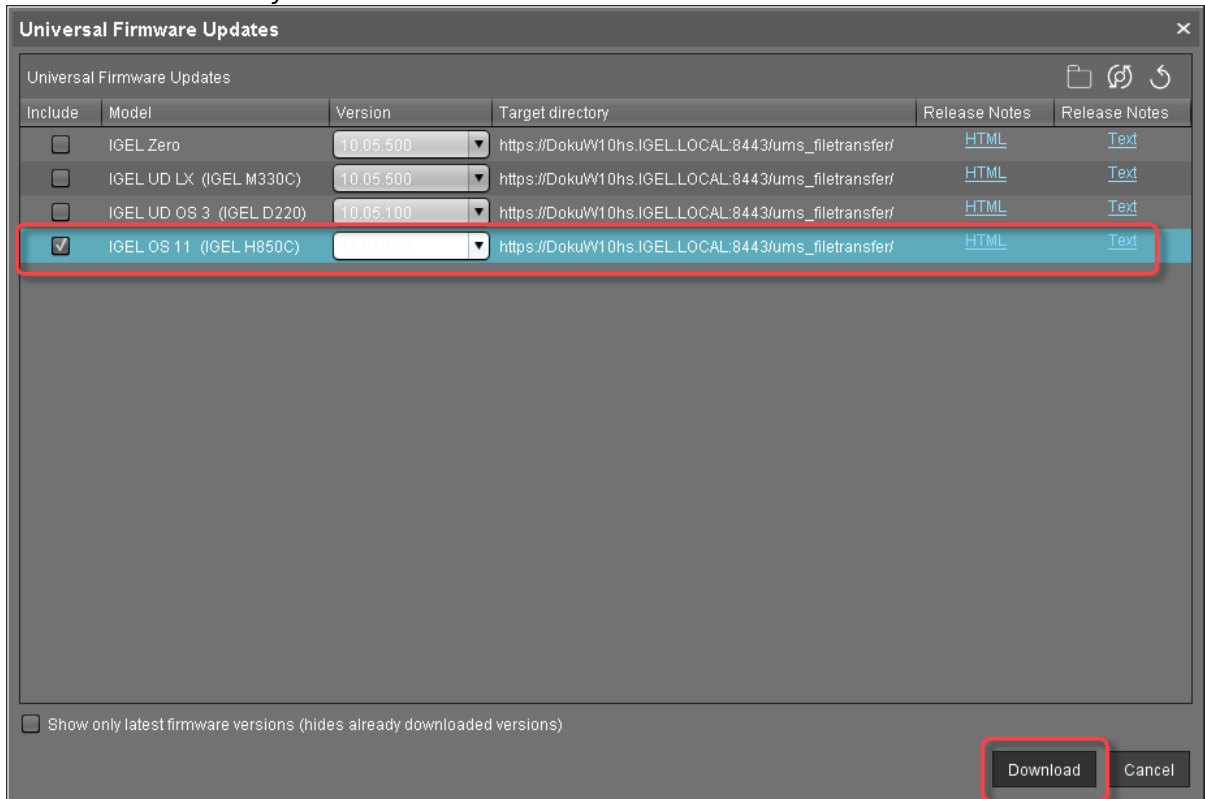
1. In the UMS Console, go to **Universal Firmware Update**, open the context menu, and select **Check for new firmware updates**.



---

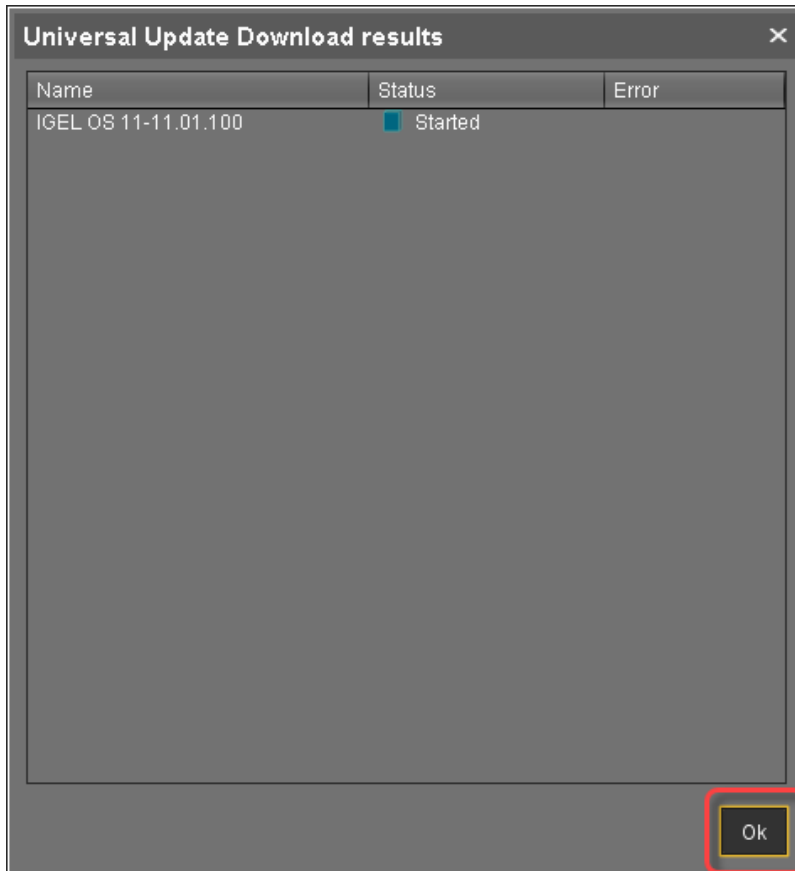
<sup>42</sup> <http://www.igel.com/>

2. Activate the firmware you want to download and click **Download**.

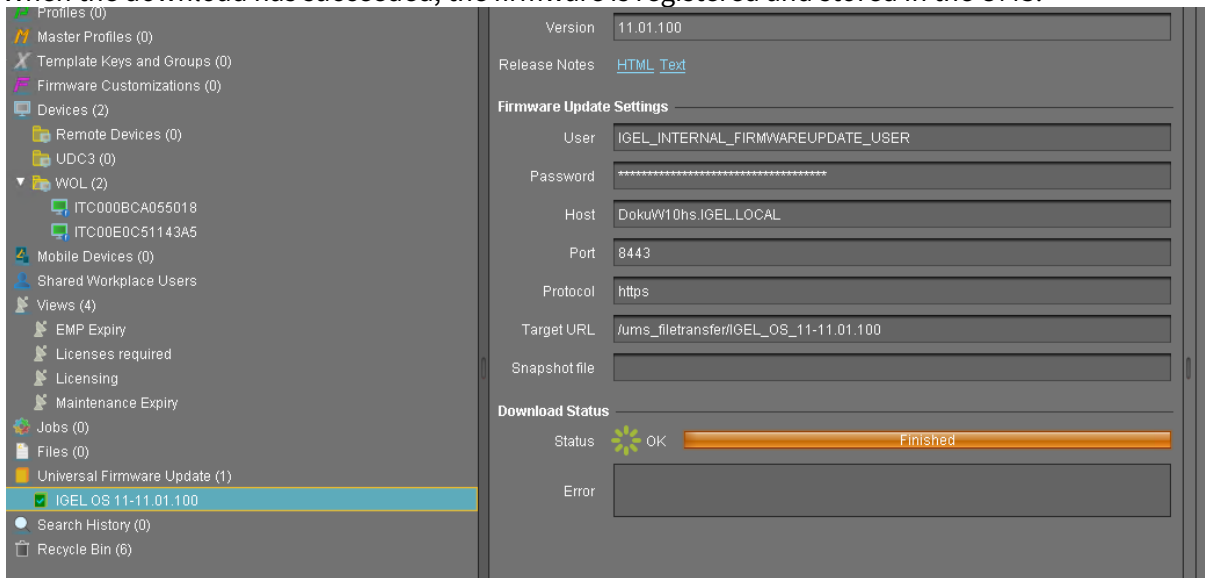


The current status of the firmware download is shown.

3. Click **Ok**.



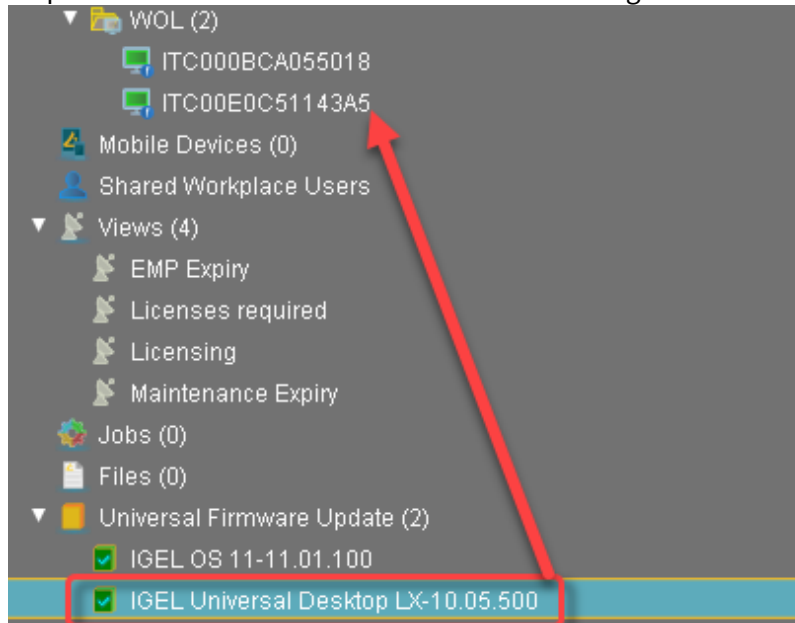
4. When the download has succeeded, the firmware is registered and stored in the UMS.



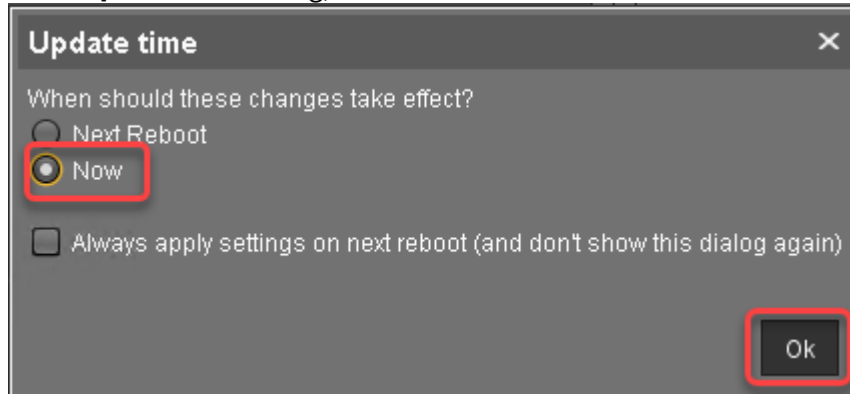


### Testing the Update on One or a Few Devices

1. In the UMS Console, go to **Universal Firmware Update**, select the desired firmware and drag and drop it on the test device or on the folder containing the test devices.



2. In the **Update time** dialog, select **Now** and click **Ok**.



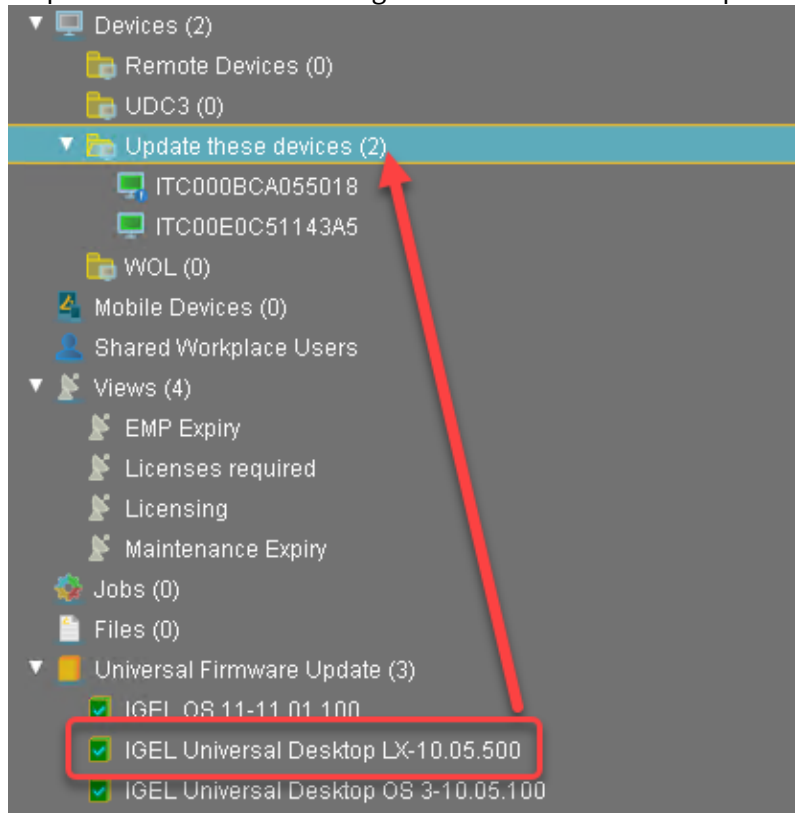
The firmware is updated on the devices; during the update process, the devices reboot.

### Rolling out the Update on All Devices

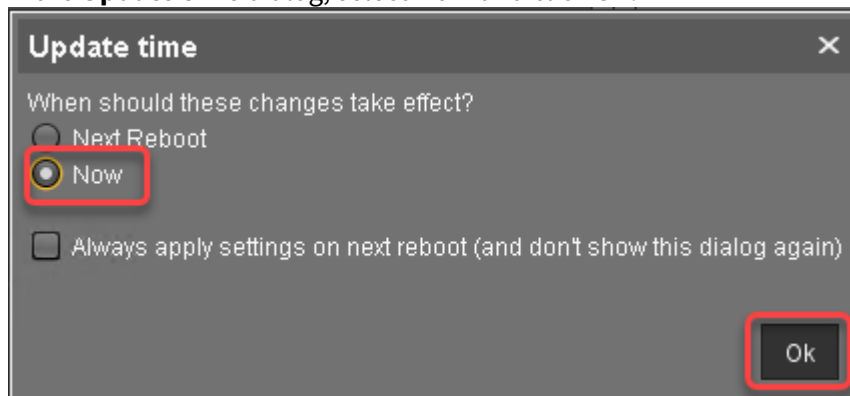
You can either start the update immediately or use a scheduled job to start it at a defined time.

To start the update immediately:

1. In the UMS Console, go to **Universal Firmware Update**, select the desired firmware and drag and drop it on the folder containing the devices that are to be updated.



2. In the **Update time** dialog, select **Now** and click **Ok**.



The firmware is updated on the devices; during the update process, the devices reboot.

## Disabling Access to Components

You can hide IGEL OS components from the user that could be used to make changes to the system.

- [Disabling Local Terminal Access](#) (see page 420)
- [Disabling Virtual Console Access](#) (see page 421)
- [Using Appliance Mode](#) (see page 422)
- [Hiding Unused Accessories](#) (see page 423)

## Disabling Local Terminal Access


### Rationale

The **Local Terminal** accessory allows the user to execute commands or make changes to the system. By default, the local terminal is disabled, that is, no local terminal session is configured. To enhance security, you should do one of the following:

- Leave the local terminal disabled
- If a local terminal session is configured, but not needed, disable it.
- If a local terminal session is needed, password-protect it.

### Instructions

To remove an existing local terminal session:

1. In IGEL Setup, go to **Accessories > Terminals**.
2. Select a local terminal session you want to delete.
3. Click  to remove the selected session.
4. When prompted, confirm that you want to delete the session.
5. Click **Apply**.

Alternatively, you can password-protect the terminals.

To password-protect the local terminal:

1. Find the local terminal session under **Accessories > Terminals**.
2. Follow the instructions under [Password-Protecting Sessions and Accessories](#) (see page 409).

## Disabling Virtual Console Access

### Rationale

The virtual consoles `tty11` and `tty12` give the user access to a shell. Disabling these makes it more difficult to execute commands or make changes to the system.

### Instructions

By default, the user can access the virtual consoles with the [Ctrl]+[Alt]+[F11] and [Ctrl]+[Alt]+[F12] keyboard commands. To disable access, do the following:

1. In IGEL Setup go to **User Interface > Display > Access Control**
2. Activate **Disable Console switching** (Default: Console switching enabled)
3. Click **Apply**.

## Using Appliance Mode

### Rationale

By default, IGEL OS users are not presented with a full-screen remote session, but have access to the desktop and to the start menu. On the contrary, in the appliance mode, a single predefined session is presented full-screen to the user. As access to other applications is prevented, this reduces the system's potential exposure to attack.


### Instructions

The appliance mode is available for the following session types:

- VMware Horizon
- Citrix Self-Service
- RHEV/Spice
- Imprivata
- RDP MultiPoint Server
- XDMCP for This Display

To enable the appliance mode for a session, proceed as follows:

1. In IGEL Setup, go to **Sessions > Appliance Mode**.
2. Pick the session and configure it according to the manual chapter Appliance Mode.

 You can combine most of the appliance mode sessions with [Two-factor Authentication](#) (see page 413) for increased security.

## Hiding Unused Accessories

### Rationale

Accessories can be used to make changes to the system. Restricting access to these accessories helps to keep the system secure.

### Instructions

To hide individual accessories (both in the start menu and the Application Launcher):

1. In IGEL Setup go to **Accessories > [accessory name]**.
2. Disable all **Starting Methods for Session**.
3. Click **Apply**.

To password-protect an accessory:

- ▶ Follow the instructions under [Password-Protecting Sessions and Accessories](#) (see page 409).

To hide the complete **System** icon of the start menu:

1. In IGEL Setup go to **User Interface > Desktop > Start Menu**.
2. Deactivate **System tab**.
3. Click **Apply**.

To hide the complete Application Launcher's **System** icon:

1. In IGEL Setup go to **Accessories > Application Launcher > Application Launcher Configuration**.
2. Activate **Hide system page**.
3. Click **Apply**.

## Minimizing the Attack Surface

Removing unused features and disabling unneeded network services reduces the parts of the system that can be attacked.

- [Removing the Local Web Browser \(see page 425\)](#)
- [Configuring the Browser \(Kiosk Mode\) \(see page 426\)](#)
- [Disabling Java in the Browser \(see page 427\)](#)
- [Disabling the PC/SC Daemon \(see page 428\)](#)
- [Disabling X Server TCP Connections \(see page 429\)](#)
- [Removing Unused Features \(see page 430\)](#)
- [Disabling Storage Hotplug \(see page 431\)](#)
- [Using USB Device Control \(see page 432\)](#)
- [Disabling USB Boot \(see page 433\)](#)
- [Leveraging AppArmor \(see page 434\)](#)



## Removing the Local Web Browser

### Rationale

The local web browser may expose vulnerabilities to the internet and can be an entry point for malware. If the browser is not needed, it is safer to remove it.

 Do not remove the local web browser if you use Citrix StoreFront sessions.

### Instructions

By default, IGEL OS has a local web browser (Firefox) installed, even if no web browser session is configured. To remove the browser:

1. In the IGEL Setup go to **System > Firmware Customization > Features**.
2. Uncheck the **Local Browser (Firefox)** feature.
3. Click **Apply**.
4. Reboot the device.

## Configuring the Browser (Kiosk Mode)

### Rationale

If you want to offer a local web browser, there are some settings that improve its security. Additionally, these settings add up to a kiosk mode, hiding the rest of IGEL OS from the user.

### Instructions

By default, the web browser makes all of its features and menus available. To achieve a restricted 'kiosk' mode, follow these instructions:

1. In the IGEL Setup, under **Sessions > Browser > Browser Global > Security**, activate the following options:
  - **Safe Browsing**
  - **Malware Protection**
2. Under **Sessions > Browser > Browser Global > Restart**, activate **Restart**.
3. Under **Sessions > Browser > Browser Global > Window**, activate the following options:
  - **Start in fullscreen mode**
  - **Hide local filesystem**
  - **Hide configuration page of the browser**
4. Under **Sessions > Browser > Browser Global > Menus & Toolbars**, activate **Hide App Menu/Menu Bar**.
5. Under **Sessions > Browser > Browser Global > Context**, activate **Hide the browser's context menu**.
6. Under **Sessions > Browser > Browser Sessions > [session name] > Settings**, activate **Autostart**.
7. Click **Apply**.
8. Reboot the device.

## Disabling Java in the Browser

Java Applets and Java Web Start may constitute a potential security threat and are now regarded as deprecated. As of IGEL OS version 10.06.100, they are no longer included in IGEL OS. The registry keys under **System > Registry > java > deployment** are obsolete.

## Disabling the PC/SC Daemon

### Rationale

Unless you are running smartcard readers that use it, you can disable the PC/SC daemon. Running fewer daemons reduces the attack surface.

### Instructions

To deactivate the PC/SC daemon:

1. In the IGEL Setup go to **Security > Smartcard > Services**.
2. Deactivate **Activate PC/SC Daemon**.
3. Click **Apply**.

## Disabling X Server TCP Connections

### Rationale

The X graphics server in IGEL OS has network functionality that could allow others to see your screen and read keyboard input. Leave it disabled to keep your data confidential.

### Instructions

By default the network functionality of the X server is disabled. To disable it again at a later time, do the following:

1. In IGEL Setup go to **User Interface > Display > Access Control**
2. Make sure that **Access Control** is activated.
3. Make sure that **Disable TCP connections** is activated.
4. Click **Apply**.

## Removing Unused Features

### Rationale

Reducing the amount of software running on a system reduces its attack surface. Therefore a basic security measure for IGEL OS 10 is to remove all unused features.

### Instructions

To disable a feature:

1. In the IGEL Setup go to **System > Firmware Customization > Features**.
2. Deactivate all the features that you do not intend to use.
3. If you do not use local printers on the endpoint device that you want to share with others, deactivate:
  - **Printing (Internet Printing Protocol CUPS)**
  - **Printing (Line Printer LPD)**
  - **Printing (TCP/IP)**
  - **Printing (ThinPrint)**

⚠ Do not remove the **Custom Partition** feature if you have a custom partition that contains software or data for which you have no backup copy. After disabling the feature and a reboot the contents of the custom partition will be lost.

⚠ Do not remove **Fluendo Gstreamer Codec Plugins** or **Hardware Video Acceleration** if you use sessions that make use of these features.

4. Click **Apply**.
5. Reboot the device.

## Disabling Storage Hotplug

### Rationale

Removable USB media can be used to steal data or to execute unauthorized software or even malware on the device.

### Instructions

Storage hotplug is disabled by default. Should you want to disable it again at any later point, follow these instructions:

1. In IGEL Setup go to **Devices > Storage Devices > Storage Hotplug**.
2. Deactivate **Storage Hotplug**.
3. Click **Apply**.

Storage devices are no longer automatically mounted when they are plugged in.

## Using USB Device Control


### Rationale

USB devices such as pen drives, wireless controllers, or printers can be used to steal data or to execute unauthorized software or even malware. Deactivating as many USB device classes as possible increases security.

### Instructions

To enable and configure USB access control:

1. In IGEL Setup, go to **Devices > USB Access Control**.
2. Check **Enable**.

 The activation of **USB Access Control** and setting the **Default rule** to **Deny** will block the use of USB devices locally and in the session and, thus, might disable devices needed for the users. Therefore, activate the USB access control only if your security policy requires that. In this case, set **Default rule** to **Deny** and configure **Allow** rules for the required USB devices and USB device classes.

It is recommended to make settings for **USB Access Control** as the last step in the device configuration. Before activating the USB access control, check that all your other settings for printers, Unified Communication, USB redirections, mapping settings for USB devices are working as expected.

Note that the USB access control is completely separate than USB redirection for remote sessions, see [When to Use USB Redirection](#) (see page 762).

Take also notice that the feature does not disable a USB port physically, i.e. power delivery will still work.

3. Set **Default rule** to **Deny**.  
In combination with the preconfigured rule that allows Human Interface Devices (HID), no USB devices apart from e.g. mouse and keyboard are allowed.
4. Configure further rules as needed. For instructions, see [How to Configure USB Access Control](#) (see page 766).
5. Click **Apply**.
6. Reboot the device.



## Disabling USB Boot

### Rationale

Disabling USB Boot prevents booting another operating system, which could be used to manipulate or (even accidentally) overwrite IGEL OS on mass storage.

### Instructions for IGEL Devices


USB Boot is disabled in the factory settings on IGEL UD LX devices. If it has been enabled and you want to disable it again, follow the instructions given here:

1. Hold down the [Del] key ([F2] key for UD2) while the system is booting.  
The UEFI menu opens.
2. Use the arrow and return keys to go to **SCU**.
3. Enter the UEFI password if one is set.  
The **Setup Utility** opens.
4. Go to **Boot**.
5. Set **USB Boot** to **Disabled**.
6. Press [F10]
7. Confirm **Exit Saving Changes?**
8. The device boots.

 Additionally, set a [UEFI Password](#) (see page 412) so the boot settings cannot be changed back.

### Instructions for 3rd-party devices converted with OSC

- ▶ Refer to the instructions of your BIOS/UEFI vendor

 Alternatively, try pressing [F12] (in general), [F10] (Intel devices) or [F9] (Hewlett-Packard devices) to access the BIOS/UEFI settings. If this does not work, try pressing [Del], [F1] or [F2] during booting.

## Leveraging AppArmor

AppArmor controls which privileges should be granted to an application that is running on the system. This way even vulnerabilities that are yet unknown can be mitigated.

The following applications are guarded by AppArmor:

- Firefox browser
- Cups print server
- Evince pdf viewer

The following system programs are guarded by AppArmor:

- tcpdump
- haveged
- dhclient

By default, AppArmor is enabled. The registry key is `system.security.apparmor`

## Configuring Remote Access and Management

Remote management via UMS and remote access are powerful features of IGEL OS. Select secure settings and disable what you do not use.

- [Tying Endpoints to Your UMS instance \(see page 436\)](#)
- [Disabling Shadowing \(see page 437\)](#)
- [Using Secure VNC Settings \(see page 438\)](#)
- [Disabling SSH Access \(see page 439\)](#)
- [Disabling X11 Forwarding \(see page 440\)](#)
- [Using Secure SSH Settings \(see page 441\)](#)
- [Disabling Secure Terminal \(see page 442\)](#)

## Tying Endpoints to Your UMS instance


### Rationale

Devices that have remote management enabled but are not yet tied to a UMS instance can be taken over by an attacker's UMS. Make sure to register all IGEL devices on your network.

### Instructions

By default, remote management is enabled on IGEL OS devices. Use automatic registration to catch all devices in your corporate network:

1. Assign the DNS entry `igelrmserver` to the UMS host. For further instructions, see Registering Devices Automatically on the IGEL UMS.
2. In the UMS console go to **UMS Administration > Global Configuration > Device Network Settings**.
3. Activate **Enable automatic registration (without mac address import)**  
Now all new IGEL devices, UD Pockets and devices converted with OSC that are booting up in the network will automatically register with your UMS instance.
4. Optionally, put newly registered devices into a quarantine directory automatically with UMS Default Directory Rules.
5. Optionally, assign a Master Profile to this directory, thereby enforcing secure settings, e.g. a local administrator password.

 Alternatively you can disable remote management in the local IGEL Setup under **System > Remote management**. Of course this means losing one of the most powerful features of IGEL OS. However, this may be an option for particular devices.

## Disabling Shadowing

### Rationale

Shadowing is made possible by a VNC server on IGEL OS, which is a network service. Reducing the number of running network services reduces the system's attack surface.

### Instructions

By default, Shadowing is not active on IGEL OS. However, if you want to disable it at any time, follow these steps:

1. In the IGEL Setup go to **System > Remote Access > Shadow**
2. Deactivate **Allow Remote Shadowing**.
3. Click **Apply**.

## Using Secure VNC Settings


### Rationale

If you intend to use shadowing on IGEL OS, there are a number of options that can make it more secure.

### Instructions

By default, Shadowing does not use encrypted network transport or a password. To activate these security features, do the following:

1. In IGEL Setup go to **System > Remote Access > Shadow**.
2. Make as many of the following settings as possible for your use case. Each setting improves security, and often also privacy:
  - Enable **Secure Mode**.
  - Enable **Use Password** and set a strong password (not needed in **Secure Mode**). The maximum length for this password is 8 characters.
  - Enable **Prompt User to allow Remote Session**.
  - Enable **Allow User to disconnect Remote Shadowing**.
  - Disable **Allow Input from Remote**.
3. Click **Apply**.

 Secure mode for shadowing can be enabled globally in **UMS under UMS Administration > Global Configuration > Remote Access**. There you can also enable the logging of users who have used secure mode shadowing .

## Disabling SSH Access

### Rationale

The SSH server on IGEL OS is a network service. Reducing the number of running network services reduces the system's attack surface. Even more so in this case, as SSH by design enables a remote user to execute commands on the system.


### Instructions

By default, the SSH server is running on IGEL OS. To deactivate it, follow these steps:

1. In IGEL Setup go to **System > Remote Access > SSH Access**.
2. Deactivate **Enable**.
3. Click **Apply**.

## Disabling X11 Forwarding

When X11 forwarding is disabled, graphic applications cannot be run over SSH. By default, X11 forwarding is disabled.

 If X11 forwarding is disabled, it is not possible to launch the IGEL Setup from an SSH session.

To ensure that X11 forwarding is disabled:

1. In the Setup, go to **System > Remote Access > SSH Access** and make sure that **Permit X11 forwarding** is deactivated.
2. Click **Apply** or **Ok**.



## Using Secure SSH Settings

### Rationale

If you intend to allow SSH connections to IGEL OS, there are a number of options that can make these more secure.

### Instructions

To secure the SSH settings of your devices, make as many of the following settings as possible for your use case

1. In IGEL Setup go to **System > Remote Access > SSH**.
2. Deactivate **Permit empty passwords**.
3. Deactivate **Permit administrator login**.
4. Deny **User access** for `user` , who can execute any command with regular user privileges.
5. Allow **User access** for `ruser` , whose access is restricted by the list **Applications access for remote user 'ruser'**.
6. Where needed, edit the list **Applications access for remote user 'ruser'**. It defines the commands that `ruser` can run from remote. By default, a local shell ( `localshell` ) and IGEL Setup ( `/config/sessions/setup0` ) are allowed.
7. Click **Apply**.
8. Go to **Security > Password**, under **User Account for Remote Access** activate **Use Password** and set a password
9. Click **Apply**.

## Disabling Secure Terminal


### Rationale

The secure terminal server on IGEL OS is a network service, providing a TLS/SSL-encrypted Telnet session. Reducing the number of running network services reduces the system's attack surface. Even more so in this case, as the secure terminal by design enables a remote user to execute commands on the system.

### Instructions

By default, the secure terminal is not active. Should you want to deactivate it at any time, do the following:

1. In IGEL Setup go to **System > Remote Access > Secure Terminal**
2. Deactivate **Secure Terminal**.
3. Click **Apply**.

 Secure Terminal can be enabled globally in the UMS under **UMS Administration > Global Configuration > Remote Access**. There you can also enable the logging of users of the secure terminal.

## Wi-Fi and Bluetooth

Rogue or unencrypted Wi-Fi access points can put your data at risk, as can Bluetooth devices. If your device has Wi-Fi and Bluetooth, make sure to configure them securely or disable them.

- [Restricting Wi-Fi Access](#) (see page 444)
- [Disabling Bluetooth](#) (see page 445)

## Restricting Wi-Fi Access

### Rationale

Using an unencrypted Wi-Fi network or falling for a rogue access point puts your users' data at risk. Enable strong encryption and restrict Wi-Fi access to a default network and optionally employ a whitelist of additional networks in order to prevent this.

### Instructions

By default, Wi-Fi is not activated on IGEL OS. To activate it and preconfigure one or more allowed networks, follow these instructions:

1. In IGEL Setup go to **Network > LAN Interface > Wireless**.
2. Activate **Activate Wireless Interface**.
3. Do not activate **Enable wireless manager**, as this would give the user free choice of Wi-Fi networks.
4. Click **Apply**.
5. Go to **Network > LAN Interface > Wireless > Default Wi-Fi network**.
6. Check **Enable WPA Encryption**.
7. Enter the **Wireless network name (SSID)**.
8. Make authentication and encryption settings, see Default Wi-Fi Network in the IGEL OS Manual.
9. Click **Apply**.
10. If needed, add further networks under **Network > LAN Interface > Wireless > Additional Wi-Fi networks**.

## Disabling Bluetooth

### Rationale

If your device has a Bluetooth interface it may be used to access data. Disabling the interface reduces the risk of data theft.

### Instructions

By default Bluetooth is deactivated on IGEL OS. Should you want to disable it at any time, do the following:

1. In the IGEL Setup go to **Devices > Bluetooth**.
2. Deactivate **Bluetooth**.
3. Click **Apply**.

## Using UD Pocket for BYOD Devices

### Rationale

Letting users access company resources with their own devices (BYOD) and software poses a security risk: These systems may have insecure configurations or even contain malware. In addition, company data should not be saved on users' private devices.

### Instructions

- ▶ Use the IGEL UD Pocket. This ensures the use of secure and trusted software. As the UD Pocket does not access the device's mass storage, company data and private data will remain separated.

For details on the IGEL UD Pocket, see [UD Pocket \(UDP\) Reference Manual](#).

For how to select the UD Pocket during the boot procedure, see [Boot Settings and Starting Your UD Pocket](#).

## Secure Shell (SSH) Access to IGEL OS with Keys

IGEL OS has a built-in OpenSSH server that can be activated and configured via the Setup application. It lets you connect securely to the device over the network in order to issue commands or transfer files. While authentication can be done with a username-password combination, using a private-public key pair can increase convenience and/or security. This document describes how to generate and distribute the keys required.

- [Generating the SSH Key Pair \(see page 448\)](#)
- [Distributing the Public Key with UMS \(see page 450\)](#)
- [Configuring SSH Access on the Device \(see page 452\)](#)

## Generating the SSH Key Pair

### Prerequisites

- Linux/Unix operating system, typically on the administrator's workstation
- *OpenSSH* client software installed

### Introduction

The following procedure will generate two keys:

- **Public key:** This key is distributed to all machines the administrator wants to connect to. It can be made public.
- **Private key:** This key stays on the administrator's machine and has to be kept secret.

⚠ For the confidentiality of the encrypted connection to devices, it is essential to keep the private key secret.

An easily understandable explanation of private and public keys can be found in a [blog post by the programmer Blake Smith](#)<sup>43</sup>.

### Generating the Key Pair

1. Open a terminal session on your workstation as the user who is going to make the SSH connections to the devices.
2. Issue the following command:

```
ssh-keygen
```

3. When prompted for the location to store the key pair in, you can:
  - Hit return, which will accept the default file name `~/.ssh/id_rsa`

⚠ Using the default name may overwrite existing SSH key pairs!

- Enter an absolute file path and key file name of your choice `.`
4. When prompted for a passphrase, you can
    - Enter a passphrase (twice)

ℹ A passphrase protects the private key file in case it gets into the hands of an attacker. On the other hand, it may be inconvenient to enter the passphrase for every connection.

- Hit return in order to use no passphrase.

---

<sup>43</sup> <http://blakesmith.me/2010/02/08/understanding-public-key-private-key-concepts.html>




⚠ This increases convenience because you will be able to log in without entering the passphrase. However, it weakens security: The private key file will be unprotected if it gets into the hands of an attacker.

Two files have been generated (default names):

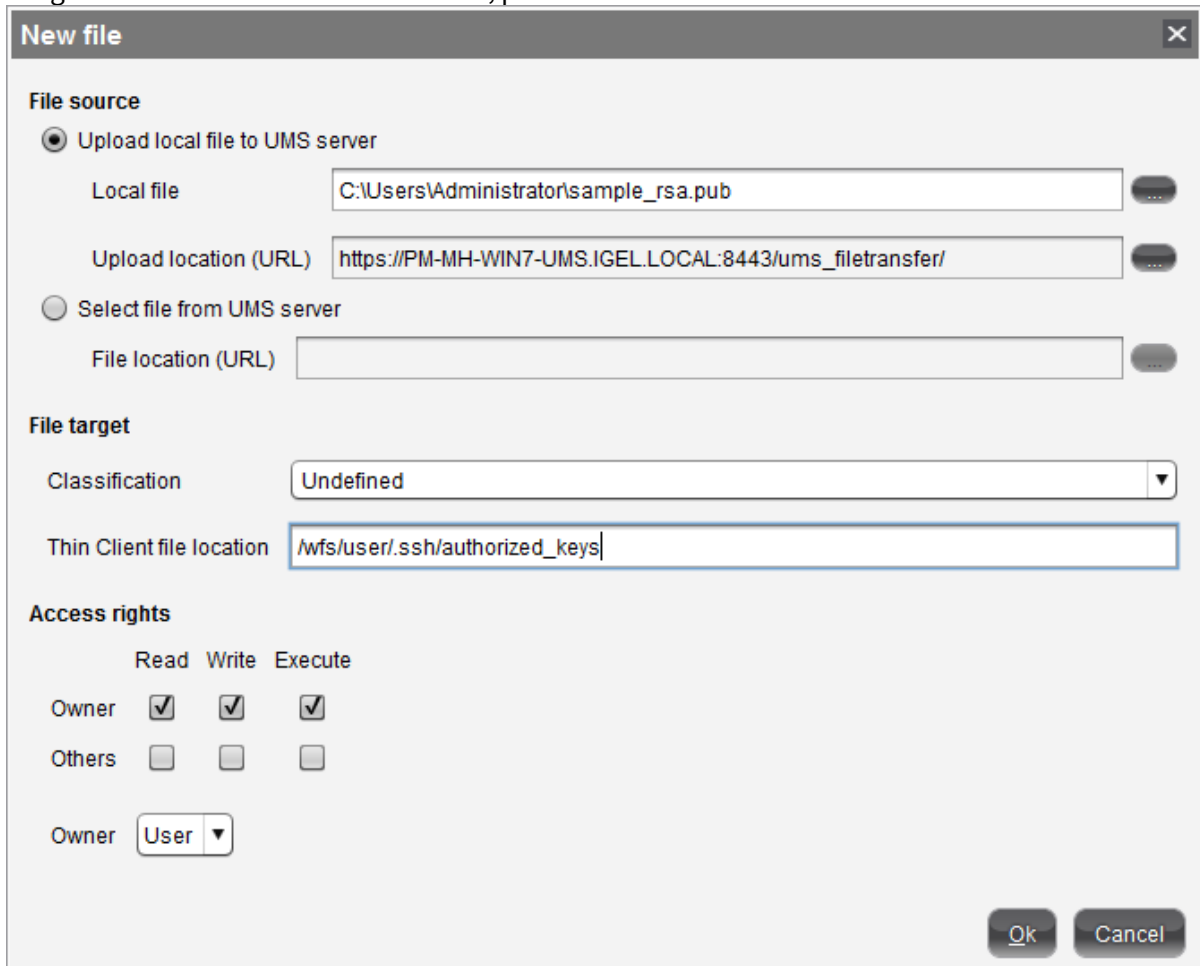
- `id_rsa` - the private key file
- `id_rsa.pub` - the public key file

## Distributing the Public Key with UMS

1. In *UMS Console*, right-click on **Files** in the navigation tree.
2. Select **New File**.
3. Upload the public key file ( \* . pub ) as a **Local File**.

 Make sure that you do not upload the private key file by mistake.

4. Set the **Classification** to **Undefined**.
5. Specify the **Thin Client file location** as `/wfs/user/.ssh/authorized_keys`
6. Leave the **Access rights** as **Read, Write, Execute**.
7. Leave the **Owner** as **User**.
8. Assign the file to the desired thin clients, profiles or directories.



**New file**

**File source**

Upload local file to UMS server

Local file

Upload location (URL)

Select file from UMS server

File location (URL)

**File target**

Classification


Thin Client file location

**Access rights**

	Read	Write	Execute
Owner	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Others	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>


Owner

Ok Cancel

 If you wish to authorize more keys for SSH connections to thin clients, prepare an `authorized_keys` file containing all the public keys. Simply append them using a text editor.

## Configuring SSH Access on the Device

1. Go to **System > Remote Access > SSH Access** in the IGEL Setup or a profile.
2. Check **Enable**.
3. Optionally, if `user` has an empty password, check **Permit empty passwords**.
4. Set **Deny** to **No** in the **User access** entry for `user`.

 This configuration gives the remote user full shell access as if they were the local user on the client.

Now you can connect to the device from the administrator's machine with the following command:

```
ssh user@[client name or IP address]
```

Depending on whether you set a passphrase for the key, you may have to enter it or not.

## Secure Terminal (Telnet with TLS/SSL)

IGEL Linux version 5.11.100 or newer and IGEL Linux version 10.01.100 or newer allow terminal access via UMS with transport encryption. In analogy to [secure shadowing](#) (see page 454), network traffic is encrypted with TLS/SSL. Secure terminal connections can only be initiated from the UMS whose certificate is stored on the device.


For details about setting up a secure terminal connection, see UMS manual Secure Terminal (Secure Shell).

Secure Terminal is the best way to create a remote access from the UMS (on Linux or Windows installed) to Linux devices, without installing an additional terminal software. Because the UMS includes the software.


## Secure Shadowing (VNC with TLS/SSL)

The **Secure Shadowing** function improves security when remotely maintaining a device via VNC at a number of locations:

- **Encryption:** The connection between the shadowing computer and the shadowed device is encrypted.  
This is independent of the VNC viewer used.
- **Integrity:** Only devices in the UMS database can be shadowed.
- **Authorization:** Only authorized persons (UMS administrators with adequate authorizations) can shadow devices.  
Direct shadowing without logging on to the UMS is not possible.
- **Limiting:** Only the VNC viewer program configured in the UMS (internal or external VNC viewer) can be used for shadowing.  
Direct shadowing of a device by another device is likewise not permitted.

 In addition, IGEL Management Interface (IMI) in Version 2 or newer provides an API for Secure Shadowing.

- **Logging:** Connections established via secure shadowing are recorded in the UMS server log. In addition to the connection data, the associated user data (shadowing UMS administrator, optional) can be recorded in the log too.

 Of course, this is only relevant to devices that meet the requirements for secure shadowing and have enabled the corresponding option. Other devices can be "freely" shadowed in a familiar manner and, if necessary, secured by requesting a password. If you would like to allow secure shadowing only, you can specify this in the UMS Console under **UMS Administration > Global Configuration > Remote Access**.

- 
- [Basic Principles and Requirements](#) (see page 455)
  - [Shadow Devices Securely](#) (see page 456)
  - [VNC Logging](#) (see page 457)

## Basic Principles and Requirements

The **Secure Shadowing** option can be enabled if the following requirements are met:

- IGEL Linux as of version 5.03.190 and 10.01.100 or IGEL Windows Embedded Standard 7 from version 3.09.100
- IGEL Universal Management Suite from version 4.07.100 onwards
- The device is registered on the UMS Server
- The device can communicate with the UMS Console and UMS Server (see below)

### Basic Technical Principles

Unlike with "normal" shadowing, the connection between the VNC viewer and the VNC server (on the device) is not established directly during secure shadowing. Instead, it runs via two proxies – one for the UMS Console and one for the VNC server on the device. These proxies communicate via a TLS/SSL-encrypted channel, while the local communication, e.g. between the VNC viewer application and the UMS proxy, takes place in the conventional unencrypted manner. As a result, a secure connection can also be established with external VNC programs that do not support TLS/SSL connections.

The two proxies (UMS Console and device) communicate with TLS/SSL encryption via the same port as the "normal" VNC connection: 5900. As a result, no special rules for firewalls need to be configured in order to perform secure shadowing.

If secure shadowing is active for a device under **Setup > System > Remote Access > Shadow > Secure mode**), the device generates a certificate in accordance with the X.509 standard and transfers it to the UMS Server when the system is next started. The UMS Server checks subsequent requests for a secure VNC connection using the certificate. The certificate in PEM format can be found in the `/wfs/client-certs/tc_ca.crt` directory on the device. The validity of the certificate can be checked on the (Linux) client using the command: `x11vnc -sslCertInfo /wfs/client-certs/tc_ca.crt`

If a UMS administrator calls up the **Shadowing** function in the UMS Console for the device, the console receives a signed request from the UMS Server which is then passed on to the device to be shadowed. This in turn passes on the request to the UMS Server which checks the validity of the request using the original certificate. If this check is successful, the console reports that the channel for the connection between the proxies can be established. The UMS proxy on the console connects to the server proxy on the device, and the server proxy, in turn, establishes on the device the connection to its VNC server.

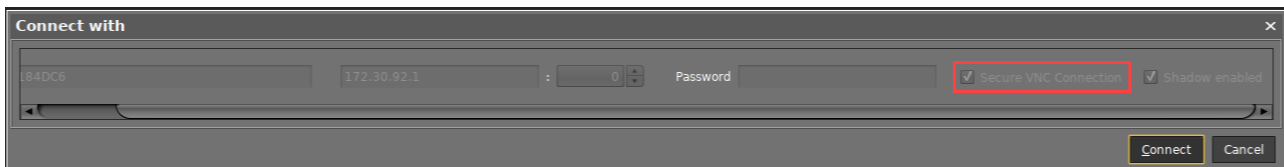
Only when these connections have been established, the console calls up the VNC viewer which then connects to the console proxy. The VNC client and VNC server are now connected via the two proxies which transfer data with TLS/SSL encryption.

Secure shadowing can be enforced independently of the device configuration for all devices that support this function: **UMS Administration > Global Configuration > Remote Access > Enable secure VNC globally**.

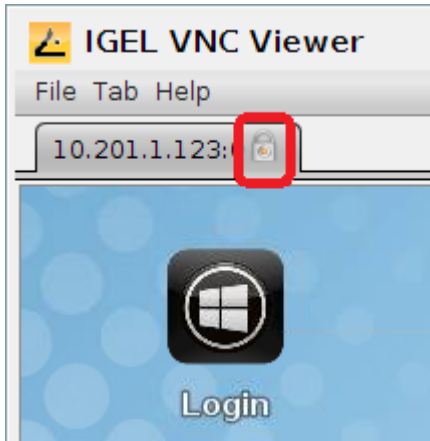
## Shadow Devices Securely

In order to shadow a device securely (with encryption), the administrator must log on to the server via the UMS console. When doing so, it is irrelevant whether a purely local UMS administrator account is used or the user was adopted via an Active Directory for example. As always, however, the UMS administrator must have the permission to shadow the object, see Object-Related Access Rights.

The device to be shadowed is called up in the structure tree and, as usual, can be executed via **Shadow** in the context menu. The connection window, however, differs from the dialog for normal VNC shadowing. The IP and port of the client to be shadowed cannot be changed, and a password for the connection is not requested – this is superfluous after logging on to the console beforehand.



When a VNC connection has been established, the symbol in the connection tab indicates secure shadowing:



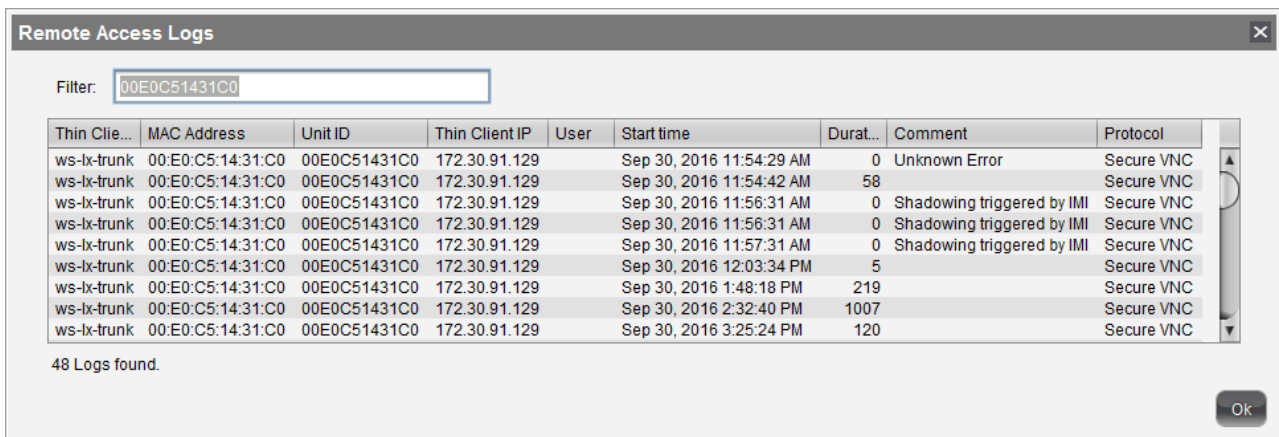


## VNC Logging

Connections via secure shadowing are always logged in the UMS. Via **UMS Administration > Global Configuration > Remote Access > Secure VNC**, you can configure whether the user name of the person shadowing is to be recorded in the log:

- **Log user for secure VNC**
  - The user name is included in the log.
  - The user name is not included in the log. (default)

The VNC log can be called up via the **context menu** of a device or folder (for several devices, **Logging > Logging: Secure Access Logs**). The name, MAC address and IP address of the shadowed device, the time and duration of the procedure and, if configured accordingly, the user name of the shadowing UMS administrator are logged.



Thin Cle...	MAC Address	Unit ID	Thin Client IP	User	Start time	Durat...	Comment	Protocol
ws-lx-trunk	00:E0:C5:14:31:C0	00E0C51431C0	172.30.91.129		Sep 30, 2016 11:54:29 AM	0	Unknown Error	Secure VNC
ws-lx-trunk	00:E0:C5:14:31:C0	00E0C51431C0	172.30.91.129		Sep 30, 2016 11:54:42 AM	58		Secure VNC
ws-lx-trunk	00:E0:C5:14:31:C0	00E0C51431C0	172.30.91.129		Sep 30, 2016 11:56:31 AM	0	Shadowing triggered by IMI	Secure VNC
ws-lx-trunk	00:E0:C5:14:31:C0	00E0C51431C0	172.30.91.129		Sep 30, 2016 11:56:31 AM	0	Shadowing triggered by IMI	Secure VNC
ws-lx-trunk	00:E0:C5:14:31:C0	00E0C51431C0	172.30.91.129		Sep 30, 2016 11:57:31 AM	0	Shadowing triggered by IMI	Secure VNC
ws-lx-trunk	00:E0:C5:14:31:C0	00E0C51431C0	172.30.91.129		Sep 30, 2016 12:03:34 PM	5		Secure VNC
ws-lx-trunk	00:E0:C5:14:31:C0	00E0C51431C0	172.30.91.129		Sep 30, 2016 1:48:18 PM	219		Secure VNC
ws-lx-trunk	00:E0:C5:14:31:C0	00E0C51431C0	172.30.91.129		Sep 30, 2016 2:32:40 PM	1007		Secure VNC
ws-lx-trunk	00:E0:C5:14:31:C0	00E0C51431C0	172.30.91.129		Sep 30, 2016 3:25:24 PM	120		Secure VNC

48 Logs found.

► To sort the list (e.g. according to user names), click on the relevant column header or filter the content shown by making entries in the **Filter** field.

## Cherry eGK Channel Substitution

As of firmware version 10.05.100, the Cherry eGK Channel is no longer available. In the Igel Universal Desktop Firmware, Linux V5, the VirtualChannel for Cherry eGK devices is still included parallel to the Cherry USB2LAN Proxy. If you want to continue using the G87-1504/ST-1503 as before, with firmware version 10.05.100 and higher you have to activate the proxy. All settings are automatically applied and run through the connector in the network.

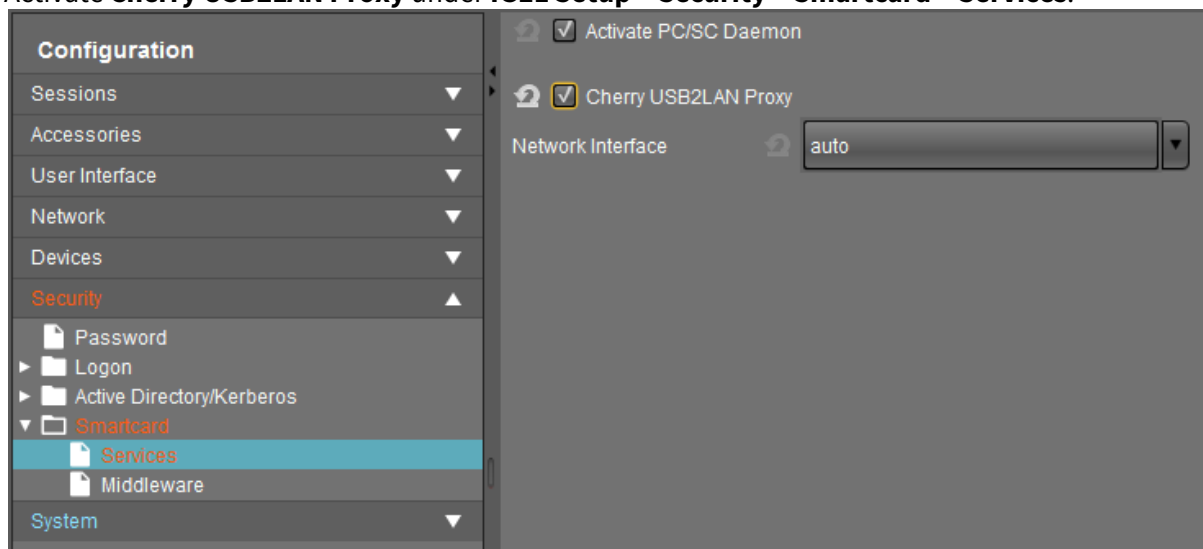
### Using the G87-1504/ST-1503 with firmware version 10.05.100 and higher:

- Activate the proxy - this can also be done from the backend.

- Cherry USB2LAN Proxy (Under Smartcard) (see screenshot)
  - IGEL device, valid for Cherry devices G87-1505, G87-1504/ST-1503 to USB

For IGEL Lx v5 and OS10:

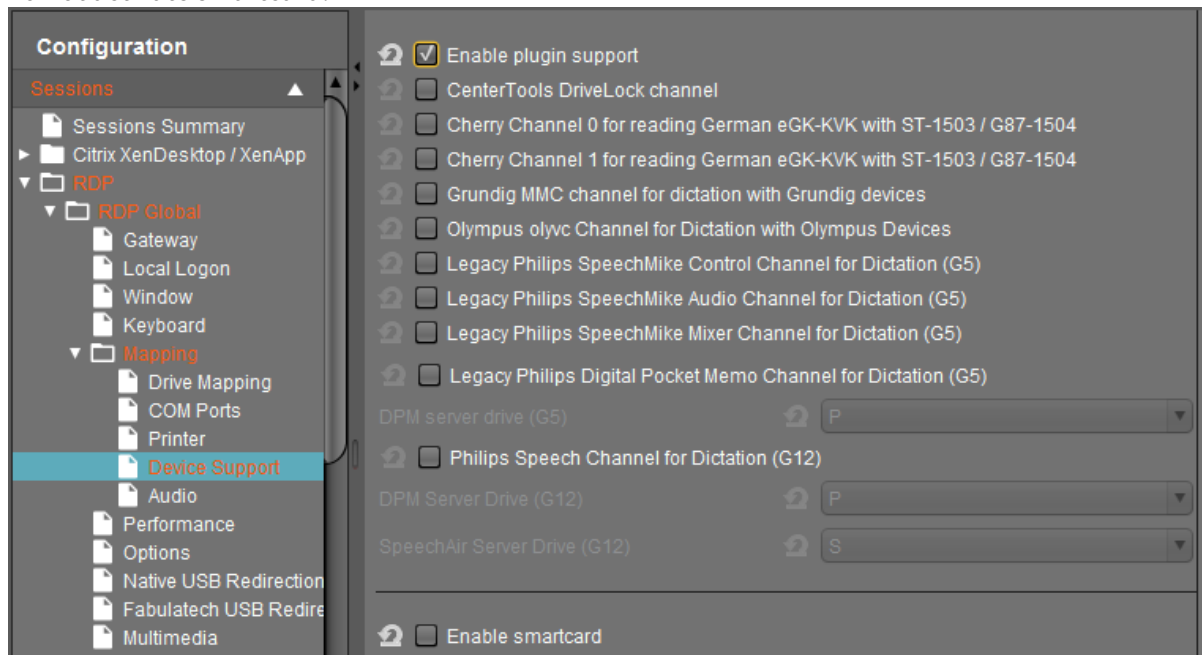
- Activate **Cherry USB2LAN Proxy** under **IGEL Setup > Security > Smartcard > Services**.



For IGEL Lx v5:

- Disable **Cherry Channel 0** and **Cherry Channel 1** under **IGEL Setup > Sessions > RDP > RDP Global > Mapping > Device Support**.

- Do not activate smartcard.



Install the Cherry eGK KVK software on the server. See [https://www.cherry.de/files/software/Cherry-eGK-KVK\\_Software\\_33.zip](https://www.cherry.de/files/software/Cherry-eGK-KVK_Software_33.zip)

Install the Cherry Linux software on the device.

- In the CT-API configuration the G87-1504/ST-1503 can be configured as network device.
- Link to Doku Client Server Integration: [https://www.cherry.de/files/manual/64410063-01\\_USBLANProxyClientServerUndCitrix.pdf](https://www.cherry.de/files/manual/64410063-01_USBLANProxyClientServerUndCitrix.pdf)
- Link to the software architecture documentation:: [https://www.cherry.de/files/manual/Cherry-eGK-KVK\\_Software-Architektur\\_Windows-20130927-v04.pdf](https://www.cherry.de/files/manual/Cherry-eGK-KVK_Software-Architektur_Windows-20130927-v04.pdf)

- i** The VirtualChannel was replaced due to the following difficulties and the future application of the telematics infrastructure (see also gematik anforderung lan)
- Independent of Citrix version (no need to check compatibility anymore)
  - Independent of the server version (2008, 2012...), if the connection runs via RDP

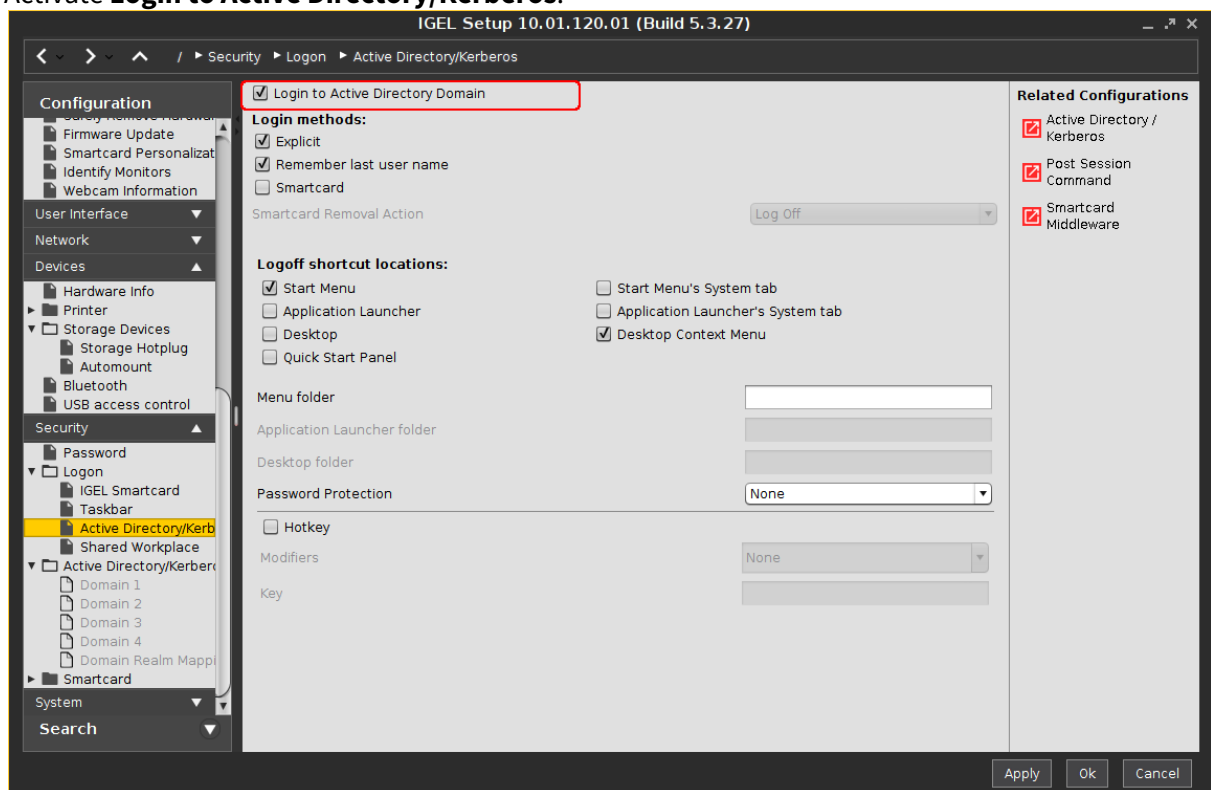
## Single Sign-on for the Browser Proxy

Using a proxy to handle a browser's internet traffic provides additional security and control. However, if the proxy is password-authenticated, the user has to enter their credentials, which adds some inconvenience.

With IGEL Linux *version 5.08* or newer and IGEL Linux *version 10.01.100* or newer, you can avoid this inconvenience by using the passthrough feature. As a prerequisite, user logon must be carried out via Kerberos.

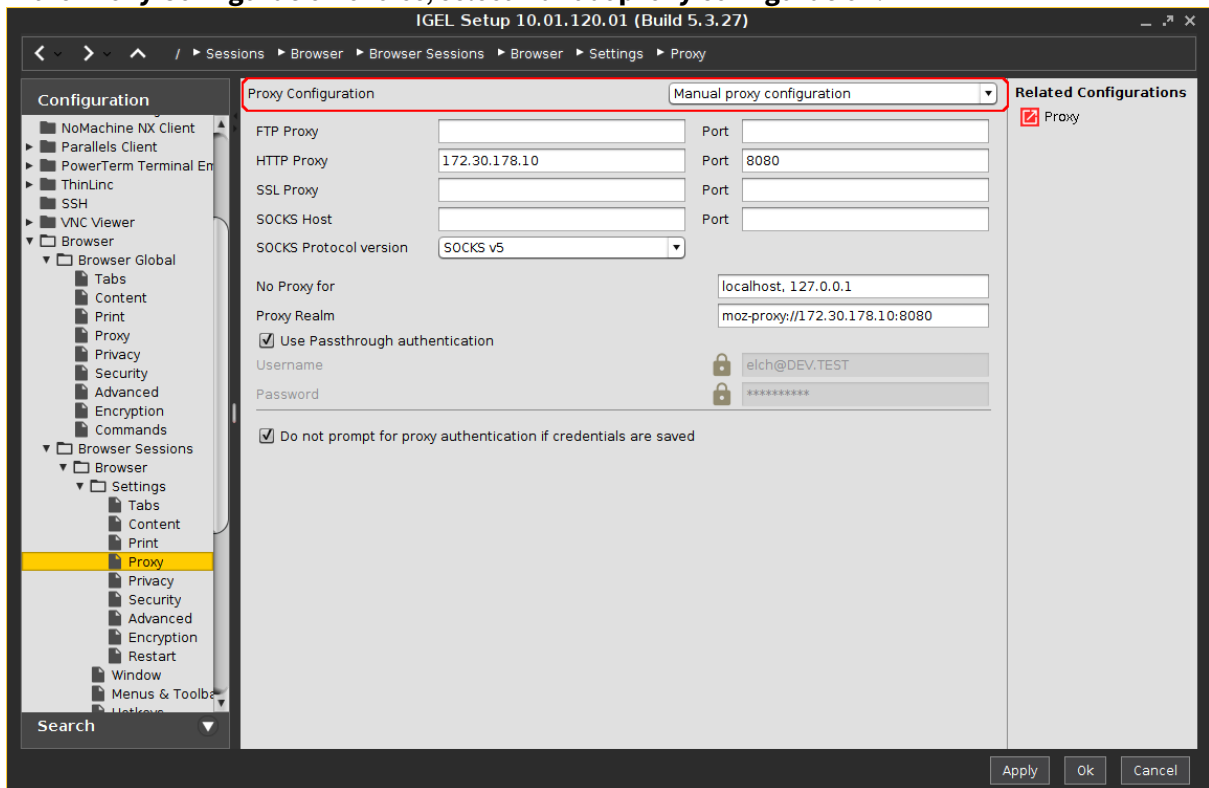
To enable single sign-on for the browser proxy:

1. Open the Setup and go to **Security > Logon > Active Directory/Kerberos**.
2. Activate **Login to Active Directory/Kerberos**.



3. Go to **Sessions > Browser > Browser Sessions > [name of the browser session] > Settings > Proxy**.

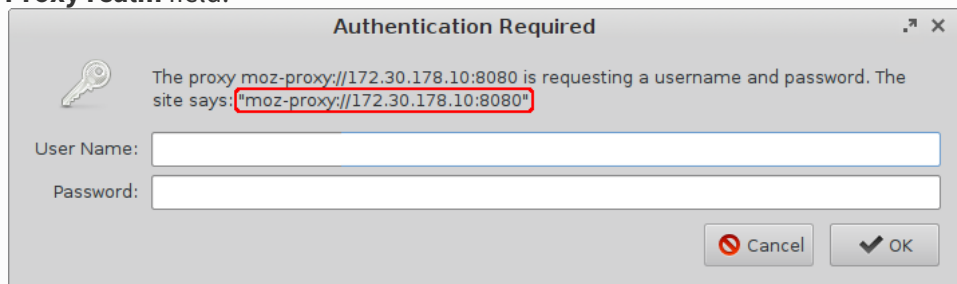
4. In the **Proxy Configuration** choice, select **Manual proxy configuration**.



5. For an HTTP proxy, define the following settings:

- **HTTP proxy:** IP address or hostname of the proxy to be used
- **Port:** Port of the proxy for HTTP
- **No proxy for:** IP addresses or hostnames of servers that can be accessed directly
- **Proxy realm:** Area in which the browser authenticates itself for the proxy. Together with the user name and password, this information is necessary for authentication.

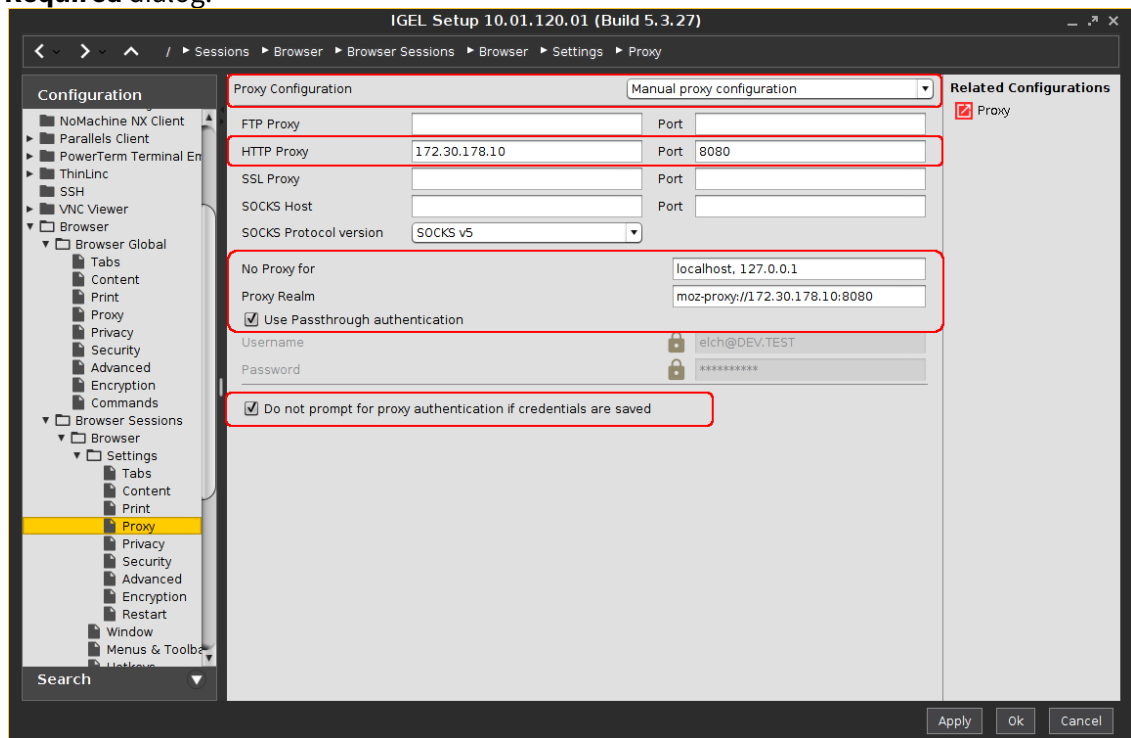
**i** The **Proxy realm** field is internally pre-populated with the value `moz-proxy://[HTTP Proxy]:[Port]`. If the field is empty, this value will be used when authenticating the browser. If the proxy expects another unknown value for the proxy realm, you can determine this as follows: Leave the **User name** and **Password** fields empty and launch the browser. The dialog window which appears will contain the correct value for the **Proxy realm** field:



In the

example above, the value for the **Proxy realm** field is as follows: `moz-proxy://172.30.178.10:8080`

- **Use passthrough authentication:** Must be enabled to allow single sign-on for the browser proxy.
- **Do not prompt for proxy authentication if credentials are saved:** Must be enabled to enable seamless single sign on for the browser proxy; suppresses the **Authentication Required** dialog.



The next time the user logs in to the device, the browser proxy is ready to use.

## Limiting the Number of Permitted Login Attempts

### Symptom

Users can attempt logging in as often and as fast as they want at the screen unlock prompt and local login prompts (e.g. for Kerberos, Shared Workplace, IGEL Smartcard).

### Problem

This leaves the system and remote sessions vulnerable to brute force login attacks.

### Solution

In IGEL OS *10.03.100* and newer, the number of login attempts is limited to 5 within 30 seconds.

These values can be changed in the system registry:

1. In Setup, go to **System > Registry**
2. Go to the `auth.login.lockout_threshold` parameter to set the maximum number of login attempts within the specified interval.
3. Go to the `auth.login.lockout_duration` parameter to set the interval in seconds.
4. Click **Apply** or **Ok**.

## Certificates

- [Certificate Enrollment and Renewal with SCEP \(NDES\)](#) (see page 465)
- [Deploying Trusted Root Certificates](#) (see page 485)
- [Which CA Certificates Are Contained in IGEL OS?](#) (see page 493)



## Certificate Enrollment and Renewal with SCEP (NDES)

SCEP is a protocol for certificate management which supports the secure issuance of certificates to network devices.

### Requirements

- SCEP server

The following SCEP server implementations can be used with IGEL Linux v5 or IGEL Linux 10:

- Windows 2008 Server with the Network Device Enrollment Service (NDES) role
- Windows 2012 Server
- Windows 2016 Server

For information on how to deploy the NDES, see <http://aka.ms/ndes>.

- Connection between the SCEP server and the certification authority (CA).

This document explains the enrollment of certificates with SCEP.

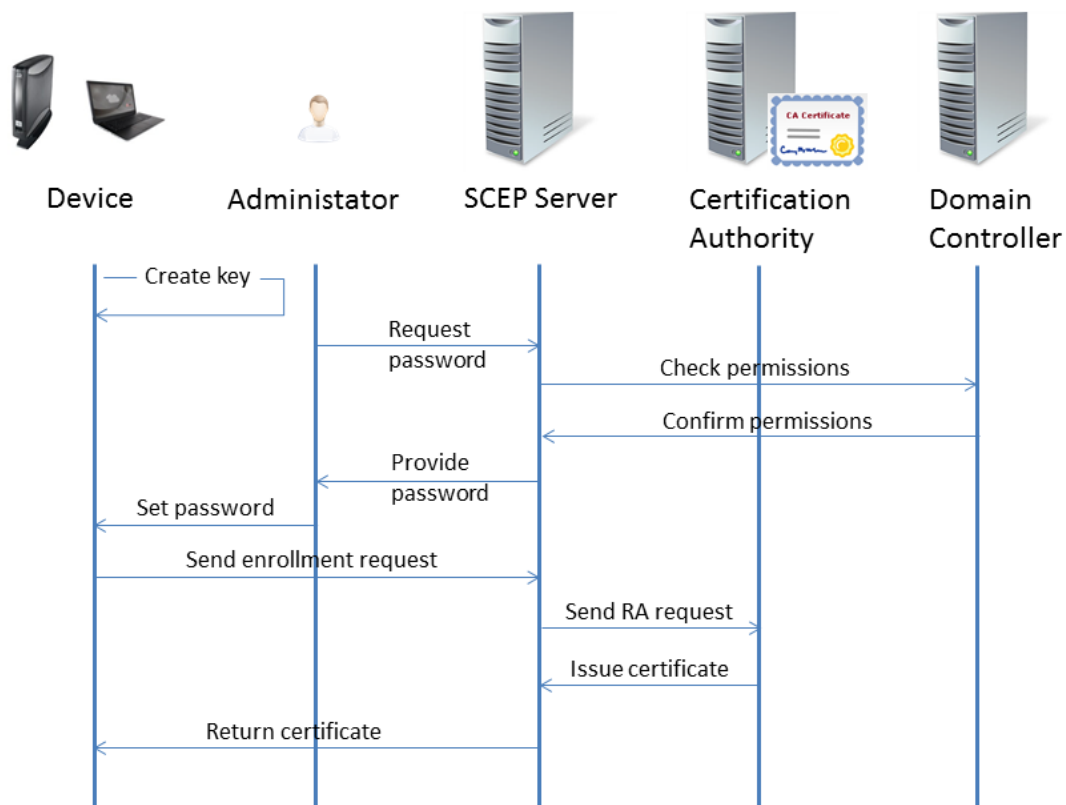
- [Technical Background](#) (see page 466)
- [Client Enrollment Details](#) (see page 468)
- [Configuration of the SCEP Client](#) (see page 470)
- [Files Involved](#) (see page 479)
- [Troubleshooting](#) (see page 480)

## Technical Background

The Simple Certificate Enrollment Protocol (SCEP) defines a way of automatically enrolling certificates for the authentication of network devices or VPNs. The client uses HTTP requests to fetch root certificates, to send certificate requests, and to fetch client certificates from the server.

For an in-deep description, see the Microsoft technet article "Network Device Enrollment Service (NDES) in Active Directory Certificate Services (AD CS)" under <http://aka.ms/ndes>.

Here is a typical certificate enrollment process:




1. The device creates an RSA public-private key pair.
2. The administrator requests a challenge password from the SCEP service (e. g. NDES).

**i** The challenge password is only required for the first enrollment request. For certificate renewal, the current certificate is used for authentication.

3. The SCEP server asks the domain controller if the administrator holds the required permissions for the configured certificate templates.
4. The domain controller confirms that the administrator holds the required permissions.

5. The SCEP server creates a challenge password and hands it over to the administrator.

 Typically, the challenge password expires after a defined time. With the NDES that is included in Windows 2008 Server, the default expiry time is 60 minutes.

6. The administrator provides the device with the challenge password, the CA identifier, and the fingerprint of the CA certificate.
7. The device sends the enrollment request to the SCEP server, using the challenge password to authenticate with the SCEP server. This action is triggered by the administrator.
8. The SCEP server signs the enrollment request with its enrollment agent certificate and sends it to the CA.
9. The CA issues the desired certificate and returns it to the SCEP server.
10. The SCEP server returns the certificate to the device.

## Client Enrollment Details

This section describes the actual certificate enrollment in detail. The process described here corresponds to step 7 to 10 in the [overall process](#) (see page 466).

i The enrollment request and the response from the CA that contains the req

1. The client requests the CA's public certificate from the SCEP server.
2. The SCEP server sends the CA's public certificate to the client.
3. The client checks the CA's public certificate against the relevant fingerprint. The fingerprint has been provided by the administrator via a UMS profile; see [Defining the Certification Authority](#) (see page 475).
4. The client sends an enrollment request to the SCEP server. This enrollment request is an HTTP GET request that contains the following:

Signed data PKCS7	Enveloped data PKCS7	Certificate Signing Request (PKCS 10)
Version		
Hashing algorithm		
Signed (unencrypted) data:	Version	
Recipient and related encrypted data encryption key; the recipient is the CA.		
Encrypted data: (encrypted with a randomly generated key that is encrypted with the recipient's public key)	Version	
Requested subject name		
Public key of client		
Challenge password		
Requested extensions		
Signature algorithm		
Digital signature		
Client certificate		
Digital signature		

5. If the request was successful, the HTTP response from the SCEP server includes the following data:

Signed data PKCS7	Enveloped data PKCS7	Degenerate Certificates (only PKCS7)
Version		
Hashing algorithm		
Signed (unencrypted) data:	Version	
List of recipients		
Encrypted data:	Version	
Issued X.509 certificate		
CA certificate		
Digital signature		

## Configuration of the SCEP Client

The configuration of the SCEP client on the IGEL OS device is carried out as follows:

- [Creating a Profile in the UMS \(see page 471\)](#)
- [Activating the SCEP Client \(see page 472\)](#)
- [Entering the Data for the Certificate Signing Request \(CSR\) \(see page 473\)](#)
- [Defining the Certification Authority \(CA\) \(see page 475\)](#)
- [Providing the SCEP Server Data \(see page 476\)](#)
- [Applying the Profile to the Devices \(see page 477\)](#)

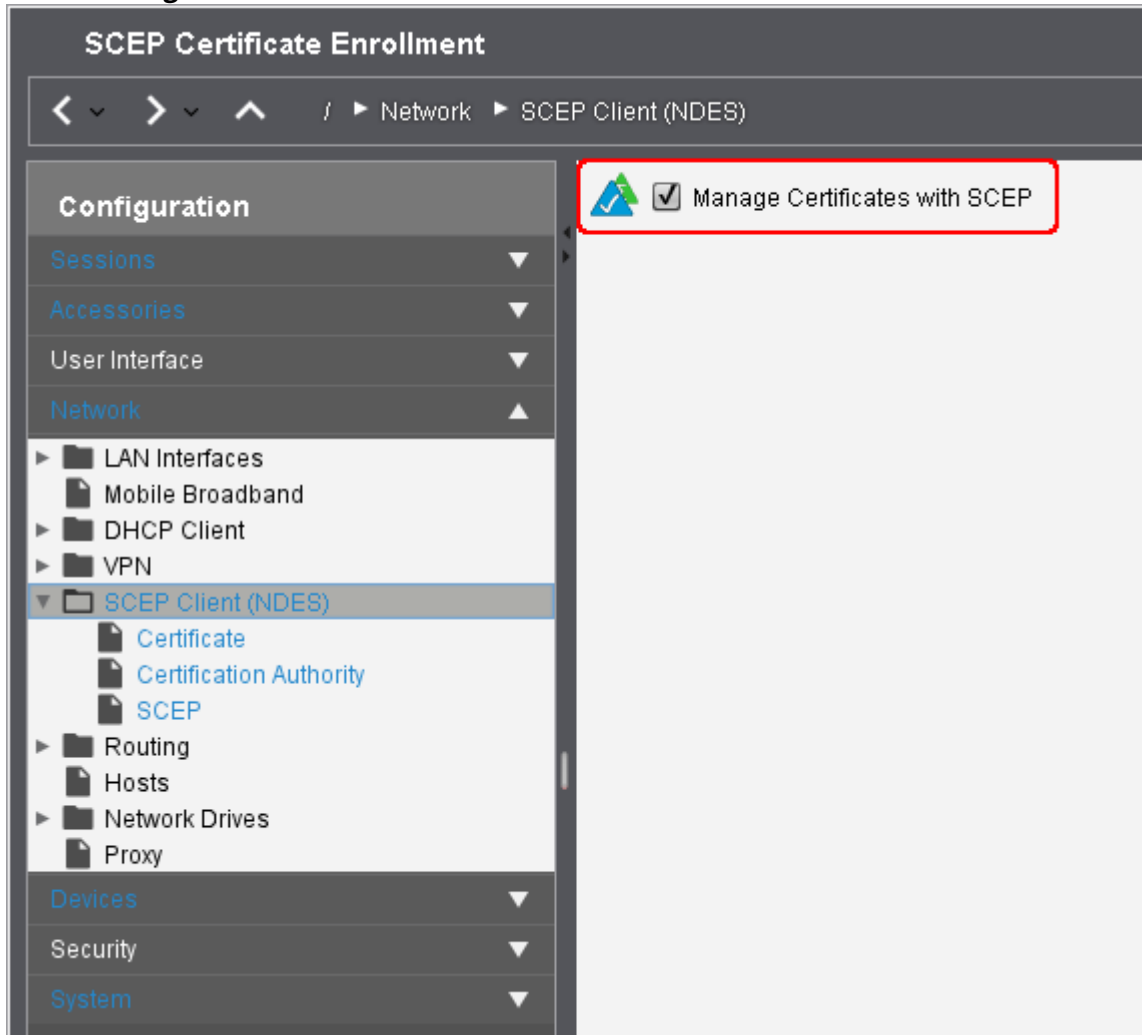
## Creating a Profile in the UMS

1. In the UMS structure tree, go to **Profiles**, open the context menu and select **New Profile**.
2. Enter an appropriate **Profile Name**.
3. In the **Based on** menu, select the firmware version that is installed on the devices in question.
4. Click **OK**.

The configuration dialog opens. The configuration dialog corresponds to the IGEL Setup available on the devices to which the profile is assigned.

### Activating the SCEP Client

1. Go to **Network > SCEP Client (NDES)**.
2. Enable **Manage Certificates with SCEP**.






## Entering the Data for the Certificate Signing Request (CSR)

► Go to **Network > SCEP Client (NDES) > Certificate** and enter the following data:

**Type of CommonName/SubjectAltName:** The characteristic for linking the certificate to the device.

- IP address: The IP address of the device.
- DNS name: The DNS name of the device.
- IP address (auto): The IP address of the device (inserted automatically).
- DNS name (auto): The DNS name of the device (inserted automatically).
- Email address: An email address.
- DNS name as UPN (auto).

 If the client automatically obtains its network name, **DNS Name (auto)** is a good type for the client certificate.

**CommonName/SubjectAltName:** Give a designation which matches the **Type of CommonName/SubjectAltName**. For certain types, this occurs automatically. No entry is then required.

**Organizational unit:** Stipulated by the certification authority.

**Organization:** A freely definable designation for the organization to which the client belongs.

**Locality:** Details regarding the device's locality. Example: "Augsburg".


**State:** Details regarding the device's locality. Example: "Bayern".

**Country:** Two-digit ISO 3166-1 country code. Example: "DE".

**RSA key length (bits):** Select a key length (one suited to the certification authority) for the certificate that is to be issued.

Possible values:

- "1024"
- "2048"
- "4096"

 The RSA key length specified here must not be lower than the minimum key length configured on the server.

**SCEP Certificate Enrollment**

Navigation: / > Network > SCEP Client (NDES) > Certificate

**Configuration**

- Sessions
- Accessories
- User Interface
- Network**
  - LAN Interfaces
  - Mobile Broadband
  - DHCP Client
  - VPN
  - SCEP Client (NDES)**
    - Certificate**
    - Certification Authority
    - SCEP
  - Routing
  - Hosts
  - Network Drives
  - Proxy
- Devices
- Security
- System

Search

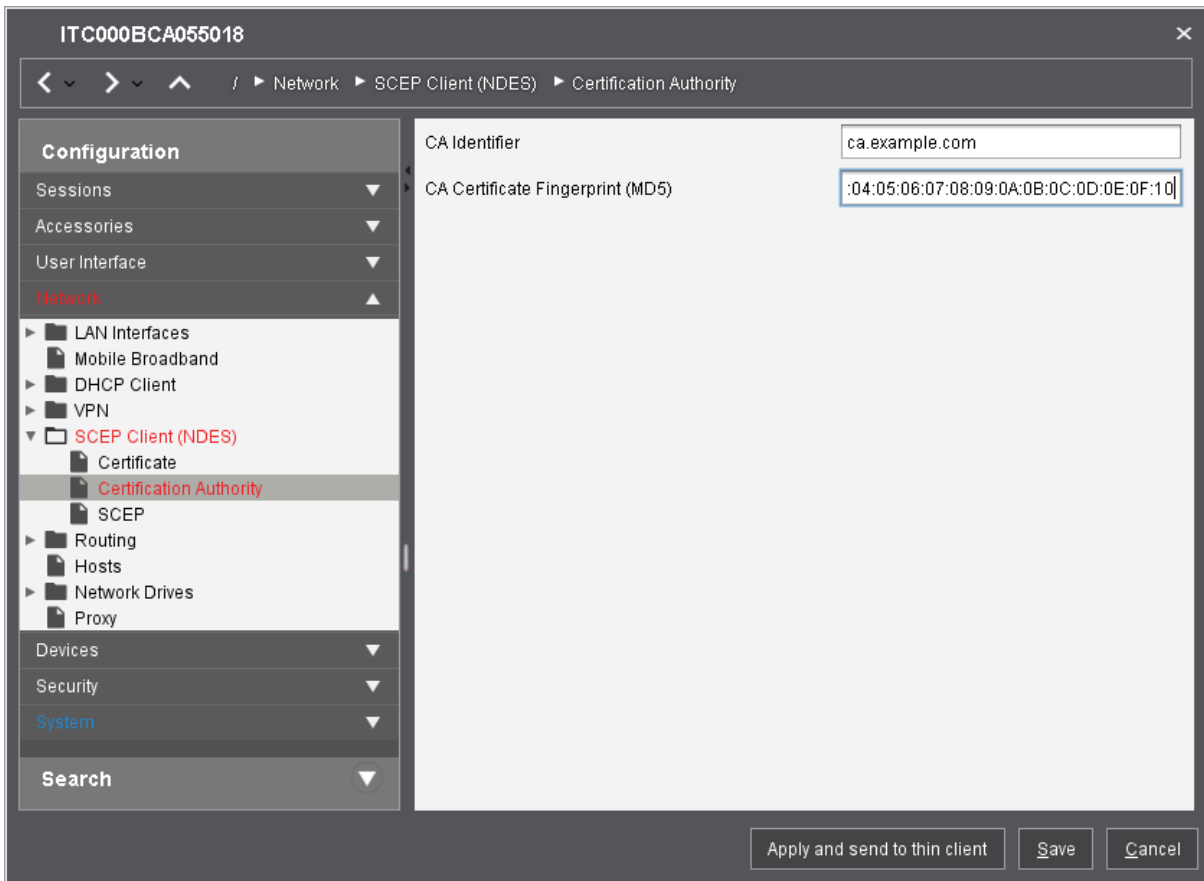
Type of CommonName/SubjectAltName	<input checked="" type="checkbox"/> DNS Name (auto)
CommonName/SubjectAltName	<input type="text"/>
Organizational Unit	<input checked="" type="checkbox"/> Technical Documentation
Organization	<input checked="" type="checkbox"/> IGEL Technology
Locality	<input checked="" type="checkbox"/> Augsburg
State	<input checked="" type="checkbox"/> Bayern
Country	<input checked="" type="checkbox"/> DE
RSA Key Length (bits)	<input checked="" type="checkbox"/> 1024

Apply and send to thin client   Save   Cancel

### Defining the Certification Authority (CA)

1. Go to **Network > SCEP Client (NDES) > Certification Authority**.
2. Enter the details for the certification authority (CA):
  - **CA Identifier:** FQDN (fully qualified domain name) of the CA
  - **CA Certificate Fingerprint (MD5):** Fingerprint of the CA certificate in the form  
`01:02:03:04:05:06:07:08:09:0A:0B:0C:0D:0E:0F:10`


i You can get the fingerprint from your NDES server: `https://<NDES Servername>/certsrv/mscep_admin`




If the CA certificate fingerprint is specified, the client will use it to check the integrity of the CA certificate it receives from the SCEP server.


## Providing the SCEP Server Data

1. Go to **Network > SCEP Client (NDES) > SCEP**.
2. Enter the following data:
  - **SCEP server URL:** URL by which the SCEP client communicates with the SCEP server.

 HTTPS is not supported; however, all security critical data that are transferred between the SCEP client and other components are encrypted.

- **Proxy server for SCEP requests** (optional): IP address or host name of the proxy server that is used for the communication between the device and the SCEP server. If a web application firewall is used instead of a proxy, its IP address or host name of the proxy server must be entered here.
- **Challenge password:** Password that the SCEP client must present to the SCEP server in its request (CSR).

 On a Microsoft NDES server, you can retrieve the password by default under `https:///certsrv/mscep_admin`.


 By default, the password on a Microsoft NDES server is valid for 1 hour and can be used only once. In order to use the password on numerous devices, additional settings must be made on the NDES server. For information, see the section "Password and Password Cache" on <https://social.technet.microsoft.com><sup>44</sup>.

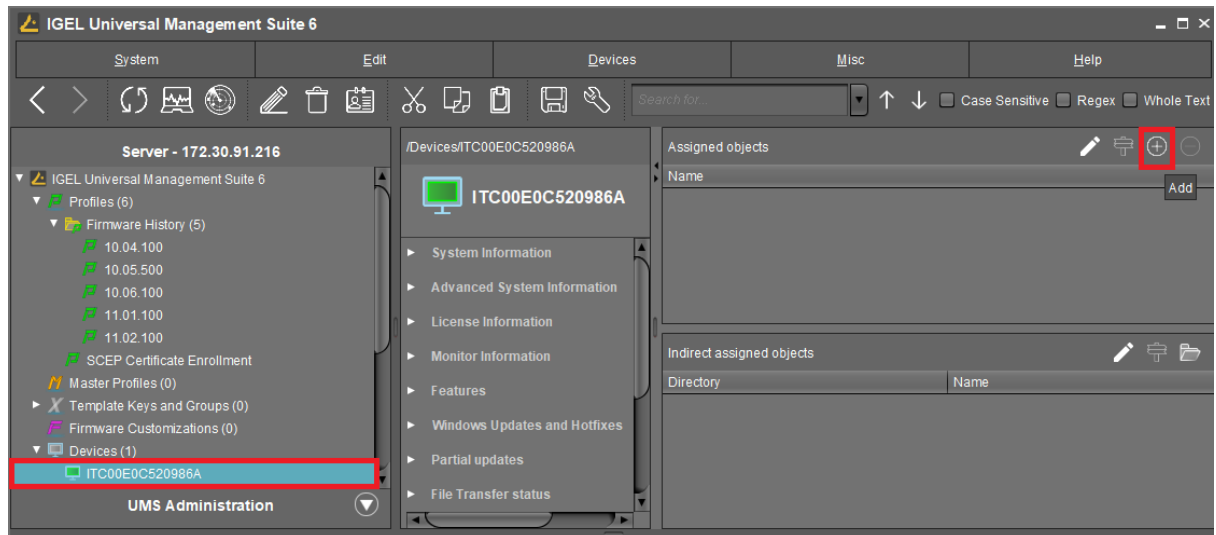
- **Certificate renewal period (days):** Time interval before certificate expiry after which the certificate renewal procedure is started. (Default: 30)
  - **Certificate expiry check interval (days):** Specifies how often the certificate is checked against its expiry date. (Default: 1)
3. Save the settings.


---

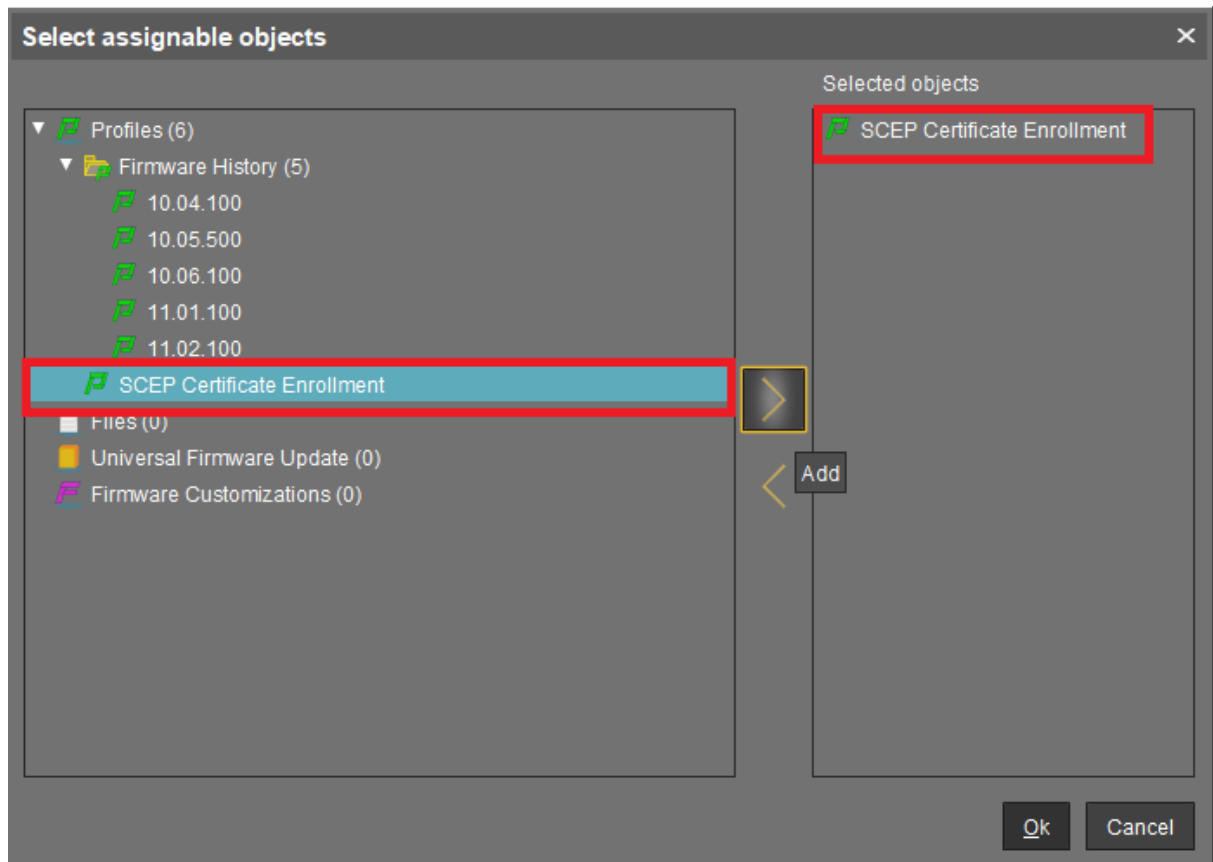
<sup>44</sup> <https://social.technet.microsoft.com/wiki/contents/articles/9063.active-directory-certificate-services-ad-cs-network-device-enrollment-service-ndes.aspx>

### Applying the Profile to the Devices

1. In the UMS structure tree under **Devices**, select the devices you want to assign the profile to.
2. In the **Assigned objects** area, click .



3. In the **Select assignable objects** dialog, select the relevant profile and click  to assign it.



4. Click **Ok**.
5. In the **Update time** dialog, select **Now** and click **Ok**.  
The device performs the actions as described in [Client Enrollment Details](#) (see page 468).

## Files Involved

All files involved are stored in the directory `/wfs/scep_certificates/cert0`. The following fixed file names are used:

<code>cacert.pem</code>	CA certificate
<code>racert_enc.pem</code>	RA certificate used for encryption (optional)
<code>racert_sig.pem</code>	RA certificate used for signature (optional)
<code>client.csr</code>	Certificate signing request
<code>client.cert</code>	Client certificate
<code>client.key</code>	Private key of client certificate

## Troubleshooting

- [Diagnostics](#) (see page 481)

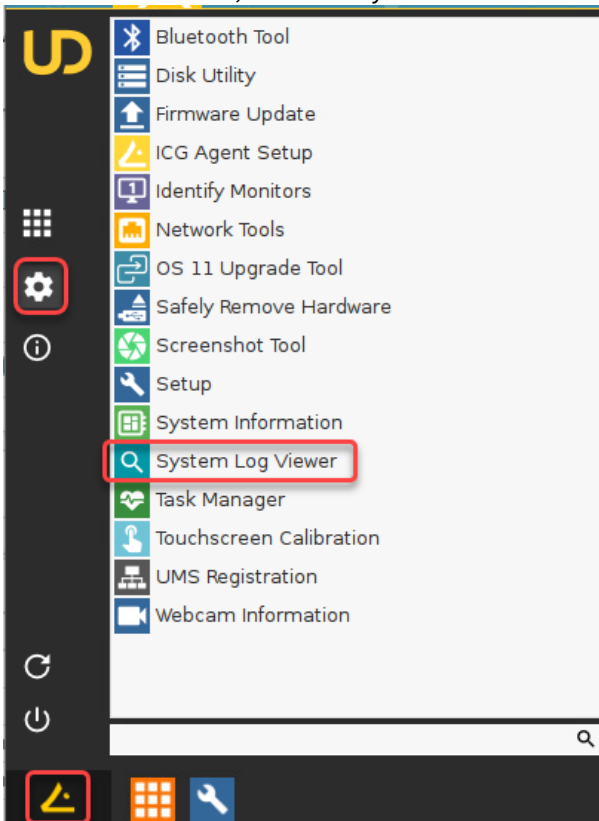


## Diagnostics

Preliminary: Tools

### System Log Viewer

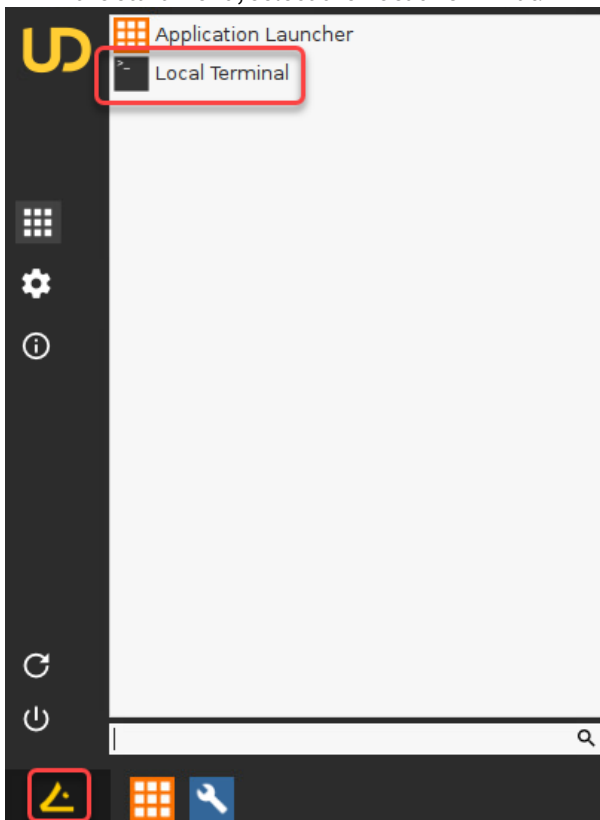
► In the start menu, select the system icon and then **System Log Viewer** to open the system log viewer.



For more information on starting, using, and configuring the system log viewer, see the System Log Viewer chapter of the IGEL OS Manual.

### Local Terminal

► In the start menu, select the **Local Terminal**.



If a local terminal session has not been set up on your device, proceed as follows:

1. Open the Setup and go to **Accessories > Terminals**.
2. Click **+** to create a local terminal session.
3. Click **Ok** to save the setting and exit the Setup.

For more information on starting and using the local terminal, see the Terminals chapter of the IGEL OS Manual.

#### Checking the Current Status of the Client Certificate Enrollment

► In the local terminal, enter the command `cert_show_status`

The status for each certificate relating to SCEP is shown:

- CA certificate
- RA encryption certificate
- RA signature certificate
- Client certificate

#### Reviewing Log Messages

1. Open the system log viewer and select `/tmp/journal.log`
2. Press **[Ctrl] + [F]** and enter `cert_agent` to search for relevant messages.

Alternatively, you can open a local terminal and enter `journalctl | grep cert_agent`

#### Reviewing the Certificates and Certificate Requests in the File System

1. Open a local terminal and login as `user` .
2. Enter `ls /wfs/scep-certificates/cert0/`

#### Deleting a Certificate Request

1. Open a local terminal and login as `root` .
2. Enter `rm -rf /wfs/scep-certificates/cert0/`  
The directory that includes the certificate request, received certificates (if existing), and the device's own private client key, is deleted. This can be useful for debugging purposes, and if SCEP is no longer used.

#### Checking the CA

1. Open a local terminal and login as `root` .
2. Enter `scep_getca 0`

#### Generating an SCEP Request Manually

1. Open a local terminal and login as `root` .
2. Enter `scep_mkrequest 0`

#### Enrolling a Certificate Manually

1. Open a local terminal and login as `root` .
2. Enter `scep_enroll 0`

#### Testing Certificate Renewal

1. Open a local terminal and login as `root` .
2. Generate an SCEP request and append "new" to the key file name: `scep_mkrequest 0`  
`"new"`

An SCEP request is issued. In the directory `/wfs/scep-certificates/cert0/` , the key file `clientnew.key` is created.

3. Renew the certificate: `scep_renew 0`
4. Overwrite the old certificate with the new one: `mv /wfs/scep-certificates/cert0/clientnew.cert /wfs/scep-certificates/cert0/client.cert`

5. Overwrite the old key with the new one: `mv /wfs/scep-certificates/cert0/clientnew.key /wfs/scep-certificates/cert0/client.key`

## Deploying Trusted Root Certificates

### Purpose

IGEL OS comes with a number of trusted root certificates from certain Certificate Authorities (CA) pre-installed. For a complete list of pre-installed root certificates, see [CA Certificates Contained in IGEL OS 11.01.100](#).

Certificates signed with these root certificates can be used for server authentication and encryption in ICA, RDP, Horizon and browser sessions. You can also verify the origin of Java applications.

Nevertheless, the root certificate you need might be missing. This document explains how to load and distribute it.

### Requirements

The certificates must be available in the Base64 file format encoded with the file extension `.pem`, `.crt` or `.cer`.

To check the file format, open the certificate with a text editor. It should look like this:

```
-----BEGIN CERTIFICATE-----
MIIDWzCCAkOgAwIBAgIQa64BW7UV06dG
MRQwEgYKCZImiZPYLGBGRYEdGVzdDEI
...
3iNjPsZgHJs9LmHM9mmy5q29z8B0GZUJl
JUzn3SvfZTuzSxw+DXH9MdQPZVDCeMyx
-----END CERTIFICATE-----
```

### Solution

We advise you to use the following file transfer types for distributing the certificates via the UMS; see also [Registering a File on the UMS Server](#):

Type	To be used for
Undefined	All-purpose class, you need to set the owner and access permissions manually.
Web Browser Certificate	Server authentication/encryption of HTTPS websites in browsers
SSL Certificate	Server authentication/encryption in ICA, RDP or Horizon sessions Authentication via Active Directory (AD)
Java Certificate	Authentication/encryption for Java applications

IBM iAccess Certificate	Server authentication/encryption for IBM iAccess sessions
Common Certificate (all-purpose)	Multiple applications needing a certificate, e.g. if you want to launch an ICA session in a browser, or if you want to secure a Java session on a secure website.

With these file transfer types, you will not need to reboot after installing.

- [Deploying Certificates via UMS](#) (see page 487)
- [Installing Certificates Manually](#) (see page 490)

## Deploying Certificates via UMS

We advise you to use the Universal Management Suite for deploying certificates when you have a certain number of clients to be addressed.

Certificates can be deployed via the UMS in two steps:

- [Loading Certificates in the UMS](#) (see page 488)
- [Assigning Certificates to IGEL Thin Clients](#) (see page 489)

## Loading Certificates in the UMS

1. Open the **UMS console**.
2. Right-click **Files**.
3. Choose **New file** to open the **New file** mask.
4. Activate **Upload local file to UMS server**.
5. Browse your new certificate file under **Local file**.
6. Select the suitable **Classification** of the certificate under **File target**.
7. Confirm with **OK**.

Your certificate is now listed in the **Files** window.

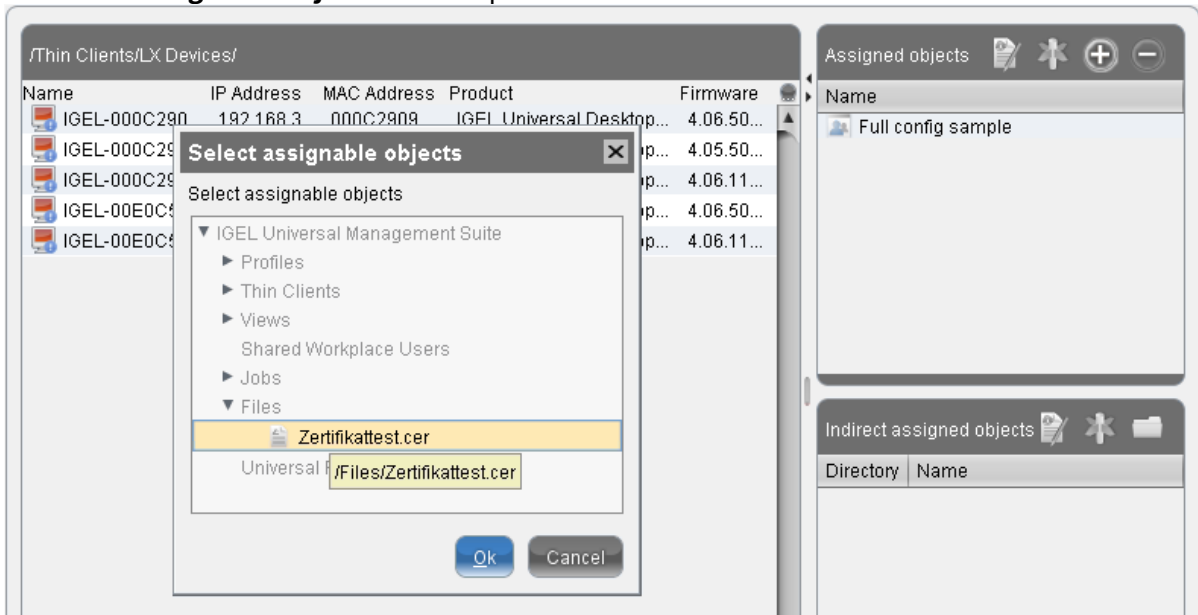


### Assigning Certificates to IGEL Thin Clients

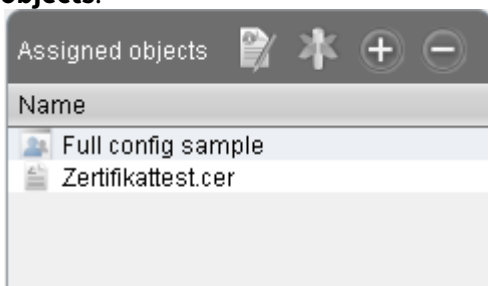
After integrating the new certificates, you distribute them to the thin clients:

1. Choose one thin client or a group of thin clients in the UMS tree.
2. Click **Add** under **Assigned objects**.

The **Select assignable object** window opens.



3. Select the new certificate and confirm by clicking on **OK**.
  4. Select the **Update time** and confirm by clicking on **OK**.
- The new certificate is now assigned to every thin client of the group and is listed under **Assigned objects**.



## Installing Certificates Manually

Use the **Firefox Certificate Manager** in order to install web browser certificates; see [Installing Web Browser Certificates](#) (see page 492).

Also a USB flash drive can be used for the manual import.

## Importing SSL Certificates (ICA, RDP, Horizon)

If a CA certificate is missing for *RDP*, *ICA* or *Horizon*, you can copy it from a USB storage device to the thin client:

1. Connect your USB storage device to the thin client.
2. Launch a **Terminal** session or press [CTRL]+[ALT]+[F11] to log in as **ROOT** on the Linux console of the thin client.
3. Create a directory for certificates:  


```
mkdir /wfs/ca-certs
```
4. Change to the directory:  

```
cd /wfs/ca-certs
```
5. Get the name of your USB storage device:  

```
ls /userhome/media
```
6. Copy the certificate to the client:  

```
cp /userhome/media// /wfs/ca-certs
```
7. Check whether the certificate was transferred:  

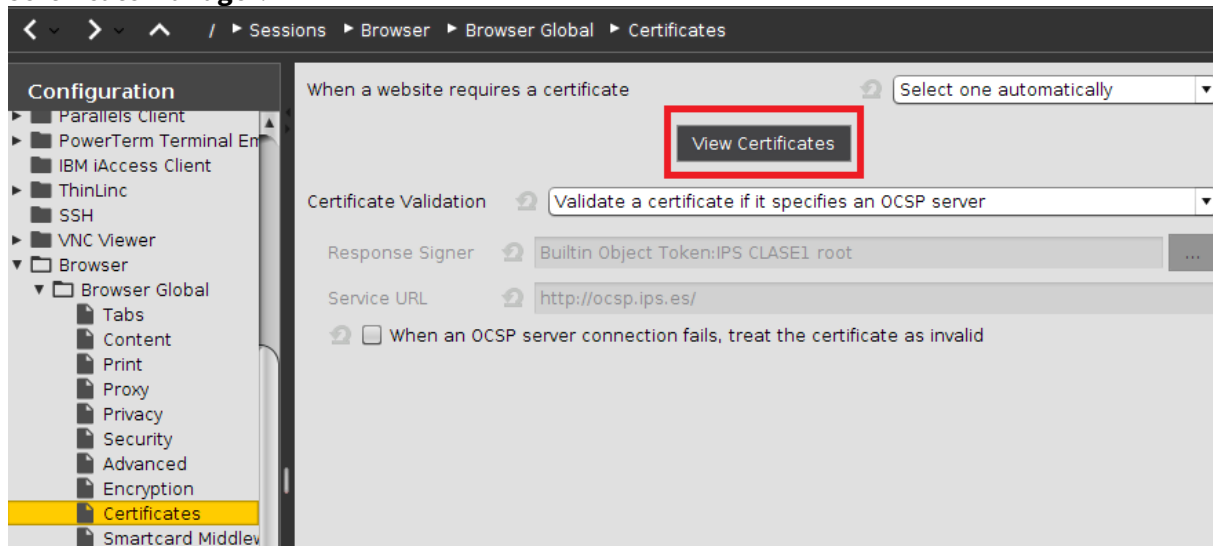
```
ls -al /wfs/ca-certs
```
8. End the terminal session or press [CTRL]+[ALT]+[F1] to exit the console.

 The certificates you have saved will be available when you boot up the thin client next time.

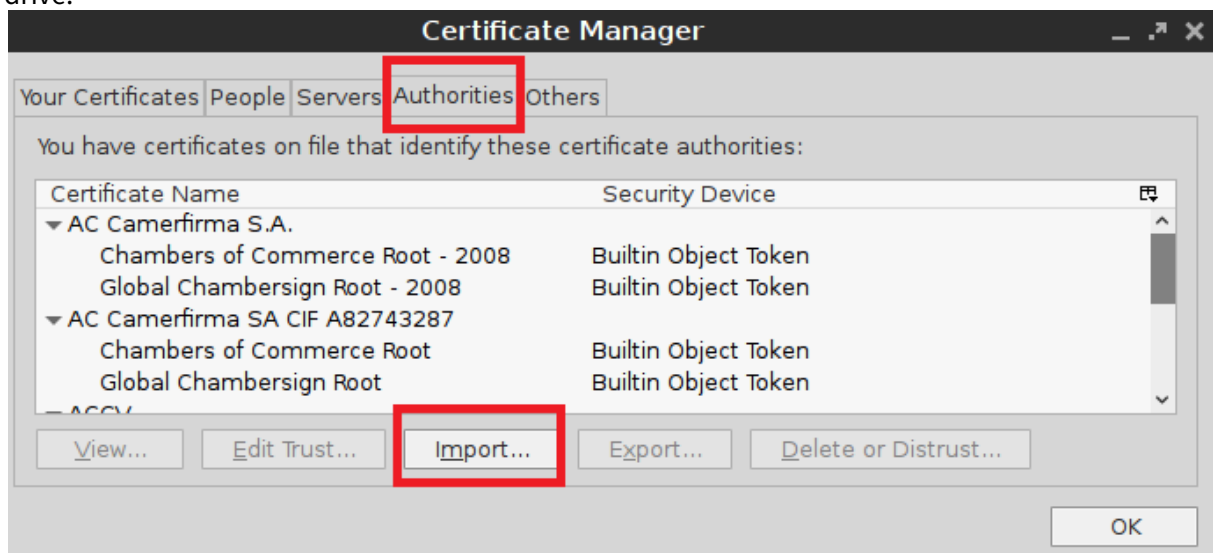
## Installing Web Browser Certificates

Installing web browser certificates manually:

1. Open the IGEL Setup.
2. Click **Sessions > Browser > Browser Global > Certificates > View Certificates** to open the **Firefox Certificate Manager**.



3. Click **Import...** in the **Authorities** tab to import a new certificate from a directory or a USB flash drive.



Manually installed certificates will be saved permanently without any further configuration.

## Which CA Certificates Are Contained in IGEL OS?

The following CA certificates are contained in IGEL OS 11.01.100:

Certificate name	Expiry date	File in /etc/ssl/certs
ACCVRAIZ1	Dec 31 09:37:37 2030 GMT	ACCVRAIZ1.crt
ACEDICOM Root	Apr 13 16:24:22 2028 GMT	ACEDICOM_Root.crt
AC RAIZ FNMT-RCM	Jan 1 00:00:00 2030 GMT	AC_RAIZ_FNMT-RCM.crt
Actalis Authentication Root CA	Sep 22 11:22:02 2030 GMT	Actalis_Authentication_Root_CA.crt
AddTrust External CA Root	May 30 10:48:38 2020 GMT	AddTrust_External_Root.crt
AddTrust Class 1 CA Root	May 30 10:38:31 2020 GMT	AddTrust_Low-Value_Services_Root.crt
AddTrust Public CA Root	May 30 10:41:50 2020 GMT	AddTrust_Public_Services_Root.crt
AddTrust Qualified CA Root	May 30 10:44:50 2020 GMT	AddTrust_Qualified_Certificates_Root.crt
AffirmTrust Commercial	Dec 31 14:06:06 2030 GMT	AffirmTrust_Commercial.crt
AffirmTrust Networking	Dec 31 14:08:24 2030 GMT	AffirmTrust_Networking.crt
AffirmTrust Premium	Dec 31 14:10:36 2040 GMT	AffirmTrust_Premium.crt
AffirmTrust Premium ECC	Dec 31 14:20:24 2040 GMT	AffirmTrust_Premium_ECC.crt
Amazon Root CA 1	Jan 17 00:00:00 2038 GMT	Amazon_Root_CA_1.crt

<b>Certificate name</b>	<b>Expiry date</b>	<b>File in /etc/ssl/certs</b>
Amazon Root CA 2	May 26 00:00:00 2040 GMT	Amazon_Root_CA_2.crt
Amazon Root CA 3	May 26 00:00:00 2040 GMT	Amazon_Root_CA_3.crt
Amazon Root CA 4	May 26 00:00:00 2040 GMT	Amazon_Root_CA_4.crt
Atos TrustedRoot 2011	Dec 31 23:59:59 2030 GMT	Atos_TrustedRoot_2011.crt
Autoridad de Certificacion Firmaprofesional CIF A62634068	Dec 31 08:38:15 2030 GMT	Autoridad_de_Certificacion_Firmaprofesional_CIF_A62634068.crt
Baltimore CyberTrust Root	May 12 23:59:00 2025 GMT	Baltimore_CyberTrust_Root.crt
Buypass Class 2 Root CA	Oct 26 08:38:03 2040 GMT	Buypass_Class_2_Root_CA.crt
Buypass Class 3 Root CA	Oct 26 08:28:58 2040 GMT	Buypass_Class_3_Root_CA.crt
CA Disig Root R1	Jul 19 09:06:56 2042 GMT	CA_Disig_Root_R1.crt
CA Disig Root R2	Jul 19 09:15:30 2042 GMT	CA_Disig_Root_R2.crt
CFCA EV ROOT	Dec 31 03:07:01 2029 GMT	CFCA_EV_ROOT.crt
CNNIC ROOT	Apr 16 07:09:14 2027 GMT	CNNIC_ROOT.crt
COMODO Certification Authority	Dec 31 23:59:59 2029 GMT	COMODO_Certification_Authority.crt
COMODO ECC Certification Authority	Jan 18 23:59:59 2038 GMT	COMODO_ECC_Certification_Authority.crt
COMODO RSA Certification Authority	Jan 18 23:59:59 2038 GMT	COMODO_RSA_Certification_Authority.crt

Certificate name	Expiry date	File in /etc/ssl/certs
Chambers of Commerce Root	Sep 30 16:13:44 2037 GMT	Camerfirma_Chambers_of_Commerce_Root.crt
Global Chambersign Root	Sep 30 16:14:18 2037 GMT	Camerfirma_Global_Chamb ersign_Root.crt
Certigna	Jun 29 15:13:05 2027 GMT	Certigna.crt
Certinomis - Autorité Racine	Sep 17 08:28:59 2028 GMT	Certinomis_ _Autorité_Racine.crt
Certinomis - Root CA	Oct 21 09:17:18 2033 GMT	Certinomis_ _Root_CA.crt
Class 2 Primary CA	Jul 6 23:59:59 2019 GMT	Certplus_Class_2_Primar y_CA.crt
Certplus Root CA G1	Jan 15 00:00:00 2038 GMT	Certplus_Root_CA_G1.crt
Certplus Root CA G2	Jan 15 00:00:00 2038 GMT	Certplus_Root_CA_G2.crt
Certum CA	Jun 11 10:46:39 2027 GMT	Certum_Root_CA.crt
Certum Trusted Network CA	Dec 31 12:07:37 2029 GMT	Certum_Trusted_Network_ CA.crt
Certum Trusted Network CA 2	Oct 6 08:39:56 2046 GMT	Certum_Trusted_Network_ CA_2.crt
Chambers of Commerce Root - 2008	Jul 31 12:29:50 2038 GMT	Chambers_of_Commerce_Ro ot_-_2008.crt
China Internet Network Information Center EV Certificates Root	Aug 31 07:11:25 2030 GMT	China_Internet_Network_ Information_Center_EV_Ce rtificates_Root.crt

Certificate name	Expiry date	File in /etc/ssl/certs
AAA Certificate Services	Dec 31 23:59:59 2028 GMT	Comodo_AAA_Services_root.crt
Secure Certificate Services	Dec 31 23:59:59 2028 GMT	Comodo_Secure_Services_root.crt
Trusted Certificate Services	Dec 31 23:59:59 2028 GMT	Comodo_Trusted_Services_root.crt
Cybertrust Global Root	Dec 15 08:00:00 2021 GMT	Cybertrust_Global_Root.crt
D-TRUST Root Class 3 CA 2 2009	Nov 5 08:35:58 2029 GMT	D-TRUST_Root_Class_3_CA_2_2009.crt
D-TRUST Root Class 3 CA 2 EV 2009	Nov 5 08:50:46 2029 GMT	D-TRUST_Root_Class_3_CA_2_EV_2009.crt
DST ACES CA X6	Nov 20 21:19:58 2017 GMT	DST_ACES_CA_X6.crt
DST Root CA X3	Sep 30 14:01:15 2021 GMT	DST_Root_CA_X3.crt
Deutsche Telekom Root CA 2	Jul 9 23:59:00 2019 GMT	Deutsche_Telekom_Root_CA_2.crt
DigiCert Assured ID Root CA	Nov 10 00:00:00 2031 GMT	DigiCert_Assured_ID_Root_CA.crt
DigiCert Assured ID Root G2	Jan 15 12:00:00 2038 GMT	DigiCert_Assured_ID_Root_G2.crt
DigiCert Assured ID Root G3	Jan 15 12:00:00 2038 GMT	DigiCert_Assured_ID_Root_G3.crt



Certificate name	Expiry date	File in /etc/ssl/certs
DigiCert Global Root CA	Nov 10 00:00:00 2031 GMT	DigiCert_Global_Root_CA.crt
DigiCert Global Root G2	Jan 15 12:00:00 2038 GMT	DigiCert_Global_Root_G2.crt
DigiCert Global Root G3	Jan 15 12:00:00 2038 GMT	DigiCert_Global_Root_G3.crt
DigiCert High Assurance EV Root CA	Nov 10 00:00:00 2031 GMT	DigiCert_High_Assurance_EV_Root_CA.crt
DigiCert Trusted Root G4	Jan 15 12:00:00 2038 GMT	DigiCert_Trusted_Root_G4.crt
E-Tugra Certification Authority	Mar 3 12:09:48 2023 GMT	E-Tugra_Certification_Authority.crt
EC-ACC	Jan 7 22:59:59 2031 GMT	EC-ACC.crt
EE Certification Centre Root CA	Dec 17 23:59:59 2030 GMT	EE_Certification_Centre_Root_CA.crt
<a href="http://Entrust.net">Entrust.net</a> <sup>45</sup> Certification Authority (2048)	Jul 24 14:15:12 2029 GMT	Entrust.net_Premium_2048_Secure_Server_CA.crt
Entrust Root Certification Authority	Nov 27 20:53:42 2026 GMT	Entrust_Root_Certification_Authority.crt
Entrust Root Certification Authority - EC1	Dec 18 15:55:36 2037 GMT	Entrust_Root_Certification_Authority_-_EC1.crt
Entrust Root Certification Authority - G2	Dec 7 17:55:54 2030 GMT	Entrust_Root_Certification_Authority_-_G2.crt

<sup>45</sup> <http://Entrust.net>

Certificate name	Expiry date	File in /etc/ssl/certs
GeoTrust Global CA	May 21 04:00:00 2022 GMT	GeoTrust_Global_CA.crt
GeoTrust Global CA 2	Mar 4 05:00:00 2019 GMT	GeoTrust_Global_CA_2.crt
GeoTrust Primary Certification Authority	Jul 16 23:59:59 2036 GMT	GeoTrust_Primary_Certification_Authority.crt
GeoTrust Primary Certification Authority - G2	Jan 18 23:59:59 2038 GMT	GeoTrust_Primary_Certification_Authority_-_G2.crt
GeoTrust Primary Certification Authority - G3	Dec 1 23:59:59 2037 GMT	GeoTrust_Primary_Certification_Authority_-_G3.crt
GeoTrust Universal CA	Mar 4 05:00:00 2029 GMT	GeoTrust_Universal_CA.crt
GeoTrust Universal CA 2	Mar 4 05:00:00 2029 GMT	GeoTrust_Universal_CA_2.crt
GlobalSign	Jan 19 03:14:07 2038 GMT	GlobalSign_ECC_Root_CA_-_R4.crt
GlobalSign	Jan 19 03:14:07 2038 GMT	GlobalSign_ECC_Root_CA_-_R5.crt
GlobalSign Root CA	Jan 28 12:00:00 2028 GMT	GlobalSign_Root_CA.crt
GlobalSign	Dec 15 08:00:00 2021 GMT	GlobalSign_Root_CA_-_R2.crt
GlobalSign	Mar 18 10:00:00 2029 GMT	GlobalSign_Root_CA_-_R3.crt

<b>Certificate name</b>	<b>Expiry date</b>	<b>File in /etc/ssl/certs</b>
Global Chambersign Root - 2008	Jul 31 12:31:40 2038 GMT	Global_Chambersign_Root -_2008.crt
Go Daddy Class 2 Certification Authority	Jun 29 17:06:20 2034 GMT	Go_Daddy_Class_2_CA.crt
Go Daddy Root Certificate Authority - G2	Dec 31 23:59:59 2037 GMT	Go_Daddy_Root_Certifica te_Authority_-_G2.crt
Hellenic Academic and Research Institutions ECC RootCA 2015	Jun 30 10:37:12 2040 GMT	Hellenic_Academic_and_R esearch_Institutions_ECC _RootCA_2015.crt
Hellenic Academic and Research Institutions RootCA 2011	Dec 1 13:49:52 2031 GMT	Hellenic_Academic_and_R esearch_Institutions_Roo tCA_2011.crt
Hellenic Academic and Research Institutions RootCA 2015	Jun 30 10:11:21 2040 GMT	Hellenic_Academic_and_R esearch_Institutions_Roo tCA_2015.crt
Hongkong Post Root CA 1	May 15 04:52:29 2023 GMT	Hongkong_Post_Root_CA_1 .crt
ISRG Root X1	Jun 4 11:04:38 2035 GMT	ISRG_Root_X1.crt
IdenTrust Commercial Root CA 1	Jan 16 18:12:23 2034 GMT	IdenTrust_Commercial_Ro ot_CA_1.crt
IdenTrust Public Sector Root CA 1	Jan 16 17:53:32 2034 GMT	IdenTrust_Public_Sector _Root_CA_1.crt
Imprivata Embedded Code Signing CA	Sep 7 16:20:00 2033 GMT	Imprivata.crt

Certificate name	Expiry date	File in /etc/ssl/certs
<a href="http://lzenpe.com">lzenpe.com</a> <sup>46</sup>	Dec 13 08:27:25 2037 GMT	<a href="http://lzenpe.com">Izenpe.com</a> <sup>47</sup> .crt
LuxTrust Global Root 2	Mar 5 13:21:57 2035 GMT	LuxTrust_Global_Root_2.crt
Microsec e-Szigno Root CA 2009	Dec 30 11:30:18 2029 GMT	Microsec_e-Szigno_Root_CA_2009.crt
NetLock Arany (Class Gold) Főtanúsítvány	Dec 6 15:08:21 2028 GMT	NetLock_Arany_Class_Gold_Főtanúsítvány.crt
Network Solutions Certificate Authority	Dec 31 23:59:59 2029 GMT	Network_Solutions_Certificate_Authority.crt
OISTE WISEKey Global Root GA CA	Dec 11 16:09:51 2037 GMT	OISTE_WISEKey_Global_Root_GA_CA.crt
OISTE WISEKey Global Root GB CA	Dec 1 15:10:31 2039 GMT	OISTE_WISEKey_Global_Root_GB_CA.crt
OpenTrust Root CA G1	Jan 15 00:00:00 2038 GMT	OpenTrust_Root_CA_G1.crt
OpenTrust Root CA G2	Jan 15 00:00:00 2038 GMT	OpenTrust_Root_CA_G2.crt
OpenTrust Root CA G3	Jan 15 00:00:00 2038 GMT	OpenTrust_Root_CA_G3.crt
Autoridad de Certificacion Raiz del Estado Venezolano	Dec 25 23:59:59 2020 GMT	PSCProcert.crt
QuoVadis Root Certification Authority	Mar 17 18:33:33 2021 GMT	QuoVadis_Root_CA.crt

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<sup>46</sup> <http://lzenpe.com>

<sup>47</sup> <http://lzenpe.com>

Certificate name	Expiry date	File in /etc/ssl/certs
QuoVadis Root CA 1 G3	Jan 12 17:27:44 2042 GMT	QuoVadis_Root_CA_1_G3.crt
QuoVadis Root CA 2	Nov 24 18:23:33 2031 GMT	QuoVadis_Root_CA_2.crt
QuoVadis Root CA 2 G3	Jan 12 18:59:32 2042 GMT	QuoVadis_Root_CA_2_G3.crt
QuoVadis Root CA 3	Nov 24 19:06:44 2031 GMT	QuoVadis_Root_CA_3.crt
QuoVadis Root CA 3 G3	Jan 12 20:26:32 2042 GMT	QuoVadis_Root_CA_3_G3.crt
SZAFIR ROOT CA2	Oct 19 07:43:30 2035 GMT	SZAFIR_ROOT_CA2.crt
SecureSign RootCA11	Apr 8 04:56:47 2029 GMT	SecureSign_RootCA11.crt
SecureTrust CA	Dec 31 19:40:55 2029 GMT	SecureTrust_CA.crt
Secure Global CA	Dec 31 19:52:06 2029 GMT	Secure_Global_CA.crt
Security Communication EV RootCA1	Jun 6 02:12:32 2037 GMT	Security_Communication_EV_RootCA1.crt
Security Communication RootCA2	May 29 05:00:39 2029 GMT	Security_Communication_RootCA2.crt
Security Communication RootCA1	Sep 30 04:20:49 2023 GMT	Security_Communication_Root_CA.crt
Sonera Class2 CA	Apr 6 07:29:40 2021 GMT	Sonera_Class_2_Root_CA.crt
Staat der Nederlanden EV Root CA	Dec 8 11:10:28 2022 GMT	Staat_der_Nederlanden_EV_Root_CA.crt
Staat der Nederlanden Root CA - G2	Mar 25 11:03:10 2020 GMT	Staat_der_Nederlanden_Root_CA_-_G2.crt

Certificate name	Expiry date	File in /etc/ssl/certs
Staat der Nederlanden Root CA - G3	Nov 13 23:00:00 2028 GMT	Staat_der_Nederlanden_Root_CA_-_G3.crt
Starfield Class 2 Certification Authority	Jun 29 17:39:16 2034 GMT	Starfield_Class_2_CA.crt
Starfield Root Certificate Authority - G2	Dec 31 23:59:59 2037 GMT	Starfield_Root_Certificate_Authority_-_G2.crt
Starfield Services Root Certificate Authority - G2	Dec 31 23:59:59 2037 GMT	Starfield_Services_Root_Certificate_Authority_-_G2.crt
SwissSign Gold CA - G2	Oct 25 08:30:35 2036 GMT	SwissSign_Gold_CA_-_G2.crt
SwissSign Silver CA - G2	Oct 25 08:32:46 2036 GMT	SwissSign_Silver_CA_-_G2.crt
Swisscom Root CA 1	Aug 18 22:06:20 2025 GMT	Swisscom_Root_CA_1.crt
Swisscom Root CA 2	Jun 25 07:38:14 2031 GMT	Swisscom_Root_CA_2.crt
Swisscom Root EV CA 2	Jun 25 08:45:08 2031 GMT	Swisscom_Root_EV_CA_2.crt
T-TeleSec GlobalRoot Class 2	Oct 1 23:59:59 2033 GMT	T-TeleSec_GlobalRoot_Class_2.crt
T-TeleSec GlobalRoot Class 3	Oct 1 23:59:59 2033 GMT	T-TeleSec_GlobalRoot_Class_3.crt

Certificate name	Expiry date	File in /etc/ssl/certs
TUBITAK Kamu SM SSL Kok Sertifikasi - Surum 1	Oct 25 08:25:55 2043 GMT	TUBITAK_Kamu_SM_SSL_Kok_Sertifikasi_-_Surum_1.crt
TÜRKTRUST Elektronik Sertifika Hizmet Sağlayıcısı	Dec 22 18:37:19 2017 GMT	TURKTRUST_Certificate_Services_Provider_Root_2007.crt
TWCA Global Root CA	Dec 31 15:59:59 2030 GMT	TWCA_Global_Root_CA.crt
TWCA Root Certification Authority	Dec 31 15:59:59 2030 GMT	TWCA_Root_Certification_Authority.crt
Government Root Certification Authority	Dec 5 13:23:33 2032 GMT	Taiwan_GRCA.crt
TeliaSonera Root CA v1	Oct 18 12:00:50 2032 GMT	TeliaSonera_Root_CA_v1.crt
Trustis FPS Root CA	Jan 21 11:36:54 2024 GMT	Trustis_FPS_Root_CA.crt
TÜBİTAK UEKAE Kök Sertifika Hizmet Sağlayıcısı - Sürüm 3	Aug 21 11:37:07 2017 GMT	TÜBİTAK_UEKAE_Kök_Sertifika_Hizmet_Sağlayıcısı_-_Sürüm_3.crt
TÜRKTRUST Elektronik Sertifika Hizmet Sağlayıcısı H5	Apr 28 08:07:01 2023 GMT	TÜRKTRUST_Elektronik_Sertifika_Hizmet_Sağlayıcısı_H5.crt
USERTrust ECC Certification Authority	Jan 18 23:59:59 2038 GMT	USERTrust_ECC_Certification_Authority.crt
USERTrust RSA Certification Authority	Jan 18 23:59:59 2038 GMT	USERTrust_RSA_Certification_Authority.crt

<b>Certificate name</b>	<b>Expiry date</b>	<b>File in /etc/ssl/certs</b>
UTN-USERFirst-Hardware	Jul 9 18:19:22 2019 GMT	UTN_USERFirst_Hardware_Root_CA.crt
VeriSign Class 3 Public Primary Certification Authority - G4	Jan 18 23:59:59 2038 GMT	VeriSign_Class_3_Public_Primary_Certification_Authority_-_G4.crt
VeriSign Class 3 Public Primary Certification Authority - G5	Jul 16 23:59:59 2036 GMT	VeriSign_Class_3_Public_Primary_Certification_Authority_-_G5.crt
VeriSign Universal Root Certification Authority	Dec 1 23:59:59 2037 GMT	VeriSign_Universal_Root_Certification_Authority.crt
VeriSign Class 3 Public Primary Certification Authority - G3	Jul 16 23:59:59 2036 GMT	Verisign_Class_3_Public_Primary_Certification_Authority_-_G3.crt
Visa eCommerce Root	Jun 24 00:16:12 2022 GMT	Visa_eCommerce_Root.crt
XRamp Global Certification Authority	Jan 1 05:37:19 2035 GMT	XRamp_Global_CA_Root.crt
certSIGN ROOT CA	Jul 4 17:20:04 2031 GMT	certSIGN_ROOT_CA.crt
ePKI Root Certification Authority	Dec 20 02:31:27 2034 GMT	ePKI_Root_Certification_Authority.crt
thawte Primary Root CA	Jul 16 23:59:59 2036 GMT	thawte_Primary_Root_CA.crt
thawte Primary Root CA - G2	Jan 18 23:59:59 2038 GMT	thawte_Primary_Root_CA_-_G2.crt



Certificate name	Expiry date	File in /etc/ssl/certs
thawte Primary Root CA - G3	Dec 1 23:59:59 2037 GMT	thawte_Primary_Root_CA_ -_G3.crt

## Smartcard

- [Authentication with IGEL Smartcard \(see page 507\)](#)
- [Smartcard Authentication \(see page 516\)](#)

## Authentication with IGEL Smartcard

Smartcards make the user experience more convenient by providing a single device that supports multiple authentication products across the enterprise. The user only has to remember a single PIN that unlocks the smart card to access the network.

### Prerequisites

Before using the IGEL smartcard, the relevant profiles and session information need to be written to the smartcard. We describe a best practice way of how to proceed. The names of folders and profiles are only examples and can be changed individually.

It is useful to use following folders and profiles on the Universal Management Suite (UMS):

Folder	Profile	Purpose
Smartcard Creation		Folder for devices which will be used for smartcard creation.
	Smartcard Key	This profile will apply the defined company key to the devices. This key will be written while creating the IGEL smartcard.
Smartcard Operation		Folder for devices whose authentication process will work only via IGEL smartcard.
	Smartcard Login	This profile will apply the company key to the devices and will activate the login with IGEL smartcard.

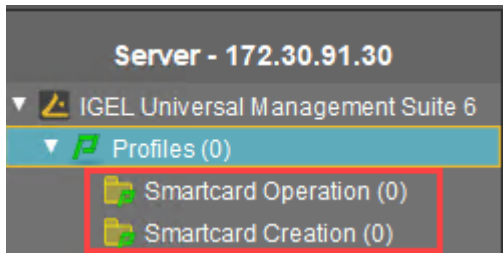
- ▶ Create two folders under **Profiles** in the Universal Management Suite (UMS), e.g. "Smartcard Operation" and "Smartcard Creation".
- ▶ Create the profile "Smartcard Login" for "Smartcard Operation".
- ▶ Create the profile "Smartcard Key" for "Smartcard Creation".

- 
- [Creating IGEL Smartcard Folders \(see page 508\)](#)
  - [Folder "Smartcard Operation" \(see page 509\)](#)
  - [Folder "Smartcard Creation" \(see page 510\)](#)
  - [Writing the IGEL Smartcard \(see page 511\)](#)
  - [Smartcard Readers Supported by IGEL Smartcards \(see page 515\)](#)

## Creating IGEL Smartcard Folders

First, add two new profile folders for creating profiles and assigning them to devices:

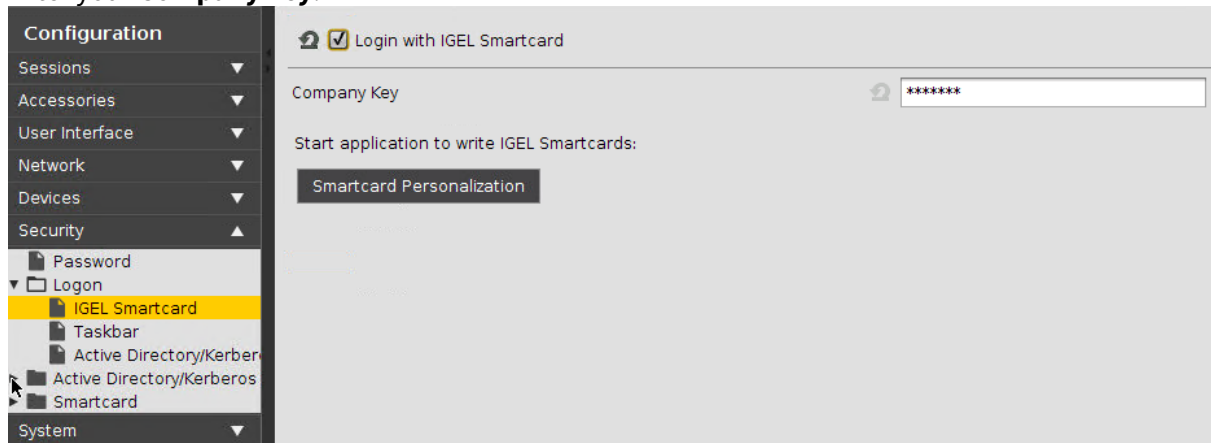
- "Smartcard Operation";
- "Smartcard Creation".



## Folder "Smartcard Operation"

In this folder, you create a new profile "Smartcard Login":

1. Right-click the folder "Smartcard Operation".
2. Choose **New Profile**.
3. Enter a **Profile Name**, e.g. "Smartcard Login".
4. Click **Security > Logon > IGEL Smartcard**.
5. Enable **Login with IGEL smartcard**.
6. Enter your **Company key**.



- i** Later on, this profile will be applied to all devices where the authentication process shall work only with a smartcard.  
This way, the device will receive:
- the company key and
  - the information that the authentication is only possible with the smartcard.

- i** The company key is a private key shared between devices and smartcards. It should be chosen similarly to a good password. If the smartcard does not hold the same company key as the device, authentication will not be possible. Remember this company key because you will need later to write exactly the same key to the smartcard.

## Folder "Smartcard Creation"

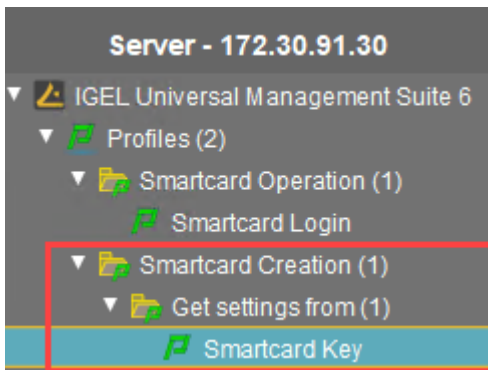
In this folder, you create a new profile "Smartcard Key":

1. Right-click the folder "Smartcard Creation".
2. Choose **New Profile**.
3. Enter a profile name, e.g. "Smartcard Key".
4. Click **Security > Logon > IGEL Smartcard**.
5. Enter the same **Company key** as in the profile "Smartcard Login".

Another additional folder is useful:

- ▶ Create the subfolder "Get settings from" under "Smartcard Creation".

In this folder, you create the profile with the session information you want to write to the smartcard.



- i** You need this additional folder because the assignment of active profiles from the UMS to the IGEL smartcard can cause problems (firmware version < 5.06.100). Later on, you will copy the folder locally to your device.

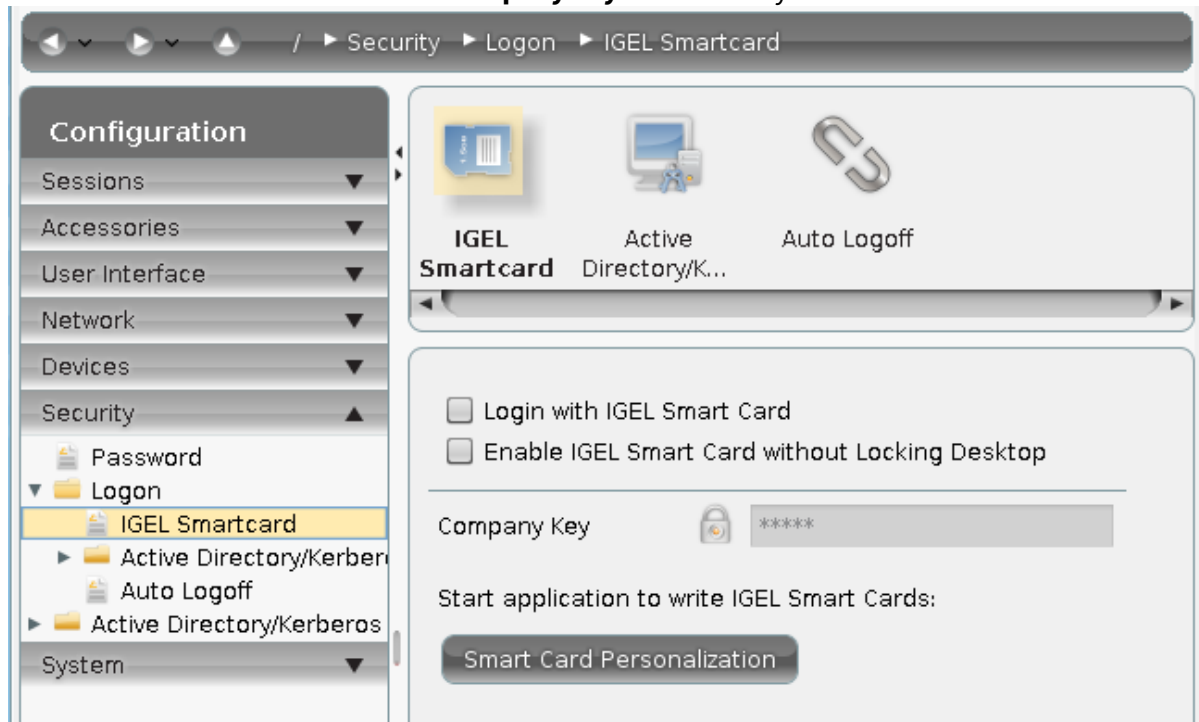
## Writing the IGEL Smartcard

### Assigning the Profile "Smartcard Creation" to the Device

1. Prepare one device which has a smartcard reader/writer.
2. Integrate this device in the UMS and put it into the folder "Smartcard Creation".  
Now the device automatically receives the company key from the profile. It will be used when writing the smartcard.

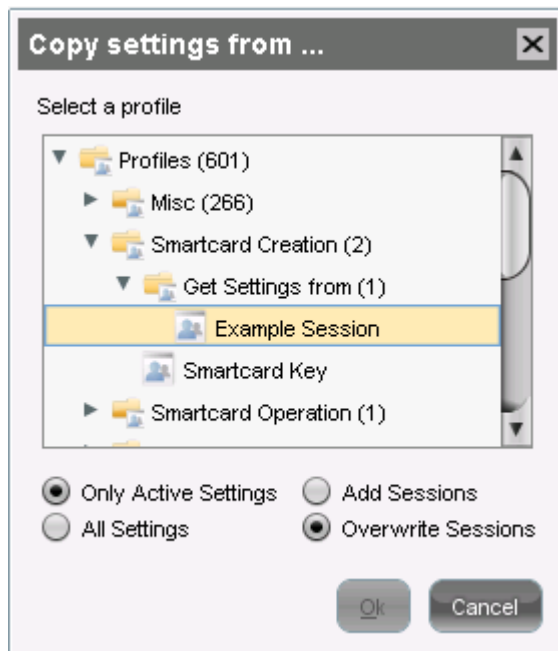
### Ensuring That the Profile Assignment Was Successful

1. Open the local setup of your device.
2. Click **Security > Logon > IGEL Smartcard**.  
You should now see a disabled field **Company key** with a lock symbol.



### Writing the Profiles to the Smartcard

1. Open the folder "Smartcard Creation" in the UMS.
2. Right-click your device.
3. Choose **Take over settings from...** to copy the profile settings to the device.  
The dialog **Copy settings from...** opens.
4. Choose your profile from the folder "Smartcard Creation" > "Get settings from".
5. Enable **Overwrite Sessions**.

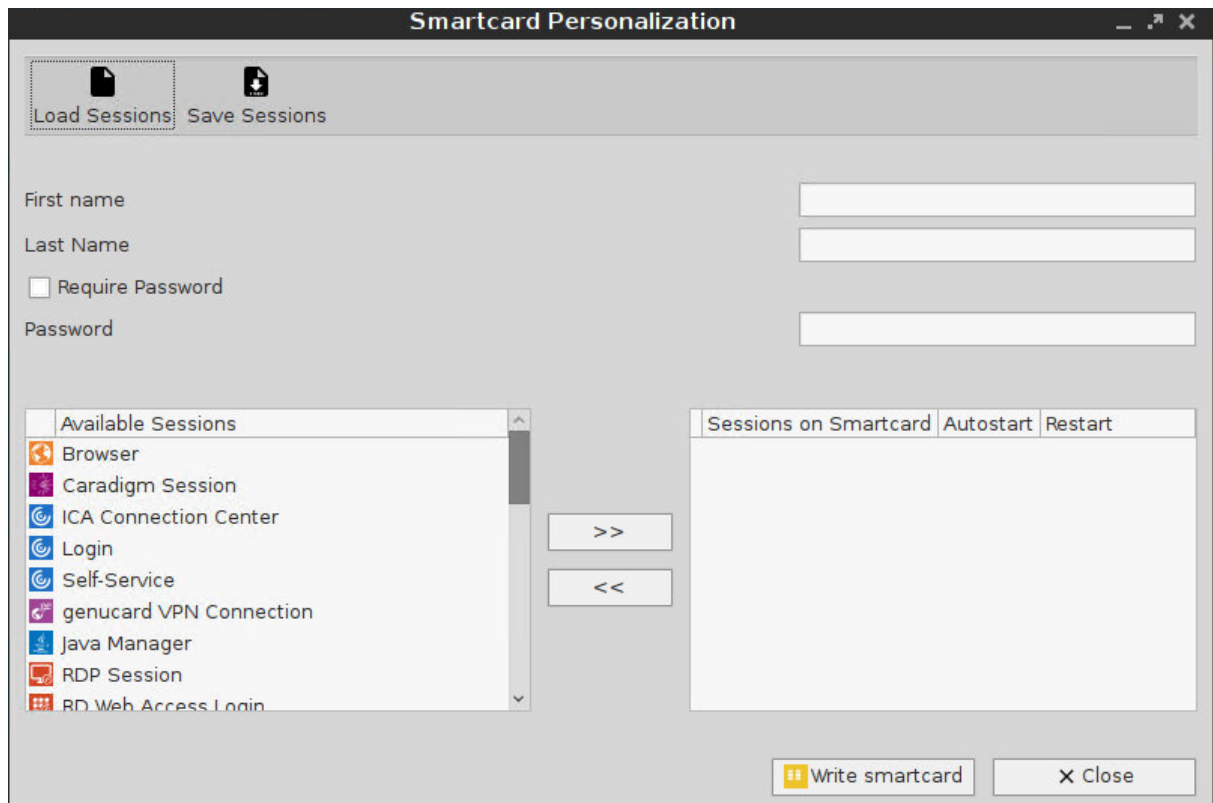


6. Click **OK** to copy the profile with the settings and the company key to the device.


### Writing the Smartcard

1. Open the local setup of your device.
2. Click **Security > Logon > IGEL Smartcard**.
3. Click **Smartcard personalization**.  
The **Smartcard personalization** dialog opens.






4. Enter the **First name** and the **Last name** of the smartcard holder that should appear at the login prompt.
5. Activate **Require password** and specify the **Password** if a password has to be required for the smartcard login.
6. Select the local sessions you want to write to the smartcard.

 Use the arrow buttons to add a session to the smartcard session list.

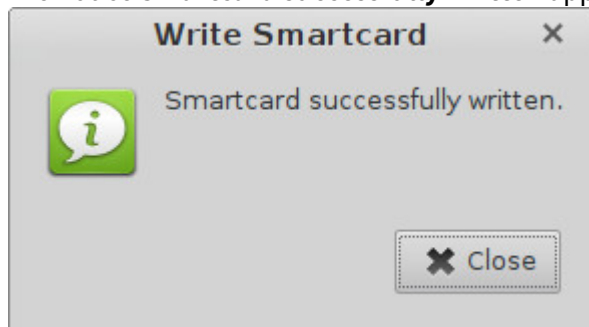
7. Activate **Autostart** for a session in the smartcard list if it should be automatically started at login. Check **Restart** if desired.

 The configuration of the sessions can be saved and reloaded at a later time.

8. Click **Write smartcard** to start the writing process with the defined settings.
9. Confirm the security question with **Yes**.



The notice **Smartcard successfully written** appears.



### Testing the New IGEL Smartcard

1. Go to the UMS.
2. Register a new device in the UMS and put it in the folder "Smartcard Operation".  
The device gets the company key and the profile information that authentication is only possible with the IGEL smartcard.
3. Restart the device.  
The **Insert Smartcard...** dialog opens.
4. Insert the IGEL smartcard into your device and verify the selected configuration.

## Smartcard Readers Supported by IGEL Smartcards

IGEL smartcards are supported by the following third-party smartcard readers:

- OMNIKEY CardMan 3111
- OMNIKEY CardMan 3x21
- OMNIKEY CardMan 3621
- OMNIKEY CardMan 6121
- OMNIKEY CardMan 3821
- USB CCID Smart Card Reader
- USB CCID Smart Card Reader Keyboard
- Fujitsu Siemens Computers SmartCard-Reader USB 2A
- Fujitsu Siemens Computers SmartCard-Reader Keyboard USB 2A
- Fujitsu Siemens Computers SmartCard-Reader USB 2C
- Cherry SmartBoard XX44
- OMNIKEY CardMan 5121
- OMNIKEY CardMan 5x21
- HID Global OMNIKEY 3x21 Smart Card Reader
- Cherry KC 1000 SC
- Cherry KC 1000 SC/DI
- Cherry KC 1000 SC Z
- Cherry KC 1000 SC/DI Z
- Cherry SmartTerminal XX44 v2
- Cherry SmartTerminal XX44
- OMNIKEY CardMan
- CCID SC Reader
- Cherry SC Reader.

## Smartcard Authentication

### Certificate Authentication

The smartcards discussed here can hold digital certificates (x.509) and corresponding private keys. The private key cannot be read from the card, but it can be used by the card itself for signing and decryption of data.

This enables the use of what is known as two-factor authentication: the user not only possesses the smartcard, he or she can also prove the knowledge of the smartcard PIN by signing data using the private key stored on the smartcard.

If you want to use Active Directory (AD), the certificate chain used by the key distribution center (domain controller) must be available on the device. For instructions on deploying certificate files, see [Registering a File on the UMS Server](#) (set **Classification** to "SSL Certificate") and [Transferring a File to a Device](#).

### Smartcard Readers

Smartcards are accessed via smartcard readers, using either a contact or contactless interface. The [IGEL Third Party Database](#)<sup>48</sup> lists the readers that are supported by the *Linux* firmware.

### PC/SC Resource Manager

The *PC/SC Resource Manager* is a common Application Programming Interface (API) that is available on *Windows* and *Linux* operating systems. It provides a standardized way for applications to handle smartcards and readers.

The *PC/SC Resource Manager* is active by default in the *Linux*-based firmware and can be controlled via the **Activate PC/SC Daemon** parameter on **IGEL Setup > Devices > Smartcard > PC/SC** or **IGEL Setup > Security > Smartcard > PC/SC** or **IGEL Setup > Security > Smartcard > Services** (depending on the firmware version).

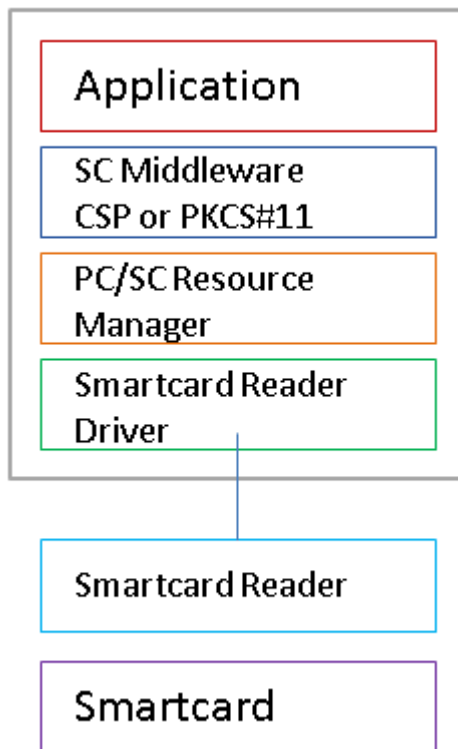
### Smartcard Middleware

In order to provide a generalized interface to different types of smartcard hardware, there is an additional software layer called smartcard middleware.

There are different types of middleware:

	Windows	Linux
<i>CSP, Cryptographic Service Provider</i>	✓	
<i>PKCS#11, Public-Key Cryptographic Standards</i>	✓	✓

<sup>48</sup> <https://www.igel.com/linux-3rd-party-hardware-database/>



Some of the smartcard authentication methods require *smartcard middleware* to be installed on the endpoint device. The following modules are available:

- *Gemalto SafeNet*
- *cryptovision sc/interface*
- *Gemalto IDPrime*
- *Athena IDProtect*
- *A.E.T.SafeSign*
- *Secmaker Net iD*
- *Coolkey*
- *OpenSC*
- *TCOS3 (IGEL Linux v5 only)*

For information on how to use a custom PKCS#11 library, refer to the article [Using a Custom PKCS#11 Library](#) (see page 626).

- 
- [Active Directory Logon with Smartcard](#) (see page 518)
  - [Citrix StoreFront](#) (see page 519)
  - [RDP Sessions](#) (see page 520)
  - [Horizon Sessions](#) (see page 521)
  - [Smartcard Authentication in Browser](#) (see page 522)

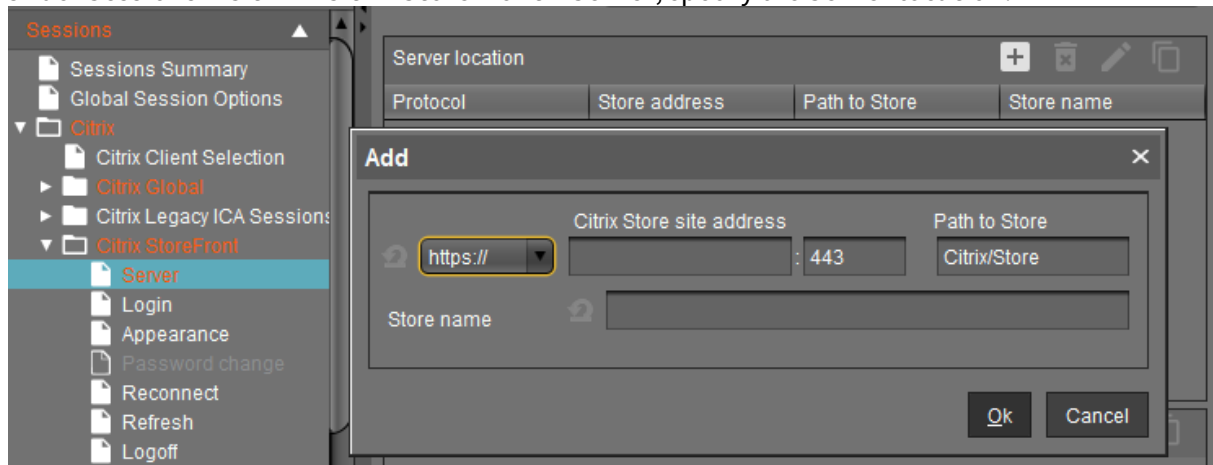
## Active Directory Logon with Smartcard

See the how-to [Passthrough Authentication](#) (see page 795).

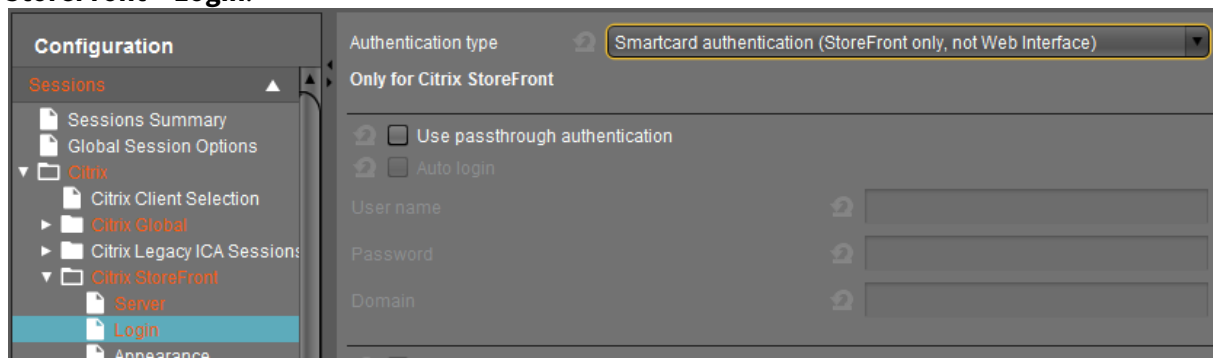
## Citrix StoreFront

In this scenario, *Citrix Receiver 13.1* or newer is required. The root certificate of the web server certificate used by the *StoreFront* server has to be known as the trusted root certificate on the endpoint device - see [Deploying Trusted Root Certificates](#) (see page 485), Certificate Type **SSL Certificate**.

1. Under **Sessions > Citrix > Citrix StoreFront > Server**, specify the **Server location**.



2. Choose **Smartcard authentication** as **Authentication type** under **Sessions > Citrix > Citrix StoreFront > Login**.



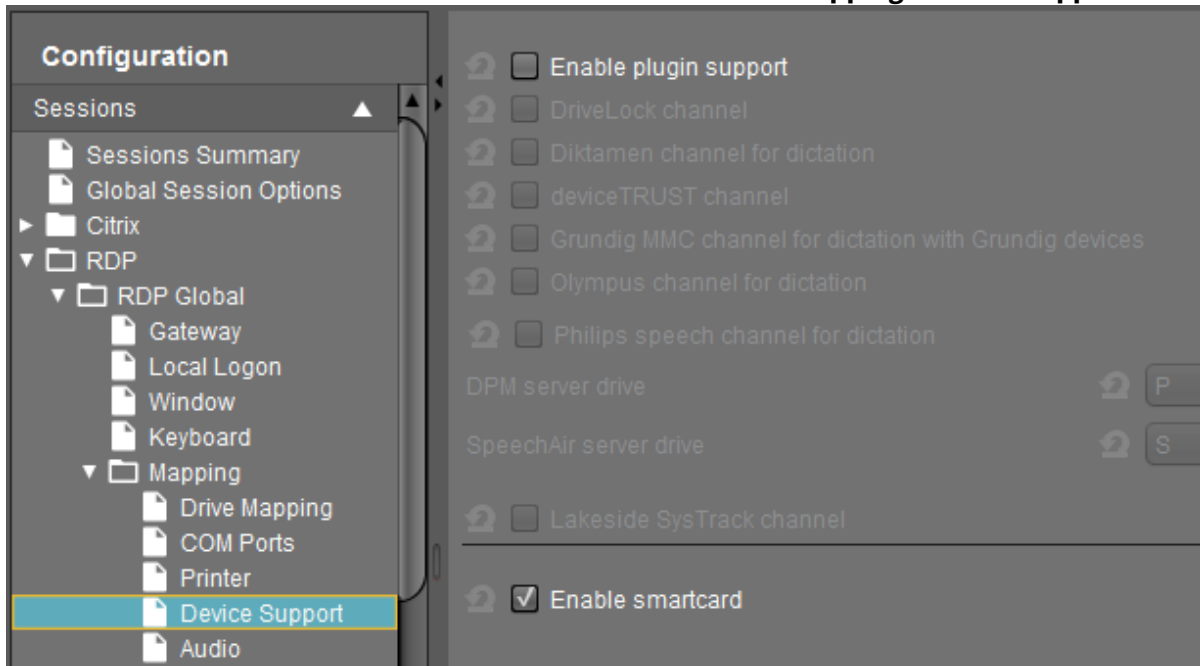
**i** When used in combination with **Active Directory Logon** the enabled **Use Passthrough authentication** activates single sign-on with smartcard.

3. Select the appropriate PKCS#11 module for the smartcard **Security > Smartcard > Middleware**.
  - Gemalto/SafeNet eToken
  - cryptovision sc/interface
  - Gemalto IDPrime
  - Athena IDProtect
  - A.E.T. SafeSign
  - Secmaker Net iD
  - Custom PKCS#11 module. See here also [Using a Custom PKCS#11 Library](#) (see page 626).

## RDP Sessions

In this scenario, the smartcard middleware has to be installed on the server side.

1. Enable **Activate PC/SC Daemon** under **Security > Smartcard > Services**.
2. Check **Enable Smartcard** under **Sessions > RDP > RDP Global > Mapping > Device Support**.






## Horizon Sessions

In this scenario, the smartcard middleware has to be installed on the virtual desktops as well as configured on the endpoint device side.

The View Connection Server has to be configured on the endpoint device side.

 The View Connection Server has to be configured to accept connections via SSL/TLS secured https URLs. The root certificate of the certificate used for this service has to be known as the trusted root certificate on the thin client (see the how-to [Deploying Trusted Root Certificates](#) (see page 485), certificate type **SSL Certificate**).

1. Select the appropriate PKCS#11 support for the smartcard under **Sessions > Horizon Client > Horizon Client Global > Smartcard**.

- Gemalto/SafeNet eToken
- cryptovision sc/interface
- Gemalto IDPrime
- Athena IDProtect
- A.E.T. SafeSign
- Secmaker Net iD
- Coolkey
- OpenSC

For details on the custom PKCS#11 library, refer to the article [Using a Custom PKCS#11 Library](#) (see page 626).

2. Configure the **Server URL** under **Sessions > Horizon Client > Horizon Client Sessions > [session name] > Connection settings**.

 Start the URL with `https://` !

## Smartcard Authentication in Browser

It is possible to authenticate using a smartcard at websites, e. g. *Citrix Web Interface* or *StoreFront*.

When connecting via an SSL/TLS secured https URL, the root certificate of the web server certificate has to be known as the **Trusted Root Certificate** on the endpoint device; see [Deploying Trusted Root Certificates \(see page 485\)](#), certificate types **Web Browser Certificate** and (!) **SSL Certificate**.

► Select the appropriate PKCS#11 module (security device) for the smartcard under **Sessions > Browser > Browser Global > Smartcard Middleware**.

- Gemalto/SafeNet eToken
- cryptovision sc/interface
- Gemalto IDPrime
- Athena IDProtect
- A.E.T. SafeSign
- Secmaker Net iD
- Coolkey
- OpenSC

For details on the custom PKCS#11 library, refer to the article [Using a Custom PKCS#11 Library \(see page 626\)](#).

## Desktop and Display

- [Display Configuration for Shared Workplace \(SWP\) \(see page 524\)](#)
- [Display Switch \(see page 525\)](#)
- [Multimonitor \(see page 529\)](#)
- [Showing and Hiding the On-Screen Software Keyboard Automatically \(see page 541\)](#)
- [Overcoming the Restrictions of a Full-Screen Session with the in-Session Control Bar \(see page 542\)](#)
- [Screen Issues When Redocking Notebook \(see page 544\)](#)

## Display Configuration for Shared Workplace (SWP)

As of IGEL Universal Desktop Linux version 4.14.100 and version 5.06.100, Shared Workplace allows user specific screen resolutions and configurations. Resolution, layout, refresh rate, rotation, number of screens, monitor connectors (DVI, VGA, ...) can be set per user, but color depth cannot.

- i** There are technical limitations to user-specific settings: For VIA graphics drivers/hardware, the maximum desktop size is set in the `Screen` section of the X configuration file. The name and location of the X configuration file depends on the firmware version:
- IGEL Linux *version 10*: `/config/Xserver/xorg.conf-0`
  - IGEL Linux *version 5*: `/config/Xserver/xorg.conf-0` or `/etc/X11/xorg.conf` (this is a symbolic link that points to `/config/Xserver/xorg.conf-0`)
- In the `Screen` section of the above-mentioned configuration file, you can find a line such as `Virtual 1920 1200`. The size defined here cannot be changed dynamically; it is a hard limit for the overall desktop size.

### Best practice

It is recommended to set the initial desktop configuration to the maximum number of screens and the resolutions to `Autodetect`. This way the user specific resolutions will not be restricted.

### Debugging

If the total framebuffer size of the user specific resolutions exceeds the limits of the `Virtual [width] [height]` setting from `/config/Xserver/xorg.conf-0` (or `/etc/X11/xorg.conf`), the user specific resolutions cannot be activated and the screen configurations are not changed dynamically.

There is no warning dialog or anything else to alert the user to this restriction. But you can find related log messages via `journalctl` or in `/var/log/messages`:

```
XRANDR: ERROR: CANNOT APPLY CHANGES ->
```

```
XRANDR: ERROR: -> Selected modes ([width]x[height]) would exceed the maximum framebuffer size ([width]x[height])
```

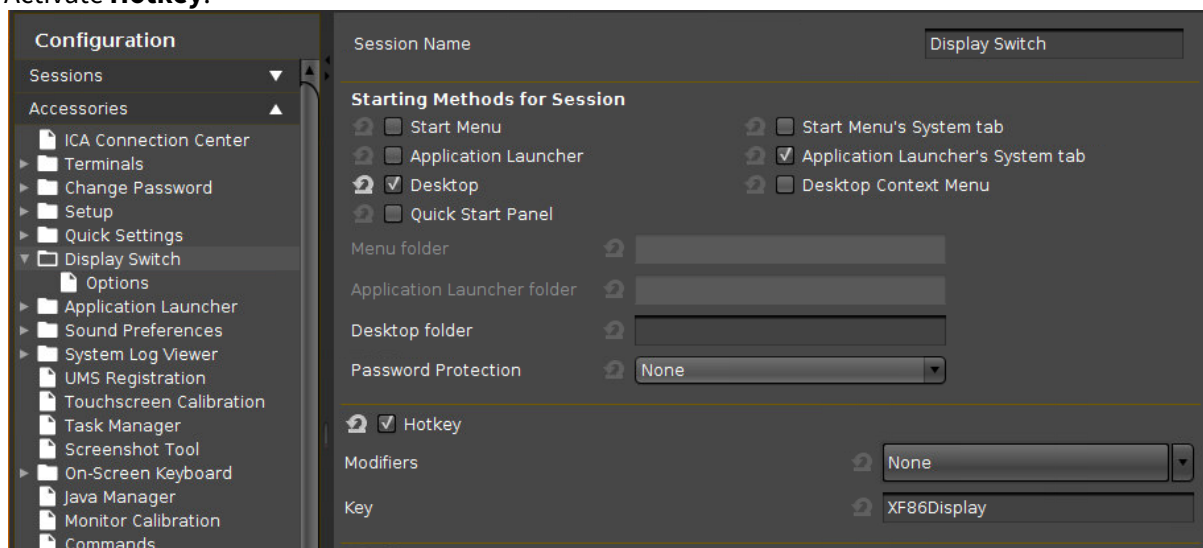
## Display Switch

If you are using a notebook with IGEL UDC2, UDC3, or UD Pocket, you might want to connect an additional monitor. If you are using an IGEL thin client (UD series), you might want to use two monitors. Any thinkable display mode, like clone mode/mirroring or extended mode, is possible. Moreover, you can change between the display modes quickly.

### Configure a Starter for the Display Switch

There are many ways to start the display switch. The following example shows how to define a hotkey typical for a notebook.

1. Open the Setup and go to **Accessories > Display Switch**.
2. Activate **Hotkey**.



By default, [Fn]+[F7] ( XF86Display ) is defined as the hotkey for starting the display switch. You can change the hotkey by selecting or entering different keys in **Modifiers** and **Key**.

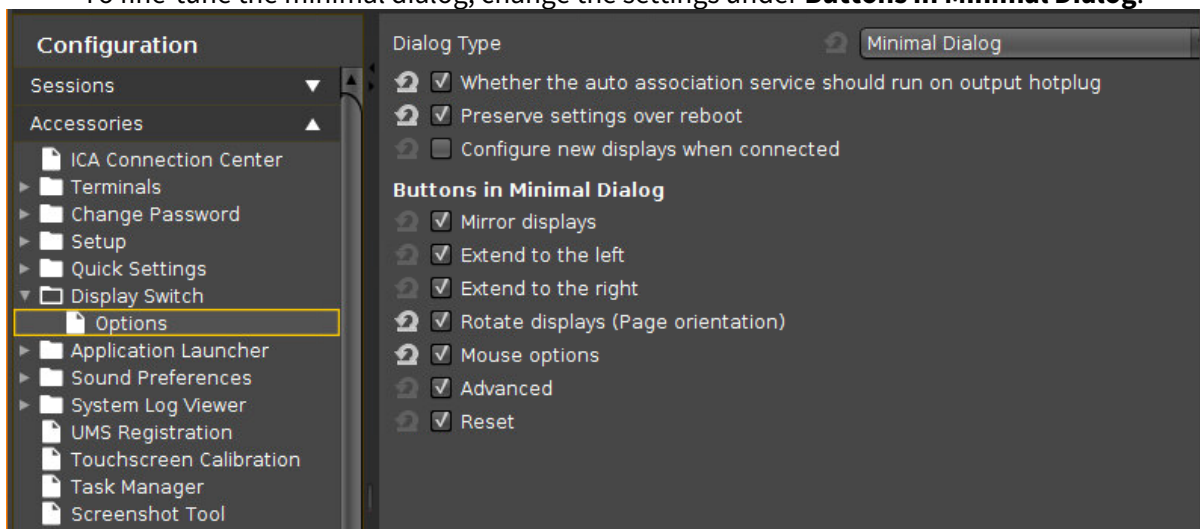
**i** To enter a key that does not have a visible character, e. g. the [Tab] key, open a terminal, log on as `user` and enter `xev -event keyboard`. Press the key to be used for the hotkey. The text in brackets that begins with `keysym` contains the key symbol for the **Key** field. Example: `Tab` in `(keysym 0xff09, Tab)`

3. Press **Apply** or **Ok**.

### Configure the Display Switch

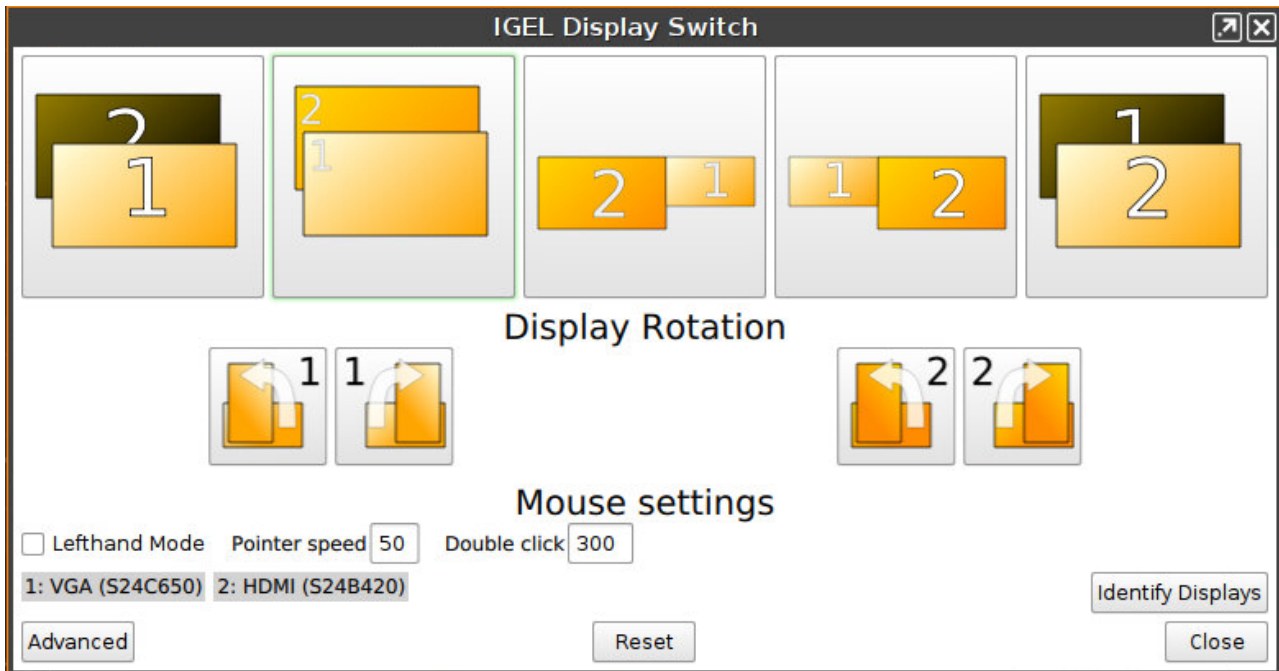
1. Open the Setup and go to **Accessories > Display Switch > Options**.
2. Consider the following settings:

- **Dialog Type:** In most cases, you can leave it at **Minimal Dialog**. The user can always switch to the advanced dialog, provided that **Advanced** in the **Minimal Dialog** area is activated.
- **Smart display configuration:** Activate this option, if you want to save all your display configurations.
- **Preserve settings over reboot:** Activate this if the settings made by the display switch are to remain unchanged after reboot.
- **Configure new displays when connected:** Activate this if you want the display switch to start automatically as soon as a new monitor is connected.
- To fine-tune the minimal dialog, change the settings under **Buttons in Minimal Dialog**.



## Use the Display Switch

The minimal dialog will look similar to this; details depend on your specific setup:



Button	Function
	Uses only display 1.
	Shows the same content on all screens, i.e. clone mode or mirroring.
	Extends the display area to the screen on the right.
	Extends the display area to the screen on the left
	Uses only display 2.

	Rotates the selected display to the left or to the right.
--	---

For more information, see the manual chapter Using Display Switch

The <b>P</b> marks the primary Display.	



## Multimonitor

Working with two or more screens is becoming increasingly popular in professional working environments.


You can find out how to configure several screens and an extended desktop with the IGEL setup here.

There are different screen configuration options:

- [Automatic Configuration](#) (see page 530)
- [Manual Configuration](#) (see page 532)
- [Additional Settings](#) (see page 534)
- [Auto Switch Monitor Configuration for Notebooks](#) (see page 539)

If you work with IGEL Universal Desktop or supported UDC2 hardware, multimonitor support is guaranteed.

Difficulties may arise if you work with UDC2 hardware and your hardware is not fully supported by IGEL.

 Multimonitor configuration for unsupported hardware only works if native graphic driver support functions properly. You must ensure that the native driver really does work because the fallback VESA driver does not allow multimonitor configuration. Click **About** in the **Application Launcher** to determine which graphic chipset you work with. If VESA is listed there, the native driver will not work and multimonitor configuration will not be possible.

- ▶ See the [Linux 3rd party hardware database](#)<sup>49</sup> for supported graphic cards.

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<sup>49</sup> <https://www.igel.com/linux-3rd-party-hardware-database/>

## Automatic Configuration

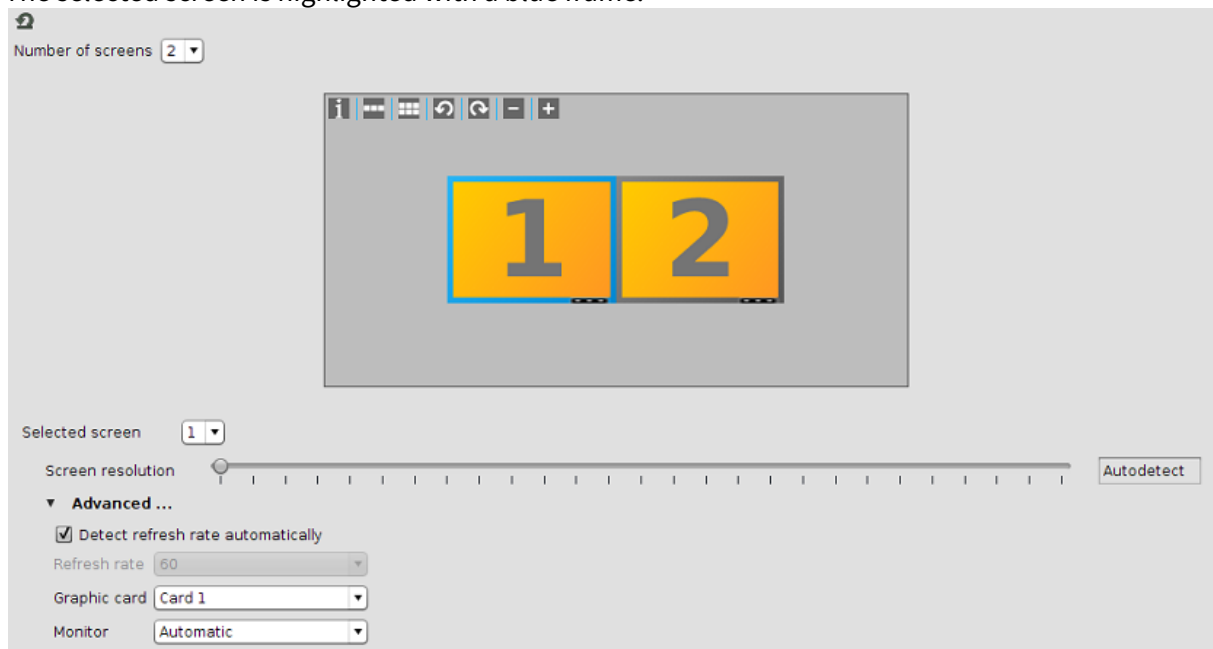
The firmware recognizes the native graphic driver and will apply the screens automatically by default.

Define two or more monitors:

1. Go to **User Interface > Display** in the structure tree.
2. Select **2** (or more) under **Number of screens**.

**i** The number of monitors that you can select depends on your hardware. Using the Universal Management Suite (UMS), you can choose up to 8 monitors.

3. Choose the screen under **Selected screen** or by clicking it with a mouse. The selected screen is highlighted with a blue frame:




4. Set **Screen Resolution** to **Autodetect** (default setting). The operating system reads out the EDID (Extended Display Identification Data) of the monitors through DDC (Display Data Channel). With these data, the correct resolution for the monitors can be recognized and set.

**i** If the **Autodetect** resolution is not available check **Monitor probing (DDC)** under **User Interface > Display > Options**. The **Monitor probing (DDC)** must be enabled (default setting).

**!** With more than 2 monitors, the screen resolution has to be specified for each screen manually.

5. Enable **Detect refresh rate automatically** (default setting) under **Advanced**.
6. Set **Monitor** to **Automatic**. The selected screen is automatically assigned to the graphic connector (monitor).

7. Drag and drop the rectangles to position the screens.

 Screen 1 is always the primary screen where the taskbar is situated.

8. Click **Apply** or **OK** to save the settings.

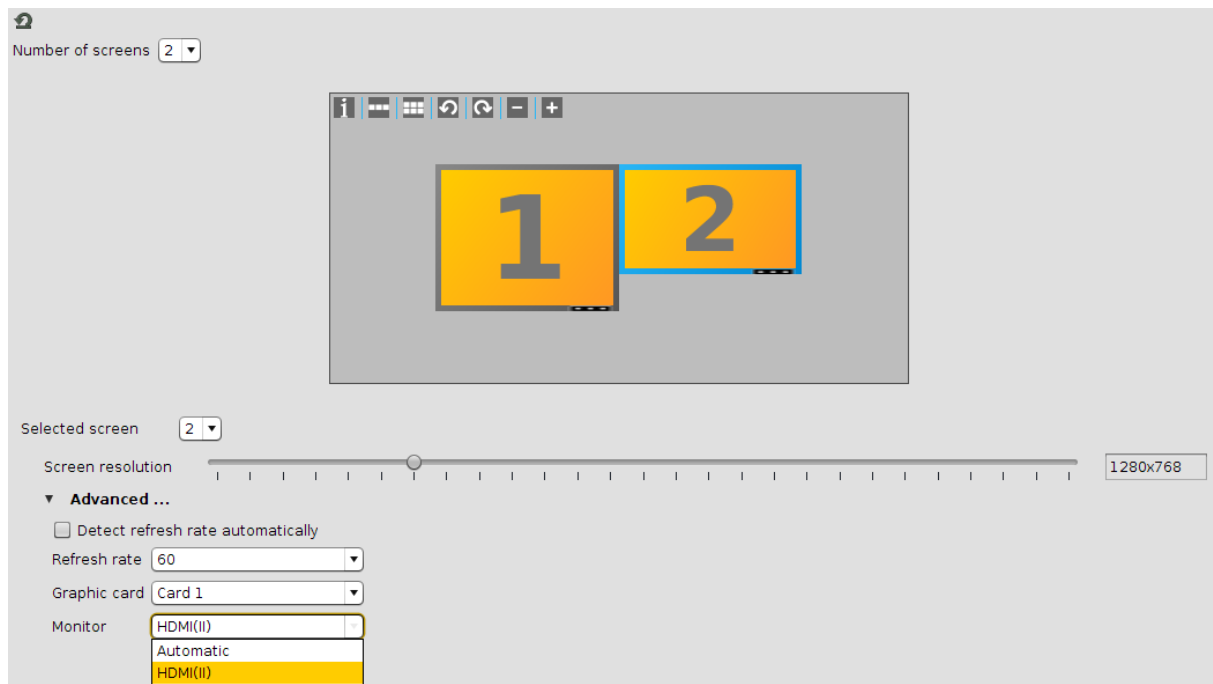
## Manual Configuration

During automatic configuration, the following problems can sometimes arise:

- One of the screens remains black.
- There is the same display on all screens.

In this case, you can set the screens manually:

1. Go to **User Interface > Display** in the structure tree.



2. Select a screen number under **Selected screen**.
3. Specify the resolution manually under **Screen resolution**.

**i** The standard resolution setting is **Autodetect**.

**i** From IGEL Linux Version 10.03.100, you have the option of defining your own resolutions via the registry ( `x.xserver0.custom_resolution` ). In order for the values set there to take effect, the resolution must be set to **Autodetect** (the slider at the far left). The following parameters apply to the entry in the registry:

- `WxH` : W = width, H = height (example: 1920x1080)
- `WxH@R` : W = width, H = height, R = refresh rate (example: 1920x1080@60 or 1920x1200@59.8)

4. Select for all screens the respective connector under **Monitor**. The manual configuration can take effect only if you assign the monitor connector to all screens.

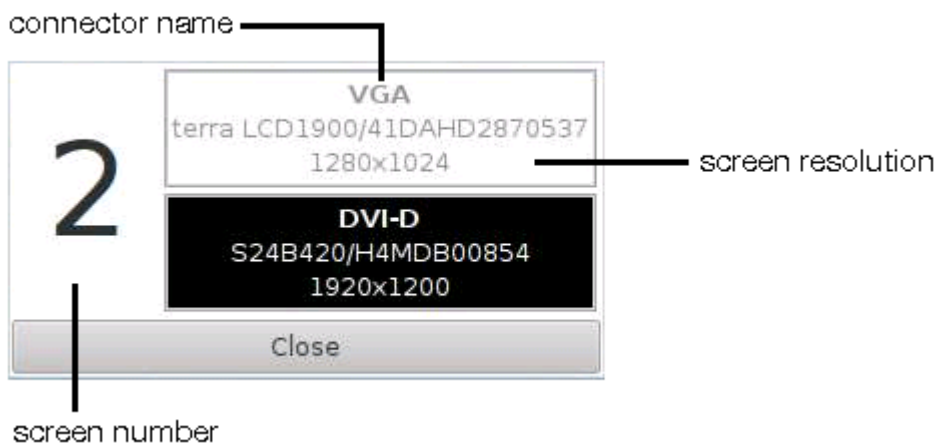
**i** If you adjust the settings directly in IGEL Setup, only the connected monitors will be available in the selection list. If you want to configure the screens using the UMS profile, all possible connectors will be shown in the selection list and you will not know which one is relevant for your device.

**Tip:**

- ▶ Click **i** in your client setup to obtain information about the connector names, screen resolutions and screen numbers.

**i** This configuration cannot be accessed from the UMS.

The black field belongs to the screen number on the left side:



## Additional Settings

A number of useful tips are provided below:

- [Rotating a Screen \(Pivot\)](#) (see page 535)
- [Setting Different Backgrounds](#) (see page 536)
- [Useful Window Settings](#) (see page 537)


### Rotating a Screen (Pivot)

1. Click on a monitor field.
2. Select  (**Rotates the selected screen counterclockwise**) or  (Rotates the selected screen clockwise).



 Two screens with autodetected resolutions are automatically aligned to the top.

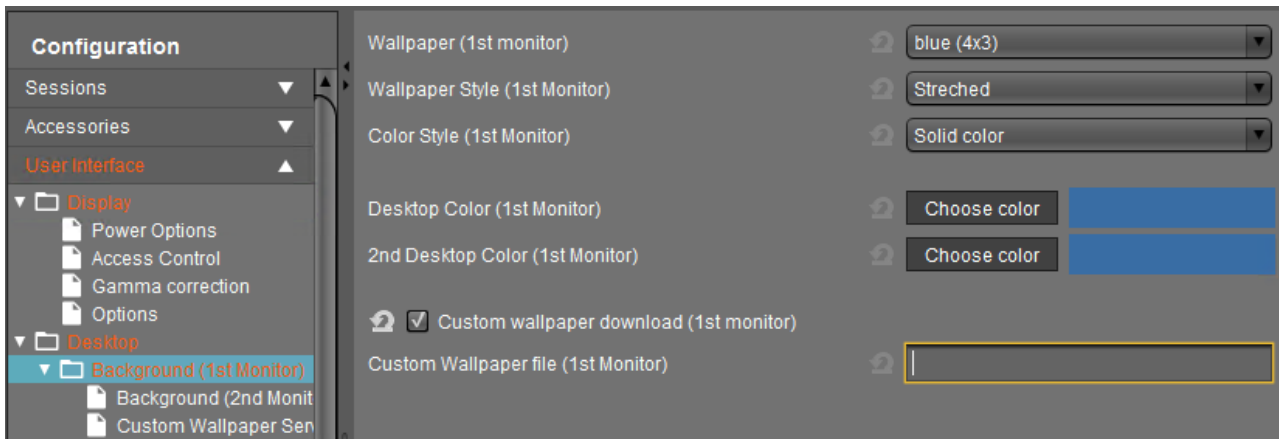
► **Alignment:** If you enter the correct resolution, you can see the real size of the screens and you will be able to align them the way you want.

 The individual screen areas must however be in contact with each other at one edge and corner, and cannot overlap.

## Setting Different Backgrounds

You can easily set different backgrounds for your screens.

- ▶ Click **User Interface > Desktop > Background** in the structure tree of the setup. There is a configuration page for each screen.



- ▶ Select the wallpaper and define the style.







**i** You may also upload your own **Custom Wallpaper**, e.g. a background with your corporate design. See [Creating Your Own Wallpaper](#) (see page 638).



## Useful Window Settings

Setting the Start Monitor or Full-screen Mode:

1. Click the name of your session under **Sessions** in the IGEL Setup, e.g. **RDP > RDP Sessions**.
2. Click **[Session Name] > Window** to configure the window settings.

Number of colors	 Global setting
Window size	 fullscreen
Desktop scale factor	 Global setting
Display resolution	 Same as window size
Start monitor	 No configuration
Multi-monitor fullscreen mode	 Global setting

 For the function "2nd monitor as Start monitor" the **Window size** has to be set to **full-screen**.

Setting the Multimonitor Full-screen Mode

1. Click **Window** in the global folder of your session, e.g. **RDP > RDP Global > Window**.
2. Configure the window settings.

Number of Colors	 Millions
Window size	 fullscreen
Desktop scale factor	 auto
 <input checked="" type="checkbox"/> Enable Display Control	
 <input type="checkbox"/> Control bar for RDP sessions	
<b>Multi Monitor</b>	
Multi-monitor fullscreen mode	 Restrict fullscreen session to one monitor

Defining the Taskbar

1. Click **User Interface > Desktop > Taskbar**.
2. Define the **Taskbar** settings.

Use Taskbar

---

Taskbar Position

Vertical Taskbar Mode

Taskbar Height/Width

Number of rows/columns in taskbar

Multi Monitor Taskbar Size

Monitor

Taskbar on top of all windows

---

Taskbar Auto Hide

Auto Hide Behavior

Taskbar Show Delay

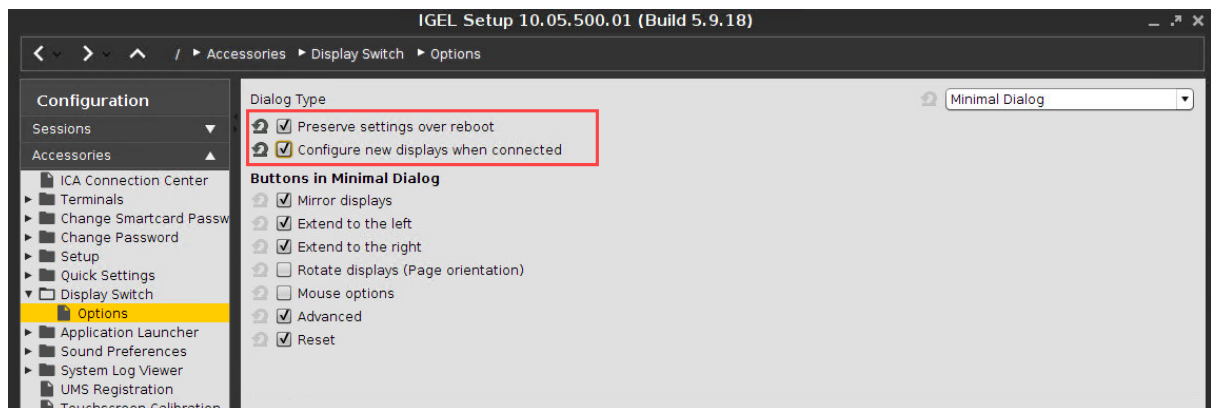
Taskbar Hide Delay

**i** If you want to expand the taskbar onto all monitors, you have to ensure that the screens are aligned to the bottom. Otherwise, you will see only half of the taskbar on one monitor.

## Auto Switch Monitor Configuration for Notebooks

This how-to provides an example for configuring the automatic monitor switch for notebooks.

1. Connect the notebook and open the lid.
2. Open the Display Switch Utility.
3. Drag & drop the displays according to your intended configuration.  
The display will snap adjacent to others.
4. If a display should not be used, drag it to the **disabled** area on the top right. The screen will be reactivated when it is dragged back to the active area.
5. If the same content is to be shown on multiple displays, drag one display onto the other.  
The interface will show **mirror**. The mirroring monitor will be displayed on the lower right.
6. Press **Apply** to save the setting.
7. Press **Yes** on the **Keep configuration** dialog so that the current settings will be saved to persistent storage and associated with the profile.
8. If you want to configure advanced settings (e. g. panning, scaling and resolutions), click the > button on the right side. The drop-down menus are on the right side.
9. In the Setup, go to **Accessories > Display Switch > Options**.
10. Enable **Preserve settings over reboot** and **Smart display configuration**.



The IGEL Display Switch utility is now used for NVIDIA graphic devices as well.

## Configuration of the Display Setting for Notebook Lid Handling

You can configure the lid handling of a notebook so that the notebook goes into standby when the lid is closed, regardless of whether the notebook is plugged in or not.

### Settings of the Standby Mode

If you want your notebook to go into standby mode on closing the lid while your notebook is plugged in, change the settings as follows:

1. In the Setup, go to **System > Registry > system > actions > lid > ac**.
2. Set **Lid close action while plugged in** to **Suspend** (Default: Turn off display)

3. Click **Apply** or **Ok** to save the setting

If you want your notebook to go into standby mode on closing the lid while your notebook is not plugged in, change the settings as follows:

1. In the Setup, go to **IGEL Setup** to **System > Registry > system > actions > lid > battery**.
2. Set **Lid close action while not plugged in** to **Suspend**. (Default: Turn off display)
3. Click **Apply** or **Ok** to save the setting.

- i** If you want that the notebook to turn off the display after the lid has been closed, change the following setting to switch off the notebook internally:
1. In the Setup, go to **System > Registry > sessions > user\_display0 > options > lid\_events**.
  2. Enable **React on lid open and close event**.
  3. Click **Apply** or **Ok** to save the setting.

## Showing and Hiding the On-Screen Software Keyboard Automatically

You can configure the on-screen software keyboard to appear or disappear automatically when an input box is selected or deselected (e. g. Firefox or screenlock).

### Showing Automatically

With the following setting, a software keyboard will be shown automatically when an input box is focused.

1. In the Setup, go to **Registry > userinterface > softkeyboard > autoshow** (parameter: `userinterface.softkeyboard.autoshow` ).
2. Enable **Automatically show on-screen keyboard when text field is selected**.

### Hiding Automatically

With the following setting, the software keyboard will be hidden automatically when an input box is not focused anymore.

1. In the Setup, go to **Registry > userinterface > softkeyboard > autohide** (parameter: `userinterface.softkeyboard.autohide` )
2. Enable **Automatically hide on-screen keyboard when text field is deselected**.

If there are any problems, e. g. the keyboard does not hide automatically, you have to disable **Automatically hide on-screen keyboard when text field is deselected** and make sure that the following Setup parameters have been enabled:

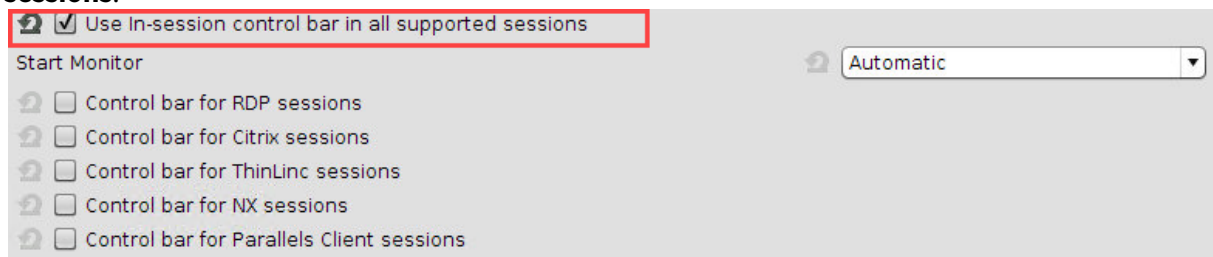
- **Accessories > On-Screen Keyboard > Autostart**
- **Accessories > On-Screen Keyboard > Restart**

## Overcoming the Restrictions of a Full-Screen Session with the in-Session Control Bar

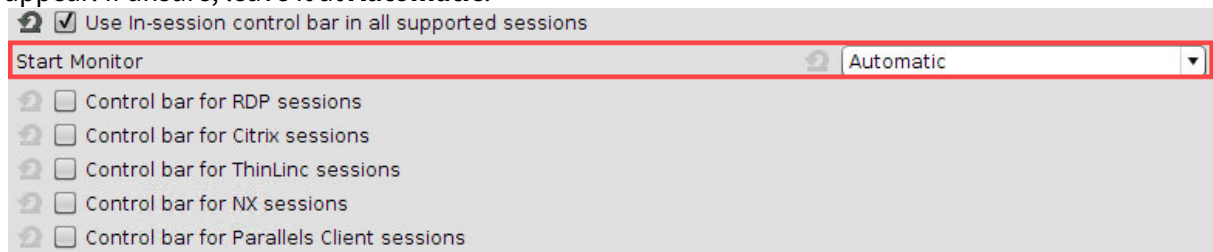
Running a session in full-screen mode gives you the advantage that the complete real estate of your monitor is at the disposal of that session. However, you might still want to eject a hotplug drive, or to minimize or end the current session. The solution provided by IGEL Linux is called **in-session control bar**.

### Activating the in-session control bar:

1. Open the Setup and go to **User Interface > Desktop > In-Session Control Bar**.
2. Activate **Use in-session control bar in all supported sessions** if you want to have an in-session control bar in all session types for which it is supported. If you want to have an in-session control bar only in sessions of certain types, activate the appropriate options, e.g. **Control bar for RDP sessions**.



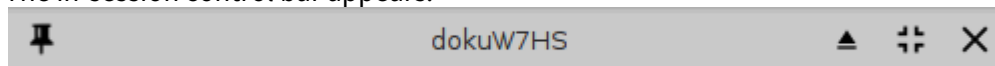
3. In the **Start Monitor** choice, select the display on which you want the in-session control bar to appear. If unsure, leave it at **Automatic**.






4. Click **Apply** or **Ok**.

### Using the in-session control bar:

1. Move the mouse to the upper edge of the desktop.  
The in-session control bar appears.



2. To perform the desired action, click the appropriate icon:
  - To eject a USB device, click ▲.

- To minimize the session view, click  .
- To end the session, click  .
- To make the in-session control bar visible permanently, click  .

## Screen Issues When Redocking Notebook

### Environment

UDC-converted notebooks running IGEL Linux 5 and above.

### Issue

When you take a notebook off the dock, e. g. to move to meeting rooms or other locations, and redock the notebook, the screen resolution ends up wrong, sometimes with a black screen and other similar screen issues.

### Solution

1. In Setup, go to **Accessories > Display Switch > Options**.
2. Enable **Configure new Displays when connected**.  
The display switch will start when the notebook is redocked.
3. Use the display switch to configure the display appropriately. For further information, see the Tips & Tricks article Display Switch.
4. Click **Ok** to save the settings.

#### **Legal Note**

IGEL's [Terms & Conditions](https://www.igel.com/terms-conditions/)<sup>50</sup> apply.

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<sup>50</sup> <https://www.igel.com/terms-conditions/>




## Customizing


- [Custom Partition Tutorial](#) (see page 546)
- [Using a Custom PKCS#11 Library](#) (see page 626)
- [Adding an Icon for Browsing Removable Storage](#) (see page 628)
- [Adding an Icon for the Image Viewer](#) (see page 630)
- [Creating a Timed Command \(Cron Replacement\)](#) (see page 632)
- [Customizing IGEL OS Desktop](#) (see page 634)
- [How to Change the Font Color of the Desktop Icons](#) (see page 657)
- [How to Set Up a Countdown to Prevent an Undesired Screen Lock In IGEL OS](#) (see page 659)
- [Installing a Calculator on IGEL Linux](#) (see page 671)
- [Keyboard Shortcuts for Managing Windows](#) (see page 672)
- [Make Frequent User Actions Easier by Defining Hotkeys](#) (see page 673)
- [Shutdown/Suspend Devices Automatically at the End of a Session](#) (see page 675)
- [Suspend to RAM - Wake Up by USB Mouse](#) (see page 676)
- [Taking Screenshots on IGEL Linux](#) (see page 677)
- [Setting the Device's System Time](#) (see page 678)
- [Updating Timezone Information \(Daylight Saving Time, DST\)](#) (see page 679)
- [Adding or Changing a MIME Type Handler](#) (see page 683)
- [Regional Settings in Sessions](#) (see page 687)

## Custom Partition Tutorial

The Custom Partition mechanism solves the task of supplying additional software or other files to IGEL OS while still being able to update the system in the regular way.

This tutorial describes creating content for a Custom Partition for IGEL OS 11.01.100 or newer. In the examples, IGEL OS 11.03.500 is used. You may also find it useful for updating existing Custom Partitions in order to make them work on IGEL OS 11.01.100 or newer, as some details have changed.

 The IGEL Support Team offers support for the deployment of Custom Partitions. However, it is not possible to offer support for any third-party software that is installed on a Custom Partition.

 If you want to build a Custom Partition and give it to third parties, make sure you have redistribution permission for the software. This is usually the case for Open Source / Free Software, but not for proprietary software. Read the license agreements and respect them.

This tutorial contains the following sections:

- [A First Simple Custom Partition \(see page 547\)](#)
- [Packaging the Custom Partition \(see page 557\)](#)
- [A Real-World CP: Chromium \(see page 573\)](#)
- [Zoom as a Custom Partition \(see page 588\)](#)
- [Microsoft Teams as a Custom Partition \(see page 608\)](#)

## A First Simple Custom Partition

As a first step, this tutorial will guide you through creating a simple Custom Partition. It will open a message window greeting the user, which can be run by clicking a desktop icon. You will learn about some basic mechanisms of Custom Partitions in this section.

Read all the following chapters in the order given and follow the instructions.

1. [Development Environment](#) (see page 548)
2. [Activating the Custom Partition Functionality](#) (see page 549)
3. ["Hello World" Program](#) (see page 550)
4. [Creating the Custom Application](#) (see page 552)
5. [Using a Partition Parameter](#) (see page 555)

## Development Environment

For this first simple Custom Partition, you only need `root` access to a device with IGEL OS version 11.01.100 or higher.

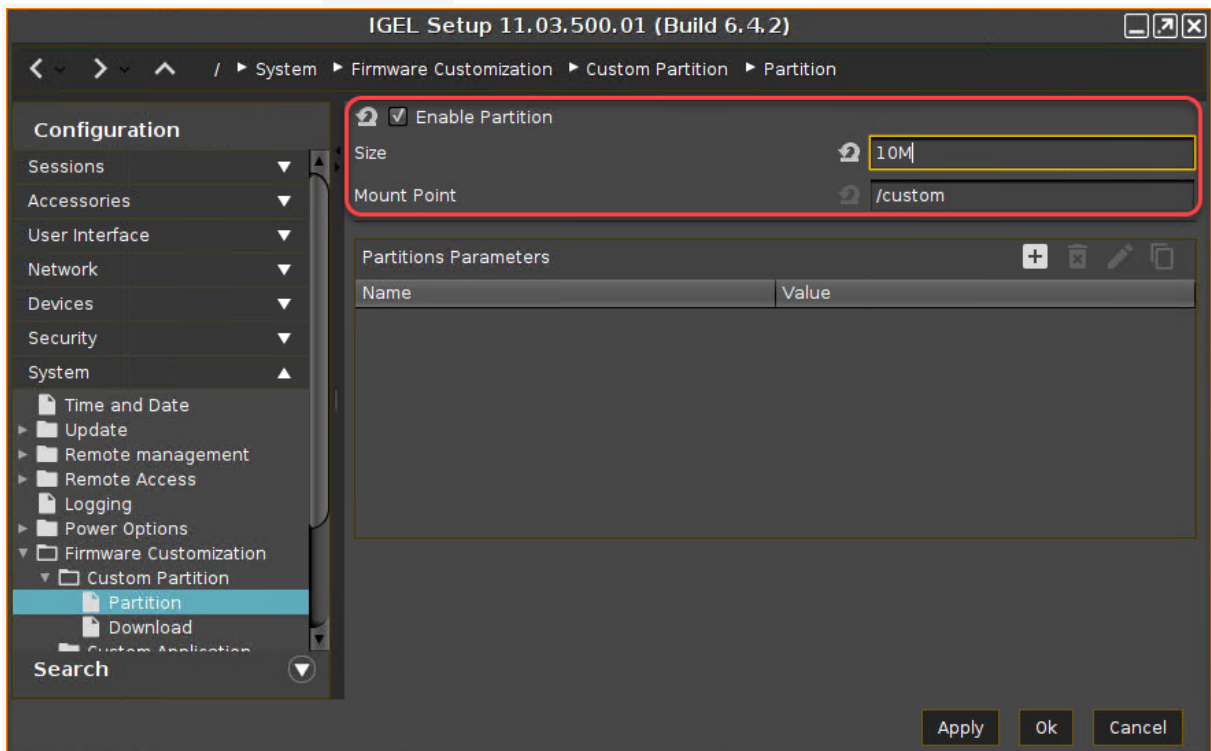
### Next Step

>> [Activating the Custom Partition Functionality](#) (see page 549)

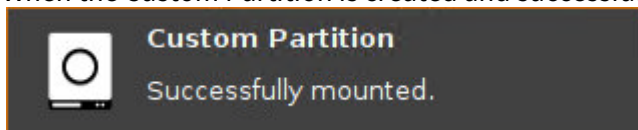
## Activating the Custom Partition Functionality

First, you must activate the Custom Partition functionality. It is deactivated by default.

1. Open the Setup and go to **System > Firmware Customization > Custom Partition > Partition**.
2. Check **Enable Partition**.
3. Set the **Size** to "10M" Megabyte).
4. Leave the **Mount Point** at /custom



5. Click **Apply**.  
The Custom Partition is created on the device's mass storage, which is indicated by a message. When the Custom Partition is created and successfully mounted, the message reads:



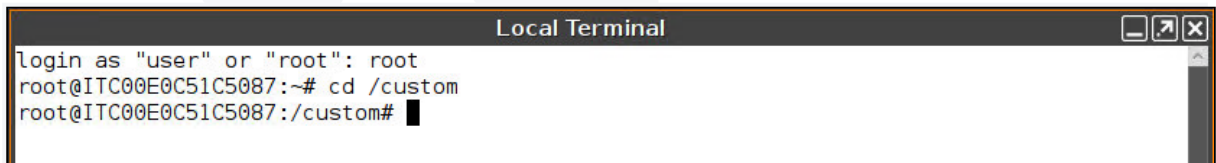
### Next Step

>> ["Hello World" Program](#) (see page 550)

## "Hello World" Program

Your first Custom Partition will contain a simple shell script that displays the message "Hello, world!" with the help of the `gtkmessage` utility.

1. Open the local terminal on your device and log in as `root` . If the local terminal has not been configured yet, see Terminals.
2. Change into the `/custom` directory: `cd /custom`



```

Local Terminal
login as "user" or "root": root
root@ITC00E0C51C5087:~# cd /custom
root@ITC00E0C51C5087:/custom#

```

3. Make a `hello` directory for your Custom Partition contents: `mkdir hello`

```
root@ITC00E0C51C5087:/custom# mkdir hello
```

4. Change into the `hello` directory: `cd hello/`

```
root@ITC00E0C51C5087:/custom# cd hello/
```

5. Open a new plaintext file using the GNU nano editor: `nano hello.sh`

```
root@ITC00E0C51C5087:/custom/hello# nano hello.sh
```

✓ The colors used by default for syntax highlighting in nano may be inconvenient for reading. You can change the colors with the following command: `sed -i "s#color cyan#color blue#; s#color brightyellow#color red#" /usr/share/nano/sh.nanorc`  
Also, you can use the `vi` editor as an alternative; the commands for exiting and saving a file will be different then.

6. Put this content into the file:

```
#!/bin/bash
gtkmessage -m "Hello, World!" -t "Hello" -o "Close"
```

```

GNU nano 2.5.3 File: hello.sh
#!/bin/bash
gtkmessage -m "Hello ${customparam get NAME}!" -t "Hello" -o "Close"

```

<sup>^</sup>G Get Help    <sup>^</sup>O Write Out    <sup>^</sup>W Where Is    <sup>^</sup>K Cut Text    <sup>^</sup>J Justify    <sup>^</sup>C Cur Pos  
<sup>^</sup>X Exit    <sup>^</sup>R Read File    <sup>^</sup> Replace    <sup>^</sup>U Uncut Text    <sup>^</sup>T To Linter    <sup>^</sup> Go To Line

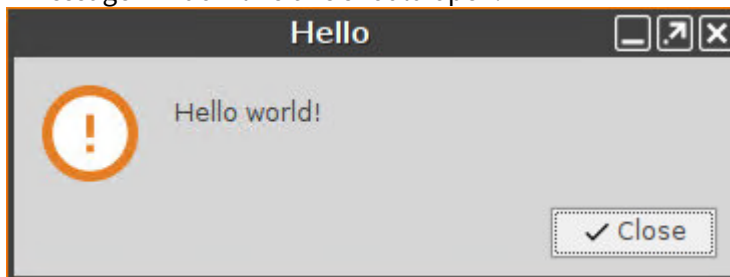
7. Save the file by pressing [Ctrl]+[o], [Return].
8. Exit the GNU nano editor by pressing [Ctrl]+[x].
9. Make the file executable: `chmod a+x hello.sh`

```
root@ITC00E0C51C5087:/custom/hello# chmod a+x hello.sh
```

10. Run the shell script from the command line to test it: `./hello.sh`

```
root@ITC00E0C51C5087:/custom/hello# ./hello.sh
```

A message window like this should open:



You can close it with the **Close** button.

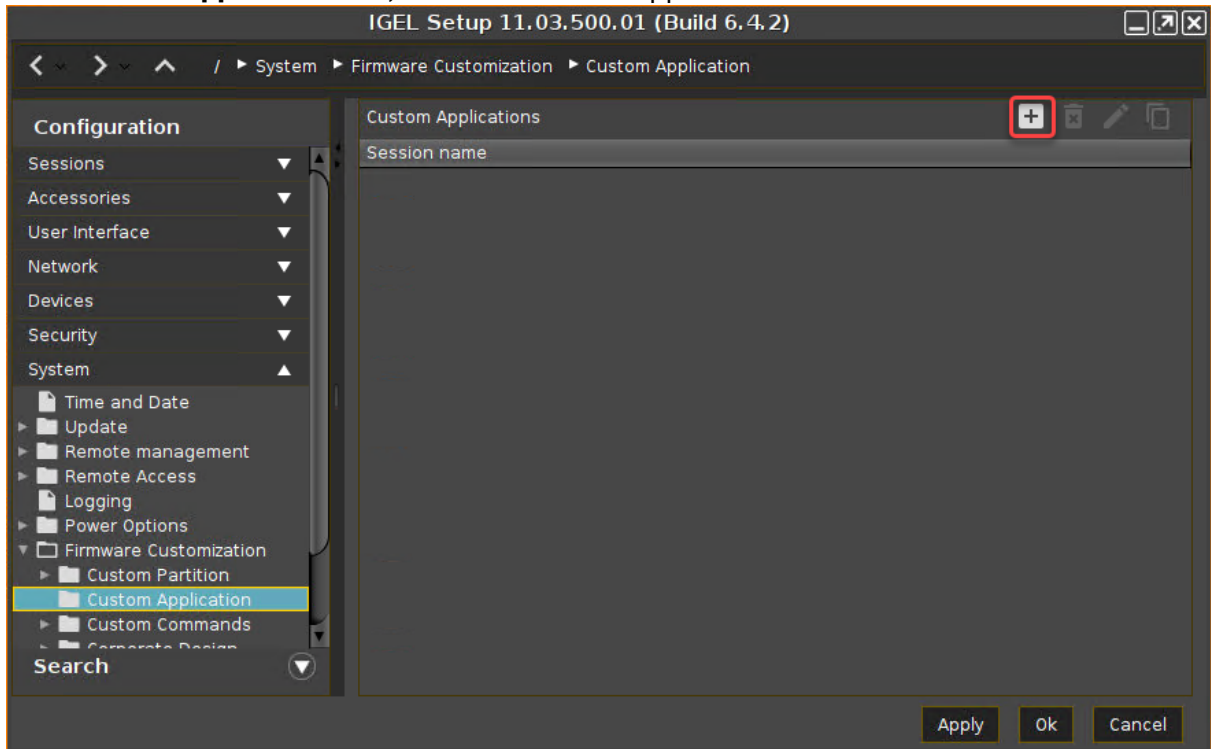
Next Step

>> [Creating the Custom Application](#) (see page 552)

## Creating the Custom Application

In the previous step, you have created a little application and executed it from the command line. Now make it more convenient for end-users: Create a custom application and place an icon on the desktop that users can click.

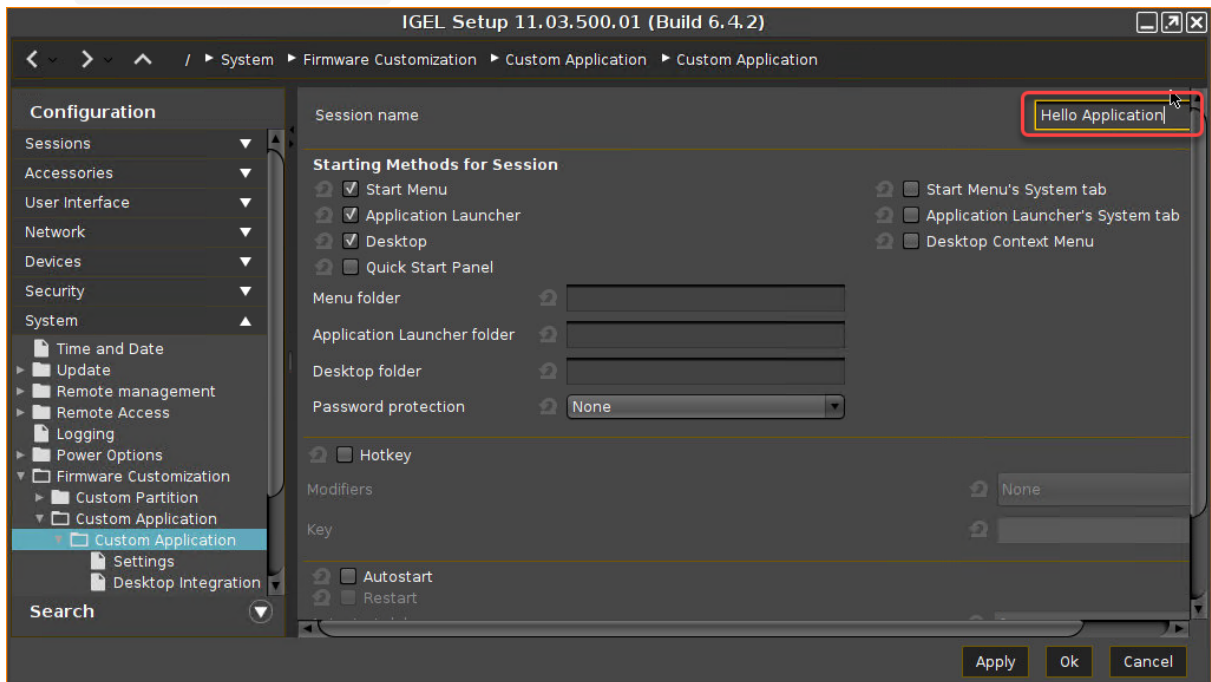
1. In the Setup, go to **System > Firmware Customization > Custom Application**.
2. In the **Custom Applications** list, click **+** to add an application.



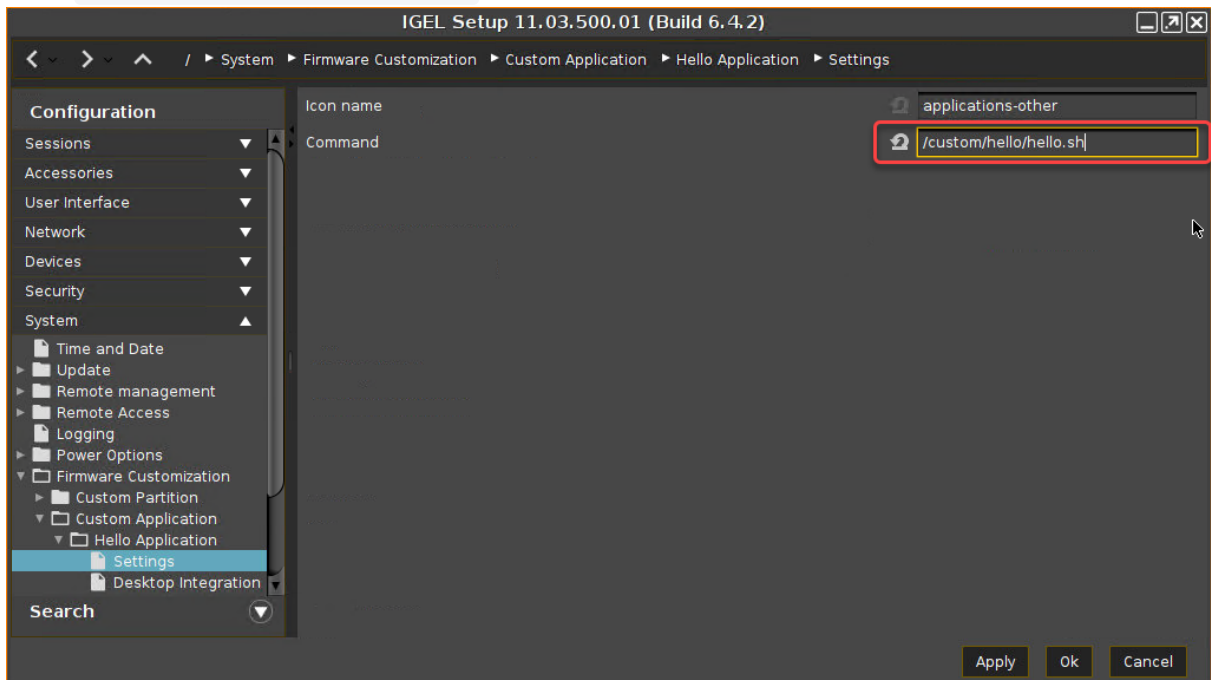
The **Desktop Integration** page opens.



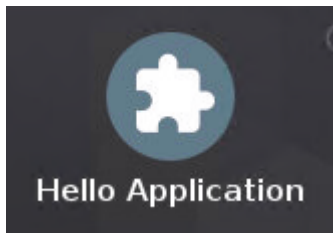
3. Enter `Hello Application` as the **Session name**.



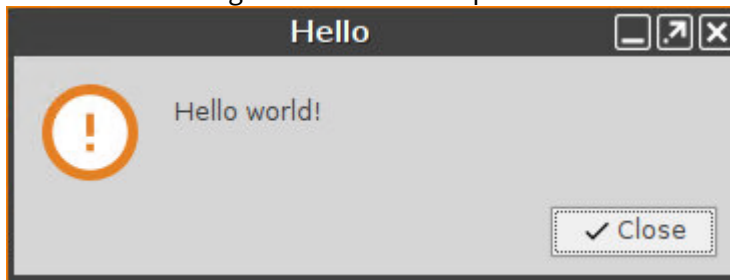
4. Click **Apply**.
5. Go to **Settings**.
6. Enter `/custom/hello/hello.sh` as the **Command**.



7. Click **OK**.  
A **Hello Application** icon has appeared on the desktop.



8. Double-click the icon.  
The "Hello" message window should open.



Next Step

>> [Using a Partition Parameter](#) (see page 555)

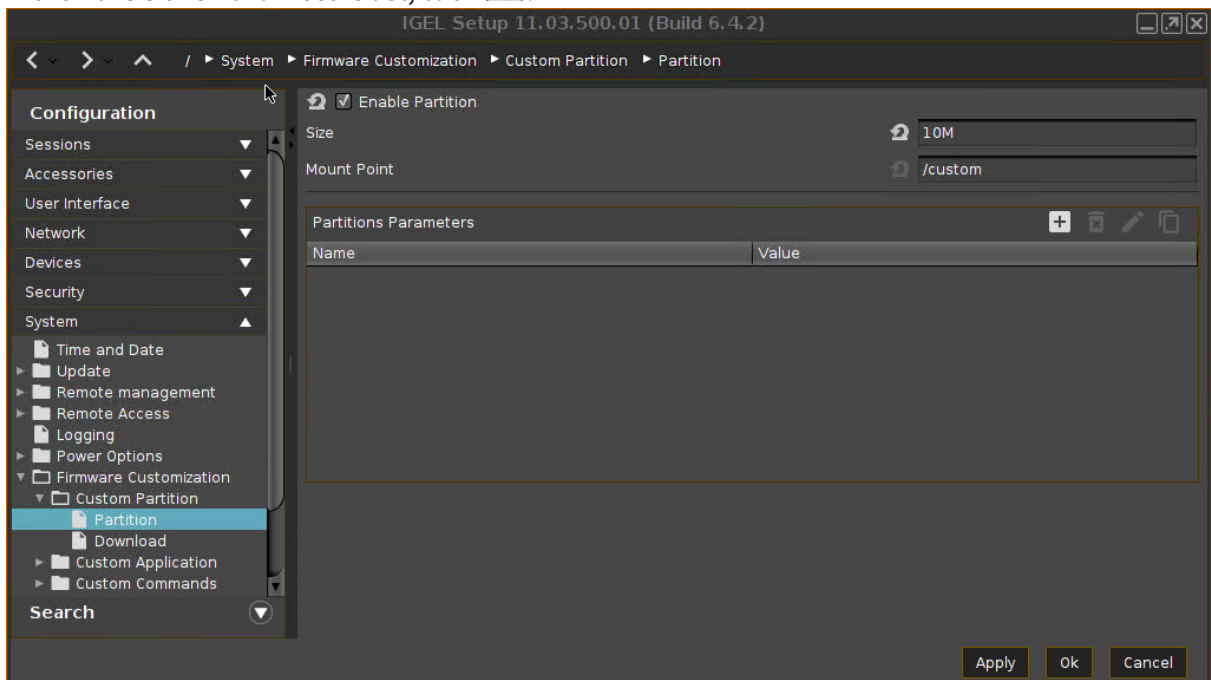
## Using a Partition Parameter

When you roll out the same Custom Partition contents to many devices, you may still want the application to use different data or options on some of the devices. Partition parameters allow you to do this.

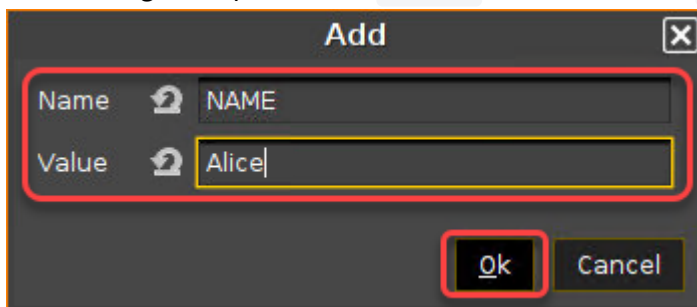
This is how you add a partition parameter to our "Hello World" program.

### Setting a Partition Parameter in the Setup

1. Go to **System > Firmware Customization > Custom Partition > Partition**.
2. In the **Partitions Parameters** list, click **+**.



3. In the dialog that opens, enter **NAME** as the **Name** and **Alice** as the **Value**. Click **OK**.



4. Click **Apply**.

### Getting the Value of a Partition Parameter

This is the command line for getting or setting a Partition Parameter's value:

```
customparam [get|set] PARAMETER_NAME [PARAMETER_VALUE]
```

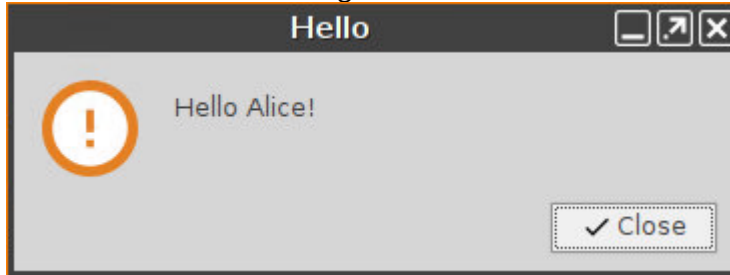
1. Change the `hello.sh` script to use this command to get the parameter value:

```
#!/bin/bash
```

```
gtkmessage -m "Hello $(customparam get NAME)!" -t "Hello" -o "Close"
```

2. Click the **Hello Application** desktop icon.

You should see the following:



## Packaging the Custom Partition

In the previous section, you developed Custom Partition contents locally on a device. Now, package it in order to deploy it to many devices via the Universal Management Suite (UMS).

Read all the following chapters in the order given and follow the instructions.

1. [Development Environment](#) (see page 558)
2. [Compressing the Custom Partition Contents](#) (see page 559)
3. [Writing the \\*.inf Metadata File](#) (see page 560)
4. [Uploading the Files to the UMS](#) (see page 561)
5. [Creating a Profile for the Custom Partition](#) (see page 566)
6. [Assigning the Profile](#) (see page 571)

When you have built this Custom Partition successfully, you can continue with a real-world partition. The following Custom Partitions are described in our tutorial:

- [Chromium](#) (see page 573)
- [Zoom](#) (see page 588)
- [Microsoft Teams](#) (see page 608)

## Development Environment

For this section, you need:

- a system with IGEL OS 11.01.100 or newer
- Universal Management Suite (UMS) 6.01.100 or newer

Next Step

>> [Compressing the Custom Partition Contents](#) (see page 559)

## Compressing the Custom Partition Contents

The contents of a Custom Partition are packaged as a compressed `tar` file. Create it on the Linux command line, e.g. on a device that is running IGEL OS:

1. In the local terminal, become `root` and change to the `/custom` directory: `cd /custom`

```
root@ITC00E0C51C5087:~# cd /custom
```

2. Compress the contents of the `hello/` directory into an archive file named `hello.tar.bz2` :

```
tar cjvf hello.tar.bz2 hello/
```

```
root@ITC00E0C51C5087:/custom# tar cjvf hello.tar.bz2 hello/
```

The result is a `hello.tar.bz2` file, sitting side-by-side with the `hello/` directory. You will upload it to UMS later.

### Next Step

>> [Writing the \\*.inf Metadata File \(see page 560\)](#)

## Writing the \*.inf Metadata File

In addition to the compressed archive that you created in the previous step, a plain text file with essential information for the endpoint device is necessary. In this, step you will create the `hello.inf` file.

1. Change to the directory that contains the compressed contents of our Custom Partition

(`hello.tar.bz2`): `cd /custom/`

```
root@ITC00E0C51C5087:/custom# cd /custom/
```

2. Create a new file named `hello.inf` and put the following into it:

```
[INFO]
```

```
[PART]
```

```
file="hello.tar.bz2"
```

```
version="1.0_igel1"
```

```
size="10M"
```

```
name="hello"
```

```
minfw="11.01.100"
```

The individual entries and their meaning are:

```
[INFO] Mandatory string
```

```
[PART] Mandatory string
```

`file` The filename of the `*.tar.bz2` archive

`version` The version of the contents, consisting of the vendor version (let's say this is "hello 1.0") and the IGEL package version (the first package we produced of the software), joined with an underscore.

`size` Size of the decompressed contents

`name` Name of this content, used for naming the subdirectory within the custom partition and for keeping track of installed contents

`minfw` Minimum firmware version required for these contents

3. Save the file.

### Next Step

>> [Uploading the Files to the UMS \(see page 561\)](#)

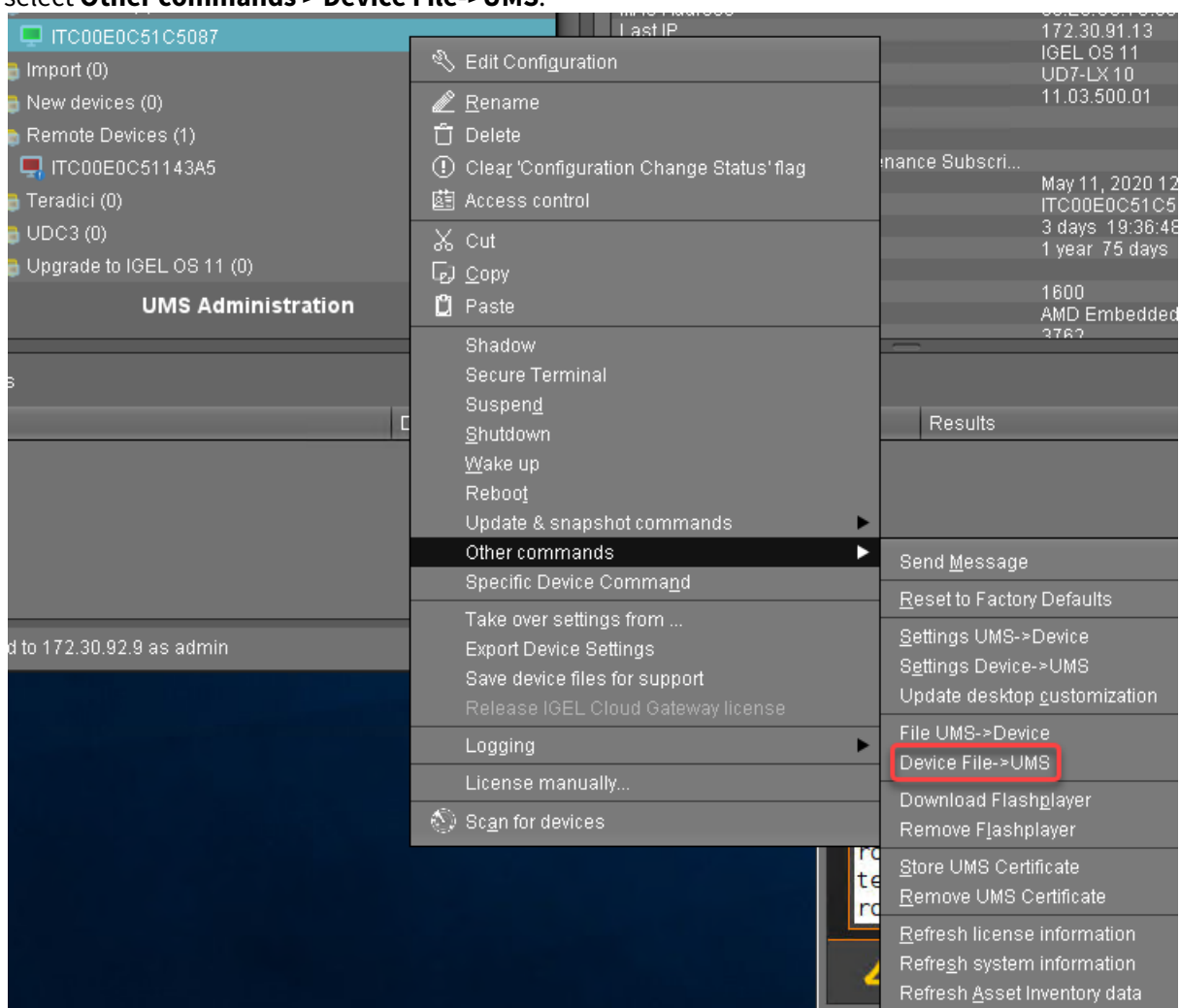


## Uploading the Files to the UMS

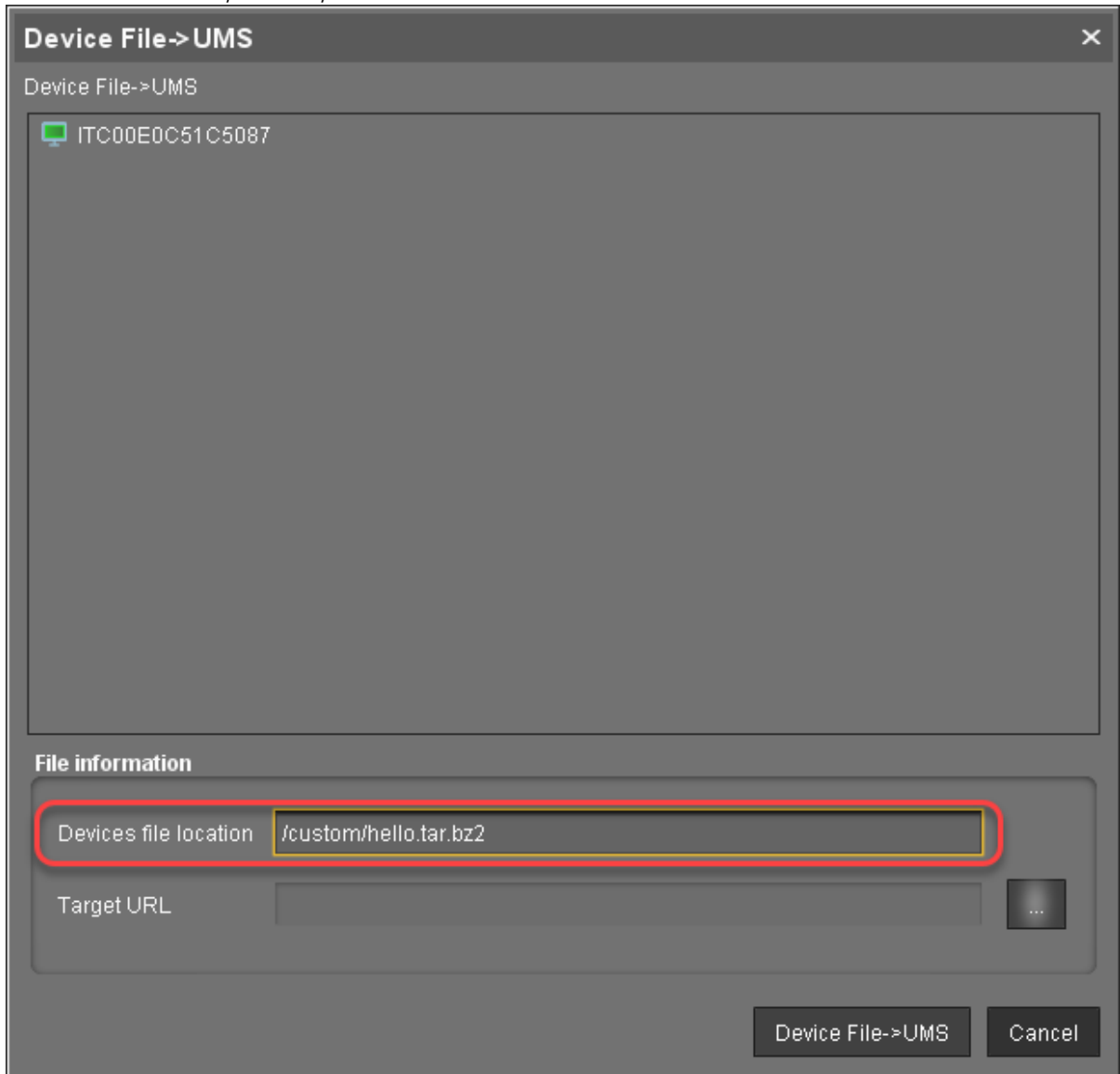
In this step, you upload the compressed `hello.tar.bz2` archive and the `hello.inf` metadata file to the UMS, which will serve them to other devices via HTTPS. To make the file available, you have to create a file object after transferring the physical file.


### Transferring the Files to the UMS

1. In the structure tree of the UMS Console, go to the device on which you have created the files and select **Other commands > Device File->UMS**.

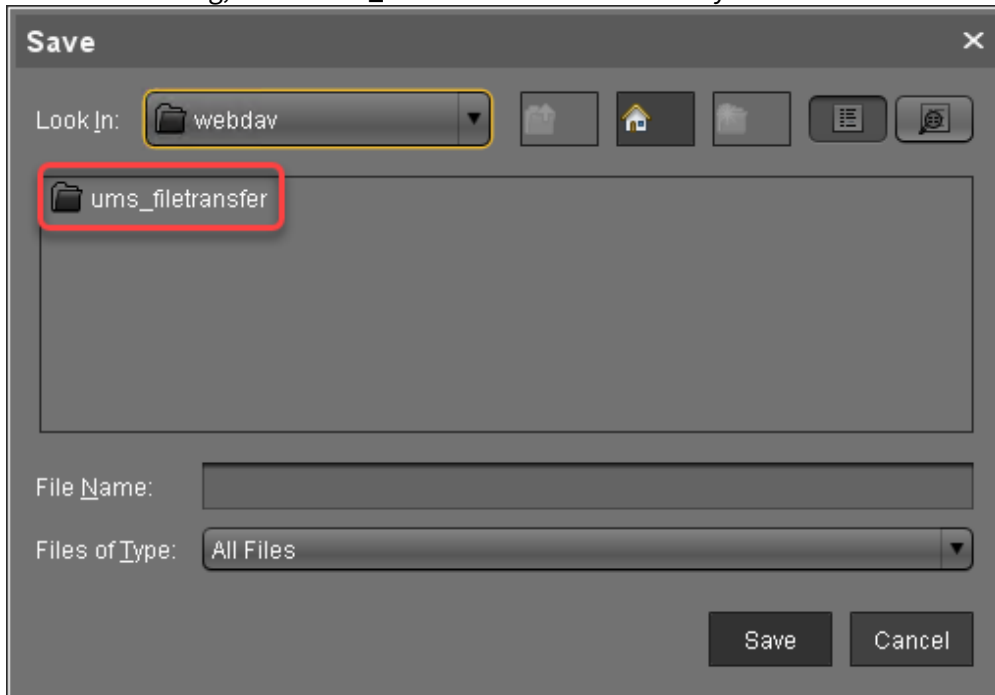


- In the **Device File->UMS** dialog, under **Device file location**, enter the complete path and file name of the bz2 archive: `"/custom/hello.tar.bz2"`

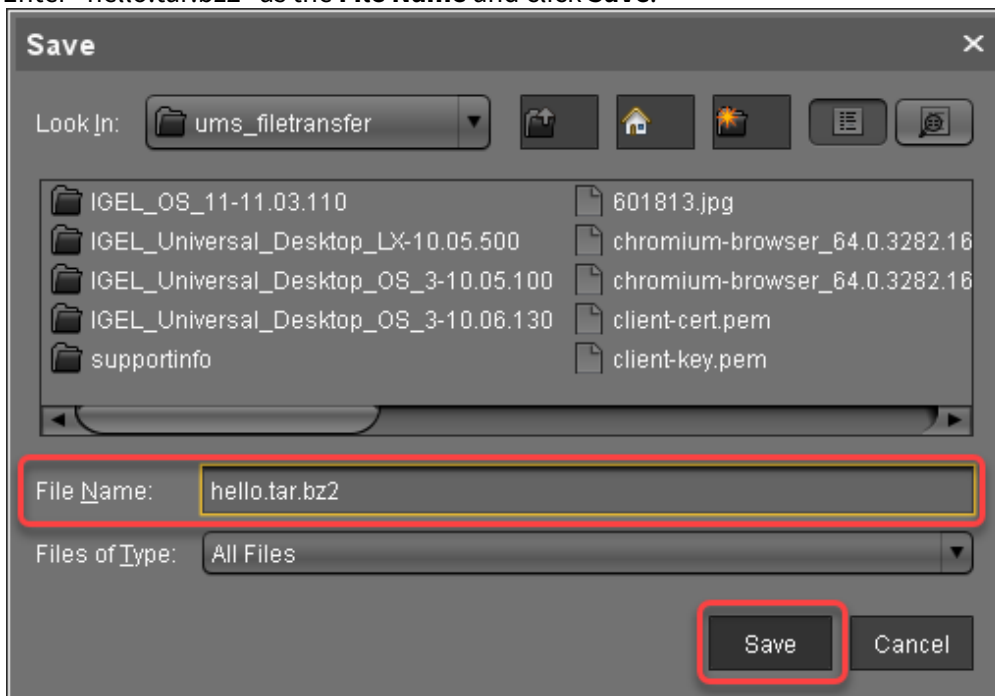


- Click  next to the **Target URL** to define the file path on the UMS Server.

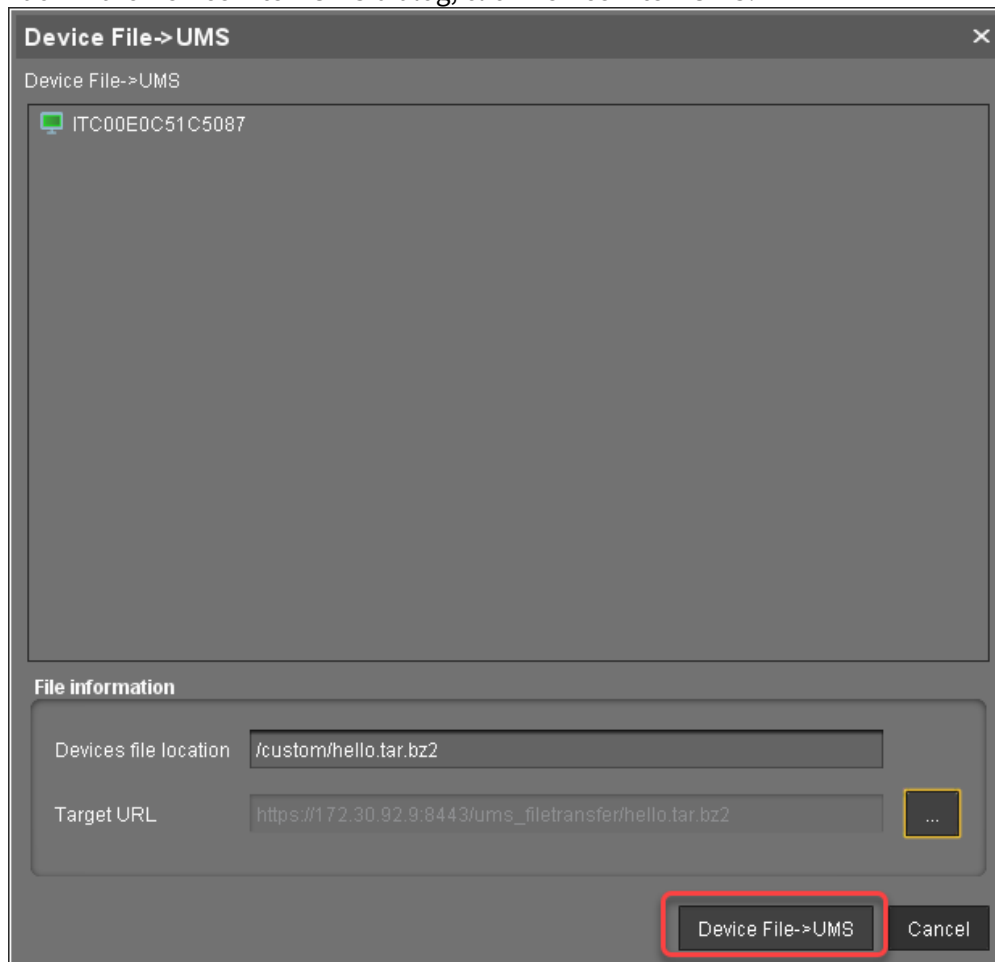
- 4. In the **Save** dialog, select **ums\_filetransfer** as the directory.



- 5. Enter "hello.tar.bz2" as the **File Name** and click **Save**.



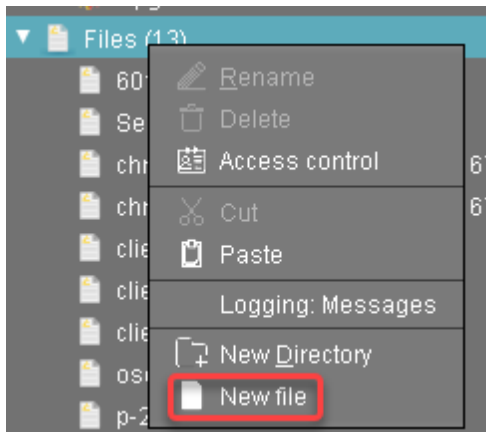
6. Back in the **Device File->UMS** dialog, click **Device File->UMS**.



7. Repeat steps 1 to 6 for the metadata file `hello.inf`.

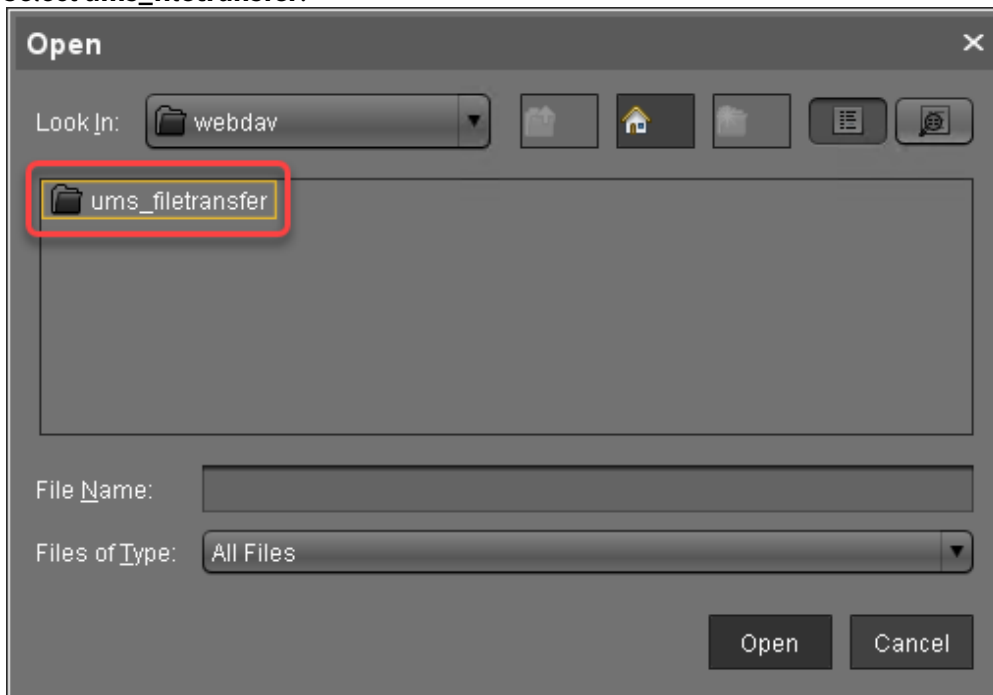
### Creating File Objects

1. In the UMS Console, right-click the **Files** folder in the structure tree and select **New File** from the context menu.



The **New file** dialog opens.

2. Activate **Select from UMS server** and click  next to this option to open the file chooser.
3. Select **ums\_filetransfer**.



4. Select "hello.tar.bz2" and click **Open**.
5. Back in the **New file** dialog, click **Ok**.
6. Repeat steps 1 to 4 for the metadata file `hello.inf`.

Next Step

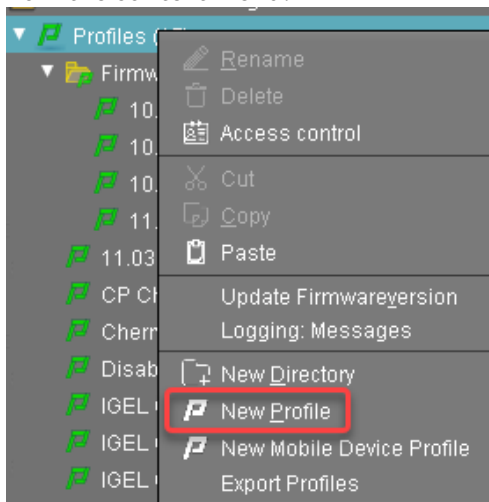
>> [Creating a Profile for the Custom Partition \(see page 566\)](#)

## Creating a Profile for the Custom Partition

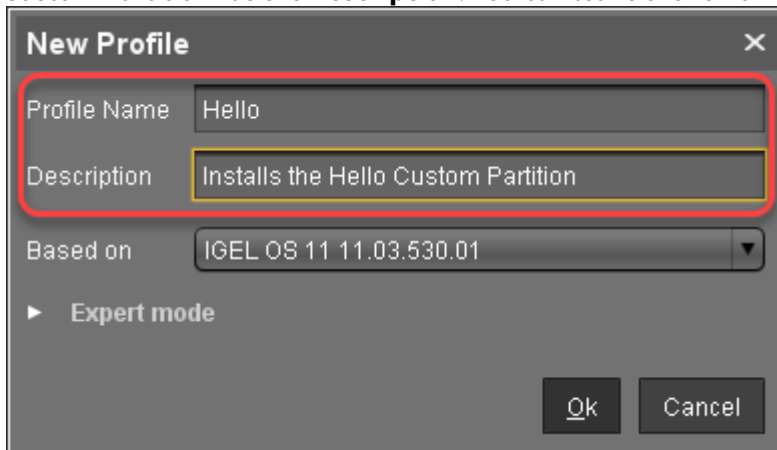
After you have uploaded the Custom Partition files to the UMS, you can now make the settings that will install the Custom Partition on any number of devices. For this purpose, we will create a profile.

### Activating the Custom Partition

1. In the structure tree of the UMS Console, right-click the **Profiles** folder and select **New Profile** from the context menu.

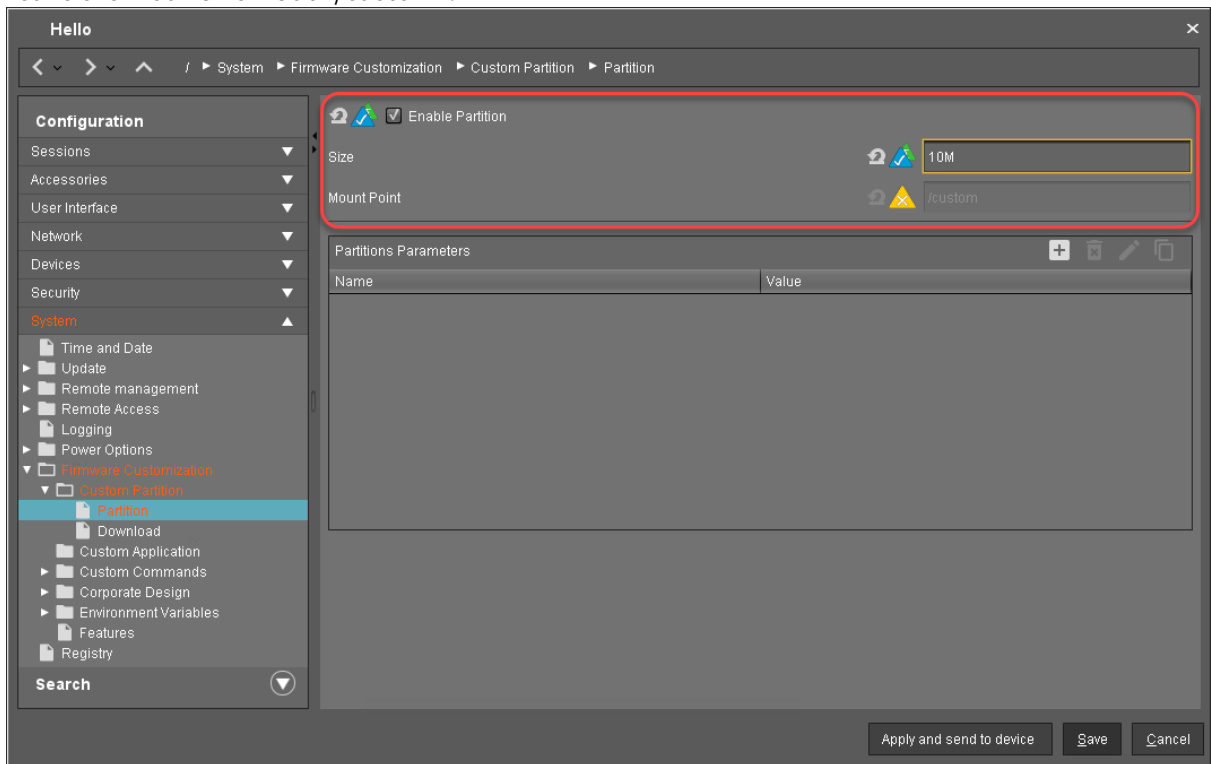


2. In the **New Profile** dialog, enter "Hello" as the **Profile Name** and something like "Installs the Hello Custom Partition" as the **Description**. You can leave the remaining fields.



3. Click **OK**.  
The configuration dialog opens, where you will make the settings for this profile.
4. Go to **System > Firmware Customization > Custom Partition > Partition**.
5. Unlock the **Enable Partition** setting by clicking the orange triangle so that it turns blue.
6. Check **Enable Partition**.
7. Unlock the **Size** setting by clicking the orange triangle so that it turns blue, and enter "10M".

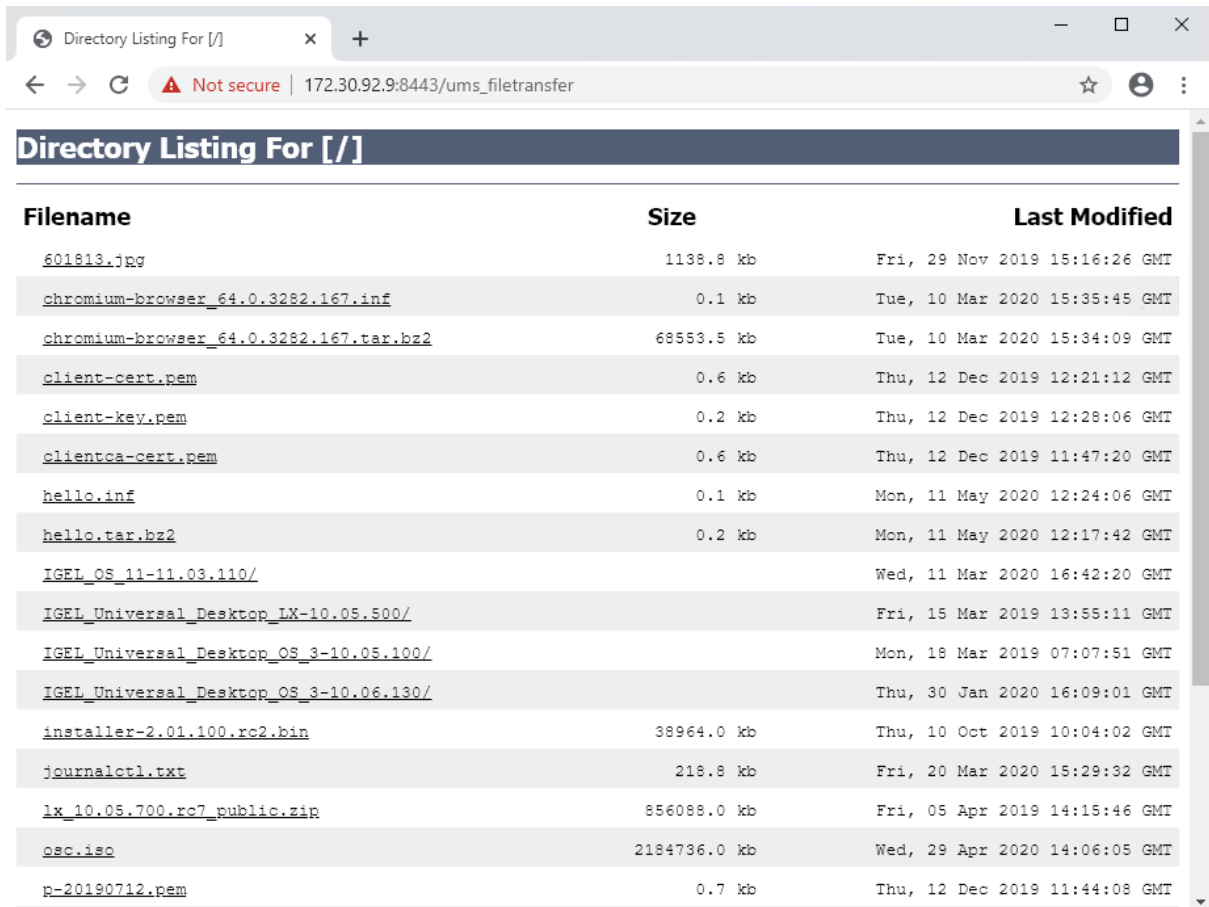
8. Leave the **Mount Point** at `"/custom"`.



Setting the Download Source

For this step, you need to determine the HTTPS download address for the `hello.inf` file first.

1. To find out the IP address of your UMS, go to **System > Remote Management** in the configuration dialog. You will find the IP address of the UMS Server your device is registered with.
2. Open a web browser and visit the following URL:  
`https://[IP or name of your UMS host]:8443/ums_filetransfer`
3. When prompted, authenticate with your UMS username and password.  
 You will see a directory listing of the files that can be downloaded from the UMS.

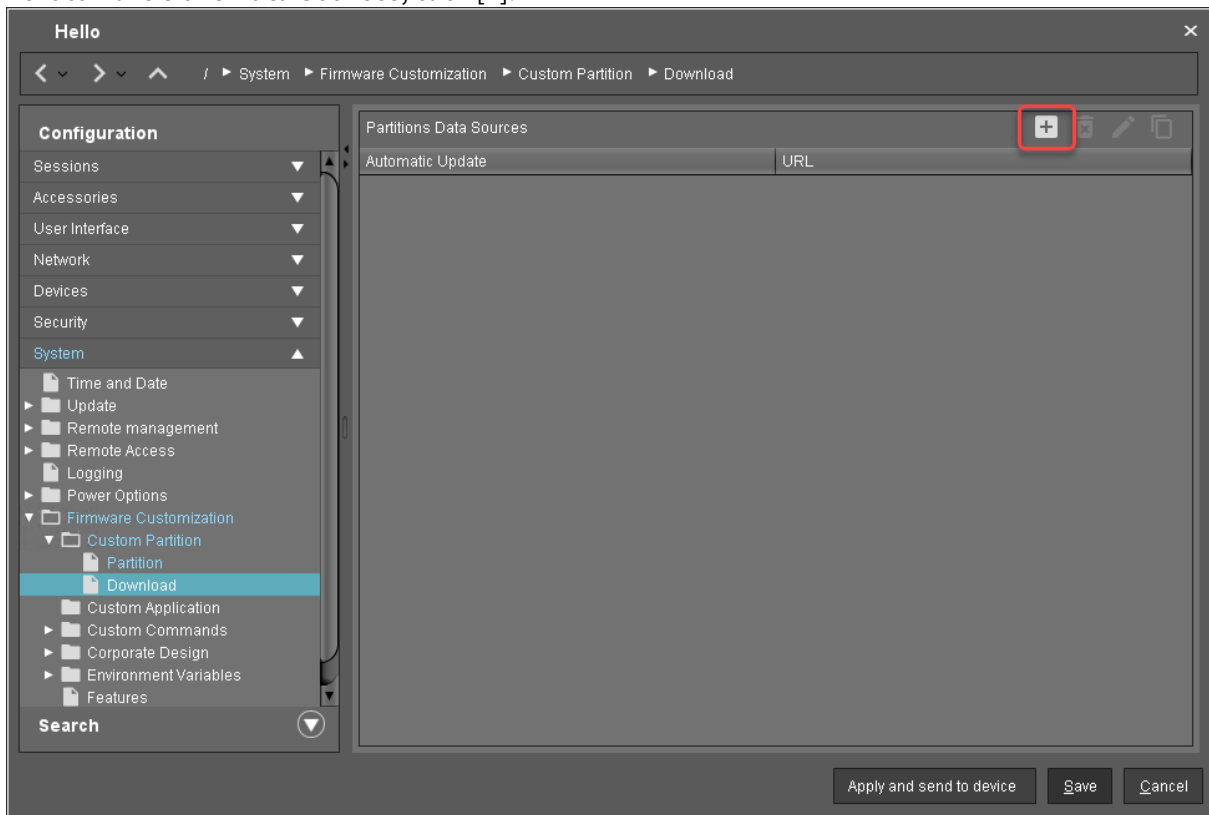


Filename	Size	Last Modified
<a href="#">601913.jpg</a>	1139.8 kb	Fri, 29 Nov 2019 15:16:26 GMT
<a href="#">chromium-browser_64.0.3282.167.inf</a>	0.1 kb	Tue, 10 Mar 2020 15:35:45 GMT
<a href="#">chromium-browser_64.0.3282.167.tar.bz2</a>	68553.5 kb	Tue, 10 Mar 2020 15:34:09 GMT
<a href="#">client-cert.pem</a>	0.6 kb	Thu, 12 Dec 2019 12:21:12 GMT
<a href="#">client-key.pem</a>	0.2 kb	Thu, 12 Dec 2019 12:28:06 GMT
<a href="#">clientca-cert.pem</a>	0.6 kb	Thu, 12 Dec 2019 11:47:20 GMT
<a href="#">hello.inf</a>	0.1 kb	Mon, 11 May 2020 12:24:06 GMT
<a href="#">hello.tar.bz2</a>	0.2 kb	Mon, 11 May 2020 12:17:42 GMT
<a href="#">IGEL_OS_11-11.03.110/</a>		Wed, 11 Mar 2020 16:42:20 GMT
<a href="#">IGEL_Universal_Desktop_LX-10.05.500/</a>		Fri, 15 Mar 2019 13:55:11 GMT
<a href="#">IGEL_Universal_Desktop_OS_3-10.05.100/</a>		Mon, 18 Mar 2019 07:07:51 GMT
<a href="#">IGEL_Universal_Desktop_OS_3-10.06.130/</a>		Thu, 30 Jan 2020 16:09:01 GMT
<a href="#">installer-2.01.100.rc2.bin</a>	38964.0 kb	Thu, 10 Oct 2019 10:04:02 GMT
<a href="#">journalctl.txt</a>	218.8 kb	Fri, 20 Mar 2020 15:29:32 GMT
<a href="#">lx_10.05.700.rc7_public.zip</a>	856088.0 kb	Fri, 05 Apr 2019 14:15:46 GMT
<a href="#">osc.iso</a>	2184736.0 kb	Wed, 29 Apr 2020 14:06:05 GMT
<a href="#">p-20190712.pem</a>	0.7 kb	Thu, 12 Dec 2019 11:44:08 GMT

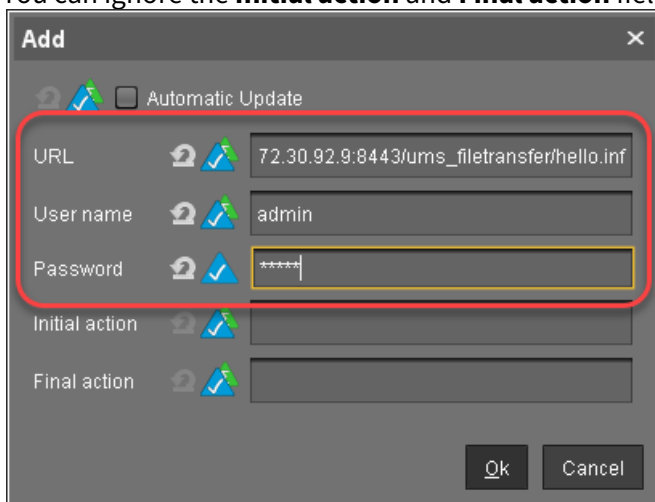
4. Right-click the `hello.inf` entry and select **Copy link address** (or the like, depending on your browser).
5. In the profile's settings, go to **System > Firmware Customization > Custom Partition > Download**.



- Next to **Partitions Data Sources**, click [+].



- The **Add** dialog opens.
- Paste the URL you copied from the browser into **URL**.
- Enter the **User name** and **Password** so that the device has access to your UMS. You can ignore the **Initial action** and **Final action** fields for the time being.



- Click **OK**.

### Creating a Custom Application

- ▶ Add a custom application to the profile by following the steps in [Creating the Custom Application](#) (see page 552).

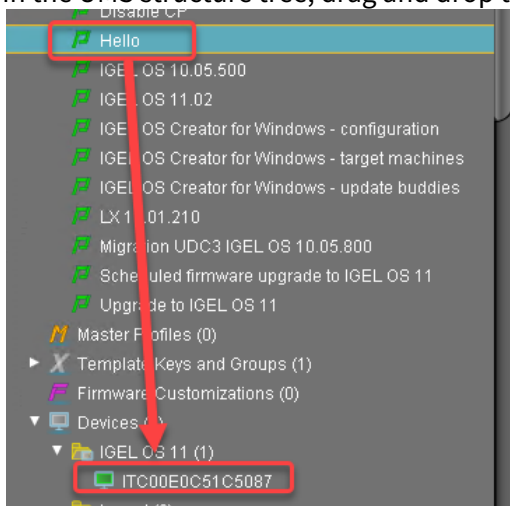
### Next Step

>> [Assigning the Profile](#) (see page 571)

## Assigning the Profile

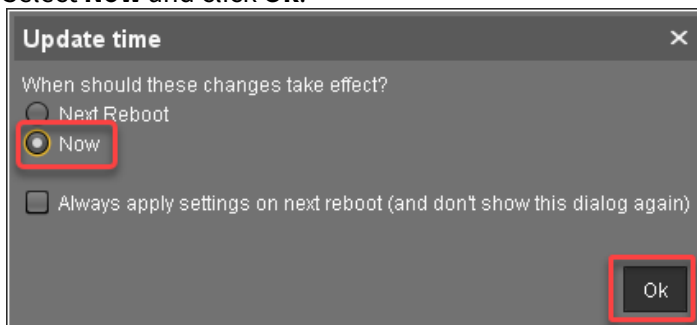
Now that you have put all the settings for installing the Custom Partition on a device into a profile, it is time to assign the profile.

1. In the UMS structure tree, drag and drop the icon of your profile onto the icon of a device.



The **Update time** dialog opens.

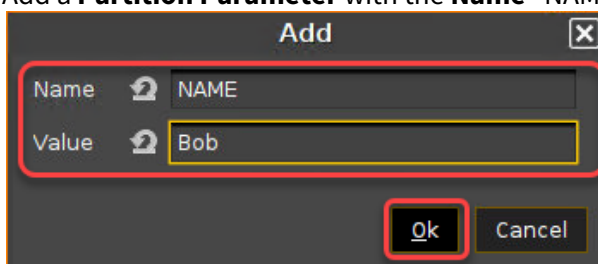
2. Select **Now** and click **Ok**.



The device receives the settings of the profile, creates the Custom Partition, downloads the contents of the Custom Partition and uncompresses them.

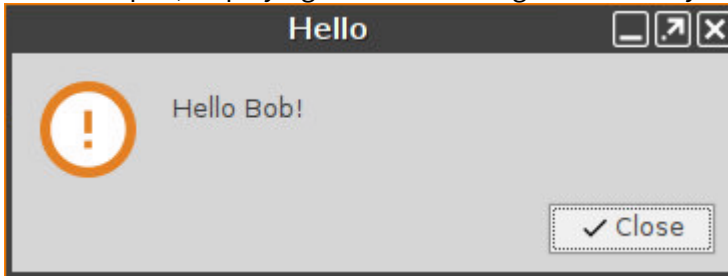
The **Hello Application** icon appears on the desktop.

3. In the device's local Setup, go to **System > Firmware Customization > Custom Partition > Partition**.
4. Add a **Partition Parameter** with the **Name** "NAME" and a **Value** of your choice.



5. Back in the Setup, click **Ok**.

6. Click the icon to test the application.  
It should open, displaying a text containing the name of your choice.



## A Real-World CP: Chromium

The previous example was simplified, but it taught you a lot of the IGEL Custom Partition fundamentals. Now build on top of these and try your hand at a real-world CP: the Chromium web browser - the Open Source sibling of Google Chrome, a complex application with a variety of features.

**i** As you will be working with original Ubuntu packages, actual version numbers (or packages) may differ from this tutorial, as Ubuntu frequently update their packages. The method for building the CP, however, remains the same.

- 
- [Development Environment](#) (see page 574)
  - [Getting the Ubuntu Package](#) (see page 575)
  - [Unpacking the Ubuntu Package](#) (see page 576)
  - [Creating a Larger CP](#) (see page 577)
  - [Setting Up Library Paths via Script](#) (see page 578)
  - [The First Run](#) (see page 580)
  - [Obtaining Libatomic](#) (see page 581)
  - [Installing Libatomic](#) (see page 582)
  - [Another Test Run](#) (see page 583)
  - [Providing Libffmpeg](#) (see page 584)
  - [Chromium Starts Successfully](#) (see page 585)
  - [Packaging the Custom Application](#) (see page 586)
  - [Advanced](#) (see page 587)

## Development Environment

For this section you need

- a system with IGEL OS *version 10.03.100* or newer,
- a Windows or Linux workstation with Universal Management Suite (UMS) in *version 5.07.100* or newer,
- a Debian or Ubuntu Linux workstation for unpacking the `*.deb` package (can be the same as the Linux workstation hosting UMS),
- a method to exchange files between the thin client and the workstation.

While a USB pen or disk drive would do the trick, it is more convenient to have either a

- Windows fileshare or
- an NFS export

that you can access both from the thin client and the workstation in order to exchange files.

[Learn how to mount network drives in the IGEL OS Manual.](#)<sup>51</sup>

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<sup>51</sup> <http://edocs.igel.com/11105.htm>

## Getting the Ubuntu Package

As the Chromium web browser is Free Software it can be found in the package repositories of Linux distributions. To build Custom Partitions, use the software packages from exactly that Ubuntu version on which your version of IGEL OS is based. From IGEL OS 10.04 up to IGEL OS 11.03, this is Ubuntu 16.04 (Xenial Xerus). You need packages for the `amd64` (also known as `x86_64`) architecture.

This is how to find the right package and download it to your Linux workstation:

1. In a web browser, go to `https://packages.ubuntu.com`
2. Use the **Search package directories** form to search
  - a. Set **Keyword** to `chromium`
  - b. Set **Distribution** to `xenial`
  - c. Click **Search**.

## Search

### Search package directories

Keyword:

Search on:  Package names only  Descriptions  Source package names

Only show exact matches:

Distribution:  Section:

3. On the results page, click the **chromium-browser** package to go to its details page.
4. At the bottom of the details page, click the **amd64** link to download the package to a local directory on your Linux workstation.

## Unpacking the Ubuntu Package

Extract the Ubuntu package on your Debian/Ubuntu Linux workstation in order to access its files:

1. Open a terminal emulator.
2. Change to the directory where you saved the Ubuntu package.
3. Create a directory to extract the files to:  
`mkdir chromium-browser`
4. Extract the package to the new directory:  
`dpkg -x *.deb chromium-browser/`
5. Run the following command to see how much space the package contents need in total (in MB):  
`du -cms chromium-browser/*`

The total is 255 MB (your package may differ slightly). To be on the safe side let's memorize that we need approximately 400 MB of space for the CP contents.



## Creating a Larger CP

Create a larger Custom Partiton so we can put all the Chromium package files into it.

1. On the thin client, make sure that you have closed all **Local Terminal** windows.
2. In UMS Console, navigate to your target thin client.
3. In **Assigned Objects**, remove the **Hello CP** profile from this thin client.
4. When prompted **When should these changes take effect?** select **Now**.  
The existing Custom Partition is deleted.
5. Right-click the thin client and select **Edit Configuration**.
6. In Setup go to **System > Firmware Customization > Custom Partition > Partition**.
7. Check **Enable Partition**.
8. Set the **Size** to `400M` (Megabyte) to be on the safe side.
9. Leave the **Mount Point** at `/custom`
10. Click **Save**.  
The new Custom Partition is created.
11. On the thin client, open a **Local Terminal** and log in as `root`
12. Change into the Custom Partition: `cd /custom`
13. Check the size of the Custom partition: `df -h ./`  
It should be roughly 400M - if it is still roughly 10M, close **Local Terminal** and use **Setup** to first disable and then re-create the Custom Partition again.
14. Copy the complete `chromium-browser/` directory with all its contents from the Debian/Ubuntu machine into the Custom Partition on the thin client.


## Setting Up Library Paths via Script

With the whole package contents in place, you need to make sure that Chromium will be able to find its libraries and other needed files. There is a pre-fabricated script for this.

1. Log into **Local Terminal** as `root`.
2. Change into the `/custom/chromium-browser` directory.
3. Enter the command `ls -l`.
4. You will see that instead of a single script as in the previous example there are the `etc/` and `usr/` directories. They include many libraries and other files that Chromium will need to run. However, it expects these directories not within the `/custom/chromium-browser/` directory, but in the filesystem root, where system directories such as `/usr` are located. The Initialization Script for the Custom Partition will fix this by setting up symbolic links, so that for example `/custom/chromium-browser/usr/lib/library.so` will appear to be in `/usr/lib/library.so`, where Chromium expects it.
5. Use the GNU nano editor to create the file `custompart-chromium-browser` and put the following contents into it - alternatively, edit the file elsewhere and copy it into `/custom/chromium-browser/`:

```
#!/bin/sh
ACTION="custompart-chromium-browser_${1}"
# mount point path
MP=$(get custom_partition.mountpoint)
# custom partition path
CP="${MP}/chromium-browser"
# output to systemlog with ID amd tag
LOGGER="logger -it ${ACTION}"
echo "Starting" | $LOGGER
case "$1" in
init)
# Initial permissions
chown -R root:root "${CP}" | $LOGGER
chmod 755 "${MP}" | $LOGGER
# Linking files and folders on proper path
find "${CP}" | while read LINE
do
DEST=$(echo -n "${LINE}" | sed -e "s|${CP}||g")
if [ ! -z "${DEST}" -a ! -e "${DEST}" ]; then
# Remove the last slash, if it is a dir
```

```
        [ -d $LINE ] && DEST=$(echo "${DEST}" | sed -e "s/\//g") | $LOGGER
        if [ ! -z "${DEST}" ]; then
            ln -sv "${LINE}" "${DEST}" | $LOGGER
        fi
    done
    ldconfig
;;
stop)
    killall -q -SIGTERM chromium-browser
    sleep 1
    killall -q -SIGKILL chromium-browser
;;
esac
echo "Finished" | $LOGGER
exit 0
```

 Use this as a script template for your Custom Partitions, replacing all instances of `chromium-browser` with the directory name of your CP.

6. Make the script executable with the following command:

```
chmod a+x custompart-chromium-browser
```

7. Run the script:

```
./custompart-chromium-browser init
```

It should run and finish without any errors.

The library paths are set up now.

## The First Run

Now that the paths for the complete Chromium package contents have been set up, try running the program for the first time:

1. Log into **Local Terminal** as `root`.
2. Change into the `/custom/chromium-browser/` directory.
3. The `usr/bin/` and `usr/lib/` directories are good candidates for Chromium's main executable. Try to run the following command:

```
./usr/lib/chromium-browser/chromium-browser
```

You will see the following error message:

```
/usr/lib/chromium-browser/chromium-browser: error while loading  
shared libraries:
```

```
libatomic.so.1: cannot open shared object file: No such file or  
directory
```

This tells you that the program tries to load the shared library `libatomic.so.1`, but can't find it.

You will need to obtain `libatomic.so.1` and install it.

## Obtaining Libatomic

The source for Libatomic will be Ubuntu Package Search again:

1. In a web browser, go to `https://packages.ubuntu.com`
2. This time use the **Search the contents of packages** form to search.
  - a. Set **Keyword** to `libatomic.so.1`
  - b. Select **packages that contain files named like this**.
  - c. Set **Distribution** to `xenial`
  - d. Set **Architecture** to `amd64`
  - e. Click **Search**.

Keyword:

Display:

packages that contain files named like this

packages that contain files whose names end with the keyword

packages that contain files whose names contain the keyword

Distribution:   Architecture:

3. This time the results page lists a lot of packages. But with the background knowledge that IGEL OS libraries are located in `/usr/lib/x86_64-linux-gnu/` you will find that **libatomic1** is the desired package. Download it to a local directory on your Linux workstation.

<code>/usr/lib/gcc-snapshot/libx32/libatomic.so.1</code>	<code>gcc-snapshot</code>
<code>/usr/lib/x86_64-linux-gnu/libatomic.so.1</code>	<code>libatomic1</code>
<code>/usr/lib32/libatomic.so.1</code>	<code>lib32atomic1</code>

## Installing Libatomic

This step installs Libatomic and sets up a symbolic link so the Chromium will find it.

1. Extract the package contents with this command:

```
dpkg -x libatomic*.deb libatomic
```

2. Change into the extracted contents:

```
cd libatomic1/usr/lib/x86_64-linux-gnu/
```

3. List its contents in long form: `ls -l`

```
lrwxrwxrwx 1 huber huber 18 Nov 3 2016 libatomic.so.1 -> libatomic.so.1.1.0
-rw-r--r-- 1 huber huber 26760 Nov 3 2016 libatomic.so.1.1.0
```

This shows you that the library file is actually named `libatomic.so.1.1.0` and that `libatomic.so.1` is a symbolic link to it. We will recreate the link on the thin client later.

4. Transfer the `libatomic.so.1.1.0` file to the thin client and place it in:

```
/custom/chromium-browser/usr/lib/chromium-browser/
```

5. Change into the directory:

```
cd /custom/chromium-browser/usr/lib/chromium-browser/
```

6. Create the symbolic link:

```
ln -s libatomic.so.1.1.0 libatomic.so.1
```

Now Libatomic is set up to be used by Chromium.

## Another Test Run

Test whether Chromium now has everything it needs to run.

1. Change into the Custom Partition directory on the thin client:

```
cd /custom/chromium-browser
```

2. Run Chromium:

```
./usr/lib/chromium-browser/chromium-browser
```

3. You will see this error message:

```
/usr/lib/chromium-browser/chromium-browser: error while loading  
shared libraries:  
libffmpeg.so: cannot open shared object file: No such file or  
directory
```

It seems Libatomic is no longer a problem, but now Chromium needs a further library:

```
libffmpeg.so
```

## Providing Libffmpeg

To obtain Libffmpeg, repeat the process for [obtaining Libatomic](#) (see page 581). Hint: The Ubuntu package is named `chromium-codecs-ffmpeg`. It contains the file `libffmpeg.so`, which you need to transfer to the thin client. Place it in `/custom/chromium-browser/usr/lib/chromium-browser/`.

**i** This is a procedure that you need to repeat until you have supplied all required libraries:

- Run the application from the commandline.
- Scan the error message for needed libraries.
- Obtain and install the required libraries.
- Run the application from the commandline.
- ...



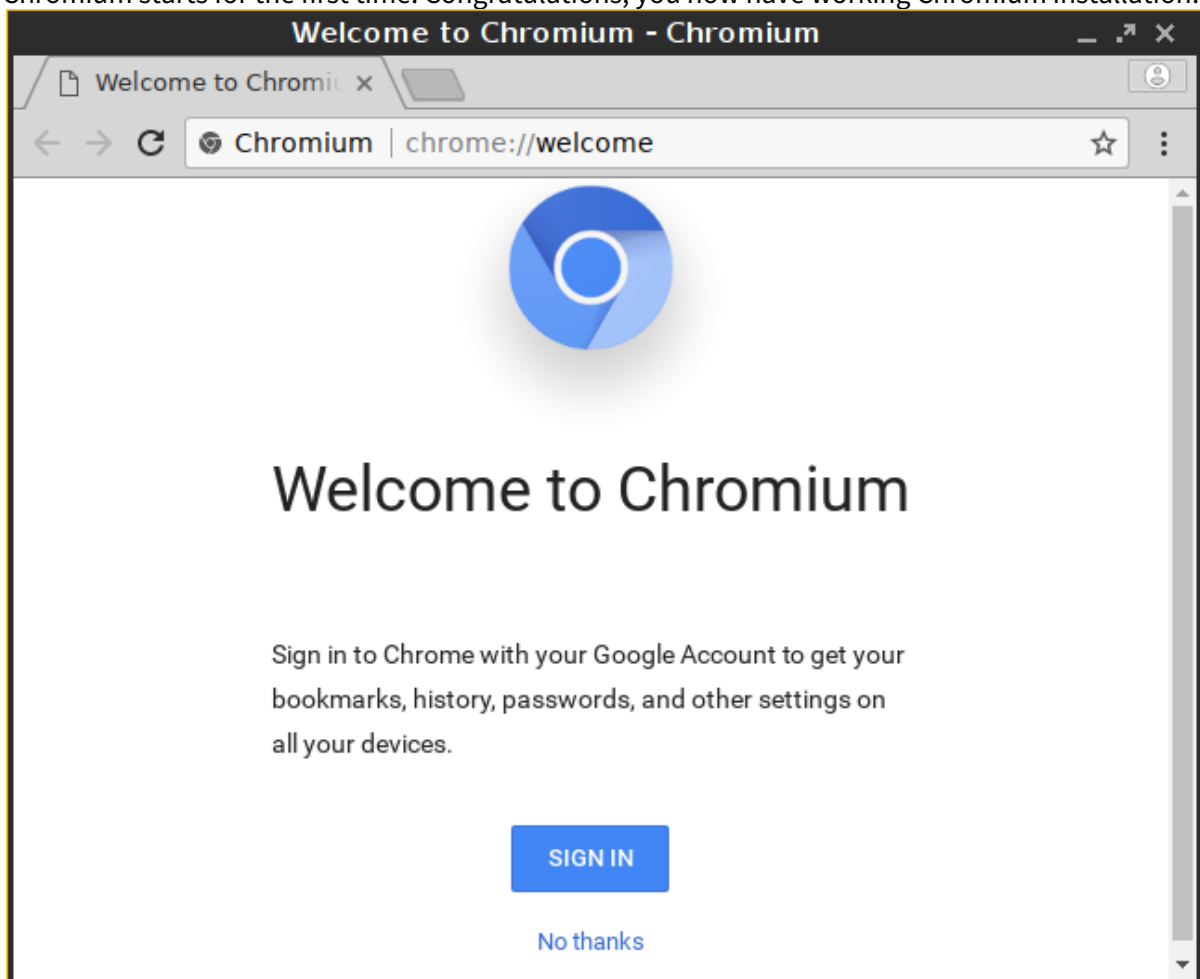
## Chromium Starts Successfully

Now you are ready to give running Chromium another try. It does not like to be started by `root` , because it is much safer to run it as the non-privileged `user` .

1. Log into **Local Terminal** as `user` .
2. Change into the `/custom/chromium-browser` directory.
3. Enter the following command:

```
./usr/lib/chromium-browser/chromium-browser
```

Chromium starts for the first time. Congratulations, you now have working Chromium installation.



The next step will package the Custom Partition so it can be deployed to any number of thin clients from UMS:

## Packaging the Custom Application

Now that the hardest part of creating the Custom Partition is done, package the CP for UMS. You are already familiar with most of the steps from earlier in this tutorial.

1. [Compress the CP Contents](#) (see page 559) into `chromium-browser.tar.bz2`
2. Upload the compressed file to UMS as a new **File**.
3. [Write the \\*.inf Metadata File](#) (see page 560) with `400M` as **size**.
4. Upload the \*.inf Metadata File to UMS as a new **File**.
5. [Create a Profile for the CP](#) (see page 566) with the **Initializing Action** set to:  
`/custom/chromium-browser/custompart-chromium-browser init`  
and the **Finalizing Action** set to:  
`/custom/chromium-browser/custompart-chromium-browser stop`
6. [Create a Custom Application](#) (see page 552) with the **Command** set to:  
`/custom/chromium-browser/usr/lib/chromium-browser/chromium-browser`
7. Assign the CP to a new thin client in order to test everything.

## Advanced

Here are some advanced topics for you to try after you have completed this tutorial.

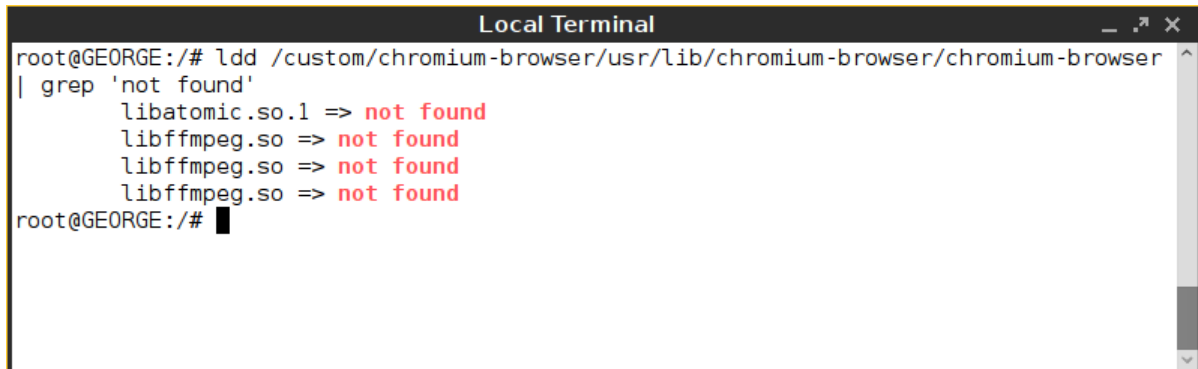
### Using ldd to Find Required Libraries

Using the `ldd` command is another way of determining the libraries that a binary requires.

1. Log into **Local Terminal** as `root`.
2. Find out which file the main binary of the Custom Partition is. It is usually found in `bin/`, `usr/bin/` or `usr/lib/` and is named similar to the application name.
3. Run the following command:

```
ldd /custom/[name]/[binary] | grep 'not found'
```

This command line contains a filter, so that it will only show you those libraries that could not be found.



```
Local Terminal
root@GEORGE:/# ldd /custom/chromium-browser/usr/lib/chromium-browser/chromium-browser
| grep 'not found'
    libatomic.so.1 => not found
    libffmpeg.so => not found
    libffmpeg.so => not found
    libffmpeg.so => not found
root@GEORGE:/#
```

### Auto-updating Custom Partitions

The Custom Partition mechanism in IGEL OS can update the Custom Partition contents automatically when a newer version is available on UMS. To activate it, follow these steps:

1. In Setup, go to **System > Firmware Customization > Custom Partition > Download**.
2. Open the CP entry in the **Partitions Data Sources** list.
3. Enable **Automatic Update**.
4. Click **OK**.
5. Click **Apply** or **Save** in the Setup window.
6. On UMS, increase the `version` property in the `*.inf` metadata file.

When booting, the thin client checks whether there is a higher version of the Custom Partition available on UMS. If so, the new CP version will be downloaded automatically.

## Zoom as a Custom Partition

Now that you have learned the IGEL Custom Partition fundamentals, build on top of these and try your hand at a real-world Custom Partition: Zoom.

Read all the following chapters in the order given and follow the instructions.

1. [Development Environment](#) (see page 589)
2. [Getting the Packages](#) (see page 590)
3. [Unpacking the Packages](#) (see page 591)
4. [Creating the Initialization Script](#) (see page 592)
5. [Compressing the Custom Partition Contents](#) (see page 595)
6. [Writing the \\*.inf Metadata File](#) (see page 596)
7. [Uploading the Files to the UMS](#) (see page 597)
8. [Creating a Profile for the Custom Partition](#) (see page 600)
9. [Assigning the Profile and Testing the Application](#) (see page 607)

## Development Environment

For this section, you need

- a system with IGEL OS 11.01.100 or newer,
- Universal Management Suite (UMS) 6.01.100 or newer,
- a Debian or Ubuntu workstation for unpacking the `*.deb` package (can be the same as the Linux workstation hosting the UMS. Ideally, the machine is running Ubuntu 18.04 LTS.
- a method to exchange files between the endpoint device and the workstation.

While a USB memory stick or disk drive would do the trick, it is more convenient to have either a

- Windows fileshare or
- an NFS export

that you can access both from the endpoint device and the workstation in order to exchange files.

Learn how to mount network drives in the IGEL OS Manual.

Next Step

>> [Getting the Packages](#) (see page 590)

## Getting the Packages

Get the required packages for Ubuntu. Apart from the Zoom package, you need the package `libxcb-xtest0[version].deb` (contains the shared libraries `libxcb-test.so.0` and `libxcb-test.so.0.0.0` which are required by the Zoom package).

1. Open <https://zoom.us/download?os=linux> in a browser and select the following:
  - **Linux Type:** "Ubuntu"
  - **OS Architecture:** "64 bit"
  - **Version:** "16.04+"
2. Download the Ubuntu/Debian package `zoom_amd64.deb`

 Version 5.0.399860.0429 has been tested by IGEL. Newer versions should work, too.

3. Change to the download directory on your workstation (typically `/home/[username]/Downloads`).
4. Download `libxcb-xtest0[version].deb` with the following command:

```
apt download libxcb-xtest0
```

### Next Step

>> [Unpacking the Packages](#) (see page 591)

## Unpacking the Packages

In this step, you extract the Ubuntu packages on your Linux workstation in order to access their files:

1. Open a terminal.
2. Change to the directory where you saved the packages.
3. Create a directory to extract the files to:

```
mkdir zoom
```

4. Extract the packages to the new directory:

```
dpkg -x zoom*.deb zoom/
```

```
dpkg -x libx*.deb zoom/
```

5. Run the following command to see how much space the package contents need in total (in MB):

```
du -cms zoom/*
```

The total is 151 MB (your package may differ slightly). To be on the safe side, let's memorize that we need approximately 500 MB of storage space for the Custom Partition contents.

Next Step

>> [Creating the Initialization Script](#) (see page 592)

## Creating the Initialization Script

In this step, you will create an initialization script that enables the application to work inside a Custom Partition. In a regular installation, the files of the Zoom application would be located in `/usr`, `/opt` and so on, whereas in the Custom Partition, they are located under `/custom/zoom/usr`, `/custom/zoom/opt` and so on.

The initialization script will fix this by creating symbolic links so that for example `/custom/zoom/usr/lib/library.so` will appear to be in `/usr/lib/library.so`, where Zoom expects it.

1. On your workstation, go to the directory where the `zoom` directory is located.
2. Open your text editor of choice and enter the following script:

```
#!/bin/sh

ACTION="custompart-zoom_${1}"

# mount point path
MP=$(get custom_partition.mountpoint)

# custom partition path
CP="${MP}/zoom"

# wfs for persistent login and history
WFS="/wfs/user/.zoom/data"

# .zoom directory
ZOOM="/userhome/.zoom/"

# output to systemlog with ID amd tag
LOGGER="logger -it ${ACTION}"

echo "Starting" | $LOGGER

case "$1" in
init)
    # Linking files and folders on proper path
    find ${CP} | while read LINE
    do
        DEST=$(echo -n "${LINE}" | sed -e "s|${CP}||g")
        if [ ! -z "${DEST}" -a ! -e "${DEST}" ]; then
            # Remove the last slash, if it is a dir
            [ -d $LINE ] && DEST=$(echo "${DEST}" | sed -e "s/\///g") | $LOGGER
        fi
        if [ ! -z "${DEST}" ]; then
            ln -sv "${LINE}" "${DEST}" | $LOGGER
        fi
    done
;;
*)
;;
esac
```



```

        fi
    done

    # Linking /userhome/.zoom/data to /wfs/user/.zoom/data for some basic
    # persistency
    mkdir -p ${WFS}
    chown -R user:users ${WFS}
    mkdir -p ${ZOOM}/data
    chown -R user:users ${ZOOM}/data
    mkdir -p ${ZOOM}/data/VirtualBkgnd_Custom
    chown -R user:users ${ZOOM}/data/VirtualBkgnd_Custom
    mkdir -p ${ZOOM}/data/VirtualBkgnd_Default
    chown -R user:users ${ZOOM}/data/VirtualBkgnd_Default

    ln -sv ${WFS}/zoomus.db ${ZOOM}/data/zoomus.db | $LOGGER
    ln -sv ${WFS}/zoommeeting.db ${ZOOM}/data/zoommeeting.db | $LOGGER
    ln -sv ${WFS}/VirtualBkgnd_Custom ${ZOOM}/data/ | $LOGGER
    ln -sv ${WFS}/VirtualBkgnd_Default ${ZOOM}/data/ | $LOGGER

    chown user:users /wfs/user/.zoom
    ln -sv /wfs/user/.zoom/zoomus.conf /userhome/.config/zoomus.conf |
$LOGGER

    # remove all com.zoom.ipc* files from /wfs/user/.zoom/data - might
    # cause issues when updating zoom
    rm ${WFS}/com.zoom.ipc*

    # add /opt/zoom to ld_library
    echo "${CP}/opt/zoom" > /etc/ld.so.conf.d/zoom.conf
    ldconfig

    ${MP}/zoom_postinst | $LOGGER

;;
stop)
    # unlink linked files
    find ${CP} | while read LINE
    do
        DEST=$(echo -n "${LINE}" | sed -e "s|${CP}||g")
        unlink $DEST | $LOGGER
    done

    # remove zoom.conf because it is not needed anymore
    rm /etc/ld.so.conf.d/zoom.conf

;;
esac

echo "Finished" | $LOGGER

```

```
exit 0
```

**i** The code line `echo "${CP}/opt/zoom" > /etc/ld.so.conf.d/zoom.conf` tells the Zoom application via the configuration file `zoom.conf` to search for libraries in `/custom/opt/zoom`. This is expected by the Zoom application.

3. Save the file as `custompart-zoom`

#### Next Step

>> [Compressing the Custom Partition Contents](#) (see page 595)

## Compressing the Custom Partition Contents

To make the unpackaged software package usable in a Custom Partition, make the application files executable and put them into a compressed `tar` file.

1. On your Linux workstation, open a terminal and change to the directory that contains the `zoom/` directory with the application files and the initialization script `custompart-zoom`.

2. Make the files in `zoom/` and the initialization script executable:

```
chmod -R +x zoom
```

```
chmod +x custompart-zoom
```

3. Compress the `zoom/` directory and the initialization script into an archive file named `zoom_[version].tar.bz2` (in our example: `zoom_5.0.399860.0429.tar.bz2`):

```
tar cjvf zoom_5.0.399860.0429.tar.bz2 zoom custompart-zoom
```

### Next Step


>> [Writing the \\*.inf Metadata File](#) (see page 596)

## Writing the \*.inf Metadata File

In addition to the compressed archive that you created in the previous step, a plain text file with essential information for the endpoint device is necessary. In this, step you will create the `zoom.inf` file.

1. Change to the directory that contains the compressed contents of our Custom Partition.
2. Create a new file named `zoom.inf` and put the following into it:

```
[INFO]
[PART]
file="zoom_5.0.399860.0429.tar.bz2"
version="5.0.399860.0429_igel1"
size="500M"
name="zoom"
minfw="11.01.100"
```

 For an explanation of the settings, see the corresponding page in the section about building a simple Custom Partition: [Writing the \\*.inf Metadata File](#) (see page 560).

### Next Step

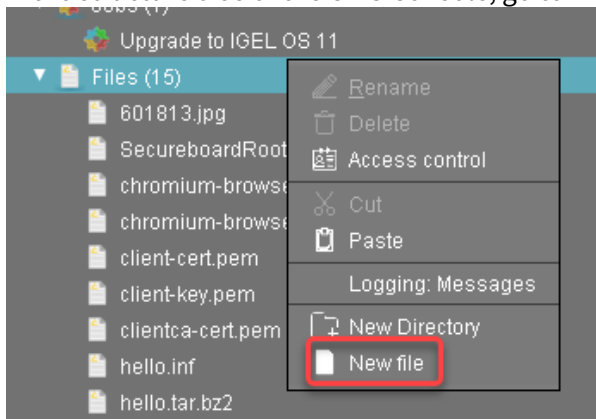
>> [Uploading the Files to the UMS](#) (see page 597)

## Uploading the Files to the UMS

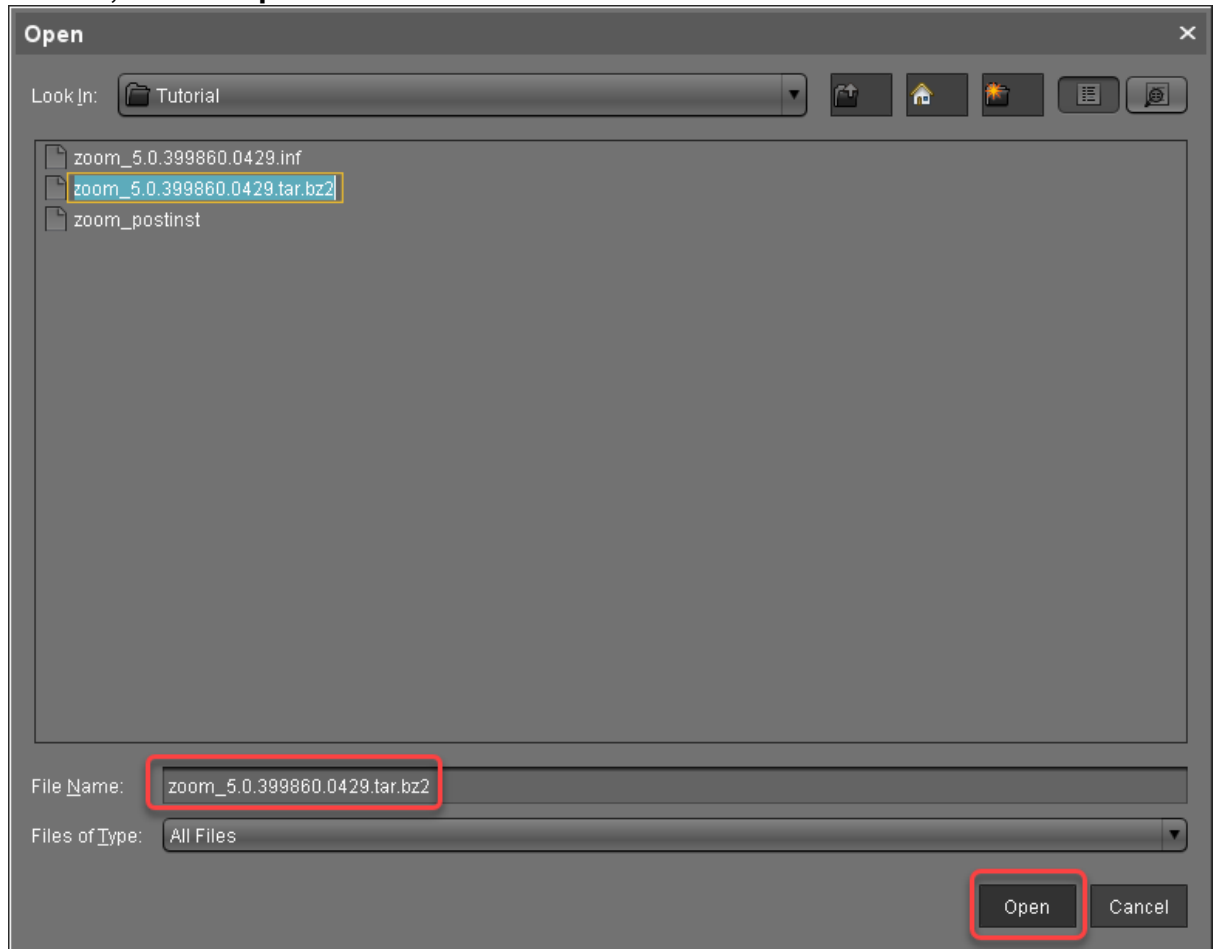
In this step, you upload the compressed `zoom_[version].tar.bz2` archive and the `zoom_[version].info` metadata file to the UMS, which will serve them to other devices via HTTPS. To make the file available, you have to create a file object after transferring the physical file.

### Transferring the Files to the UMS

1. Make sure that the Zoom files can be accessed from the machine that hosts the UMS Console.
2. In the structure tree of the UMS Console, go to **Files** and select **New file** in the context menu.

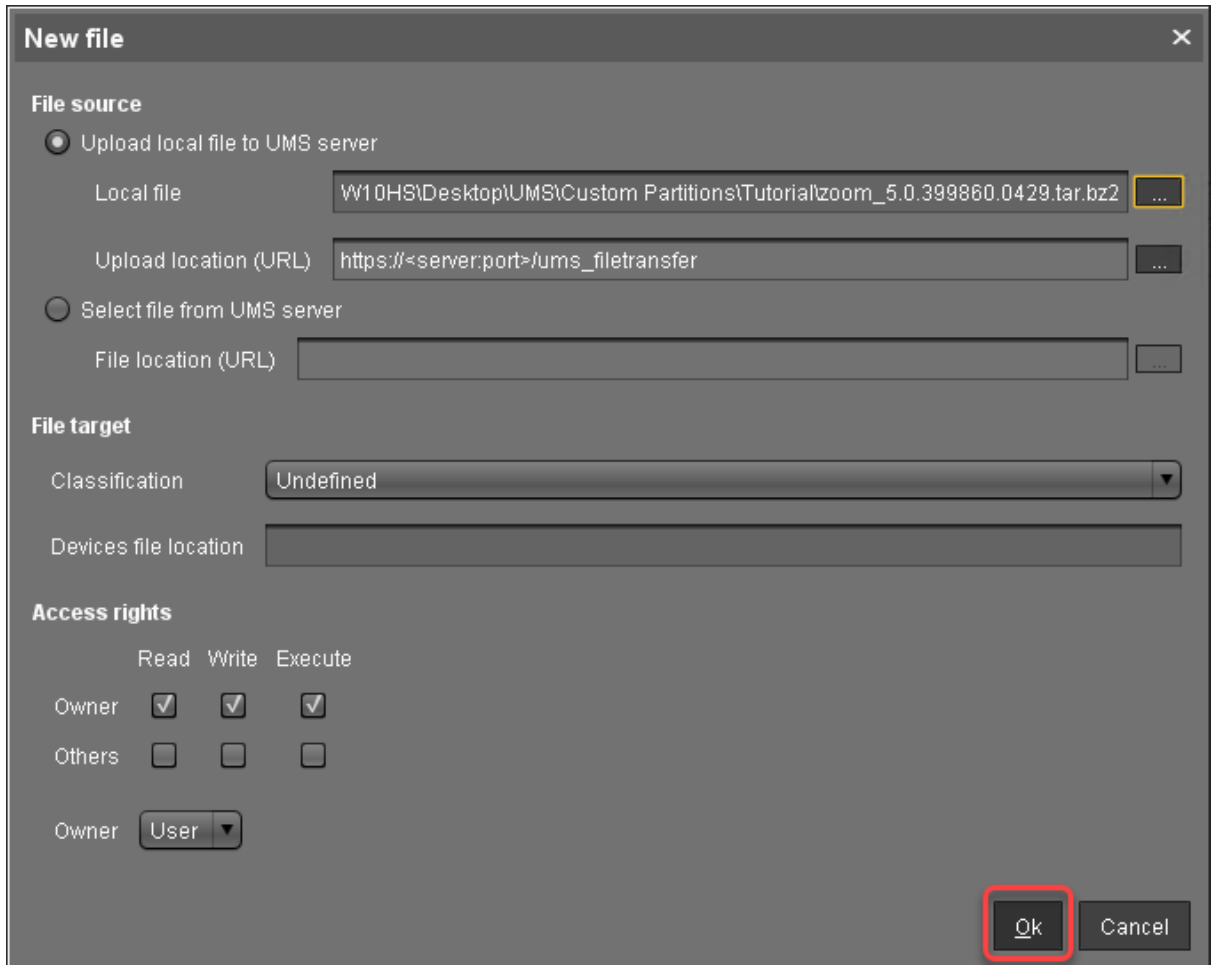


3. Click **...** next to the **Local file** field, select `zoom_[version].tar.bz2` on your local machine, and click **Open**.



4. Click **...** next to the **Target URL** to define the file path on the UMS Server.

5. Review the file name at **Local file** and click **Ok**.



6. Repeat steps 1 to 5 for `zoom_[version].inf`

#### Next Step

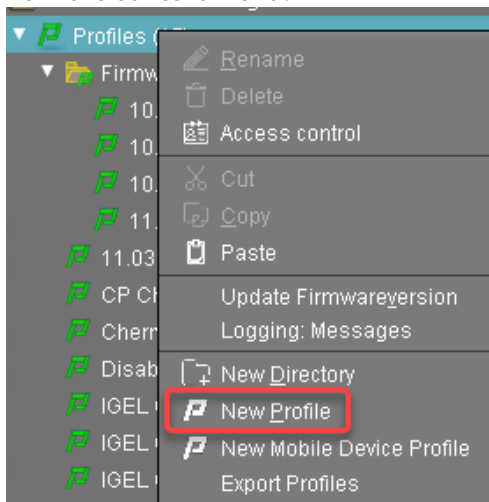
>> [Creating a Profile for the Custom Partition](#) (see page 600)

## Creating a Profile for the Custom Partition

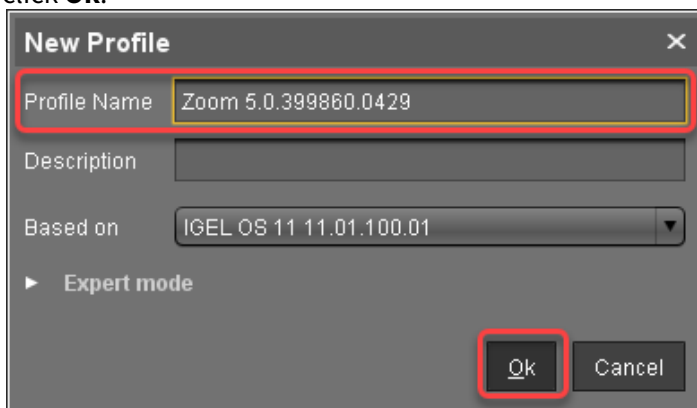
After you have uploaded the Custom Partition files to the UMS, you can now make the settings that will install the Custom Partition on any number of devices. For this purpose, you create a profile.

### Activating the Custom Partition

1. In the structure tree of the UMS Console, right-click the **Profiles** folder and select **New Profile** from the context menu.



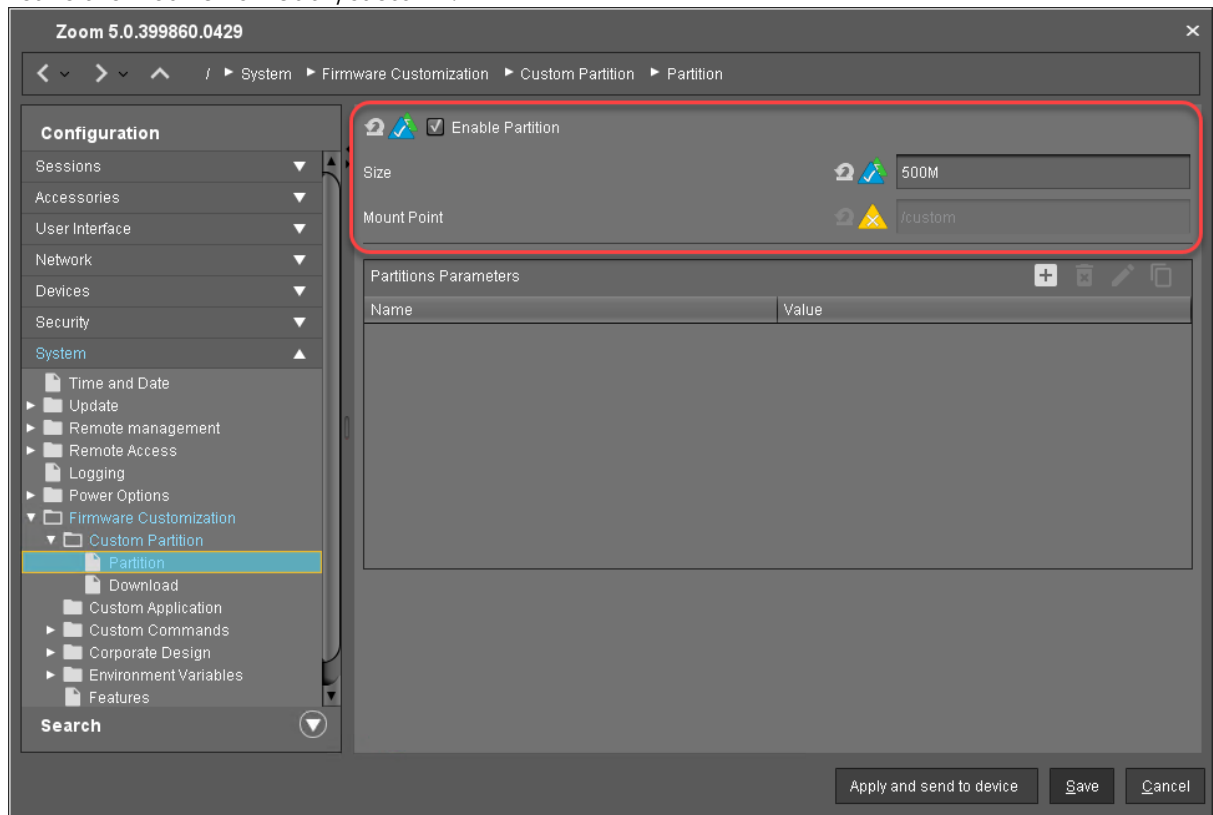
2. In the **New Profile** dialog, enter a **Profile Name**, e. g. "Zoom" followed by the version name, and click **Ok**.



3. Go to **System > Firmware Customization > Custom Partition > Partition**.
4. Unlock the **Enable Partition** setting by clicking the orange triangle so that it turns blue.
5. Check **Enable Partition**.
6. Unlock the **Size** setting by clicking the orange triangle so that it turns blue, and enter "500M".



### 7. Leave the **Mount Point** at `"/custom"`.



### Setting the Download Source

For this step, you need to determine the HTTPS download address for the `zoom.inf` file first.

1. To find out the IP address of your UMS, go to **System > Remote Management** in the configuration dialog. You will find the UMS Server your device is registered with and its IP address.
2. Open a web browser and visit the following URL:  
`https://[IP or name of your UMS host]:8443/ums_filetransfer`
3. When prompted, authenticate with your UMS username and password.  
 You will see a directory listing of the files that can be downloaded from the UMS.

- Right-click the **zoom\_[version].inf** entry and select **Copy link address** (or the like, depending on your browser).

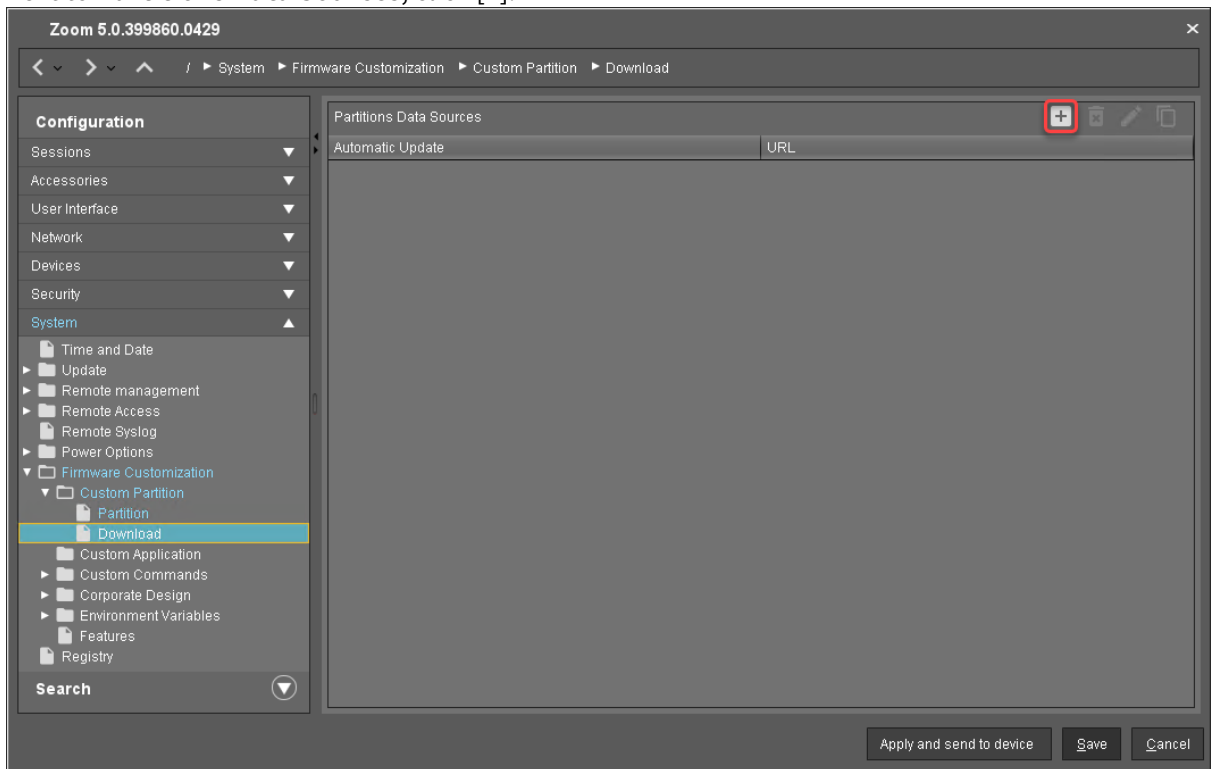
**Directory Listing For [/]**

Filename	Size	Last Modified
<a href="#">601813.jpg</a>	1138.8 kb	Fri, 29 Nov 2019 15:16:26 GMT
<a href="#">chromium-browser_64.0.3282.167.inf</a>	0.1 kb	Tue, 10 Mar 2020 15:35:45 GMT
<a href="#">chromium-browser_64.0.3282.167.tar.bz2</a>	68553.5 kb	Tue, 10 Mar 2020 15:34:09 GMT
<a href="#">client-cert.pem</a>	0.6 kb	Thu, 12 Dec 2019 12:21:12 GMT
<a href="#">client-key.pem</a>	0.2 kb	Thu, 12 Dec 2019 12:28:06 GMT
<a href="#">clientca-cert.pem</a>	0.6 kb	Thu, 12 Dec 2019 11:47:20 GMT
<a href="#">hello.inf</a>	0.1 kb	Mon, 11 May 2020 12:24:06 GMT
<a href="#">hello.tar.bz2</a>	0.2 kb	Mon, 11 May 2020 12:17:42 GMT
<a href="#">IGEL_OS_11-11.03.110/</a>		Wed, 11 Mar 2020 16:42:20 GMT
<a href="#">IGEL_Universal_Desktop_LX-10.05.500/</a>		Fri, 15 Mar 2019 13:55:11 GMT
<a href="#">IGEL_Universal_Desktop_OS_3-10.05.100/</a>		Mon, 18 Mar 2019 07:07:51 GMT
<a href="#">IGEL_Universal_Desktop_OS_3-10.06.130/</a>		Thu, 30 Jan 2020 16:09:01 GMT
<a href="#">installer-2.01.100.rc2.bin</a>	38964.0 kb	Thu, 10 Oct 2019 10:04:02 GMT
<a href="#">journalctl.txt</a>	218.8 kb	Fri, 20 Mar 2020 15:29:32 GMT
<a href="#">lx_10.05.700.rc7_public.zip</a>	856088.0 kb	Fri, 05 Apr 2019 14:15:46 GMT
<a href="#">osC.iso</a>	2184736.0 kb	Wed, 29 Apr 2020 14:06:05 GMT
<a href="#">p-20190712.pem</a>	0.7 kb	Thu, 12 Dec 2019 11:44:08 GMT
<a href="#">SecureboardRootCA.pem</a>	0.7 kb	Thu, 12 Dec 2019 11:40:35 GMT
<a href="#">supportinfo/</a>		Wed, 03 Apr 2019 10:35:27 GMT
<a href="#">tc_files_for_support_00E0C53627EE.zip</a>	133.7 kb	Wed, 29 Apr 2020 09:48:15 GMT
<a href="#">user-cert.der</a>	0.4 kb	Thu, 12 Dec 2019 12:13:25 GMT
<a href="#">user-key.pem</a>	0.2 kb	Thu, 12 Dec 2019 11:33:20 GMT
<a href="#">userca-cert.pem</a>	0.6 kb	Thu, 12 Dec 2019 16:30:59 GMT
<a href="#">zoom_5.0.399860.024.tar.bz2</a>	52687.5 kb	Thu, 14 May 2020 11:40:32 GMT
<a href="#">zoom_5.0.399860.024.tar.bz2</a>	0.1 kb	Thu, 14 May 2020 11:42:20 GMT
<a href="#">zoom_5.0.399860.024.tar.bz2</a>	52687.5 kb	Thu, 14 May 2020 12:55:31 GMT

**Apache Tomcat/8**

- Back in the profile, go to **System > Firmware Customization > Custom Partition > Download**.

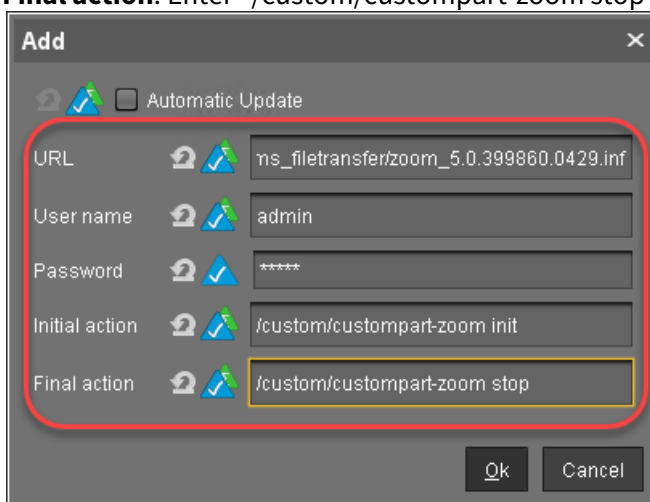
6. Next to **Partitions Data Sources**, click [+].



The **Add** dialog opens.

7. Edit the settings as follows:

- **URL:** Paste the URL you copied from the browser.
- **User name:** Username for accessing the UMS
- **Password:** Password for the username
- **Initial action:** Enter `"/custom/custompart-zoom init"`.
- **Final action:** Enter `"/custom/custompart-zoom stop"`.

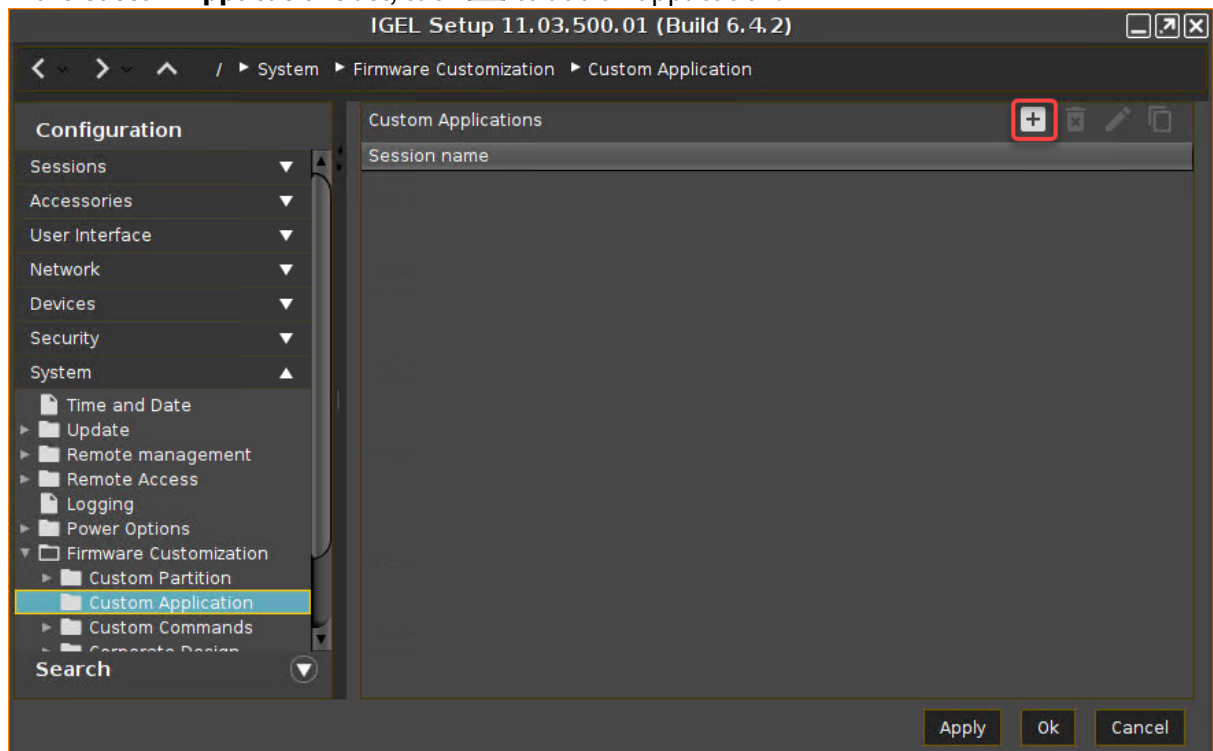


8. Click **OK**.

### Configuring the Custom Application

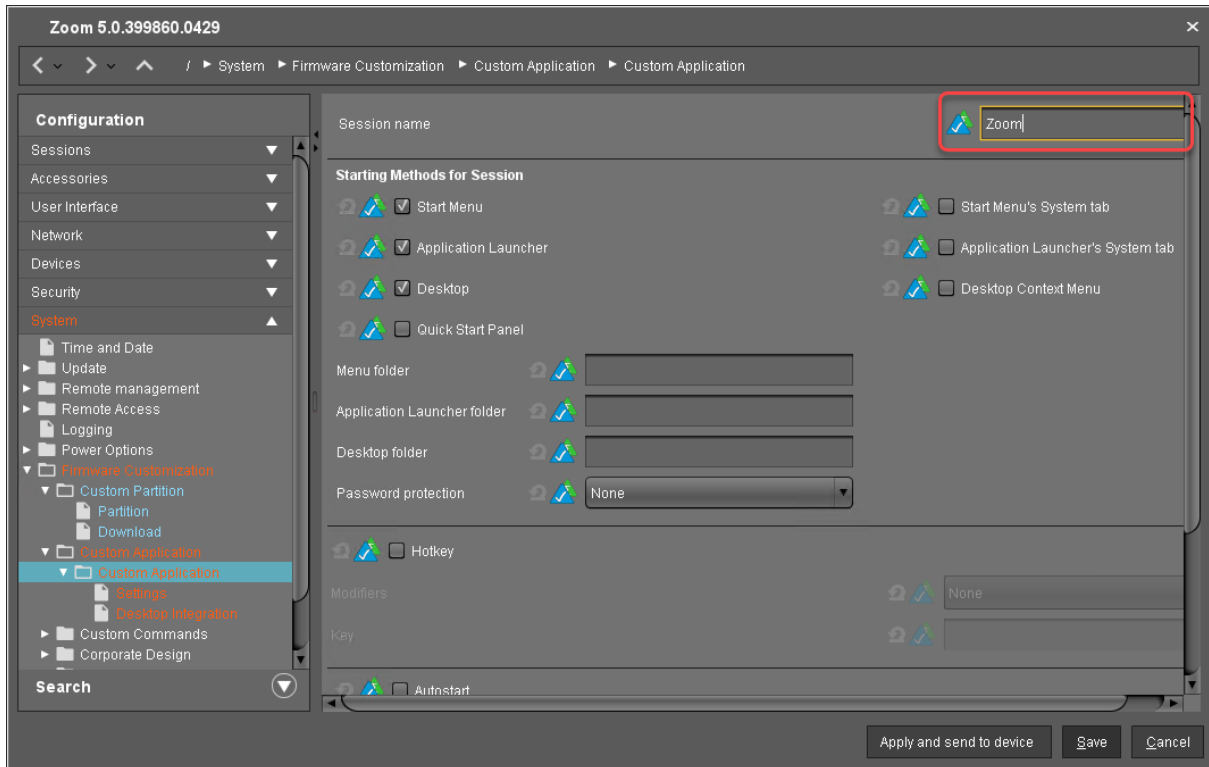
To create a convenient starting method for the user, create a custom application that includes a starter icon on the desktop.

1. Go to **System > Firmware Customization > Custom Application**.
2. In the **Custom Applications** list, click **+** to add an application.



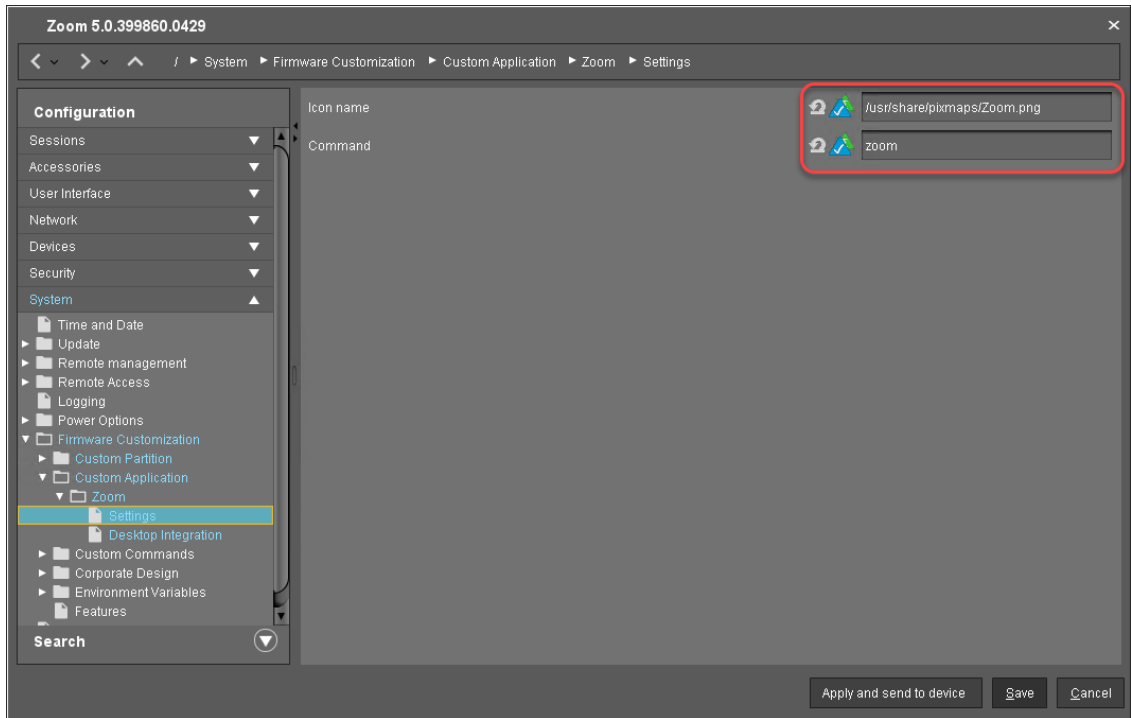
The **Desktop Integration** page opens.

3. Enter "Zoom" as the **Session name**.



4. Go to **Settings**.
5. Edit the settings as follows:
  - **Icon name:** Enter `"/usr/share/pixmaps/Zoom.png"`.

- **Command:** Enter "zoom".



6. Click **Save**.

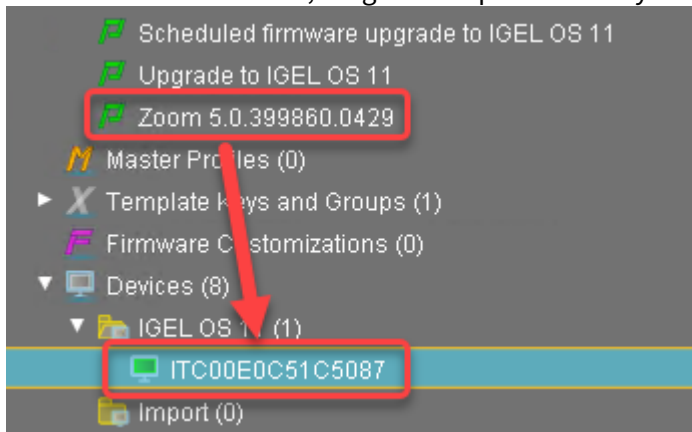
Next Step

>> [Assigning the Profile and Testing the Application \(see page 607\)](#)

## Assigning the Profile and Testing the Application

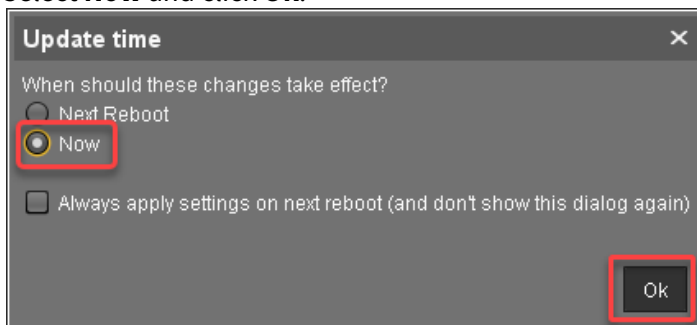
Now that you have put all the settings for installing the Custom Partition on a device into a profile, it is time to assign the profile.

1. In the UMS structure tree, drag and drop the icon of your profile onto the icon of a device.



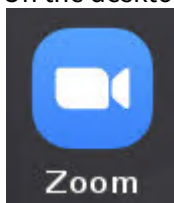
The **Update time** dialog opens.

2. Select **Now** and click **Ok**.



The device receives the settings of the profile, creates the Custom Partition, downloads the contents of the Custom Partition, and uncompresses them.

On the desktop of the endpoint device, the Zoom icon should appear:



3. Click on the Zoom icon to test the Zoom application.

## Microsoft Teams as a Custom Partition

Now that you have learned the IGEL Custom Partition fundamentals, build on top of these and try your hand at a real-world Custom Partition: Microsoft Teams.

If you want to get an impression of how Microsoft Teams works on IGEL OS, watch this video:



Sorry, the widget is not supported in this export.  
But you can reach it using the following URL:

<https://m.youtube.com/watch?v=3X0IKKu5eZY>

Read all the following chapters in the order given and follow the instructions.

1. [Development Environment](#) (see page 609)
2. [Getting the Package](#) (see page 610)
3. [Unpacking the Packages](#) (see page 611)
4. [Creating the Initialization Script](#) (see page 612)
5. [Compressing the Custom Partition Contents+1](#) (see page 614)
6. [Writing the \\*.inf Metadata File 1](#) (see page 615)
7. [Uploading the Files to the UMS](#) (see page 616)
8. [Creating a Profile for the Custom Partition](#) (see page 619)
9. [Assigning the Profile and Testing the Application](#) (see page 625)



## Development Environment

For this section, you need

- a system with IGEL OS 11.01.100 or newer,
- Universal Management Suite (UMS) 6.01.100 or newer,
- a Debian or Ubuntu workstation for unpacking the `*.deb` package (can be the same as the Linux workstation hosting the UMS). Ideally, the machine is running Ubuntu 18.04 LTS.
- a method to exchange files between the endpoint device and the workstation.

While a USB memory stick or disk drive would do the trick, it is more convenient to have either a

- Windows fileshare or
- an NFS export

that you can access both from the endpoint device and the workstation in order to exchange files.

Learn how to mount network drives in the IGEL OS Manual.


Next Step

>> [Getting the Package](#) (see page 610)

## Getting the Package

Get the required package for Ubuntu.

1. Open <https://www.microsoft.com/en-us/microsoft-365/microsoft-teams/download-app#allDevicesSection> in a browser and click **Linux DEB (64-bit)**.

 When you open the URL from a Windows machine, the Linux download button will probably not appear.

2. Download the package `teams_[version]_amd64.deb` (example: `teams_1.3.00.5153_amd64.deb` )
3. Change to the download directory on your workstation (typically `/home/[username]/Downloads` ).

### Next Step

>> [Unpacking the Package](#) (see page 611)

## Unpacking the Packages

In this step, you extract the packages on your Linux workstation in order to access their files:

1. Open a terminal.
2. Change to the directory where you saved the packages.
3. Create a directory to extract the files to:  
`mkdir teams`
4. Extract the packages to the new directory:  
`dpkg -x teams*.deb teams/`
5. Run the following command to see how much space the package contents need in total (in MB):  
`du -cms teams/*`

The total is 237 MB (your package may differ slightly). To be on the safe side, let's memorize that we need approximately 500 MB of storage space for the Custom Partition contents.

### Next Step

>> [Creating the Initialization Script](#) (see page 612)

## Creating the Initialization Script

In this step, you will create an initialization script that enables the application to work inside a Custom Partition. In a regular installation, the files of the Teams application would be located in `/usr`, whereas in the Custom Partition, they are located under `/custom/teams/usr`. The initialization script will fix this by creating symbolic links so that for example `/custom/teams/usr/share/libffmpeg.so` will appear to be in `/usr/share/libffmpeg.so`, where Teams expects it.

1. On your workstation, go to the directory where the `teams` directory is located.
2. Open your text editor of choice and enter the following script:

```
#!/bin/sh

ACTION="custompart-teams_${1}"

# mount point path
MP=$(get custom_partition.mountpoint)

# custom partition path
CP="${MP}/teams"

# only needed if application has an executable
BIN="/usr/bin/teams"

# output to systemlog with ID amd tag
LOGGER="logger -it ${ACTION}"

echo "Starting" | $LOGGER

case "$1" in
init)
    # Linking files and folders on proper path
    find ${CP} | while read LINE
    do
        DEST=$(echo -n "${LINE}" | sed -e "s|${CP}||g")
        if [ ! -z "${DEST}" -a ! -e "${DEST}" ]; then
            # Remove the last slash, if it is a dir
            [ -d $LINE ] && DEST=$(echo "${DEST}" | sed -e "s/\//")
        fi
        ln -sv "${LINE}" "${DEST}" | $LOGGER
    done
;;
stop)
```

```
# unlink linked files
find ${CP} | while read LINE
do
    DEST=$(echo -n "${LINE}" | sed -e "s|${CP}||g")
    unlink $DEST | $LOGGER
done
;;
esac

echo "Finished" | $LOGGER

exit 0
```

3. Save the file as `custompart-teams`

#### Next Step

>> [Compressing the Custom Partition Contents](#) (see page 614)

## Compressing the Custom Partition Contents

To make the unpackaged software package usable in a Custom Partition, make the application files executable and put them into a compressed `tar` file.

1. On your Linux workstation, open a terminal and change to the directory that contains the `teams/` directory with the application files and the initialization script `custompart-teams`

2. Make the files in `teams/` and the initialization script executable:

```
chmod -R +x teams
```

```
chmod +x custompart-teams
```

3. Compress the `teams/` directory and the initialization script into an archive file named `teams_[version].tar.bz2` (in our example: `teams_1.3.00.5153.tar.bz2`):

```
tar cjvf teams_1.3.00.5153.tar.bz2 teams custompart-teams
```

### Next Step


>> [Writing the \\*.inf Metadata File](#) (see page 615)

## Writing the \*.inf Metadata File

In addition to the compressed archive that you created in the previous step, a plain text file with essential information for the endpoint device is necessary. In this, step you will create the `teams.inf` file.

1. Change to the directory that contains the compressed contents of our Custom Partition.
2. Create a new file named `teams.inf` and put the following into it:

```
[INFO]
[PART]
file="teams_1.3.00.5153.tar.bz2"
version="1.3.00.5153_igel1"
size="500M"
name="teams"
minfw="11.01.100"
```

 For an explanation of the settings, see the corresponding page in the section about building a simple Custom Partition: [Writing the \\*.inf Metadata File](#) (see page 560).

### Next Step

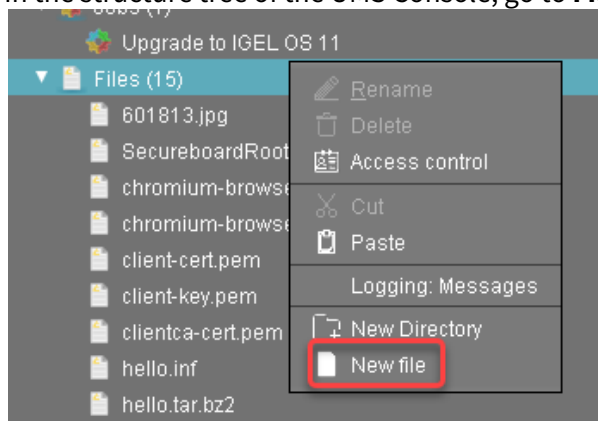
>> [Uploading the Files to the UMS](#) (see page 616)

## Uploading the Files to the UMS

In this step, you upload the compressed `teams_[version].tar.bz2` archive and the `teams_[version].inf` metadata file to the UMS, which will serve them to other devices via HTTPS. To make the file available, you have to create a file object after transferring the physical file.

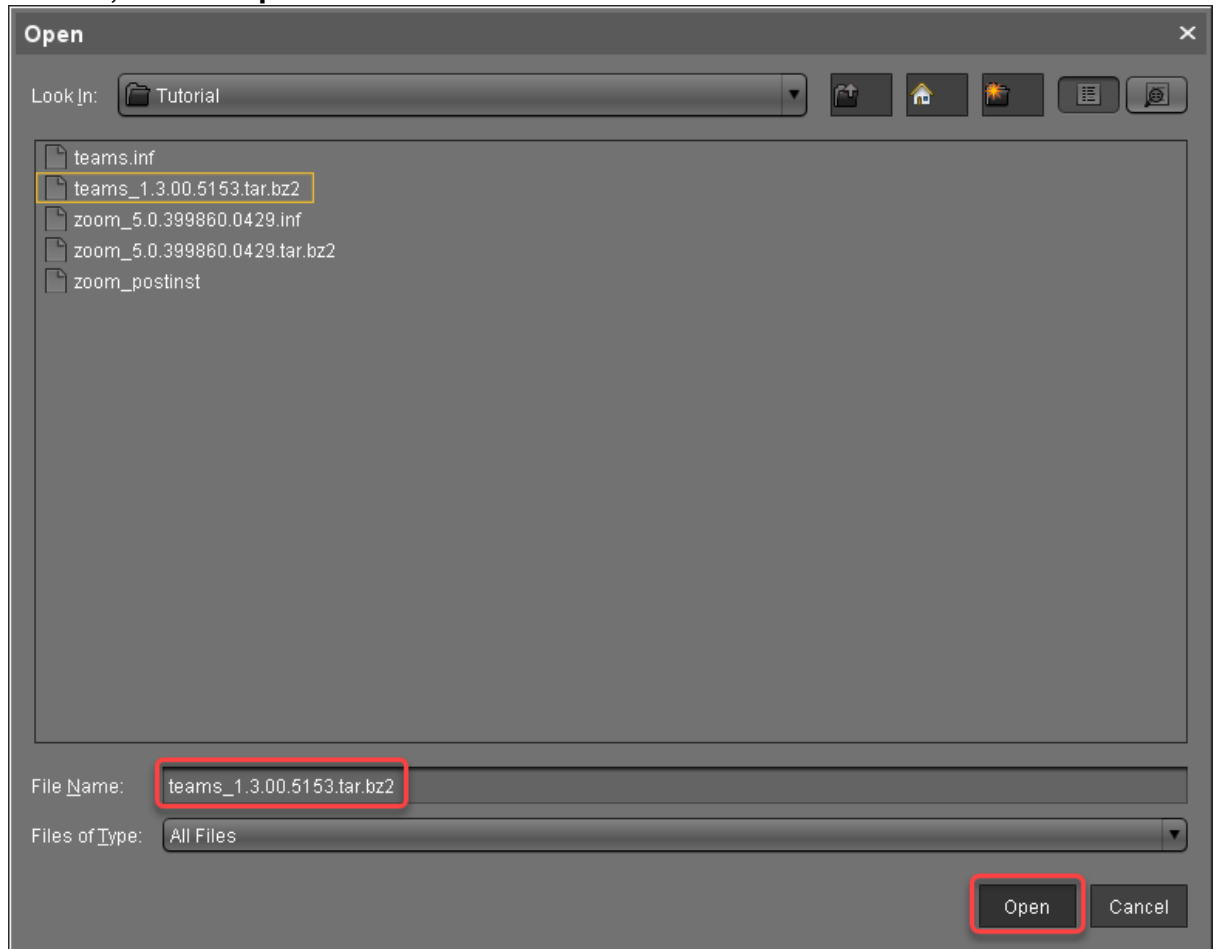
### Transferring the Files to the UMS

1. Make sure that the Teams files can be accessed from the machine that hosts the UMS Console.
2. In the structure tree of the UMS Console, go to **Files** and select **New file** in the context menu.



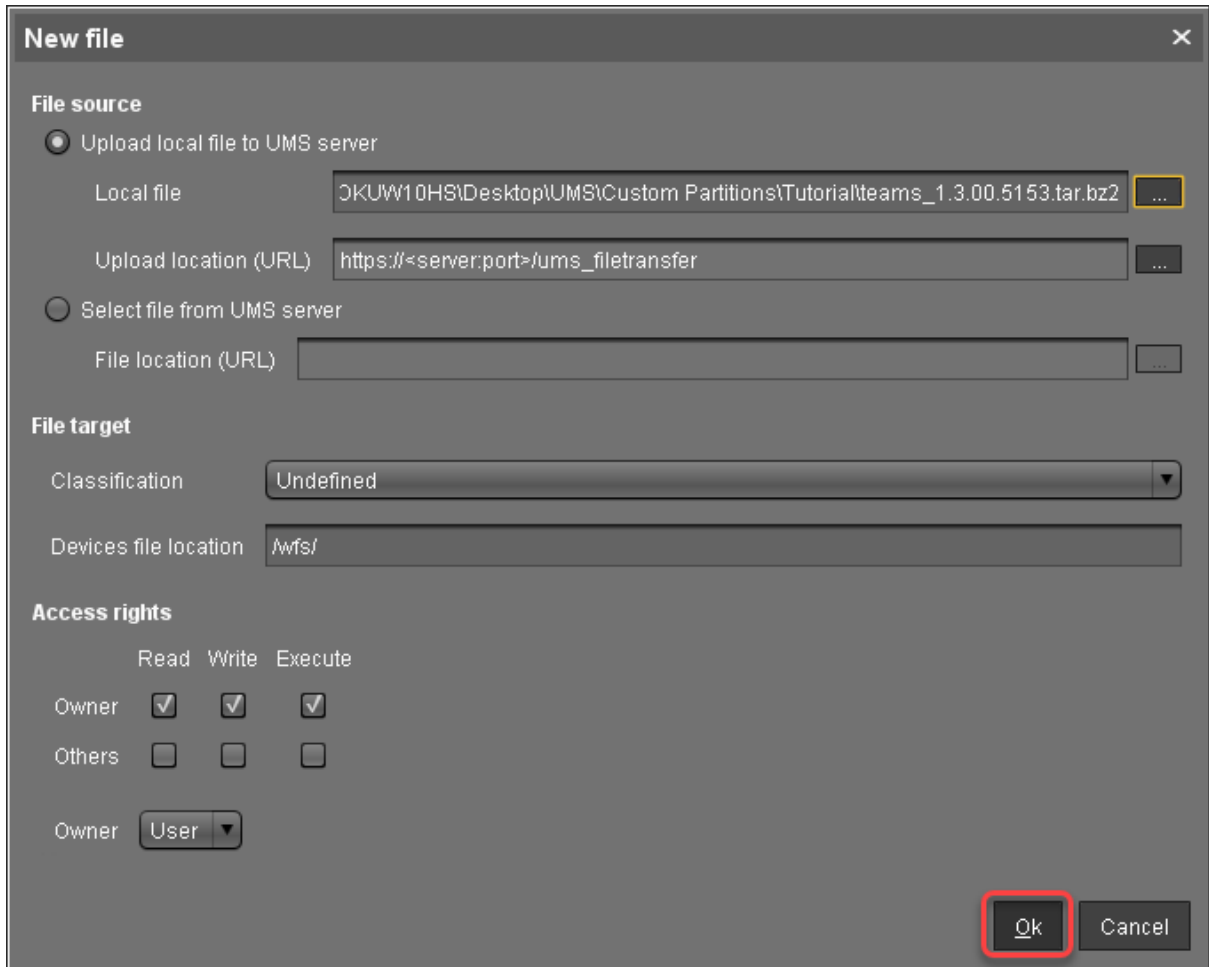


3. Click **...** next to the **Local file** field, select `teams_[version].tar.bz2` on your local machine, and click **Open**.



4. Click **...** next to the **Target URL** to define the file path on the UMS Server.

5. Review the file name at **Local file** and click **Ok**.



6. Repeat steps 1 to 5 for `teams_[version].inf`

**Next Step**

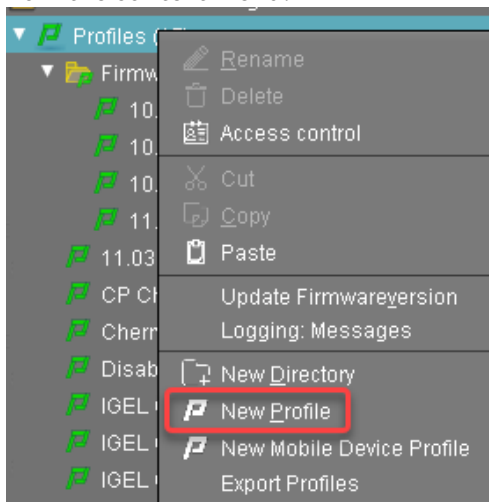
>> [Creating a Profile for the Custom Partition](#) (see page 619)

## Creating a Profile for the Custom Partition

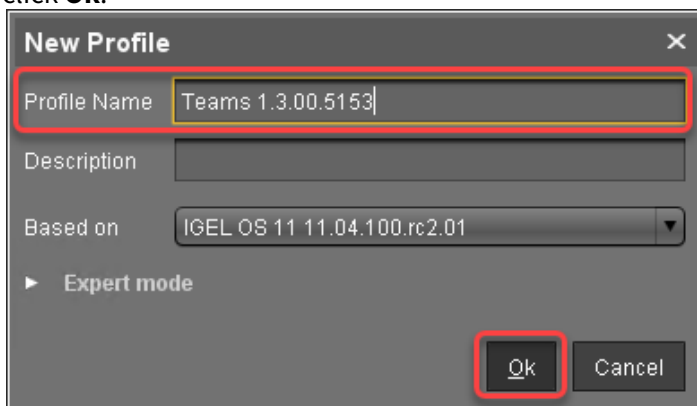
After you have uploaded the Custom Partition files to the UMS, you can now make the settings that will install the Custom Partition on any number of devices. For this purpose, you create a profile.

### Activating the Custom Partition

1. In the structure tree of the UMS Console, right-click the **Profiles** folder and select **New Profile** from the context menu.

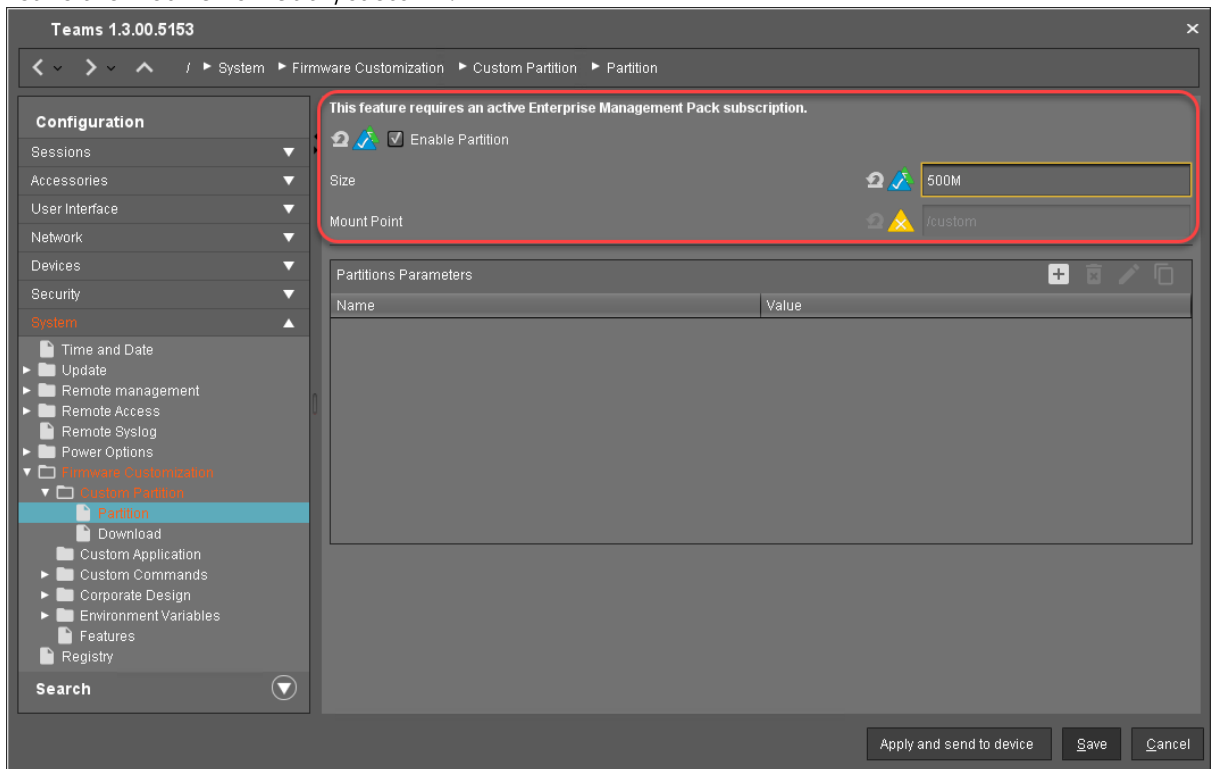


2. In the **New Profile** dialog, enter a **Profile Name**, e. g. "Teams" followed by the version name, and click **Ok**.



3. Go to **System > Firmware Customization > Custom Partition > Partition**.
4. Unlock the **Enable Partition** setting by clicking the orange triangle so that it turns blue.
5. Check **Enable Partition**.
6. Unlock the **Size** setting by clicking the orange triangle so that it turns blue, and enter "500M".

7. Leave the **Mount Point** at `"/custom"`.

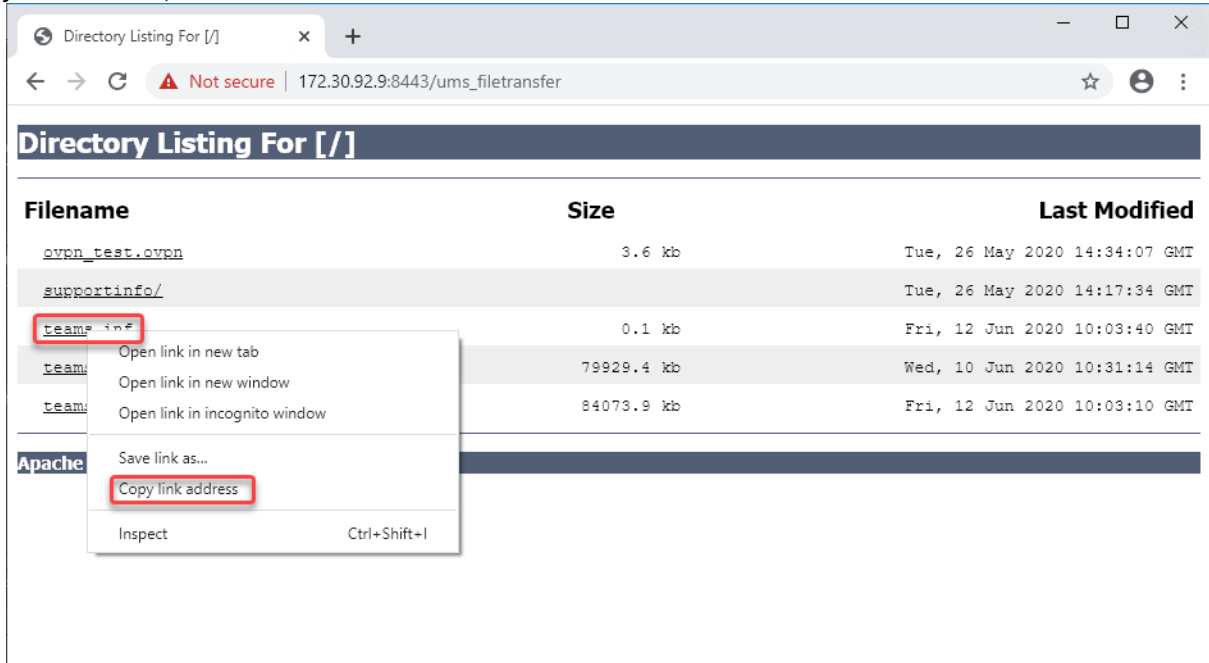


Setting the Download Source

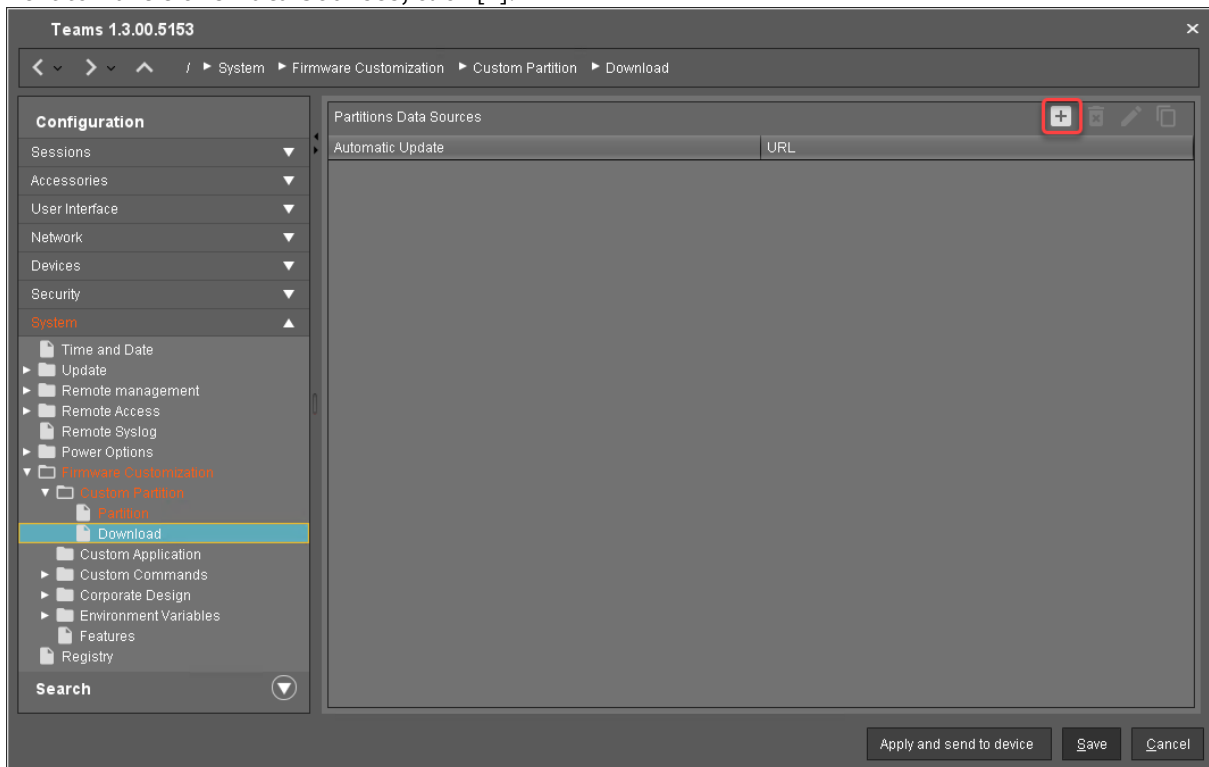
For this step, you need to determine the HTTPS download address for the `teams.inf` file first.

1. To find out the IP address of your UMS, go to **System > Remote Management** in the configuration dialog. You will find the UMS Server your device is registered with and its IP address.
2. Open a web browser and visit the following URL:  
`https://[IP or name of your UMS host]:8443/ums_filetransfer`
3. When prompted, authenticate with your UMS username and password.  
 You will see a directory listing of the files that can be downloaded from the UMS.

- Right-click the **teams\_[version].inf** entry and select **Copy link address** (or the like, depending on your browser).



- Back in the profile, go to **System > Firmware Customization > Custom Partition > Download**.
- Next to **Partitions Data Sources**, click [+].



The **Add** dialog opens.

7. Edit the settings as follows:

- **URL:** Paste the URL you copied from the browser.
- **User name:** Username for accessing the UMS
- **Password:** Password for the username
- **Initializing action:** Enter "/custom/custompart-teams init".
- **Finalizing action:** Enter "/custom/custompart-teams stop".

Field	Value
URL	2.30.92.9:8443/ums_filetransfer/teams.inf
User name	admin
Password	*****
Initializing Action	/custom/custompart-teams init
Finalizing Action	/custom/custompart-teams stop

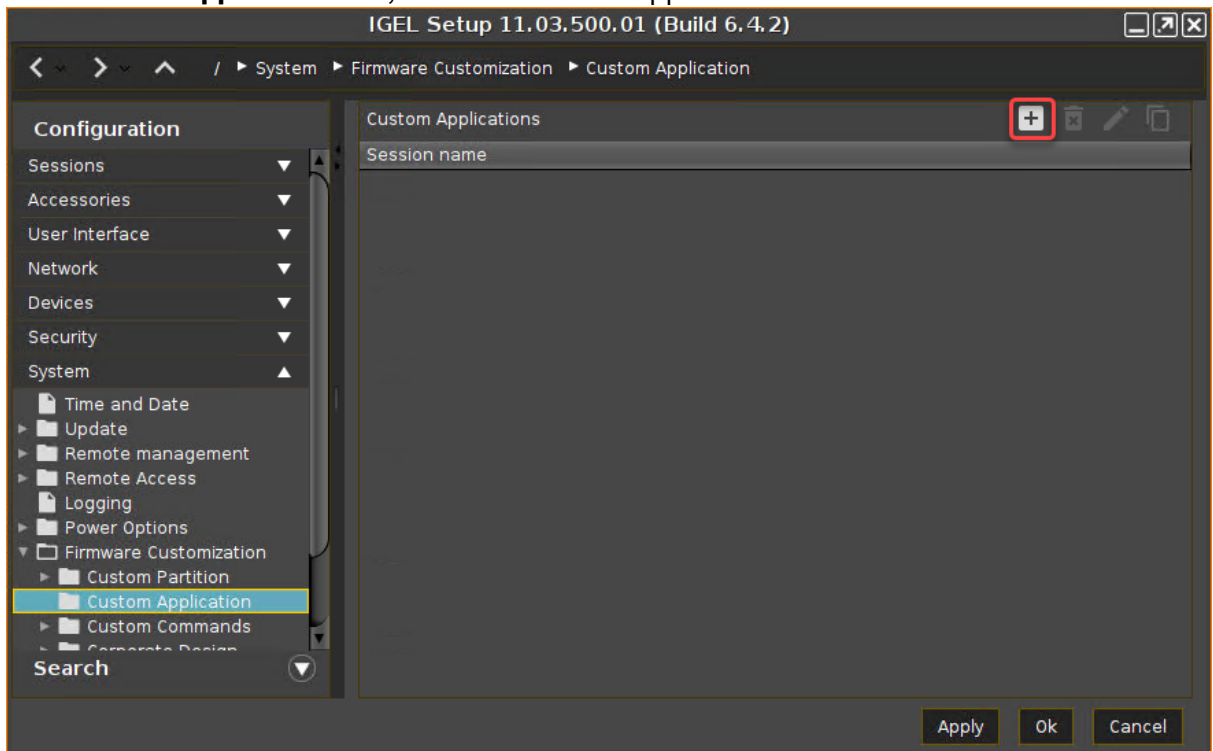
8. Click **OK**.

### Configuring the Custom Application

To create a convenient starting method for the user, create a custom application that includes a starter icon on the desktop.

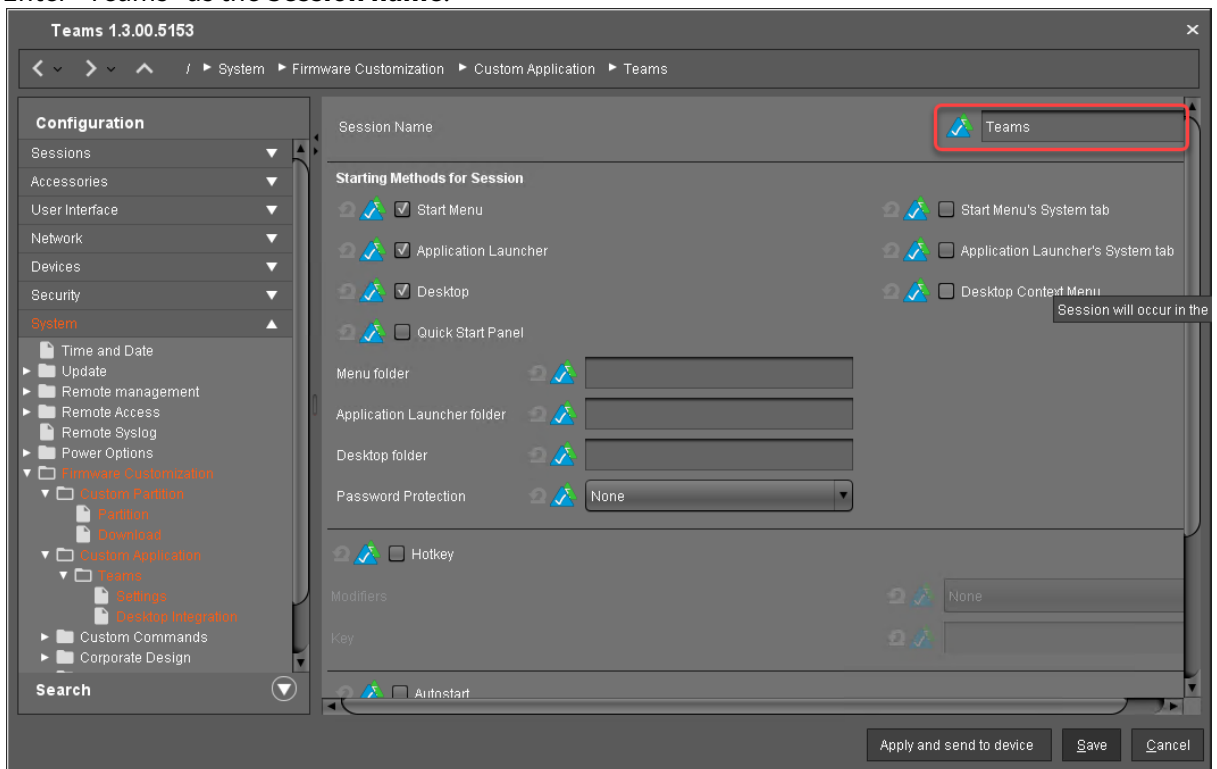
1. Go to **System > Firmware Customization > Custom Application**.

- In the **Custom Applications** list, click  to add an application.

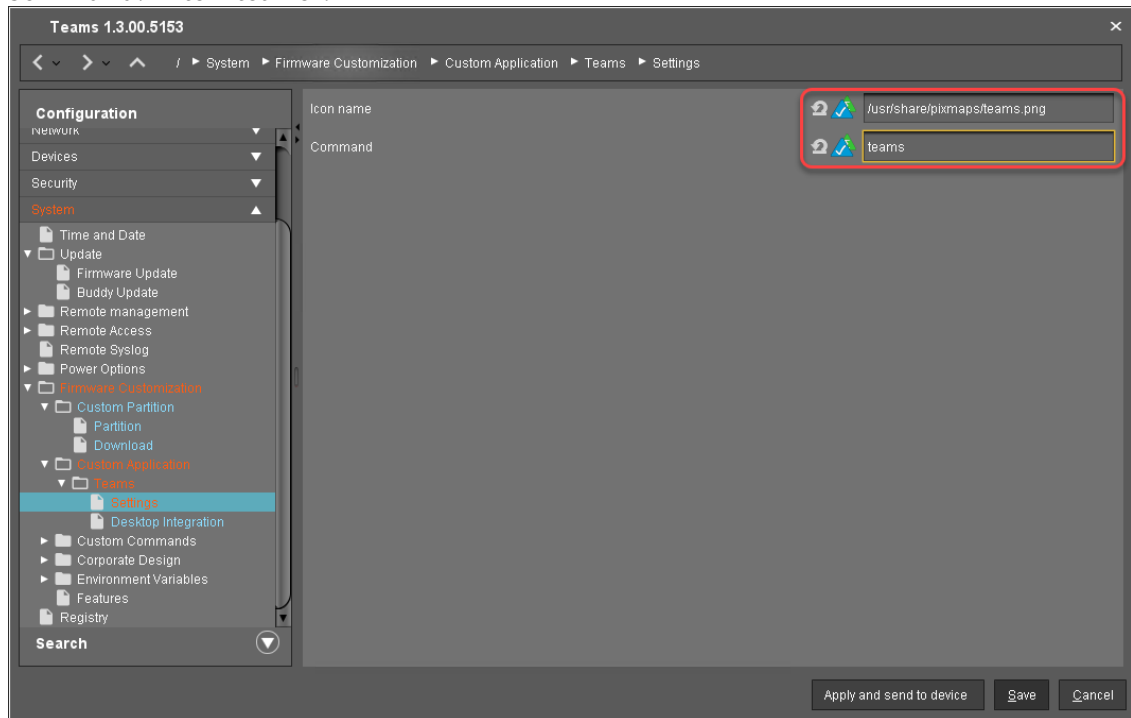


The **Desktop Integration** page opens.

- Enter "Teams" as the **Session name**.



4. Go to **Settings**.
5. Edit the settings as follows:
  - **Icon name:** Enter `"/usr/share/pixmaps/teams.png"`.
  - **Command:** Enter `"teams"`.



6. Click **Save**.

#### Next Step

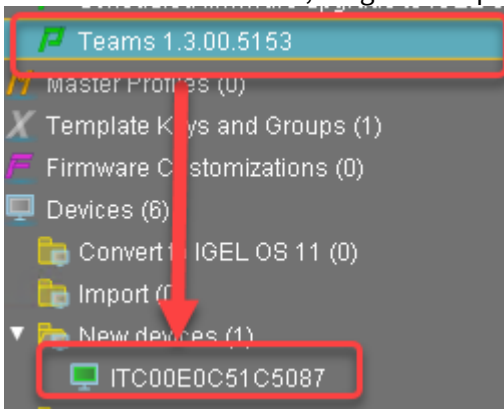
>> [Assigning the Profile and Testing the Application \(see page 625\)](#)



## Assigning the Profile and Testing the Application

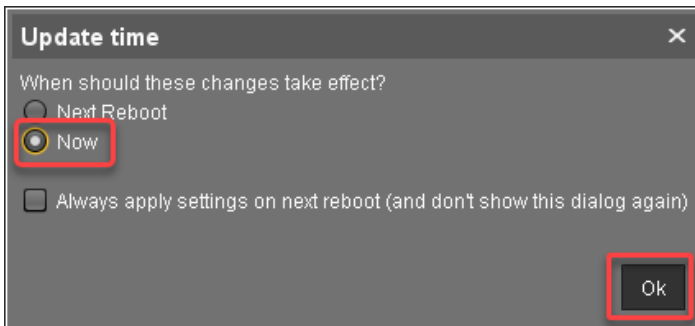
Now that you have put all the settings for installing the Custom Partition on a device into a profile, it is time to assign the profile.

1. In the UMS structure tree, drag and drop the icon of your profile onto the icon of a device.



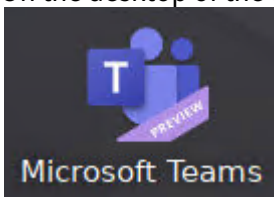
The **Update time** dialog opens.

2. Select **Now** and click **Ok**.



The device receives the settings of the profile, creates the Custom Partition, downloads the contents of the Custom Partition, and uncompresses them.

On the desktop of the endpoint device, the Microsoft Teams icon should appear:



3. Click on the Microsoft Teams icon to test the application.

## Using a Custom PKCS#11 Library


### Issue

You want to use your own PKCS#11 library.

### Problem

In the Setup, you cannot find how to activate a custom PKCS#11 library.

### Solution

-  In case of the installation of a custom PKCS#11 library, the file(s) must be placed on the endpoint device either via UMS file transfer or [Custom Partition](#) (see page 546).  
The use of the `/wfs` folder is NOT recommended because of its space limit.

### Using with Kerberos and/or Citrix StoreFront Logon

To use a custom PKCS#11 library with Kerberos and/or Citrix StoreFront Logon:

- In Setup, go to **Security > Smartcard > Middleware**.
- Select **Custom PKCS#11 module**.
- Under **Path to the library**, enter the path to your PKCS#11 library. Example: `/usr/lib/pkcs11/[name of the library].so`

### Using with VMware Horizon

To use a custom PKCS#11 library with VMware Horizon:

- In Setup, go to **System > Registry**.
- Enable the registry key `vmware.view.pkcs11.use_custom`.
- Set the registry key `vmware.view.pkcs11.custom_path` to the path to your PKCS#11 library. Example: `/usr/lib/pkcs11/[name of the library].so`

### Using with Firefox Browser

To use a custom PKCS#11 library with the Firefox browser:

- In Setup, go to **System > Registry**.
- Enable the registry key `browserglobal.security_device.custom.enable`.

- Set the registry key `browserglobal.security_device.custom.device_name` to the name of your PKCS#11 library.
- Set the registry key `browserglobal.security_device.custom.lib_path` to the path to your PKCS#11 library. Example: `/usr/lib/pkcs11/[name of the library].so`

## Adding an Icon for Browsing Removable Storage

### Symptom

There is no obvious way of viewing files from removable media locally on the thin client.

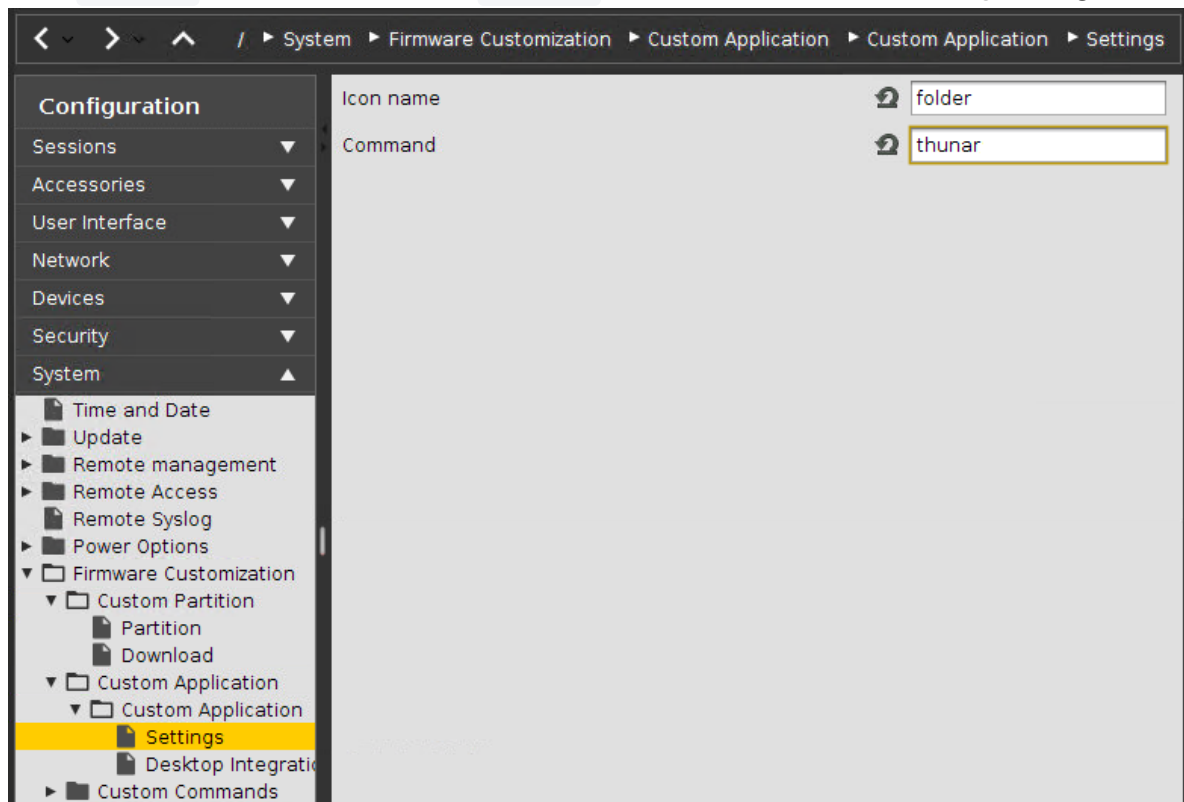
### Problem

You want to view files from removable media locally on the thin client.

### Solution

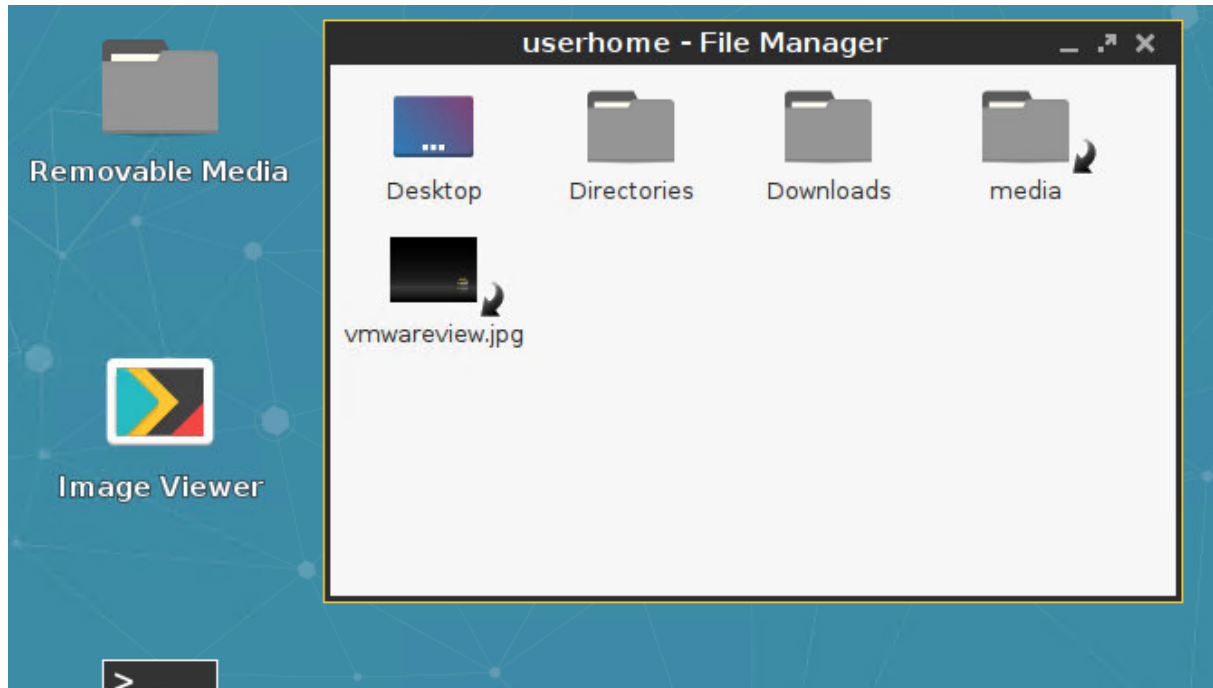
Create a custom application that opens the contents of removable media in the **File Manager**.

1. Go to **System > Firmware Customization > Custom Application** in **Setup**.
2. Click the star symbol to create a new **Custom Application**.
3. Enter a name, e.g. *Removable Media*, and choose desktop integration options for the application.
4. Enter `folder` as the **Icon name** and `thunar` as the **Command** in the **Settings** dialog:



5. Save the settings.

6. Insert a removable medium such as a USB stick into the thin client.



7. Click the new **Removable Media** icon. This opens **File Manager** and lets you browse the contents. Clicking a file will open it in the application configured by the MIME type handler (as of IGEL LINUX 5.06.100, see [FAQ](#) (see page 683)).

## Adding an Icon for the Image Viewer

### Symptom


You want to view images locally on the thin client.

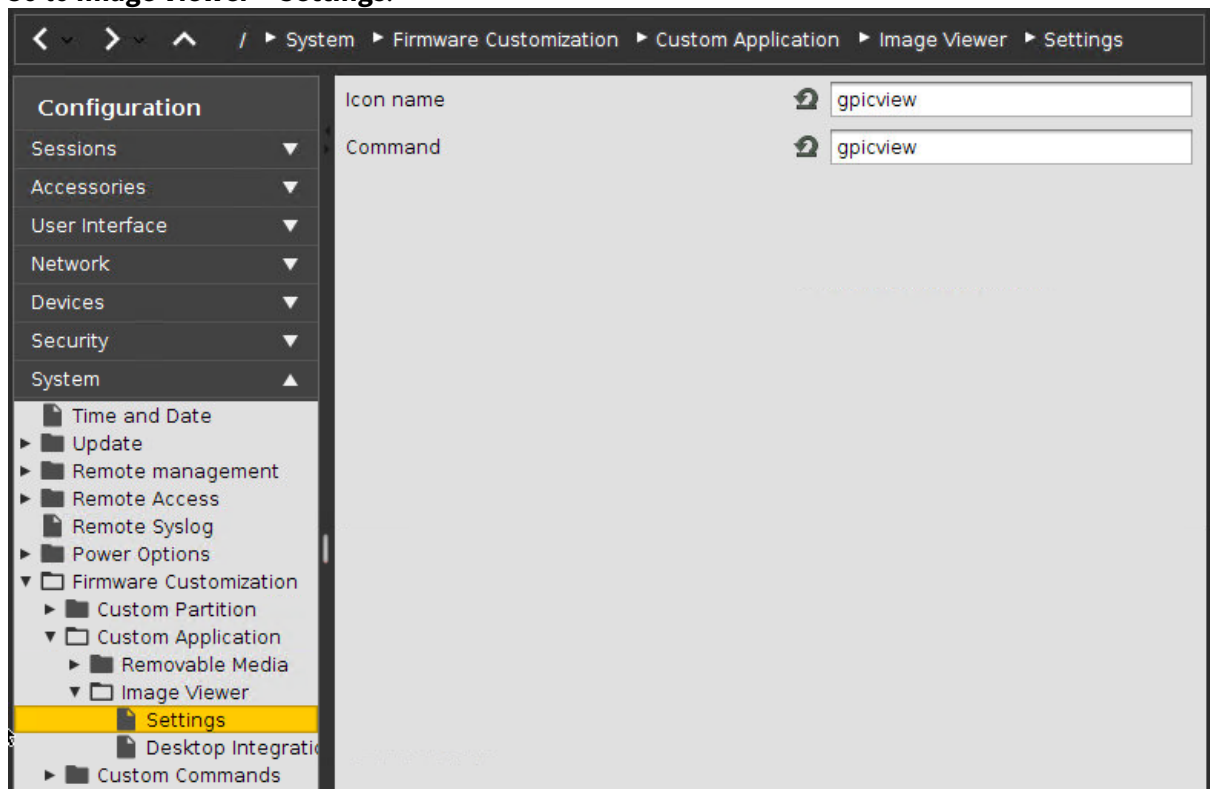
### Problem

The image viewer contained in *IGEL Linux* as from version 5.06.100 on has no desktop icon or menu entry.

### Solution

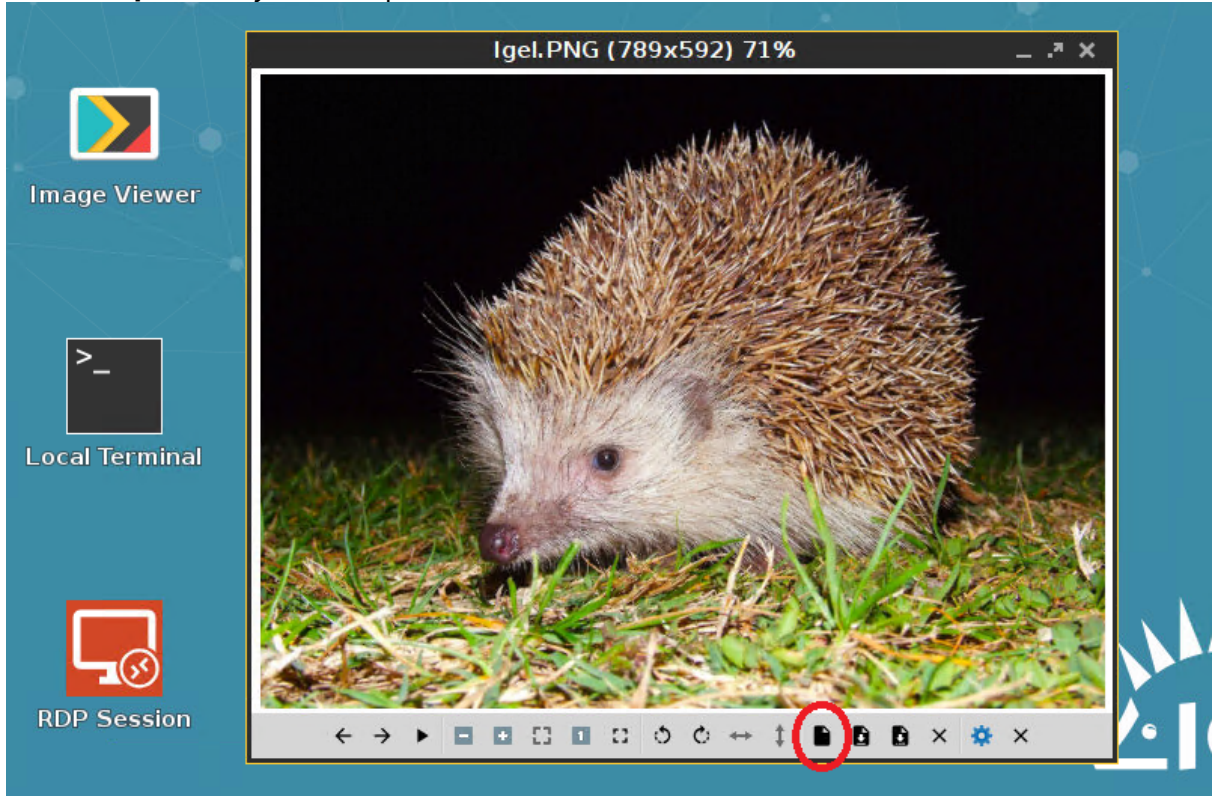
Create a custom application that opens the Image Viewer.

1. Go to **System > Firmware Customization > Custom Application** in Setup.
2. Click  to create a new **Custom Application**.
3. Enter a name, e.g. *Image Viewer*, and choose desktop integration options for the application.
4. Go to **Image Viewer > Settings**:



5. Enter `gpicview` as both the **Icon name** and the **Command** in the **Settings** dialog.
6. Save the settings.

7. Click the newly created icon for **Image Viewer**.
8. The **Image Viewer** opens.
9. Click the **Open File** symbol to open a file.



## Creating a Timed Command (Cron Replacement)

You can define one or more commands which are executed at a defined time. The configuration is similar to that of a `cron` job. The implementation in IGEL OS uses `systemd` to execute the command.

To define a timed command:

1. In the Setup, go to **System > Registry > system > cron > cronjob%**
2. Activate **enable\_cron**.
3. If you want to define paths to executables in addition to the existing path environment variable, add them under **path**, separated by ":".
4. Click **Add Instance**.  
The instance "cronjob1" is created, which will be renamed to "cronjob0" when the device has restarted.
5. Set the parameters for your timed command according to your needs:
  - **command**: Command to be executed. Example for testing purposes: `gtkmessage -m "Here is your cron replacement"`
  - **day\_of\_month**: Day of the month  
Possible values:
    - "1" ... "31": The command is executed on the defined day. To select a list of days for execution, enter a comma-separated list, e.g. "1,8". To enter a range of days, use a hyphen, e.g. "1-3".
    - "\*": The command is executed every day of the month.
  - **day\_of\_week**: Day of a week  
Possible values;
    - "1" ... "7": The command is executed on the defined day. "0" and "7" both mean Sunday. To select a list of days for execution, enter a comma-separated list, e.g. "1,3". To enter a range of days, use a hyphen, e.g. "1-3".
    - "\*": The command is executed every day of the week.
  - **hour**  
Possible values:
    - "0" ... "23": The command is executed in the defined hour. Example: "15" means 3 p.m, plus the minutes defined under **minute**. To select a list of hours for execution, enter a comma-separated list, e.g. "9,17". To enter a range of hours, use a hyphen, e.g. "9-17".
    - "\*": The command is executed every hour.
  - **minute**  
Possible values:
    - "0" ... "59": The command is executed in the defined minute. To select a list of minutes for execution, enter a comma-separated list, e.g. "15,45". To enter a range of minutes, use a hyphen, e.g. "5-10".
    - "\*": The command is executed every minute.
  - **month**  
Possible values:
    - "1" ... "12"; The command is executed in the defined month. To select a list of months for execution, enter a comma-separated list, e.g. "1,4". To enter a range of months, use a



hyphen, e.g. "1-3".

- "\*": The command is executed every month.

- **user:** The user under which the command is executed

Possible options:

- "root"

- "user"

- **year:** Year in 4-digit format. Example: "2019". To select a list of years for execution, enter a comma-separated list, e.g. "2019,2020". To enter a range of years, use a hyphen, e.g. "2019-2021". If the command is to be executed each year, enter "\*".

6. Click **Apply** or **Ok**.


7. Restart the device.

After the device has restarted, the command will be executed as configured.

## Customizing IGEL OS Desktop

You want to give your IGEL OS desktops a more individual look and feel. This document shows how to customize your IGEL OS desktops using the Universal Management Suite (UMS). There are two ways to do it:

- via a firmware customization;
- via a profile.

 With a firmware customization function, you can change your desktop design much easier and quicker than with a profile. For an example, see [Creating Your Own Wallpaper via Firmware Customization](#) (see page 639). See also [Firmware Customizations and Create Firmware Customization](#) in the UMS Reference Manual.

For information on customizing IGEL OS desktops via a profile, see:

- [Introduction](#) (see page 635)
- [Creating Your Own Wallpaper](#) (see page 638)
- [How to Create a Custom Bootsplash for IGEL OS Devices via the UMS](#) (see page 642)
- [Creating Your Own Screensaver](#) (see page 647)
- [Assigning Your Own Company Logos](#) (see page 652)
- [Creating Your Own Taskbar](#) (see page 654)
- [Customizing Desktop Icons](#) (see page 655)

## IGEL Tech Video



Sorry, the widget is not supported in this export.  
But you can reach it using the following URL:

<https://www.youtube.com/watch?v=qFQttefMIX8>

## Introduction

If you want to roll out your complete corporate design changes and apply them to multiple devices, you can create one single profile for all settings.

Before defining special profiles, you must take the following steps:

- [Uploading a Picture](#) (see page 636)
- [Creating a Profile](#) (see page 637)

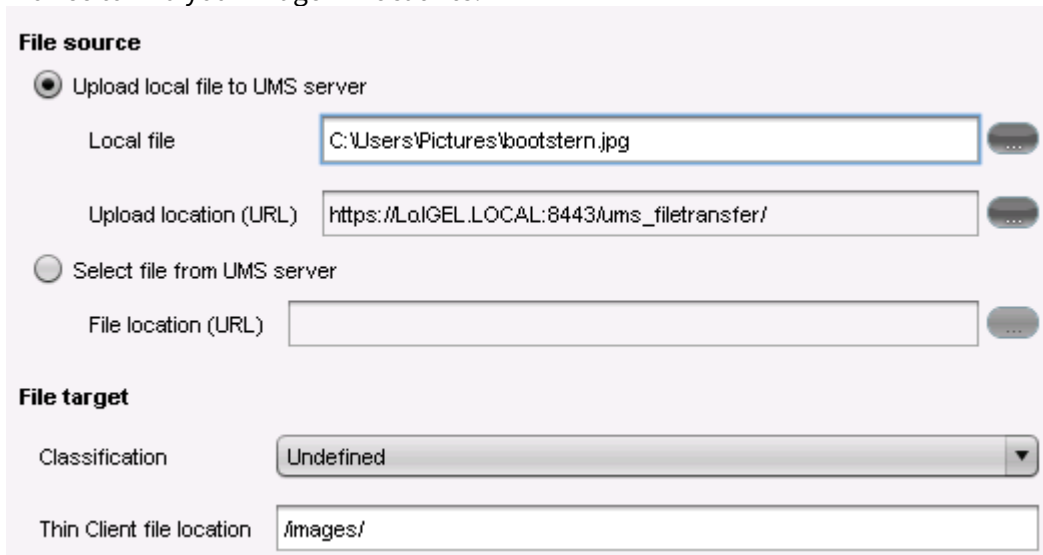
## Uploading a Picture

Upload your image files to the UMS server, then assign them to the relevant profile and also to your devices.

You can choose between the following formats for your pictures : **BMP, JPG, GIF, TIF, PNG** and **SVG**. Ensure that the name of your image file has no blanks, otherwise the file will not be accepted. **25 MB** of free storage space are available for your pictures.

Upload your files:

1. Click **New file** on the context menu of the **Files** directory in the tree.
2. Browse to find your image in **Local file**.



The screenshot shows a configuration window for uploading a file. It is divided into two main sections: 'File source' and 'File target'.

**File source:**

- The 'Upload local file to UMS server' radio button is selected.
- The 'Local file' text box contains the path: `C:\Users\Pictures\bootstern.jpg`.
- The 'Upload location (URL)' text box contains the URL: `https://LolIGEL.LOCAL:8443/ums_filetransfer/`.
- The 'Select file from UMS server' radio button is unselected.
- The 'File location (URL)' text box is empty.

**File target:**

- The 'Classification' dropdown menu is set to 'Undefined'.
- The 'Thin Client file location' text box contains the path: `/images/`.

3. Browse to select a picture directory in **Upload location (URL)**.  
Since UMS version 5 you can use as upload location only `/ums-filetransfer/` and its subdirectories.
4. Enter a **Thin Client file location** directory for the target device.  
If you enter a directory which does not yet exist, it will be created automatically. If you do not enter a specific directory, the image will be put in the root directory.
5. Click **OK**.  
Your image will be listed in the list of **Files**.
6. Assign the image to your devices by dragging and dropping them or by adding them under **Assigned objects**.

**i** If you put more than one image in the **Thin Client file location** directory, all images will be alternately shown by the **screensaver** (see page 647), one after the other.

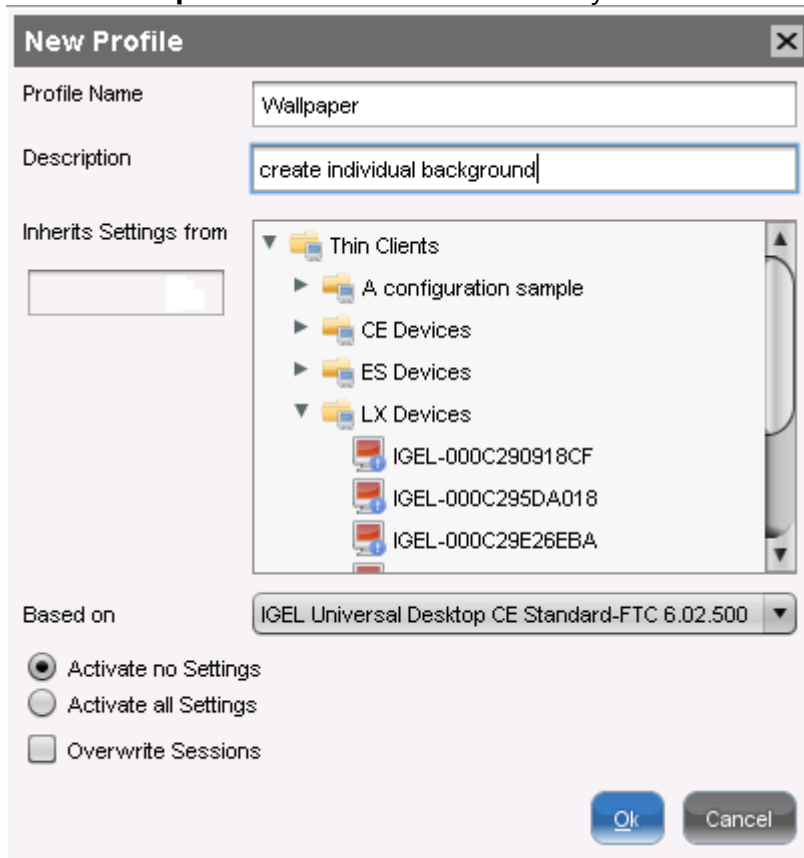
## Creating a Profile

You have already [uploaded your image file](#) (see page 636).

As you work with the UMS, to manage several clients, you need to create a profile to assign the new settings to your clients.

Create a **Profile** to assign your settings to the clients:

1. Click **New profile** in the context menu of the **Profiles** directory in the tree.
2. Enter a **Profile Name**.
3. Enter a **Description** and choose the firmware of your thin client under **Based on**.



4. Click **OK**.

## Creating Your Own Wallpaper

There are two ways how to create an own wallpaper:

- [Via a Firmware Customization](#) (see page 639)
- [Via a Profile](#) (see page 640)

With a Firmware Customization, setting up your own wallpaper is much easier than with a profile.

## Creating Your Own Wallpaper via Firmware Customization

This is how you can create your own wallpaper using a firmware customization function in the UMS:

1. In the UMS, right-click on **Firmware Customizations > Create New Firmware Customization**. The **Firmware Customization Details** dialog opens.
2. Enter a **Name** for your wallpaper customization.
3. As **Use Case**, select **Wallpaper**.
4. Select the image file for each monitor:
  - Click **Choose file** if you have already uploaded a file in the UMS.
  - Click **Upload file** if you want to upload a new file.

 The file name must not contain any blank spaces or special characters such as %, \$, umlauts, etc.

5. Select your image file and click **Open**.
6. Check the image file location and click **OK**.
7. Optionally, click **Next** to directly apply this new firmware customization to a device or folder of devices.
8. Click **Finish** to save your new firmware customization.

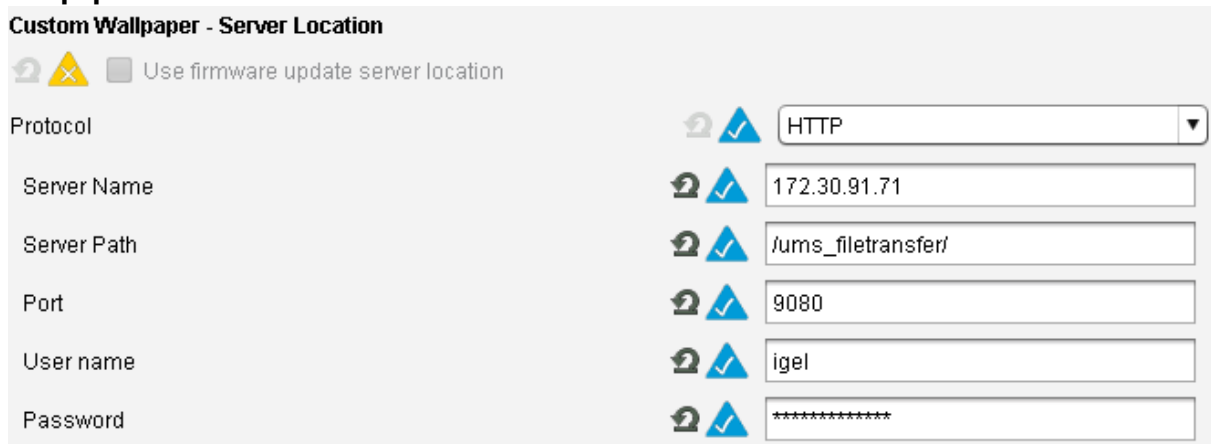
## Creating Your Own Wallpaper via a Profile

You have already uploaded your wallpaper picture; see [Uploading a Picture](#) (see page 636).

1. Create a profile and name it, for example, **Wallpaper**; see [Creating a Profile](#) (see page 637). The **Profile Configuration** window opens.
2. Set the wallpaper server location; see below "Setting the Wallpaper Server Location".
3. Configure the background of the client desktop; see below "Configuring the Background".

### Setting the Wallpaper Server Location


1. Click **System > Firmware Customization > Corporate Design > Background > Custom Wallpaper Server**.



2. Choose **HTTP** as **Protocol**.
3. Enter the **Server name** of your UMS Server.
4. Enter the path of your wallpaper directory as **Server path**.
5. The standard **Port** should be 9080.
6. Set your UMS administrator **User name** and **Password**.
7. Click **Save** to save the settings.

### Configuring the Background

1. Open the profile.
2. Click **System > Firmware Customization > Corporate Design > Background (1st Monitor)**.
3. Activate **Custom wallpaper download**.
4. Enter under **Custom wallpaper file** the name of the picture you want to define as your background image.

 If you use more than one monitor, you have to assign the background image to each one of them manually.

5. Assign the profile to your devices by dragging and dropping them or by adding them under **Assigned objects**.



#### Checking the Results

1. Choose the device in the UMS structure tree under **Devices**.
2. Go to **User Interface > Desktop > Background**.  
You will see that the wallpaper has already been assigned by the profile; you cannot set it manually any more.  
Alternatively, you can shadow your thin client and you will see the new wallpaper.

This way, you can automatically assign background images to your devices. It is very easy to maintain them because the only thing you have to do if you want to choose another image is to change it in the profile.

## How to Create a Custom Bootsplash for IGEL OS Devices via the UMS

This document shows how you can create a custom bootsplash for your endpoint devices using the Universal Management Suite (UMS). There are two ways to do it:

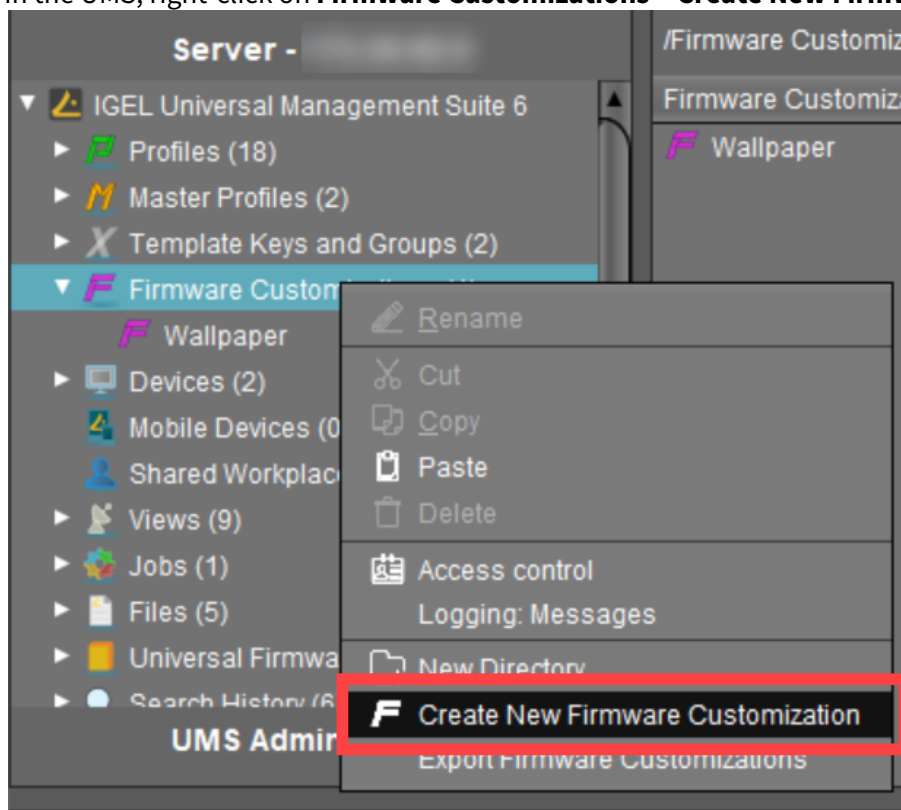
- via a firmware customization
- via a profile

With a firmware customization function, you can create your own bootsplash much easier and quicker than with a profile.

### How to Create a Custom Bootsplash via a Firmware Customization

This is how you can create your own bootsplash using a firmware customization function in the UMS:

1. In the UMS, right-click on **Firmware Customizations > Create New Firmware Customization**.



The **Firmware Customization Details** dialog opens.

2. Enter a **Name** for your bootsplash customization.

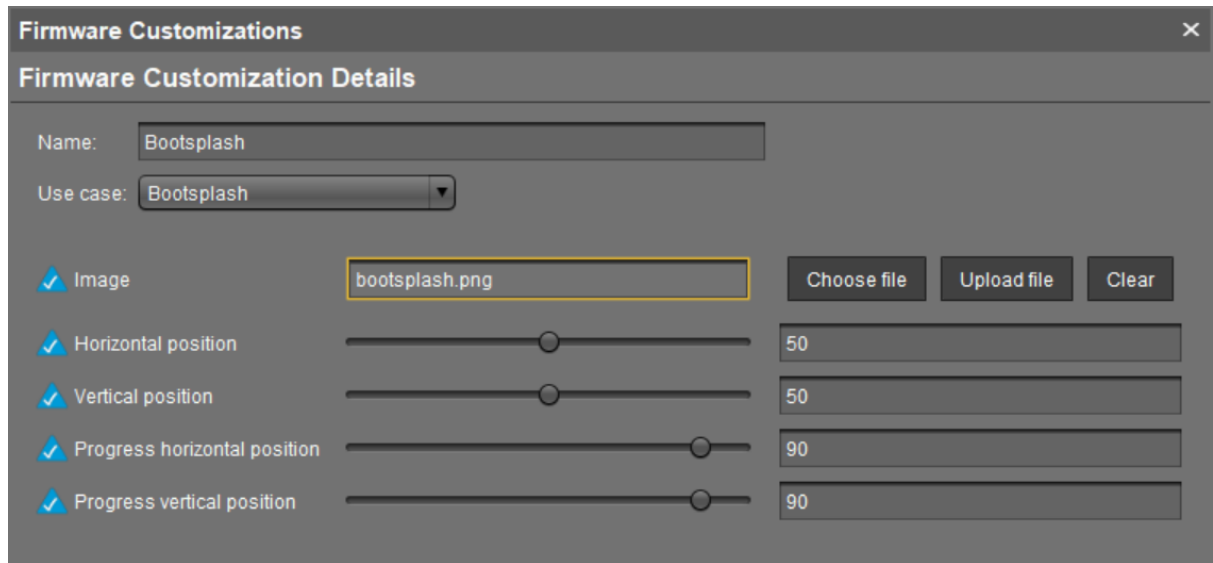
3. As **Use case**, select **Bootsplash**.

4. Select the image file for your bootsplash:

- Click **Choose file** if you have already uploaded a file to the UMS Server.
- Click **Upload file** if you want to upload a new file.

**i**

- The file name must not contain any blank spaces or special characters such as %, \$, umlauts, etc.
- The file types supported for a bootsplash are JPG, BMP, and PNG.
- The optimum size of the picture is 800 x 600 pixels.



5. Define the position of your bootsplash.
6. Optionally, click **Next** to assign this new firmware customization to a device or a device directory.
7. Click **Finish** to save your new firmware customization.

### How to Create a Custom Bootsplash via a Profile

This is how you can create your own bootsplash using a profile in the UMS:

1. Upload your boot logo to the UMS Server; see [Uploading a Picture](#) (see page 636).

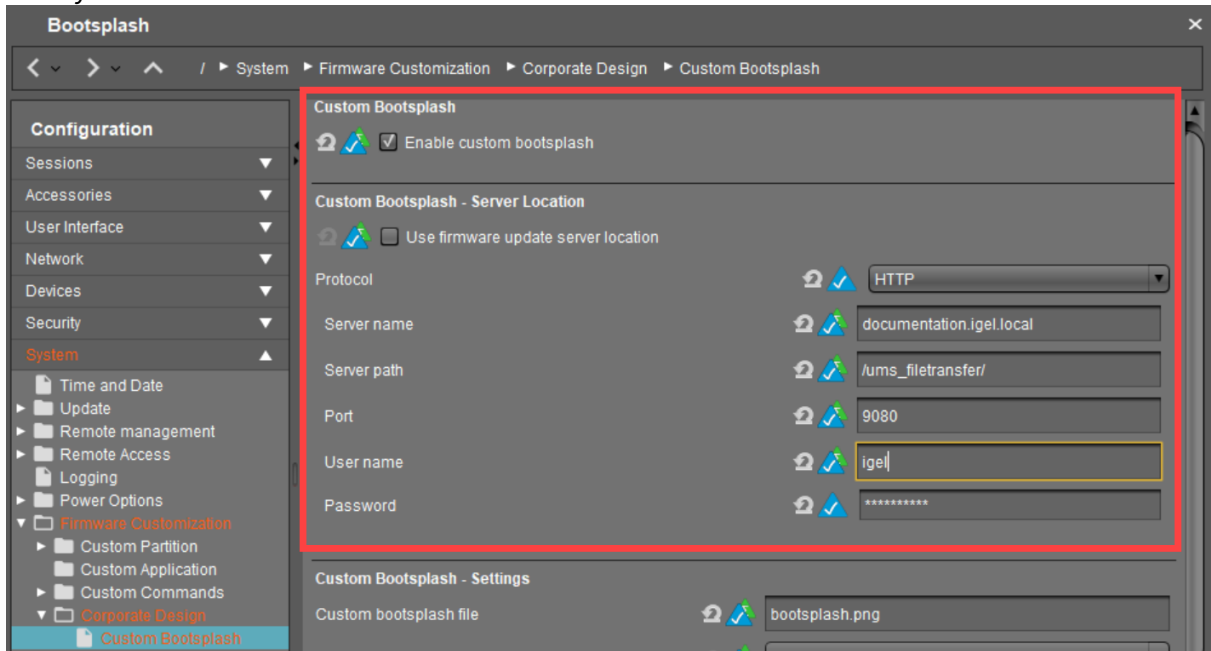
- i**

  - The file name must not contain any blank spaces or special characters such as %, \$, umlauts, etc.
  - The optimum size of the picture is 800 x 600 pixels.

2. Create a new profile named **Bootsplash**; see [Creating a Profile](#) (see page 637).
3. In the profile configuration window, go to **System > Firmware Customization > Corporate Design > Custom Bootsplash** to create your own bootsplash.
4. Activate **Enable custom bootsplash**.
5. Choose **HTTP** as **Protocol**.
6. Under **Server name**, enter the name or the IP address of your UMS Server.
7. Enter the path of your boot logo directory as **Server path**.
8. Specify your HTTP server port under **Port**.

**i** The default UMS HTTP server port is 9080. For more information on UMS ports, see IGEL UMS Kommunikationsports.

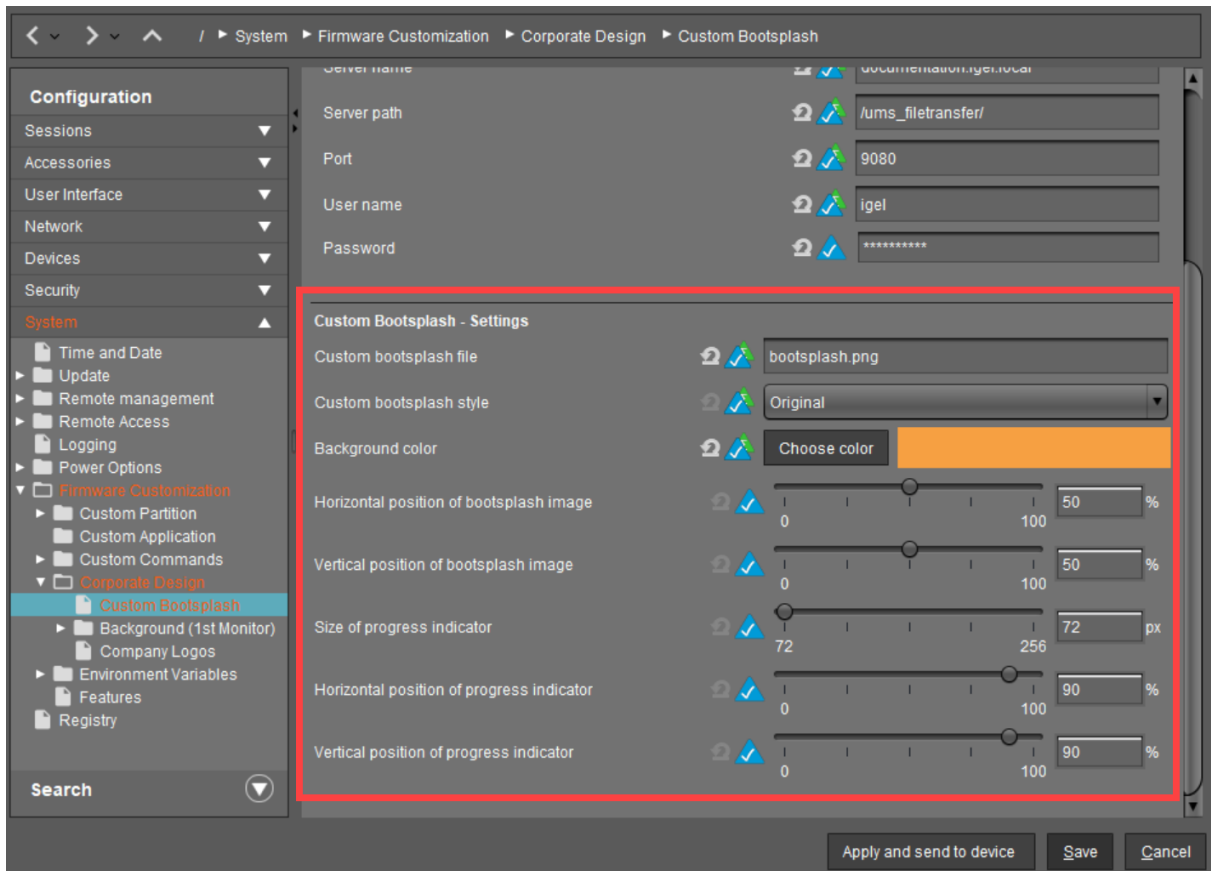
9. Enter your UMS administrator **User name** and **Password**.



10. Enter the name of your bootsplash image under **Custom bootsplash file**.

11. Define **Custom bootsplash style** and **Background color**.

12. Define **vertical** and **horizontal position** for the bootsplash image and progress indicator. The scale goes from 0 (left) to 100 (right); 50 means "centered".



13. **Save** the settings.
14. Assign the profile to your devices by dragging and dropping them or by adding them under **Assigned objects**. For more information on the profile assignment, see [Wie kann ich IGEL UMS Profile zuweisen?](#).


**i** If the image file or any setting of an existing custom bootsplash is changed, the bootsplash code has to be rebuilt. You can trigger this from the UMS via **Jobs > New Scheduled Job** with the command **Update desktop customization**.

## Creating Your Own Screensaver

This section describes how to configure an autostart screensaver with your own picture using the UMS.

Proceed as you did for the wallpaper:

1. Upload your logo to the UMS server. For details, see [Uploading a Picture \(see page 636\)](#).


 The size of the picture is irrelevant because it will be reduced automatically to 200 x 150 pixels.

2. Create a new Profile named **Screensaver**. For details, see [Creating a Profile \(see page 637\)](#).
3. Configure the profile settings.  
There are four areas where you have to make settings in the screensaver profile:
  - [Setting a Delay Time for Booting \(see page 648\)](#)
  - [Setting a Timeout for Autostart \(see page 649\)](#)
  - [Assigning the Custom Logo \(see page 650\)](#)
  - [Assigning the Custom Clock \(see page 651\)](#)
4. Assign the profile to your devices by dragging and dropping them or by adding them under **Assigned objects**.

## Setting a Delay Time for Booting

Configure **Autostart** in the screensaver profile under **User Interface > Screenlock / Screensaver**.


1. Enter a **Session name**, for example **Screensaver**.
2. Enable **Autostart**.
3. Enter the number of seconds of **Delay**.

 This setting tells the system that it must launch the autostart of this session with a certain delay during booting.




## Setting a Timeout for Autostart

1. Click **User Interface > Screenlock / Screensaver > Options**.
2. Enable **Start automatically**.
3. Enter a number of minutes for **Timeout**.

 With this setting, you decide how long the system has to wait before starting the screensaver after the last input.

## Assigning the Custom Logo

1. Go to **System > Firmware Customization > Corporate Design > Company Logos**.
2. Activate **Enable image display**.
3. Enter the **Image file/directory** you have defined under **Thin Client file location**. See [Uploading a Picture](#) (see page 636).

 If you enter a folder instead of a single image file as the source, all images in the folder will be displayed as a slide show. The **display time** for the images can be configured.

4. Activate **One image per monitor** if you use more than one monitor and if you want to show different pictures on each screen.
5. Under **Image duration** specify the time in seconds that you want to wait before the image is to be changed.
6. Under **Image display mode** you can choose between the following different image actions:
  - **Small-sized hopping**: Small pictures are shown in changing positions.
  - **Medium-sized hopping**: Bigger pictures are shown in changing positions.
  - **Full-screen center cut out**: The pictures will be shown in full-screen mode. They may possibly be cut at the border.
  - **Full-screen letterbox**: The pictures are shown in full size as large as possible according to the screen.

## Assigning the Custom Clock

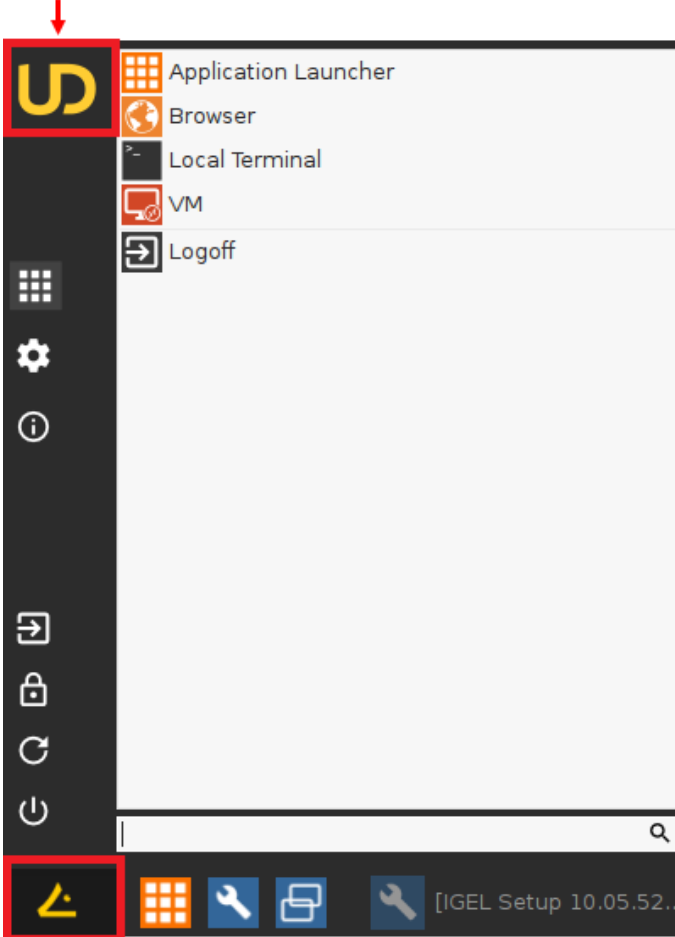
You can also configure a digital screensaver clock independently of the screen display.

1. Click **User Interface > Screenlock / Screensaver > Screensaver**.
2. Select the **Clock display monitor** where you want to display the clock.
3. Activate **Show seconds** if you want to see the digital time display, including seconds.
4. Define the **size, position** and **color** settings of your screensaver clock.

## Assigning Your Own Company Logos

You can set your own images for the **start button** and the **company logo in the start menu**.

Company logo




Start button icon

**i** The **Start button icon** is customizable in IGEL Linux 5.08.100 and newer.

**i** To see a start menu with a company logo, you first have to set the **Start Menu Type** on **Advanced** under **User Interface > Desktop > Start Menu**.  
If you set the **Start Menu Type** on **Auto** and the device has a clock frequency of 1 GHz, the system will choose the advanced type.

To assign your own icons via UMS:

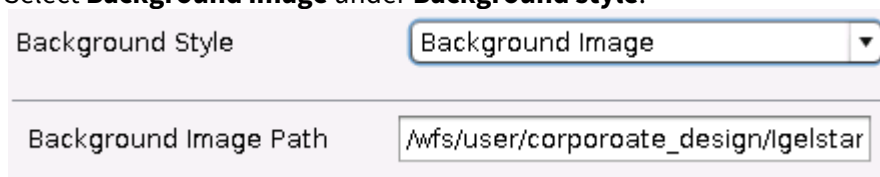
1. Upload your logos to the UMS server. For details, see [Uploading a Picture](#) (see page 636).
2. Create a new profile. For details, see [Creating a Profile](#) (see page 637).  
The profile configuration window opens.
3. Go to **System > Firmware Customization > Corporate Design > Company Logos > Start Menu**.
4. Enter the file name and the full path of the image under **Start button icon**.
5. Enter the file name and the full path of the image under **Company logo in start menu**.
6. Click **Save** or **Apply and send to Thin Client** to save the settings.
7. Assign the profile to your devices by dragging and dropping them or by adding them under **Assigned objects**.

 An alternative to this is the chapter Create Firmware Customization in the UMS manual. Here you will find further configuration options for adapting the UMS to your requirements.

## Creating Your Own Taskbar

You can apply your own design to a taskbar. To customize the taskbar on multiple devices, use the IGEL UMS and proceed as follows:

1. Upload the desired image to the UMS server, see [Uploading a Picture](#) (see page 636).
2. Create a new profile, see [Creating a Profile](#) (see page 637).
3. Assign the image to the profile by dragging and dropping it or by adding it under **Assigned objects**.
4. In the profile configuration window, go to **User Interface > Desktop > Taskbar Background**.
5. Select **Background image** under **Background style**.



Background Style	Background Image
Background Image Path	/wfs/user/corporoate_design/Igelstar

6. Enter the full path of the desired image under **Background image path**.
7. Assign the profile to your devices by dragging and dropping them or by adding them under **Assigned objects**.

## Customizing Desktop Icons

**i** You can only customize the desktop icon of a session. The taskbar icon of a session cannot be customized and will remain the default icon. Complete customization is not possible.

### Prerequisites

You can use the following graphic formats and resolutions for a custom desktop icon:

- PNG - common resolutions are 128x128, 96x96, 64x64, 48x48, 32x32, 24x24, 22x22, 16x16, but others are also accepted and scaled accordingly.

**i** We recommend at least a resolution of 64x64.

- SVG - no resolutions because SVG contains freely scalable vector graphics.

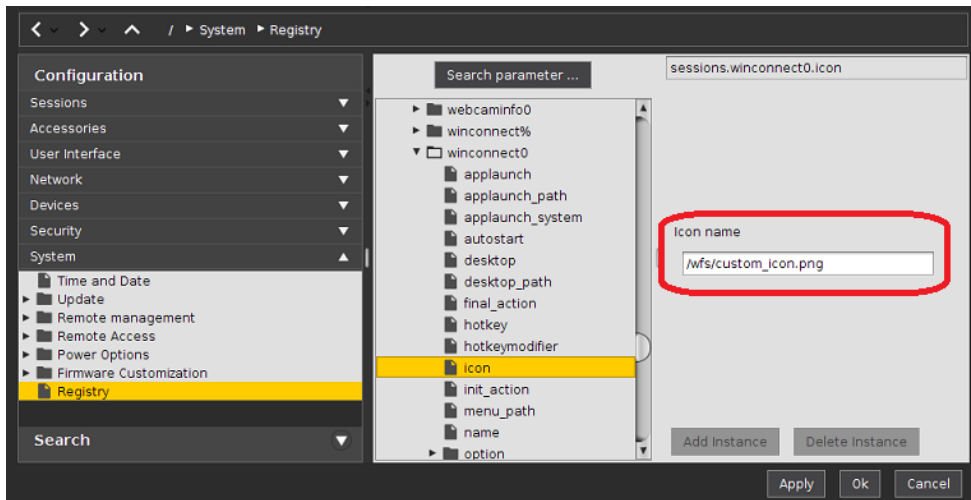
**i** Even though other formats like BMP or JPEG are supported, only PNG and SVG are recommended because these formats support transparency.

To customize the desktop icon of a session, proceed as follows:

1. In the Setup, go to **System > Registry**.
2. In the Registry, navigate to **sessions.[session name].icon**.

**i** For technical reasons, some registry keys do not match the session's name. For example, RDP sessions are found under the key `winconnect[0-...]`.

3. Enter under **Icon name** the absolute path to your custom icon as shown in the sample picture below.



4. Click **Ok** to save the changes.



## How to Change the Font Color of the Desktop Icons

### Problem

You want to alter the font color of the desktop icons, but there is no obvious way to do that in the Setup.

### Environment

- IGEL OS 11.01.100 or higher

### Instructions

To change the font color of the desktop icons:

1. In the Setup, go to **System > Firmware Customization > Custom Commands > Base**.
2. Under **Initialization**, enter the following command where red is the desired font color:

```
sed -i "/^XfdesktopIconView.label[ \t]*{/,/}/ s#^\([ \t]*color:[ \t]*\)white;#\1red;#" /usr/share/themes/IGEL-Dark/gtk-3.0/xfdesktop.css
```

You can specify any other color which can be recognized by [GTK](https://www.gtk.org/)<sup>52</sup>, e.g. blue , black , green , etc.

Example:

```
sed -i "/^XfdesktopIconView.label[ \t]*{/,/}/ s#^\([ \t]*color:[ \t]*\)white;#\1green;#" /usr/share/themes/IGEL-Dark/gtk-3.0/xfdesktop.css
```

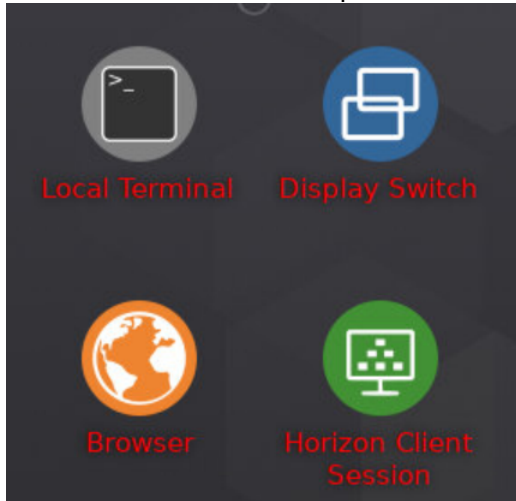
3. Save the changes.

---

<sup>52</sup> <https://www.gtk.org/>

4. Reboot the device.

The font color of the desktop icons has been changed to red:



## How to Set Up a Countdown to Prevent an Undesired Screen Lock In IGEL OS

In some situations, a screen lock that comes without a warning can cause disruption. Typically, this is the case when a user who is logged in to a remote session does not interact with the device for some time, which results in the screen lock kicking in. To circumvent this problem, you can set a visible countdown that is started before the screen is locked, so the user can react in time.

**i** Review the timeouts in the power settings of your device to ensure that the display won't turn black before the countdown is started; see System and Screen.

The configuration is described in the following sections:

- [Defining the Countdown's Behavior](#) (see page 659)
- [Defining the Countdown's Appearance](#) (see page 661)

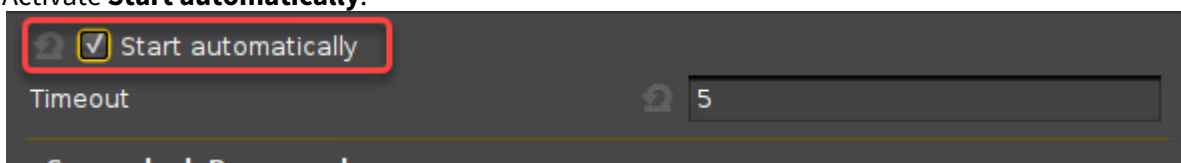
For special purposes, like closing a remote session to prevent it from running unattended, you can configure an additional set of commands. It consists of a command that determines whether the countdown should be started (typically, check whether the remote session is running) and a command that will be executed when the countdown reaches 0 (typically, close the remote session). The configuration is described in the following section:

- [Configuring a Conditional Countdown and Command](#) (see page 663)

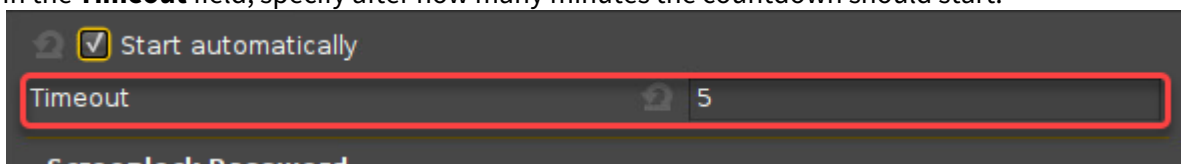
### Defining the Countdown's Behavior

For a description of all options, see Options.

1. In the Setup or UMS configuration dialog, go to **User Interface > Screenlock / Screensaver > Options**.
2. Activate **Start automatically**.



3. In the **Timeout** field, specify after how many minutes the countdown should start.

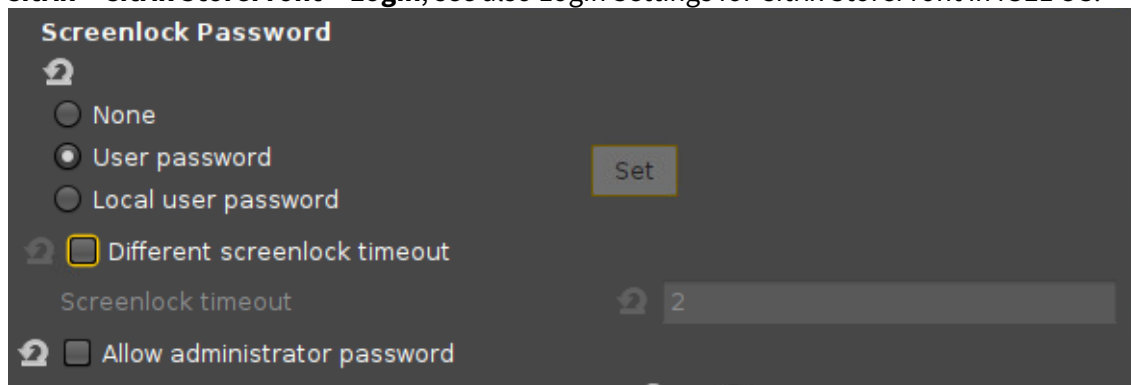


4. Select the password to be used to unlock the screen:

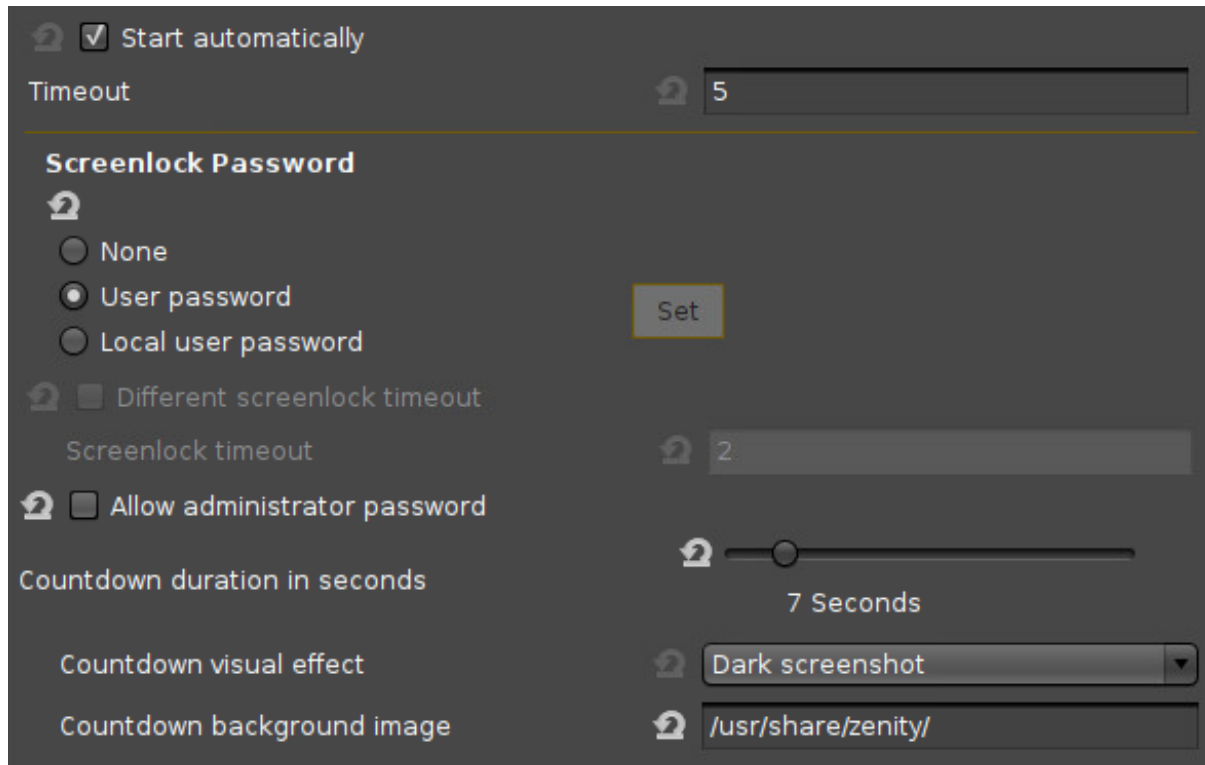
- **None:** The user can unlock the screen without a password. Please note that the countdown will not be started when this option is selected!
- **User password:** The user must enter the user password to unlock the screen. If you are using Microsoft Active Directory (AD) resp. Kerberos for authentication, which is highly recommended, the user's AD/Kerberos password will be used here. For details, see Active Directory/Kerberos. If you are not using AD/Kerberos, the user password is configured in **Security > Password** under **User**. Please note that the password should not, at any rate, be set via a UMS profile, otherwise all affected devices would have the same password!
- **Local user password:** The user must enter a special screen lock password to unlock the screen; click **Set** to define this password. Please note that the password should not, at any rate, be set via a UMS profile, otherwise all affected devices would have the same password! This password is also used for **Security > Logon > Local User > Login with local user password**; see [Local User](#) (see page 659).

If the user is logged in via Active Directory (AD), the AD credentials are used instead of this password to unlock the screen.

If you are using Citrix Storefront, this password can be synchronized with the Citrix session password by enabling **Synchronize Citrix password with screen lock** under **Sessions > Citrix > Citrix StoreFront > Login**; see also Login Settings for Citrix StoreFront in IGEL OS.



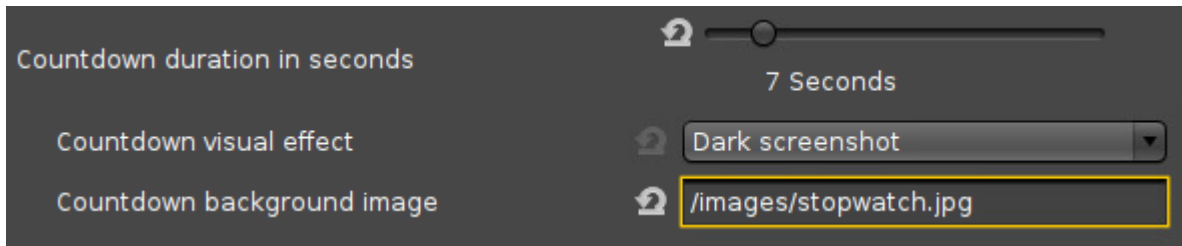
5. Set the **Countdown duration in seconds**. The range is from 1 to 60.  
Configuration example:



6. Apply the settings to your devices or to your profile.

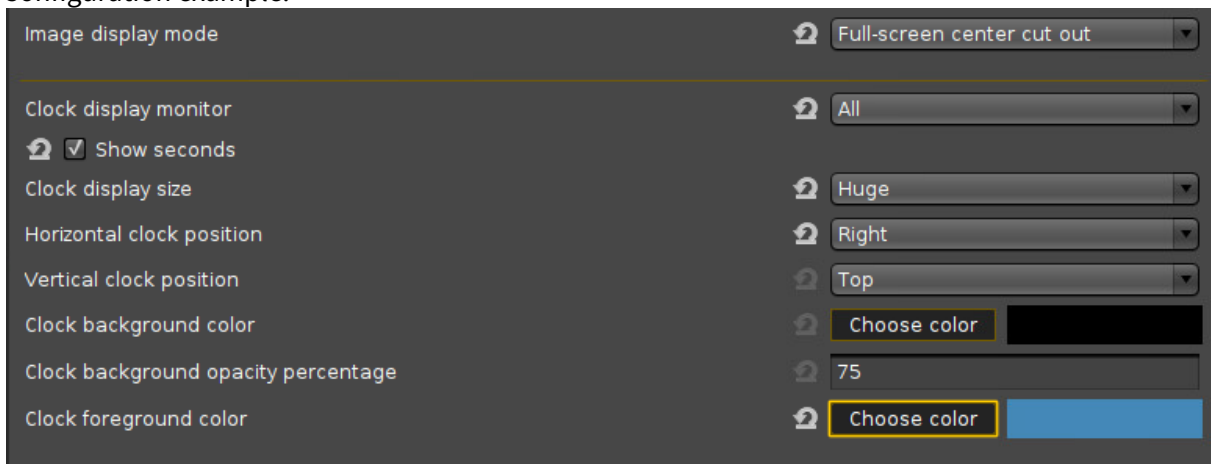
## Defining the Countdown's Appearance

1. In the Setup, go to **User Interface > Screenlock / Screensaver > Options**.
2. If you want the current desktop as a background image during the countdown, select the visual effect:
  - **Dark screenshot:** The desktop screenshot is darkened.
  - **Gray screenshot:** The desktop screenshot is grayed out.
3. If you want a custom image as a background image during the countdown, enter a valid path and file name. Example: `/images/`. If the image is not already residing on your device, you can upload it using the UMS; see [Uploading a Picture](#) (see page 636).  
Configuration example with custom image:



4. Go to **User Interface > Screenlock / Screensaver > Screensaver**.
5. Customize the countdown's appearance using the following parameters; these parameters define the appearance of both the screensaver's clock and the countdown. For further information, see Screensaver.
  - **Image display mode:** Position and scaling for the background image
  - **Clock display monitor:** Select the monitor(s) on which the countdown is to be shown.
  - **Show seconds:** Define whether the seconds should be displayed on the clock.
  - **Clock display size:** Size of the countdown digits
  - **Horizontal clock position:** Horizontal position of the countdown digits
  - **Vertical clock position:** Vertical position of the countdown digits
  - **Clock background color:** Color of the countdown background area. The countdown background area is a rectangle with rounded corners.
  - **Clock background opacity percentage:** Set the opacity for the clock's background area (defined by **Clock background color**),
  - **Clock foreground color:** Color of the countdown digits

Configuration example:



- Apply the settings to your devices or to your profile.  
Here is an example of the countdown with a custom image:



## Configuring a Conditional Countdown and Command

In our example, a Citrix session is running (e.g. in appliance mode), and the endpoint device has been idle for a while. After the timeout, the system checks whether a Citrix session is running; this is to prevent the session from running unattended. The Citrix session is detected, so the countdown kicks in. The user does not interact with the device, so the countdown is not stopped. When the countdown has reached 0, the system kills the Citrix client; the user is logged off.

In the following, we will first specify the command that determines whether the countdown should be started. Then, we will specify the command that is executed when the countdown has reached 0.

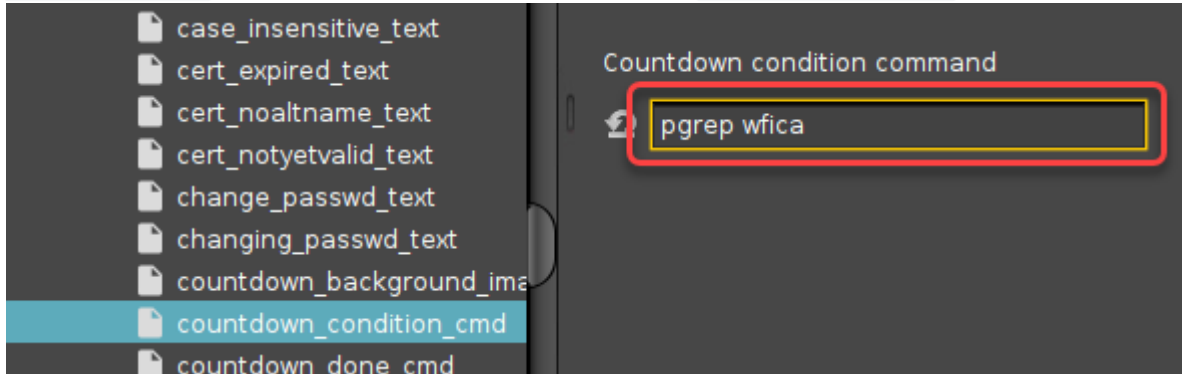
### Command That Determines the Condition under Which the Countdown Should Be Started

**⚠** This command only makes sense in combination with a command that is to be executed after the countdown is done; see [Command to Be Executed after the Countdown](#) (see page 664).

- In the Setup, go to **System > Registry** and open the registry key **sessions > xlock0 > options > countdown\_condition\_cmd**  
( `sessions.xlock0.options.countdown_condition_cmd` ).

2. Enter the command in the field **Countdown condition command**. The user that issues the commands is `user` . If no command is defined here, the countdown will be started. Examples:

`pgrep wfica` (returns 0 if a Citrix session is present), `pgrep igelrdp2`



3. Click **Apply** or **Ok**.

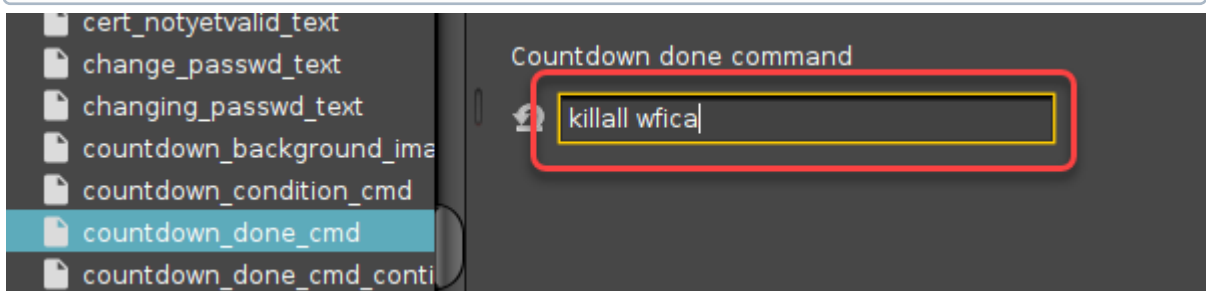
If the command returns 0, the countdown is started. When the countdown has reached 0, the command specified with **System > Registry > sessions > xlock0 > options > countdown\_done\_cmd** is executed (see [Command to Be Executed after the Countdown](#) (see page 664)).

If the command returns a non-zero value, the countdown is not started. A command that is configured for execution after the countdown will therefore not be executed. The screen lock or screensaver will be started.

### Command to Be Executed after the Countdown


1. In the Setup, go to **System > Registry** and open the registry key **sessions > xlock0 > options > countdown\_done\_cmd** (`sessions.xlock0.options.countdown_done_cmd`).
2. Enter the command in the field **Countdown done command**. The user that issues the commands is `user` . Examples: `killall wfica` (terminates the Citrix ICA client), `logoff`

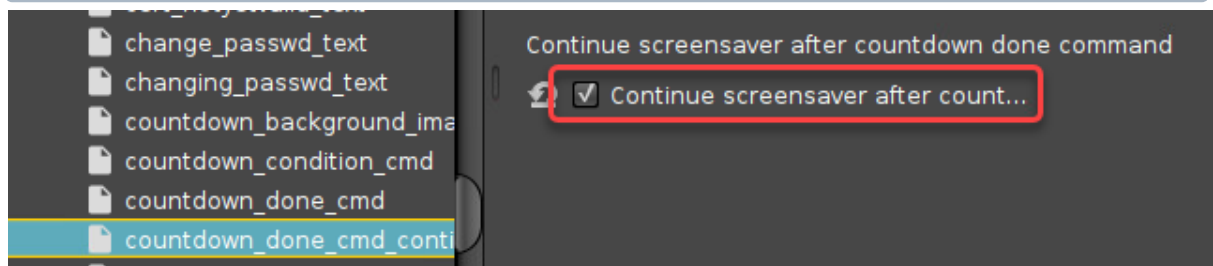
**i** The command is executed synchronously before the countdown goes away. If the command doesn't terminate quickly, it must be sent to the background by appending " & " .





- (Optional) If you want to enforce the start of the screensaver after the **Countdown done command** has been executed, open the registry key **sessions > xlock0 > options > countdown\_done\_cmd\_continue** ( `sessions.xlock0.options.countdown_done_cmd_continue` ) and enable **Continue screensaver after countdown done command**.

 Some applications stop the screensaver when they get restarted, so this does not always have the desired effect.



- Click **Apply** or **Ok**.

## How to Set Up a Countdown in the IGEL OS

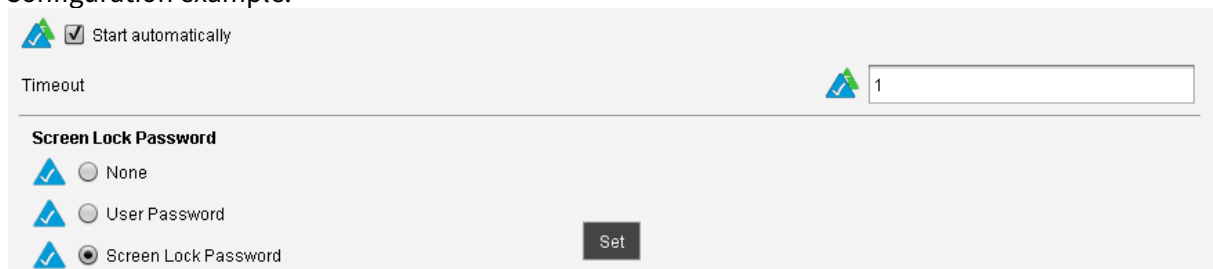
You can set up the countdown via the device's local Setup or via the IGEL Universal Management Suite (UMS). It is recommended to use the IGEL UMS and store your settings in a profile; this allows you to apply your settings to a random number of devices in one go.

For more information about profiles, see the Profiles chapter in the IGEL UMS reference manual.

### Defining the Countdown's Behavior

1. In the Setup, go to **User Interface > Screenlock / Screensaver > Options**.
2. Activate **Start automatically**.
3. In the **Timeout** field, set the idle timeout in minutes, after which the countdown should start.
4. Select the password to be used to unlock the screen:
  - **None**: The user can unlock the screen without a password.
  - **User password**: The user must enter the user password to unlock the screen. The user password is configured in **Security > Password**.
  - **Screenlock password**: The user must enter a special screenlock password to unlock the screen. Click **Set** to define the screenlock password.
5. Set the **Countdown duration** in seconds. The range is from 1 to 60.

Configuration example:



The screenshot shows the 'Screenlock / Screensaver > Options' configuration screen. At the top, there is a checkbox labeled 'Start automatically' which is checked. Below this is a 'Timeout' field with a value of '1'. Underneath, there is a section titled 'Screen Lock Password' with three radio button options: 'None', 'User Password', and 'Screen Lock Password'. The 'Screen Lock Password' option is selected. To the right of these options is a 'Set' button.

6. Apply the settings to your devices or to your profile.

### Defining the Countdown's Appearance

1. In the Setup, go to **User Interface > Screenlock / Screensaver > Options**.
2. If you want the current desktop as a background image during the countdown, select the visual effect:
  - **Dark screenshot**: The desktop screenshot is darkened.
  - **Gray screenshot**: The desktop screenshot is grayed out.

- If you want a custom image as a background image during the countdown, enter a valid path and file name. Example: `/images/` . If the image is not already residing on your device, you can upload it using the UMS; see [Uploading a Picture](#) (see page 636).

Configuration example with custom image:

Countdown duration in seconds	<input type="range" value="10"/> 10
Countdown visual effect	Dark screenshot
Countdown background image	/images/stopwatch.jpg

- Go to **User Interface > Screenlock / Screensaver > Screensaver**.

- Customize the countdown's appearance using the following parameters; these parameters define the appearance of both the screensaver's clock and the countdown. For further information, see Screensaver.

- Image display mode:** Position and scaling for the background image

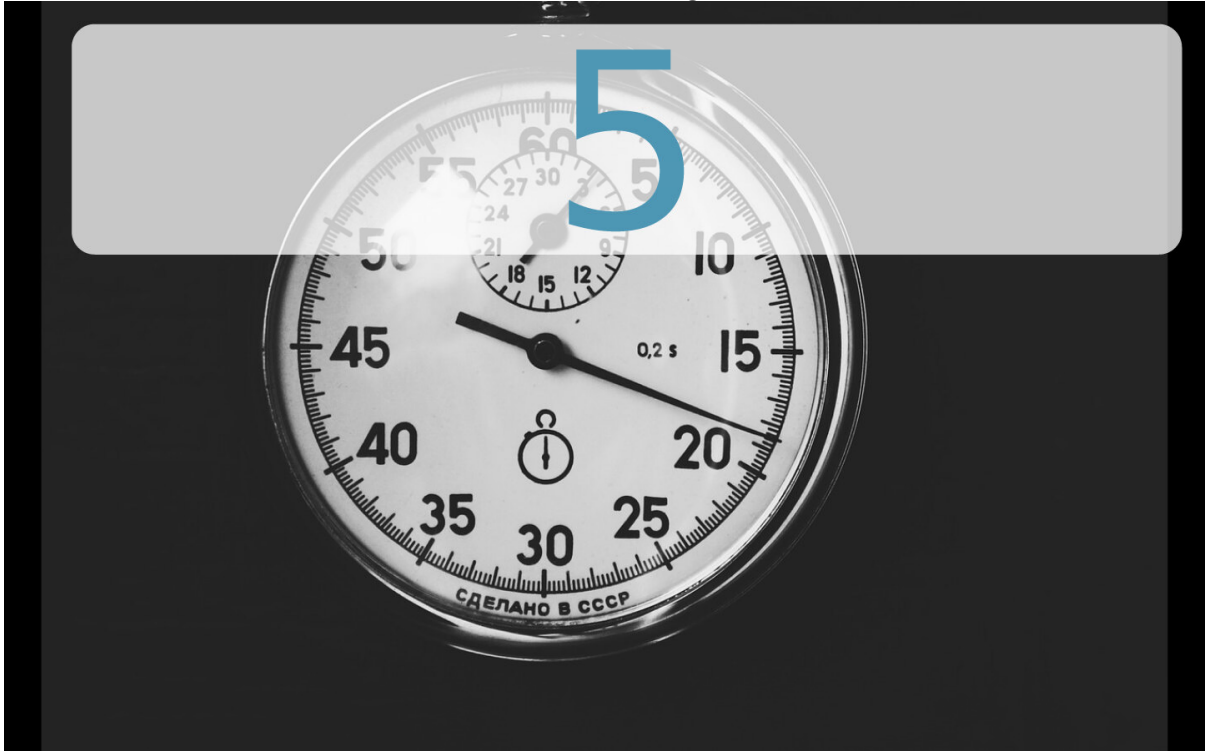
This parameter is only relevant for IGEL Linux v5. With IGEL Linux *version 10.03.500* or higher, the **Image display mode** is set to "Full-screen letterbox".

- Clock display monitor:** Selects the monitor(s) on which the countdown is to be shown.
- Clock display size:** Size of the countdown digits
- Horizontal clock position:** Horizontal position of the countdown digits
- Vertical clock position:** Vertical position of the countdown digits
- Clock background color:** Color of the countdown background area. The countdown background area is a rectangle with rounded corners.
- Clock foreground color:** Color of the countdown digits

Configuration example:

Image display mode	Full-screen center cut out
Clock display monitor	All
<input type="checkbox"/> Show seconds	
Clock display size	Huge
Horizontal clock position	Right
Vertical clock position	Top
Clock background color	Choose color
Clock background opacity percentage	75
Clock foreground color	Choose color <span style="background-color: #0070C0; color: white; padding: 2px 10px;"> </span>

6. Apply the settings to your devices or to your profile.  
Here is an example of the countdown with a custom image:



## Configuring a Conditional Countdown and Command

You can specify an arbitrary command that is executed when the countdown has reached 0.

Additionally, you can specify a command that determines whether the countdown is to be started.

Example use case: The countdown is running, but the user does not interact with the device in order to make the countdown stop. When the countdown has reached 0, the system checks whether a session is running, e.g. an appliance mode Citrix session. If yes, the user is logged off from this session.

If no command is set to be executed after countdown, the screen will be locked instead.

The user that issues the commands depends on the firmware version in use:

- With IGEL Linux v5, the user is `root`.
- With IGEL OS Linux 10, the user is `user`.

To specify the command that determines the condition:

1. In the Setup, go to **System > Registry** and open the registry key **sessions > xlock0 > options > countdown\_condition\_cmd** (`sessions.xlock0.options.countdown_condition_cmd`).
2. Enter the command in the field **Countdown condition command**. Example: `pgrep wfica` (determines if a Citrix session is present)
3. Click **Apply** or **Ok**.  
If the command returns 0, the countdown or commando is started.  
If the command returns a non-zero value, the countdown or commando is not started.

To specify the command to be executed after the countdown:

1. In the Setup, go to **System > Registry** and open the registry key **sessions > xlock0 > options > countdown\_done\_cmd** (`sessions.xlock0.options.countdown_done_cmd`).
2. Enter the command in the field **Countdown done command**. Example: `killall wfica` (terminates the Citrix ICA client)

**i** The command is executed synchronously before the countdown goes away. If the command doesn't terminate quickly, it must be sent to the background by appending `" & "`.

3. Open the registry key **sessions > xlock0 > options > countdown\_done\_cmd\_continue** (`sessions.xlock0.options.countdown_done_cmd_continue`) and specify whether the screensaver should be started after the command has been started.

**i** With IGEL Linux v5, the screensaver does not start immediately. It will be started after the idle timeout defined under **User Interface > Screen Lock/Saver > Options > Timeout**.  
With IGEL OS Linux 10, the screensaver is started immediately.

- The screensaver is started after the command has been started.
  - The screensaver will not be started.
4. Click **Apply** or **Ok**.


## Installing a Calculator on IGEL Linux

### Issue

You may want to have a desktop calculator.

### Solution


1. Download the opensource java calculator from: <http://sourceforge.net/projects/simpcalc/>

 The default download location of the local Firefox browser is `/tmp/`.

2. Open a **Local Terminal** and log in as `root`
3. Copy the downloaded `.jar` file from the `/tmp/` directory to `/wfs/simplecalc.jar`:  
`cp /tmp/ /wfs/simplecalc.jar`

It is important to copy the file to `/wfs` because otherwise the file would be flushed with a reboot.

4. Open IGEL Setup and create a new custom application: **System > Firmware Customization > Custom Application**
5. Set **Command** to `java -jar /wfs/simplecalc.jar` in **Settings**
6. Click the newly created icon on the desktop to run the custom application.

 To distribute this application to several thin clients please use the file transfer option in IGEL UMS and set up a profile with the custom application configuration.

## Keyboard Shortcuts for Managing Windows


Switching back and forth between open application windows by using keyboard shortcuts is a common way of managing windows.


If you work in a fullscreen environment, you also need a way to switch to the desktop.

With IGEL Linux OS *version 10.03.500*, the device desktop was added to the window cycle of the window manager.

Use the following default shortcuts to switch from application windows to the desktop:

Task	Default Shortcut
Switch between active windows using Task Switcher	Ctrl + Alt + Tab
Switch between active windows using Task Switcher (backwards)	Ctrl+Alt+Shift+Tab
Switch focus to next window	Ctrl + Esc
Switch focus to next window (2)	Ctrl + Alt + UpArrow
Switch focus to next window (reverse order)	Ctrl + Alt + DownArrow

 Go to IGEL Setup > User Interface > Hotkeys > Commands to change these shortcut combinations.

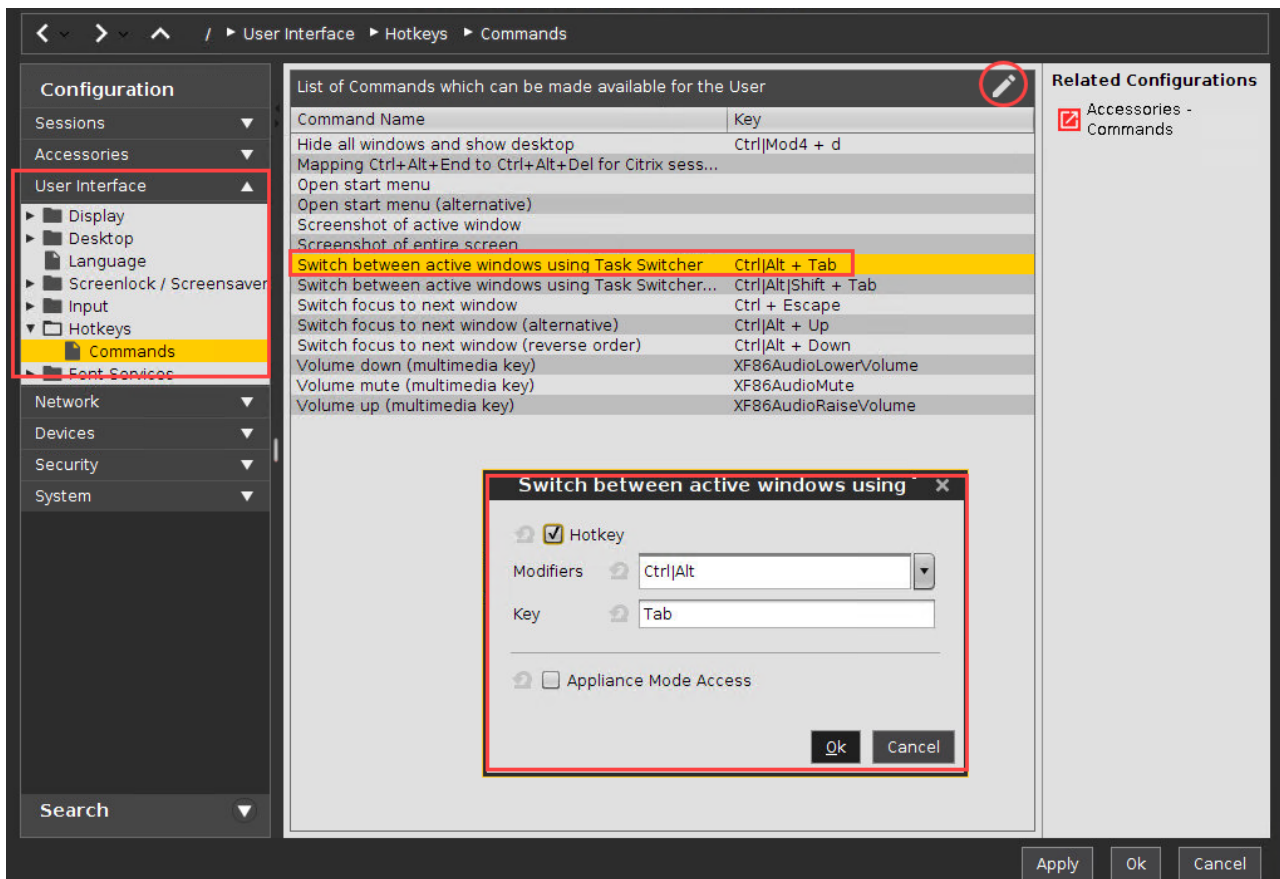
 Switching to the desktop minimizes all windows. Switching back to a window right after that restores all windows.



## Make Frequent User Actions Easier by Defining Hotkeys

For common actions, such as switching between different windows, or lock the screen, you can use a hotkey. Some hotkeys are preconfigured, but you can activate, deactivate, and modify them.

The following example shows how to find out or modify the hotkey for switching between windows:

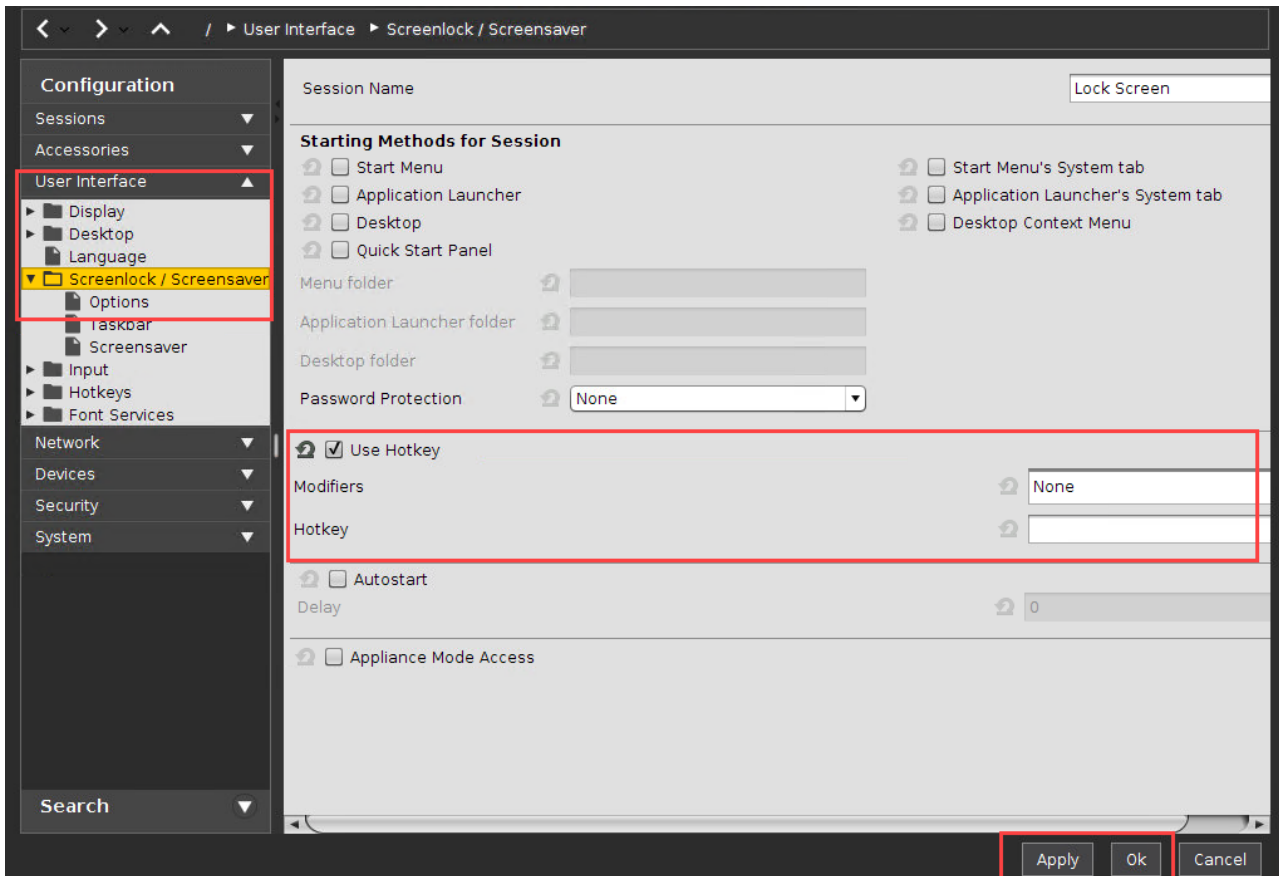


1. Open the setup and go to **User Interface > Hotkeys > Commands**.
2. Select **Switch between active windows using Task Switcher**.
3. Click on **Modify**.  
A dialog window is opened.
4. Enable **Hotkey**, if not already enabled.
5. Select a modifier key or a combination of modifier keys under **Modifiers**.
6. Enter a **Key**.

**i** If you want to enter a key that has no visible character assigned, e. g. the [Tab] key, open a terminal, logon as user and enter `xev -event keyboard`. Press the key designated for the hotkey. The text in brackets starting with `keysym` will contain the desired string for the **Key** field; example: `Tab` in `(keysym 0xff09, Tab)`

7. Click on **Ok**.
8. Click on **Apply** or **Ok**.  
The hotkey is ready for use.

The following example shows how to define a hotkey to lock the screen:



1. Open the setup and go to **User Interface > Screenlock/Screensaver**.
2. Enable **Hotkey**.
3. Select a modifier key or a combination of modifier keys under **Modifiers**.
4. Enter a **Key**.
5. Click on **Apply** or **Ok**.  
The hotkey is ready for use.

## Shutdown/Suspend Devices Automatically at the End of a Session

### Issue

You may want to shutdown, suspend, restart or log off from the device automatically after ending a session.

### Solution

You can define an "after-logout-action" dependent on a session type. This action is performed after ending the last instance of the defined session type.

Proceed as follows:

1. In the thin client's local setup (or its UMS configuration or profile) navigate to **System > Firmware Customization > Custom Commands > After End of Session**.
2. Choose a **Session type**.
3. Choose an auto logoff command.
4. Save the changes with **Apply** or **OK**.

If the last instance of the chosen session type is ended, the auto logoff command will be processed.

See also IGEL OS manual: Post Session


**i** The auto logoff command **Shutdown** will perform the default action defined in **System > Energy > Shutdown**. Please check this parameter before using auto logoff.

**i** The auto logoff command **Logoff** is futile unless you define a logon method in **Security > Logon** (Smartcard, Active Directory/Kerberos or IGEL Shared Workplace). The Logoff command also can not be used with an appliance - in this case only **Shutdown/Suspend** or **Reboot** commands are working.

**i** When using auto logoff commands with an appliance, make sure to define the corresponding session type - e.g. **Horizon View** when using the *VMware Horizon View* appliance.

## Suspend to RAM - Wake Up by USB Mouse

You can wake up your device by mouse click or key press.

 The wake-up functionality strongly depends on the hardware and BIOS version in use. We recommend testing this function before using it. With devices converted by UDC3/OS Creator (OSC) or UD Pocket, it only works when the hardware is fully supported.

### Setting System Suspend as the Default Action

1. In Setup, go to **System > Power Options > Shutdown**.
2. Activate **Allow system suspend**.
3. Under **Default action**, select "Suspend".
4. Save the setting by clicking **Apply** or **Ok**.  
From now on, the system will be suspended to RAM whenever it is shut down.

To use the wake-up functionality, the following steps must be performed:

### Configuring the BIOS for PS/2 Mouse and Keyboard

1. Open the BIOS of your device and check if the power management section has parameters named "PS/2 Wake up from S3" or similar.
2. If present, set the parameters to enabled.
3. Save the BIOS configuration and continue booting.

### Configuring the BIOS for USB Mouse and Keyboard

1. Open the BIOS of your device and check if the power management section has parameters named "USB Wake Up from S3" or similar.
2. If present, set the parameters to enabled.
3. Save the BIOS configuration and continue booting.

### Enabling the Wake-Up Functionality

1. In the IGEL Setup, activate **System > Registry > system > acpi\_wakeup > enabled > Wakeup from S3 by USB devices**.
2. Click **Apply** or **Ok**.

To check if the wake-up functionality works, click  > , wait a few minutes, and try to wake up the device using a mouse click or a key press.

## Taking Screenshots on IGEL Linux

### Issue


For support or documentation purposes, the user wants to take a screenshot in IGEL Linux without accessing the client via VNC.

### Solution

On IGEL Linux 5.08.100 and newer or IGEL Linux 10.01.100 and newer, use the pre-installed Screenshot Tool.

On earlier versions:

1. Download the tool [Rapid Screenshot](#)<sup>53</sup>.

 The default download location of local Firefox is `/tmp/`.

2. Open a **Local Terminal** and log in as root.
3. Copy the downloaded `.jar` file from the `/tmp/` directory to `/wfs/screenshot.jar` :  

```
cp /tmp/ /wfs/screenshot.jar
```


It is important to copy the file to `/wfs` because otherwise the file would be flushed with a reboot.

4. Open IGEL setup and create a new **custom application**:  
**System > Firmware Customization > Custom Application**
5. Set **Command** to `java -jar /wfs/screenshot.jar` in **Settings**.
6. Click the new icon on the desktop to run the **custom application**.

To distribute this application to several thin clients use the file transfer option in IGEL UMS and set up a profile with the custom application configuration.

1. HOW TO USE *Easy Screenshot Maker*:
  - a. Start the application.
  - b. Make a screenshot.
  - c. Save the file for example as `test.png`.
2. HOW TO USE *Rapid Screenshot*:
  - a. Start the application.
  - b. Click **Save in** to configure the path to store screenshots.
  - c. Click button **Click**.

The screenshot will be saved automatically as `.jpg`.

 Please note the licenses for both screenshot capture tools mentioned on the websites of these specific tools!

<sup>53</sup> <https://sourceforge.net/projects/screenshot/?source=directory>


## Setting the Device's System Time

### Issue

The thin client's system time is not correct.

### Solution

1. Open the thin client's configuration either locally or in UMS.
2. Go to **System > Time and Date**
3. Choose your **Continent/Area** (e.g. America).
4. Choose your **Location** (e.g. New York).
5. Set time and date
  - a. either manually by clicking **Set time and date**
  - b. or automatically by configuring an **NTP Time Server**.
6. Click **OK** or **Apply** to save your settings.

 Note: If choosing **General** as **Time Zone Area** you have to set your GMT time zone (**Location**) following the POSIX standard (as usual in Linux) - which means you have to invert the offset of your common UTC time zone! (See tool tip for **Location** as well.) Therefore it is preferable to set the system's time zone by choosing the corresponding area and location instead of defining the GMT offset.

Example for America/New York: In POSIX standard **GMT+5** is the time zone **5 hours west** of Greenwich and corresponds to **UTC-5**

#### Legal Note

IGEL's [Terms & Conditions](https://www.igel.com/terms-conditions/)<sup>54</sup> apply.

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<sup>54</sup> <https://www.igel.com/terms-conditions/>

## Updating Timezone Information (Daylight Saving Time, DST)

### Symptom

The device is showing an incorrect time of day for your location, although you have set the correct time zone.

### Problem

The time zone or the regulation for Daylight Saving Time (DST) for your location has changed.

### Solution

Update the time zone information files via IGEL Universal Management Suite (UMS). This is known to work for

- IGEL Linux version 10.01.100 or newer
- IGEL Linux version 5.04.100 or newer
- IGEL Linux version 4.14.100 or newer
- IGEL Linux ARM version 1.09.100 or newer.

Retrieving current time zone information files:

#### On Windows

- Use your web browser to download the following package files:
  - <http://packages.ubuntu.com/xenial-updates/all/tzdata/download> for IGEL Linux version 10.x
  - <http://packages.ubuntu.com/trusty-updates/all/tzdata/download> (for IGEL Linux version 5.x)
  - <http://packages.ubuntu.com/precise-updates/all/tzdata/download> (for IGEL Linux version 4.x)
- Extract the package contents using the program 7-Zip (freely available from <http://www.7-zip.org>).
- Find the file for your location in the extracted directory in `usr/share/zoneinfo/`, e.g. `usr/share/zoneinfo/Africa/Casablanca` for Morocco.

#### On Linux

- Update your system time zone information with these commands: `sudo apt-get update`  
`sudo apt-get install tzdata`

- Find the file for your location in the system directory `/usr/share/zoneinfo/`, e.g. `/usr/share/zoneinfo/Africa/Casablanca` for Morocco.

#### Distributing the files from IGEL Universal Management Suite

- Select **System > New > New File** from the UMS Console menu bar or go to **Files** in the tree structure and select **New File** from the context menu.
- Select the time zone file for your location under **Local File**.
- Select **Undefined** under **Classification**.
- Specify `/wfs/zoneinfo/` as the **Devices file location**.
- Set the **Access rights** to Read and Write for the Owner, and to Read for Others.
- Select Root as the **Owner**.
- Click **OK** to confirm the settings.



### New file ✕

**File source**

Upload local file to UMS server

Local file

Upload location (URL)

Select file from UMS server

File location (URL)

**File target**

Classification

Devices file location

**Access rights**

	Read	Write	Execute
Owner	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Others	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Owner	<input type="text" value="Root"/>		

On a device, you can verify the transfer and activation of the new time zone information files:

- In the **Local Terminal**, enter `grep 'timezone_config' /var/log/messages`

i On IGEL Linux version 10.x, use: `journalctl | grep 'timezone_config'`

- The output should look like the following:
 

```
Feb 27 11:28:13 (none) timezone_config: loading /wfs/zoneinfo/
Casablanca to /usr/share/zoneinfo/Africa/Casablanca
Feb 27 11:28:13 (none) timezone_config: loading /wfs/zoneinfo/
Casablanca to /usr/share/zoneinfo/posix/Africa/Casablanca
```

```
Feb 27 11:28:13 (none) timezone_config: configure timezone Africa/  
Casablanca
```

## Adding or Changing a MIME Type Handler

### Symptom

Files or protocols are opened with the wrong application.

### Problem

The MIME type handler for the file type or the protocol is missing or misconfigured.

### Solution

Change the MIME type handler or add a new one.

MIME type handlers are defined by `*.desktop` files in the `/usr/share/applications/mime/` directory.

To add a new `*.desktop` file, use the following sample and edit it according to your needs:

```
[Desktop Entry]
Version=1.0
Encoding=UTF-8
Type=Application
Name=Browser//A name for the MIME type handler
Categories=Application
Exec=/usr/bin/firefox %u//The binary to execute on opening an associated file
MimeType=x-scheme-handler/http;x-scheme-handler/https;text/html;application/
xhtml+xml;//A list of MIME types separated by semicolon
Terminal=false
StartupNotify=false
NoDisplay=true
```

You can find out more about `*.desktop` files in a [specification at freedesktop.org](https://freedesktop.org) (see page 683).

These are the default handlers on IGEL Linux:Images (opened via gpicview)

- image/bmp;
- image/gif;
- image/jpeg;
- image/jpg;
- image/png;
- image/x-bmp;

- image/x-pcx;
- image/x-tga;
- image/x-portable-pixmap;
- image/x-portable-bitmap;
- image/x-targa;
- image/x-portable-greymap;
- application/pcx;
- image/svg+xml;
- image/svg+xml;

Videos and Music (opened via `/services/mplr/bin/mediaplayer` )

Note that `/services/mplr/bin/mediaplayer` calls either `/config/sessions/mediaplayer0` if existent or `totem` if this is not the case

- application/mxf;
- application/ogg;
- application/ram;
- application/sdp;
- application/smil;
- application/smil+xml;
- application/vnd.ms-wpl;
- application/vnd.rn-realmedia;
- application/x-extension-m4a;
- application/x-extension-mp4;
- application/x-flac;
- application/x-flash-video;
- application/x-matroska;
- application/x-netshow-channel;
- application/x-ogg;
- application/x-quicktime-media-link;
- application/x-quicktimeplayer;
- application/x-shorten;
- application/x-smil;
- application/xspf+xml;
- audio/3gpp;
- audio/ac3;
- audio/AMR;
- audio/AMR-WB;
- audio/basic;
- audio/midi;
- audio/mp4;
- audio/mpeg;
- audio/mpegurl;
- audio/ogg;
- audio/prs.sid;

- audio/vnd.rn-realaudio;
- audio/x-ape;
- audio/x-flac;
- audio/x-gsm;
- audio/x-it;
- audio/x-m4a;
- audio/x-matroska;
- audio/x-mod;
- audio/x-mp3;
- audio/x-mpeg;
- audio/x-mpegurl;
- audio/x-ms-asf;
- audio/x-ms-asx;
- audio/x-ms-wax;
- audio/x-ms-wma;
- audio/x-musepack;
- audio/x-pn-aiff;
- audio/x-pn-au;
- audio/x-pn-realaudio;
- audio/x-pn-realaudio-plugin;
- audio/x-pn-wav;
- audio/x-pn-windows-acm;
- audio/x-realaudio;
- audio/x-real-audio;
- audio/x-sbc;
- audio/x-scpls;
- audio/x-speex;
- audio/x-tta;
- audio/x-wav;
- audio/x-wavpack;
- audio/x-vorbis;
- audio/x-vorbis+ogg;
- audio/x-xm;
- image/vnd.rn-realpixmap;
- image/x-pict;
- misc/ultravox;
- text/google-video-pointer;
- text/x-google-video-pointer;
- video/3gpp;
- video/dv;
- video/fli;
- video/flv;
- video/mp4;
- video/mp4v-es;
- video/mpeg;
- video/msvideo;
- video/ogg;

- video/quicktime;
- video/vivo;
- video/vnd.divx;
- video/vnd.rn-realvideo;
- video/vnd.vivo;
- video/x-anim;
- video/x-avi;
- video/x-flc;
- video/x-fli;
- video/x-flic;
- video/x-flv;
- video/x-m4v;
- video/x-matroska;
- video/x-mpeg;
- video/x-ms-asf;
- video/x-ms-asx;
- video/x-msvideo;
- video/x-ms-wm;
- video/x-ms-wmv;
- video/x-ms-wmx;
- video/x-ms-wvx;
- video/x-nsv;
- video/x-ogm+ogg;
- video/x-theora+ogg;
- video/x-totem-stream;
- x-content/video-dvd;
- x-content/video-vcd;
- x-content/video-svcd;

Documents (opened via `/usr/bin/evince` )

- application/pdf;
- image/tiff

Web (opened via `/usr/bin/firefox -remote` )

- x-scheme-handler/http;
- x-scheme-handler/https;
- text/html;
- application/xhtml+xml;

## Regional Settings in Sessions

### Symptom

If you set a certain keyboard language it has no effect on the regional settings.

### Problem

In the *IGEL* setup there are several input fields for regional settings. You would like to understand which setting has what effect in the sessions.


### Solution

Defining general regional settings:

- ▶ Go to **IGEL Setup > User Interface > Language**.
  - **Language:** Select one of the languages offered for the graphical user interface.
  - **Keyboard Layout:** Select the country-specific assignment of keys, e.g. English(US).
  - **Input Language:** Set the language you are going to write in, e.g. English(Australia).
  - **Standards and Formats:** Select country-specific formats, e.g. for date and time or currency.

Defining session-specific regional settings:

- ▶ Go to the settings of your session, e.g. Citrix: **IGEL Setup > Sessions > Citrix > Citrix Global > Keyboard**.

 The default settings are those you defined under **User Interface > Language**.

- ▶ Specify **Keyboard Layout** and **Input Language** for your Citrix Session.

## Devices

- [Monitor](#) (see page 689)
- [Webcam Redirection and Optimization](#) (see page 708)
- [Webcam Information](#) (see page 719)
- [Bluetooth Tool](#) (see page 721)
- [How to Deploy a Jabra Xpress Package](#) (see page 726)
- [Connecting Signature Pads](#) (see page 730)
- [Using a Kofax / Wacom Signature Pad](#) (see page 731)
- [Using a StepOver Signature Pad](#) (see page 732)
- [eGK/KVK - Card Reader](#) (see page 738)
- [Using Mobile Device Access](#) (see page 746)
- [Swapping Function of Mouse Buttons \(e.g. When Using an Evoluent Mouse\)](#) (see page 755)
- [Using Natural Scrolling \(reverse Scrolling Direction\)](#) (see page 757)
- [Connecting a Serial Barcode Scanner](#) (see page 758)
- [Using DriveLock with IGEL Devices](#) (see page 760)
- [Restricting the Mounting of Hotplug Storage Devices on IGEL Linux](#) (see page 761)
- [When to Use USB Redirection](#) (see page 762)
- [How to Configure USB Access Control](#) (see page 766)
- [Issues with USB IDs in USB Devices Rules](#) (see page 769)
- [Powerterm Session: USB scanner issues after update to LX 5.07.100](#) (see page 771)




## Monitor

- [Touchscreen Calibration](#) (see page 690)
- [Touchscreen in Multimonitor Environment](#) (see page 703)
- [Solving Hotplugging Issues with DisplayPort Monitors](#) (see page 704)
- [No Sound When Using a DisplayPort Monitor](#) (see page 705)
- [Connecting Three DVI Monitors to UD7 with Passive DisplayPort Adapters](#) (see page 707)

## Touchscreen Calibration

For setting up a touchscreen, you have to enable the touchscreen function and select a specific touchscreen driver.

 The initial configuration should take place with a mouse and keyboard connected to ensure that you can open the setup and navigate within it.

To set up a touchscreen:

1. In IGEL Setup, go to **User Interface > Input > Touchscreen**.
2. Activate **Enable touchscreen**.
3. Select your touchscreen driver under **Touchscreen type**.

Depending on the selected driver, you have different configuration options. For further information, click the appropriate link:

- [EvTouch \(USB\)](#) (see page 691)
- [eGalax](#) (see page 695)
- [Elo Multitouch \(USB\)](#) (see page 697)
- [Elo Singletouch \(USB\)](#) (see page 699)
- [TSHARC \(USB\)](#) (see page 701)

## EvTouch (USB)

## Supported Devices

Supported touch monitors and touchscreen controllers:

Vendor	Product	Name
0x16FD	0x5453	Reakin, TS2005F USB TouchController
0x7374	0x0001	
0x04E7	0x0020	Elo TouchSystems, Touchscreen Interface (2700)
0x1870	0x0001	Nexio Co., Ltd, iNexio Touchscreen controller
0x10F0	0x2002	Nexio Co., Ltd, iNexio Touchscreen controller
0x0664	0x0306	ET&T Technology Co., Ltd., Groovy Technology Corp. GTouch Touch Screen
0x0664	0x0309	ET&T Technology Co., Ltd. Groovy Technology Corp. GTouch Touch Screen
0x14C8	0x0003	Zytronic, Unknown device
0x1AC7	0x0001	
0x0F92	0x0001	
0x08F2	0x00F4	Gotop Information Inc., Unknown device
0x08F2	0x00CE	Gotop Information Inc., Unknown device
0x08F2	0x007F	Gotop Information Inc., Super Q2 Tablet
0x0DFC	0x0001	GeneralTouch Technology Co., Ltd, Touchscreen
0x1391	0x1000	IdealTEK, Inc., URTC-1000
0x6615	0x0001	IRTOUCHSYSTEMS Co. Ltd., Touchscreen
0x595A	0x0001	IRTOUCHSYSTEMS Co. Ltd., Touchscreen
0x0AFA	0x03E8	
0x0637	0x0001	
0x1234	0x5678	Brain Actuated Technologies, Unknown device
0x16E3	0xF9E9	
0x0403	0xF9E9	Future Technology Devices International, Ltd, Unknown device

Vendor	Product	Name
0x0596	0x0001	MicroTouch Systems, Inc., Touchscreen
0x134C	0x0004	PanJit International Inc., Touch Panel Controller
0x134C	0x0003	PanJit International Inc., Touch Panel Controller
0x134C	0x0002	PanJit International Inc., Touch Panel Controller
0x134C	0x0001	PanJit International Inc., Touch Panel Controller
0x1234	0x0002	Brain Actuated Technologies, Unknown device
0x1234	0x0001	Brain Actuated Technologies Unknown device
0x0EEF	0x0002	D-WAV Scientific Co., Ltd, Touchscreen Controller(Professional)
0x0EEF	0x0001	D-WAV Scientific Co., Ltd, eGalax TouchScreen
0x0123	0x0001	
0x3823	0x0002	
0x3823	0x0001	

Setup Parameters

- **Touchscreen type**  
More

<b>IGEL Setup &gt; User Interface &gt; Input &gt; Touchscreen</b>		
> <b>Touchscreen type</b>	userinterface.touchscreen.driver	

- **Swap X and Y values**  
More

<b>IGEL Setup &gt; User Interface &gt; Input &gt; Touchscreen</b>		
> <b>Swap X and Y values</b>	userinterface.touchscreen.swapxy	enabled / <u>disabled</u>

- **Set driver specific defaults** for resetting calibration values.

Calibration / Reset

Calibrating the touchscreen:

1. Go to **IGEL Setup > User Interface > Input > Touchscreen**.
2. Set **Touchscreen already calibrated** to 'false'.

**More**

IGEL Setup > User Interface > Touchscreen		
> <b>Touchscreen already calibrated</b>	userinterface.touchscreen.calibrated	enabled / <a href="#">disabled</a>

3. Set **Touchscreen type** to **EvTouch (USB)**.

**More**

IGEL Setup > User Interface > Input > Touchscreen		
> <b>Touchscreen type</b>	userinterface.touchscreen.driver	

4. Reboot the device or click **IGEL Setup > Accessories > Touchscreen Calibration** to use the IGEL touchscreen calibration tool.

This will call the `xinput_calibrator` calibration tool which is located at `/usr/bin/xinput_calibrator`. The calibration parameter will be saved in IGEL setup.

#### Hold-to-Right-Click Feature

To activate the feature:

1. Enable the option **Emulate right button** under **User Interface > Input > Touchscreen**.

**More**

IGEL Setup > User Interface > Input > Touchscreen		
> <b>Emulate right button</b>	userinterface.touchscreen.emulatethirdbutton	enabled / <a href="#">disabled</a>

2. Set under **Right button timeout** the time after which right-click is generated.

**More**

IGEL Setup > User Interface > Input > Touchscreen		
> <b>Right button timeout</b>	userinterface.touchscreen.emulatethirdbuttontimeout	Default: <u>1000</u> <u>msec</u>

### Multimonitor

Multimonitor configuration is not supported.

## eGalax

## Supported Devices

EETI eGalax eMPIA USB touchscreens.

## Setup Parameters

- **Touchscreen type**  
**More**

<b>IGEL Setup &gt; User Interface &gt; Input &gt; Touchscreen</b>		
<b>&gt; Touchscreen type</b>	userinterface.touchscreen.driver	

## Calibration / Reset

Calibrating the touchscreen:

1. Go to **IGEL Setup > User Interface > Input > Touchscreen**.
2. Set **Touchscreen already calibrated** to 'false'.  
**More**

<b>IGEL Setup &gt; User Interface &gt; Touchscreen</b>		
<b>&gt; Touchscreen already calibrated</b>	userinterface.touchscreen.calibrated	enabled / <u>disabled</u>

3. Set **Touchscreen type** to **eGalax**.  
**More**

<b>IGEL Setup &gt; User Interface &gt; Input &gt; Touchscreen</b>		
<b>&gt; Touchscreen type</b>	userinterface.touchscreen.driver	

4. Reboot the device or click **IGEL Setup > Accessories > Touchscreen Calibration** to use the IGEL touchscreen calibration tool.  
This will call the proprietary EETI calibration tool, which is located at `/usr/bin/eCalib`. The calibration parameter will be saved in `/wfs/egtouch.d`.

Hold-to-Right-Click Feature

To activate the feature:

1. Enable the option **Emulate right button** under **User Interface > Input > Touchscreen**.  
**More**

<b>IGEL Setup &gt; User Interface &gt; Input &gt; Touchscreen</b>		
<b>&gt; Emulate right button</b>	userinterface.touchscreen.emulatethirdbutton	enabled / <u>disabled</u>

2. Set under **Right button timeout** the time after which right-click is generated.  
**More**

<b>IGEL Setup &gt; User Interface &gt; Input &gt; Touchscreen</b>		
<b>&gt; Right button timeout</b>	userinterface.touchscreen.emulatethirdbuttontimeout	Default: <u>1000 msec</u>

Multimonitor

Multimonitor configuration is not supported.



## Elo Multitouch (USB)

### Supported Devices

IntelliTouch Plus/iTouch Plus 2515-07(non HID), 2521 (HID), 2515-00(HID) PCAP 2 touch, 4 touch and 10 touch controllers.

### Setup Parameters

- **Touchscreen type**

**More**

<b>IGEL Setup &gt; User Interface &gt; Input &gt; Touchscreen</b>		
<b>&gt; Touchscreen type</b>	userinterface.touchscreen.driver	

### Calibration / Reset

Calibrating the touchscreen:

1. Go to **IGEL Setup > User Interface > Input > Touchscreen**.
2. Set **Touchscreen already calibrated** to 'false'.

**More**

<b>IGEL Setup &gt; User Interface &gt; Touchscreen</b>		
<b>&gt; Touchscreen already calibrated</b>	userinterface.touchscreen.calibrated	enabled / <u>disabled</u>

3. Set **Touchscreen type** to **Elo Multitouch (USB)**.

**More**

<b>IGEL Setup &gt; User Interface &gt; Input &gt; Touchscreen</b>		
<b>&gt; Touchscreen type</b>	userinterface.touchscreen.driver	

4. Reboot the device or click in IGEL Setup **Accessories > Touchscreen Calibration** to use the IGEL touchscreen calibration tool.

This will call the proprietary ELO Multitouch calibration tool which is located at `/etc/opt/`

`elo-mt-usb/elo`. The calibration parameter will be saved in `/wfs/elo-usb.d/MT-USBConfigData`.

### Hold-to-Right-Click Feature

To activate the feature:

1. Enable the option **Emulate right button** under **User Interface > Input > Touchscreen**.  
**More**


IGEL Setup > User Interface > Input > Touchscreen		
> <b>Emulate right button</b>	userinterface.touchscreen.emulatethirdbutton	enabled / <u>disabled</u>

2. Set under **Right button timeout** the time after which right-click is generated.  
**More**

IGEL Setup > User Interface > Input > Touchscreen		
> <b>Right button timeout</b>	userinterface.touchscreen.emulatethirdbuttontimeout	Default: <u>1000 msec</u>

### Multimonitor

Multiple ELO Multitouch (USB) touchscreens on a single IGEL device are supported. Calibration of the second ELO Multitouch USB touchscreen can be done via command line by using: `/etc/opt/elo-mt-usb/elo --videoscreen=2` where 2 is the second ELO Multitouch touchscreen connected to the IGEL device.

 To view a list of video and USB touchscreen devices available for calibration, use the command: `/etc/opt/elo-mt-usb/elo --viewdevices`.

## Elo Singletouch (USB)

### Supported Devices

Elo Smartset USB Controllers:

- IntelliTouch(R) 2701, 2700, 2600, 2500U
- CarrollTouch(R) 4500U, 4000U
- Accutouch(R) 2216, 3000U, 2218
- Surface Capacitive 5020, 5010, 5000
- Accoustic Pulse Recognition(APR) Smartset 7010
- Other Elo Smartset USB controllers

### Setup Parameters

#### Touchscreen type

**More**

<b>IGEL Setup &gt; User Interface &gt; Input &gt; Touchscreen</b>		
<b>&gt; Touchscreen type</b>	userinterface.touchscreen.driver	

### Calibration / Reset

Calibrating the touchscreen:

1. Go to **IGEL Setup > User Interface > Input > Touchscreen**.
2. Set **Touchscreen already calibrated** to 'false'.

**More**

<b>IGEL Setup &gt; User Interface &gt; Touchscreen</b>		
<b>&gt; Touchscreen already calibrated</b>	userinterface.touchscreen.calibrated	enabled / <u>disabled</u>

3. Set **Touchscreen type** to **Elo Singletouch (USB)**.

**More**

<b>IGEL Setup &gt; User Interface &gt; Input &gt; Touchscreen</b>		
<b>&gt; Touchscreen type</b>	userinterface.touchscreen.driver	

4. Reboot the device or click in IGEL Setup **Accessories > Touchscreen Calibration** to use the IGEL touchscreen calibration tool.


This will call the proprietary ELO Singletouch calibration tool which is located at `/etc/opt/e1o-usb/e1ova` . The calibration parameter will be saved in `/wfs/e1o-usb.d/USBConfigData` .

#### Hold-to-Right-Click Feature

The feature is not supported.

#### Multimonitor

Multiple ELO Singletouch USB touchscreens on a single IGEL device are supported. Calibration of the second ELO Singletouch USB touchscreen can be done via command line by using: `/etc/opt/e1o-usb/e1ova --videoscreen=2` where 2 is the second ELO Singletouch USB touchscreen connected to the IGEL device.

 To view a list of video and USB touchscreen devices available for calibration, use the command: `/etc/opt/e1o-usb/e1ova --viewdevices` .

## TSHARC (USB)

### Supported Devices

Hampshire TSHARC USB touchscreens.

### Setup Parameters

- **Touchscreen type**  
**More**

<b>IGEL Setup &gt; User Interface &gt; Input &gt; Touchscreen</b>		
<b>&gt; Touchscreen type</b>	userinterface.touchscreen.driver	

### Calibration / Reset

Calibrating the touchscreen:

1. Go to **IGEL Setup > User Interface > Input > Touchscreen**.
2. Disable **Touchscreen already calibrated**.  
**More**

<b>IGEL Setup &gt; User Interface &gt; Touchscreen</b>		
<b>&gt; Touchscreen already calibrated</b>	userinterface.touchscreen.calibrated	enabled / <u>disabled</u>

3. Set **Touchscreen type** to **TSharc**.  
**More**

<b>IGEL Setup &gt; User Interface &gt; Input &gt; Touchscreen</b>		
<b>&gt; Touchscreen type</b>	userinterface.touchscreen.driver	

4. Reboot the device or click **IGEL Setup > Accessories > Touchscreen Calibration** to use the IGEL touchscreen calibration tool.  
This will call the proprietary Hampshire calibration tool, which is located at `/usr/bin/tscal`.  
The calibration parameter will be saved in `/wfs/tsharc.d`.

Hold-to-Right-Click Feature

To activate the feature:

1. Enable the option **Emulate right button** under **User Interface > Input > Touchscreen**.  
**More**

<b>IGEL Setup &gt; User Interface &gt; Input &gt; Touchscreen</b>		
<b>&gt; Emulate right button</b>	userinterface.touchscreen.emulatethirdbutton	enabled / disabled

2. Set under **Right button timeout** the time after which right-click is generated.  
**More**

<b>IGEL Setup &gt; User interface &gt; Input &gt; Touchscreen</b>		
<b>&gt; Right button timeout</b>	userinterface.touchscreen.emulatethirdbuttontimeout	Default: <u>1000</u> msec

Multimonitor

Multimonitor configuration is not supported.

## Touchscreen in Multimonitor Environment

### Symptom

You are using a touchscreen in a multimonitor environment. In this case, it can happen that the touchscreen coordinate matrix expands over both monitors, with the result that the monitor interprets the touch point in a wrong way.

### Problem

You touch the touchscreen in its center and the cursor moves between the two screens.

### Solution

To avoid the unrequested expansion of the touchscreen matrix you have to select the correct touchscreen connection type in the setup:

1. Click **User Interface > Input > Touchscreen** in the IGEL setup.
2. Select the correct connection type under **Multi Monitor > Touchscreen Monitor**.

## Solving Hotplugging Issues with DisplayPort Monitors

### Symptom

On IGEL Linux, in a dual view configuration, the following problem occurs: If a monitor connected via DisplayPort is only switched on after booting the device, it will remain black.

### Problem

The DisplayPort standard allows for a powered-off monitor to be undetectable by the graphics card.

### Solution

The following checks whether a monitor contained in the configuration is missing (i.e. powered off) and makes it usable as soon as it appears (i.e. is powered on):

1. If you are using IGEL Linux 5, make sure you are running version 5.10.410 or newer.  
If you are using IGEL Linux 10 you do not need to upgrade.
2. In Setup, go to **System > Registry > Parameter >**  
`session.user_display%.options.enhanced_hotplug`
3. Make sure the parameter is set to `true` (default).

**i** There is another setting you can use if you do not want IGEL Linux to change the display settings every time a DisplayPort monitor is switched on/off:

- Go to **System > Registry > Parameter >**  
`sessions.user_display%.options.disable_hotplug`
- Set it to **DP\_Disconnect\_Only**.



## No Sound When Using a DisplayPort Monitor

### Symptom

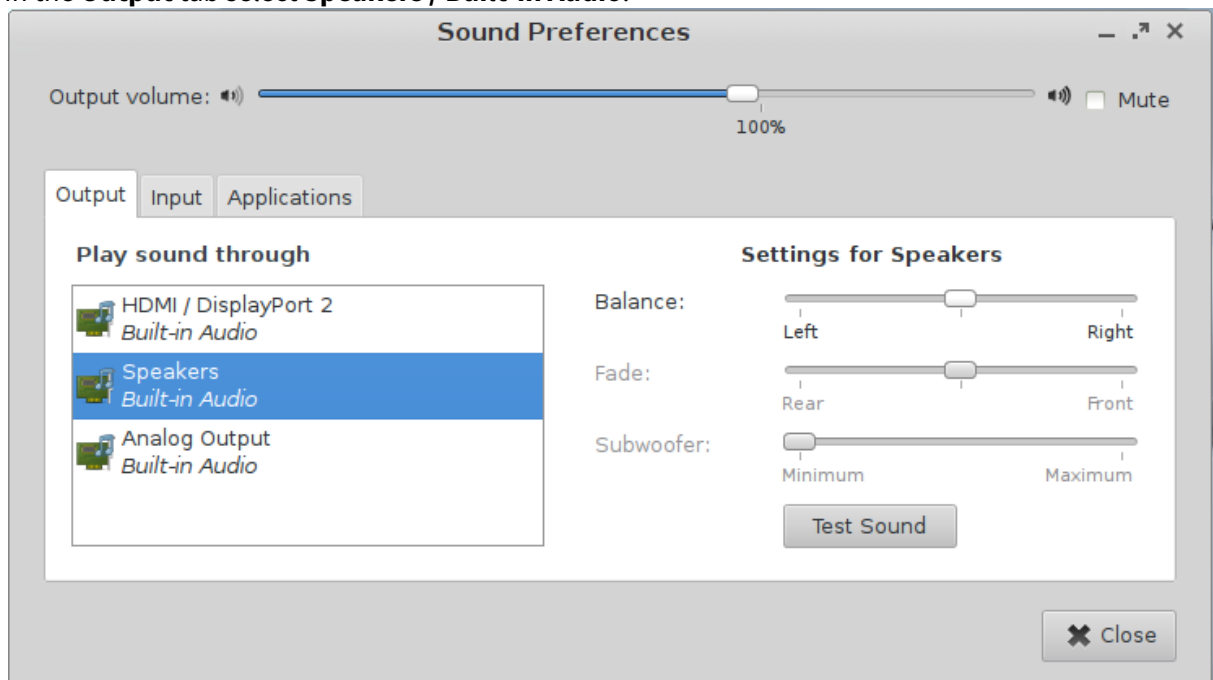
You do not hear any sound from your *IGEL UD5* or *UD6* device. You are using a monitor connected via DisplayPort.

### Problem

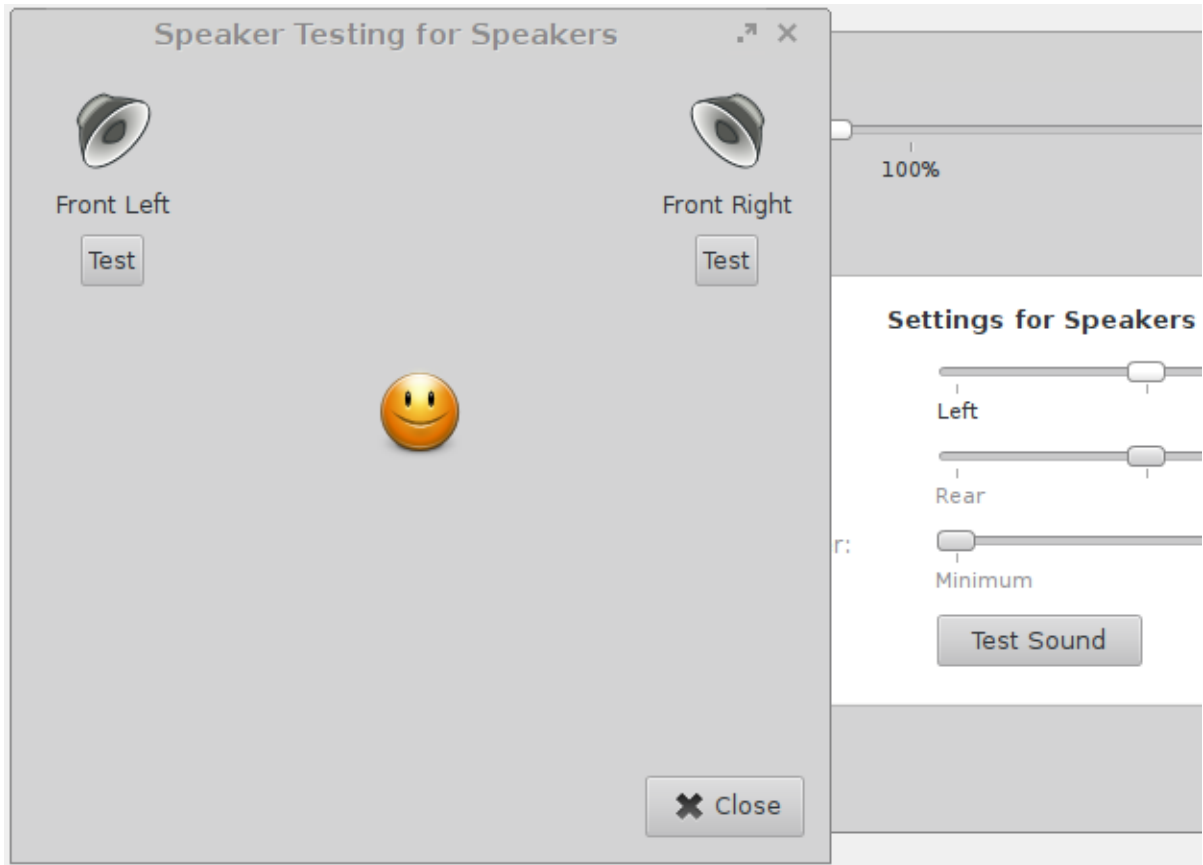
Some DisplayPort monitors misleadingly report support for display audio although they do not have loudspeakers. Therefore *IGEL Linux* will try to play back audio via the monitor.

### Solution

1. Right-click on the loudspeaker icon in the panel and open **Sound Preferences**.
2. In the **Output** tab select **Speakers / Built-in Audio**.



3. Click **Test Sound** to test the new setting. Check if you hear a voice saying "Front Left" and "Front Right" on the device speakers.




## Connecting Three DVI Monitors to UD7 with Passive DisplayPort Adapters

### Problem

When three DVI monitors are connected to a UD7 thin client over passive DisplayPort adapters, only one or two monitors are detected.

### Solution

 This solution is only persistent if energy saving is switched off.

1. Open the thin client's Setup.
2. Go to **System > Registry > x > xserver0 > force\_reconfig** (Registry key: `x.xserver0.force_reconfig`) and set the value to **never**.
3. Click **Ok** to save the setting and close the Setup.
4. Restart the device.  
All three monitors should be detected.

## Webcam Redirection and Optimization

### Overview

This article provides an overview and best-practice recommendations for the use of webcams on IGEL OS within remote sessions such as Citrix, VMware Horizon, and RDP.

In general, webcam support on IGEL OS can be divided into three categories:

Unoptimized	<p>The raw data from the webcam is sent over the network via USB redirection. The raw data from the webcam is highly affected by network latency between the client and the server and takes up a lot of bandwidth, requires the correct drivers on the server-side, increases the server's CPU and RAM load.</p> <p>Example: <b>Native USB Redirection</b> for RDP sessions</p>
Optimization type 1	<p>In this case, the video and audio data is compressed on the client side. This optimization type makes the webcam stream far more efficient and reliable, although the data stream must still pass via the VDI server in addition to the cloud servers of the particular communication software (Teams, Zoom, etc.).</p> <p>Examples: <b>HDX RealTime Webcam redirection</b> for Citrix sessions, <b>Real Time Audio Video (RTAV)</b> for VMware Horizon sessions</p>
Optimization type 2	<p>In this case, the video and audio data is also compressed on the client side. However, unlike type 1, this optimization type offloads the data stream from the VDI server and sends it <i>directly</i> to Teams/Zoom/etc. in the cloud, i.e. "single-hop". This allows for the best performance and also removes the server load, but relies on the correct optimization pack being present on the client and is specific to each communication suite. It may also require a more complex network configuration because the endpoint has to be able to communicate directly with the communication cloud server and not only the VDI server.</p> <p>Examples: <b>Microsoft Teams optimization</b> and <b>Zoom Media plugin</b> for Citrix sessions</p>



In the case of optimization type 1 or type 2, it is important to ensure that the agent/component on the server side is installed and is compatible with the client-side version. For details on the latter, see the "Component Versions" section of the IGEL OS release notes.

## General Recommendations

For optimal performance of webcams on IGEL OS, the correct optimization pack has to be enabled for the specific application, e.g. **Microsoft Teams optimization**, **Zoom Media plugin**, **Cisco Webex Teams VDI**, etc. However, optimization packs are not available for all session types.

### ⚠️ USB Redirection

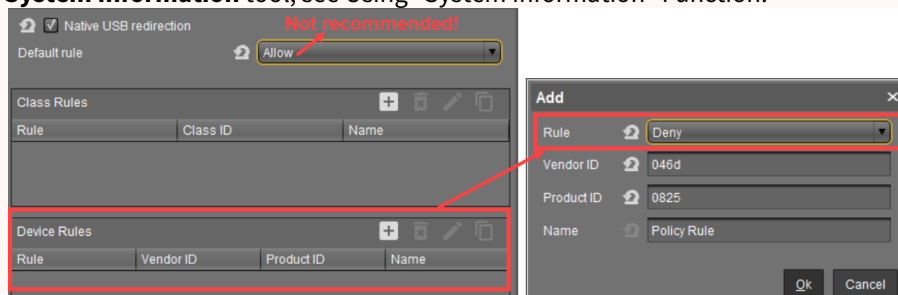
If no optimization pack exists for your session type or the optimization pack available does not function correctly, you can try to use USB redirection – either the **Native USB Redirection** or the less frequently used **Fabulatech USB Redirection** (not both together), – but **ONLY** as a LAST RESORT, when no other solution is possible.

In general, where USB redirection is available as an option inside the VDI session options, it should be disabled for the webcam devices.

- Set **Default rule** to **Deny**
- OR, if the **Default rule** is **Allow** (NOT recommended), go to **Device Rules** and add **Deny** rules for the specific Vendor ID and Product ID of the webcam.

#### How to Find Out Vendor and Product IDs

To get Vendor/Product IDs, use the command `lsusb` in the terminal. You can also use the **System Information** tool, see Using “System Information” Function.



This is necessary because USB redirection will block the webcam from being correctly optimized (if optimization is possible).

⚠️ Do not forget to check and adjust settings and policies on the server side. Otherwise, your webcam may not work, even if all settings in the IGEL OS are configured correctly.

✅ Always check the IGEL OS release notes for specific remarks, especially in the case of private builds. Always try to use the latest firmware, see [IGEL download server](https://www.igel.com/software-downloads/workspace-edition/)<sup>55</sup>.

ℹ️ In certain cases, some of the settings described later on in this article may not be visible even though you have selected the correct firmware version for the profile in the UMS. In this case, update the UMS to the latest version.

<sup>55</sup> <https://www.igel.com/software-downloads/workspace-edition/>

## Citrix

Option 1: **Unified Communications** (Best Choice)

<b>Microsoft Teams Optimization</b>	<p>Path: <b>Sessions &gt; Citrix &gt; Citrix Global &gt; Unified Communications &gt; VDI Solutions &gt; <a href="#">Microsoft Teams optimization</a></b> (see page 708) (enabled by default)</p> <ul style="list-style-type: none"> <li>• Available as of IGEL OS version 11.04.100.</li> <li>• Depends on the version of Citrix Workspace App used. For best results, the latest version should be preferred. For the Citrix Workspace App versions included, see IGEL OS release notes.</li> </ul> <p>For server-side requirements for Microsoft Teams optimization, see <a href="#">Microsoft Teams installation</a><sup>56</sup>.</p> <p>To troubleshoot Microsoft Teams optimization in Citrix, see:</p> <ul style="list-style-type: none"> <li>• <a href="#">Troubleshooting HDX Optimization for Microsoft Teams</a><sup>57</sup></li> <li>• <a href="#">Peripherals in Microsoft Teams</a><sup>58</sup></li> </ul>
<b>Zoom Media Plugin</b>	<p>Path: <b>Sessions &gt; Citrix &gt; Citrix Global &gt; Unified Communications &gt; VDI Solutions &gt; <a href="#">Zoom Media Plugin</a></b> (see page 708)</p> <ul style="list-style-type: none"> <li>• Available as of IGEL OS version 11.04.100</li> <li>• For the Zoom Media Plugin versions included, see IGEL OS release notes.</li> </ul> <p>For more information about Zoom Media Plugin, including server-side requirements, see <a href="#">Getting started with VDI</a><sup>59</sup>.</p>

<sup>56</sup> <https://docs.citrix.com/en-us/citrix-virtual-apps-desktops/multimedia/opt-ms-teams.html#microsoft-teams-installation>

<sup>57</sup> <https://support.citrix.com/article/CTX253754>

<sup>58</sup> <https://docs.citrix.com/en-us/citrix-virtual-apps-desktops/multimedia/opt-ms-teams.html#peripherals-in-microsoft-teams>

<sup>59</sup> <https://support.zoom.us/hc/en-us/articles/360031096531-Getting-Started-with-VDI>

<b>Cisco Webex Meetings / Teams VDI</b>	<p>Path: <b>Sessions &gt; Citrix &gt; Citrix Global &gt; Unified Communications &gt; Cisco &gt; Cisco Webex Meetings VDI or Cisco Webex Teams VDI</b></p> <ul style="list-style-type: none"> <li>• Available as of IGEL OS version 11.04.100</li> <li>• For the Cisco Webex Meetings / Teams VDI versions included, see IGEL OS release notes.</li> </ul> <p>For more information about Cisco Webex products for VDI, including supported environments, see:</p> <ul style="list-style-type: none"> <li>• <a href="#">Cisco Webex Meetings Virtual Desktop Software</a><sup>60</sup></li> <li>• <a href="#">Overview of Webex Teams for VDI</a><sup>61</sup></li> </ul>
<b>Cisco JVDI Client</b>	<p>Path: <b>Sessions &gt; Citrix &gt; Citrix Global &gt; Unified Communications &gt; Cisco &gt; Cisco JVDI client</b></p> <ul style="list-style-type: none"> <li>• For the Cisco JVDI client versions included, see IGEL OS release notes.</li> </ul> <p>For more information about Cisco JVDI client, see <a href="#">Deployment and Installation Guide for Cisco Jabber Softphone for VDI</a><sup>62</sup>.</p>
<b>Skype for Business</b>	<p>Path: <b>Sessions &gt; Citrix &gt; Citrix Global &gt; Unified Communications &gt; Skype for Business &gt; HDX RealTime Media Engine</b> (enabled by default)</p> <ul style="list-style-type: none"> <li>• Skype for Business webcam redirection relies on the <b>Citrix HDX Realtime Media Engine</b> (client-side counterpart to the Lync Optimization Pack).</li> <li>• This setting is the same as <b>Sessions &gt; Citrix &gt; Citrix Global &gt; HDX Multimedia &gt; HDX RealTime Media Engine</b>.</li> </ul> <div style="border: 1px solid red; padding: 5px; margin-top: 10px;"> <p><b>!</b> <b>IMPORTANT:</b> <a href="#">Skype for Business Online</a> will be retired by Microsoft on July 31, 2021<sup>63</sup>. After this, it will no longer be available, and Microsoft Teams must be used instead.</p> </div>

<sup>60</sup> <https://help.webex.com/en-us/nfjsqzbb/Cisco-Webex-Meetings-Virtual-Desktop-Software>

<sup>61</sup> [https://www.cisco.com/c/en/us/td/docs/voice\\_ip\\_comm/cloudCollaboration/wbxt/vdi/wbx-teams-vdi-deployment-guide/wbx-teams-vdi-deployment-wbx-calling-EFT\\_chapter\\_00.html](https://www.cisco.com/c/en/us/td/docs/voice_ip_comm/cloudCollaboration/wbxt/vdi/wbx-teams-vdi-deployment-guide/wbx-teams-vdi-deployment-wbx-calling-EFT_chapter_00.html)

<sup>62</sup> [https://www.cisco.com/c/en/us/td/docs/voice\\_ip\\_comm/jvdi/12\\_9/dig/jvdi\\_b\\_deploy-install-jvdi-12-9/jvdi\\_b\\_deploy-install-jvdi-12-9\\_chapter\\_01.html](https://www.cisco.com/c/en/us/td/docs/voice_ip_comm/jvdi/12_9/dig/jvdi_b_deploy-install-jvdi-12-9/jvdi_b_deploy-install-jvdi-12-9_chapter_01.html)

<sup>63</sup> <https://techcommunity.microsoft.com/t5/microsoft-teams-blog/skype-for-business-online-to-be-retired-in-2021/ba-p/777833>

## Option 2: HDX RealTime Webcam Redirection (Should Only Be Used If Optimization Packs under Option 1 Are Not Applicable)

For other VDI programs which require the use of a webcam (e.g. the browser), HDX RealTime Webcam redirection can be used. This option enables the compression of audio and video on the client side, which is redirected to an HDX virtual webcam on the server side. It also allows for the resolution of the webcam to be defined manually.

**⚠ Only One Option at a Time for a Particular Device**

- **HDX RealTime Webcam redirection** and **HDX RealTime Media Engine** should not be enabled at the same time.
- If you use HDX or an application-specific optimization pack (e.g. **Zoom Media plugin**), **Native USB Redirection / Fabulatech USB Redirection** should be disabled.

Settings on the Server Side	Settings on the Client Side
<p>The following policy settings must be enabled:</p> <ul style="list-style-type: none"> <li>• Multimedia conferencing (enabled by default)</li> <li>• Windows Media Redirection (enabled by default)</li> </ul> <p>For details, see <a href="https://docs.citrix.com/en-us/citrix-virtual-apps-desktops/multimedia/webcam-compression.html">https://docs.citrix.com/en-us/citrix-virtual-apps-desktops/multimedia/webcam-compression.html</a>.</p>	<ol style="list-style-type: none"> <li>1. Go to <b>Sessions &gt; Citrix &gt; Citrix Global &gt; HDX Multimedia</b>.</li> <li>2. Enable <b>Multimedia redirection</b> (enabled by default).</li> <li>3. Enable <b>HDX RealTime Webcam redirection</b>.</li> <li>4. Configure the webcam resolution, 352 x 288 by default, and other settings if required.</li> </ol> <div style="border: 1px solid #f0e68c; padding: 5px; margin: 10px 0;"> <p><b>⚠</b> Certain webcam models may only support specific resolutions. For more information, see <a href="#">How to Configure Webcam settings When Webcams are Not Redirected Through HDX Real-Time</a><sup>64</sup>.</p> </div> <ol style="list-style-type: none"> <li>5. If the USB redirection is enabled (not recommended), use <b>Device Rules</b> to forbid the forwarding of the webcam via USB redirection. See <a href="#">the section above</a> (see page 709).</li> </ol>

### Dependencies

- **HDX RealTime Webcam Redirection** is only supported for 32-bit applications on the server side (limitation of Citrix Receiver/Workspace App for Linux). Deploy a 32-bit browser to verify the webcam redirection online, e.g. [www.webcamtests.com](http://www.webcamtests.com)<sup>65</sup>. See also <https://support.citrix.com/article/CTX223199>.

<sup>64</sup> <https://support.citrix.com/article/CTX134772>


<sup>65</sup> <http://www.webcamtests.com>



- Webcam redirection generally works with or without **HDX RealTime Media Engine (RTME)**. However, to avoid conflicts and for the better performance of webcam redirection, disabling **RTME** (enabled by default) is highly recommended.
- Webcam usage is limited to one application. For instance, when Skype is running with a webcam and GoToMeeting is started, you have to exit Skype to use the webcam with GoToMeeting.

#### Supported Video Conferencing Applications

- Adobe Connect
- Cisco Webex and Webex for Teams (Give preference to the optimization pack for Cisco Webex Meetings / Teams VDI instead, [see above \(see page 710\)](#))
- GoToMeeting
- Google Hangouts and Hangouts Meet
- IBM Sametime
- Microsoft Skype for Business 2015, 2016, and 2019 (Give preference to the optimization pack for Skype for Business instead, [see above \(see page 710\)](#))
- Microsoft Lync 2010 and 2013
- Microsoft Skype 7 or higher
- Media Foundation-based video applications on Windows 8.x or higher and Windows Server 2012 R2 and higher

 **HDX RealTime Webcam Redirection** is NOT supported for Microsoft Teams. Use **Microsoft Teams optimization** instead, [see above \(see page 710\)](#).

#### **Does Webcam Audio Work but Video Doesn't?**

- ▶ Try to increase the graphics memory in the BIOS to 512 MB.

For more detailed information about HDX RealTime Webcam, see:

- <https://support.citrix.com/article/CTX132764>
- <https://docs.citrix.com/en-us/citrix-workspace-app-for-linux/configure-xenapp.html#webcams>

## VMware Horizon


### Option 1 (Best Choice)

<p><b>Zoom Media Plugin</b></p>	<p>Path: <b>System &gt; Registry &gt; vmware &gt; view &gt; vdzoom &gt; enable</b></p> <ul style="list-style-type: none"> <li>• Available as of IGEL OS version 11.04.200</li> <li>• For the Zoom Media Plugin versions included, see IGEL OS release notes.</li> </ul> <div style="border: 1px solid #f0e68c; padding: 5px; margin: 10px 0;"> <p><b>⚠</b> Zoom Media Plugin will NOT function if you enable <b>HTML5 multimedia redirection (System &gt; Registry &gt; vmware &gt; view &gt; html5mmr, disabled by default).</b></p> </div> <p>For more information about Zoom Media Plugin, including server-side requirements, see <a href="#">Getting started with VDI</a><sup>66</sup>.</p>
<p><b>Cisco Webex Teams VDI</b></p>	<p>Path: <b>Sessions &gt; Horizon Client &gt; Horizon Client Global &gt; Unified Communications &gt; Cisco &gt; Cisco Webex Teams VDI</b> (see page 708)</p> <ul style="list-style-type: none"> <li>• Available as of IGEL OS version 11.04.100</li> <li>• For the Cisco Webex Teams VDI versions included, see IGEL OS release notes.</li> </ul> <p>For more information, see <a href="#">Overview of Webex Teams for VDI</a><sup>67</sup>.</p>
<p><b>Cisco JVDI Client</b></p>	<p>Path: <b>Sessions &gt; Horizon Client &gt; Horizon Client Global &gt; Unified Communications &gt; Cisco &gt; Cisco JVDI client</b> (see page 708)</p> <ul style="list-style-type: none"> <li>• For the Cisco JVDI client versions included, see IGEL OS release notes.</li> </ul> <p>For more information about Cisco JVDI client, see <a href="#">Deployment and Installation Guide for Cisco Jabber Softphone for VDI</a><sup>68</sup>.</p>

<sup>66</sup> <https://support.zoom.us/hc/en-us/articles/360031096531-Getting-Started-with-VDI>


<sup>67</sup> [https://www.cisco.com/c/en/us/td/docs/voice\\_ip\\_comm/cloudCollaboration/wbxt/vdi/wbx-teams-vdi-deployment-guide/wbx-teams-vdi-deployment-wbx-calling-EFT\\_chapter\\_00.html](https://www.cisco.com/c/en/us/td/docs/voice_ip_comm/cloudCollaboration/wbxt/vdi/wbx-teams-vdi-deployment-guide/wbx-teams-vdi-deployment-wbx-calling-EFT_chapter_00.html)

<sup>68</sup> [https://www.cisco.com/c/en/us/td/docs/voice\\_ip\\_comm/jvdi/12\\_9/dig/jvdi\\_b\\_deploy-install-jvdi-12-9/jvdi\\_b\\_deploy-install-jvdi-12-9\\_chapter\\_01.html](https://www.cisco.com/c/en/us/td/docs/voice_ip_comm/jvdi/12_9/dig/jvdi_b_deploy-install-jvdi-12-9/jvdi_b_deploy-install-jvdi-12-9_chapter_01.html)

<b>Skype for Business</b>	Path: <b>Sessions &gt; Horizon Client &gt; Horizon Client Global &gt; Unified Communications &gt; Skype for Business &gt; Virtualization Pack Skype for Business</b> (enabled by default) <div style="border: 1px solid red; padding: 5px; margin-top: 10px;">  <b>IMPORTANT:</b> Skype for Business Online will be retired by Microsoft on July 31, 2021<sup>69</sup>. After this, it will no longer be available, and Microsoft Teams must be used instead. </div>
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## Option 2: Real-Time Audio-Video (RTAV)

Real-time Audio-Video (RTAV) is the optimization pack for audio and video calls inside VMware Horizon sessions. RTAV compresses audio and video on the client side and sends it to the Horizon server, where a VMware Virtual Webcam instance is created.

 Like for Citrix sessions, USB redirection should be disabled if RTAV is to be used.

► Enable **Sessions > Horizon Client > Horizon Client Global > Multimedia > Real Time Audio Video (RTAV)**.

 RTAV is only available when connecting via PCoIP or VMware Blast.

 Note that only one webcam will be redirected (limitation of Horizon client for Linux). If multiple webcams are available on the client, the preferred webcam can be defined in the IGEL Setup under **System > Registry > vmware.view.rtav-webcam-id**. For details, see [Select a Preferred Webcam or Microphone on a Linux Client System](#)<sup>70</sup>.

For more information about RTAV, see [Configuring Real-Time Audio-Video](#)<sup>71</sup>.

### Microsoft Teams

Microsoft Teams can be used with RTAV in "Fallback Mode". This configuration is not an optimal solution as the data makes multiple hops between the Horizon client, server, and Microsoft Teams server. For more information, see [Configuring Microsoft Teams with Real-Time Audio-Video](#)<sup>72</sup>.

Microsoft Teams media optimization (single-hop or "Optimized Mode") in Horizon sessions is currently only supported with the Horizon client for Windows 10 in conjunction with Horizon 8 (2006). For more information, see [Microsoft Teams Optimization with VMware Horizon](#)<sup>73</sup>.

<sup>69</sup> <https://techcommunity.microsoft.com/t5/microsoft-teams-blog/skype-for-business-online-to-be-retired-in-2021/ba-p/777833>

<sup>70</sup> <https://docs.vmware.com/en/VMware-Horizon-7/7.9/horizon-remote-desktop-features/GUID-C8C17975-AA1E-4378-A305-00E02FF93201.html>


<sup>71</sup> <https://docs.vmware.com/en/VMware-Horizon-7/7.6/horizon-remote-desktop-features/GUID-D6FD6AD1-D326-4387-A6F0-152C7D844AA0.html>

<sup>72</sup> <https://docs.vmware.com/en/VMware-Horizon/2006/horizon-remote-desktop-features/GUID-E64B3E85-BA1E-4FB7-9DB4-FF9B7B7A892C.html>

<sup>73</sup> <https://techzone.vmware.com/resource/microsoft-teams-optimization-vmware-horizon>

## RDP

There is currently no optimization available for webcam redirection in RDP sessions. It may be possible to redirect webcams via USB redirection, e.g. **Native USB Redirection**. However, each webcam has to be individually tested for if it functions with this method. It often depends on the webcam itself and its Windows driver whether they can cope with the higher latencies that occur with USB redirections compared to the real USB bus.

 In some situations, webcams may not be redirected correctly due to network latency, bandwidth limitations, or the lack of compatible drivers on the server.

### **Unoptimized Webcam Support**

- Note that because USB redirection is not designed for redirecting video devices, the bandwidth usage and server CPU load may increase significantly.
- For this reason, it is recommended to use webcams that output directly H.264 or H.265 streams, and not MJPEG, in order to reduce the data volume.

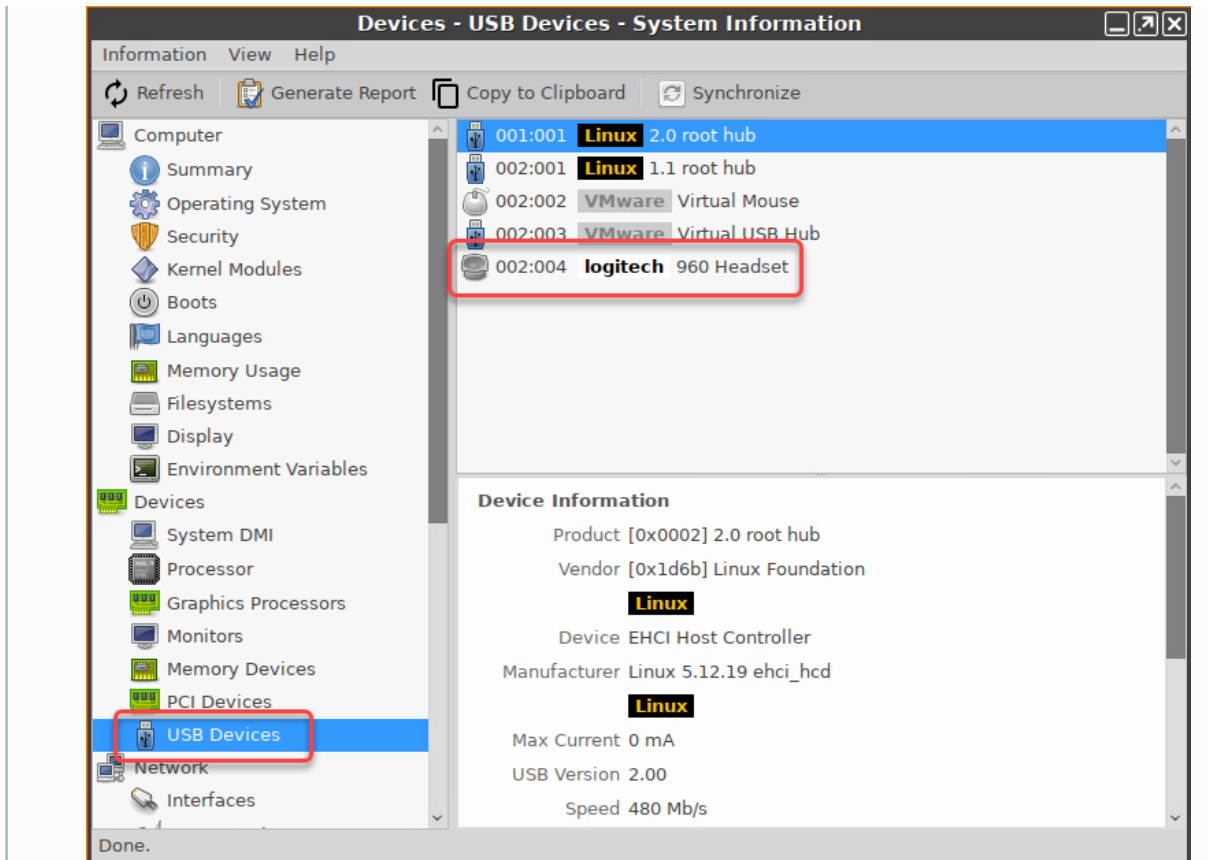
## Native USB Redirection

1. Enable **Sessions > RDP > RDP Global > Native USB Redirection > Enable native USB redirection**.
2. Set the **Default rule** to **Deny**.
3. Under **Device Rules**, add the specific **Vendor ID** and **Product ID** of the device to be redirected.

### **Getting USB Device Information**

To find out the **Class ID**, **Subclass ID**, **Vendor ID** and **Product ID** of the connected USB device, you can use the **System Information** tool. For further information, see Using “System Information” Function.

System Information example:



Alternatively, you can use the command `lsusb` (or `lsusb | grep -i [search term]`) in the terminal.

Example for `lsusb` :

```

Local Terminal
File Edit View Terminal Tabs Help
root@ITC005056930CAD:~# lsusb | grep -i logitech
Bus 002 Device 004: ID 046d:0a45 Logitech, Inc. 960 Headset
root@ITC005056930CAD:~#
    
```

- i On RDS servers, the following may be helpful:
  - ▶ Disable the setting **Do not allow supported Plug and Play device redirection** under **Computer Configuration > Administrative Templates > Windows Components > Remote Desktop Services > Remote Desktop Session Host > Device and Resource Redirection**.

- i **For Microphone (e.g. Headset)**
  - ▶ Enable **Sessions > RDP > RDP Global > Mapping > Audio > Audio recording**.

### ✓ Custom Partition as a Local Alternative

You can also use [Custom Partitions](#) (see page 546) for Microsoft Teams or Zoom, e.g. in order to save backend resources, which may be a good choice in slow RDP backends. The Custom Partition is locally installed but is easy to access in the remote session.

- For details, see [Microsoft Teams as a Custom Partition](#) (see page 608), [Zoom as a Custom Partition](#) (see page 588).
- Contact the IGEL Support Team to get support for the deployment of Custom Partitions.

For how to open up the webcam in Windows 10, see [Open the Camera in Windows 10](#)<sup>74</sup>.

For a video overview on using webcams and other USB devices in remote sessions, see:

#### English



Sorry, the widget is not supported in this export.  
But you can reach it using the following URL:

<https://www.youtube.com/watch?v=PYCU1AEfS-g&feature=youtu.be>

#### German



Sorry, the widget is not supported in this export.  
But you can reach it using the following URL:

<https://www.youtube.com/watch?v=caNhFib5cuA&feature=youtu.be>

<sup>74</sup> <https://support.microsoft.com/en-us/windows/open-the-camera-in-windows-10-8da044ed-c4a8-2fb4-da51-232362e4126d#:~:text=To%20open%20up%20your%20webcam,Let%20apps%20use%20my%20camera.>

## Webcam Information

If you are running a device with *IGEL Linux* version 5.3.100 or higher, you can configure and test a webcam using a built-in tool. This tool is called **Webcam Information**.

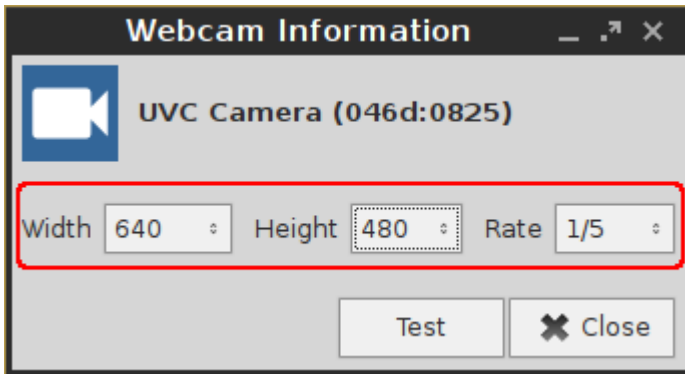
► To configure a starter for **Webcam Information**, open the IGEL Setup and go to **Accessories > Webcam Information**.

To determine and change the width, height, and frame rate of your webcam:

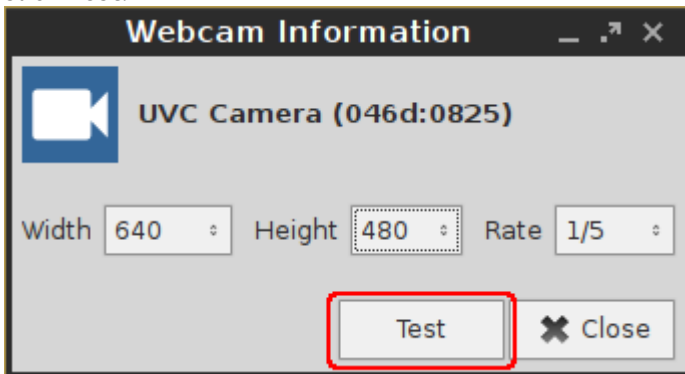
1. Start the **Webcam Information** tool.

The following values are shown:

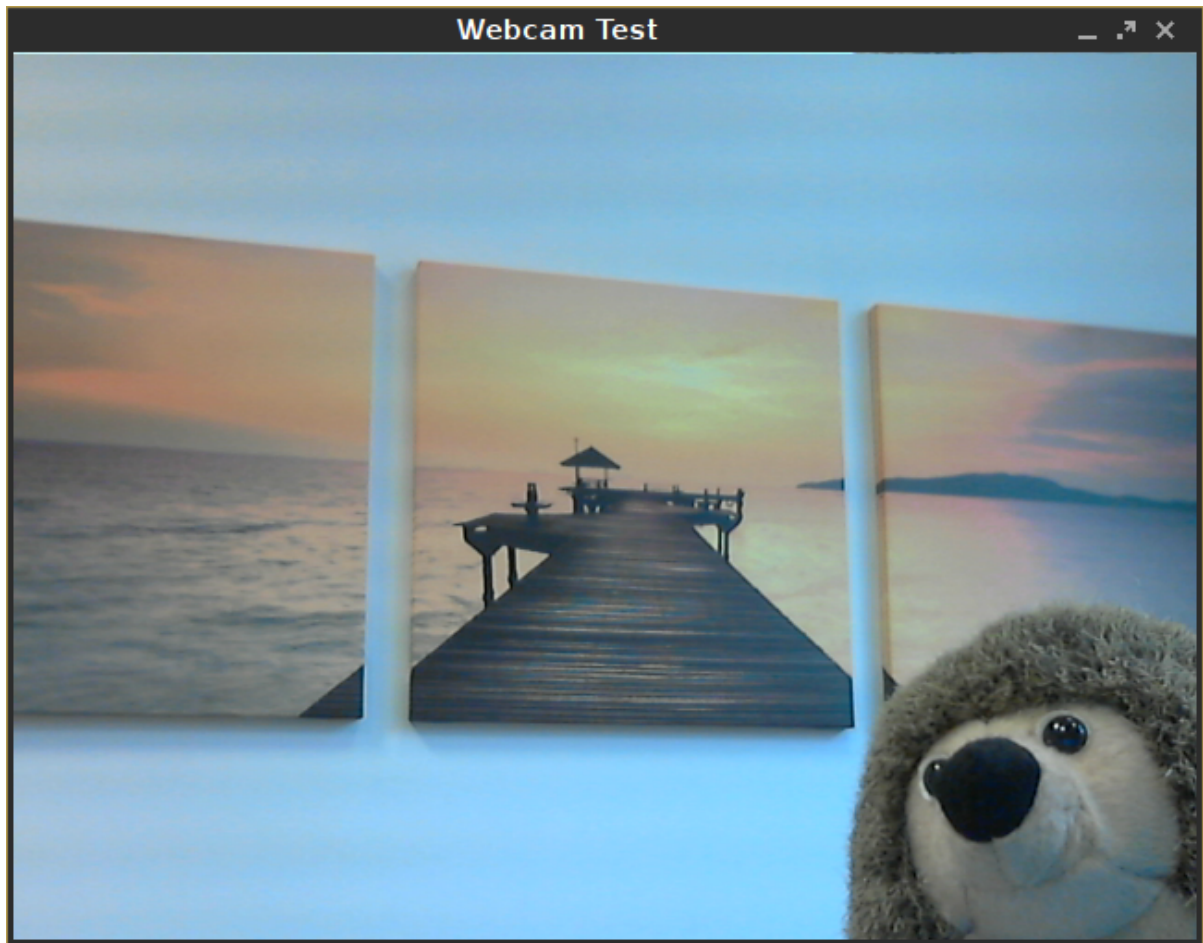
- **Width:** Width of the image in pixels
- **Height:** Height of the image in pixels
- **Rate:** Frame rate in fps (frames per second). Example: **1/30** means 30 single images per second.



2. Click on one of the fields to change the value. In doing so, the supported values are shown.
3. Click **Test**.



The video image generated with the current settings is shown.



To check if the webcam is working in a session (e.g. via Citrix HDX webcam redirection), open a browser in the session and go to <https://www.onlinemictest.com/webcam-test/>.



## Bluetooth Tool

As of *IGEL Linux* version 5.10.100, you can connect or disconnect Bluetooth devices conveniently using the Bluetooth tool. The Bluetooth tool supports the following pairing methods:


- Pairing with PIN entry (for most keyboards)
- Pairing with fixed PIN (for most headsets, mice or GPS devices)
- Pairing with automatic PIN allocation

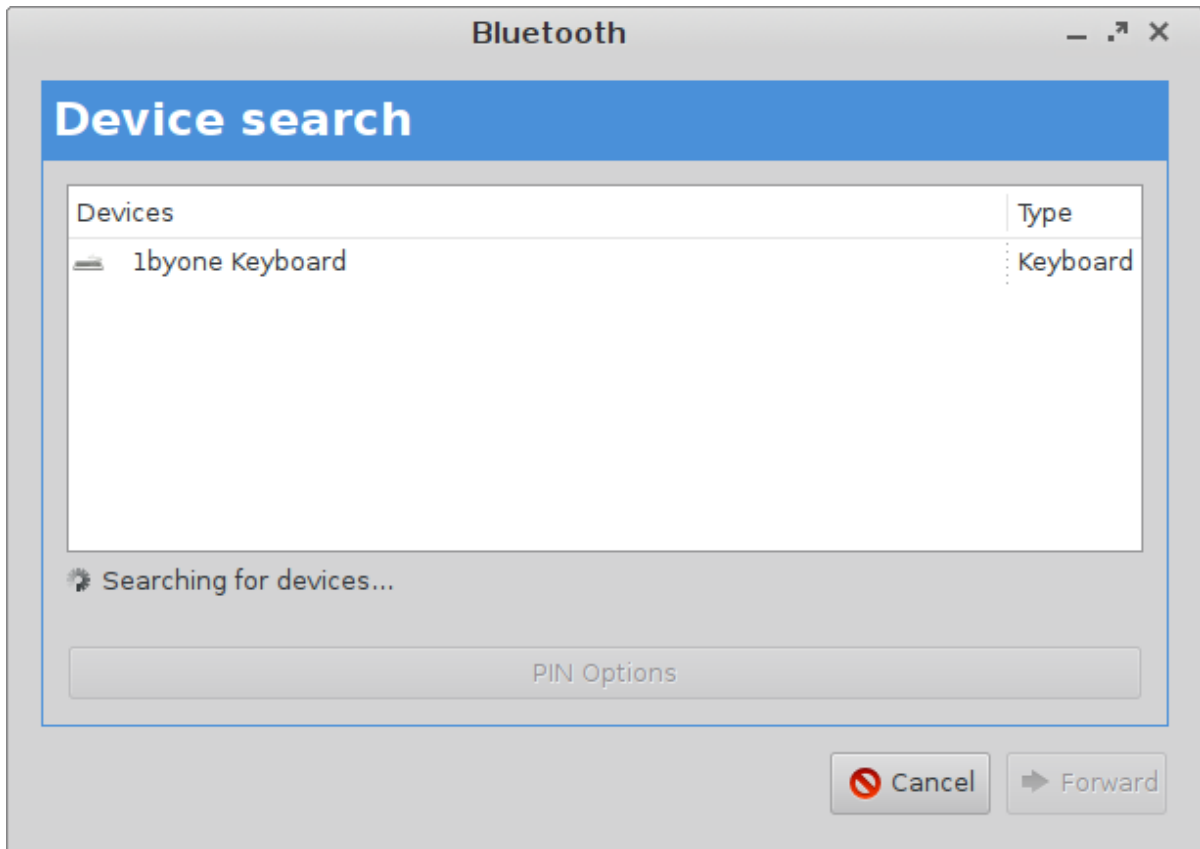
For further information, please refer to the manual chapter Bluetooth Tool.

In the following example, we will connect a Bluetooth device with PIN entry:

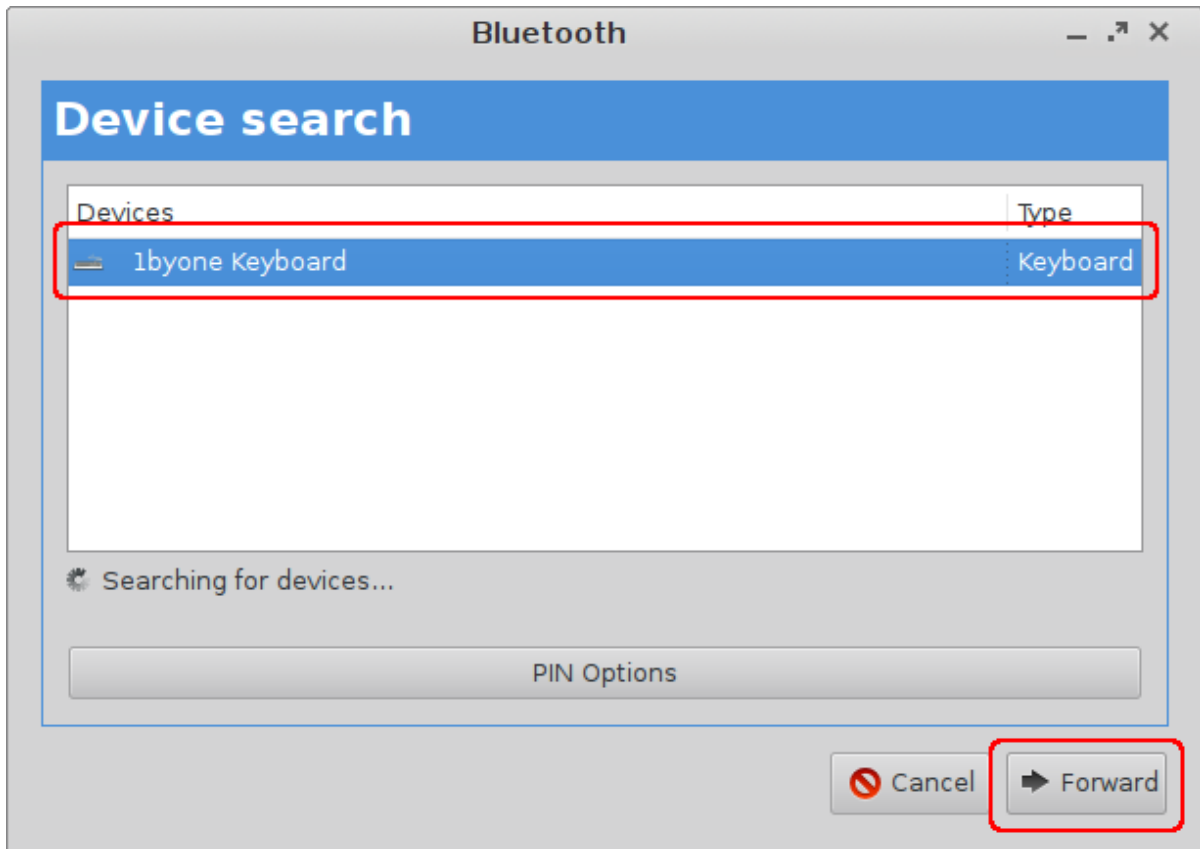
1. Make sure that the following preconditions are met:
  - A Bluetooth USB adapter is connected to your device.
  - The Bluetooth device is ready.
  - The options **Setup > Devices > Activate Bluetooth** and **Setup > Devices > Tray Icon** are enabled.



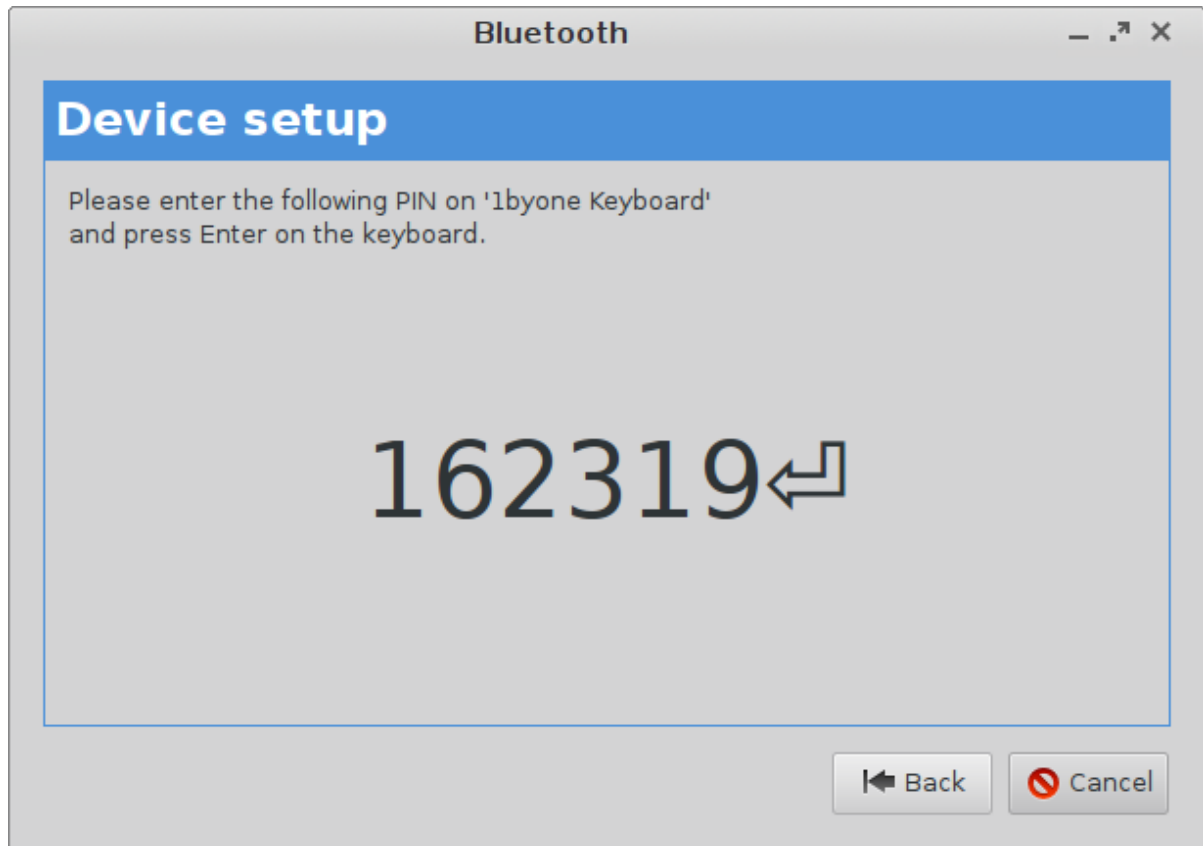
2. Launch the **Bluetooth Tool** via  > **System > Bluetooth Tool** or another launch option, if available.  
The **Device search** dialog will be shown. After a few seconds, the Bluetooth devices found by the device are displayed.



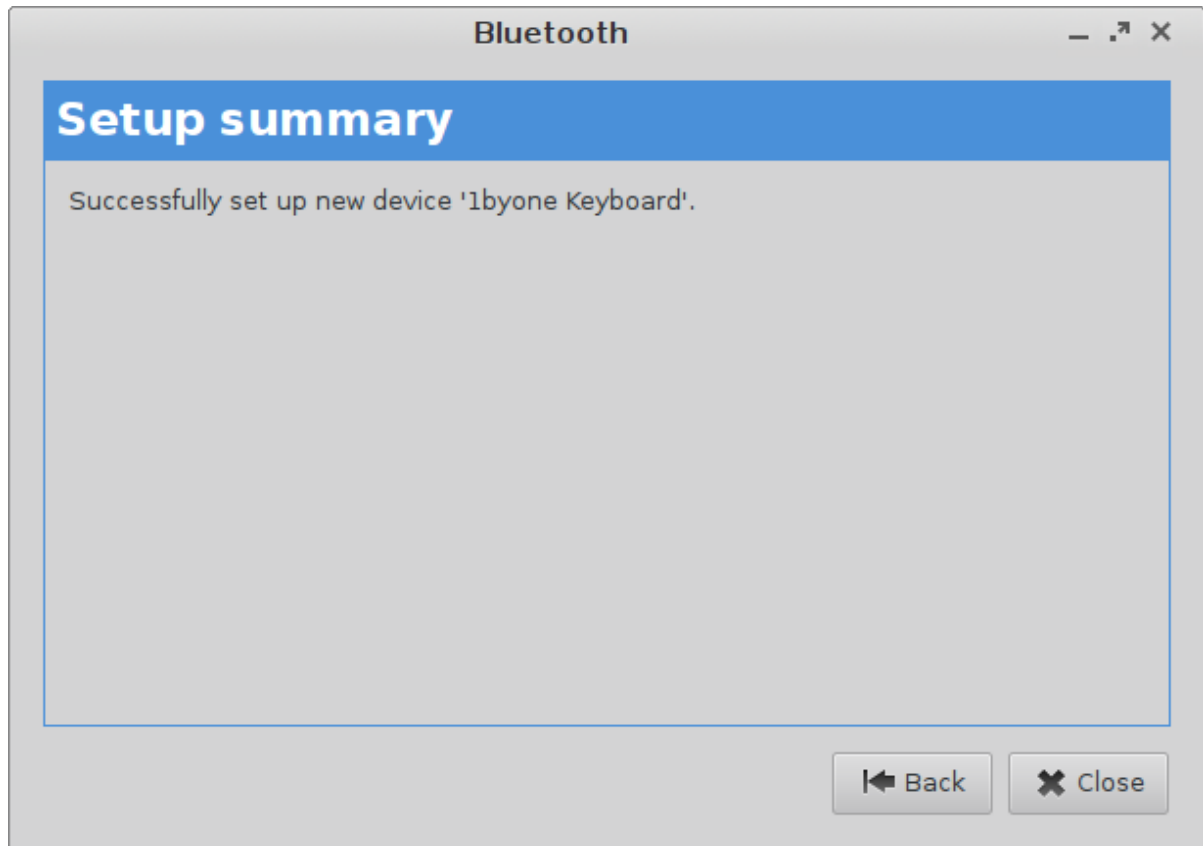
3. Highlight the desired Bluetooth device and click on **Forward**.




A PIN will be shown on the **Device setup** dialog.



4. Enter the PIN into your Bluetooth device.  
If everything went well, the status of the connection will be shown.



5. Click on **Close**.

Your Bluetooth device is ready for use. By right-clicking the  icon in the system tray, you can to start the Bluetooth tool again, e.g. to pair another Bluetooth device or to unpair a device.

## How to Deploy a Jabra Xpress Package

Jabra Xpress is a solution for the remote mass-deployment of Jabra USB headsets that enables creating and deploying packages containing settings, firmware updates, etc. for Jabra devices. For more information, see <https://www.jabra.com/supportpages/jabra-xpress#/>.

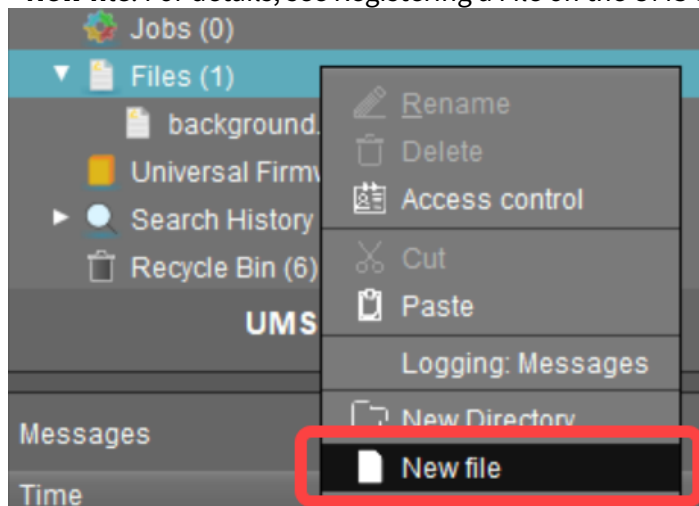
Deployment of a Jabra Xpress package involves the following steps:

1. Making the package available for download over the FTP(S) or HTTP(S) protocol (see page 726)
2. Configuring the source URL in the IGEL Setup (see page 726)
3. Triggering the deployment process in the UMS (see page 727)

### Making the Jabra Xpress Package Available for Download

1. Create a package on the Jabra Xpress portal and download it.
2. Place the ZIP archive onto your FTP(S) or HTTP(S) server.

If you want to use the UMS as a source location, register the ZIP archive in the UMS under **Files > New file**. For details, see Registering a File on the UMS Server.

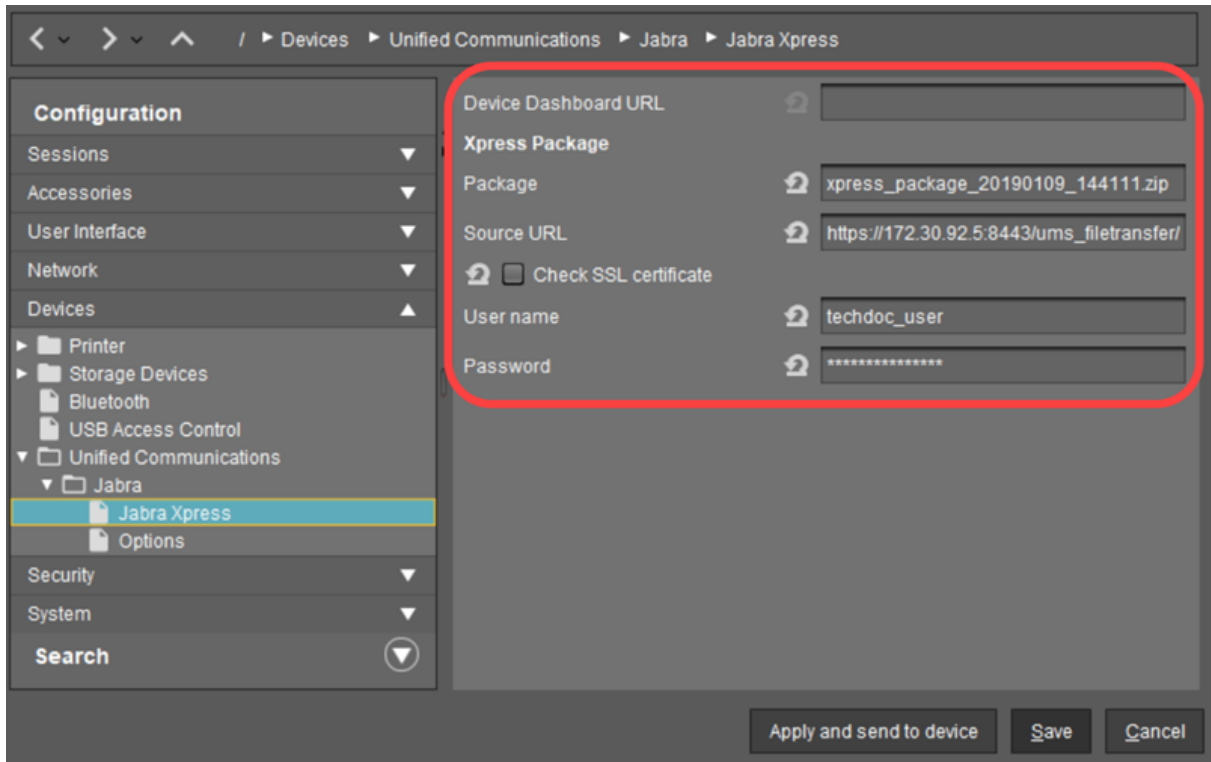


### Configuring the Source URL

Now you have to configure the download location:

1. In the IGEL Setup or in the configuration dialog in the UMS, go to **Devices > Unified Communications > Jabra > Jabra Xpress**.
2. Under **Device Dashboard URL**, you can optionally specify the URL of the dashboard server of the Jabra device.
3. Under **Package**, enter the file name of the Jabra Xpress package.  
Example: `xpress_package_20190109_144111.zip`.

4. Under **Source URL**, specify the URL to the directory containing the Xpress package.  
Example: `https://172.30.92.5:8443/ums_filetransfer/` if you use the UMS as the source location.
5. Disable **Check SSL certificate** if you use the UMS as the source for your Xpress package or a self-signed certificate.
6. Under **User name**, specify the user name for accessing the Xpress package that resides under the **Source URL**.
7. Under **Password**, specify the password for accessing the Xpress package that resides under the **Source URL**.

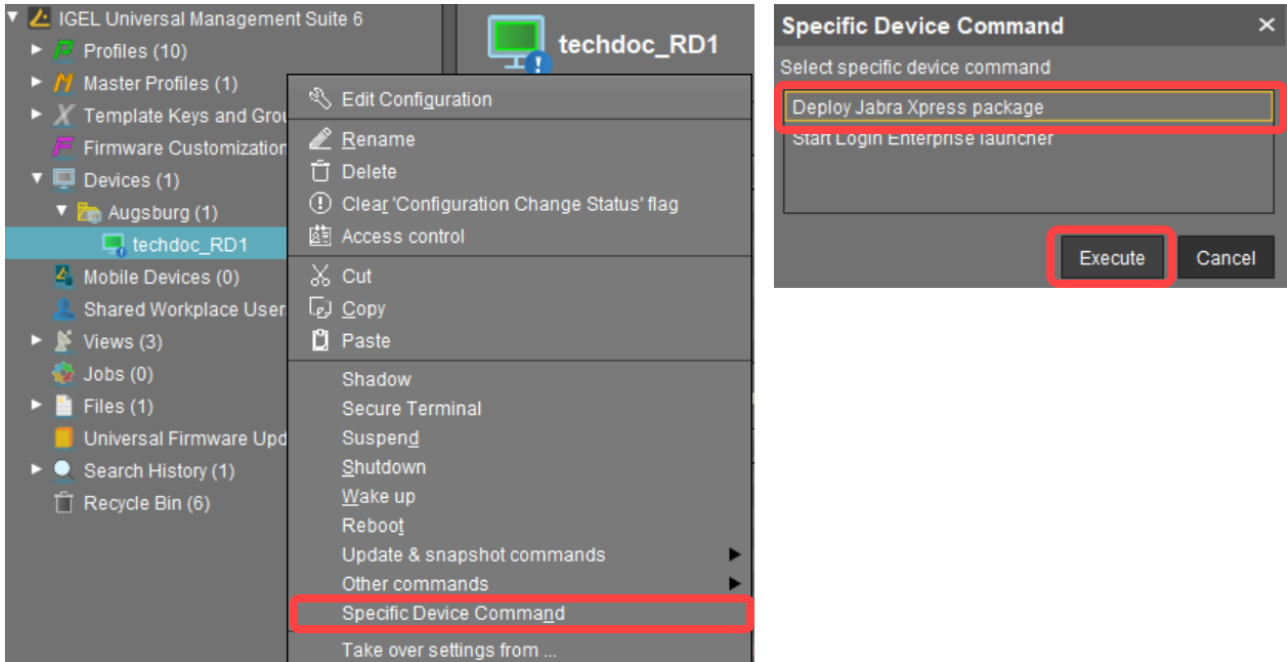


8. Save the settings.

## Triggering the Deployment Process

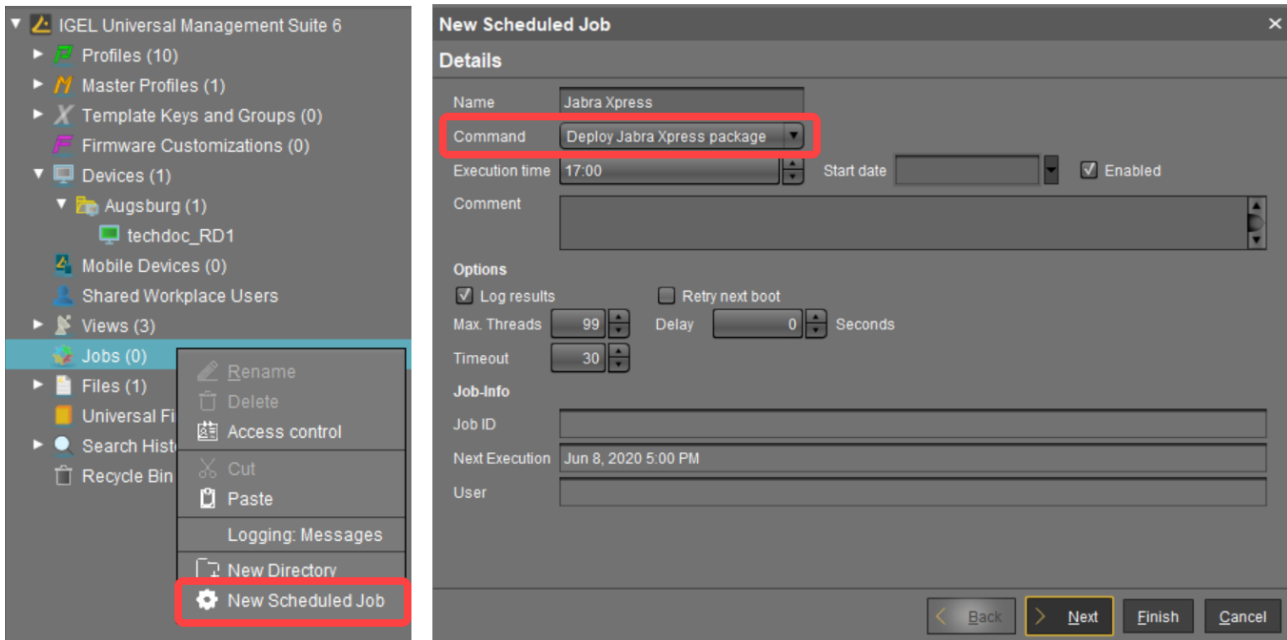
Finally, you have to trigger the deployment process. There are two possibilities:

- ▶ In the UMS, go to **Devices** > [context menu of the device] > **Specific Device Command** and select **Deploy Jabra Xpress Package**.



OR

► In the UMS, go to **Jobs > New Scheduled Job** and select **Deploy Jabra Xpress package** as **Command**. Assign the job to the necessary devices, see Assignment.



**i** Note that it is not possible to reverse the deployment process, e.g. to remove an Xpress package from the Jabra device. If you require the previous settings, you have to configure and deploy a new Jabra Xpress package with the old headset firmware and configuration.





See also Jabra Xpress in the IGEL OS reference manual.

## Connecting Signature Pads

You can connect signature pads from the following manufacturers:

- StepOver;
- signotec.

▶ To enable them, go to Setup > **User Interface** > **Input** > **Signature Pad**.

▶ To configure a serial connection in order to be able to use USB signature pads from these manufacturers, proceed as follows:

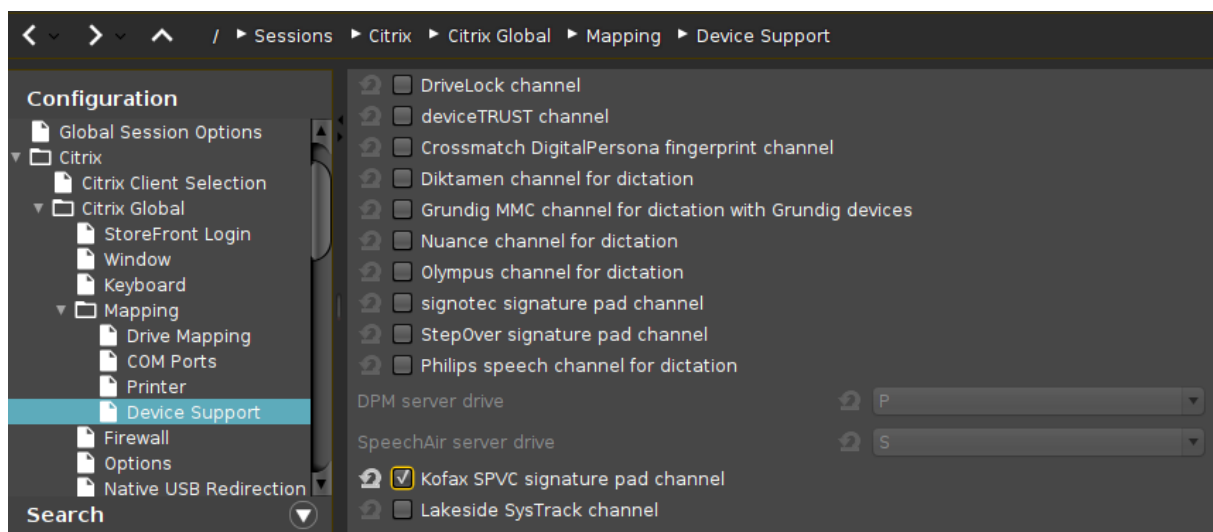
1. Enable **COM port mapping** under:
  - Setup > **Sessions** > **Citrix** > **Citrix Global** > **Mapping** > **COM Ports** for Citrix sessions;
  - Setup > **Sessions** > **RDP** > **RDP Global** > **Mapping** > **COM Ports** for RDP sessions.
2. Click on **Add** .
3. Click **Detect Devices...**
4. Select your device.  
Your signature pad can now be used.

## Using a Kofax / Wacom Signature Pad

You can use a Kofax / Wacom signature pad in Citrix sessions using the Kofax SPVC signature pad channel. The Virtual Serial Sign Pad method is no longer supported.

### On the Device

1. Connect the signature pad to one of the device's USB ports.
2. Go to **Sessions > Citrix > Citrix Global > Mapping > Device Support**.
3. Enable **Kofax SPVC signature pad channel**.



### On the VDI Server (Windows)

- ▶ Install the required software from Kofax / Wacom.

The driver contained in this software will listen for signature pads on a virtual channel. Applications such as SignDoc will be able to use the signature pad.

## Using a StepOver Signature Pad

You can use a StepOver signature pad in Citrix and RDP sessions. There are two different means to achieve this:

- [With StepOver TCP Client](#) (see page 733)
- [With StepOver Signature Pad Channel](#) (see page 737)

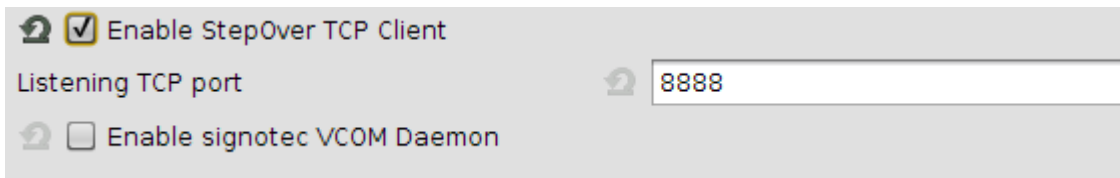
Only one of the methods can be used at a given time. Which of the two you need is determined by your applications on the server side.

See also [StepOver Signature Pads Compatibility](#).

## With StepOver TCP Client

### On the Device

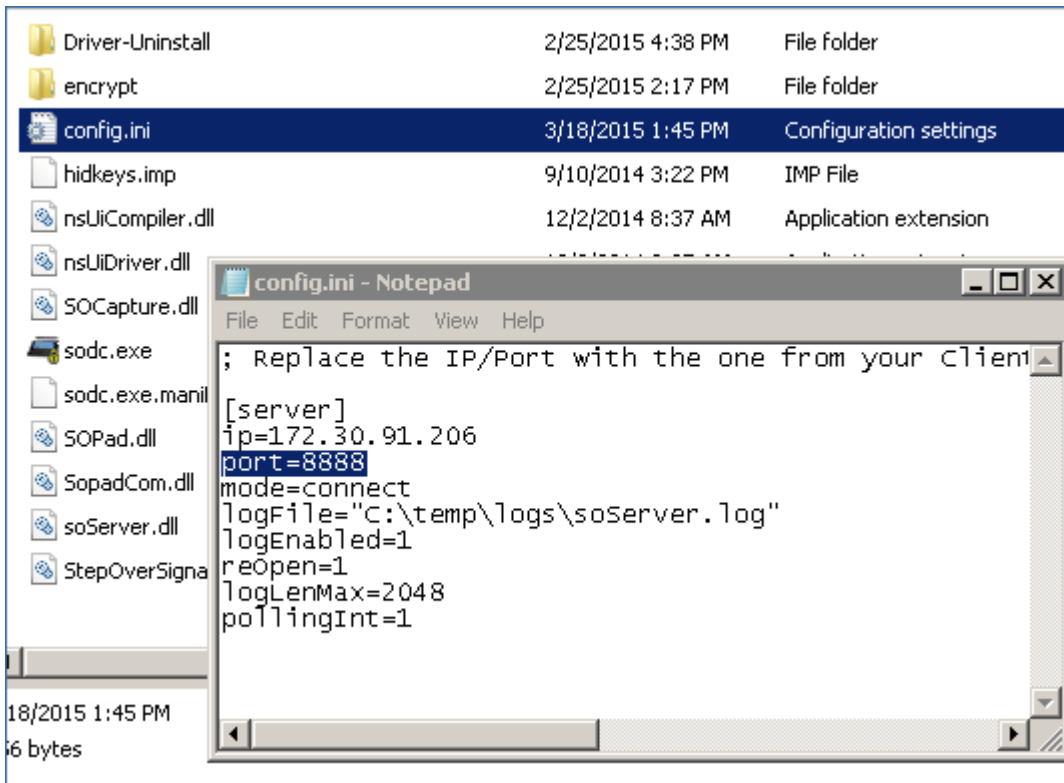
- ▶ Connect the signature pad to one of the device's USB ports.
- ▶ Go to **User Interface > Input > Signature Pad** in IGEL Setup.
- ▶ Enable **StepOver TCP Client**.
- ▶ Modify **Listening TCP Port** if needed. (Default: 8888)



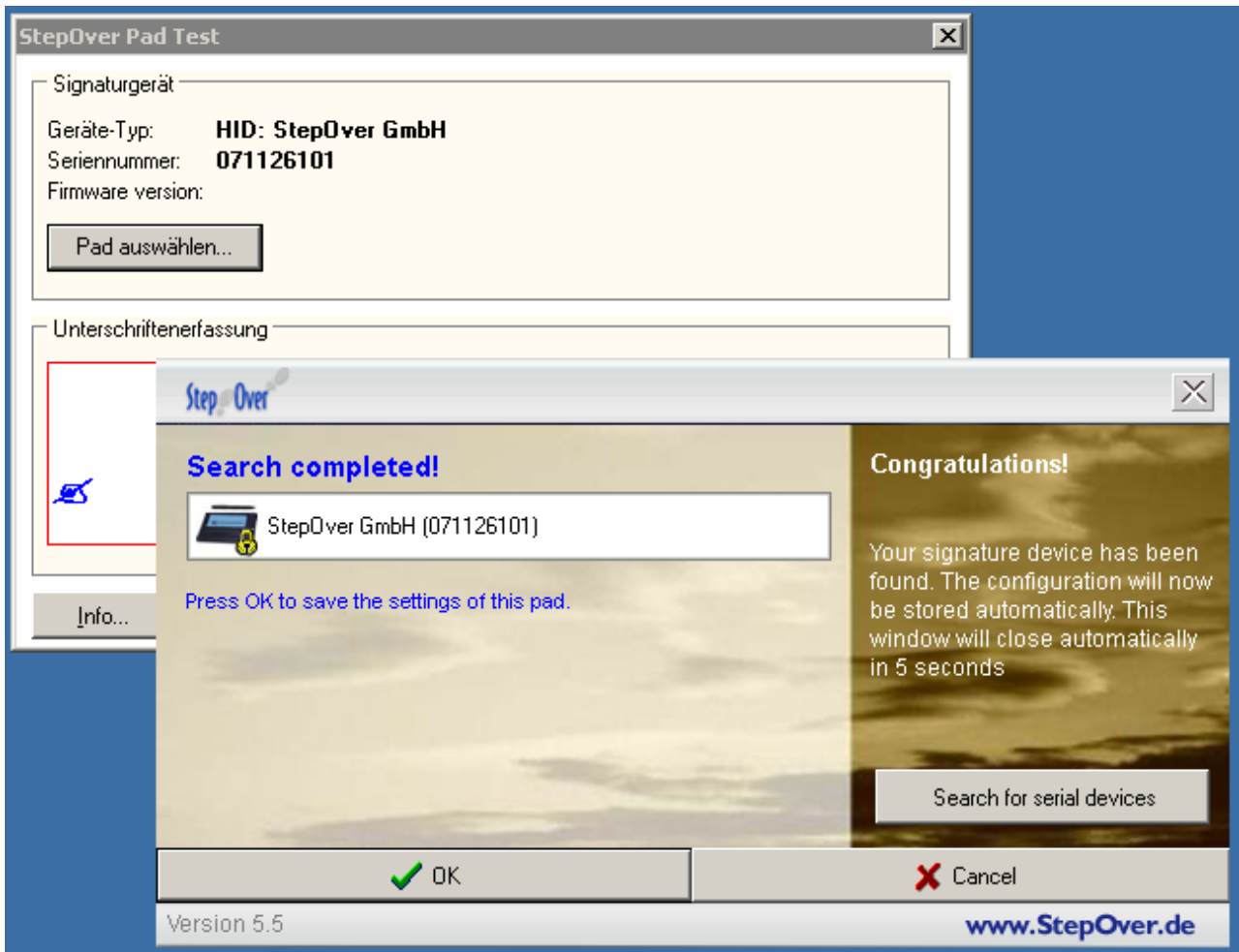
**i** You can check whether the **StepOver TCP Client** is running on the device by entering the following in a local terminal: `ps waux | grep sotcp`. The result should contain an `sotcp` process.

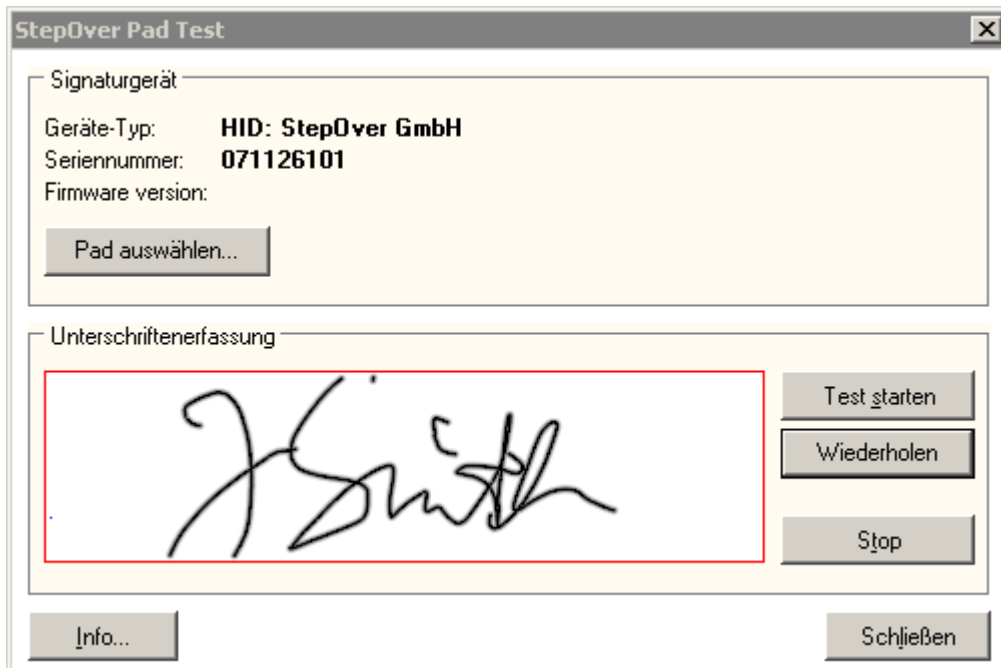
### On the VDI Server (Windows)

- ▶ Locate the `sodc.exe` program on the server. It is the part of StepOver eSignature Office and can be found in `[Your Program Files Directory]\StepOver\eSignatureOffice [version]\driver\`.
- ▶ If you are using a non-standard TCP port, change it in the `config.ini` file located in the same directory.



- ▶ Execute `sodc.exe`. The **StepOver Pad Test** window will open. Use its buttons to search and select your signature pad and try writing into the provided field.





The status LED of the pad will turn to green when the connection is successful. The signature pad is now ready to be used with enabled applications such as StepOver eSignature Office.



## With StepOver Signature Pad Channel

**StepOver signature pad channel** is applicable to Citrix sessions only. It activates StepOver Citrix Client and enables the redirection via Citrix virtual channel.

### On the Device

- ▶ In the IGEL Setup, go to **Sessions > Citrix > Citrix Global > Mapping > Device Support**.
- ▶ Enable **StepOver signature pad channel** and save the changes.

### On the Server

- ▶ During the installation of the StepOver software, select the option "Citrix".

## eGK/KVK - Card Reader

The IGEL Linux thin clients support the reading of German electronic health cards (eGK), health insurance cards (KVK) and the German card for allied health professions (HBA) by a variety of readers connected via RDP or ICA. Configuration and functionality vary according to the reader type.

The following tested solutions are available:


Reader	Port	Client/server connection
Cherry G80-1502	Serial	COM port mapping
Cherry ST-2052	USB	Smartcard mapping
Cherry ST-1503 and Cherry G87-1504	USB	Cherry Virtual Channel (IGEL Linux v5 only)
SICCT via LAN provided by the Cherry USB2LAN proxy (IGEL Linux <i>version 5.12.100</i> and IGEL Linux <i>version 10.03.100</i> onwards)		
ORGA 910/920 M	USB	COM port mapping
ORGA 6041 L eGK eHealth-BCS	USB	COM port mapping
SCM Microsystems eHealth200	USB	Smartcard mapping
SCM Microsystems eHealth500	USB	COM port mapping
celectronic CARD STAR /medic2	Serial	COM port mapping
celectronic CARD STAR /memo3	USB	COM port mapping

- [Cherry G80-1502 at the Serial Port](#) (see page 739)
- [Cherry ST-2052](#) (see page 740)
- [Cherry ST-1503 und G87-1504 \(USB\)](#) (see page 741)
- [Orga 910/920 M](#) (see page 742)
- [Orga 6041 L eGK eHealth-BC S](#) (see page 743)
- [celectronic CARD STAR / medic2](#) (see page 744)
- [celectronic CARD STAR/ memo3](#) (see page 745)

## Cherry G80-1502 at the Serial Port

### Connecting the keyboard


- ▶ Connect the keyboard to both the PS/2 port and the serial port of the thin client.

 Firmware version 1.19 of the keyboard must be present and the keyboard must be in mode S1. Refer to [http://www.cherry.de/files/manual/Cherry\\_G80-1502\\_mit\\_eGK.pdf](http://www.cherry.de/files/manual/Cherry_G80-1502_mit_eGK.pdf).

Functionality	
Software:	Cherry eHealth eGK/KVK software
Device/server connection:	COM port mapping

### Configuring the device

In IGEL Setup, add the COM port device to which the keyboard is connected:

1. Click **Sessions > RDP > RDP Global > Mapping > COM Ports**
2. Click .
3. Select a **COM port device** (COM1, COM2,...).

### Configuring the server

1. Install the eGK-KVK software by *Cherry*.  
See also [http://www.cherry.de/files/manual/eHealth\\_Client-Server\\_Einbindung.pdf](http://www.cherry.de/files/manual/eHealth_Client-Server_Einbindung.pdf)
2. Start the program CT-API configuration.
3. Select the appropriate port number for the G80-1502.

## Cherry ST-2052

Functionality	
USB ID:	046a:003e
Software:	Cherry eHealth eGK/KVK software
Device/server connection:	Smartcard (PC/SC) mapping

### Configuring the device

- Select **Activate PC/SC Daemon** in Setup under **Security > Smartcard > Services**:



### Configuring the server

1. Install the eGK-KVK software by *Cherry*.  
See also [http://www.cherry.de/files/manual/eHealth\\_Client-Server\\_Einbindung.pdf](http://www.cherry.de/files/manual/eHealth_Client-Server_Einbindung.pdf)
2. Start the program *CT-API configuration*.
3. Select port number 1 for the ST-2052.

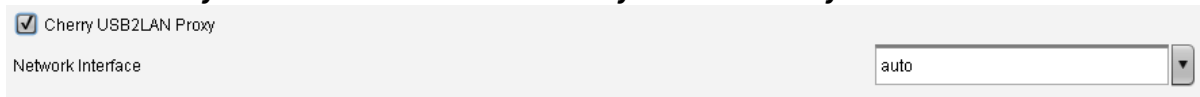
### Cherry ST-1503 und G87-1504 (USB)

Functionality	
USB ID:	046a:0080 for ST-1503 046a:0081 for G87-1504
Software:	Cherry eHealth eGK/KVK software
Client/server connection:	SICCT via LAN provided by the Cherry USB2LAN proxy

Cherry USB2LAN proxy: Makes Cherry electronic health card devices available in the network via SICCT. The communication between card reader and server takes place independently of the VDI connections.

#### Configuring the Thin Client for Using the Cherry USB2LAN Proxy

1. Activate **Security > Smartcard > Services > Cherry USB2LAN Proxy**:



#### Configuring the Server for the Cherry USB2LAN Proxy

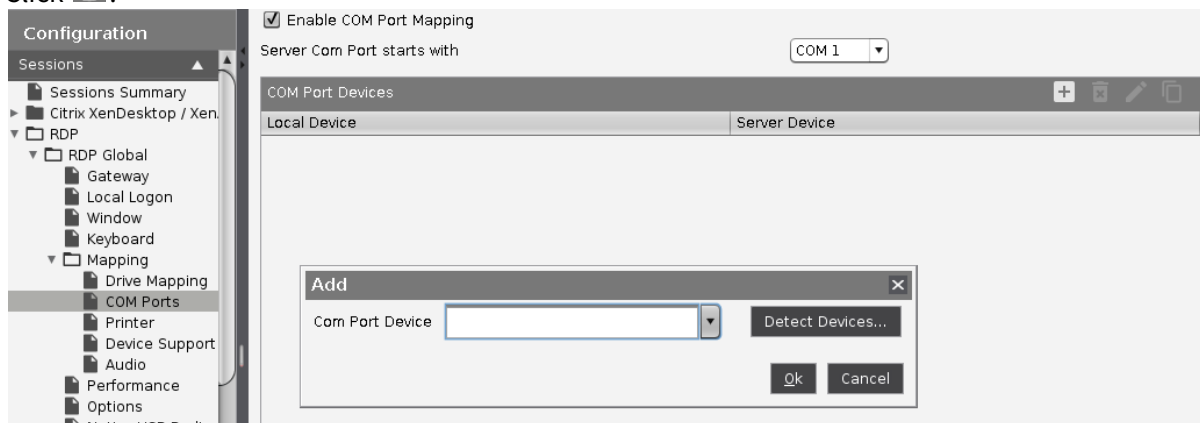
1. Install the eGK-KVK software by Cherry.
2. Configuration according to chapter 6 in [http://www.cherry.de/files/manual/eHealth\\_Client-Server\\_Einbindung.pdf](http://www.cherry.de/files/manual/eHealth_Client-Server_Einbindung.pdf).

## Orga 910/920 M

Functionality	
USB ID:	0780:1202
Software:	CT-API by Orga
Device/server connection:	COM port mapping

### Configuring the device

1. Click **Sessions > RDP > RDP Global > Mapping > COM Ports** for RDP
2. Select **Enable Com Port Mapping**:
3. Click .



4. Select USB COM 1 as a new COM port device ( `/dev/ttyUSB0` ).

### Configuring the server

1. Download the appropriate driver for *Orga 910/920 M* from the download page: [http://healthcare-eid.ingenico.com/de/treiber\\_anleitungen.aspx](http://healthcare-eid.ingenico.com/de/treiber_anleitungen.aspx)<sup>75</sup>
2. Install the driver.

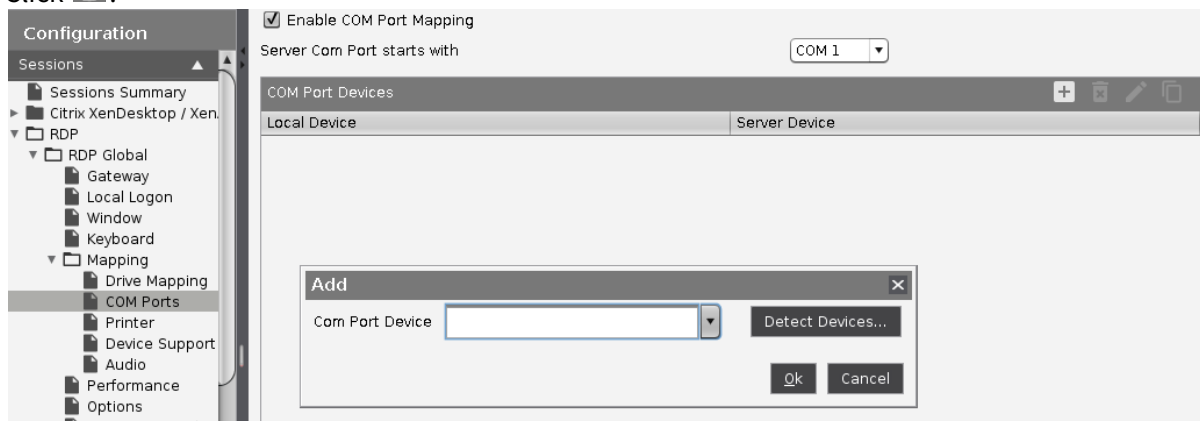
<sup>75</sup> <https://ingenico.de/healthcare/downloads>

## Orga 6041 L eGK eHealth-BC S

Functionality	
USB ID:	0780:1302
Software:	CT-API by Orga
Device/server connection:	COM port mapping

### Configuring the device

1. Click **Sessions > RDP > RDP Global > Mapping > COM Ports** for RDP.
2. Select **Enable Com Port Mapping**:
3. Click .



4. Select USB COM 1 as a new COM port device ( `/dev/ttyUSB0` ).

### Configuring the server

1. Download the appropriate driver for *Orga 6041 L eGK eHealth-BC S* from the download page: [http://healthcare-eid.ingenico.com/de/treiber\\_anleitungen.aspx](http://healthcare-eid.ingenico.com/de/treiber_anleitungen.aspx)<sup>76</sup>
2. Install the driver.

<sup>76</sup> <https://ingenico.de/healthcare/downloads>

## celectronic CARD STAR / medic2

### Connecting the reader

- ▶ Connect the reader to the COM port of the thin client.

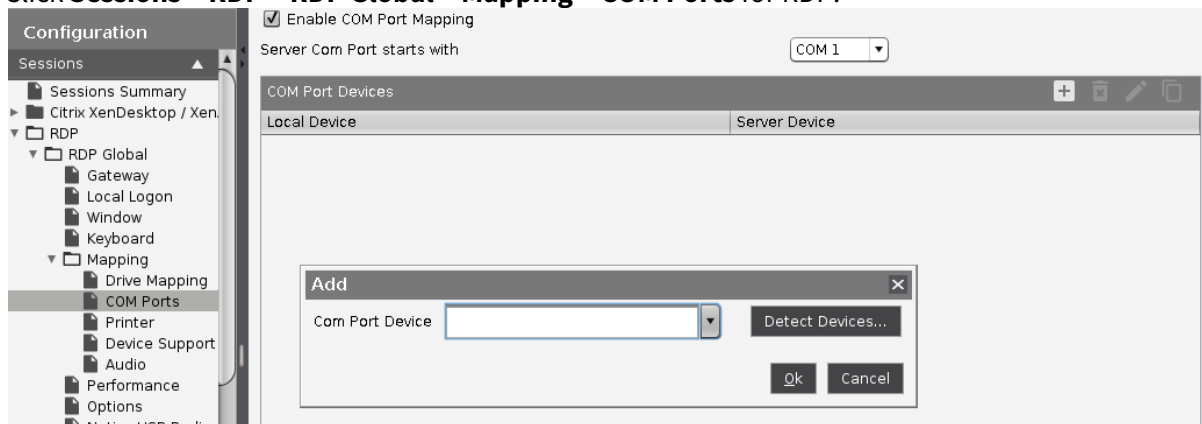
 The reader must be set to host/PC serial interface.

Functionality	
Software:	CT-API by celectronic
Device/server connection:	COM port mapping

### Configuring the device

In IGEL Setup, add the COM port device to which the keyboard is connected:

1. Click **Sessions > RDP > RDP Global > Mapping > COM Ports** for RDP.



2. Click .
3. Select a **COM port device** (COM1, COM2,...).

### Configuring the server

1. Download the appropriate driver for *celectronic CARD STAR / medic2* from the download page: <https://www.ccv.eu/de/>
2. Install the driver.

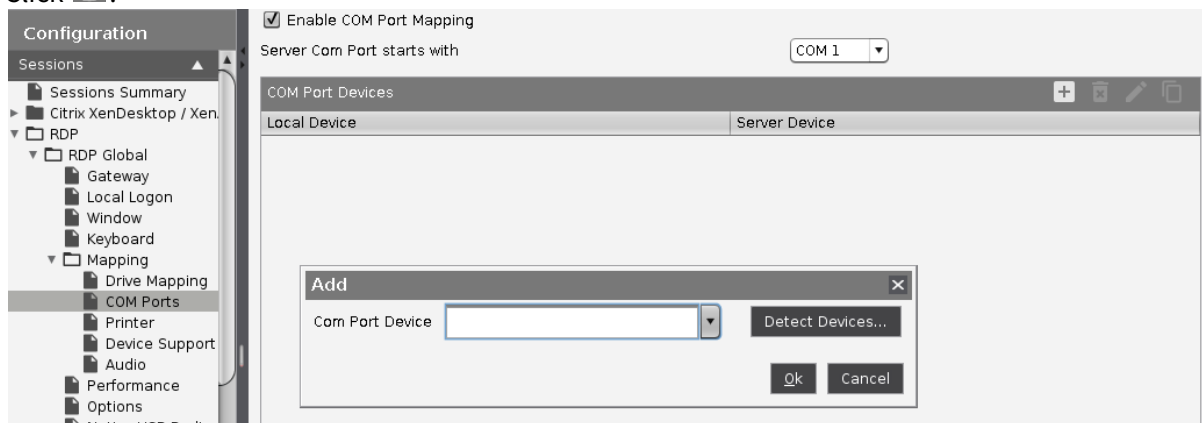


## celectronic CARD STAR/ memo3

Functionality	
USB ID:	152a:8180
Software:	CT-API by celectronic
Device/server connection:	COM port mapping

### Configuring the device

1. Click **Sessions > RDP > RDP Global > Mapping > COM Ports** for RDP.
2. Select **Enable Com Port Mapping**:
3. Click .



4. Select USB COM 1 as a new COM port device ( `/dev/ttyUSB0` ).


### Configuring the server

1. Download the appropriate driver for *celectronic CARD STAR memo3* from the download page: <https://www.ccv.eu/><sup>77</sup>
2. Install the driver.

<sup>77</sup> <https://www.ccv.eu/de/>


## Using Mobile Device Access

You can access your mobile device file structure via USB, e.g. to make it available in a session.

 **Feature with limited support!** The mobile device access feature comes with “limited support”. This feature is offered 'as is' without any warranty. Any support for this feature is provided on a non-binding, “best effort” basis.


The following device types can be used:

- Smartphones with Android (via MTP / PTP) or iOS
- Tablets with Android via MTP / PTP) or iOS
- Digital cameras

 The functionality may differ according to the specific device and operating system version.

## Environment

- IGEL Universal Desktop (UD) with IGEL OS10.04.100 or higher


 IZ devices are not supported!

- IGEL Universal Desktop Converter 3 (UDC3) with IGEL Linux 10.04.100 or higher
- UD Pocket with IGEL Linux 10.04.100 or higher
- To configure the feature via UMS, UMS version 5.08.110 is required.


- 
- [Enabling Mobile Device Access \(see page 747\)](#)
  - [Disabling Mobile Device Access \(see page 748\)](#)
  - [Mapping a Mobile Device for a Session \(see page 749\)](#)
  - [Connecting Your Mobile Device \(see page 750\)](#)
  - [Accessing the Mobile Device USB Window from a Session \(see page 751\)](#)
  - [Viewing the Files and Directories Locally \(see page 752\)](#)
  - [Safely Removing the Mobile Device \(see page 754\)](#)

## Enabling Mobile Device Access

1. Ensure that the settings under **System > Update > Firmware Update** are correct. The **Server Path** must point to the firmware version that is currently installed. This is required because the software package for mobile device access must be downloaded in order to deploy the feature.
2. Go to **System > Firmware Customization > Features** and activate **Mobile Device Access USB**.
3. Confirm the warning dialog with **Ok**.
4. Click **Ok** in the main window.
5. Reboot the device.  
On reboot, the device downloads and installs the software package for the mobile device access feature.
6. If mobile device access should be available permanently, make sure that **Autostart** is activated under **Accessories > Mobile Device Access**. The other start options are described in the manual under Mobile Device Access.

 If you want to use mobile device access in appliance mode, you must enable autostart or configure a hotkey. Autostart is recommended.

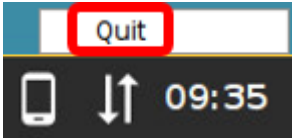
7. Configure the start options for mobile device access according to your requirements.
8. If you have activated **Autostart** as the only start option, restart the device.

When the mobile device access is activated, the smartphone symbol  is shown in the task bar. For appliance mode sessions, the in-session control bar is available; see [Accessing the Mobile Device USB Window from a Session](#) (see page 751).

## Disabling Mobile Device Access

### Disabling Mobile Device Access

- ▶ In the context menu of the tray icon, click **Quit**.



## Mapping a Mobile Device for a Session

There are two alternative options to map a mobile device to a drive in a session:

- Automatic Drive Mapping
- Manual Mapping to a Specific Drive

### Automatic Drive Mapping

You can use dynamic client drive mapping to have a drive automatically mapped to your mobile device. The directories and files on your mobile device will be accessible under this drive.

1. In the IGEL Setup, go to **Devices > Storage Devices > Storage Hotplug** and enable **Storage hotplug**.
2. Set **Client drive mapping** to "Dynamic".
3. Click **OK**.

You can access the directories and files on your mobile device like with a regular hotplug storage device.

For further information, see the manual chapter Storage Hotplug.

### Manual Mapping to a Specific Drive

You can specify a drive letter under which the directories and files on your mobile device will be accessible.

1. If the session will run in fullscreen mode, open the IGEL Setup, go to **User Interface > Desktop** and activate **In-Session Control Bar**.
2. If the session will run in fullscreen mode or appliance mode, ensure that **Autostart** under **Accessories > Mobile Device Access** is enabled. See here also [Enabling Mobile Device Access \(see page 747\)](#).
3. Go to the **Drive Mapping** page for your session type. Example: With RDP sessions, the setup path is **Sessions > RDP > RDP Global > Mapping > Drive Mapping**.
4. Activate **Enable drive mapping**.
5. Click  **Add** to bring up the mapping window.
6. Click **Enabled** to enable the drive connection.
7. Select a **Drive to map** from the list under which the local device or the folder is to be mapped.
8. Enter `/media` as the **Local Drive Path**.
9. Click **OK**.

You can access the directories and files on your mobile device like with a regular hotplug storage device.

## Connecting Your Mobile Device

1. If mobile device access is not started already, use one of the start options configured under **Accessories > Mobile Devices Access**.
2. Connect your mobile device with your thin client.
3. Allow file transfer on your phone, e. g. **Transfer Files** (Android smartphones) or **Trust The Computer** (Apple iPhone).

The directories of your mobile device are mounted.

You can view the contents; see [Viewing the Files and Directories Locally](#) (see page 752).

You can remove the mobile device securely; see [Safely Removing the Mobile Device](#) (see page 754).

## Accessing the Mobile Device USB Window from a Session

### Non-Fullscreen Session

- ▶ Click  to open the **Mobile Device Access USB** window.

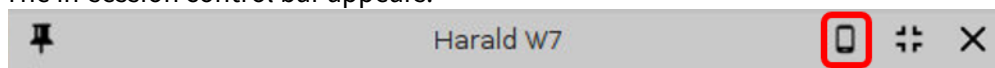
The **Mobile Device Access USB** window appears.

You can view the directories and files on your mobile device or safely remove the device; see [Safely Removing the Mobile Device](#) (see page 754).

### Fullscreen Session

In a session that is running in fullscreen mode or appliance in a fullscreen session, you can use the in-session control bar to open the **Mobile Device Access USB** window.

1. Move the mouse pointer to the upper edge of the screen.  
The in-session control bar appears.

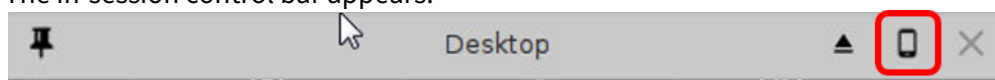


2. Click the smartphone symbol.  
The **Mobile Device Access USB** window appears.  
You can view the directories and files on your mobile device or safely remove the device.

### Appliance Mode Session

In a session that is running in appliance mode, you can use the in-session control bar to open the **Mobile Device Access USB** window.

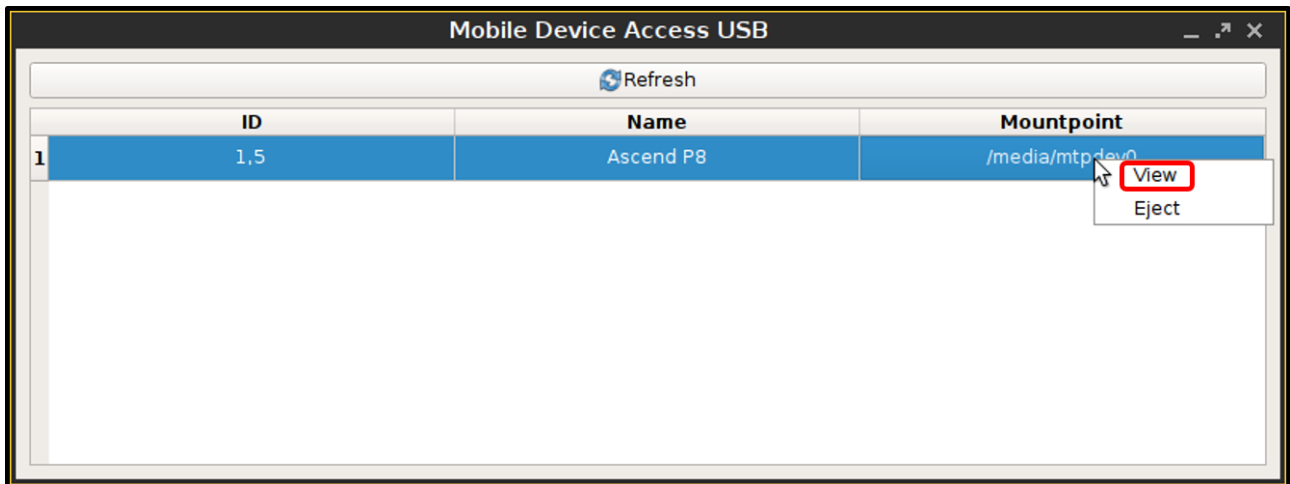
1. Move the mouse pointer to the upper edge of the screen.  
The in-session control bar appears.



2. Click the smartphone symbol.  
The **Mobile Device Access USB** window appears.  
You can view the directories and files on your mobile device or safely remove the device.

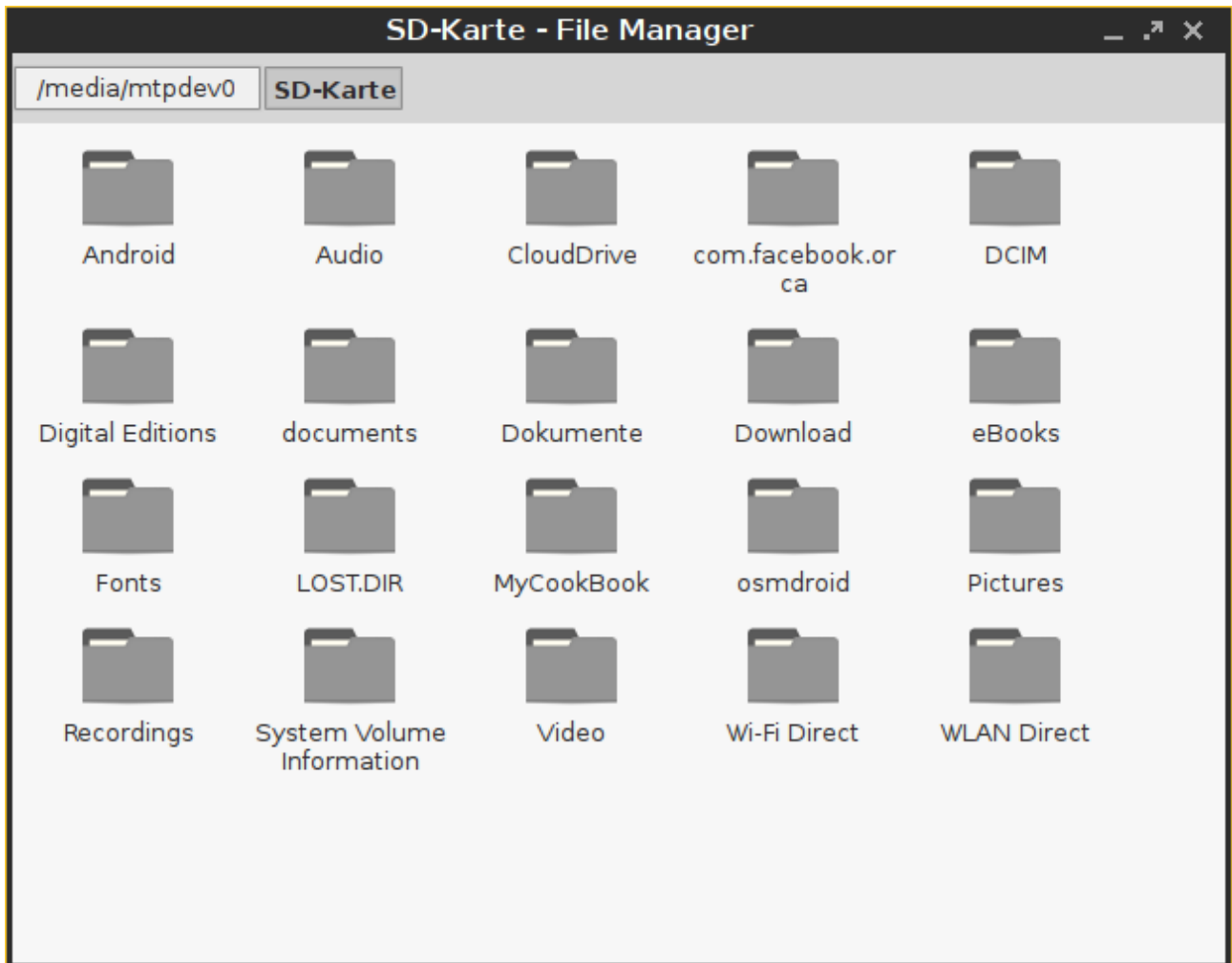
## Viewing the Files and Directories Locally

- ▶ Select **View** in the context menu.



The directories on your smartphone are displayed. Access is read-only, i. e. you can only view the directories and files.





## Safely Removing the Mobile Device

- ▶ Click **Eject** in the context menu for the device in question.



## Swapping Function of Mouse Buttons (e.g. When Using an Evoluent Mouse)

The assignment of mouse buttons for *Evoluent Mouse 3* changed between firmware versions 5.04.130 and 5.05.100.

### Problem

Users have become used to the assignment as it was up to 5.04.130, so you want to reproduce the same assignment in 5.05.100.0.

### Solution

#### A. To manually analyze the assignment and determine how it needs to be adjusted:

1. Open a local terminal.
2. Find the mouse ID: `xinput list`

The output should look something like this: `Virtual core pointerid=2[master pointer (3)] |- Virtual core XTEST pointer id=4[slave pointer (2)] |- Logitech USB Optical Mouse id=10[slave pointer (2)] - Virtual core keyboardid=3[master keyboard (2)] - Virtual core XTEST keyboard id=5[slave keyboard (3)] - Power Buttonid=6[slave keyboard (3)] - Video Busid=7[slave keyboard (3)] - Power Buttonid=8[slave keyboard (3)] - Sleep Buttonid=9[slave keyboard (3)] - Logitech USB Keyboardid=11[slave keyboard (3)] - Logitech USB Keyboardid=12[slave keyboard (3)]`

3. Find your mouse and its ID in the output (here: Logitech USB Optical Mouse, id=10).
4. Check the number of buttons in the button map: `xinput get-button-map [ID]` (where ID is the ID of your mouse device).
5. Now check which button number is set for the buttons in question: `xev`  
A test window will appear.
6. Click into the window using the buttons that you want to swap. Look for the button numbers in the terminal output: `ButtonPress event, serial 39, synthetic NO, window 0x3200001, root 0xae, subw 0x0, time 25542794, (114,113), root:(2884,634), state 0x10, button 1, same_screen YES ButtonRelease event, serial 39, synthetic NO, window 0x3200001, root 0xae, subw 0x0, time 25542898, (114,113), root:(2884,634), state 0x110, button 1, same_screen YES ButtonPress event, serial 39, synthetic NO,`

```

window 0x3200001, root 0xae, subw 0x0, time 25543218, (114,113),
root:(2884,634), state 0x10, button 3, same_screen YES
ButtonRelease event, serial 39, synthetic NO, window 0x3200001,
root 0xae, subw 0x0, time 25543330, (114,113), root:(2884,634),
state 0x410, button 3, same_screen YES

```

In the above example the buttons number 1 and 3 were used.

B. To change the assignment of the mouse buttons on the local thin client:

1. Set a new button map for the mouse in **Setup > System > Firmware Customization > Custom Commands > Desktop Commands > Final**.
2. Swap the buttons in the map. To swap e.g. the buttons 1 and 3, change the setting from `xinput set-button-map [ID] 1 2 3 4 5 6 7` to `xinput set-button-map [ID] 3 2 1 4 5 6 7`

C. To automatically change the assignment using a UMS profile:

As the ID of the mouse may be different on each client, you cannot use the command as shown in B2 but need to use a script that will automatically map the correct input device.

1. Run the following command in a local terminal: `xinput --list`
2. Make a note of the complete name of the mouse.
3. Create a profile in **Setup > System > Firmware Customization > Custom Commands > Desktop Commands > Final** with a custom command: `MouseID=$(xinput --list --id-only 'NAME OF MOUSE') xinput set-button-map $MouseID 3 2 1 4 5 6 7`
4. Replace NAME OF MOUSE with the name of the mouse as determined in step C1.

## Using Natural Scrolling (reverse Scrolling Direction)

### Issue

You are using a touchpad instead of a mouse and you want to reverse the scrolling direction to have natural scrolling – with the screen content moving synchronously to the fingers' movement on the touchpad.

### Problem


There is no "reverse scrolling" parameter in IGEL Setup.

### Solution

1. Open the device's configuration either locally or in the UMS.
2. Go to **System > Firmware Customization > Custom Commands > Desktop > Final desktop command**.
3. Enter the following command:

```
echo "pointer = 1 2 3 5 4 6 7 8 9 10 11 12" > ~/.Xmodmap && xmodmap  
~/.Xmodmap
```


4. Save the settings and restart your device.

 This will reverse the scrolling direction of a mouse wheel as well. Swapping 4 and 5 will reverse vertical scrolling, swapping 6 and 7 will reverse horizontal scrolling as well (if supported).

## Connecting a Serial Barcode Scanner

### Connecting Barcode Scanner via COM Port

1. Determine to which COM port of the device the barcode reader is physically connected.
2. Open the IGEL Setup, go to **System > Registry > devices > serial > inputattach** and enable the relevant key, according to the COM port in use:
  - COM1 ( `/dev/ttyS0` ): **devices.serial.inputattach.com0.enabled**
  - COM2 ( `/dev/ttyS1` ): **devices.serial.inputattach.com1.enabled**
  - COM3, COM4 ...: Add a new instance by clicking **devices.serial.inputattach.com% > Add Instance** and define the port appropriately, e.g. `/dev/ttyS2` for COM3.
3. If the device's baud differs from 9600 (default), enter the correct baud under **devices.serial.inputattach.com0.baud**.

 With most barcode readers, you can change the baud by scanning a specific bar code.

4. In the Setup, click **Apply** or **Ok** to submit the new settings. To make absolutely sure that the new settings are effective, you can reboot the device.
5. Check if the barcode scanner is working.


### Connecting Barcode Scanner via USB

If the barcode scanner is connected over USB, the challenge is to identify the device which is assigned to it. Depending on your specific device and environment, your mileage may vary. Start with the [simple procedure](#) (see [page 758](#)). If you are lucky, this will do it. If not, continue with the [extended procedure](#) (see [page 759](#)).

#### Simple Procedure

1. Connect the barcode to a USB port. This will trigger an event which will be logged and reported by `dmesg`.
2. Open a terminal on your endpoint device. For further information on the device's terminal, see [Terminals](#).
3. To find the right device file, enter `dmesg | grep tty` in the terminal.  
If you are lucky, the relevant device file is listed. Its name is either `ttyUSB<NUM>` or `ttyACM<NUM>`. Example: `ttyUSB0`  
If the relevant device file is not listed, try the [extended procedure](#) (see [page 759](#)) below.
4. Open the IGEL Setup, go to **System > Registry > devices > serial > inputattach**.
5. Set the **devices.serial.inputattach.com0.port** to the device file you have found. Example: If the device file is `ttyUSB0`, enter `/dev/ttyUSB0`
6. Activate **devices.serial.inputattach.com0.enabled**.

7. If the device's baud differs from 9600 (default), enter the correct baud under **devices.serial.inputattach.com0.baud**.

 With most barcode readers, you can change the baud by scanning a specific bar code.

8. Click **Apply** or **Ok** to submit the new settings. To make absolutely sure that the new settings are effective, you can reboot the endpoint device.
9. Check if the barcode scanner is working.

### Extended Procedure: Device File Was Not Found on the First Go

If the device file could not be found using the simple procedure, try loading the device driver manually. As the explicit loading of the driver must be executed with every system start, a custom command must be added.

1. In the terminal, enter the following commands, one after the other:

```
modprobe cdc-acm
```

```
dmesg | grep tty
```

The relevant device file is listed. Its name is either `ttyUSB<NUM>` or `ttyACM<NUM>` .

Example: `ttyACM0`

2. Open the IGEL Setup, go to **System > Registry > devices > serial > inputattach**.
3. Set the **devices.serial.inputattach.com0.port** to the device file you have found. Example: If the device file is `ttyUSB0` , enter `/dev/ttyACM0`
4. Activate **devices.serial.inputattach.com0.enabled**.
5. If the device's baud differs from 9600 (default), enter the correct rate under **devices.serial.inputattach.com0.baud**.

 With most barcode readers, you can change the baud by scanning a specific barcode.

6. Go to **System > Firmware Customization > Custom Commands > Base** and under **Initialization**, enter `modprobe cdc-acm`
7. Click **Apply** or **Ok** to submit the new settings. Reboot the device.
8. Check if the barcode scanner is working.

## Using DriveLock with IGEL Devices

### Issue

DriveLock allows the system administrator to control access to removable devices within Citrix or RDP sessions. This is possible for USB devices; as of IGEL OS version 10.04.100, SATA devices are also supported.

### Problem

How to integrate DriveLock solution with IGEL OS devices?

### Solution

After configuring the Citrix or RDP server according to the original documentation, you have to activate the DriveLock virtual channel in the Setup. See the original DriveLock documentation.

#### Using DriveLock with RDP:

1. In **Devices > Storage Devices > Storage Hotplug**, change the settings as follows:
  - Deactivate **Enable dynamic client drive mapping**.
  - Set **Number of storage hotplug devices** to 1 or higher.
  - Activate **Private drive letter for each storage drive**.
2. In **Sessions > RDP > RDP Global > Mapping > Drive Mapping**, change the settings as follows:
  - Activate **Enable Drive Mapping**.
3. In **Sessions > RDP > RDP Global > Mapping > Device Support**, change the settings as follows:
  - Activate **DriveLock channel**.

#### Using DriveLock with Citrix:

1. In **Devices > Storage Devices > Storage Hotplug**, change the settings as follows:
  - Deactivate **Enable dynamic client drive mapping**.
  - Set **Number of storage hotplug devices** to 1 or higher.
  - Activate **Private drive letter for each storage drive**.
2. In **Sessions > Citrix > Citrix Global > Mapping > Drive Mapping**, change the settings as follows:
  - Enable **Activate Drive Mapping**.
3. In **Sessions > Citrix > Citrix Global > Mapping > Device Support**, change the settings as follows:
  - Activate **DriveLock channel**.



## Restricting the Mounting of Hotplug Storage Devices on IGEL Linux

### Goal:


You want to restrict the mounting of hotplug storage devices.

### Solution:

As of *IGEL Linux version 5.10.100*, the following registry keys let you disable the mounting of hotplug storage devices based on the device class (floppy, optical, harddisk, flash, other).

- `devices.hotplug.enable_floppy`
- `devices.hotplug.enable_optical`
- `devices.hotplug.enable_harddisk`
- `devices.hotplug.enable_flash`
- `devices.hotplug.enable_other`

These are all of type **bool**. Their default value is **true**. If true, mounting volumes on floppies, optical media, harddisks, flash memory devices, and others is enabled respectively.

 Even if the above settings allow mounting hotplug storage devices, the following settings may still restrict it:

- **Devices > USB access control**
- **Devices > Storage Devices > Storage Hotplug**

In order to disable mounting of a device class system-wide:

1. In setup, go to **System > Registry**.
2. In the **Parameter** tree, open **Devices > hotplug**.
3. To disable the mounting of a device class, uncheck its **Enable hotplug [...]** parameter.

## When to Use USB Redirection

### **Solution Based on Experience from the Field**

This article provides a solution that has not been approved by the IGEL Research and Development department. Therefore, official support cannot be provided by IGEL. Where applicable, test the solution before deploying it to a productive environment.

## Document Purpose

In general, USB redirection is not needed for standard functionality such as; audio, video, HID input, etc. However, in some special circumstances, a device may need to be redirected into a VDI session for full functionality, or if it requires a specific driver to function.

For webcams, see [Webcam Redirection and Optimization](#) (see page 708).

Use USB redirection ONLY WHEN ABSOLUTELY REQUIRED.

In this document, we will define the best practices for using USB redirection in a VDI environment, and go through the process with an example.

The example described here is for VMWare Horizon, but it is similar for Citrix, RDS, and most other VDI technologies as well.

## Best Practices for USB Redirection

Below are some general rules that, if followed, will provide the best performance and reliability when using USB redirection.

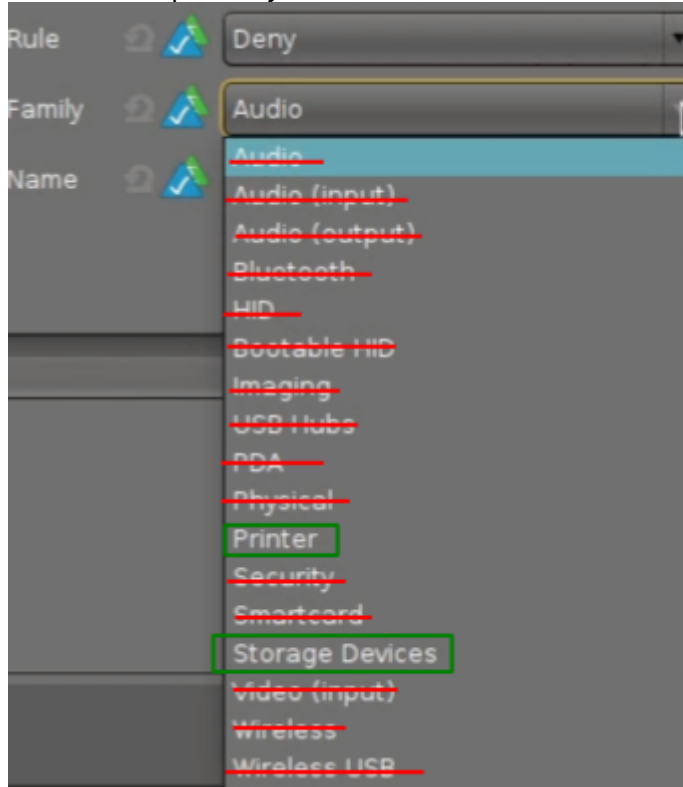
- ALWAYS set the default rule to "Deny".
- DO use VID and PID to redirect devices whenever possible. This is the best way to make sure that a device is redirected and that the USB virtual channels are not flooded with excess redirection.
- Enable USB redirection for the minimal amount of devices required to support user workflows
- As a rule, the USB classes below should NEVER be redirected. Instead, redirect individual devices in these classes using **Device Rules**.

<b>Audio</b>	<b>Audio (input)</b>	<b>Audio (output)</b>	<b>Bluetooth</b>
<b>HID</b>	<b>Bootable HID</b>	<b>Imaging</b>	<b>USB Hubs</b>
<b>PDA</b>	<b>Physical</b>	<b>Security</b>	<b>Smart Card</b>
<b>Video (input)</b>	<b>Wireless</b>	<b>Wireless USB</b>	

- The following classes may be redirected in specific circumstances:
  - **Printers**
    - Only if CUPS configurations or a third party does not fill this requirement

- **Storage**

- Only if mass storage options do not meet the requirements for user workflows or software compatibility



**i** Rules are meant to be broken, right? If redirecting these classes is the only way things work, take a deeper look and see if there is a better way. If there is no obvious better way, then test thoroughly before moving into production.

## Example: Redirecting a Nuance Powermic (Dictaphone)

Below we will run through the basic process of redirecting a single device into a Horizon VDI session from an IGEL device.

**i** Some devices, including the Nuance Powermic, require custom split rules in Horizon, which will not be covered in this article. The splitting can be done with Horizon Group Policy on the VM, or as additional settings on IGEL. Please contact your vendor for their best practice for the devices.

### Prerequisites

1. Make sure that **Devices > USB Access Control** is disabled on the IGEL devices, or make sure there are no USB access control rules restricting access to the USB device. More information about IGEL USB access can be found under USB Access Control.
2. USB redirection policies for Horizon/Citrix/RDS must be configured to allow redirection to happen

3. The VDI image must have compatible drivers installed for the devices being redirected into the session

## Getting Device Information from IGEL

The first step that needs to be done, is to identify the device's vendor ID and product ID which will be used to create our redirection rule.

1. Plug in the USB device to an IGEL terminal.
2. Connect to the IGEL device using SSH or **IGEL Secure Terminal**.
3. Log in as **user** with the user password set by the IGEL profile.
4. Type `su` to switch to the root account and provide the root password when prompted.
5. Run `lsusb` to display a list of devices and locate the device.
6. Note the **ID numbers** separated by a colon ":"
  - a. In the Dictaphone example, this is `0554` and `1001`.
  - b. The first number is the vendor ID (VID) and the second is the product ID (PID).

```

root@HW-UD3-2020:/userhome# lsusb
Bus 002 Device 002: ID 174c:3074 ASMedia Technology Inc. ASM1074 SuperSpeed hub
Bus 002 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub
Bus 001 Device 005: ID 076b:3031 OmniKey AG
Bus 001 Device 004: ID 067b:23a3 Prolific Technology, Inc.
Bus 001 Device 008: ID df04:0004
Bus 001 Device 007: ID 0554:1001 Dictaphone Corp.
Bus 001 Device 006: ID 0451:2036 Texas Instruments, Inc. TUSB2036 Hub
  
```

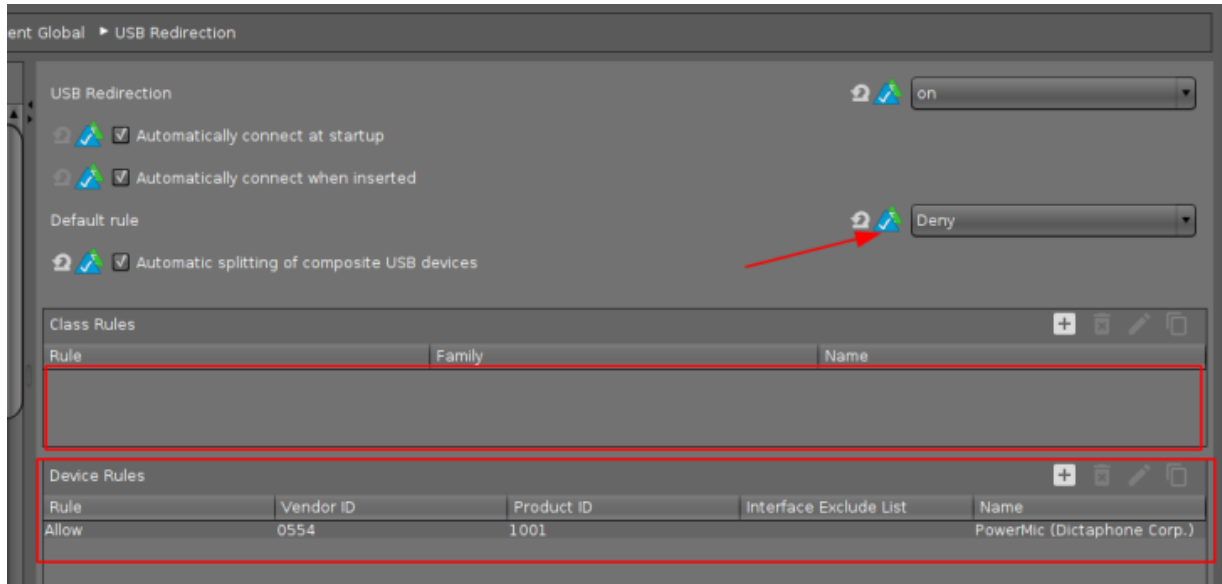
**i** If the device cannot be easily identified by name, then disconnect the device and run `lsusb` again to see which one disappeared.

## Configuring the IGEL Profile

1. Create a new profile in UMS called "USB Redirection".
2. Go to the **USB Redirection** page for your session.
3. Set **USB Redirection** to "on" and set the **Default rule** to "Deny".
4. Make sure that both **Automatically connect at startup** and **Automatically connect when inserted** are both **enabled**.
5. Clear out any existing **Class Rules** that may have previously existed (if using an existing profile).
6. Add a **Device Rule** using the **Vendor ID** and **Product ID** collected in the previous section, and set it to "Allow".

**✓** To make it easy, set the name of the rule to match the device name.


7. Apply the new profile to the device, and reboot for safe measures.  
The device should now be reflected in the Windows Device manager in the VDI session. If so, then the redirection rule is correct and working as expected.



If the device shows up as **unknown** then most likely a driver will need to be installed in the OS to support the device.

## How to Configure USB Access Control


You can allow and prohibit the use of USB devices on your endpoint device. Specific rules for individual devices or device classes are possible.

 The activation of **USB Access Control** and setting the **Default rule** to **Deny** will block the use of USB devices locally and in the session and, thus, might disable devices needed for the users. Therefore, activate the USB access control only if your security policy requires that. In this case, set **Default rule** to **Deny** and configure **Allow** rules for the required USB devices and USB device classes. It is recommended to make settings for **USB Access Control** as the last step in the device configuration. Before activating the USB access control, check that all your other settings for printers, Unified Communication, USB redirections, mapping settings for USB devices are working as expected. Note that the USB access control is completely separate than USB redirection for remote sessions, see [When to Use USB Redirection](#) (see page 762). Take also notice that the feature does not disable a USB port physically, i.e. power delivery will still work.

### Enable USB Access Control


1. Open the Setup and go to **Devices > USB Access Control**.
2. Enable the option **Enable**.
3. Select the **Default Rule**. The default rule specifies whether the use of USB devices is generally allowed or prohibited.
4. Create one or more rules for classes of devices or individual devices.

### Create a Class Rule

1. To create a new rule, click  in the **Class Rules** area.
2. Choose a **rule**. The rule specifies whether use of the device class defined here is allowed or prohibited.
3. Under **Class ID**, select the class of device for which the rule should apply. Examples: **Audio**, **Printer**, **Mass Storage**.
4. Under **Name**, give a name for the rule.
5. Click **OK**.
6. Save the changes.  
The rule is active.

### Create a Device Rule

 When a rule is defined, at least one of the properties **Vendor ID** or **Product ID** or **UUID** must be given.

1. To create a new rule, click  in the **Device Rules** area.
2. Choose a **rule**. The rule specifies whether use of the device defined here is allowed or prohibited.
3. Give the **Vendor ID** of the device as a hexadecimal value.

- 4. Give the **Product ID** of the device as a hexadecimal value.

**Getting USB Device Information**

To find out the **Class ID**, **Subclass ID**, **Vendor ID** and **Product ID** of the connected USB device, you can use the **System Information** tool. For further information, see Using “System Information” Function.

System Information example:

Alternatively, you can use the command `lsusb` (or `lsusb | grep -i [search term]`) in the terminal.

Example for `lsusb` :

```
Local Terminal
File Edit View Terminal Tabs Help
root@ITC005056930CAD:~# lsusb | grep -i logitech
Bus 002 Device 004: ID 046d:0a45 Logitech, Inc. 960 Headset
root@ITC005056930CAD:~#
```

- 5. Give the **Device UUID** (Universal Unique Identifier) of the device.
  - 6. Specify **Permissions** for the device.
- Possible values:

- Global setting: The default setting for hotplug storage devices is used; see **Default permission** parameter under **Devices > Storage Devices > Storage Hotplug**.
  - Read only
  - Read/Write
7. Under **Name**, give a name for the rule.
  8. Click **OK**.
  9. Save the changes.  
The rule is active.

### Example

- The set rule prohibits the use of USB devices on the device.
- A class rule allows the use of all entry devices (HID = Human Interface Devices).
- A device rule allows the use of the USB storage device with the UUID 67FC-FDC6.
- The use of all other USB devices, for example, storage devices or printers, is prohibited.

The screenshot displays the configuration interface for device rules. At the top, there are settings for 'Enable' (checked), 'Default rule' (set to 'Deny'), and 'Default permission' (set to 'Read/Write'). Below these are two tables: 'Class Rules' and 'Device Rules'. In the 'Class Rules' table, the 'Allow' rule for 'HID (Human Interface Device)' is highlighted. In the 'Device Rules' table, the 'Allow' rule for 'Storage Device' with 'Device uuid' '67FC-FDC6' and 'Permission' 'Read/Write' is highlighted.

Class Rules		
Rule	Class ID	Name
Allow	HID (Human Interface Device)	Allow HID

Device Rules					
Rule	Vendor ID	Product ID	Device uuid	Permission	Name
Allow			67FC-FDC6	Read/Write	Storage Device



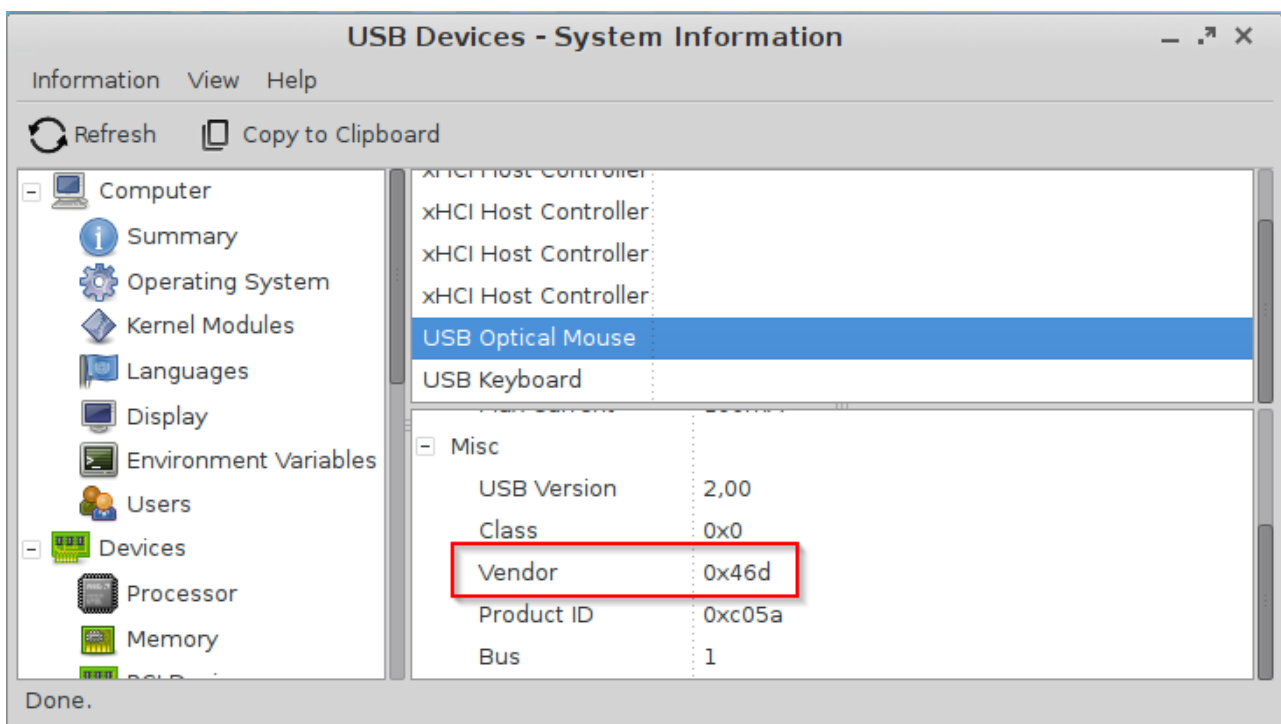
## Issues with USB IDs in USB Devices Rules

### Symptom

USB Device Rules you configured do not take effect.

### Problem

The **System Information** tool in IGEL OS up to version 11.04.100 omits leading zeros in USB vendor and product IDs. These are shown only three hexadecimal digits long.

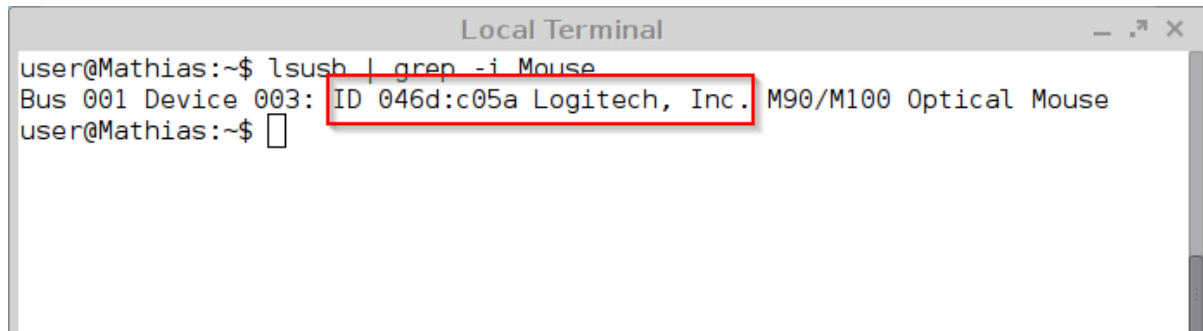


### Solution

If you see three-digit USB IDs in **System Information**, use the `lsusb` command:

1. Open **Local Terminal**.
2. Enter the `lsusb` command.
3. Look for the device in question, possibly using `grep` to search in the `lsusb` output:

```
lsusb | grep -i [search term]
```



```
Local Terminal
user@Mathias:~$ lsusb | grep -i Mouse
Bus 001 Device 003: ID 046d:c05a Logitech, Inc. M90/M100 Optical Mouse
user@Mathias:~$
```

4. Use the four-digit IDs that `lsusb` reports.

## Powerterm Session: USB scanner issues after update to LX 5.07.100

### Symptom

A Powerterm session is used in combination with a USB scanner.

After an update to LX 5.07.100, the scanner does not function like before.

### Problem

The scanner does not function as before, missing characters, etc.

### Solution

1. In Setup, go to **Sessions > Powerterm Terminal Emulation > PowerTerm Selection**
2. Select **PowerTerm Version 9.2.x**

## Printer

- [CUPS: Mapping Local Printer to Citrix or RDP Sessions \(see page 773\)](#)
- [Print Server Configuration \(see page 774\)](#)
- [Installing a Custom CUPS Driver \(see page 777\)](#)

## CUPS: Mapping Local Printer to Citrix or RDP Sessions

### Issue

How to map a locally connected PCL/PS-based printer to a Citrix or RDP session?

### Problem

The CUPS driver does not support all printer functions such as duplex, color profiles, etc.

### Solution

1. Open local IGEL Setup or UMS configuration or profile.
2. Go to **Devices > Printer > CUPS > Printers**.
3. Create a new printer and define a **Printer Name**.
4. Select the **Printer Port** your printer is connected to.
5. Set **Manufacturer = Generic**.
6. Set **Printer names = Raw Queue**.
7. Switch to the tab **Mapping in sessions**.
8. Enable **Map Printer in ICA Sessions** or **Map Printer in RDP Sessions**.
9. Enable the radio button **Use Custom Windows Driver Name**.
10. Enter the exact name of the Windows driver installed on the server.
11. Check if **Sessions > Citrix > Citrix Global > Mapping > Printer > Client printer mapping** or **Sessions > RDP > RDP Global > Mapping > Printer > Enable Client Printer Mapping** is enabled.
12. Start the ICA or RDP session and install the printer driver with the redirected port named `TS00x/ClientPort`.

## Print Server Configuration

### Prerequisites

- IGEL OS version 10 or higher
- Printer with the integrated PCL/PS controller.

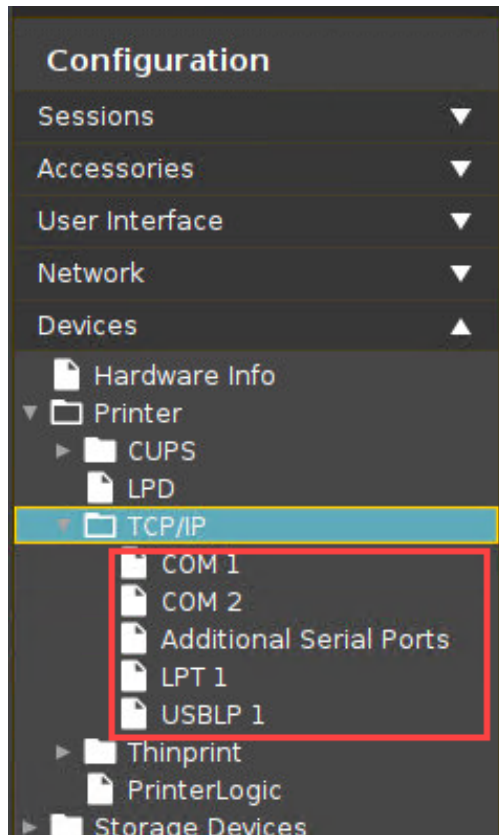
### Recommendation

Assign a fixed IP address to the IGEL device or reserve one for it via DHCP.

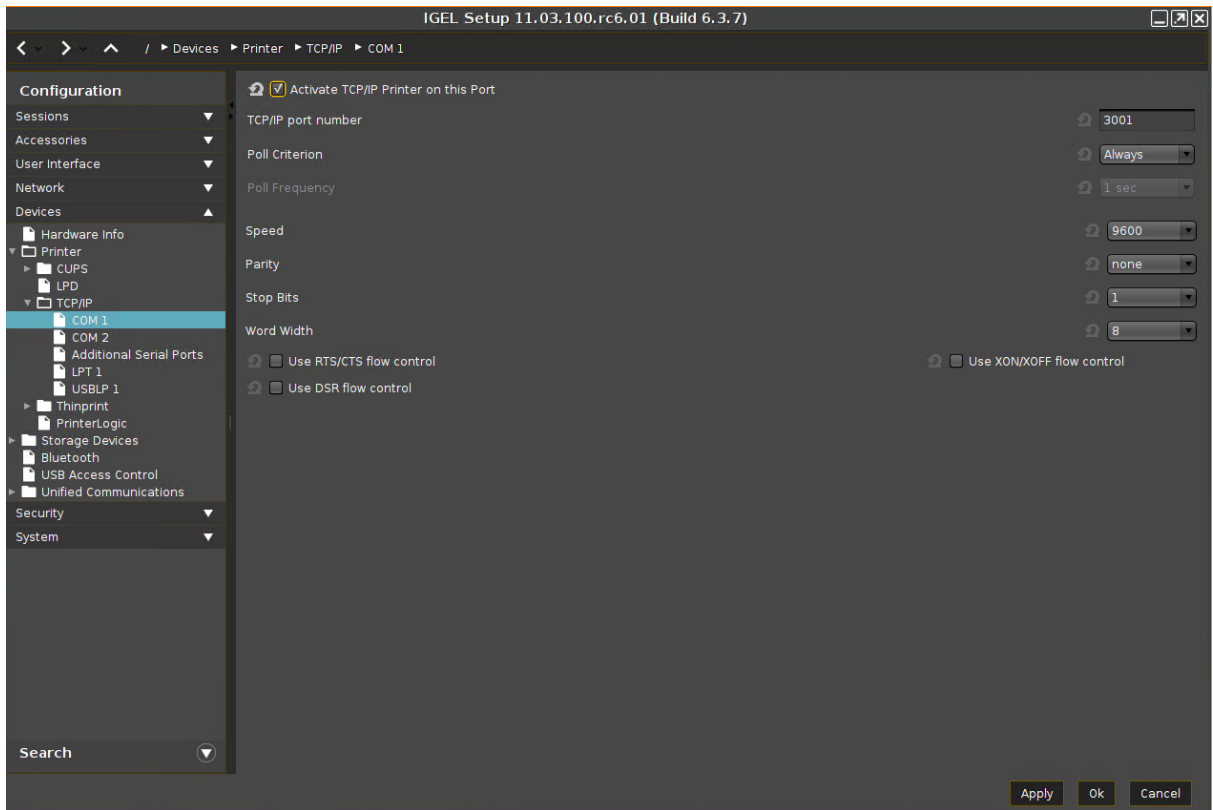
### Instructions

To use the IGEL device as a print server for locally connected printers, follow the steps below:

1. In the IGEL Setup, go to **Devices > Printer > TCP/IP**.
2. Select the port to which the printer is connected.
  - COM 1
  - COM 2
  - Additional Serial Ports
  - LPT 1
  - USBLP 1



3. Enable **Activate TCP/IP Printer on this Port.**  
Enter the **TCP/IP port number** on which the print server service is listening. (Windows default: 9100)  
**Poll Criterion** and **Poll Frequency** must only be adjusted if required by the environment.
4. Click **Apply** or **Ok** to save the settings.



The printer can be installed and used by other systems like a regular network printer.



## Installing a Custom CUPS Driver

### Environment

IGEL Linux v5 and higher.

### Issue

Your printer is not included in the CUPS default configuration.

### Solution

You can install a custom driver from your manufacturer.


#### Copying the PPD Driver File to the Device

- ▶ Copy the driver file (PPD file) to the folder `/wfs` using the UMS file transfer mechanism, see Files.

#### Adding a New CUPS Driver

Now that you have copied the driver file to the device, you have to add a new printer and set the PPD file as the driver definition. To do so, proceed as follows:

 For a detailed description of the CUPS configuration options, see CUPS.

1. In Setup, go to **Devices > Printer > CUPS > Printer**.
2. Click  to get to **Add** dialogue.
3. Define the following settings:
  - **Printer name:** Name of the printer.
  - **Printer port:** Port to which the printer is connected. Depending on which type you select, you will have to provide additional information, e.g. server and port in the case of **TCP Printer Port**.
  - **Manufacturer:** Choose **Custom**, which will bring up the **Driver definition** field.
  - **Driver definition:** Enter the absolute path to the PPD file.
4. Click **Ok** to save the settings.
5. Restart your device.

## UD Pocket

- [Running IGEL OS from UD Pocket on a Dell WYSE ZX0D \(aka 7010\) Device \(see page 779\)](#)
- [Running UD Pocket on an Acer Chromebook C910 \(see page 780\)](#)
- [How to Boot from the UD Pocket on Mac mini, MacBook Air 2018, MacBook Pro \(see page 781\)](#)

## Running IGEL OS from UD Pocket on a Dell WYSE ZX0D (aka 7010) Device

Here you can learn which settings you have to make on the Dell WYSE ZXoD (aka 7010) to be able to start the device with a UD pocket.

1. Boot up the Dell device.
2. In the BIOS go to the **Advanced** tab.
3. Enable **Boot From USB**.
4. Change to the **Boot** tab.
5. Change the boot priority to make **USB HDD** the default by moving it to the top.
6. Save the settings
7. Put in the UD Pocket

See this video:




Sorry, the widget is not supported in this export.  
But you can reach it using the following URL:

<https://www.youtube.com/watch?v=C0NWdjVE1RI>




## Running UD Pocket on an Acer Chromebook C910

You can use the IGEL UD Pocket with the Acer Chromebook C910. This requires installation of a BIOS extension which enables the device to boot into an alternative operating system.

 The procedures described here have been tested with the Acer Chromebook C910; the procedures may differ for other Chromebook types.

For further information, refer to [MrChromebox.tech](https://mrchromebox.tech)<sup>78</sup>.

### Enabling Your Device to Boot from UD Pocket

1. Ensure that you have a WiFi connection; this is required for downloading the SeaBIOS extension.
2. Boot into recovery mode by pressing [ESC] +  (Refresh) +  (Power) simultaneously.  
The recovery mode screen is shown, which states that the OS is broken.
3. Press [Ctrl] + [D] to enter developer mode.  
The developer mode screen is shown, confirming that OS verification is off.
4. Open a root-capable shell by pressing [Ctrl] + [Alt] +  (F2).
5. Login as `chronos`; no password is required unless one has been set.
6. Change to /tmp: `cd /tmp`.
7. Download the ChromeOS firmware utility script: `curl -LO https://mrchromebox.tech/firmware-util.sh`
8. Start the script with root permissions: `sudo bash firmware-util.sh`
9. Enter `1` to select the first option.
10. Enter `y` to confirm.  
The RW\_Legacy firmware is downloaded to your device.
11. When the download has completed, press [Enter].
12. Enter `r` to reboot.  
The device reboots into developer mode.
13. To boot from UD Pocket, press [Ctrl] + [L].

### Booting from UD Pocket

1. Ensure that the device is in developer mode. This should be the case if the device has been configured according to the procedures described above, and if since then no changes were made that have affected the developer mode.
2. Press [Ctrl] + [L] to boot from UD Pocket.

---

<sup>78</sup> <https://mrchromebox.tech>

## How to Boot from the UD Pocket on Mac mini, MacBook Air 2018, MacBook Pro

### **Solution Based on Experience from the Field**

This article provides a solution that has not been approved by the IGEL Research and Development department. Therefore, official support cannot be provided by IGEL. Where applicable, test the solution before deploying it to a productive environment.

### Environment

- Mac devices with an Apple T2 Security Chip, e.g. Mac mini, MacBook Pro, MacBook Air 2018, iMac Pro

### Problem

The secure boot implemented with the Apple T2 Security Chip does not allow to boot Linux on the above-mentioned devices. For details, see the German overview <https://www.computerbase.de/2018-11/apple-t2-linux-installation-umgehung/>. Therefore, some configuration changes on these devices are required to boot from the UD Pocket.

### Solution

Via the recovery menu, it is possible to disable the secure boot option. To do this, proceed as follows:

1. To get into the macOS recovery menu, press and hold the command key [⌘] + [R] during the boot process as soon as the Apple logo appears.
2. Under **Utilities**, select the **Startup Security Utility**.
3. Use an administrator account to deactivate the secure boot option under **Secure Boot > No Security**.

For more information about the Startup Security Utility on Mac devices, see <https://support.apple.com/en-us/HT208198>.

## Miscellaneous

- [Sending Device Log Files to IGEL Support](#) (see page 783)
- [Exporting the Local Device Configuration](#) (see page 791)
- [Which Unified Communication Solutions Does IGEL OS Support?](#) (see page 794)
- [Passthrough Authentication](#) (see page 795)
- [Hardware Video Acceleration on IGEL OS](#) (see page 810)
- [Running Commands before or after a Session](#) (see page 813)
- [Copy Sessions in Setup or UMS](#) (see page 815)
- [IZ1 and UD2-MM Usage of RAM](#) (see page 816)
- [Starting UMS Console Crashes NX Session](#) (see page 817)
- [Accessing IGEL Setup within Appliance Mode](#) (see page 818)
- [An Application Window Cannot Be Repositioned](#) (see page 819)
- [Updating IGEL UMD: Error "not compatible with System5"](#) (see page 821)
- [Will My Session Be Closed When My IGEL OS Endpoint Device Enters Suspend Mode?](#) (see page 822)

## Sending Device Log Files to IGEL Support

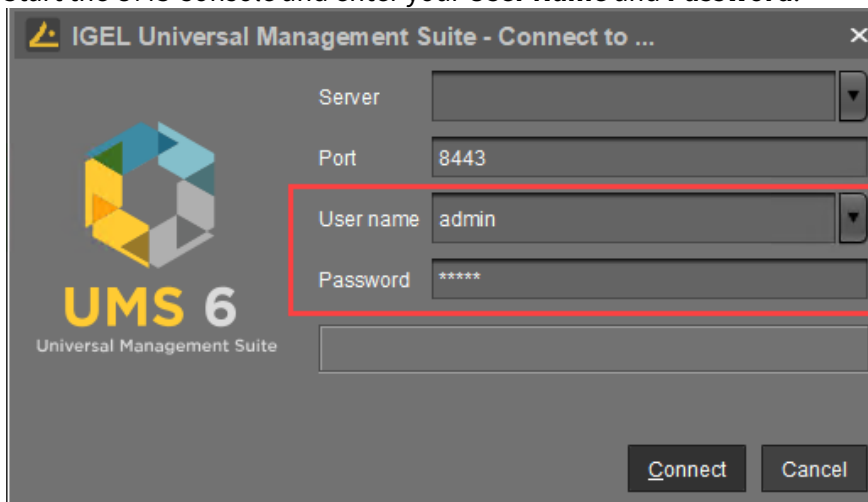
When the IGEL support team asks you to provide your device's log files, follow the instructions below.

There are two possibilities to send log files to the support team, one that uses the IGEL Universal Management Suite (UMS) and one that works locally with a USB memory stick:

- [With UMS](#) (see page 783)
- [Without UMS](#) (see page 788)

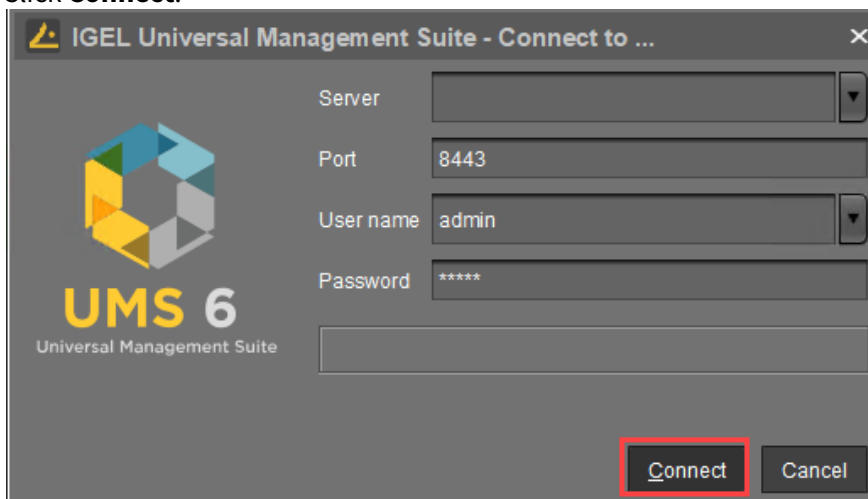
### With UMS

1. Start the UMS Console and enter your **User Name** and **Password**.



The screenshot shows the 'IGEL Universal Management Suite - Connect to ...' dialog box. On the left is the UMS 6 logo. On the right are input fields for 'Server', 'Port' (8443), 'User name' (admin), and 'Password' (\*\*\*\*\*). A red rectangular box highlights the 'User name' and 'Password' fields. At the bottom right are 'Connect' and 'Cancel' buttons.

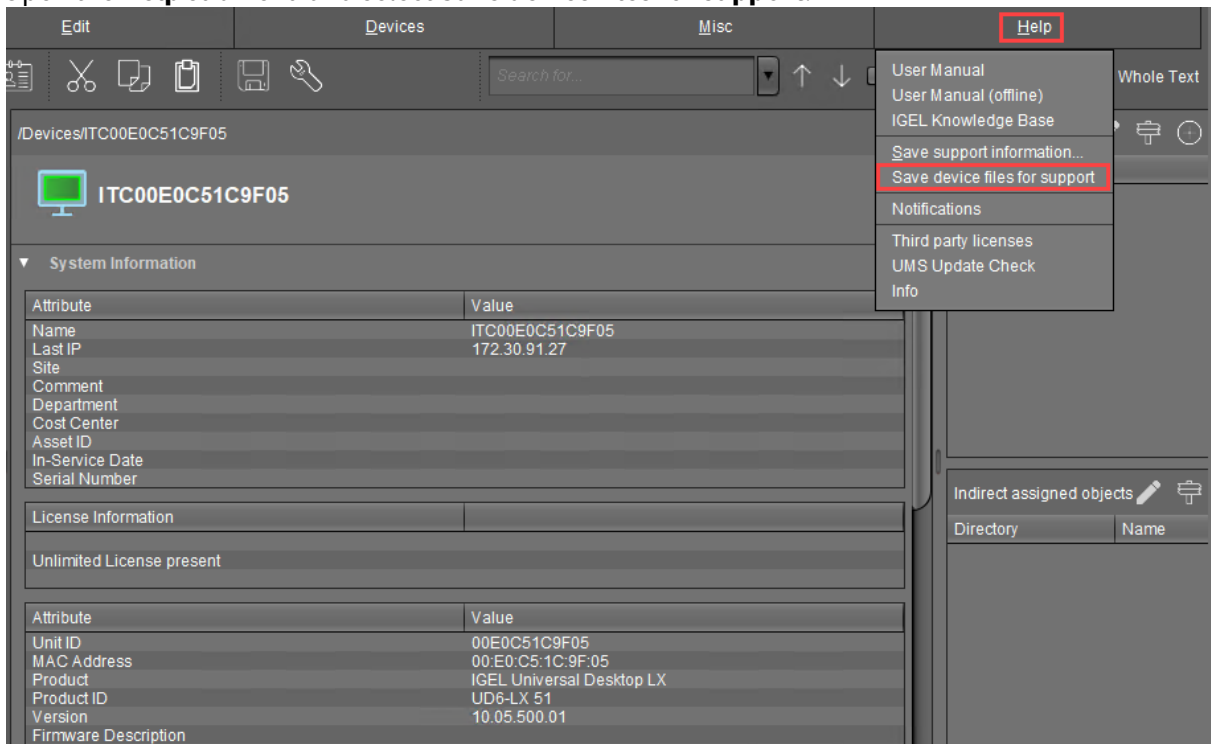
2. Click **Connect**.



This screenshot is identical to the previous one, but the 'Connect' button at the bottom right is highlighted with a red rectangular box.

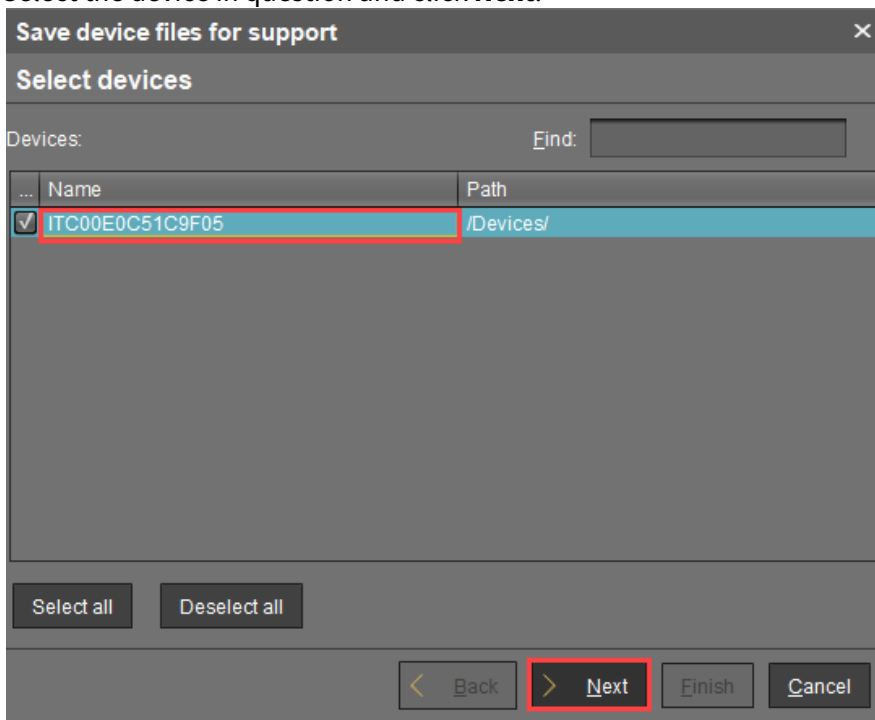
The UMS Console window opens.

- Open the **Help** submenu and select **Save device files for support**.



The dialog **Save device files for support** opens.

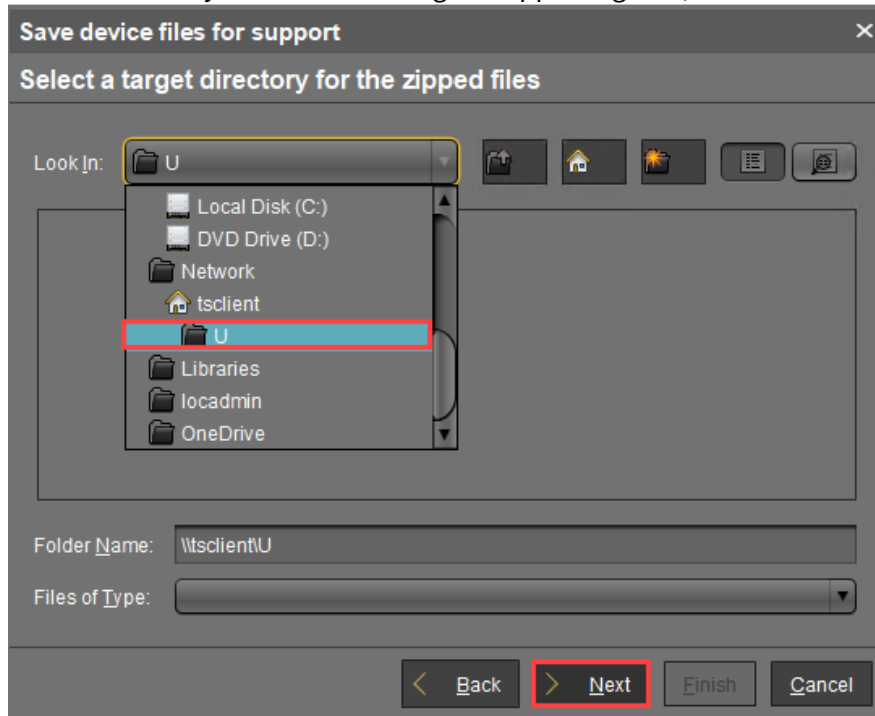
- Select the device in question and click **Next**.



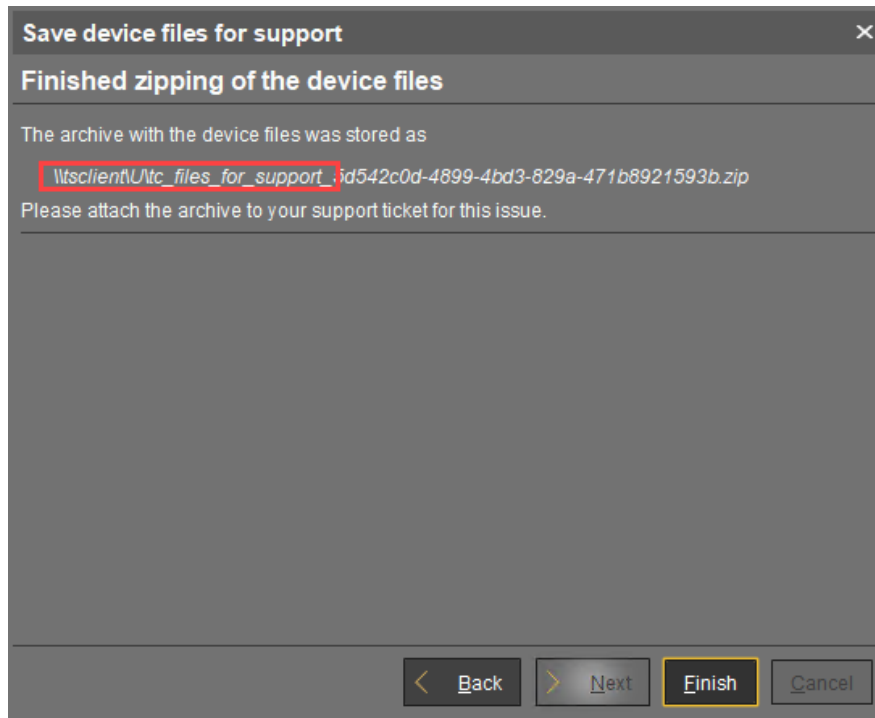
The dialog **Select a target directory for the zipped files** opens.



5. Select a directory suitable for saving the zipped log files, and click **Next**.

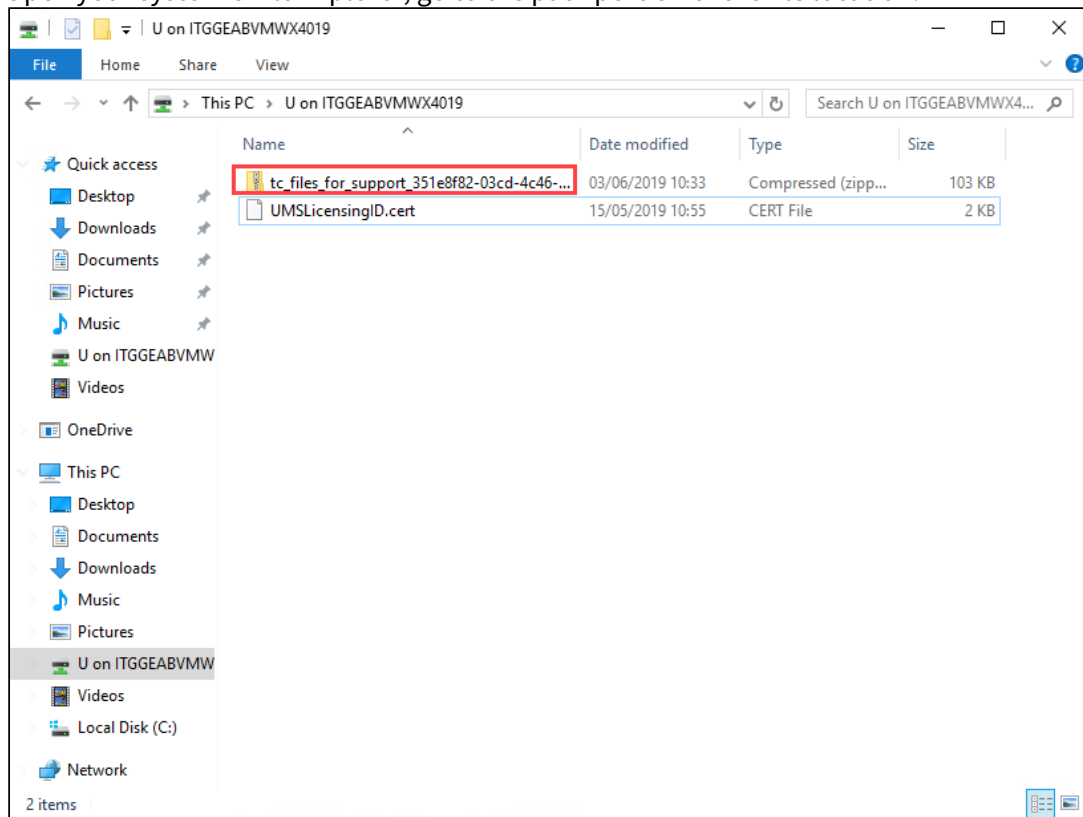


A confirmation dialog shows the path and file name under which the log files are stored. Depending on your system, you can copy the path using [Ctrl] + [C] and paste it into the File Explorer's address bar.



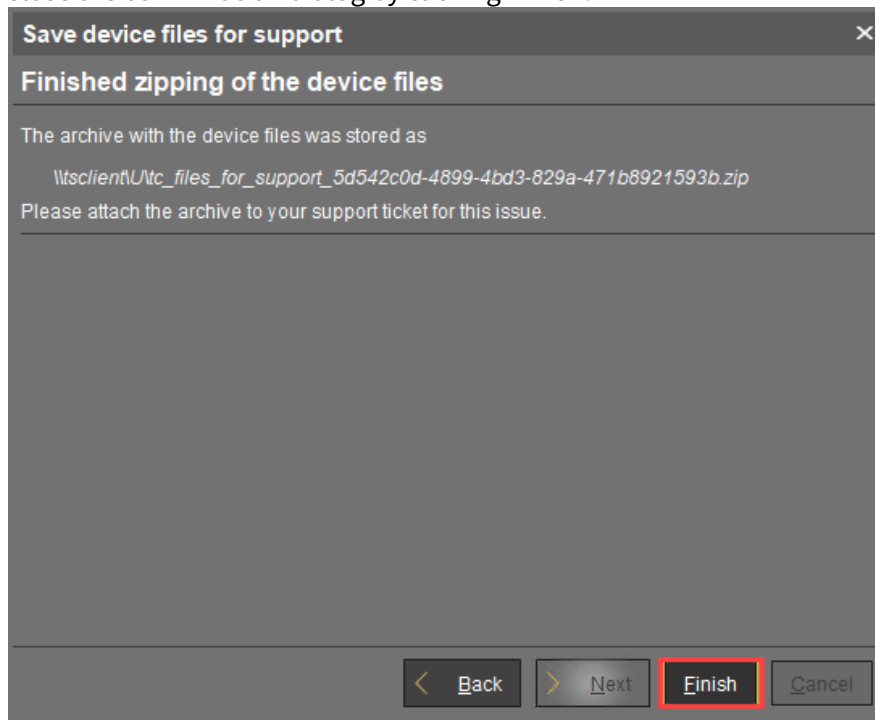
- i** Depending on your network, hardware, and the amount and size of the log files, the collection and the upload of the files might take up to a few minutes.
- In the case of failure, try the following:
- If you are using UMS 6.10.110 or higher: Go to **UMS Administration > Global Configuration > Device Network Settings** and change the parameter **Timeout for the device support file upload action (seconds)** to a higher value. The maximum is 9000 seconds.
  - Check if port 8443 is open for TCP connections.
  - If everything should fail, try the method described under [Without UMS \(see page 788\)](#).


6. Open your system's File Explorer, go to the path portion of the file location.



7. Send the ZIP file to the IGEL support team.

8. Close the confirmation dialog by clicking **Finish**.



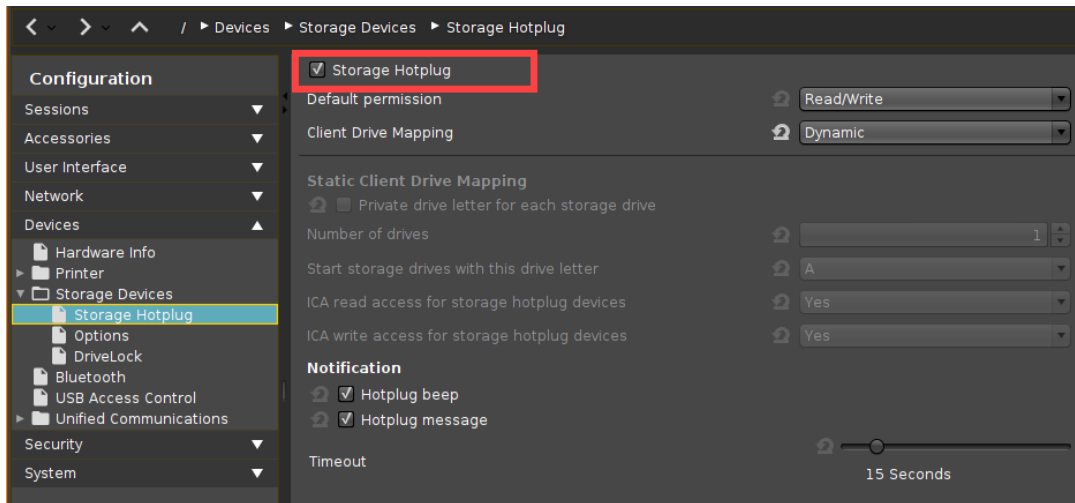
 The above procedure collects only those logs that have been written since the last system start. To allow persistent logs, you can configure a dedicated partition for debug logs. For more information, also on adding additional logs, see [Extended Logging With Syslog, Tcpdump and Netlog](#) (see page 384).


## Without UMS

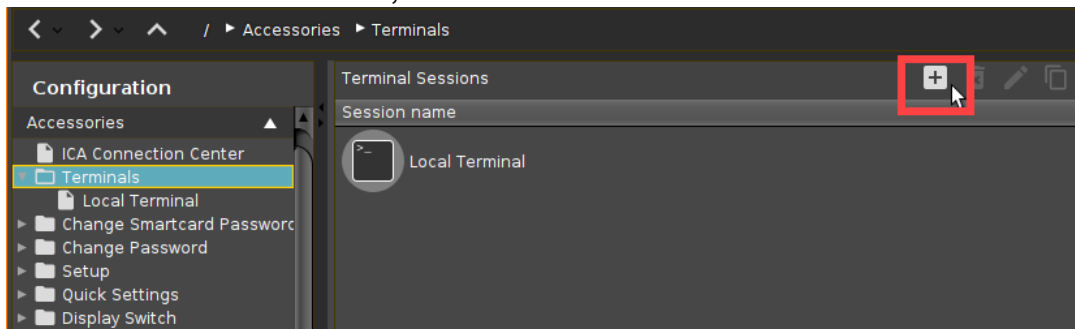
When the UMS is not accessible or there is an issue with network connectivity, you can still extract system logs from a device and send them to support. You will need a USB stick, preferably formatted to NTFS format, to transfer the logs to.

### Setting Up the Device

1. In the IGEL Setup, go to **Devices > Storage Devices > Storage Hotplug** and enable **Storage Hotplug**.

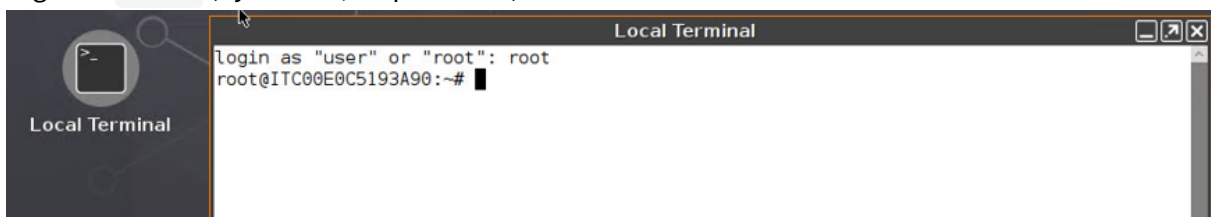


2. Under **Accessories > Terminals**, click  to create a terminal session.



### Identifying the USB Stick

1. Plug the USB stick into the IGEL OS device and start the terminal session.
2. Log in as `root` (by default, no password).



3. Enter the following commands:

```
cd /userhome/media
ls -l
```

- Note the name of the USB stick:

```
Local Terminal
login as "user" or "root": root
root@ITC00E0C5193A90:~# cd /userhome/media
root@ITC00E0C5193A90:/userhome/media# ls -l
total 4
drwxr-xr-x 1 user users 4096 Nov 10 12:01 NEW VOLUME
root@ITC00E0C5193A90:/userhome/media#
```

## Writing the Log File

- In the terminal, run the command `cd /userhome/media/[Name of your USB stick]`.

If there are spaces in the device name, use quotation marks `"`. Example: `cd /userhome/media/"NEW VOLUME"`

If there are no spaces in the device name, quotation marks are not required.

- Run the command `journalctl > logfile.txt`. This will create the system log files on the USB stick with the file name `logfile.txt`.

```
Local Terminal
root@ITC00E0C5193A90:~# cd /userhome/media/"NEW VOLUME"
root@ITC00E0C5193A90:/userhome/media/NEW VOLUME# journalctl > logfile.txt
root@ITC00E0C5193A90:/userhome/media/NEW VOLUME#
```

- Safely eject the USB stick from the IGEL OS device.  
You can now examine this log file yourself or send it to IGEL support for analysis.

## Exporting the Local Device Configuration

### Issue

There is a specific support case and you need to read out the current local configuration of the device.

### Solution

If you need to read out the current local configuration of the device (e.g. during a support case), you can copy the two local files `setup.ini` and `group.ini` either locally or via the IGEL UMS.

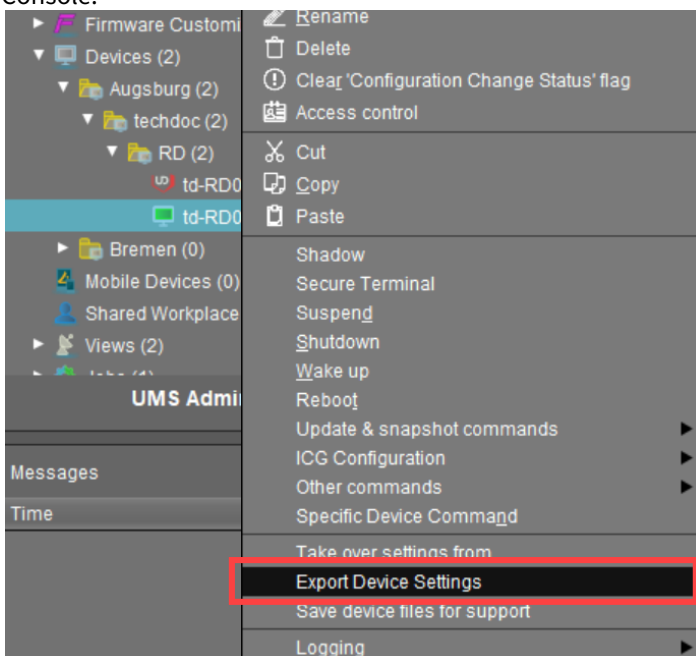
#### Option 1: Via UMS Console > Help > Save device files for support

You can transfer the `setup.ini` and `group.ini` files together with the device's log files as described in the section "With UMS" under [Sending Device Log Files to IGEL Support](#) (see page 783).

#### Option 2: Via UMS Console > [device's context menu] > Export Device Settings

Alternatively, you can export the effective settings that affect the device (i.e. the interaction of local settings and all profiles) as an XML file: **UMS Console > [device's context menu] > Export Device Settings**.

The IGEL Support can import this file into the UMS as a profile and view the effective settings directly in the UMS Console.



### Option 3: Via UMS Console > [device's context menu] > Other commands > Device File->UMS

You can also transmit the `setup.ini` and `group.ini` files from the device to the UMS as follows:

1. In the UMS Console, select **Other commands > Device File->UMS** from the device's context menu or under **Devices** in the menu bar.
2. Under **Device file location**, specify `/wfs/` as the source.  
Example: `/wfs/setup.ini`
3. Under **Target URL**, select the destination on the UMS Server and enter the name of the transferred file under **File Name**.  
Example: `https://umsserver.domain:8443/ums_filetransfer/setup.ini`
4. Click **Device File->UMS**.  
The file will be transferred to `/rmguiserver/webapps/ums_filetransfer`.

### Option 4: Via copying to a USB storage device

You can also save the files locally on a FAT32-formatted USB stick:

1. In the IGEL Setup, go to **Devices > Storage Devices > Storage Hotplug** and enable **Storage Hotplug**.  
If you use static client drive mapping, make sure that the **Number of drives** is greater than zero.  
See Storage Hotplug.
2. Create a terminal session under **Accessories > Terminals**.
3. Connect your USB stick.
4. Open the terminal and log in as `root`.

 To find out the name of the USB stick, you can use the commands:

```
cd /userhome/media
```

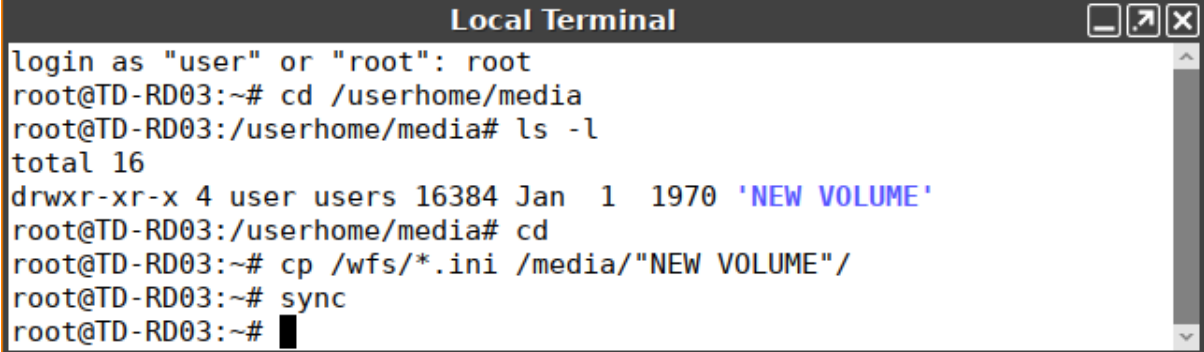
```
ls -l
```

If there are spaces in the device name, you'll have to include it later in the quotation marks "".  
If there are no spaces in the device name, quotation marks will not be required.

5. Type `cp /wfs/*.ini /media/[name of USB storage device]/` and press [Return] to copy all `.ini` files from your endpoint device, incl. `setup.ini` and `group.ini`, to the USB stick.



6. Type `sync` and press [Return]. Wait a few seconds before safely ejecting the USB stick from the endpoint device.

A screenshot of a terminal window titled "Local Terminal". The window has a dark background and a light-colored text area. The text shows a sequence of commands and their outputs: a login prompt, a directory change to /userhome/media, a file listing command (ls -l) showing a directory named 'NEW VOLUME', a directory change to the new volume, a copy command (cp /wfs/\*.ini /media/"NEW VOLUME"/), and finally the sync command. The terminal ends with a prompt and a cursor.

```
login as "user" or "root": root
root@TD-RD03:~# cd /userhome/media
root@TD-RD03:/userhome/media# ls -l
total 16
drwxr-xr-x 4 user users 16384 Jan  1  1970 'NEW VOLUME'
root@TD-RD03:/userhome/media# cd
root@TD-RD03:~# cp /wfs/*.ini /media/"NEW VOLUME"/
root@TD-RD03:~# sync
root@TD-RD03:~# █
```

## Which Unified Communication Solutions Does IGEL OS Support?

This article provides an overview of the Unified Communication software and hardware solutions that are supported by IGEL OS.

### Hardware

- Jabra Handsets / Headsets
- Poly Headsets
- EPOS/Sennheiser

### Virtual Desktop Optimizations

The virtual desktop optimizations provide the endpoint device with a media engine and redirect the audio and video streams so that they are exchanged directly between the endpoint devices. This results in higher performance and a lower server load.

#### For Citrix Sessions

- Skype for Business; for configuration, see the chapter Skype for Business in the IGEL OS Reference Manual.
- Cisco Jabber (JVDI Client); for configuration, see the chapter Cisco Jabber in the IGEL OS Reference Manual.

#### For Horizon Sessions

- Skype for Business; for configuration, see the chapter Skype for Business in the IGEL OS Reference Manual.

### Local Installation on the Endpoint Device with a Custom Partition

In contrast to the virtual desktop optimizations, where the Unified Communication apps are installed on the VDI server, this approach involves installing the apps on the endpoint device. This is achieved by using the Custom Partition mechanism of IGEL OS.

For building a Custom Partition by yourself, see the [Custom Partition Tutorial](#) (see page 546).

You can acquire any of the following Custom Partitions free of cost; just ask your IGEL contact:

- TeamViewer
- Zoom (see also [Zoom as a Custom Partition](#) (see page 588) in the [Custom Partition Tutorial](#) (see page 546))

## Passthrough Authentication

Passthrough authentication is a convenient single sign-on method. With this function, an IGEL user logs in once and gains access to all sessions without having to explicitly authenticate themselves again for each of them.

This document explains what basic settings are necessary for passthrough authentication and where you can enable the single sign-on method in the relevant sessions.

- [Introduction](#) (see page 796)
- [Basic configuration](#) (see page 798)
- [Session Configuration](#) (see page 805)

### IGEL Tech Video



Sorry, the widget is not supported in this export.  
But you can reach it using the following URL:

<https://www.youtube.com/watch?v=JxGOEGAb3LI>

## Introduction

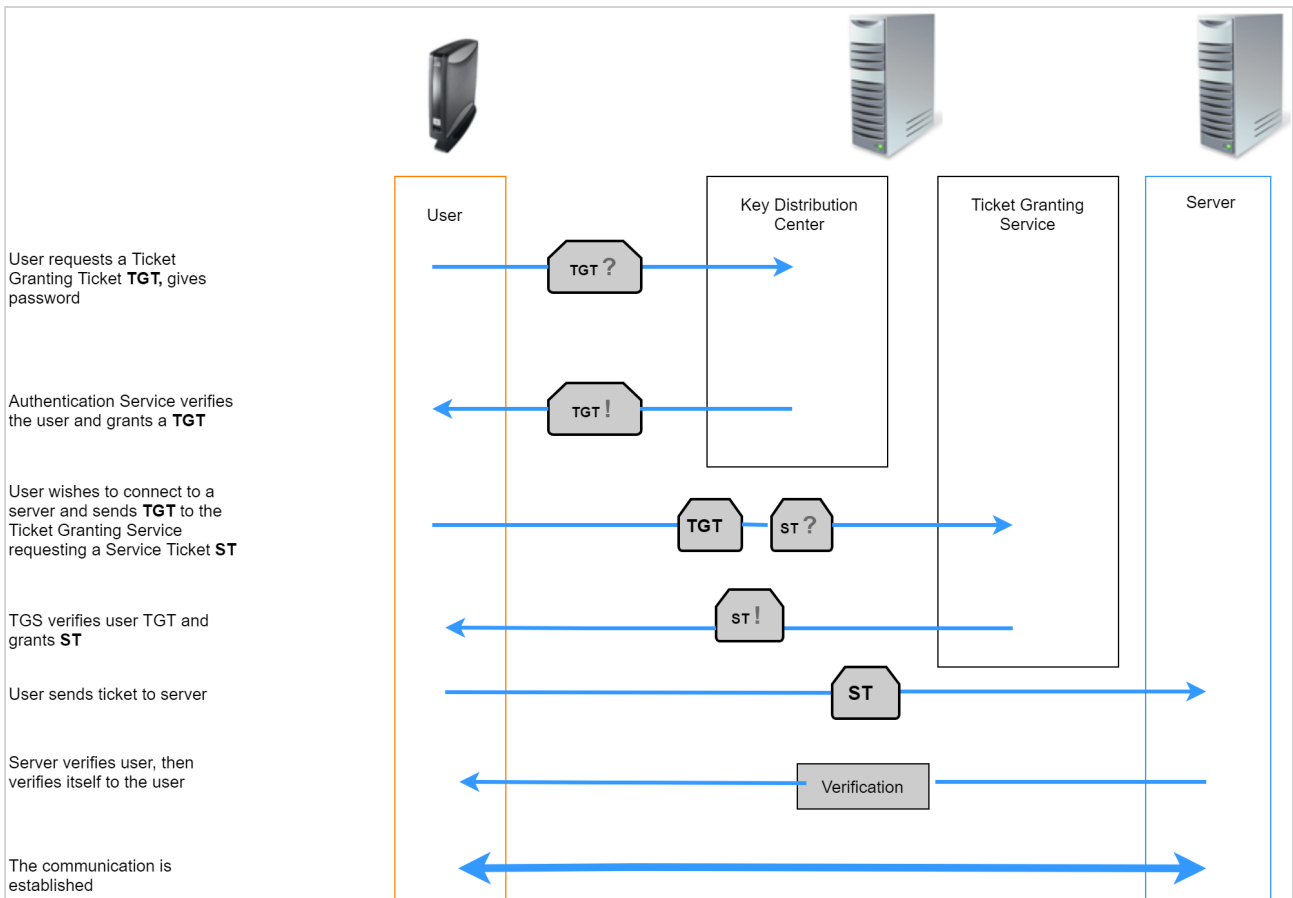
Two methods of single sign-on for a session are available:

Kerberos Passthrough	<p>Real Kerberos authentication with clients that support Kerberos.</p> <p>Within a session, you can access network resources, e.g. file servers, without having to authenticate yourself again; this works automatically via Kerberos.</p>
Passthrough	<p>Uses cached credentials (user name and password) from local log-on for authentication.</p> <p>For access to network resources within sessions, you have to enter your credentials again.</p>

Kerberos is an authentication service. It operates with user, service and computer entities which are known as **principals**. These principals all belong to a **realm**, an administrative unit. Each principal has a unique **principal name** within the realm. To provide the authentication system, a service known as **key distribution center** is used.

As an example, Microsoft Windows Domains form a realm. The Windows Domain name is the realm name (in upper case letters), e.g. `EXAMPLE.COM`. A user principal would be for example `user@EXAMPLE.COM`. The domain controllers take on the role of the key distribution centers.

When logging in, a user obtains a **ticket granting ticket** from the key distribution center. This ticket expires after a certain time (usually 1 day). When the user starts an ICA session for example, the client can obtain a so-called **service ticket** from the key distribution center with the aid of the ticket granting ticket. With this service ticket, authentication for the ICA server is accomplished.




To enable passthrough authentication you have to make certain settings:

1. [Modify certain basic settings which are necessary to fulfill the conditions for Kerberos passthrough authentication. \(see page 798\)](#)
2. [Enable passthrough authentication in the relevant session. \(see page 805\)](#)

## Basic configuration

Your client configuration must fulfill certain conditions before you can enable passthrough authentication.

- [Set the time correctly on all involved hosts and clients.](#) (see page 799)
- [Configure the domain.](#) (see page 800)
- [Activate login to the Active Directory domain.](#) (see page 802)

 When activating the **Smartcard** login method, some additional configuration may be necessary (see page 803).

## Time

The time must be set correctly on all involved hosts and clients.

The best practice procedure is as follows:


1. Activate **Use NTP Time Server** under **System > Time and Date** in the setup.
2. Specify the **NTP Time Server**.

 A Windows domain controller can be used for this, if applicable.

## Domains/Realms

To configure the domain(s) proceed as follows:

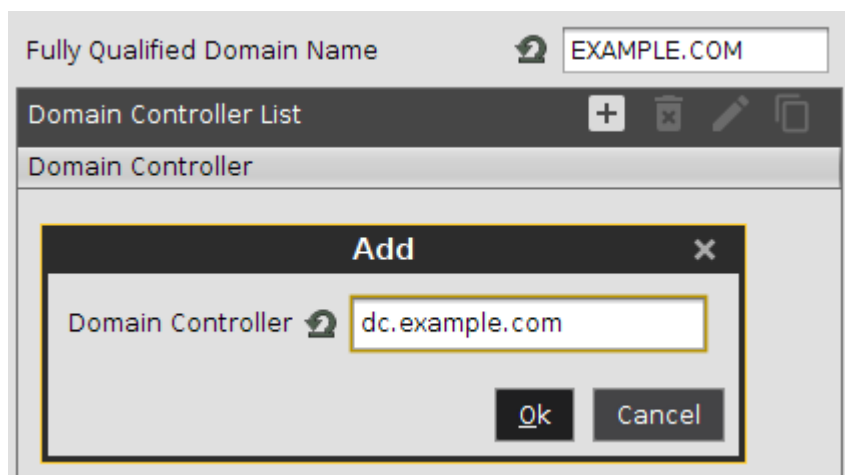
1. Click **Security > Active Directory/Kerberos**.
2. Activate **enable** to enable Kerberos.
3. Enter the fully qualified domain name under **Default Domain**, e.g. `EXAMPLE.COM` (upper case letters).
4. Enable **DNS Lookup for Domain Controller** and **DNS Lookup for Domain**.

 These settings are sufficient for the domain setup when the DNS servers, e.g. the domain integrated MS DNS servers, are aware of the Active Directory.

Otherwise you may configure up to 4 domains/realms:

1. Click **Security > Active Directory/Kerberos > Domain1...4**.
2. Enter the **fully qualified domain name**, e.g. `EXAMPLE.COM` (upper case letters).
3. Specify at least one Windows domain controller (Kerberos key distribution center) in the **Domain Controller List**.

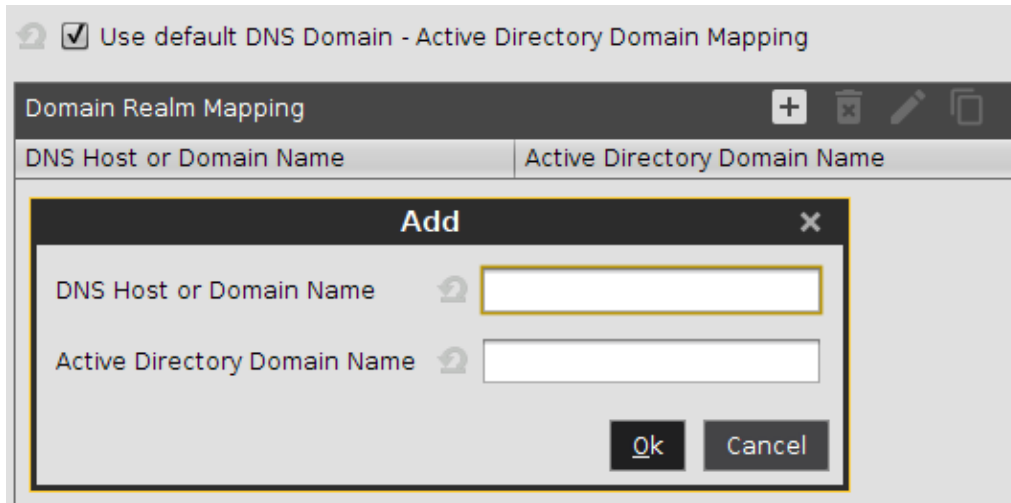
It can be a DNS name or an IP address.



4. Click **Security > Active Directory/Kerberos > Domain Realm Mapping** to define the mapping between Active Directory domain names and DNS names.



5. Activate **Use default DNS Domain - Active Directory Domain Mapping**.



**i** If both names match, i.e. if a host in the domain `EXAMPLE.COM` has the DNS name `host.example.com`, nothing needs to be done here and the default setting is sufficient. Otherwise an appropriate entry in the **Domain Realm Mapping** list has to be created.

## Login

1. Click **Security > Logon > Active Directory/Kerberos**.
2. Activate **Login to Active Directory Domain**.
3. Choose one or more of the following login options:
  - **Explicit:** A login dialog is presented to the user.
  - **Remember last user name:** The login dialog will be prepopulated with the last user name that logged in. This option can be checked for convenience if **Explicit Login** is selected.
  - **Smartcard:** Login with smartcard and related smartcard PIN.
4. Underneath **Logout Shortcut Locations**, specify where a log-out button will appear.


## Smartcard

For using the **Smartcard** login method, some additional configuration is necessary:

1. Under **Security > Logon > Active Directory/Kerberos**, activate **Smartcard**.
2. Under **Smartcard removal action**, define what should happen when the smartcard is removed:
  - **Log out**: Performs a disconnect or log out of running sessions, removes all user related data from the device and prepares the device for the next user login.
  - **Lock device**: Locks the screen during sessions. Only the user who is already logged in can unlock the device with his smartcard and PIN. Additionally, select **User password** under **User Interface > Screenlock / Screensaver > Options**, to make the setting effective.
3. Choose an appropriate PKCS#11 module under **Security > Smartcard > Middleware**.

 The smartcards for this login must be supported by a PKCS#11 module which can access the certificates on the smartcard.

Kerberos login with a smartcard involves certificates. The root certificate of the certificate used by the key distribution center (domain controller) must therefore be available on the device. Either the root certificate is one of the public trusted certificate authorities or it must be deployed to the device, see [Deploying Trusted Root Certificates](#) (see page 485).

 When using Windows 2000 or Windows Server 2003-based domain controllers in combination with smartcard login, the parameter `auth.krb5.realms.pkinit.pkinit_win2k` has to be activated in the registry. This enables the use of an earlier protocol version of PKINIT preauthentication .

## Kerberos Ports

The following Kerberos ports are relevant for Linux environments:

	UDP Port	TCP Port
Getting tickets including the initial TGT	88	88
Changing password from UNIX/Linux		749

## Session Configuration

For single sign-on with sessions, two methods are available:

- **Kerberos Passthrough:** Uses real Kerberos authentication with clients that support Kerberos.
- **Passthrough:** Uses cached user name and password from local logon for authentication.

 Currently, real Kerberos authentication is only available in Citrix sessions.

In the following sections, you can find how to activate passthrough authentication in sessions that support it:

- [Citrix StoreFront/Web Interface](#) (see page 806)
- [RDP](#) (see page 807)
- [Horizon Client](#) (see page 808)
- [Parallels Client](#) (see page 809)

## Citrix StoreFront/Web Interface

1. Go to **Sessions > Citrix > Citrix Global > StoreFront Login**.
2. Select the **Authentication type**:
  - **Password authentication**: To enable passthrough, this option must be selected, and **Use Passthrough authentication** must be activated.
  - **Kerberos passthrough authentication**
  - **Smartcard authentication (StoreFront only, not Web Interface)**: Authentication via smartcard will only work with StoreFront, not with Web Interface.
  - **Citrix authentication mechanism (instead of IGEL), Smartcard disabled**
  - **Citrix authentication mechanism (instead of IGEL), Smartcard enabled**

See also StoreFront Login.

## RDP

For RDP sessions, passthrough is supported. Kerberos passthrough is not yet supported.

1. Go to **Sessions > RDP > RDP Sessions > [session name] > Logon**.
2. Enable **Use passthrough authentication for this session**.

## Horizon Client

For Horizon sessions, passthrough is supported. Kerberos passthrough is not yet supported.

1. Go to **Sessions > Horizon Client > Horizon Client Sessions > [session name] > Connection settings**.
2. Enable **Use passthrough authentication for this session**.



## Parallels Client

For Parallels Client sessions, passthrough is supported. Kerberos passthrough is not yet supported.

1. Go to **Sessions > Parallels Client > Parallels Client Sessions > [session name] > Connection**.
2. Enable **Use system credentials** to use the passthrough authentication.

## Hardware Video Acceleration on IGEL OS

### Question

Does my hardware with IGEL OS offer video acceleration?

### Answer

Open **Application Launcher** > **About** to look up your product ID and device type:

The screenshot shows the 'Application Launcher' window in IGEL Workspace. The 'About' section is active, displaying system information. The 'Product ID' and 'Device Type' are highlighted with red boxes. The 'About' icon in the left sidebar is also highlighted with a red box.

Product	
Copyright	IGEL Technology GmbH
Firmware Release Date	Mittwoch, 5. August 2020
Firmware Version	11.04.100.01
Product ID	UD3-LX 51
Product Name	IGEL OS 11
Website	https://www.igel.com

License Information	
Workspace Edition Maintenance Expiration Date	✔ Freitag, 12. März 2021
Enterprise Management Pack Expiration Date	✔ Freitag, 12. März 2021
Workspace Edition Add-on Teradici Expiration Date	✔ Donnerstag, 3. September 2020

Network	
Local Name	ITC00E0C520986A
Default gateway	✔ [Redacted]
DNS Server 1	✔ [Redacted]
DNS Server 2	✔ [Redacted]
Universal Management Suite	✔ [Redacted]

Interface 1 (eth0)	
Description	Realtek Semiconductor Co., Ltd. RTL8111/8168/8411 PCI Express Gigabit Ethernet Controller
Hardware Address	00:E0:C5:20:98:6A
IP Address	[Redacted]

Hardware	
Boot Mode	EFI
CPU Model	AMD GX-424CC SOC with Radeon(TM) R5E Graphics (4 CPUs)
Device Type	IGEL M340C
Flash Size	3761 MB
Graphics Chipset	ATI MULLINS

In version 5.07.100 and newer and version 10.01.100 and newer, IGEL OS offers hardware video acceleration for

- Media Player
- Citrix Multimedia Redirection
- RDP Multimedia Redirection (TSMF and EVOR)
- VMware Horizon Multimedia Redirection


on selected devices. This allows playing back HD video with a maximum of 20% CPU usage.

**i** The Multimedia Codec Pack (MMCP) is required for this feature if your IGEL OS version is lower than 11.01.100.

Hardware video acceleration is supported on the following IGEL devices:

Product ID	Device Type	Chipset	IGEL Linux >=		IGEL OS	
			v5.07.100	v5.09.100	10	11
IZ2-HDX/RFX/ HORIZON 40* (see page 812)	IGEL D220	Intel Bay Trail	✓	✓	✓	✓* (see page 812)
IZ3-HDX/RFX/ HORIZON 41, 42	IGEL M330C	VIA VX900	✓			
IZ3-HDX/RFX/ HORIZON 50* (see page 812)	IGEL M340C	ATI Mullins		✓	✓	✓* (see page 812)
IZ3-HDX/RFX/ HORIZON 51* (see page 812)	IGEL M340C	ATI Mullins			✓	✓* (see page 812)
UD2-LX 40	IGEL D220	Intel Bay Trail	✓	✓	✓	✓
UD2-LX 50, 51	IGEL M250C	Intel HD Graphics				✓
UD3-LX 40	IGEL M320C	VIA VX900	✓	✓		
UD3-LX 41, 42	IGEL M330C	VIA VX900	✓	✓		
UD3-LX 50	IGEL M340C	ATI Mullins		✓	✓	✓
UD3-LX 51	IGEL M340C	ATI Mullins			✓	✓

Product ID	Device Type	Chipset	IGEL Linux >= v5.07.100	IGEL Linux >= v5.09.100	IGEL OS 10	IGEL OS 11
UD3-LX 60	IGEL M350C	AMD Radeon Vega 3 Graphics				✓
UD5-LX 40	IGEL H820C	Intel Sandy Bridge	✓	✓	✓	
UD5-LX 50	IGEL H830C (Dualcore CPU Model)	Intel Bay Trail	✓	✓	✓	✓
UD6-LX 51	IGEL H830C (Quadcore CPU Model)	Intel Bay Trail	✓	✓	✓	✓
UD7-LX 10	IGEL H850C	AMD Radeon Graphics			✓	✓
UD7-LX 11	IGEL H850C	AMD Radeon Graphics				✓
UD7-LX 20	IGEL H860C	AMD Radeon Vega 8 Graphics				✓
UD9-LX 40, UD9-LX 41 Touch	IGEL UD9 BT	Intel Bay Trail		✓	✓	✓
UD10-LX	IGEL UD10 TC236	VIA VX900	✓	✓		

 On 3rd-party hardware with UDC3, IGEL OS Creator (OSC), and UD Pocket, hardware video acceleration depends on the graphics chipset of the device.

## Codecs

The following codecs are supported:

- MPEG-2 (simple and main profiles)
- H.264 (baseline, main and high profiles)
- WVC1/WMV3 (simple, main and advanced profiles)
- MPEG-4 (DivX/Xvid): only on VIA VX900 and ATI Mullins

\* To upgrade your IZ device to IGEL OS 11, please contact your IGEL sales representative. See also <https://www.igel.com/tradeup/> and The IGEL OS 11 Migration Plan.

## Running Commands before or after a Session

### Symptom

You want to run shell commands before a specific session is started or after it has terminated.

### Problem

You need hooks which will call your shell commands.

### Solution

As of IGEL *Universal Desktop Linux 5.06.100* there is a generic mechanism for calling shell commands before and after a session. It works with Citrix ICA, RDP and VNC Viewer sessions.

This feature is accessible only through the **Registry**.

Open **Setup** at **System > Registry**. Use either the Registry tree or the **Search parameter ...** function to locate the following Registry keys:

for VNCviewer:

```
sessions.vncviewer*.init_action
```

```
sessions.vncviewer*.final_action
```

for RDP:

```
sessions.winconnect*.init_action
```

```
sessions.winconnect*.final_action
```

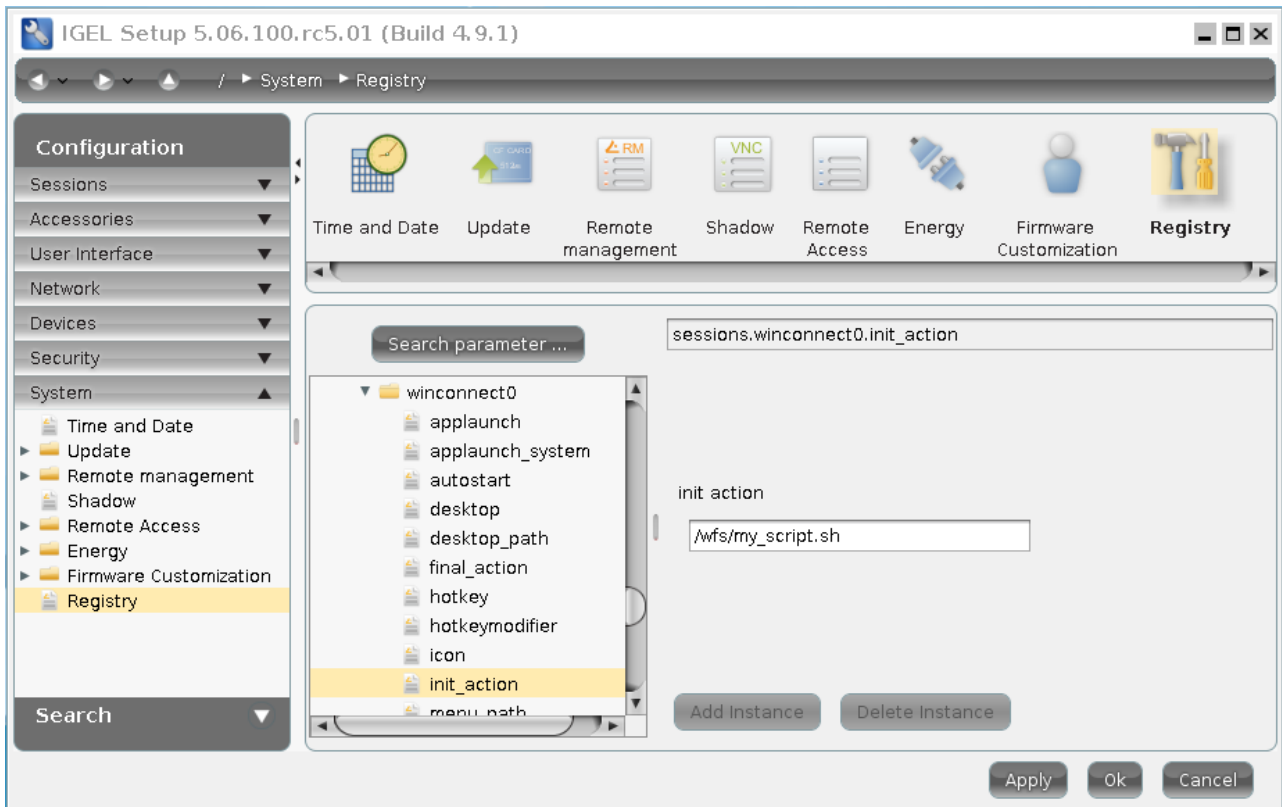
for Citrix/ICA:

```
sessions.ica*.init_action
```

```
sessions.ica*.final_action
```

(where \* is the related session number, e.g. 0,1,2,3,...)

The `init_action` is executed before the session is started. The `final_action` is executed after the session has been terminated. Enter shell commands or the path to a custom script or executable:



**i** The Registry keys for newly created sessions only appear after a restart of **Setup**.


**i** Your `init_action` scripts or executables have to return before the session will start. Alternatively, background your command by adding `'&'` to the end of the commandline.

## Copy Sessions in Setup or UMS

Sometimes you want to create a session that differs from another only in a few details. *IGEL Linux version 5.10.100* or newer and *UMS version 5.02.100* or newer let you copy complete sessions. Once the session is copied, you can easily adapt the required settings.

Copying is available in the **Sessions** section of *IGEL Setup* (and occasionally in some other sections) as well as in the **Edit Configuration** function in *UMS*.

To copy a session, proceed as follows:

1. In the setup, open the menu path **Sessions > [Session Type] > [Session Type] Sessions**.  
Example: **Sessions > RDP > RDP Sessions**  
The existing sessions are shown.
2. Highlight the session that you want to copy.
3. Click .  
A copy of the session will be created within the same folder.

## IZ1 and UD2-MM Usage of RAM

How is RAM used by processes in UD2-MM and IZ1 (also known as ARM or SoC devices)?

A total of 1024 MB main memory is divided as follows:

- ~128 MB is used for graphics
- ~362 MB is used for internal processes such as communication between DSP and ARM processor
- ~534 MB is available for user processes



## Starting UMS Console Crashes NX Session

### Symptom:

When you are connected to an Ubuntu host via NX, starting UMS console on the Ubuntu host crashes the NX session.

### Solution:

1. Become **Root** on the Ubuntu host.
2. Open the configuration file `/opt/IGEL/RemoteManager/rmclient/RemoteManager.bin.config` in a text editor.
3. Add the line `vmparam -Dsun.java2d.xrender=false` to the file.
4. Save the file.
5. Become a regular user.
6. Start UMS Console.

## Accessing IGEL Setup within Appliance Mode

### Symptom

When using the appliance mode, IGEL Setup is not accessible directly.

### Problem

Within the appliance mode, all other local applications are hidden; the system's hotkey [Ctrl+Alt+s] does not work either.

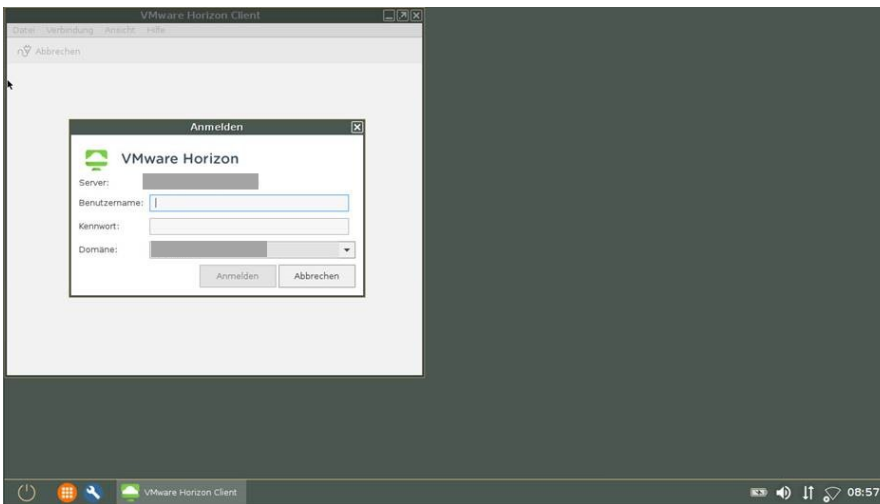
### Solution

To start the IGEL Setup within the appliance mode, press hotkey [Ctrl+Alt+F2].

## An Application Window Cannot Be Repositioned

### Symptom

Some application windows, e.g. VMware Horizon windows, are placed at startup in the upper left corner instead of being displayed in the middle. In case of frameless applications, the window cannot then be moved and may conceal the icons.



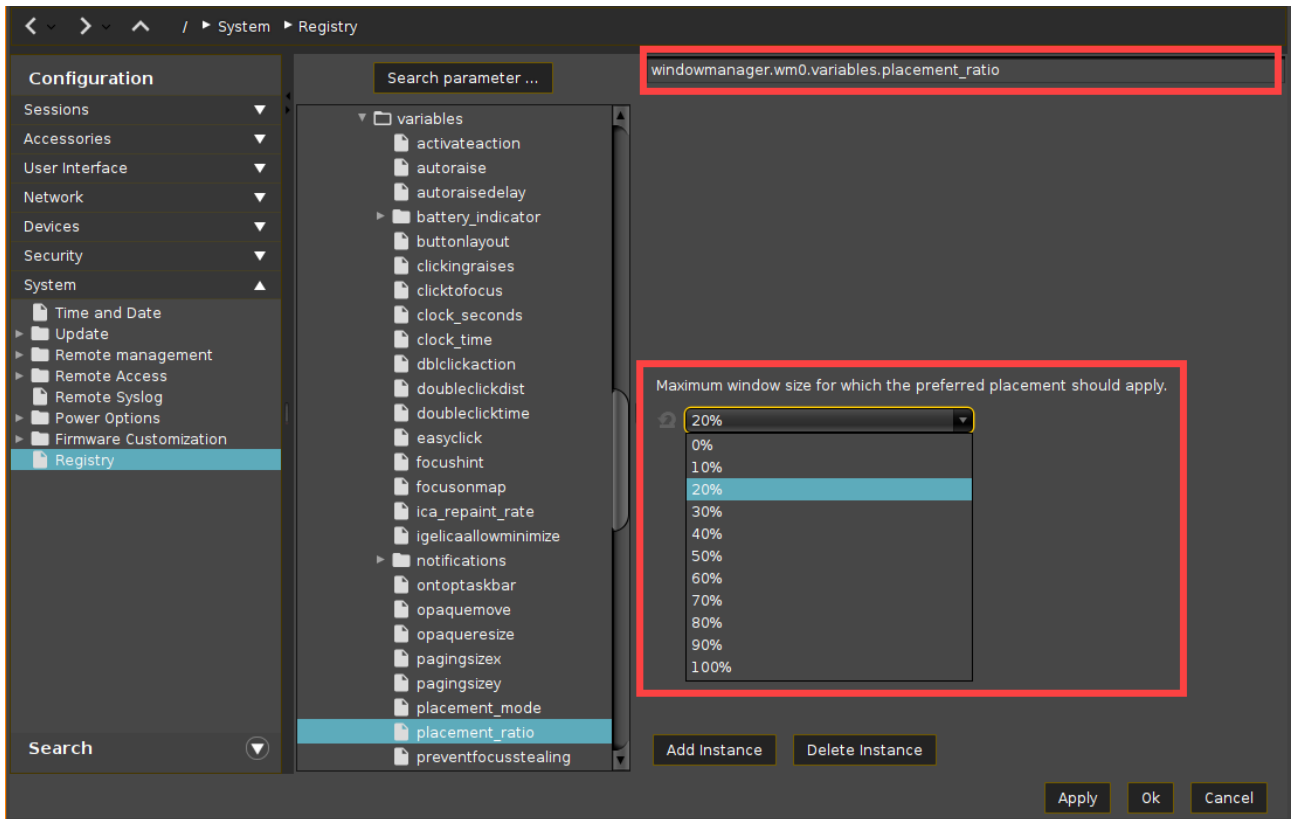
### Problem

Either the screen is too small or the selected resolution is too low.

### Solution

1. Go to **System > Registry**.
2. Select the registry key `windowmanager.wm0.variables.placement_ratio`.
3. Specify a higher percentage value under **Maximum window size for which the preferred placement should apply**. This entry refers to the total work area.

**i** The preferred placement is defined with the registry key `windowmanager.wm0.variables.placement_mode`.



### Example

Session: VMware Horizon Client

Screen resolution: 1366x768

Value for **Maximum window size for which the preferred placement should apply**: at least 40%

## Updating IGEL UMD: Error "not compatible with System5"

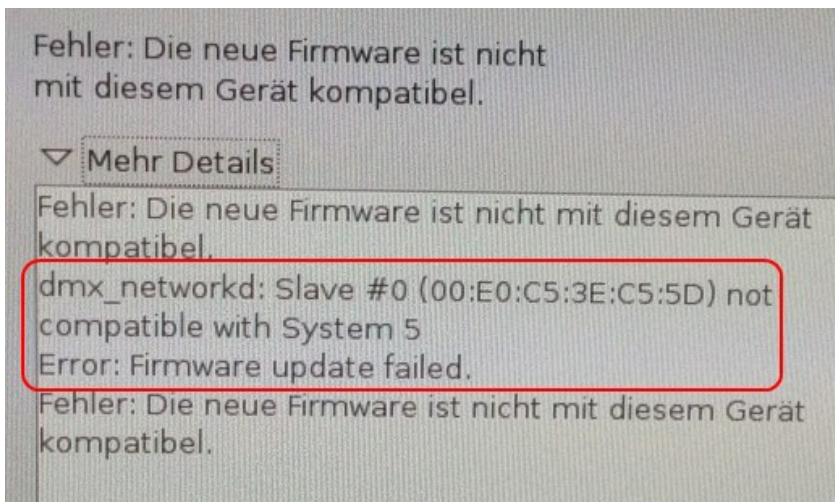
### Symptom

Universal Multi Display firmware (IGEL UMD) can't be updated to version 4.13.100.

Error Message:

```
Firmware not compatible.
```

```
dmx_networkd: Slave #0 (MAC) not compatible with System5
```



### Solution

Delete file `/tmp/NOT_SYS_5_COMPATIBLE` from UMD master client and update again without rebooting.

## Will My Session Be Closed When My IGEL OS Endpoint Device Enters Suspend Mode?

This article will teach you how to configure your IGEL OS device so that your session is not interrupted when your device goes into suspend mode.

### Session Disconnection on Suspend

When an IGEL OS endpoint device goes into suspend mode (S3), remote sessions like Citrix, Microsoft Windows RDP, or VMware Horizon, for instance, will be disconnected.

### IGEL Environment

- Endpoint device with IGEL OS 11
- Remote session, e.g. Citrix, Microsoft Windows RDP, or VMware Horizon

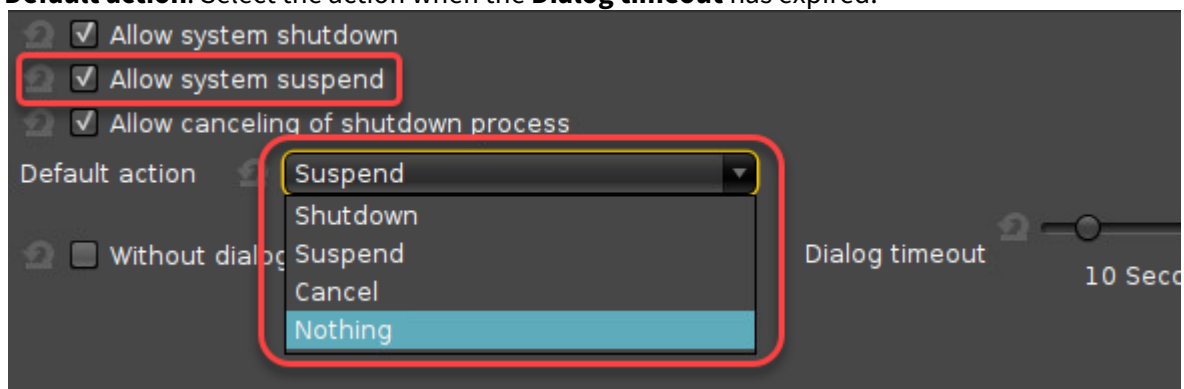
### Avoiding Possible Issues

Modern server-based or cloud-based systems provide remote session resume features on the server side. Check out the relevant documentation for your system.

### Configuring Suspend Mode

► To allow or disallow suspend mode, go to **System > Power Options > Shutdown** and set the following parameters according to your needs:

- **Allow system suspend**
- **Default action:** Select the action when the **Dialog timeout** has expired.



► To configure suspend or shutdown on inactivity, go to **System > Power Options > System** and set the following parameters according to your needs:

- **System suspend/shutdown on inactivity:** Set the timeout after which the system shuts down or enters suspend mode.
- **System action on inactivity:** Define whether the system should enter suspend mode or shut down after the timeout.

