



Installation and Sizing Guidelines for IGEL UMS



The following installation and sizing guidelines are intended to support you with setting up the IGEL Universal Management Suite (UMS) environment – UMS Server, UMS Console & UMS Web App, database, and, if required, load balancer and ICG instances. For information on the installation requirements, see Installation Requirements for the IGEL UMS.

The size and structure of the UMS setup depend mainly on the following criteria:

- Number of devices
- High Availability
- ICG connection for devices outside of your company network

General Preconditions

The Installation and Sizing Guidelines apply for a standard UMS setup and describe the most common UMS environments. Any individual exceptions or requirements may not be covered by these scenarios.

- System requirements: UMS 6.05 and newer, ICG 2.02 and newer
- UMS Console may be located **inside the same (V)LAN as UMS Servers** (no NAT, no proxies) or **outside the VLAN** with firewalls/routing configured according to IGEL UMS Communication Ports.
- Devices **directly connected to the UMS Server** are in **the same (V)LAN as UMS Servers** (no NAT, no proxies). If there is a firewall, it must be configured according to IGEL UMS Communication Ports.
- Devices **outside of the internal LAN** are connected **via ICG**.
- Devices are **not booted/rebooted frequently** (once a day on average).
- **A maximum of 10 different firmware versions** is managed via UMS.
- UMS backups and exports are **not permanently stored on the UMS server** host.
- In the case of automatic device registration (see Registering Devices Automatically on the IGEL UMS): The **DNS** alias `igelrmserver` or the **DHCP** tag can only point to ONE UMS installation. Therefore, the installation of several separate UMS Servers (without the High Availability Extension) in one network is not recommended.

⚠ High Availability with IGEL UMS Load Balancers: All UMS Servers and UMS Load Balancers must reside on **the same VLAN**.
For High Availability (UMS HA) with IGEL UMS Load Balancers, network traffic must be allowed over UDP broadcast port 6155, and TCP traffic and UDP broadcast traffic over port 61616. For further port configuration, see IGEL UMS Communication Ports.
Note: IGEL UMS HA installation with IGEL UMS Load Balancers is not supported in cloud environments like Azure / AWS as they do not allow broadcast traffic within their networks. The HA installation without IGEL UMS Load Balancers (as well as the Distributed UMS) is, however, supported in cloud environments as of UMS version 6.10.

i Recommended Additional Information

IGEL UMS Communication Ports: Find a list with all ports that are relevant for the communication with the UMS.

Latest release notes: Find in the Supported Environment section the list of supported servers, clients, and backend databases.



High Availability (HA): Find useful how-tos and the reference guide around your HA installation.
IGEL Cloud Gateway: Find how-tos, the reference guide, and additional information concerning the management of endpoints outside the company network.

-
- [IGEL UMS Sizing Guidelines & Architecture Diagrams](#)(see page 4)
 - [Performance Optimizations in IGEL UMS](#)(see page 17)
 - [IGEL Cloud Gateway vs. Reverse Proxy for the Communication between UMS 12 and IGEL OS Devices](#)(see page 19)



IGEL UMS Sizing Guidelines & Architecture Diagrams

The following sizing guidelines are intended to support you with setting up the IGEL Universal Management Suite (UMS) environment – UMS Server, UMS Console & UMS Web App, database, and, if required, load balancer and ICG instances.



General Installation Recommendations

For small installations, a single UMS Server instance (standard UMS) with an embedded database is usually sufficient. If required, a single-instance installation can be easily extended anytime to a Distributed UMS installation by installing additional servers (and in the case of an embedded database, by switching preliminarily to an external data source).

Large installations should use either the UMS High Availability or the Distributed UMS (preferable for new installations, e.g. because you do not have to configure additional firewall exclusions). For large installations, it is also recommended to use DNS-Round-Robin load balancing or IGEL Cloud Gateway.

For more information, see IGEL UMS Installation.

Installation Size	#Devices	#UMS Server Host (+ Load Balancer)	UMS Server	UMS Console Standalone	#Load Balancer Standalone	Load Balancer Standalone	Database*	ICG
S	< 5.000	1 server	8 GB RAM (UMS Web App + 1 GB) 4 CPUs 25 GB free disk space	Optional* 3 GB RAM 2 CPUs 1 GB free disk space			Embedded database	1 ICG instance per 2,500 devices Server generally: 8 GB RAM 2 CPUs 20 GB free disk space Only ICG service: 4 GB RAM 2 CPUs



Installation Size	#Devices	#UMS Server Host (+ Load Balancer)	UMS Server	UMS Console Standalone	#Load Balancer Standalone	Load Balancer Standalone	Database*	ICG
M	< 15,000	1 server	8 GB RAM (UMS Web App + 1 GB) 4 CPUs 25 GB free disk space	Optional* 3 GB RAM 2 CPUs 1 GB free disk space			External database 10 GB	2 GB free disk space
M / S (HA or Distributed UMS)	< 15,000	2 servers 2 load balancers	9 GB RAM (Web App +1GB) 6 CPUs 25 GB free disk space	Optional* 3 GB RAM 2 CPUs 1 GB free disk space			External database 10 GB	
L (HA or Distributed UMS)	< 50,000	2 servers 2 load balancers	6 GB RAM*** (Web App +1GB) 4 CPUs 25 GB free disk space	Mandatory 3 GB RAM 2 CPUs 1 GB free disk space			External database 10 GB	
XL (HA or Distributed UMS)* ***	< 300,000	Up to 6 servers (1 server / 50,000 devices)	9 GB RAM (Web App +1GB) 6 CPUs 25 GB free disk space	Mandatory 6 GB RAM 4 CPUs 1 GB free disk space	Up to 3 Load Balancer (1 LB / 3 Server)	4 GB RAM 4 CPUs 2 GB free disk space	External database 20 GB	

* UMS Console can be installed on UMS Server host.

** Follow the recommendation of the external database system on RAM and CPU.

*** RAM and CPU requirements are less than in the case of **M / S (HA)** installation since the UMS Console is installed on a separate host machine (**UMS Console Standalone = Mandatory**).

**** General recommendation: 1 UMS Server per 50,000 devices, 1 load balancer for 3 UMS Servers.



For the architecture diagrams of the installations, see:

- [Small Environment: UMS S](#)(see page 7)
- [Medium Environment: UMS M](#)(see page 9)
- [Small and Medium Environments: UMS M/S \(HA\)](#)(see page 11)
- [Large Environment: UMS L \(HA\)](#)(see page 13)
- [Extra Large Environment: UMS XL \(HA\)](#)(see page 15)



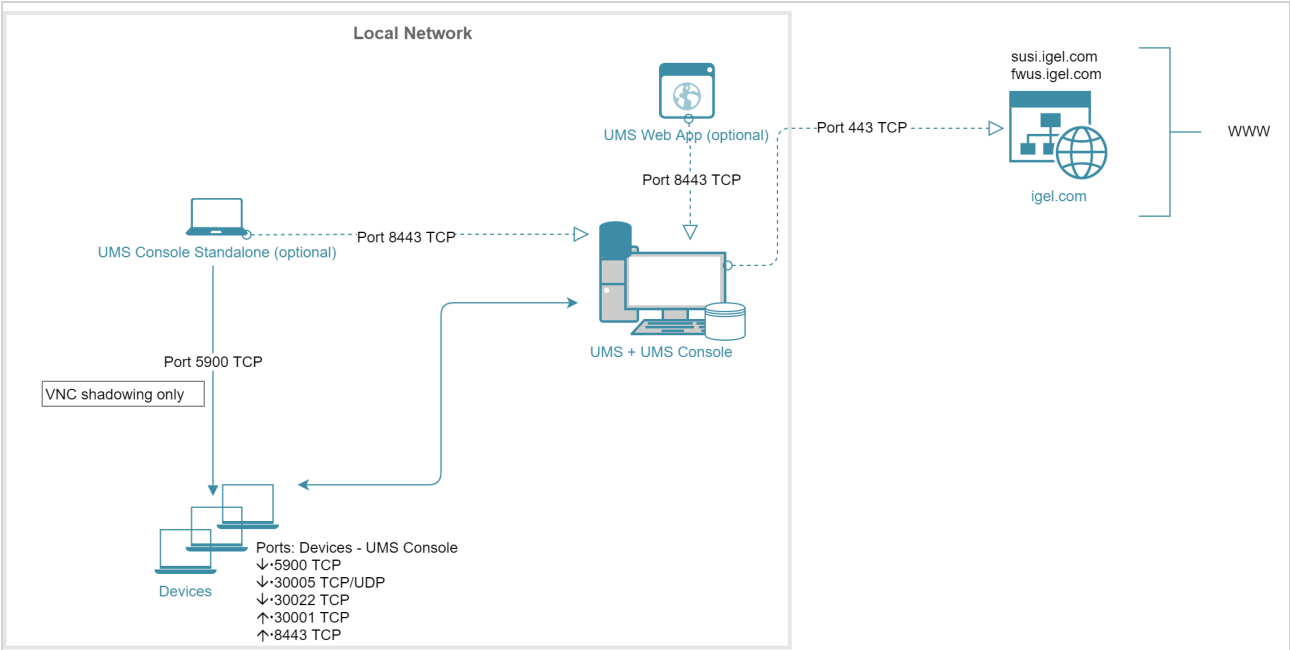
Small Environment: UMS S

Small Size UMS Installation (<5k Devices) or Demo/POV Environment with an Embedded Database

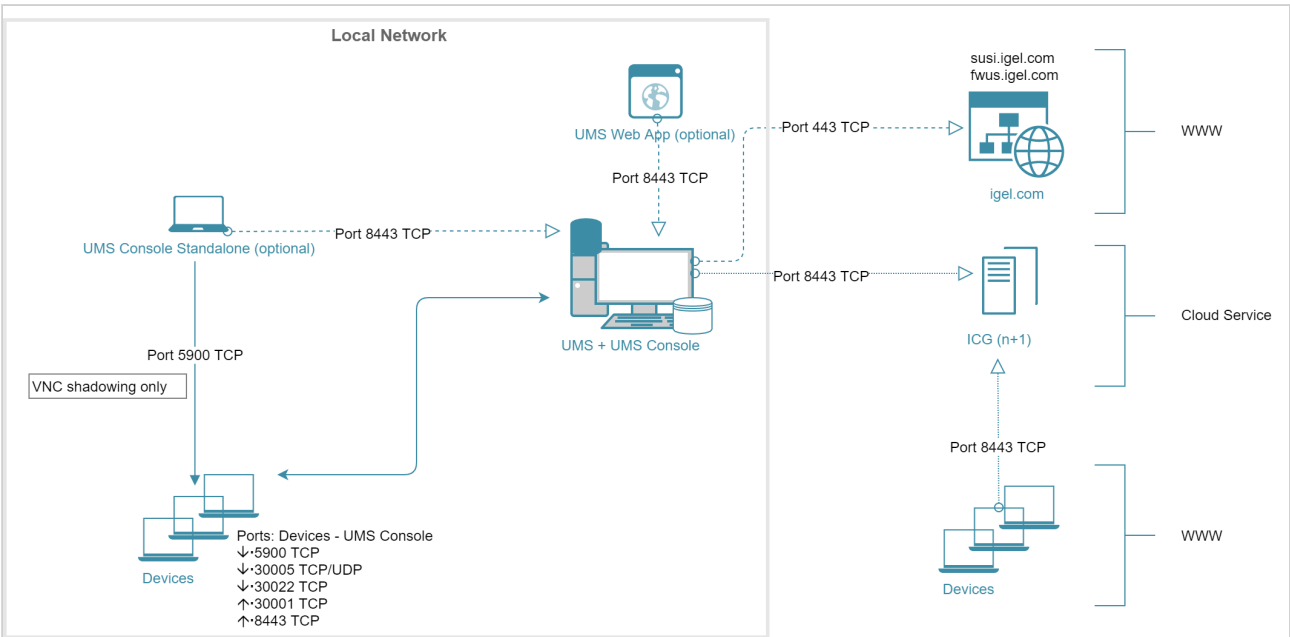
Installation Size	#Devices	#UMS Server Host	UMS Server	UMS Console Standalone	#Load Balancer Standalone	Load Balancer Standalone	Database	ICG
S	< 5.000	1 server	8 GB RAM (UMS Web App + 1 GB) 4 CPUs 25 GB free disk space	Optional* 3 GB RAM 2 CPUs 1 GB HDD			Embedded database	1 ICG instance per 2,500 devices Server generally: 8 GB RAM 2 CPUs 20 GB HDD Only ICG service: 4 GB RAM 2 CPUs 2 GB HDD

* UMS Console can be installed on UMS Server host.

Architecture: Small Environment



Architecture: Small Environment + ICG in Cloud





Medium Environment: UMS M

Medium Size UMS Installations (up to ~15k Devices); No High Availability

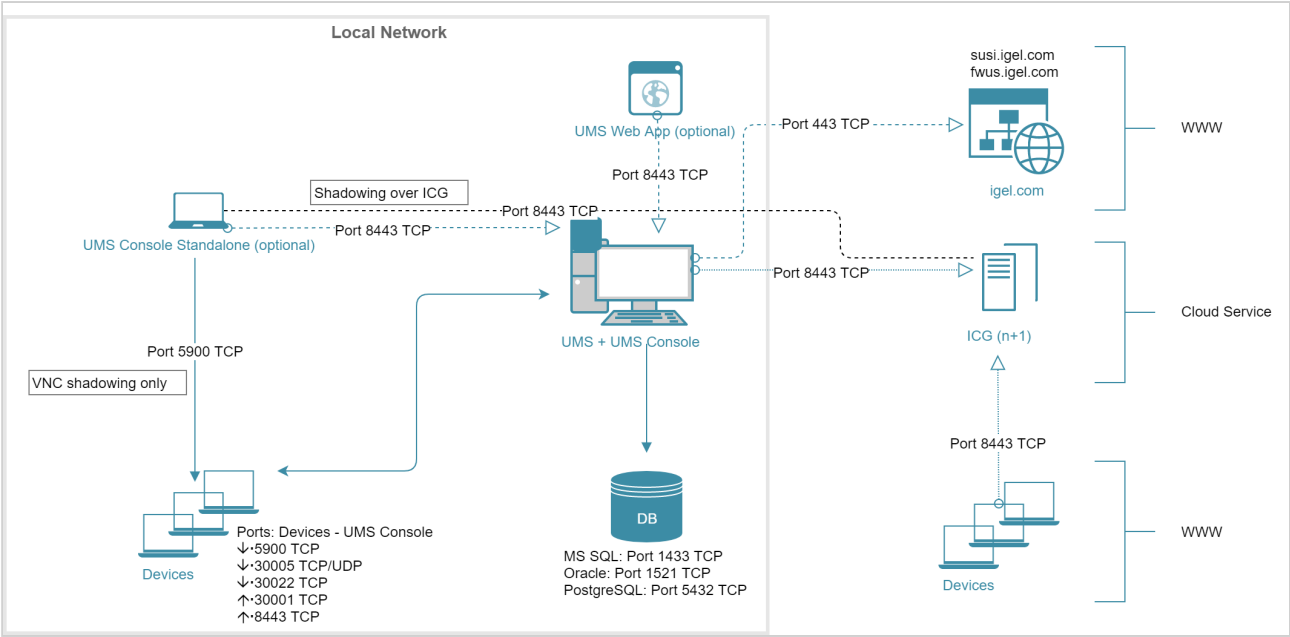
Installation Size	#Devices	#UMS Server Host	UMS Server	UMS Console Standalone	#Load Balancer Standalone	Load Balancer Standalone	Database*	ICG
M	< 15,000	1 server	8 GB RAM (UMS Web App + 1 GB) 4 CPUs 25 GB free disk space	Optional* 3 GB RAM 2 CPUs 1 GB HDD			External database 10 GB	1 ICG instance per 2,500 devices Server generally: 8 GB RAM 2 CPUs 20 GB HDD Only ICG service: 4 GB RAM 2 CPUs 2 GB HDD

* UMS Console can be installed on UMS Server host.

** Follow the recommendation of the external database system on RAM and CPU.

For High Availability, see [Small and Medium Environments: UMS M/S \(HA\)](#) (see page 11).

Architecture: Medium Environment + ICG





Small and Medium Environments: UMS M/S (HA)

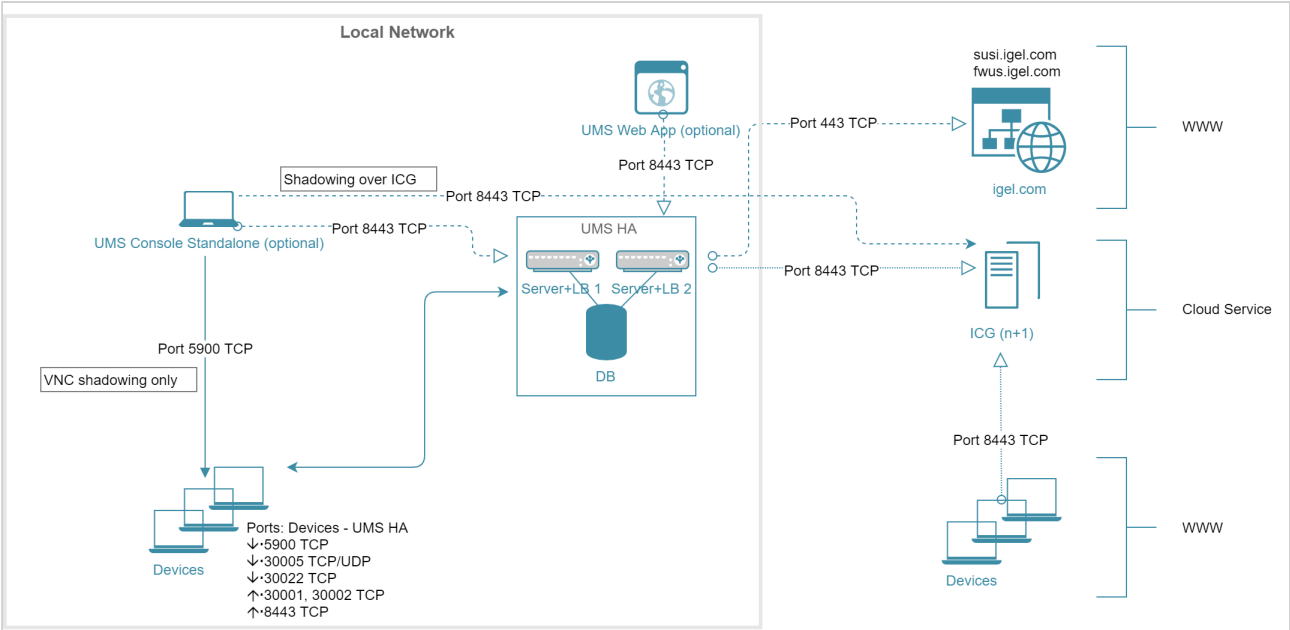
Small and Medium Size UMS Installations (up to ~15k devices); High Availability

Installation Size	#Devices	#UMS Server Host (+ Load Balancer)	UMS Server	UMS Console Standalone	#Load Balancer Standalone	Load Balancer Standalone	Database*	ICG
M / S (HA or Distributed UMS)	< 15,000	2 servers 2 load balancers	9 GB RAM (Web App + 1 GB) 6 CPUs 25 GB HDD	Optional* 3 GB RAM 2 CPUs 1 GB HDD			External database 10 GB	1 ICG instance per 2,500 devices Server generally: 8 GB RAM 2 CPUs 20 GB HDD Only ICG service: 4 GB RAM 2 CPUs 2 GB HDD

* UMS Console can be installed on UMS Server host.

** Follow the recommendation of the external database system on RAM and CPU.

Architecture: Small and Medium Environment (HA) + ICG





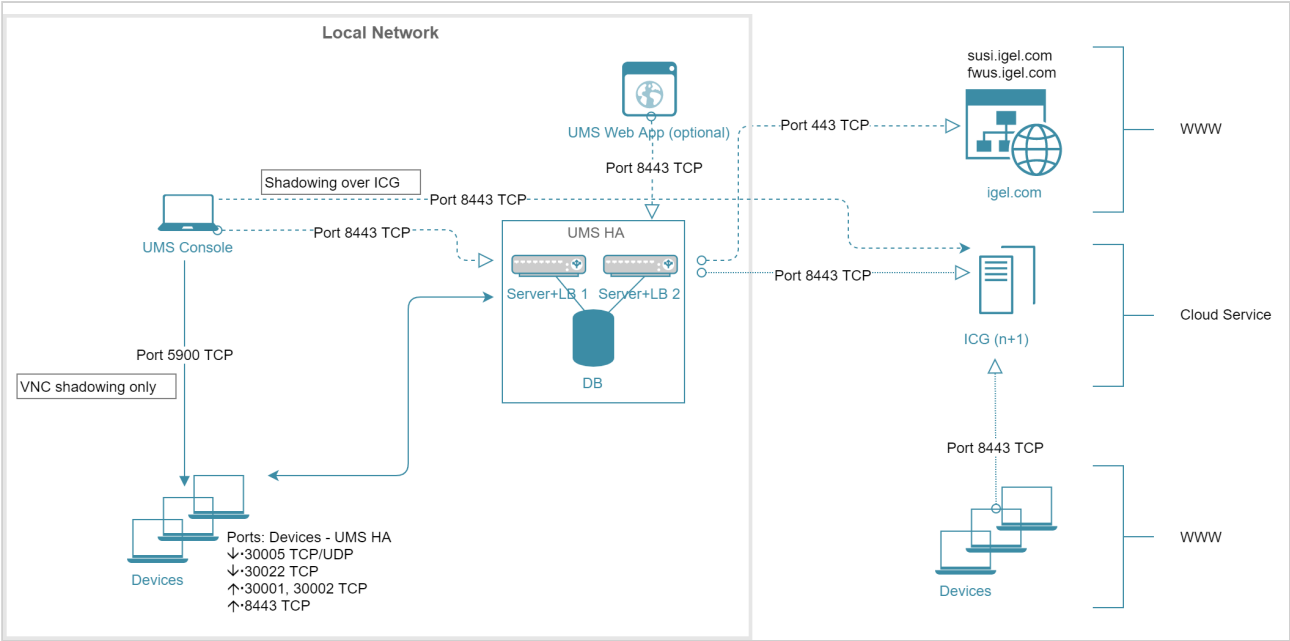
Large Environment: UMS L (HA)

Large UMS Installations with up to 50k Devices; High Availability + ICG

Installation Size	#Devices	#UMS Server Host (+ Load Balancer)	UMS Server	UMS Console Standalone	#Load Balancer Standalone	Load Balancer Standalone	Database*	ICG
L (HA or Distributed UMS)	< 50,000	2 servers 2 load balancers	6 GB RAM (Web App +1GB) 4 CPUs 25 GB HDD	Mandatory 3 GB RAM 2 CPUs 1 GB HDD			External database 10 GB	1 ICG instance per 2,500 devices Server generally: 8 GB RAM 2 CPUs 20 GB HDD Only ICG service: 4 GB RAM 2 CPUs 2 GB HDD

* Follow the recommendation of the external database system on RAM and CPU.

Architecture: Large Environment (HA) + ICG





Extra Large Environment: UMS XL (HA)

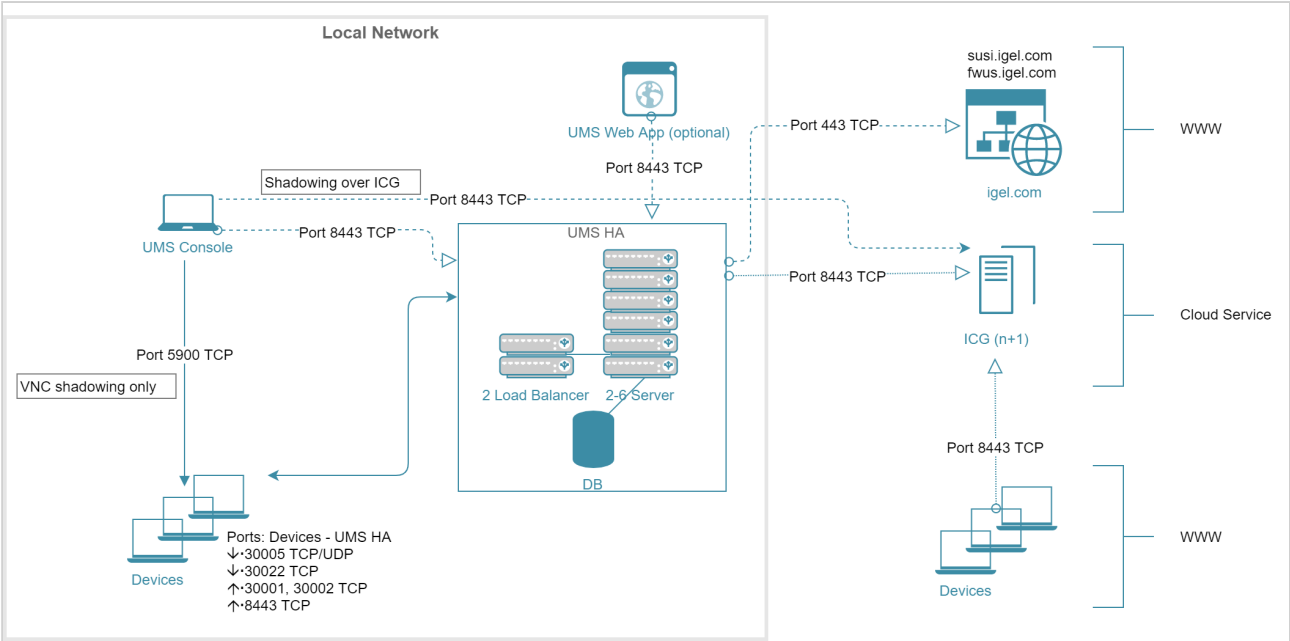
Extra Large UMS Installations with up to 300k Devices; High Availability + ICG

Installation Size	#Devices	#UMS Server Host	UMS Server	UMS Console Standalone	#Load Balancer Standalone	Load Balancer Standalone	Database*	ICG
XL (HA or Distributed UMS)**	< 300,000	Up to 6 servers (1 server / 50,000 devices)	9 GB RAM (Web App +1GB) 6 CPUs 25 GB HDD	Mandatory 6 GB RAM 4 CPUs 1 GB HDD	Up to 3 load balancers (1 load balancer / 3 servers)	4 GB RAM 4 CPUs 2 GB HDD	External database 20 GB	1 ICG instance per 2,500 devices Server generally: 8 GB RAM 2 CPUs 20 GB HDD Only ICG service: 4 GB RAM 2 CPUs 2 GB HDD

* Follow the recommendation of the external database system on RAM and CPU.

** General recommendation: 1 UMS Server per 50,000 devices, 1 load balancer for 3 UMS Servers.

Architecture: Extra Large Environment (HA) + ICG





Performance Optimizations in IGEL UMS

Data Sizing

- The number of registered firmware versions has the **largest impact** on the size of the database. (Listed in UMS Console under **Misc > Firmware Statistics**)
- The number of devices or profiles has a **minor impact**.
- Average size per...
 - Firmware configuration: ~15 MB
 - Profile (depends on the number of active parameters): ~100 kB
 - Device: ~100 kB
- Reserve 500 MB up to 1 GB for database transaction logs of excessive database calls like **Remove unused Firmware**. Please note that the usage depends on the database system used.

Latencies

If you are struggling with long-distance connections and high latency, please consider the following recommendations:

- Minimize latency between...
 - Database <-> UMS Server: <= 20 ms
 - Several UMS Servers: <= 50 ms
 - Load balancer <-> UMS Server: <= 50 ms
- High latency between the database and the UMS Server has a **huge impact** on the performance. The communication between the device and the UMS Console will slow down, the UMS Console itself will become lazy.
- High latency between the device and the UMS Server has **little impact** on overall performance.

Performance Optimizations

- **UMS logs:**
Use administrative tasks to automatically clean up logs (logging data, job execution data, execution data of administrative tasks, process events, asset information history) or remove old UMS log files (`/rmguiserver/logs`) when storage space runs out.
- **Firmware:**
Remove unused firmware regularly.
- **Embedded database only:**
 - Optimize database regularly (UMS Administrator application, e.g. once a month)
 - Check for free storage space and expand the storage size if necessary (keep at least 1 GB free at all times)
- **Number of devices:**
 - If the device count is high (>10k) and overall performance is low, increase UMS Server and UMS Console memory. See How to Configure Java Heap Size for the UMS Server and How to Configure Java Heap Size for the UMS Console.



- Avoid too many devices (>5k) in one folder.
- **Assignments:**
Keep the number of assignments per device (direct and indirect) at a low level (<25).
- **Administrative tasks and jobs:**
The more administrative tasks and jobs are created, the more heap is "eaten up", so it may be necessary to increase UMS Server memory. See How to Configure Java Heap Size for the UMS Server.
- **Default directory rules:**
Do not use default directory rules with the **Apply rule when device boots** option unless they are required.
- **Concurrent device requests:**
If you are experiencing problems with many concurrent device requests (delays in configuration deployment or logging on to the device), open the UMS Console and use the options under **UMS Administration > Global Configuration > Device Network Settings > Device Requests** (thread and queue size) to control the throughput of the device requests. Contact support for recommendations.

Limitations: UMS HA

- Device actions that are manually triggered in the UMS Console are performed by **one UMS Server** (the one the UMS Console is currently connected to); there is no load balancing for these actions.

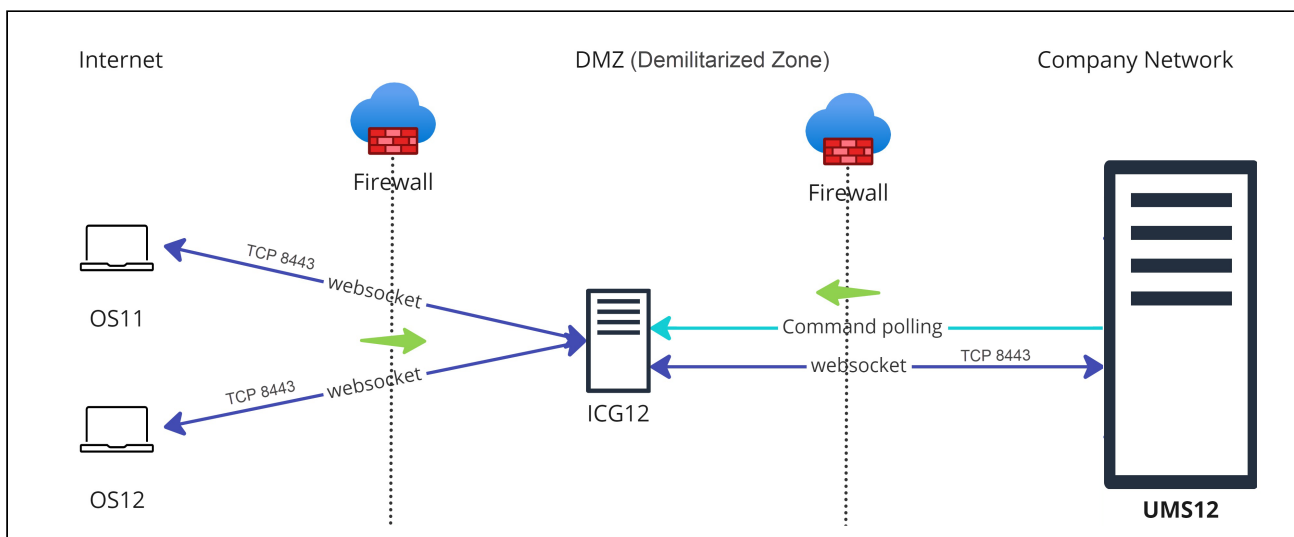


IGEL Cloud Gateway vs. Reverse Proxy for the Communication between UMS 12 and IGEL OS Devices

With the launch of IGEL Universal Management Suite (UMS) 12, the Unified Protocol used for all communication between the UMS and IGEL OS 12 devices was introduced, see Overview of the IGEL UMS. The Unified Protocol is a secure protocol that uses TCP 8443, see IGEL UMS Communication Ports. However, depending on the structure of your UMS environment, company's security policies, etc., it may be insufficient, and the use of the IGEL Cloud Gateway (ICG) or reverse proxy may be required. In the following article, you will find pros and cons of each solution.

Option 1: ICG 12

In the case of the ICG, endpoint devices connect to the ICG as well as the UMS connects to the ICG, see Devices and UMS Server Contacting Each Other via ICG. The WebSocket communication between the ICG and the UMS as well as between the ICG and the device is only established after mutual authentication, and the communication is encrypted with TLS. All data is routed through this WebSocket.



Advantages:

- Suitable for mixed environments when you manage both IGEL OS 12 and IGEL OS 11 devices
- No inbound connection from the device to the UMS
- Only the ICG is exposed to the Internet. Thus, if compromised, the UMS is NOT compromised at the same time.
- Simple and lightweight, which minimizes the attack surface

Disadvantages:

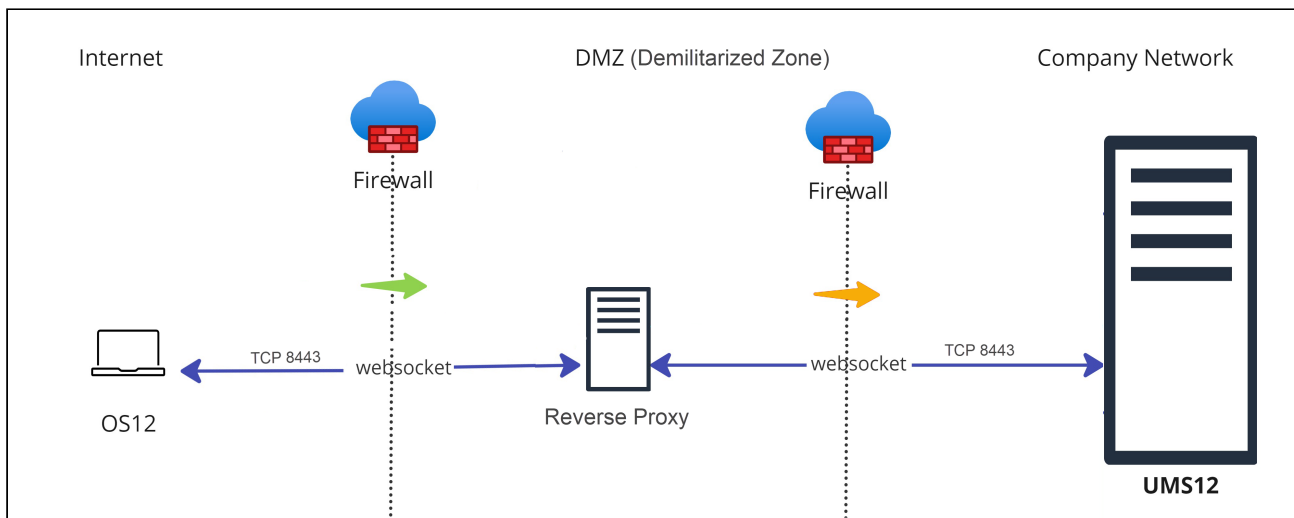
- UMS as an Update Proxy feature cannot currently be used, i.e. IGEL OS devices can download the apps from the App Portal only, not from the UMS Server. See Configuring Global Settings for the Update of IGEL OS Apps.



- Higher latency and longer command execution in comparison to the reverse proxy. For large enterprise environments, the use of a reverse proxy may be considered.

Option 2: Reverse Proxy

Another possibility to route the traffic via port 8443 is to use a reverse proxy. The reverse proxy will forward the requests from devices to the UMS.



Technical details:

- Reverse proxy with SSL offloading is possible as of UMS 12.02. See IGEL UMS Configuration for the External Load Balancer / Reverse Proxy: Example for NGINX with SSL Offloading.
- The FQDN and port of the reverse proxy must be specified as a Cluster Address, see Server Network Settings in the IGEL UMS.
- It is advisable to use TLS 1.3 for the reverse proxy configuration.

Advantages:

- Load balancing
- UMS as an Update Proxy feature can be used, i.e. IGEL OS devices can download the apps from the UMS Server. See Configuring Global Settings for the Update of IGEL OS Apps.

Disadvantages:

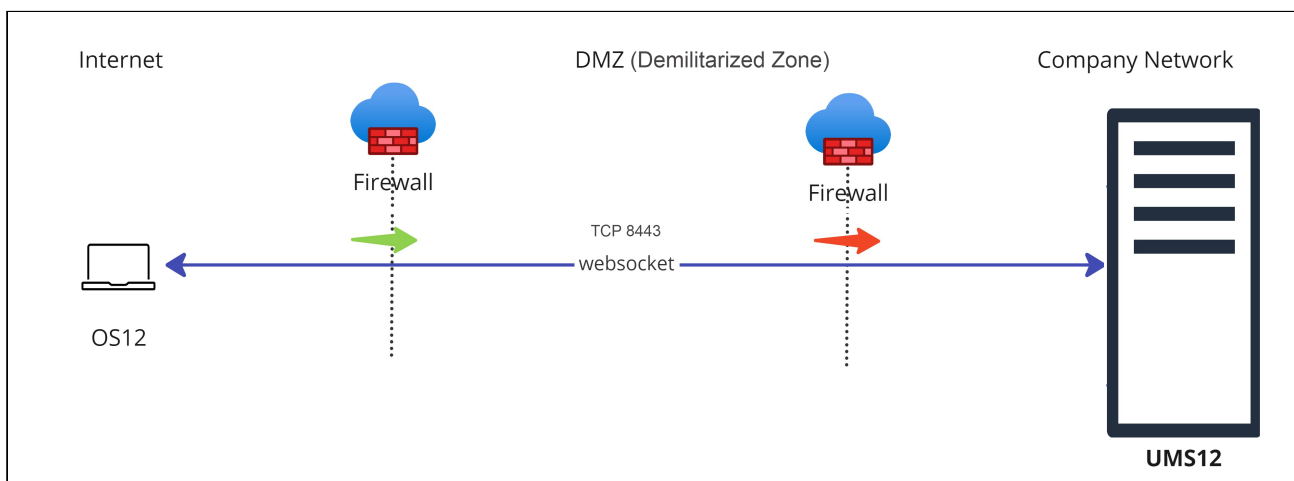
- Can be used if you manage IGEL OS 12 devices only.
- Proper configuration and maintenance of the reverse proxy is required. For security reasons, you may want to restrict access to any components you do not require, but note that the following paths must be enabled:
 - For IGEL OS 12 device onboarding and communication: TCP 8443 `/device-connector/*`
 - For IGEL OS 12 and UMS as an Update Proxy feature: TCP 8443 `/ums-approxy/*`
 - For the UMS Web App: TCP 8443 `/wums-app/*` and `/webapp/*`
- Inbound connection from the device to the UMS



- Adds an extra layer of security (depending on the configuration), but, if compromised, the reverse proxy can provide access to the UMS. In comparison, the ICG does not expose the UMS to the Internet.

Option 3: Direct Connection of the Devices to the UMS via Unified Protocol (No ICG, No Reverse Proxy)

In this case, IGEL OS 12 devices communicate directly with the UMS, see Devices Contacting UMS.



Advantages:

- port 8443 (can be changed under **UMS Administrator > Settings > Web server port**) must be opened in a firewall, but no other configuration is required
- suitable for communication with devices within the company network


Disadvantages:


- Inbound connection from the device to the UMS
- For communication with devices outside the company network, it is advised to consider the use of a reverse proxy or the ICG

i IGEL Onboarding Service (OBS) is NOT a substitute for an ICG or a reverse proxy and is only meant to authenticate and register the endpoint device with the correct UMS during the onboarding. For more information on the OBS, see Initial Configuration of the IGEL Onboarding Service (OBS) and Onboarding IGEL OS 12 Devices.

Legend to the images:



 : Shows that the traffic in the WebSocket runs in both directions.

 (multicolored): Shows from which side firewalls etc. must be opened.