# Tosi Hub 4.4

User Guide

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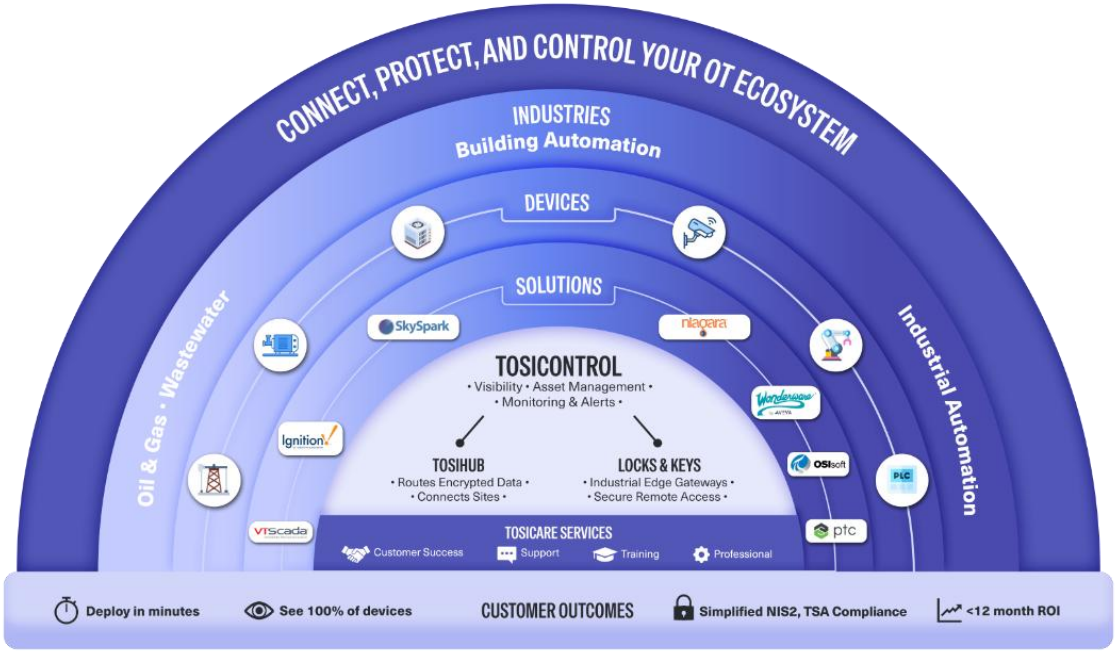
# 1 Introduction

Congratulations on choosing Tosi Hub!

Tosi is globally audited, patented and performs at the highest security levels in the industry. The technology is based on two-factor authentication, automatic security updates and the latest encryption technology.

Tosi solution consists of modular components that offer unlimited expandability and flexibility. All Tosi products are compatible with each other and are internet connection and operator agnostic. Tosi creates a direct and secure VPN tunnel between the physical devices. Only trusted devices can access the network.




Tosi Hub turns your Tosi ecosystem into a controlled OT network of always-on VPN connections for remote maintenance, continuous monitoring, real-time data collection and data logging.

This document applies to Hub version 4.3.

# 2 System description

## 2.1 Context of use

Tosi Hub makes it possible to build a system consisting of many Tosi Nodes and Keys. Tosi Hub is a VPN tunnel concentrator that maintains always-on VPN connections towards Tosi Nodes and provides centralized user and network management.

Tosi Hub is used when the number of users and remote locations is in their dozens or hundreds or when a centralized server software needs to communicate with the remote locations. The Hub allows connecting over a thousand serialized Nodes and Keys simultaneously.

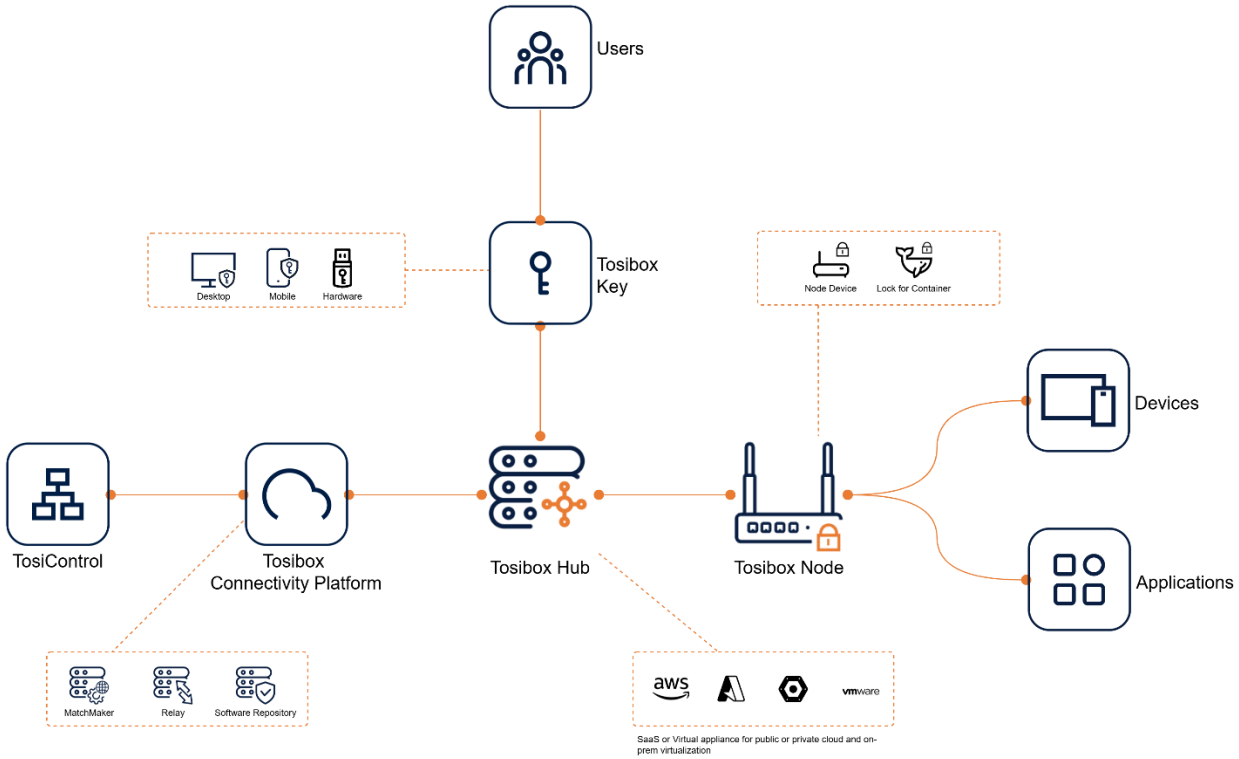
Tosi Hub is a licensed software product that runs on the customer's own server or virtualization platform and scales easily from just a few connections up to hundreds or even thousands. The maximum number of concurrent connections is defined by license type and the performance of the hardware or platform which the Hub is running on.

## 2.2 Tosi Hub in brief

Tosi Hub is a software-only solution for central VPN management running in a virtual server environment. It enables integration of separate Tosi Nodes into a robust and distributed network of connected devices.

HUB can be deployed e.g. in office networks and cloud infrastructure typically residing in data centers to build centrally managed and connected Tosi ecosystem. Also, with the help of virtual platforms it is possible to achieve a very high level of redundancy and fault-tolerance where failover time is measured in just seconds.

Tosi Hub has high throughput and encryption capacity limited only by available computing resources and the network parameters. This allows building large-scale systems that provide simultaneous access to thousands of Locks, Keys and Mobile Clients and the devices connected to them.



### Hub functionality

Logging and alerts

- Network wide audit logging from connected Tosi Nodes
- System audit trail
- Connection monitoring to detect and notify the user about connection problems
- Email alerts for connection establishment and disconnection

User and access rights management

- Account management for the system
- Scalable user access management per Lock and Node
- Scheduled access management

Network monitoring

- Status of each Lock and Node in the network
- Status of each user in the network
- System overall status

Security

- Support for VLANs (virtual LANs)
- Built-in firewall
- Encryption and authentication: PKI, 3072-bit RSA
- Data encryption: TLS 1.2 and 1.3, ChaCha20 / AES-256-CBC / AES-192-CBC / AES-128-CBC / Blowfish-128-CBC

## 2.3 Licensing

Tosi Hub maximum number of concurrent VPN connections is limited with the license.

Connections total count indicates the number of connected Nodes, Keys and Mobile Clients and the total license cap of concurrent VPN connections. Each device can potentially utilize one license when it is online, and VPN tunnel is formed between the Hub and the Node, Key or Mobile Client.

Tosi Hub starts limiting new VPN connections when the license cap is reached.

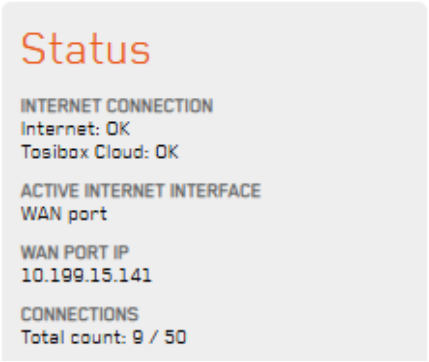



*Figure 1: In total of nine connected devices to this HUB and a license cap of 50.*

In the above screen shot the Hub has nine connected devices either online or offline and the license cap of 50 concurrent VPN connections.

## 2.4 System components

The complete system consists of Tosi Nodes and Keys that are matched to the Hub in a way that the system owner decides.

Every matched Key uses either a bridged (Layer 2) or a routed (Layer 3) connection type. The bridged layer 2 connection means that the Lock is essentially in the same network with the Hub's LAN port or VLAN that it is bridged to. The routed layer 3 connection creates a connection where the Node and the Hub both have their own IP addresses, and the communication works by routing the IP packets through the network towards the target IP address.

The bridged Key connection allows access only to a specific LAN network and the Locks bridged to it. The routed Key connection allows the selection of multiple LAN networks, Locks and other targets that are accessible for the Key. The desired connection type can be selected for each Key in the Web user interface from **SETTINGS > KEYS AND LOCKS**. The default connection type for Keys matched to a Hub is Layer 3. Additional Keys can be matched to the Hub the same way as they are to a Node.

The matching process for Nodes and Keys is presented in the Key and Lock User Manual. Connecting a Node to the Hub is carried out essentially in the same way as when connecting two Nodes together, except during the process the connection type is defined either as Layer 2 or Layer 3.

## 2.5 Main features

### TosiControl integration

Tosi Hub serves as a central component in network management with Tosi Control. Access controls configured through Access Groups can be monitored via Tosi Control. The Hub transmits network element listings and their status information for centralized device management.

### Unrestricted Service and Protocol Support

The Hub enables authentic Layer 2 communication, eliminating the need for specific ethernet protocol drivers. Deploy any protocol, ethernet-capable edge device, data analytics software, or cloud hosting environment. Our automated networks allow you to build your desired system without legacy technology constraints.

### Built-in automated cybersecurity

Our automated networking eliminates human error in cybersecurity configuration. Every Hub includes:

- Automated Linux iptables-based firewall at the edge, rendering Hub LAN-connected devices invisible to the internet
- Point-to-point networks through 256-bit AES encrypted VPN tunnels without third-party cloud involvement, ensuring full data encryption during transit

### Central user access management

The Hub offers centralized user management through Access Groups. This feature enables administrators to define access rights between connected devices and users. Configuration is managed through the Access Groups menu.

### Audit log data collection and forwarding

The Hub collects log data from events occurring on both the Hub itself and any connected Nodes and Sub Locks. Log collection and monitoring can be enabled through the menu interfaces of both the Hub and individual Nodes. Hub can be configured to forward log data to a remote logging server.

#### Connection monitoring and alerts

Tosi Hub can send email alerts for established and closed connections. Alerts can be configured selectively for any Node and implemented without additional services. Alert configuration is available through the menu.

#### Virtual LANs (VLANs)

Tosi Hub supports VLAN configuration through any physical LAN port, accessible via the menu interface.

#### Prometheus Resource Monitoring

Tosi Hub features integration with Prometheus monitoring system, enabling comprehensive resource tracking and performance analysis. Monitor CPU usage, memory consumption, and system health metrics in real-time. The built-in Prometheus support provides standardized metrics that can be easily integrated with existing monitoring dashboards and alerting systems.

# 3 System Requirements

## 3.1 Requirements for cloud and on-premises virtualization platforms

Virtualisation platform based on one of the following:

- VMWare vSphere/ESXi v7.0 GA
- Microsoft Hyper-V on Windows Server 2022
- Linux KVM
- Microsoft Azure cloud platform (new installations are done on Azure Marketplace)
- Amazon AWS cloud platform (update from previous version, new installations on Hub 4.x branch are now supported)

Minimum HW and computing requirements for cloud and on-premises virtualisation platforms:

- x86-64 processor architecture, processor with two high performance server CPU cores. Additional cores can be required based on the intended system load
- Minimum 2 GB RAM, recommended 8 GB RAM for large environments
- Minimum 16 GB of permanent storage, recommended 20GB for VMWare, Hyper-V and KVM environments
- Two or more network interfaces for the virtual machine
- One non-restricted IP address, recommended public IP address
- Minimum 10/10 Mbit/s internet connection, recommended 100/100 Mbit/s

To install and setup the Hub, you will also need:

- Internet connectivity to download the Hub VM image and possible software updates
- License key to activate the Hub

Note that Secure Boot is not supported and should be disabled if available on the platform.

## 3.2 Microsoft Azure

Hub can be installed on Microsoft Azure from the Azure Marketplace. The above requirements apply to Azure.

- https://azuremarketplace.microsoft.com/
- How to install HUB from Azure Marketplace

## 3.3 Amazon Web Service

Hub 4.X image can be found in AWS AMI (Amazon Machine Images) catalog. The above system requirements apply also to AWS.

Installation instructions:

- How to install VCL / HUB on Amazon AWS Cloud via WEB-GUI

# 4 Connectivity

## 4.1 Tosi Platform Cloud architecture

Typically, Tosi products facilitate direct establishment of VPN connections between one another. However, certain scenarios preclude this direct connection, such as instances where outbound UDP is obstructed by a firewall, or a proxy server is necessitated. In such circumstances, a fallback mechanism is employed, utilizing the Tosi Cloud environment to establish relayed VPN connection.

The relay server serves as a Tosi-hosted router, redirecting encrypted VPN data between the connected endpoints. Relay servers possess known addresses and are perpetually accessible to Tosi products via the TCP protocol.

Due to the latencies inherent in the communication between VPN endpoints and relay servers, as well as the characteristics of the TCP protocol and limitations of server capacity, relayed connections may not deliver performance on par with direct UDP connections. To optimize latencies and ensure optimal performance, it is advisable to permit all outbound UDP connections in the firewall configuration.

## 4.2 TCP and UDP connections

The Tosi Platform, encompassing the Hub among other components, offers support for two distinct VPN connection types: TCP (Transmission Control Protocol) and UDP (User Datagram Protocol) connections. Within the platform, a VPN tunnel can be established using either of these protocols.

TCP and UDP are transport layer protocols within the Internet Protocol (IP) suite, governing the transmission of data over networks while presenting different sets of features and trade-offs.

TCP can create a dependable and sequentially ordered connection between two devices before transmitting data. It ensures that data packets transmitted from one device are received accurately and in the same order by the receiving device. Notably, the TCP connection type is relayed*, meaning the connection is routed through servers in the Tosi Cloud. Consequently, relayed TCP connections typically exhibit slower performance compared to direct UDP connections. Starting from Hub version 4.4.0, also direct TCP connections are supported for HUB orchestrated direct connections.

On the other hand, UDP operates differently, as it does not establish a dedicated connection prior to data transmission. Instead, it independently sends packets, known as datagrams, to the recipient without

providing guarantees of reliability, ordering, or congestion control. UDP prioritizes simplicity and minimizes overhead.

The UDP connection type, in contrast to TCP, is always a direct connection from the Hub to the respective Gateway or Client. This inherent directness results in faster performance when compared to the relayed TCP connections.

## 4.3 Installing behind a firewall

Tosi Hub is designed to work best with a non-restricted public IP address. Often this is the optimal solution providing the best connectivity with the easiest setup.

If separate network edge firewall is required in front of the Hub this can be achieved with the following remarks. The firewall must be configured with:

- UDP enabled for direct VPN connections to work. Without UDP enabled all network connections will be routed via relays which can cause increased latency
- No port translation
- No restrictions towards the Internet
- For Direct Connectivity, see network and port requirements in chapter 4.4.6

## 4.4 Direct Connectivity (HUB-Orchestrated VPN)

### 4.4.1 Overview

HUB version 4.4.0 introduces a new optional operating mode called Direct Connectivity. This feature enables VPN connections to be established directly between the HUB and its paired devices, such as Clients and Gateways, without relying on Tosi Cloud (MatchMaker) for ongoing connection orchestration.

Direct Connectivity provides a more independent and resilient connectivity model, while still remaining fully compatible with the existing cloud-assisted approach. It is important to note that MatchMaker is still required during the initial phase: at least one MatchMaker-based VPN connection must be established first in order to perform the necessary certificate exchange. After this has been completed, subsequent connections can be established directly between the device and the HUB.

### 4.4.2 Benefits

Direct Connectivity improves both reliability and performance in environments where the HUB is reachable from the public internet.

One of the key advantages is reduced dependency on Tosi Cloud. Once direct connectivity has been established, VPN connections can still be formed even if MatchMaker or relay services are temporarily unavailable. This increases overall fault tolerance, especially in critical environments.

Another important benefit is that connections are guaranteed to be direct. When VPN is orchestrated by the HUB, traffic does not need to pass through relay infrastructure, which leads to more predictable network behavior and can reduce latency.

Connection establishment is also expected to be faster, particularly in larger environments. The direct negotiation model involves fewer components and avoids some of the throttling and overhead associated with MatchMaker-based connection handling.

In addition, Direct Connectivity reduces load on backend systems. Because fewer connection requests are processed through MatchMaker and relays, the solution scales more efficiently in deployments with a large number of devices.

The feature also introduces support for Direct TCP VPN connections. This is particularly useful in networks where UDP traffic is restricted or blocked, such as in environments with strict firewall policies.

### 4.4.3 When to Use Direct Connectivity

Direct Connectivity is best suited for environments where the HUB can be reliably reached from the internet and where network policies allow controlled inbound traffic.

Typical use cases include industrial and OT environments, enterprise networks with managed firewall configurations, and cloud-based deployments. It is also a good fit in scenarios where high availability is critical, or where reducing dependency on external cloud services is desirable.

The feature is especially beneficial in larger deployments, where the reduction in backend load and faster connection handling can have a noticeable impact.

Direct Connectivity is also a good choice in networks where UDP traffic is restricted. In such cases, the support for Direct TCP connections enables VPN connectivity even in more constrained environments.

### 4.4.4 When Direct Connectivity is not suitable

Direct Connectivity cannot be used in environments where the HUB is not reachable from the public internet. This typically includes situations where the HUB is located behind Carrier-Grade NAT (CGNAT), which is common in many mobile (4G/5G) network connections.

It is important to distinguish between the role of the HUB and the clients in this context. VPN clients, such as Gateways or Key clients, can be located in mobile networks without issue. The limitation applies specifically to the HUB, which must be publicly reachable in order to accept inbound connections.

Direct Connectivity is also not suitable in networks where inbound traffic to the HUB cannot be allowed due to firewall policies or other restrictions. In these cases, the system will automatically fall back to MatchMaker-based VPN orchestration.

### 4.4.5 How it works

The connection process begins with a standard MatchMaker-based VPN connection between the client and the HUB. During this connection, the necessary certificates and connection parameters for direct communication are exchanged.

Once this initial step has been completed, the client can establish a direct connection to the HUB. The HUB then orchestrates the VPN connection directly, without involving MatchMaker in the process.

If, for any reason, the direct connection cannot be established, the system automatically falls back to using MatchMaker. This ensures that connectivity is always maintained, even in environments where direct connectivity is not possible.

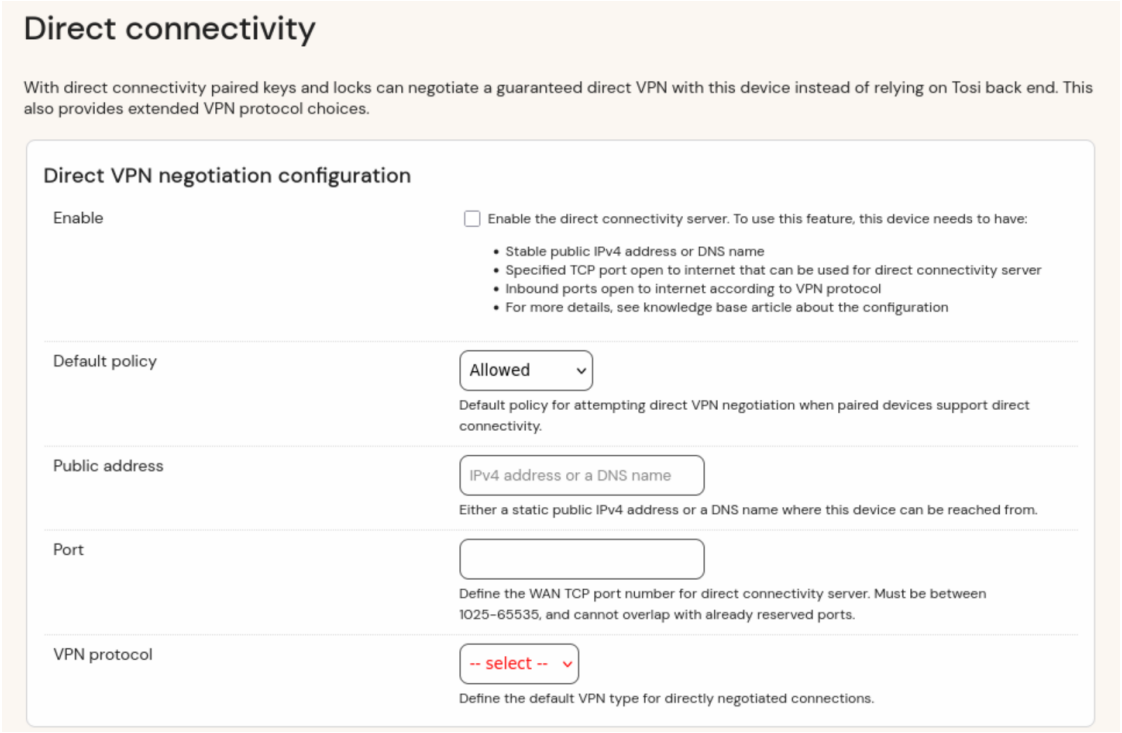
### 4.4.6 Network and port requirements

To use Direct Connectivity, the HUB must have either a public IP address or a DNS name that resolves to it. The network must allow inbound connections to the HUB, and if the HUB is located behind a router, appropriate port forwarding must be configured.

Connection negotiation between Direct Connectivity uses two types of ports. The first is a single configurable TCP port, which is used for the client and the HUB. This port is defined in the HUB user interface and serves as the entry point for direct connectivity.

The second is a port range used for the actual VPN traffic. By default, this range is 50000–54999 and is used for establishing VPN tunnels. These ports are allocated dynamically by the HUB during connection setup.

Both the negotiation port and the VPN port range must be allowed through any firewalls between the client and the HUB. There is no need to allow any inbound connection to the Gateways side.




### 4.4.7 Security considerations

Although Direct Connectivity requires inbound ports to be opened to the HUB, this does not mean that the system is exposed to unauthenticated access.

All connections are strongly authenticated and encrypted. The HUB validates incoming connection requests before processing them, and only trusted and authorized devices are allowed to establish VPN connections.

In addition, VPN connections use modern security configurations, including a minimum TLS version of 1.3. This ensures that security remains aligned with Tosi's principles, even when inbound connectivity is enabled.

### 4.4.8 Limitations

As of HUB version 4.4.0 and Gateway version 5.12.0, Direct Connectivity supports only Layer 3 VPN connections. The feature is not supported when the Gateway/Client is using a proxy, and it always requires an initial MatchMaker-based connection for certificate exchange.

Direct Connectivity also requires support from the participating platform components.  To utilize the Direct Connectivity feature, the minimum required versions are Tosi HUB 4.4.0, Tosi Gateway firmware version 5.12.0 and Tosi Client software version 4.4.2.

While the feature is expected to provide significant benefits in larger environments, it has not yet been fully validated at very large scales, and a gradual rollout is recommended in such cases.

### 4.4.9 Direct connectivity Summary

Direct Connectivity introduces a new optional operating mode for Tosi Platform VPN connections. The default mode remains the cloud-assisted, NAT-friendly approach based on MatchMaker, which works reliably in all environments.

The new direct mode allows Tosi HUB to orchestrate VPN connections independently, enabling direct connections, reduced cloud dependency, improved performance, and support for Direct TCP connectivity.

By supporting both modes, Tosi provides a flexible solution that can be adapted to a wide range of deployment scenarios without compromising reliability or security.

# 5 Installation

## 5.1 Installing the VM image

In most cases, one of the images referenced earlier can be imported to the virtualisation platform directly or converted to a suitable format. Please refer to the documentation of your virtualization platform for the supported image formats and import method.

Hub images are distributed at https://downloads.tosibox.com/HUB/.

See also the helpdesk article: How to Install HUB

## 5.2 VMWare vSphere/ESXi

- Download the latest image named …esx.ova
- Use the Deploy OVF Template function of the vSphere client to import the downloaded .ova file
- Adjust the CPU and RAM hardware settings according to your needs, keeping in mind the minimum requirements

- Make sure that the video memory setting is set to "auto-detect" or at least 32 MB is available for the VM if configured manually
- Make sure that the network adapter is in bridged mode and satisfies the requirement of the non-firewalled public IP address
- Check from VMWare virtual switch security settings your virtual LAN adapter has security options are set to
    - Promiscuous mode – Accept
    - MAC address changes – Reject
    - Forged transmits – Accept

## 5.3 Microsoft Hyper-V

- Download the latest .vhdx image
- If needed, create a new Virtual Switch using type External and the interface that is connected to the Internet
- Create a new VM, select Generation 2
- Download the latest .vhdx image and "use an existing virtual hard disk" and select the downloaded .vhdx file as disk image.
- Edit the settings of the created VM
- Add new Network Adapter (not Legacy)
- In the Network Adapter's settings, select the correct Virtual Switch (if you created one earlier, select it)
- In the Network Adapter's settings, go to Advanced Features and select Enable MAC address spoofing
- Disable secure boot

## 5.4 Linux KVM

In most cases, one of the distributed images can be imported to the virtualization platform directly or converted to a suitable format. Please refer to the documentation of your virtualization platform for the supported image formats and import method.

## 5.5 Cloud installation

For instructions how to install the Hub on Azure see Tosi Helpdesk.

# 6 Initial setup

## 6.1 Accessing the configuration interface

Start the virtual machine that was installed. The virtual machine will automatically boot into graphical console / desktop and launch the activation user interface through a browser. The browser will automatically close after it has been inactive for a long time. In this case it can be restarted by interacting on the desktop with mouse or keyboard.

## 6.2 WAN interface configuration and product activation

In the activation user interface, configure the IP address settings for the WAN interface. After activation is complete, you can configure the IP address manually. When configuring the IP address manually, it is

very important to enter also working DNS servers as many product features, including the activation, require a working DNS service.

Enter the delivered license key into its own field and click Activate. The product is now activated, and it will download the rest of the product components using the defined WAN connection. This can take up to 15 minutes, depending on the Internet connection speed. After the activation and installation is finalized, a message “Activation completed, rebooting...” will appear and the VM will automatically reboot. After rebooting, you can proceed with the configuration.

## 6.3 Change password

After the virtual machine has booted up again, the graphical console now provides access to the Hub web user interface. Log in with the default admin credentials (admin / admin) and go to **SETTINGS > CHANGE PASSWORD** to change the password.

The web user interface can be accessed also remotely over VPN connection from master Key. If there is a need to access the web user interface from other Keys or networks, the access rights can be explicitly allowed in the Access Groups.

## 6.4 Configuring LAN interfaces

Tosi Hub can have multiple LAN and VLAN interfaces that can provide access to your own local networks and services. The initial configuration of Hub contains a default LAN1 interface that is not connected to any real adapter. To assign LAN1 to a real adapter, it must be first deleted by navigating to Interfaces page and selecting Delete next to interface ‘LAN1’.

To add additional LAN interfaces for the Hub, you must first configure a new network adapter for the virtual machine. This is done differently depending on your virtualization platform and typically requires restarting the virtual machine. In case layer 2 VPN connections from Keys or Nodes are required, the network adapter should be configured to allow MAC address spoofing or promiscuous mode:

- Hyper-V: In the Network Adapter’s settings, go to Advanced Features and tick Enable MAC address spoofing
- VirtualBox: In the Network Adapter’s settings, open Advanced menu and set Promiscuous Mode: Allow All

After the new network adapter is added, it can be configured in the web user interface by selecting **NETWORK > INTERFACES > ADD**.

In the “Add interface” view, set the port role as ‘LAN’, define a number for the interface (e.g. starting from ‘1’), choose the IP address assignment method (DHCP or static) and finally choose the newly added network adapter. After clicking Submit, the IP address and DHCP server settings can be configured if protocol was set to static. After clicking Save, the new interface is ready to be used, and it can be included in Access Groups or additional VLANs utilising the interface.

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*At minimum Hub must have one LAN interface configured when using Mobile Clients. The interface does not have to be connected to a physical interface but must exist.*

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NOTE. In Cloud environment, one cannot access the UI, and remote matching needs to be made via console. See the helpdesk document for more information.

## 6.5 Create Remote Matching code

After the Hub is activated and has Internet connection, the Master Key needs to be matched to the Hub to add it to the network. This is done with the remote matching feature.

1. Go to **SETTINGS > KEYS AND LOCKS**. Scroll down to the bottom of the page to find Remote Matching.


*Figure 2: Remote Matching Code generation*

2. Click the Generate button to create the Remote Matching Code.
3. Copy and send the code to the network administrator who has the Master Key for the network. Only the network administrator can add the Hub to the network.

## 6.6 Remote Matching

Insert the network Master Key in your workstation and Tosi Key client application opens. If Key application is not installed browse to www.tosibox.com for more information. Note that you must use the Master Key for your network.

Log in with your credentials and go to **DEVICES > REMOTE MATCHING**.

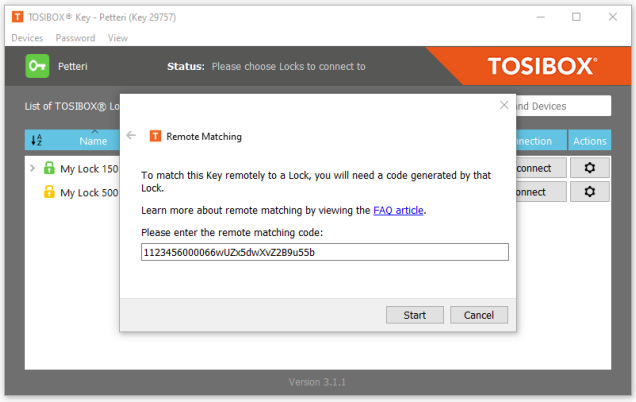


*Figure 3: Remote Matching on Tosibox Key client application*

Paste the Remote Matching code on the text field and click Start. The Key application will connect to the Tosibox infrastructure. When “Remote Matching completed successfully” appears on the screen, Hub has been added to your network. You can see it on the Key application interface immediately.

## 6.7 Connecting Nodes and Locks

Now that you have Hub installed in your network you can connect all your Nodes and Locks for always-on, secure VPN connectivity.

1. Open Tosibox Key application and go to **DEVICES > CONNECT LOCKS**.
2. Tick all the wanted Nodes and Locks and make sure you also include the Hub in the selection. Click Next.

3. For Select Connection Type choose either Layer 2 or Layer 3, click Next.
4. Confirmation dialog is displayed, click Save and the VPN tunnel is created between each selected node and the Hub separately and the devices start to appear on the Hub's Status view.

If you need to revert the connection, you can go through the **DEVICES > REVERT LOCK CONNECTIONS** wizard in the Key client application and remove those devices you do not want connected to Hub.

## 6.8 Software update

Software updates can be checked and installed from Hub **SETTINGS > SOFTWARE UPDATE**. Opening the Software update view displays the option to check for possible available updates.

It is recommended to update to the latest available software version before taking the Hub to production environment.

# 7 User interface

Tosi Hub web user interface screen is dived into four sections:

A. Menu bar – Product name, menu commands and Login/Logout command
B. Status area – System overview and general status
C. Tosi devices – Nodes and Keys matched to this Hub
D. Network devices – Devices connected to the selected Node discovered during network scan

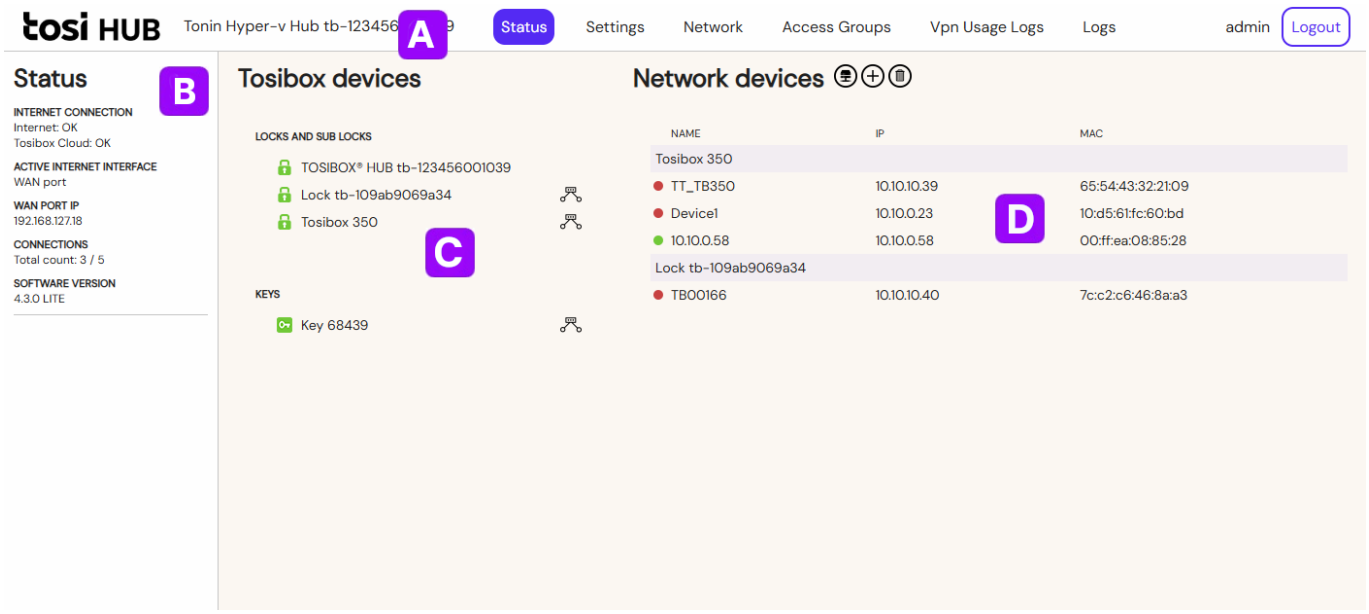


*Figure 4: Tosi Hub user interface overview*

Note that your screen can look different depending on the settings and your network.

## 7.1 Navigating in the user interface

### Status menu

The Status menu command opens the Status view with basic information about the network configuration, all matched Tosi Nodes and Tosi Clients (Keys) and possible LAN or manually added devices.

Tosi Hub scans the configured network interfaces. The LAN network scan can be configured to discover physical LAN devices with the Scan for LAN devices button.

New network devices can be added either

- automatically by clicking the network icon ("Scan for LAN devices"), which searches for all the devices within the LAN networks of the product
- manually by clicking the plus icon ("Add network device") and filling in the required details on the page that opens.

The network device list consists of devices connected to Hub LAN or VLAN. The list can be cleared by clicking the Clear network device list button. Devices connected to any Nodes' LAN are not cleared as the list of devices is managed by the Nodes and sent to Hub periodically.

### Settings menu

The Settings menu contains various settings related to

- Tosi Gateways (Locks/Nodes) and Tosi Clients (keys),
- changing the name for the Hub
- changing the password of the admin account
- restart the Hub
- update the software
- set email alerts,
- configure the Prometheus monitoring
- remote logging
- direct connectivity
- change the advanced settings.

The advanced settings page allows control to

- Remote support access from Tosi Technical Support
- Option to use the old remote support server
- Logging server and audit logging settings
- Hub time zone
- VPN cipher selection
- NTP service on Hub
- Local user password minimum and maximum length requirement
- Enabling Enhanced TosiControl integration for improved TosiControl experience
- VPN access from the Mobile Clients
- Force computers using the Key to route all Internet traffic through the Hub
- HTTP/HTTPS selection

### Network menu

All networking settings can be edited in the Network menu.

- Interfaces – Configure WAN and LAN interfaces
- VLANs – Configure virtual LAN settings. VLANs can be added to any of the product's LAN interfaces
- Static routes – Configure active static routes on the Hub
- DHCP Server – Configure Dynamic Host Configuration Protocol server on the Hub
- VPN details – Displays details on active VPN connections
- Diagnostics – Utilities for network diagnostics:  Ping, traceroute, nslookup and port listen

### Access Groups menu

Access Groups is the central user management view. Access Groups are used to define access rights between the connected devices and users.

Access Groups menu allows the administrator to define access control between Keys and Locks already matched with the Hub, the Hub LANs or VLANs, IP address ranges or single IP address even on port and protocol level. It also allows defining an access schedule for Sub Keys in this access group.

### VPN usage logs menu

VPN usage logs collect logging information on Keys accessing Nodes or IP addresses on Hub LAN. This data can be used for analysing how much data is consumed over the traced VPN connections.

### Logs menu

Logs view creates audit trail of various admin actions such as configuration modifications to keep track of changes in the system for system auditing purposes.

## 7.2 Login

Tosi Hub UI is protected from unauthorized access with a username/password. Login is possible only over VPN connection if accessing from the internet or from any workstation via private LAN side.

You can log in to the product's web user interface in the following ways:

- Using the virtual machine's graphical console
- Using any of the Hub's configured LAN or VLAN interfaces. The connecting computer must be connected to the same network with the LAN/VLAN interface and the LAN/VLAN interface must belong to an access group that provides access to the web user interface. The IP address of the product's LAN/VLAN interface is entered as the address in the browser.
- Over a VPN connection from a serialized master Key. The browser opens by double-clicking the Hub's name in the Key user interface.

There is a single administrator level access and one pre-defined username (admin). The default password is generated during the installation.

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*Login session timeouts automatically in 1h if there is no user activity. Timeout length is not configurable.*

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## 7.3 Adding admin users

Tosi Hub supports a maximum of 50 admin users. Default administrator user 'admin' can create and delete new users, but the default user cannot be removed. Only one user can be logged in at the same time.

When a new user is created an unambiguous username is required. The system generates a one-time password for the user. When a new user logs in for the first time, they must change the password. If a password for the user is lost, admin can reset it from the same menu, creating a new one-time password for the user.

Users can change their own password any time. Hub enforces mandatory password change during the first login.

Password constraints (min, max length) are set on Advanced settings view. Audit log will record configuration changes done by all admin users.

## 7.4 Adding virtual LANs

When the system local network has multiple VLAN networks available, adding a new virtual LAN can be used to connect the Hub to these networks. Each VLAN is configured to work over one of the product's virtual network adapters.

- To add a new VLAN interface, open the VLANs page and click Add
- Set the interface name, select the physical LAN port and VLAN tag (an integer between 1 and 4094). Note that VLAN ID can be set to one single interface at a time. Remove used VLAN ID before assigning it to another VLAN.
- Click Submit.
- Set the IP address and netmask used by the Hub in this VLAN and define DHCP settings if needed.
- Accept the settings by clicking the Save button. The newly added virtual LANs are summarized on the VLANs page together with their settings.

# 8 Access rights management

In Tosi Platform there are two principal methods for managing access rights: using the Tosi Client or with Tosi Hub.

The basic, always available, and best suited model for small networks is where the Key users have direct VPN connections from their workstations to Nodes and Locks at remote locations. Access rights are managed with the Tosi Client application.

When the network grows and more Nodes, Locks and users are added, Hub becomes a necessity and the central point of management. In a network with Hub, Key applications' role for administrator is to add new Nodes and Locks and users to the network but not to manage access rights, this is done with Hub's Access Groups. Administrator can continue to use the Key application to grant access to Nodes and Locks to other administrators or users.

## 8.1 Managing access rights with Key

In the basic model Key users have direct VPN connections to Nodes and Locks at remote locations. Administrator can manage access rights to Nodes and Locks for SubKey users. Access to LAN devices cannot be limited, all LAN devices under a Lock are accessible automatically when a user is given

access to the Lock. For administrator Key application is the primary tool to manage user access rights to the Locks.

If there is a need to define access rights to individual network devices behind a Node, it is done on each Node individually.

In the basic model Hub is used for always-on, bidirectional protected connections that enable for instance data collection and real-time direct service connections to the devices installed in the field. Hub can operate for instance as a data collection point, connection status log recorder or a connection supervisor.

## 8.2 Managing access rights with Tosi Hub

In centralized model Keys have access to the remote locations via the Hub and direct access from the Key application to the Nodes and Locks is disabled.

The centralised model enables an easy to use and versatile deployment of access rights management using the Hub's Access Groups view. Access Groups define access rights between group members which can be Keys, Nodes, IP addresses or network ranges, or MAC addresses. Members of an Access group can communicate freely.

Access can be granted to Locks' LAN networks, devices (IP addresses or ranges on Lock's network or on Hub LANs / VLANs) or devices with port and protocol restrictions, allowing protected, customer specific "server / field device / remote user" networks to be created, all of which are separated from each other. Access rights are instantly deployed.

Care must be taken to ensure adequate Internet connection bandwidth as all remote connection traffic flows through the Hub.

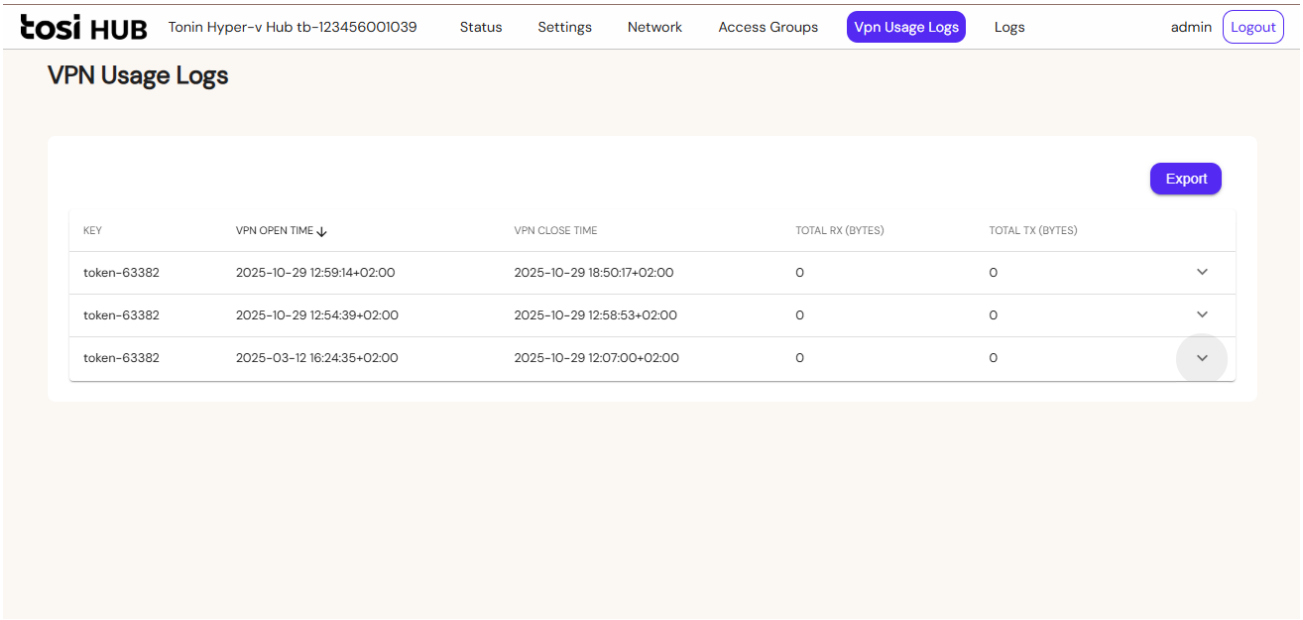
# 9 Logging and alerts

There are in total three distinct variations of logging in Hub.

- VPN usage logging for Keys
- Email alerts
- Admin trail with or without Remote logging

## 9.1 VPN usage logging for Keys

VPN usage logging is available at the main level in the main menu at **VPN USAGE LOGS**.




VPN usage logging collects usage statistics for transmitted VPN data. Collected data includes used Key, the VPN end-point IP address or accessed Lock, time the tunnel is open in accuracy of seconds and the amount of data transferred. Data can be used e.g. for billing purposes.

VPN usage logging can be enabled for each Key independently from **SETTINGS > KEYS AND LOCKS**. Logging is disabled by default.

Once logging is activated, Keys and Locks view can be used to select the Keys to be traced. Activating VPN usage logging has performance impact if large number of Keys is being traced.

The summary view shows the information about connecting Key, the start and end times for the connection, and amount of data transferred (RX and TX). The data amount calculations assume KB is equal to 1024 bytes.

## 9.2 Email alerts

Email alerts are disabled by default. Alerts can be taken in use in **SETTINGS > ALERTS.** Alerts require configuring email server using SMTP (Simple Mail Transfer Protocol server).

Email alerts can be enabled for each Node independently.

**Email alerts**

| Title | Message content | Example |
|---|---|---|
| [TOSIBOX] Alert: <node> connected | Lock <ID> (<node>) connected to HUB <ID> at <date> <time> | Lock tb-109ab9026b99 (Lock150) connected to HUB tb-001122000975 at 2022-09-14 19:55:27+0300. |
| [TOSIBOX] Alert: <node> disconnected | Lock <ID> (<node>) disconnected from HUB <ID> at <date> <time> | Lock tb-109ab9026b99 (Lock150) disconnected from HUB tb-001122000975 at 2022-09-17 04:24:06+0300. |

## 9.3 Admin trail

Audit logging stores various admin actions such as system state and configuration changes. Admin actions can be traced as audit log events on the Logs view. Audit logging is enabled by default but can be switched off by demand.

Supported Admin trail events are listed in an article on Tosi Knowledgebase.

Admin trail events can also be forwarded to a remote logging server.

## 9.4 Remote logging

Remote logging enables the transmission of audit events to an external server for centralized storage and analysis. This capability improves real-time monitoring, troubleshooting, and security maintenance throughout your network infrastructure.

The main advantage of remote logging is its ability to centralize security auditing and enhance incident response by retaining long-term audit logs. Through remote logging, you can guarantee that crucial system events and audit trails are stored securely off-device, creating a dependable record for forensic analysis, security inquiries, and compliance reporting.

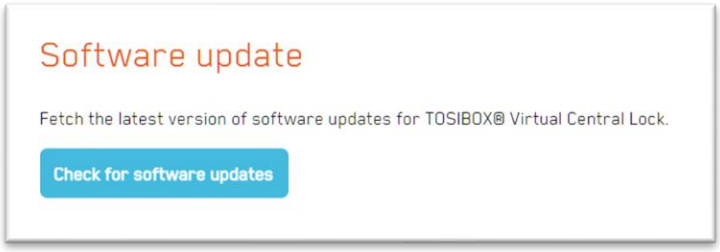
Starting from Hub version 4.1.0 it's possible to add also system performance data and VPN usage data into remote logs. Please see the helpdesk's HUB remote logging document for the detailed configuration details.

# 10 Software update

There are two types of updates

- **System upgrade** – System upgrade is a major release containing foundational changes to the platform and applications
- **Software update** – Software update is a minor release containing updates to selected parts of the system

Software updates can be checked and installed from *Settings* > *Software update*. Opening the Software update view displays the option to check for possible available updates.



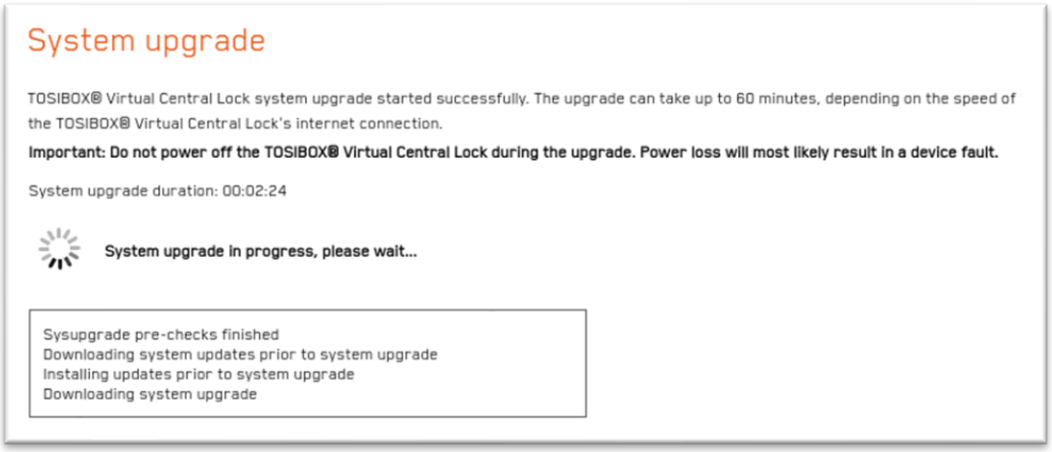

By clicking the *Check for software updates* button Hub connects to the update service and verifies if update is available and displays information accordingly. SW updates are also checked automatically once a day. If a new update is found a notification is shown on the UI along with an audit event. Update can be installed from the SW Update page as wanted.

When the upgrade is complete you get "System upgrade finished successfully" message.

Depending on the availability of the software upgrades and updates UI can show the option to start either of the processes. If both options are available system upgrade installs required system updates if update is not run first. System upgrade is a safe option even if a system update is offered.

Software update process is enhanced with checking for Azure and AWS specific extensions. Hub can warn about extensions coming from unknown sources. It is up to the user to determine the risk level of offered extensions.

System upgrade can be a lengthy process and require restarting the Hub. It is recommended to perform system upgrades only during planned maintenance breaks.




Software update typically takes less time and does not necessarily require reboot. VPN connections can go down temporarily during software update installation.

When the upgrade is complete you get “System upgrade finished successfully” message. If a reboot is required after the SW update, Hub will notify about this.

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*Updates from previous versions can require increased disk partition size. Requirements for the current version are listed in chapter System requirements. If your system has less resources available updates will not start, and you get a message on screen accordingly. Contact Tosi support if help is needed.*

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Virtual machine snapshot is highly recommended before any type of update.

# 11 Legal notices



Effective September 23, 2025, Tosibox rebranded as Tosi. In this document, references to “Tosi” refer to the brand name, while the legal entity remains Tosibox Oy until Q2 2026."

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