

Prepared by Jon-Olov Vatn	Document Release Notes WeOS 5.9.0	
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WeOS 5.9.0

Release Notes

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Important User Information

This section details important user information, directed in particular to new users of WeOS 5:

- WeOS 5.9.0 has been interoperability tested with WeOS 4.28 (4.28.4). For mixed WeOS 5 and WeOS 4 networks this is the strongly recommended WeOS version configuration.
- WeOS 5.9 requires WeConfig 1.11.1, or later.
- WeOS 5.1 introduced a new JSON based configuration file format, replacing the previous CLI based format. There is no migration path for configuration files from WeOS 4 to WeOS 5, or from 5.0 to 5.1. Users must factory reset after upgrade to WeOS 5.1 or later. Users upgrading to this release from WeOS 5.1, or later, are not affected.

For help with getting started using WeOS 5, refer to the Quick Start Guide in section 6.

User Guide

In a previous release, WeOS 5.5, a new User Guide was introduced. Compared to the WeOS 4 Management Guide, the User Guide is a web first publication focusing on use-cases, documented in stand-alone “HowTo:s”, and configuration guides for all supported sub-systems.

The User Guide is included in the release Zip file in the sub-directory: `user-guide/`. To access the documentation, open the following file in your web browser (example for WeOS 5.5.0):

`file://Downloads/WeOS-5.5.0/user-guide/index.html`

The `user-guide/` directory can also be placed on an intranet web server for easy access from within an organization. The directory is fully relocatable and does not need to be placed in the root folder of the web server.

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1 News

WeOS 5.9.0 release includes support for several interesting features, as well as a set of bug fixes. List of new feature highlights:

- Stateful Inspection Firewall
- NAT/NAPT (IP Masquerading) and Port-Forwarding
- IEC 62439-2 MRP (Media Redundancy Protocol)
- Dynamic DNS (DDNS)
- Improved certificate management

Detailed changes and additions are listed in the following sections. Worth specific mention are general changes to the CLI syntax of above mentioned functionality, compared to WeOS 4. This is an ongoing effort to ensure a coherent look and feel between different CLI commands (see section 8).

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2 Summary of Changes

This section details new features added in this major release.

Users new to WeOS 5 are recommended to read section 8 carefully, as it high-lights some of the major differences between WeOS 4 and WeOS 5.

2.1 Firewall, IP Masquerading/NAPT and Port Forwarding

WeOS 5.9.0 introduces firewall support for products with software level 'extended', comparable to the stateful firewall support existing for WeOS 4 products. High-lights of the WeOS 5 firewall:

- allows for filtering of incoming and forwarded traffic.
- ability to add comments to firewall rules for simplified maintenance
- clean configuration syntax, making it easy to determine what an entered rule does

Once the WeOS 5 firewall is enabled, the user explicitly needs to add allow rules to allow both incoming and forwarded traffic to pass. Here is a significant difference as compared to WeOS 4 firewall, which by default adds implicit rules to allow traffic to reach services such as DHCP and SSH. The example below shows how to allow DHCP clients on any interface to access the WeOS DHCP server.

```
example:/config/ip/firewall/#> input accept dport 67 proto udp
```

In addition WeOS 5.9.0 adds support for NAT/NAPT (IP Masquerading), when your WeOS router can provide connectivity from your private network towards the Internet using a single IP address. Support for port-forwarding is also included. An example of configuring your WeOS unit to share interface *vlan2* using NAPT is shown below. The first line establish the NAPT function, while the second line is needed to allow traffic from your (private) interfaces to be passed onto *vlan2*. The return traffic of established connections is also allowed (stateful firewall).

```
example:/config/ip/firewall/#> nat out vlan2  
example:/config/ip/firewall/#> forward accept out vlan2
```

Note: In WeOS 5.9.0 is that configuration of firewall, NAPT and port forwarding is *limited to the CLI*. Web support will be added in a later release.

For more detailed information, please see the WeOS 5 *User Guide* included in the release zip, both the *Configuration* and *HOWTO* sections.

2.2 IEC 62439-2 MRP (Media Redundancy Protocol)

WeOS 5.9.0 adds support for IEC 62439-2 MRP (Media Redundancy Protocol), complementing existing layer-2 redundancy support (FRNT, RSTP, etc.)

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MRP highlights:

- Two profiles are supported, MRP 30 ms and 200 ms maximum recovery time profiles.
- A device can act as a Media Redundancy Manager (MRM) or a Media Redundancy Client (MRC).
- One MRP Domain can be configured, i.e., each device can (only) be part of one MRP ring.
- In addition to regular Ethernet ports, WeOS enables the use of L2 SSL VPN ports (Layer-2 OpenVPN ports) as MRP ring ports.
- MRP SNMP MIB (IEC 62439-2 MRP MIB) is **not** (yet) supported.

Note: MRP is provided as an add-on service, requiring installation of a license key. In WeOS 5.9, MRP will work even without the presence of such a license file, but it will be enforced in a later release.

2.3 Dynamic DNS (DDNS)

WeOS 5.9.0 introduces support for DDNS, which allows keeping hostnames up to date with their respective IP addresses in seamless way. Major DDNS providers are supported: Freedns, NoIP, Loopia, Cloudflare, DynDNS, DuiaDNS, Yandex and DNSPod. In addition, WeOS allows configuring custom DDNS providers, as well as *checkip* service providers.

Since the majority of DDNS providers allow communication over HTTPS protocol, DDNS application in WeOS is equipped with functionality to explicitly enable or disable communication over HTTPS.

Another great feature of DDNS is the ability to choose *ca-certificate* store for HTTPS communication. By default DDNS will use builtin certificates (shipped with WeOS), but users may change this by first importing certificates of their own, and then changing *ca-store* DDNS option from *auto* to *local*. In this way, DDNS application will use the user-provided certificates for communication with providers.

2.4 Improved Certificate Management

WeOS 5.9.0 introduces improved certificate management. The all-new *show* function presents all certificates in a well-structured, uniform and easy-to-follow way.

For the purpose of convenience, certificates can now be referred to by their label or hash, which greatly simplifies the workflow.

All imported certificates are packaged internally into a bundle, which can be used instead of system-default bundle (includes all certificates shipped with WeOS) in applications that allow this, such as DDNS.

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2.5 TCN Echo Server (IEC 61375)

On Viper-TBN, WeOS 5.9.0 adds support for a so called 'TCN Echo Server' via the TRDP interface. Please refer to the *User Guide*, section 'Configuration/Train/IEC 61375-2-3 (Communication Profile)', for detailed information.

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3 Known Limitations

This section describes known limitations in WeOS.

3.1 Available ports for boot specific functionality

The bootloader rescue mode only supports regular copper ports, not SFP ports. On RedFox-5528, ports 1-4 are also not supported until the system has booted.

3.2 Firewall and Hardware Offloading

Use of the WeOS Firewall on a system with Hardware Offloading enabled isn't supported and the behavior of doing so is undefined.

Hence, if the firewall is to be used on a Viper-TBN, it is necessary to disable the hardware offloading in the following manner:

```
redfox-4d-3b-20:/#> configure
redfox-4d-3b-20:/config/#> ip
redfox-4d-3b-20:/config/ip/#> no offload
redfox-4d-3b-20:/config/ip/#> leave
redfox-4d-3b-20:/#>
```

3.3 SNMP

SNMP in WeOS 5 is read-only.

When configuring SNMPv3 authentication it will not inform the user if the password length is valid (minimum of 8 characters).

The MIBs folder in the release ZIP-file contains a conformance folder listing all supported MIBs and OIDs.

3.4 FRNT

Fastlink must be enabled manually for FRNT (gigabit Ethernet) ring ports.

Fastlink is a unique feature of Westermo products to optimize gigabit Ethernet link-down fail-over times in layer-2 redundancy protocols such as FRNT.

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3.5 RSTP

WeOS 5 supports RSTP, compliant to IEEE 802.1D-2004. Due to limitations in the WeOS 4 implementation of RSTP, a WeOS 4 unit will keep ports in blocking mode longer than needed when connected to a WeOS 5 node.

Hence, mixing WeOS 4 and WeOS 5 units in RSTP topologies may exhibit relatively long periods with limited connectivity during topology changes, this applies to both link failure and when a link comes up again.

Link aggregate path-cost use the configured port speed value(s) and not the negotiated speed value. This can lead to RSTP making the non-optimal path selection. Work-around this issue by setting a fixed path-cost in the spanning-tree port configuration.

3.6 IEC 61375

In this release, not all of the recovery use cases, nor the optional cases, are supported.

WeOS 4 support for inhibition via SNMP is removed. Inhibition is now set via TRDP ECSP_CTRL or TRDP ETBN_CTRL.

TTDP and non-TTDP multicast can be used simultaneously in this release, but is considered unstable and is strongly recommended to be avoided.

"Automatic Gap Insertions", when several vehicles have the same name, can lead to unexpected behavior. This is also true when Ethernet speed on backbone ports is set to Gigabit speed.

When recovery-mode is set to deferred/wait, an ECSC must be running on the configured multicast address. If no ECSC is running and sending data on the configured multicast address, no node will come up at all.

Gigabit speed on backbone ports limits the handling of lost and recovering middle nodes.

Since hardware offloading was introduced in WeOS 5.8.0, Viper TBN can now route data at a faster rate than the CPU could previously, leading to a potential of overloading the CPU during the time when the offloading tables are being set up. Since this happens during TTDP train inauguration, it is strongly recommended to enable inauguration inhibition on all nodes to reduce spurious re-inaugurations and guarantee a stable train communication.

3.7 LLDP

When using Link Aggregation, the individual member ports will transmit LLDP frames using the MAC address of the link aggregation interface, i.e. all member links in an aggregate will be using the same MAC address. The MAC Local bit (02) is also set.

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3.8 Port Monitoring

It is not possible to utilize port monitoring directly on a link aggregation port interface. However it is still fully possible to monitor the individual member ports that constitute any given link aggregate.

Therefore, in order to fully monitor an aggregate, monitoring must be configured for each of the aggregate member ports.

3.9 Link Aggregation

The current release WeOS 5.9 is not fully compatible with link aggregation in release WeOS 5.6 or earlier; this is due to a bug in WeOS 5.6, which included ports of different speeds in the aggregate.

3.10 Search function in User Guide

The User Guide included within the release-zip is Web based. The Search function in the User Guide navigation pane only works you make the pages available via a Web Server. That is, the Search function does not work when opening the User Guide via your local file system.

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4 Known Issues

Issue	Category	Description
#17353	Alarm	Link Alarm can fail when included in aggregate
#17572	System	FDB not showing all learned entries
#17650	WEB	LAGs and SSL tunnels are not all visible when configuring VLANs or IGMP snooping
#17740	LLDP	LLDP does not report Management IP Address associated with default VLAN
#17746	DHCP	Manually configured DHCP relay remoteid hex values over 0x7f not stored correctly in config file
#17760	OSPF	Segmentation fault in ospfd (FRR) when disabling OSPF, or rebooting unit
#17764	RSTP	RSTP configuration can become corrupt when using Link-aggregation
#17816	WEB	Multiple L2 SSL tunnels can not be configured into a VLAN in Web on RFIR-5528
#17888	RSTP	Removing a Port from a VLAN bridge causing RSTP ports to go into blocking.
#17908	Link Aggregation	Flooded traffic is forwarded through detached ports
#17912	VRRP	VRRP state sometimes unavailable if more than one instance configured
#17947	TCN	TTDP signalling handled as L2 priority 0
#17634	Alarm	Triggered "iface" action will not be released if configuration removes the triggered action
#17982	IGMP	IGMP snooping may occasionally fail to store learnt group MAC addresses in FDB (Viper-TBN)
#17991	VPN	L2VPN bridging on Viper-TBN unable to switch traffic
#17992	TCN	Shortening flag not set when node uncoupled
#17964	TCN	Use of VRRP and HW Offloading can break unicast upon VRRP failover (Viper-TBN)

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4.1 Pre-WeOS 5.8.1 issue on Lynx and RedFox (rare case of corrupt configuration filesystem)

This section only applies to WeOS 5 Lynx and RedFox units (i.e., not Viper-TBN).

If you have a WeOS 5 Lynx/RedFox unit running WeOS 5.8.0 or earlier, the unit is subject to an extremely rare bug where the configuration file system may become corrupt. If this occurs, the unit will continuously reboot the next time the unit is (re)started. This bug was fixed in WeOS 5.8.1 (referred to as issue 17842).

Although it is extremely unlikely that your device will experience this bug, you are strongly recommended to upgrade to WeOS 5.8.1 (or later) if you are running an older version of WeOS 5.

The remainder of this section describes the recommended method to upgrade to WeOS 5.8.1, as well as the procedure to handle the (rare) case when you wish to recover a broken unit.

- *Safely upgrade a unit to WeOS 5.8.1 (or later):* The Lynx/RedFox unit you wish to upgrade to WeOS 5.8.1 may potentially have a corrupt configuration filesystem (not seen until next reboot). Thus, to mitigate issues in this rare case, you are recommended to conduct some preparatory steps before initiating the regular upgrade procedure. See instructions below.
- *Handle a unit constantly rebooting:* In case your Lynx/RedFox already experienced this rare bug and is constantly rebooting, you will be able to reset the filesystem via the console port. After that the unit will boot, and you could initiate the upgrade to WeOS 5.8.1 (or later). Please see step 5 for instructions on how to reset the filesystem via the console port.

Best practice to upgrade a Lynx/RedFox unit running WeOS 5.8.0 or earlier:

1. Make a backup of your current configuration offline, e.g., using the Backup facility in the Web (Menu: “Maintenance” and “Backup & Restore”).
2. Connect a console cable to your Lynx/RedFox. See section 6.3 for information on console port settings (speed, parity, etc.). You should be able to login to the unit using your admin password (good as test to make sure the console program is correctly configured).
3. Conduct the upgrade to WeOS 5.8.1 (from Web or CLI). See also section 7.1.
4. From the console you will be able to see the unit rebooting after upgrade. If you reach the login prompt, the upgrade went fine. This is the likely scenario. **Done!**
5. If you via the console port discovers that the system continuously reboots, this is a sign that the configuration filesystem is corrupt. The steps below describe how to proceed if this (extremely rare) situation has occurred.
 - (a) Break the boot process by pressing Control-C (‘Control’ and ‘C’ buttons) in the terminal associated with the console port. (Keep them pressed until the boot process is stopped and you enter the Barebox Boot Menu).
 - (b) Enter the boot menu password (only needed if you have configured a boot menu password).

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(c) You are now presented with the Barebox Boot Menu (see below).

```
Barebox Boot Menu
1: Primary Partition
2: Secondary Partition
3: Network (BOOTP)
4: Factory Reset
5: System Recovery
6: Shell
```

(d) Press 4 and <Enter> to select Factory Reset.

(e) Answer 'y' (yes) to the follow-up question on erasing configuration data. The system will then boot with its factory default setting.

(f) Once the system has booted, restore the backup configuration you have stored offline (step 1).

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5 Fixed Issues

Fixed issues in WeOS 5.9.0

Issue	Category	Description
#17855	VPN	L2VPN only able to bridge known unicast and known multicast to/from Ethernet port
#17975	SNMP	Unable to retrieve ttdpCntEtbnId SNMP value with SNMPGet function
#17978	TCN	ECSP Backup is sometimes out of sync with Master
#17698	CLI	CLI interface setting for "enable always" exists but does not bite
#17911	System	Upgrading generates message 'ERROR: FATAL'
#17945	WEB	Iface inet dhcp configuration options missing in web
#17938	TCN	Loss of ECSC while consist is Leading leads to stuck lead state
#17750	Alarm	No input validation check for a configured sensor ID in temperature and digin triggers
#17805	WEB	Unable to change the VLAN name via GUI
#17957	SNMP	The ttdpEtbnCnt SNMP value does not reflect the correct number of ETBNs currently present on ETB network

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6 Quick Start Guide

WeOS 5 devices are intended to be usable out-of-the-box as a switch. All access ports are assigned to the same VLAN (untagged) and the device tries to acquire a management IP address via DHCP. It also acquires a link-local address (in the 169.254.x.x range). These addresses are advertised with mDNS (Linux/Apple), SSDP (Windows), and LLDP.

6.1 Default User and Password

user: admin

password: admin

6.2 General

Apple, Linux, and Windows users with mDNS installed, can either use an mDNS client to find the device's IP address, or connect using a web browser:

- <http://weos.local>
- <http://redfox-4d-3b-20.local>

The first example is not available if there are many WeOS devices on the same LAN. The latter, and more reliable address, is a combination of the hostname and the last three octets of the device's MAC address in that LAN. In this example the hostname is `redfox` and the MAC address is `00:07:7c:4d:3b:20`.

Windows users without mDNS have SSDP to discover WeOS devices. In Windows 7 there is the *Network and Sharing Center* where a clickable icon for each discovered WeOS device should appear under *Network Infrastructure*. The PC must, however, be in the same subnet (DHCP or link-local) for this to work. Windows users also have the Westermo WeConfig tool to manage their WeOS devices.

Expert users can also use `nmap`, a port scanner, to scan the network for the device. Be aware though that this might be frowned upon should your device be located on a shared network.

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6.3 CLI

WeOS comes with a Command Line Interface (CLI) that can be accessed via a console port at 115200@8N1, or Secure Shell (SSH). Only SSH protocol version 2 is supported. To gain access to the CLI using SSH you need:

- An SSH client, see below
- The device's IP address or DNS/mDNS name, see above
- The user name and password, default user: admin, password: admin

SSH Clients

There are many of SSH clients available, some of them can even be used to connect to the devices using a (USB) serial console port. A few free clients are listed below. Please follow the directions for installation and usage applicable to your operating system and client.

UNIX, Linux, Apple macOS OpenSSH, <https://www.openssh.com>

Apple macOS Termius, <https://www.termius.com>

Windows PuTTY, <https://www.chiark.greenend.org.uk/~sgtatham/putty/>

CLI Overview

The CLI has two main scopes: admin-exec and configure context. The former is what the user lands in after initial login.

```
redfox-4d-3b-20 login: admin
Password: *****
```

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```
\\ Westermo WeOS v5.3 5.3.x-g7890bde -- Oct 24 19:30 CEST 2018
Type: 'help' for help with commands, 'exit' to logout or leave a context.
```

```
redfox-4d-3b-20: /#> help
```

Central concepts in WeOS are: ports, VLANs, and interfaces. To see status of each in admin-exec context, use `show ports`, `show vlans`, and `show ifaces`.

To change settings, enter the configuration context with the command `config`. The same commands as above also apply here, but now display the configured settings. Notice how the CLI prompt changes to show the current scope.

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```
redfox-4d-3b-20:/config/#> iface vlan2
```

To show or change the interface and VLAN properties the user enters the command: `iface vlan2` and `vlan 2`, respectively, with an optional “show” as prefix. E.g. `show iface vlan2`.

```
redfox-4d-3b-20:/config/iface-vlan2#> help inet
```

The help command is always available. Use it stand-alone or with a context-specific setting to get more detailed help.

To leave a level use the command `end` to save or `abort` (or Control-D) to cancel. To save and exit all levels, and go back to admin-exec, use `leave` (or Control-Z).

```
redfox-4d-3b-20:/config/iface-vlan2#> leave
```

Applying configuration.

Configuration activated. Remember "copy run start" to save to flash (NVRAM).

The CLI, unlike the WebUI and WeConfig, has a concept of a running configuration. This is an activated but volatile (RAM only) file that must be saved to built-in flash (non-volatile storage) before rebooting. Many separate config files can be saved, but only one can be the selected startup-config. For details, see the built-in help text for the admin-exec `copy` and `show` commands.

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7 Firmware Upgrade

Firmware upgrade is supported from the CLI, WebUI, and WeConfig tool. The CLI only supports FTP/TFTP upgrade but the WebUI and WeConfig tool can also upgrade via CGI upload – making them the ultimate choice if you have no FTP/TFTP server available or do not care to set one up.

7.1 WeOS Image

(For upgrading a WeOS 5 Lynx/RedFox unit running WeOS 5.8.0 or earlier, please see section 4.1 for additional instructions.)

WeOS devices run from a built-in flash disk and usually comes with three partitions: primary, secondary, and boot. The latter is for the boot loader (see below) and the primary is the main WeOS image partition. Should this ever get corrupted, e.g. due to power-loss during upgrade, the device will boot using an image from the secondary (or backup) partition. This is a very appreciated, but mostly unknown, robustness feature.

```
redfox-4d-3b-20: /#> upgrade primary <SERVER-ADDRESS> <FILE>
```

The system must reboot when upgrading the partition image the system started on. This protects against flash corruption issues seen in earlier releases, caused by simultaneous access to the flash during programming or when starting new processes after an upgrade. Also, WeOS warns when one of the partitions has an image with invalid CRC. Attempting to upgrade the partition with the OK CRC is discouraged, upgrade the partition with the invalid CRC first.

As usual, when upgrading from an earlier release, we always recommend backing up your configuration beforehand.

Note: The version string listed in the output from the `show system-information` command in the CLI, or the System Details page in the WebUI, is only updated after reboot.

7.2 Boot Loader

The boot loader firmware has its own version numbering scheme and is CPU platform specific. Please note, unless the release notes explicitly recommends it, there is usually no need to upgrade the boot loader.

```
redfox-4d-3b-20: /#> upgrade boot <SERVER-ADDRESS> <FILE>
```

Note: The boot loader firmware can only be upgraded from the CLI.

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8 Significant differences between WeOS 4 and WeOS 5

Some aspects of the CLI are different between WeOS 4 and WeOS 5. Here are some examples:

- Access port names have changed, e.g. `Eth 1` is now `eth1`. Similarly, on products with M12 ports, `Eth X1` is now `ethX1`.
- Port ranges (lists) have changed, e.g. `Eth 1-8` is now `eth1..eth8`
- Server and Internet port settings are now usually input as `ADDR:PORT`
- IGMP settings have been renamed from `igmp-foo` to `multicast-foo` due to the included MLD snooping support. Hidden compatibility aliases exist to ease the transition
- Stateless NAT (NAT 1-to-1) has moved out from the firewall context
- Enabling management services per interface has moved to each specific service
- Configuration of management services have moved to a separate management sub-context
- New discovery services, in addition to LLDP, are mDNS and SSDP. The latter is for discovery on Windows systems, see also section 6
- The DHCP relay agent CLI syntax has changed considerably
- The `show running-config` command now lists an actual file, in JSON format as mentioned previously. An optional keyword now lists the first level JSON object, and more advanced keywords can also be given in `jq` syntax¹. For more information, see the CLI online help text for `help running-config`

¹For more information on `jq`, a JSON query tool, see <https://stedolan.github.io/jq/>