



Extreme OS ONE Switching and Routing v22.2.2.0 Management Configuration Guide

Comprehensive Instructions for Configuration and
Management

9039555-00 Rev AA
April 2026



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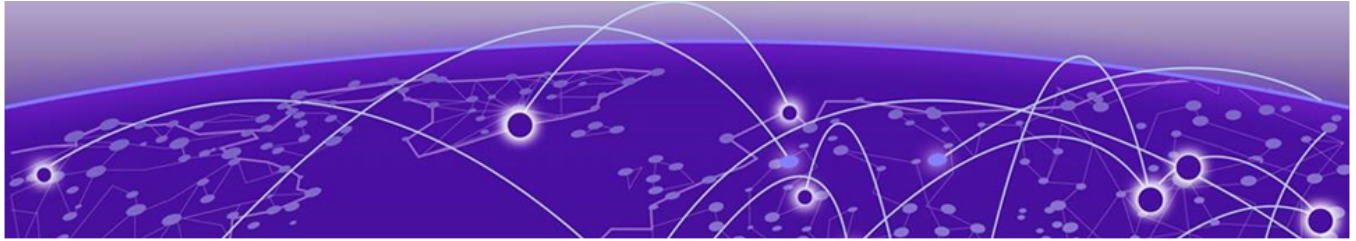
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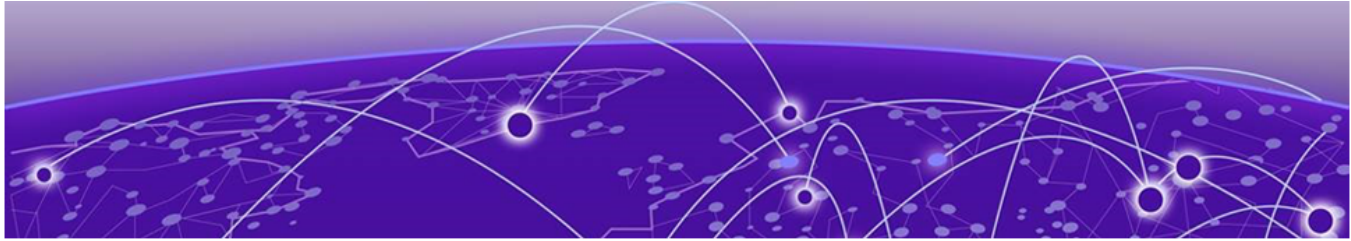
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Abstract

This *Extreme OS ONE SR Management Configuration Guide* version 22.2.2.0 provides CLI-based instructions for configuring and managing supported platforms. Supported platforms include Extreme 8520/8720/8730/8820. The guide covers essential setup, provisioning, operational workflows, automation, and troubleshooting, with updates for license handling and enhanced management features. Designed for experienced network engineers and administrators, the guide emphasizes secure automation and operational introspection across Extreme OS ONE deployments.



Preface

Read the following topics to learn about:

- The meanings of text formats used in this document.
- Where you can find additional information and help.
- How to reach us with questions and comments.

Text Conventions

Unless otherwise noted, information in this document applies to all supported environments for the products in question. Exceptions, like command keywords associated with a specific software version, are identified in the text.

When a feature, function, or operation pertains to a specific hardware product, the product name is used. When features, functions, and operations are the same across an entire product family, such as Extreme Networks switches, the product is referred to as *the switch*.

Table 1: Notes and warnings






Icon	Notice type	Alerts you to...
	Tip	Helpful tips and notices for using the product
	Note	Useful information or instructions
	Important	Important features or instructions
	Caution	Risk of personal injury, system damage, or loss of data
	Warning	Risk of severe personal injury

Table 2: Text

Convention	Description
screen displays	This typeface indicates command syntax, or represents information as it is displayed on the screen.
The words <i>enter</i> and <i>type</i>	When you see the word <i>enter</i> in this guide, you must type something, and then press the Return or Enter key. Do not press the Return or Enter key when an instruction simply says <i>type</i> .
Key names	Key names are written in boldface, for example Ctrl or Esc . If you must press two or more keys simultaneously, the key names are linked with a plus sign (+). Example: Press Ctrl+Alt+Del
<i>Words in italicized type</i>	Italics emphasize a point or denote new terms at the place where they are defined in the text. Italics are also used when referring to publication titles.
NEW!	New information. In a PDF, this is searchable text.

Table 3: Command syntax

Convention	Description
bold text	Bold text indicates command names, keywords, and command options.
<i>italic text</i>	Italic text indicates variable content.
[]	Syntax components displayed within square brackets are optional. Default responses to system prompts are enclosed in square brackets.
{ x y z }	A choice of required parameters is enclosed in curly brackets separated by vertical bars. You must select one of the options.
x y	A vertical bar separates mutually exclusive elements.
< >	Nonprinting characters, such as passwords, are enclosed in angle brackets.
...	Repeat the previous element, for example, <i>member [member...]</i> .
\	In command examples, the backslash indicates a “soft” line break. When a backslash separates two lines of a command input, enter the entire command at the prompt without the backslash.

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Call GTAC

For immediate support: (800) 998 2408 (toll-free in U.S. and Canada) or 1 (408) 579 2800. For the support phone number in your country, visit www.extremenetworks.com/support/contact.

Before contacting Extreme Networks for technical support, have the following information ready:

- Your Extreme Networks service contract number, or serial numbers for all involved Extreme Networks products
- A description of the failure
- A description of any actions already taken to resolve the problem
- A description of your network environment (such as layout, cable type, other relevant environmental information)
- Network load at the time of trouble (if known)
- The device history (for example, if you have returned the device before, or if this is a recurring problem)
- Any related RMA (Return Material Authorization) numbers

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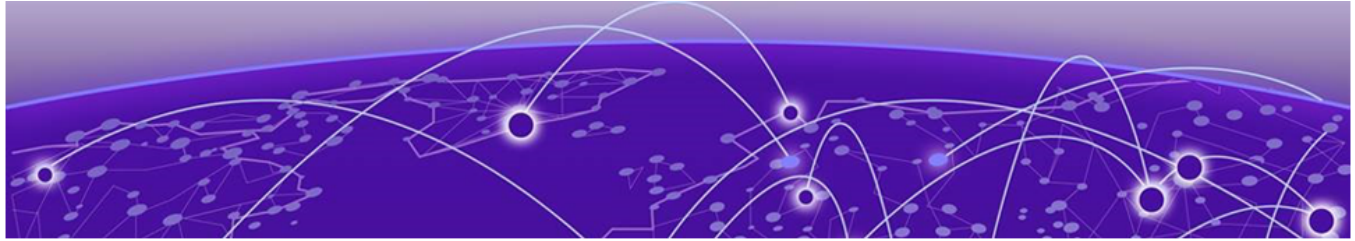
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- Improvements that would help you find relevant information.
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Provide as much detail as possible including the publication title, topic heading, and page number (if applicable), along with your comments and suggestions for improvement.



About This Document

- [What's New in this Document](#) on page 13
- [Supported Platforms](#) on page 14
- [Ethernet Interfaces and Chassis Devices](#) on page 14
- [User Management](#) on page 14

What's New in this Document

The following table describes the information added to this guide for Extreme OS ONE Switching and Routing, release 22.2.2.0:

Feature	Description	Link
Logging Functionality	Added new topic "Logging Functionality and Transmission of Log Events". This describes how Extreme OS ONE logs SysLog messages with LogID, level, and description.	Logging Functionality and Transmission of Log Events on page 45
Privileged access in start-shell via sudo	Updated the topic "Escalate Linux Permissions" with information on enforcing user awareness and authentication for privileged access in start-shell via sudo, with a security warning banner and a password required each time.	Escalate Linux Permissions on page 86

Feature	Description	Link
ACL-based mirroring	The new topic "Configure Flow-Based Mirroring" describes the procedure to configure flow-based (ACL-based) mirroring.	Configure Flow-Based Mirroring on page 148
	Updated the topic "How Mirroring Works" with the information on types of mirroring supported, limitations, and configuration guidelines	Mirroring Overview
	Updated the topic "Use Case Scenarios and Configuration Examples for Port Mirroring" with the configuration examples on Local SPAN Flow-Based Mirroring.	Use Case Scenarios and Configuration Examples for Port Mirroring

For additional information, see the *Extreme OS ONE SR Release Notes*.

Supported Platforms

Extreme OS ONE Switching and Routing 22.2.1.0 and later releases support Extreme 8520, Extreme 8720, Extreme 8730, and Extreme 8820 hardware platforms.



Note

Although many software and hardware configurations are tested and supported for this release, all possible configurations and scenarios are beyond this document's scope.

For information about other releases, see the documentation for those releases.

Ethernet Interfaces and Chassis Devices

The current version does not support any multi-slot (chassis) devices.

However, the Ethernet interface configuration and output *slot/port* examples in this document may appear as either 0/x or n/x, where "n" and "x" are integers greater than 0.

For all currently supported devices, specify **0** for the slot number.

User Management

The device is pre-configured with a default username 'admin'. Upon first login, you will be prompted to update the default password. Contact your Extreme Networks sales representative for the default password.

During the first login via CLI, you will be prompted to change both the admin password and the GRUB password. You can choose to either set a different password for GRUB or use the same admin password for GRUB (by pressing Enter). After updating the passwords, the system will confirm that the admin and GRUB passwords have been updated successfully.

To reconfigure the GRUB password, use the CLI command: `config terminal > system > grub > username <name> password <password>`. After a factory reset, both admin and GRUB passwords will be reset to `<default-password>` and must be changed by the user. When entering the ONIE prompt during reload, enter the GRUB login credentials (username: root, password: user-set password).

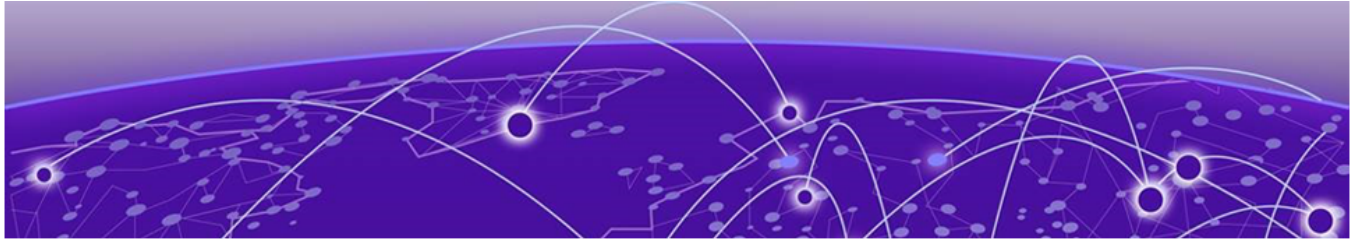
The new password must meet the following criteria:

- Minimum of 8 characters
- At least one uppercase letter
- At least one number
- At least one special character (for example, aRng#456)
- Must include at least one lowercase character



Note

- Running the `copy default-config running-config` command will reset the password, prompting you to set a new one.
- SSH is the only protocol enabled by default in the system.



Configuration Fundamentals

- [Configuration Files](#) on page 16
- [Session Connection](#) on page 36
- [System Logging Configuration](#) on page 43
- [Logging Functionality and Transmission of Log Events](#) on page 45
- [Ethernet Management Interfaces](#) on page 53
- [Configure an IPv6 Address on the OS ONE Platform](#) on page 57
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- [Interface Ethernet Ports](#) on page 67
- [System Clock](#) on page 68
- [Management VRFs](#) on page 69
- [Zero Touch Provisioning \(ZTP\) over DHCP](#) on page 74
- [Configuration and DRC \(Drift & Reconcile\) Tracking](#) on page 83

Configuration Files

When you boot up a device for the first time, the default configuration is the running configuration. As you configure the device, the changes are written to the running configuration. Changes to the running configuration are auto persisted across device reboots.

Default Configuration Files

Default configuration files are part of the firmware package for the device and are automatically applied to the running configuration under the following conditions:

- When the device boots up for the first time and no customized configuration is available.
- When you restore the default configuration.

You cannot remove, rename, or change the default configuration.

Running Configuration Files

The configuration currently effective on the device is referred to as the running configuration. Any configuration change you make while the device is online are made to the running configuration.

The running configuration file name is `running-config`.

Auto-Persistence of Configuration Data

All configuration changes performed on the device are automatically persisted by default.

Configurations are saved to a persistent configuration data store. After a device reboots, or, is brought up, configurations are restored from this data store. If this data store becomes unusable for any reason, configurations are then replayed from the default-config file.

Displaying Configurations

The following examples illustrate how to display the running configuration.

Displaying the running configuration

To display the contents of the running configuration, enter the **show running-config** command in the privileged EXEC mode. The following output is truncated.

```
device# show running-config
! Firmware: 10.2.1.0-20251113_152315_UTC-vwarad, Application(s):
22.2.2.0-20251113_152709_UTC-vwarad
! Date and Time: Sat, 2025-11-22 14:19:40 UTC
system
  grub
    username root password-hashed
grub.pbkdf2.sha512.10000.46FCFD6ED2118C98BC45F9EF4A1963AC4D4304F5E4D72325
8974ED3C1CF6BA910A48355BCCA63C9EC6EFE22479C7C612B2B1661843BF70C95EB726431317B852.E53F87925
9A261EB5E07809ACC
87A87D9E256D5D25A868C7E067A33981551282801023CFB96756AF7569D83C8B288D509A375987529AC4CD245B
9DE41F0A6CE7
!
  aaa
    authentication
      admin-user admin password-hashed $6$v7a4pJNPannughVD$SI1M4CRBY3.2s8oDJ5wtGtOKT4m.n4/
aYgudrw8GAvZxn44e
dsNg3QxSTPoeNh9FF6AT29PnOYHFbK4ILbdh1l
!
  ssh-server DEFAULT
    key rsa 4096
    vrf mgmt-vrf
    enable
!
!
bfd
  profile default
    interval 300 min-rx 300 multiplier 3
!
  profile mlag
    interval 300 min-rx 300 multiplier 3
!
!
overlay-networks
  default-nve base
  default-vni-offset 0
  nvo base
```

```
    member nve base
    member vni-domain base
    split-horizon base
    !
    nve base
    vni-domain base
    !
interface ethernet 0/1
    description This is backup
    no shutdown
    !
interface ethernet 0/2
    shutdown
    !
interface ethernet 0/3
    shutdown
    !
interface ethernet 0/4
    shutdown
    !
interface ethernet 0/5
    shutdown
    !
interface ethernet 0/6
    shutdown
    !
interface ethernet 0/7
    shutdown
    !
interface ethernet 0/8
    shutdown
    !
interface ethernet 0/9
    shutdown
    !
interface ethernet 0/10
    shutdown
    !
interface ethernet 0/11
    shutdown
    !
interface ethernet 0/12
    shutdown
    !
interface ethernet 0/13
    shutdown
    !
interface ethernet 0/14
    shutdown
    !
interface ethernet 0/15
    shutdown
    !
interface ethernet 0/16
    shutdown
    !
interface ethernet 0/17
    shutdown
    !
interface ethernet 0/18
    shutdown
    !
interface ethernet 0/19
    shutdown
```

```
!  
interface ethernet 0/20  
  shutdown  
!  
interface ethernet 0/21  
  shutdown  
!  
interface ethernet 0/22  
  shutdown  
!  
interface ethernet 0/23  
  shutdown  
!  
interface ethernet 0/24  
  shutdown  
!  
interface management 0  
  description hi there !  
  ipv4 address dhcp  
  no shutdown  
!  
vrf mgmt-vrf  
  member management 0  
!  
vrf default-vrf  
load-balance ethernet dst-mac src-mac vlan etype  
load-balance ipv4 dst-ip dst-l4-port protocol src-ip src-l4-port  
load-balance ipv6 dst-ip dst-l4-port nxt-hdr src-ip src-l4-port  
control-plane  
!  
device#
```

Backing up Configurations

The Backup Configuration feature ensures that device configurations can be safely backed up and restored, providing an additional layer of reliability and flexibility in network management.

It enables devices to recover their configuration in two key scenarios:

- Automatic recovery on config-db corruption
- Applying a backup configuration on immediate reboot

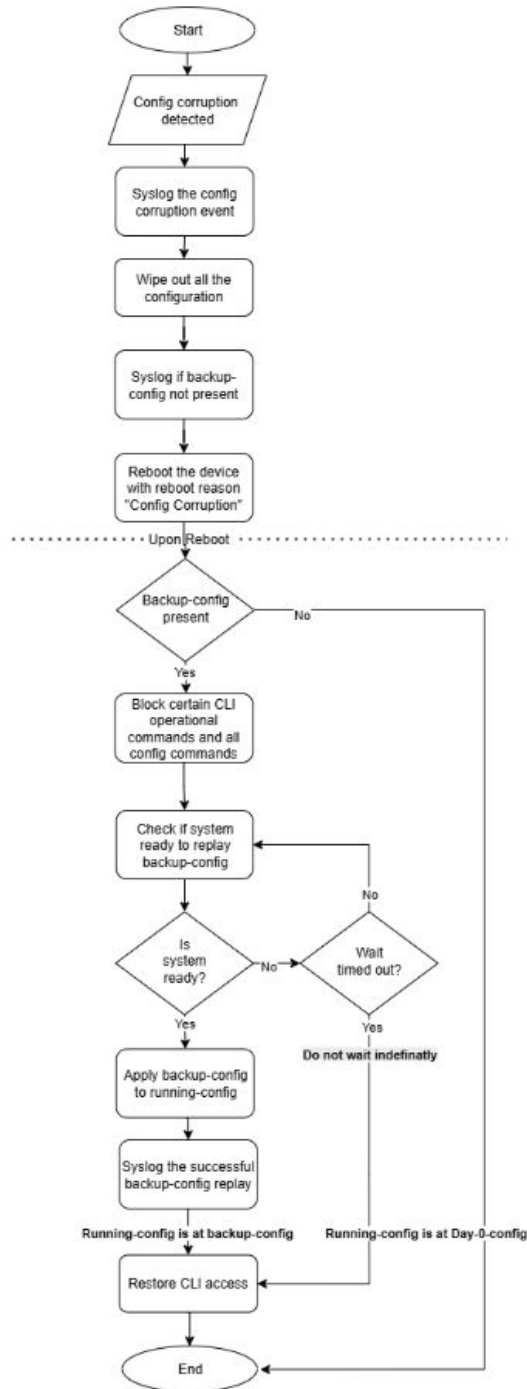
The key characteristics include:

- **No Default Backup:** By default, there is no backup configuration file on the device.
- **User-Initiated Backup:** A backup configuration is created only when explicitly requested by the user through CLI commands or gNOI calls.
- **Single Backup File:** The system maintains at most one backup configuration file at any given time.
- **Overwriting Existing Backup:** When a new backup configuration is created, it overwrites any existing backup file, ensuring that only the most recent user-created backup configuration is preserved.
- **Plain-Text Format:** The backup configuration file is a plain-text ASCII file, similar in format to the output of the **show running-config** command. The system maintains at most one backup configuration file at any given time.

Automatic Recovery on Config-DB Corruption

In the event of configuration database (config-db) corruption, the system initiates an automatic recovery process to restore functionality. This automatic recovery process ensures that the system can recover from config-db corruption and resume normal operation with minimal disruption. The following sequence of actions occurs:

1. **Corruption Detection:** The system detects config-db corruption and logs the event.
2. **Configuration Wipeout:** The device performs a complete configuration wipeout and reboots.
3. **Backup Configuration Check:** Upon reboot, the system checks for a backup configuration file
 - **Backup-config present:** The system replays the configuration from the backup-config file during reboot.
 - **No backup-config:** The device boots with the day-0 configuration and the management interface configured for DHCP.
4. **Restricted CLI Access:** During backup-config replay, CLI access is restricted to basic commands such as start-shell, and configuration changes are not allowed.
5. **CLI Access Restoration:** Once the system is fully initialized and the backup configuration is successfully applied, CLI access is restored.



If a backup configuration file exists, the system applies it during the reboot process. If not, the device boots with the day-0 configuration, and the management interface is configured for DHCP.

Applying Backup-Config on Immediate Reboot

To apply a backup configuration on the next reboot, you can use the `apply-on-next-reboot` option when creating the backup configuration file. In contrast to the

Automatic Recovery on Config-DB Corruption scenario, this case does not involve an automatic device reboot. However, when the device reboots for any reason, the user's request to apply backup-config on next reboot is executed. The following sequence of actions occurs:

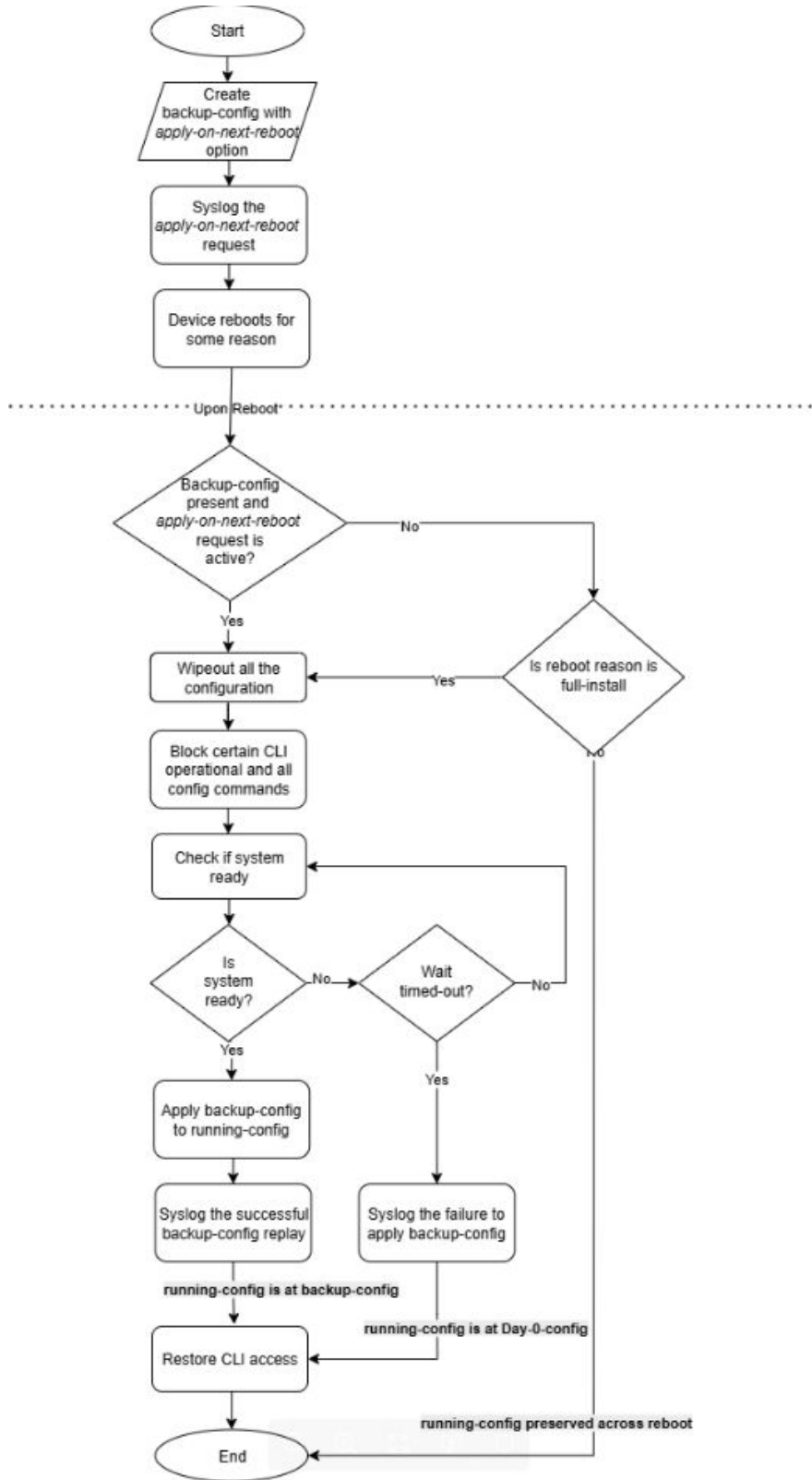
1. **Device Reboot:** The device reboots and recognizes the apply-on-next-reboot request.
2. **Configuration Wipe:** The device wipes out all existing configurations.
3. **Configuration Replay:** The backup configuration is applied, and any commands that fail to apply are ignored and logged.
4. **Temporary CLI Block:** Access to most CLIs is temporarily blocked during the configuration replay
5. **Config Replay Completion:** Once the backup configuration is successfully applied, the config replay is logged, and CLI access is restored.

When applying a backup configuration on the next reboot, consider the following key points:

- The backup configuration will be applied only once on the immediate next reboot.
- Subsequent reboots will not trigger the backup configuration replay again
- The device will wipe out all existing configurations before applying the backup configuration.
- Any commands that fail to apply during the configuration replay will be ignored and logged.
- CLI access will be temporarily blocked during the configuration replay.
- The backup configuration file will be preserved and remain available for future use, including automatic recovery in case of config-db corruption.

Canceling a Pending Application Request

You can cancel an active `apply-on-next-reboot` request by removing the backup configuration file using the `rm backup-config` command or the equivalent gNOI operation. This action disables the pending request, ensuring that the backup configuration is not applied on the next reboot.



Show Backup-Config Replay-Status

Use the **show backup-config replay-status** command to view the current status and progress of applying the backup configuration to the running configuration.

Backup-Config File Persistence

The persistence of the backup configuration file varies depending on the type of system operation. The following table outlines backup configuration file persistence behavior and specifies the conditions under which the backup configuration is applied during various system operations. For instance:

- During full upgrades or rollbacks, the backup configuration is applied only if the user has explicitly triggered `apply-on-next-reboot` beforehand.
- For full installations, the mere presence of a backup configuration is sufficient for it to be applied during the reboot process.

Operation Type	Backup-config File Retained	Backup-config Applied
Firmware upgrade/rollback	Yes	Yes (Only on immediate upgrade/downgrade if 'apply-on-next-reboot' was enabled)
Net/ONIE install	No	NA
Full-Install	Yes	Yes (Mear presence of backup-config file will trigger the config replay)
Full-Install with No-Preserve	No	No
Power cycle / Reload for any reason	Yes	Yes (Only on immediate reboot if 'apply-on-next-reboot' was enabled)
Factory Reset	No	No
Config DB corruption	Yes	Yes

Deliverables and Limitations of Backup Configuration

Use this topic to understand the deliverables and limitations, so you can effectively utilize the Backup Configuration feature and plan for potential constraints.

Deliverables

- **Backup Configuration Feature:** Supports two primary use cases, assuming a backup config file has been saved on the device:
 - Automatic recovery from config-db corruption
 - User-initiated config restore via the `apply-on-next-reboot` option
- **Complete CLI and gNOI Interface:** For managing the backup config feature, including:
 - Creating backup configurations from a file or the running config
 - Displaying backup configuration contents

- Removing backup configurations
- Applying backup configuration to the running-config
- Copying backup configuration to a file

Limitations

- **Manual Backup Creation:** Backup configurations must be created manually by the user. Automatic backup creation or scheduling is not available.
- **Scale Configuration Performance:** Backing up and restoring large-scale configurations can be time and resource-intensive, with duration dependent on configuration size and complexity.
- **CLI Availability During Restore:** CLI access is restricted during backup configuration replay, potentially impacting management operations for large configurations.
- **Single Backup Limitation:** Only one backup configuration file is supported at a time. Creating a new backup will overwrite any existing backup configuration.
- **Validation Requirement:** Backup config files must be validated before saving to the device to ensure configuration integrity.

Commands and Log Messages for Backup Configuration

Use this topic to learn about the commands (CLI and gNOI) and event log messages.

CLI Commands

The following commands are applicable for backup configuration:

For more information about command syntax and parameters, see the *Extreme OS ONE SR Command Reference Guide*.

- **copy backup-config file URL [{vrf VRF-NAME | source-ip ADDRESS}]**

Use this command to copy the backup configuration from disk to a destination file. The destination file can be on the disk, USB or remote location.

- **copy file URI backup-config [apply-on-next-reboot]**

Use this command to copy a configuration file to the backup-config, which can be used to recover from config-db corruption. The apply-on-next-reboot option enables you to apply the backup-config on the next reboot, regardless of the reason for the reboot.

- **copy running-config backup-config [apply-on-next-reboot]**

Use this command to copy the device's running configuration to the backup-config, which can be used to recover from config-db corruption. Additionally, the apply-on-next-reboot option enables you to apply the backup-config on the next reboot, regardless of the reason for the reboot.

- **rm backup-config**

Use this command to remove the backup configuration.

- **show backup-config replay-status**

Use this command to view the current status or progress of automated backup-config replays to running-config (excludes manually triggered config file replays).

- **show backup-config**

Use this command to view the content of backup configuration file.

Show Tech additions

The following logs are available for troubleshooting backup config issues:

- **Backup-Config Replay:** CLI commands executed during backup-config replay are available in the `/var/log/tierra/cli/vtysh_auditlog_admin_admin_LOCAL` log file.
- **gNOI Issues:** For issues related to gNOI, check the `api-gw rastrace` logs located at `/tmp/tierra/trace/api-gw`. Use the **show logging raslogs** and **backup-config** commands.
- **Config Corruption Issues:** For issues related to configuration corruption, check the `config-db rastrace` logs located at `/tmp/tierra/trace/config-db`.

gNOI Commands

```

syntax = "proto3";

package extreme.config_management;

import "extreme/types/types.proto";

option go_package = "github.extremenetworks.com/Engineering/tierra-os/proto/extreme/
config_management";
// Specifies the semantic release version of this proto schema.
option (extreme.types.version) = "0.1.0";

// The ConfigManagement service provides an interface for config related
// operations on Target.
service ConfigManagement {
  // CopyDefaultToRunning RPC is used for copying default-config to
  // running-config. This leads to auto reboot of the device on success.
  rpc CopyDefaultToRunning(CopyDefaultRunningRequest)
    returns (ConfigResponse) {};

  // CopyFileToRunning RPC is used for copying file to running-config.
  rpc CopyFileToRunning(CopyConfigRequest) returns (ConfigResponse) {};

  // CopyRunningToFile RPC is used for copying running-config to a
  // specified configuration file.
  rpc CopyRunningToFile(CopyConfigRequest) returns (ConfigResponse) {};

  // CopyFileToBackupConfig RPC is used to create a backup-config file by
  // copying a config file from various sources such as remote file, USB or
  // disk. Optionally supports apply-on-next-reboot flag (defaults to false)
  // to replay the backup-config on immediate reboot.
  rpc CopyFileToBackupConfig(CopyFileToBackupConfigRequest)
    returns (ConfigResponse) {};

  // CopyRunningConfigToBackupConfig RPC is used to create a backup-config
  // file by copying the current running configuration to the backup config
  // location. Optionally supports apply-on-next-reboot flag (defaults to
  // false) to replay the backup-config on immediate reboot.
  rpc CopyRunningConfigToBackupConfig(CopyRunningConfigToBackupConfigRequest)

```

```

    returns (ConfigResponse) {};

// RemoveBackupConfig RPC is used to delete the backup-config file and
// clear any pending apply-on-next-reboot requests.
rpc RemoveBackupConfig(RemoveBackupConfigRequest)
    returns (ConfigResponse) {};

// CopyBackupConfigToFile RPC is used to copy the backup-config file to a
// specified destination file location for export or archival purposes.
rpc CopyBackupConfigToFile(CopyBackupConfigToFileReq)
    returns (ConfigResponse);
}

message CopyRequest {
    oneof Request {
        CopyDefaultRunningRequest copy_default_running_request = 1;
    }
}

```

Event Log Messages

To enable effective monitoring and troubleshooting of the system, the system utilizes a common logging and event subsystem to:

- Log various messages
- Generate standardized events to indicate:
 - Status changes
 - Errors
 - Failures

The following Security Audit log messages are generated for backup configuration-related events:

- ◦ **LogID 8016:** Backup config created successfully.
- ◦ **LogID 8017:** Backup config created with apply-on-next-reboot.
- ◦ **LogID 8018:** Backup config creation failed.
- ◦ **LogID 8019:** Backup config copied to destination successfully.
- ◦ **LogID 6016:** Backup config restored successfully.
- ◦ **LogID 6017:** Backup config restore failed.
- ◦ **LogID 6018:** Apps not ready within timeout during backup-config replay.
- ◦ **LogID 6019:** Physical interfaces not found during backup-config replay.
- ◦ **LogID 6020:** Indicates that upon reboot due to config corruption, the backup-config file not found, hence default config restored successfully.
- ◦ **LogID 16001:** An unrecoverable configuration database error (config corruption) detected.
- ◦ **LogID 16002:** Config DB corruption, backup-config found, restoring from backup configuration.
- ◦ **LogID 16003:** Config DB corruption, backup-config not found, restoring default configuration
- ◦ **LogID 16004:** Config DB corruption. Failed to reboot the device.

```

{
  "LogID": 8016,
  "Details": {

```

```

        "Level": "Info",
        "Msg": "Backup config created successfully",
        "Cause": "Indicates that backup-config file created successfully",
        "Remedy": "No action required.",
        "Impact": "Backup config created to be used during unfortunate config-corruption."
    }
},
{
    "LogID": 8017,
    "Details": {
        "Level": "Info",
        "Msg": "Backup config created successfully, and it will be applied on next
reboot",
        "Cause": "Indicates that backup-config file created and will be applied on next
reboot or config corruption",
        "Remedy": "No action required.",
        "Impact": "Current configurations will be wiped out and configs from backup-
config file will be applied to running-config on next reboot."
    }
},
{
    "LogID": 8018,
    "Details": {
        "Level": "Error",
        "Msg": "Backup config creation failed",
        "Cause": "Error occurred while creating backup configuration file",
        "Remedy": "Check system resources and try creating backup config again.",
        "Impact": "No backup config available for restoration in case of config
corruption or reboot."
    }
},
{
    "LogID": 6016,
    "Details": {
        "Level": "Info",
        "Msg": "Backup config restored successfully.",
        "Cause": "Indicates that upon reboot, the backup-config is replayed to running-
config successfully.",
        "Remedy": "No action is required.",
        "Impact": "None"
    }
},
{
    "LogID": 6017,
    "Details": {
        "Level": "Error",
        "Msg": "Backup config restore failed.",
        "Cause": "Indicates that upon reboot, the backup-config replay to running-config
failed.",
        "Remedy": "Configure the device to restore the connectivity.",
        "Impact": "Device comes up with Day-0 configuration."
    }
},
{
    "LogID": 6018,
    "Details": {
        "Level": "Error",
        "Msg": "Apps not ready within timeout during backup-config replay.",
        "Cause": "One or more applications did not reach INSTALLED status within the
10-minute timeout period after reboot.",
        "Remedy": "Reconfigure the device if required.",
        "Impact": "Backup-config replay will proceed, but configuration may be partially
applied due to unavailable applications."
    }
}
}

```

```

    }
  },
  {
    "LogID": 6019,
    "Details": {
      "Level": "Error",
      "Msg": "Physical interfaces not found during backup-config replay.",
      "Cause": "Physical interface are not created within the timeout period after
applications are installed.",
      "Remedy": "Reconfigure the device if required.",
      "Impact": "Backup-config replay will proceed, but configuration may be partially
applied due to unavailable physical interfaces."
    }
  },
  {
    "LogID": 6020,
    "Details": {
      "Level": "Info",
      "Msg": "Default/Day-0 config successfully restored due to config corruption and
backup-config file not available.",
      "Cause": "Indicates that upon reboot due to config corruption, the backup-config
file not found, hence default config restored successfully.",
      "Remedy": "Reconfigure the device.",
      "Impact": "Device now at default/Day-0 configuration."
    }
  }
}
{
  "LogID": 8019,
  "Details": {
    "Level": "Info",
    "Msg": "Backup config copied to destination successfully",
    "Cause": "Indicates that backup-config file copied to destination successfully",
    "Remedy": "No action required.",
    "Impact": "None"
  }
},
{
  "LogID": 16001,
  "Details": {
    "Level": "Error",
    "Msg": "An unrecoverable configuration database error (config corruption)
detected.",
    "Cause": "Configuration database corruption.",
    "Remedy": "No action required. Take a backup of a stable config to avoid
manual config-restore in future",
    "Impact": "Device reboots."
  }
},
{
  "LogID": 16002,
  "Details": {
    "Level": "Error",
    "Msg": "Config DB corruption, backup-config found, restoring from backup
configuration.",
    "Cause": "Configuration DB corrupted and backup-config file found.",
    "Remedy": "No action required.",
    "Impact": "Device reboots and backup-config replayed to running-config."
  }
},
{
  "LogID": 16003,
  "Details": {
    "Level": "Error",
    "Msg": "Config DB corruption, backup-config not found, restoring default

```

```

configuration",
  "Cause": "Configuration DB corrupted and no backup-config file found.",
  "Remedy": "Configure the device to restore the connectivity. And take the
backup of a stable config to avoid manual config-restore in future.",
  "Impact": "Device comes up with default configuration."
},
},
{
  "LogID": 16004,
  "Details": {
    "Level": "Error",
    "Msg": "Config DB corruption. Failed to reboot the device.",
    "Cause": "Failed to reboot the device on Config data corruption.",
    "Remedy": "Manually reboot the device.",
    "Impact": "Device in bad state till rebooted."
  }
}
}

```

Configuration File Restoration

Restoring a configuration involves overwriting a given configuration file on the device by downloading an archived backup copy from an external host or an attached device.

All interfaces remain online. The following parameters are unaffected:

- Interface management IP address
- Software feature licenses installed on the device

The following is an example output of restoring a configuration (copying a configuration from a disk drive to the current running configuration):

```

device# copy file disk://config-file/runncfg.txt running-config
Applying management interface IP address configuration
..
device#

```

Restore the Default Configuration

Follow this procedure in EXEC mode to restore the default configuration.



Note

To factory default MLAG peers, perform the following steps:

1. Run the **copy default-config running-config** command on the intended MLAG peer.
 2. Enable Maintenance Mode after the device boots up.
 3. Copy the configuration file to the factory default switch.
 4. Disable Maintenance Mode after configuration loading is complete.
1. Enter the **copy default-config running-config** command to overwrite the running configuration with the default configuration from a saved configuration file.

```

device# copy default-config running-config
This operation will modify your running configuration.

```

2. Confirm that you want to make the change by entering <user input> when prompted.

```
WARN: system will be rebooted to have configuration changes to take effect!
Do you want to continue? [y/n]: y
device#
device# Connection to 10.10.0.1 closed by remote host.
Connection to 10.37.35.1 closed.
```

Managing Flash Files

The Extreme device provides a set of tools for removing, and displaying files you create in the device flash memory. You can use the display commands with any file, including the system configuration files. The **rm** command only applies to copies of configuration files you create in the flash memory. You cannot delete any of the system configuration files.

Listing Contents of the Flash Memory

To list the contents of the flash memory, enter the **ls** command in EXEC mode.

The following example lists the contents of all directories on the device:

```
device# ls disk://tech-support
tech-support :
-rw----- 6427 2025-04-01 08:54:42 TS-32d-250401T5416.log
-rw-r--r-- 5012653 2025-04-01 08:54:42 TS-32d-250401T5416.tar.gz
-rw----- 6427 2025-04-02 09:13:04 TS-32d-250402T1238.log
-rw-r--r-- 7837214 2025-04-02 09:13:04 TS-32d-250402T1238.tar.gz
device#
```

The following example lists the directories and folders whose names end with the letter 'z' or 'Z' in the disk://tech-support directory:

```
device# ls disk://tech-support | include \wz\b*
-rw-r--r-- 5012653 2025-04-01 08:54:42 TS-32d-250401T5416.tar.gz
-rw-r--r-- 7837214 2025-04-02 09:13:04 TS-32d-250402T1238.tar.gz
device#
```

The following example redirects the listing of the contents of the disk://tech-support directory to a file named disk://config-file/files_for_support_call (and overwrites a file of the same name if one exists):

```
device# ls disk://tech-support | save disk://config-file/files_for_support_call
device#
```

The following example appends the listing of the contents of the disk://coredumps directory to the end of a file named disk://config-file/files_for_support_call:

```
device# ls disk://coredumps | append disk://config-file/files_for_support_call
device#
```

View the Content of a File in Flash Memory

Use the **cat** command to view file contents.

**Note**

To display the contents of the running configuration, use the `show running-config` command.

```
device# cat disk://config-file/testConfig.conf
! Firmware: 10.2.1.0, Application(s): 22.2.2.0
! Date and Time: Mon, 2025-12-10 00:54:36 EDT
system
  clock timezone America/New_York
  hostname device
  ntp
    server 192.x.x.x
    enable
  !
  aaa
    authentication
      admin-user admin password-hashed $6$IFcKQDE68LWEjxCP$JZgqUWvQLv3oEBxo4JMBi
//6/Po5hkbBMNqnS1yPDORUKOELDDGxsVQ1dRJ.5EksCCnx9dPwTrT.zR1FrCECX1
    !
  !
  grpc-server DEFAULT
    certificate-id ssl-reserved-generated
    mutual-tls
    port 9340
    vrf vrfnew1
  !
  grpc-server gminew1
    certificate-id test_cert_id
```

Deleting File from the Flash Memory

To delete a file from the flash memory, enter the **rm** command with the file name in EXEC mode.

**Note**

You cannot delete a system configuration file in flash memory.

```
device# rm disk://config-file/testConfig.cfg
Warning: File testConfig.cfg will be deleted (from disk).
Do you want to continue? [y/n]: y
```

Copying Support Save Files

- The following example displays a list of the existing tech support files on the device:

```
device# show tech-support
File Name                               Size (bytes)    Created
TS-dutb-251028T160410.log              8037           2025-10-28 16:04:54
TS-dutb-251028T160410.tar.gz           12298874       2025-10-28 16:04:54
device#
```

- The following example generates a compressed TAR file named `TS-48xt-250429T073900.tar.gz` and a log file named `TS-48xt-250429T073900.log`

containing the data to send to Extreme Networks Technical Support for monitoring and troubleshooting. These files are saved locally at `/var/data/disk/techsupport`:

```
device# system tech-support
Generating show commands output
Executing base-svc host commands
Executing commands for service chassis-mgr
Executing commands for service state-db
Executing commands for service interface-mgr
Archiving /etc/extreme
Archiving /var/log/messages
Archiving /var/log/messages.1
Archiving /var/log/messages.1.gz
Archiving /var/log/messages.2
Archiving /var/log/messages.2.gz
Archiving /var/log/messages.3
Archiving /var/log/messages.3.gz
Archiving /var/log/messages.4
Archiving /var/log/messages.4.gz
Archiving /var/log/auth.log
Archiving /var/log/debug
Archiving /var/log/debug.1
Archiving /var/log/debug.1.gz
Archiving /var/log/debug.2
Archiving /var/log/debug.2.gz
Archiving /var/log/debug.3
Archiving /var/log/debug.3.gz
Archiving /var/log/debug.4
Archiving /var/log/debug.4.gz
Archiving /var/log/containers
Archiving /var/log/tierra
Archiving /var/log/log_file_journalctl
Archiving /var/log/daemon.log
Archiving /var/log/bmclog.gz
Archiving /var/log/consolelog
Archiving /tmp/tierra
Archiving /mnt/onl/usrdata/coredumps
Archiving /mnt/onl/usrdata/oom
Archiving /mnt/onl/usrdata/pprof
Archiving /run/log/journal
Archiving /var/data/disk/techsupport/ShowOutput.txt
Archiving /var/data/disk/techsupport/.prevJournalLog
Archiving /var/ms-commands
Archiving /mnt/onl/config/auditlog
Archiving /mnt/onl/config/db
Archiving /mnt/onl/config/allHwTables.txt
Archiving /var/data/monitors/k3s_events
Archiving /var/data/monitors/pods_resources_usage.log.gz
Archiving /var/data/monitors/system_resources_usage.log.gz
Archiving /etc/snmp
Archiving /var/log/snmpd.log
Archiving /var/log/ethphyd.bootlog
Archiving /etc/passwd
Archiving /etc/shadow
Archiving /etc/group
Archiving /etc/ssh
Archiving /etc/tierra
Archiving /etc/ldap.conf
Archiving /etc/ldap.map
Archiving /etc/tacacs.conf
Archiving /etc/radius.conf
Archiving /etc/pam.d
Archiving /var/data/cert-mgmt/certs
Archiving /var/data/cert-mgmt/app-cert
Archiving /var/data/cert-mgmt/ca-trust
```

```

Archiving /lib/systemd/system/xinetd*.service
Archiving /lib/systemd/system/sshd*.service
Archiving /var/crash
Archiving /var/log/base-svc-stdoutlogs
Archiving /var/data/ztp
Archiving /var/log/db-migrator.log
Cleaning up temporary files
TechSupport completed and file TS-48xt-250429T073900.tar.gz generated
Done
device#

```

- The following example generates a compressed TAR file named TS-32d-250620T084936.tar.gz and a log file named TS-32d-250620T084936.log. These files are copied to the /home/user/techsupport/TS/ directory on remote host 1.2.3.4:

```

device# system tech-support scp://exampleuser:examplepassword@1.2.3.4/home/user/
techsupport/TS/
Generating show commands output
Executing base-svc host commands
Executing commands for service chassis-mgr
Executing commands for service state-db
Executing commands for service interface-mgr
Archiving /etc/extreme
Archiving /var/log/messages
Archiving /var/log/messages.1
Archiving /var/log/messages.1.gz
Archiving /var/log/messages.2
Archiving /var/log/messages.2.gz
Archiving /var/log/messages.3
Archiving /var/log/messages.3.gz
Archiving /var/log/messages.4
Archiving /var/log/messages.4.gz
Archiving /var/log/auth.log
Archiving /var/log/debug
Archiving /var/log/debug.1
Archiving /var/log/debug.1.gz
Archiving /var/log/debug.2
Archiving /var/log/debug.2.gz
Archiving /var/log/debug.3
Archiving /var/log/debug.3.gz
Archiving /var/log/debug.4
Archiving /var/log/debug.4.gz
Archiving /var/log/containers
Archiving /var/log/tierra
Archiving /var/log/log_file_journalctl
Archiving /var/log/daemon.log
Archiving /var/log/bmclog.gz
Archiving /var/log/consolelog
Archiving /tmp/tierra
Archiving /mnt/onl/usrdata/coredumps
Archiving /mnt/onl/usrdata/oom
Archiving /mnt/onl/usrdata/pprof
Archiving /run/log/journal
Archiving /var/data/disk/techsupport/ShowOutput.txt
Archiving /var/data/disk/techsupport/.prevJournalLog
Archiving /var/ms-commands
Archiving /mnt/onl/config/auditlog
Archiving /mnt/onl/config/db
Archiving /mnt/onl/config/allHwTables.txt
Archiving /var/data/monitors/k3s_events
Archiving /var/data/monitors/pods_resources_usage.log.gz
Archiving /var/data/monitors/system_resources_usage.log.gz
Archiving /etc/snmp
Archiving /var/log/snmpd.log
Archiving /var/log/ethphyd.bootlog

```

```

Archiving /etc/passwd
Archiving /etc/shadow
Archiving /etc/group
Archiving /etc/ssh
Archiving /etc/tierra
Archiving /etc/ldap.conf
Archiving /etc/ldap.map
Archiving /etc/tacacs.conf
Archiving /etc/radius.conf
Archiving /etc/pam.d
Archiving /var/data/cert-mgmt/certs
Archiving /var/data/cert-mgmt/app-cert
Archiving /var/data/cert-mgmt/ca-trust
Archiving /lib/systemd/system/xinetd*.service
Archiving /lib/systemd/system/sshd*.service
Archiving /var/crash
Archiving /var/log/base-svc-stdoutlogs
Archiving /var/data/ztp
Archiving /var/log/db-migrator.log
Cleaning up temporary files
TechSupport completed and file TS-32d-250620T084936.tar.gz generated
Done
Copying the techsupport files to remote server...
The Techsupport is successfully copied to the remote server
device#

```

- The following example displays a list of the existing tech support files on the device:

```

device# ls disk://tech-support
tech-support :
-rw----- 8037      2025-10-28 15:25:39  TS-48xt-250429T073900.log
-rw-r--r-- 11981288  2025-10-28 15:25:39  TS-48xt-250429T073900.tar.gz
device#

```

```

device# copy file disk://tech-support/TS-kvm-x86-64-250307T1956.tar.gz file scp://
user:password@192.x.x.x:/home/user
copy file to a file is successfull

```

A new directory with the format `<TS>-<HOSTNAME>-<YYMMDDTHHMM>.log file` is automatically saved in the internal techsupport directory within the switch or USB device. The location of this sub-directory will depend on the **copy** command parameters.

```

tech-support:
-rw----- 7378      2025-03-06 23:43:37  TS-8730-32d-250306T4006.log
-rw-r--r-- 15436035  2025-03-06 23:43:37  TS-8730-32d-250306T4006.tar.gz

```

You can transfer the tech support file to a USB drive or an external server.

```

device# copy file disk://tech-support/TS-8730-32d-250306T4006.tar.gz file usb://
TS-8730-32d-250306T4006.tar.gz

```

You can transfer the tech support file to a remote server.

```

device# system tech-support scp://prashanth:123!#aBc@1.2.3.4/home/user/techsupport/TS/

```

The following is an example output of **clear tech-support** command to clear the generated tech support files:

- Without specifying the filename

```

device# clear tech-support
<cr>
FILENAME
device# clear tech-support

```

You can clear either individual tech-support files by specifying the file name or all files at once by not specifying a particular file name. If you choose to clear all files, a warning message will be displayed.

```
device# clear tech-support
WARNING: All the available Techsupport files will be cleared. Do you want to continue?
[y/n]: y
Tech-Support Files cleared
```

- With a specific techsupport filename

```
device# clear tech-support TS-420ax-250922T180231.log
Cleared the Tech-Support file: TS-420ax-250922T180231.log
```

Session Connection

You can connect to your device through a console session on the serial port, or through a Telnet or Secure Shell (SSH) connection to the management port belonging to either the mgmt-vrf, default-vrf, or a user-defined vrf. You can use any account login present in the local device database or on a configured authentication, authorization, and accounting (AAA) server for authentication. For initial setup procedures, use the pre-configured administrative account that is part of the default device configuration.

The device must be physically connected to the network. If the device network interface is not configured or the device has been disconnected from the network, use a console session on the serial port.

See the appropriate hardware guide for information on connecting through the serial port and establishing an Ethernet connection for a console session.



Warning

If you try to create more than 32 CLI sessions (either SSH or TELNET sessions, or a combination of both sessions), a message will be displayed to close one of the existing sessions to proceed.

Telnet

Telnet allows access to management functions on a remote networking device. Unlike SSH, Telnet does not provide a secure, encrypted connection to the device.

The device supports a combined maximum (SSH, Telnet, and serial) of 32 CLI sessions. Both IPv4 and IPv6 addresses are supported.

The Telnet service is disabled by default on the device. When the Telnet server is disabled, existing inbound Telnet connections are terminated and access to the device by additional inbound connections is not allowed until the Telnet server is re-enabled. If you have admin privileges, you can disable and re-enable inbound Telnet connections from global configuration mode.

Connecting to an Extreme Device with Telnet

A Telnet session allows you to access a device remotely using port 23. However, it is not secure. If you need a secure connection, use SSH.

1. Establish a Telnet session to the Extreme device from a remote device.

```
device# telnet 192.x.x.x
```

The example establishes a Telnet session to the device with the IP address of 192.x.x.x

If the device is active and the Telnet service is enabled on it, a display similar to the following appears.

```
Trying 192.x.x.x...
Connected to 192.x.x.x.
Escape character is '^]'.

```

2. Once you have established the Telnet connection, you can log in normally.

```
login as: admin
Pre-authentication banner message from server:
This system is for authorized users only. All activity is logged and regularly checked
by systems personal. Individuals using this system without authority or in excess
of their authority are subject to having all their services revoked. Any illegal
activities conducted by user or attempts to take down this system or its services will
be reported to local law enforcement and said user will be punished to the full extent
of the law. Anyone using this system consents to these terms.
End of banner message from server
admin@192.x.x.x's password:
Last login: Mon Mar  3 07:17:02 2025 from 192.x.x.x
*****
System is ready for all commands
*****
device#
```

The default admin login name is admin. Extreme recommends that you change the default account password when you log in for the first time.

Enable or Disable Telnet Service

1. In EXEC mode, enter global configuration mode.

```
device# configure terminal
device(config)#
```

2. Disable Telnet service on the device.

```
device(config)# system
device(config-system)#
device(config-system)# telnet-server
device(config-system-telnet-server-DEFAULT)#
device(config-system-telnet-server-DEFAULT)# no enable
device(config-system-telnet-server-DEFAULT)#
```

All Telnet sessions including any currently active sessions are immediately terminated, and cannot be re-established until the service is re-enabled.

3. Enable Telnet service on the device.

```
device(config-system-telnet-server-DEFAULT)# enable
device(config-system-telnet-server-DEFAULT)#
```

SSH

Secure Shell (SSH) allows secure access to management functions on a remote networking device. Unlike Telnet, which offers no security, SSH provides a secure, encrypted connection to the device.

The device supports a combined maximum (SSH, Telnet, and serial) of 32 CLI sessions. Both IPv4 and IPv6 addresses are supported.



Note

Disabling or enabling the SSH server does not impact existing sessions, but disabling it will prevent new SSH sessions from being established.

The SSH service is enabled by default on the device. When the SSH server is disabled, existing SSH connections will remain active until they reach their idle timeout. Additionally, new session access will be blocked until the SSH server is re-enabled. If you have admin privileges, you can disable and re-enable inbound SSH connections from global configuration mode.

Feature Support for SSH

SSHv2 is the supported version of SSH, but not all features typically available with SSHv2 are supported on the Extreme devices. SSH user authentication is performed with passwords stored on the device or on an external authentication, authorization, and accounting (AAA) server.

Key Exchange Algorithms

Key exchange algorithms securely exchange a shared session key with a peer. The following key exchange algorithms are supported:

- curve25519-sha256
- curve25519-sha256-libssh
- diffie-hellman-group-exchange-sha1
- diffie-hellman-group-exchange-sha256
- diffie-hellman-group14-sha1
- diffie-hellman-group16-sha512
- diffie-hellman-group18-sha512
- diffie-hellman-group14-sha256
- ecdh-sha2-nistp256
- ecdh-sha2-nistp384
- ecdh-sha2-nistp521

Message Authentication Codes (MACs)

MACs ensure the integrity of messages sent over SSH connections. The following Hash-based Message Authentication Code (HMAC) message authentication algorithms are supported:

- hmac-sha1
- hmac-sha1-96

- hmac-sha1-etm-openssh
- hmac-sha2-256
- hmac-sha2-256-etm-openssh
- hmac-sha2-512
- hmac-sha2-512-etm-openssh

Encryption Algorithms

Encryption algorithms (ciphers) ensure data privacy over SSH connections. The following encryption algorithms are supported:

- aes192-cbc
- aes192-ctr
- aes128-gcm-openssh
- aes128-ctr
- aes128-cbc
- aes256-cbc
- aes256-ctr: AES in Counter Mode (CTR) mode with 256-bit key
- aes256-gcm-openssh
- chacha20-poly1305-openssh

SSH

- **Secure Communication:** SSH enables secure communication with Extreme OS ONE, running OpenSSH_9.6p1 server. Only the northbound interface is enabled by default in the management VRF.
- **Default Configuration:** SSH server is enabled by default in the management VRF and is the only northbound interface enabled by default.
- **User Authentication:** Password-based authentication with local or remote user information storage (TACACS, LDAP, RADIUS).

Configurable SSH Parameters

- **Host Key:** Manually generate SSH host-key pairs, replacing existing keys. Default: RSA 4096 bits. SSH host keys are preserved in the `/etc/ssh` folder.
- **Host Key Preservation:** SSH host keys are preserved across firmware upgrades and full installations.
- **Supported key types and sizes:**
 - RSA: 2048 and 4096 bits (default)
 - ECDSA: 256 bits
- **Ciphers, Key Exchange Algorithms, and Message Authentication Codes:** Configurable with priority lists.
- **Client Alive Interval:** Terminate client connection if not reachable within the specified interval (default: 0, disabled).

SSH Server Instances

- **Default Instance:** Created and associated with the management VRF by default.

- Multiple Instances: Can be configured with unique VRF instances.
- Modification and Deletion: Applicable only to new SSH connections

SSH Server Configuration

Extreme OS ONE supports Secure Shell (SSH) for secure remote management. The SSH server can be configured using the following command:

```
ssh-server NAME
```

Parameter	Type	Range	Default	Description
NAME	String	1-64	DEFAULT	SSH server instance name

Command Mode

```
config-system
```

Default Behavior

By default, an SSH server instance named DEFAULT is created and is automatically associated with 'mgmt-vrf'.

Configuration Commands

To configure an SSH server instance:

```
device(config-system)# ssh-server NAME
```

To configure the default instance:

```
device(config-system)# ssh-server
device(config-system-ssh-server-DEFAULT) #
```

Verification Commands

To check the SSH server configuration:

```
device(config-system)# do show running-config system ssh-server
system
  ssh-server DEFAULT
    key rsa 4096
    vrf mgmt-vrf
    enable
  !
!
```

To check the current running state:

```
device(config-system)# do show running-state system ssh-server
system
  ssh-server DEFAULT
    key rsa 4096
    vrf mgmt-vrf
    enable
  !
!
```

SSH Host Key Preservation

To ensure continuity and security, SSH host keys are preserved during:

1. Firmware Upgrades: Keys are automatically backed up before the upgrade and restored afterward.
2. Full-Install Firmware Updates: The `/etc/ssh` folder is backed up and restored by default during the full installation process.

(Optional) Disabling Key Preservation

You can choose to remove existing keys and disable preservation using the `no-preserve` parameter:



Note

Using the `no-preserve` option will remove existing SSH host key.

```
system firmware fullinstall <url path of firmware
file> [no-preserve]
```

Connect to an Extreme Device with SSH

Follow this procedure to establish an SSH session to access a device remotely using port 22.



Note

The default admin login name is `admin`. As a best practice, change the default account password when you log in for the first time.

1. Establish an SSH session connection to the Extreme device.

```
device# ssh admin@192.0.2.0
```

The example establishes an SSH session to the device with the IP address of 192.0.2.0.

2. Enter `yes` if prompted.

```
The authenticity of host '192.0.2.0 (192.0.2.0)' can't be established.
RSA key fingerprint is 9f:83:62:cd:55:6c:b9:e8:1d:79:ab:b4:04:f4:f6:2a.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '192.0.2.0' (RSA) to the list of known hosts.
admin@192.0.2.0's password:
```

```
SECURITY WARNING: The default password for at least
one default account (root, admin and user) have not been changed.
```

```
Welcome to the Extreme OS ONE Software
admin connected from 192.0.2.0 using ssh on device
device#
```

Shut Down and Re-enable SSH Service

Follow this procedure to enable or disable SSH service.

1. In EXEC mode, enter global configuration mode.

```
device# configure terminal
```

2. Disable SSH service on the device.

```
device(config)# system
device(config-system)#
device(config-system)# ssh-server
device(config-system-ssh-server-DEFAULT)# no enable
device(config-system-ssh-server-DEFAULT)#
```

Disabling the SSH service will block new sessions, but existing sessions will remain unaffected.

3. Enable SSH service on the device.

```
device(config-system-ssh-server-DEFAULT)# enable
```

4. (Optional) The SSH Server can be restarted on all VRF instances using **ssh-server restart** command.

Configure Terminal Session Parameters

Follow this procedure to set the parameters.



Note

Specifying a value of 0 allows the terminal session to stay open until the device is rebooted or the connection is terminated by other means.

Set the timeout length.

The following example configures the terminal timeout to 300 seconds (five minutes) on the device.

```
device# terminal timeout 300
```

Configure Login Banner

The Extreme device can be configured to display a greeting message on user terminals as a banner when they enter the Privileged EXEC CLI level or access the device through Telnet/SSH. The Login banner displays a message before the user logs into the device.

Complete the following steps to set and display a login banner.

1. In privileged EXEC mode, access global configuration mode.

```
device# configure terminal
device(config)# system
device(config-system)#
```

2. Configure the login banner.

```
device(config-system)# login-banner UNAUTHORIZED ACCESS TO THIS DEVICE IS NOT ALLOWED.
Activities performed on this device are monitored and recorded. Do not access or
configure this device without explicitly authorized permission. Unauthorized attempts
to
access or configure this device might result in civil or criminal penalties.
```

The banner can be up to 2048 characters long. You can use the **no login-banner** command to remove the banner. For more information about the **login-banner** command, see the *Extreme OS ONE SR Command Reference Guide*.

3. Verify the configured banner.

```
device(config-system)# do show running-config system banner
system
```

```

login-banner UNAUTHORIZED ACCESS TO THIS DEVICE IS NOT ALLOWED.
Activities performed on this device are monitored and recorded. Do not access or
configure this device without explicitly authorized permission. Unauthorized attempts
to
access or configure this device might result in civil or criminal penalties.
!
device(config-system)#

```

The following example is the configuration of the previous steps.

```

device# configure terminal
device(config)# system
device(config-system)# login-banner NAUTHORIZED ACCESS TO THIS DEVICE IS NOT ALLOWED.
Activities performed on this device are monitored and recorded. Do not access or
configure this device without explicitly authorized permission. Unauthorized attempts to
access or configure this device might result in civil or criminal penalties.

```

Configure MOTD Banner

The Extreme device can be configured to display a greeting message on user terminals as a banner when they enter the Privileged EXEC CLI level or access the device through Telnet/SSH. The MOTD-banner (Message of the Day) displays a message after the user logs into the device.

Complete the following steps to set and display a MOTD banner.

1. In privileged EXEC mode, access global configuration mode.

```

device# configure terminal
device(config)# system
device(config-system)#

```

2. Configure the MOTD banner.

```

device(config-system)# motd-banner UNAUTHORIZED ACCESS TO THIS DEVICE IS NOT ALLOWED.
Activities performed
on this device are monitored and recorded. Do not access or configure this device
without explicitly authorized permission. Unauthorized attempts to access or configure
this device might result in civil or criminal penalties.

```

The banner can be up to 2048 characters long. You can use the **no motd-banner** command to remove the banner. For more information about the **motd-banner** command, see the *Extreme OS ONE SR Command Reference Guide*.

3. Verify the configured banner.

```

device(config-system)# do show running-config system banner
system
login-banner hellow
motd-banner UNAUTHORIZED ACCESS TO THIS DEVICE IS NOT ALLOWED. Activities performed
on this device are monitored and recorded. Do not access or configure this device
without explicitly authorized permission. Unauthorized attempts to access or configure
this device might result in civil or criminal penalties.

```

System Logging Configuration

For comprehensive information on command syntax and parameters on logging configuration, see the *Extreme OS ONE SR Command Reference Guide*.

The following table describes a list of commands used to configure system logging:

Command	Description
Console/Monitor Severity Level: [no] <console monitor> severity <emergency alert critical error warning notice info debug>	Enable/disable displaying Syslog messages on console or SSH terminal (default is disabled, with default severity set to error).
Remote Server Configuration: [no] remote-server NAME	Configure remote server to forward Syslog messages, with options for transport mechanisms, remote port, secure forwarding, and VRF. The following example displays the remote syslog server configuration that is running currently on the device. In this example, the server uses a VRF instance named red-vrf: <pre>device# show running-config system logging remote-server system logging remote-server 1.1.1.1 mode-transport tcp remote-port 525 secure-forwarding tls vrf red-vrf ! ! device#</pre>
Display Logging Information: <ul style="list-style-type: none"> • show logging raslog • show system logging facility • show system logging remote-server • show logging audit config firmware security 	<ul style="list-style-type: none"> • Display all Syslog messages in time order. • Display the severity level configured for each facility (service). • Display remote server configuration details. • Display audit logs for config, firmware, or security-related activities.
Monitoring: monitor <start stop>	Start or stop displaying Syslog messages on SSH-connected terminal (if enabled). You must run this command in the privileged EXEC mode.
show running-config system logging For example, <pre>device# show running-config system logging console On Console session facility Facility information monitor On Monitor session remote-server Remote-server information device#</pre>	Display the current logging configuration, including: <ul style="list-style-type: none"> • Console session facility information • Monitor session information • Remote server information

Logging Functionality and Transmission of Log Events

Extreme OS ONE logs syslog messages with LogID, level, and description. SysLog messages are forwarded to remote servers using UDP/TCP transport. Each service generates logs.



Note

Device boot may show '[FAILED] Failed to start Rotate log files on console.

```
2025-02-24 06:51:16.8518 chassis-mgr[7]: {"Level":"info","LogID":5016,"Msg":"System initialization is complete. All services are UP"}
```

```
2025-02-17 08:42:05.3090 interface-mgr[8]: {"Level":"info","LogID":25013,"Msg":"Interface ethernet 0/2 Operationally UP"}
```

```
2025-02-17 08:42:52.3133 interface-mgr[8]: {"Level":"info","LogID":25014,"Msg":"Interface ethernet 0/1 Operationally DOWN"}
```

Supported Features

- Syslog Forwarding to remote-server
- Syslog Forwarding over TCP, RELP, RELP + TLS
- Syslog messages local storage management
- Printing Syslog messages on Console, Terminal
- Logging configurations

Syslog Forwarding to Remote Server

The Extreme OS ONE enables remote syslog forwarding via the rsyslogd daemon (version 8.2402.0). This feature allows replication and forwarding of system logs (Syslogs) to one or more configured remote syslog servers using UDP/TCP transport.

Configuration Flow

For detailed information on syslog configuration with TLS, see *Extreme OS ONE SR Security Configuration Guide*.

1. User configures remote servers via CLI.
2. CLI Plugin publishes config notifications to Message Bus.
3. Chassis manager Microservice subscribes to Message Bus and processes updates.
4. Chassis manager passes remote server details to OS ONE Service over GRPC.
5. OS ONE service applies configurations to rsyslog daemon via `/etc/rsyslog.d/90-User.conf`.
6. Rsyslog daemon forwards Syslogs to configured remote servers.
7. OS ONE Service acknowledges Chassis-mgr Microservice on successful configuration.
8. Chassis-mgr updates Operational State DB in mgmt-service.
9. Show commands fetch data from Operational State DB.
10. On reload, Chassis-mgr reconciles with OS ONE service over gRPC.

Syslog Forwarding over TCP

- Forwards Syslogs to remote-server over TCP
- Uses TCP protocol for transport
- With default configuration, syslog forwarding uses UDP protocol for transport

Syslog Forwarding over RELP

- Forwards Syslogs over TCP with RELP (Reliable Event Logging Protocol) for reliable delivery (no message loss)

Syslog Forwarding over RELP + TLS

- Forwards Syslogs over TCP with RELP and secure TLS connection
- Ensures reliable delivery (no message loss) with secure connection
- Uses default RELP protocol with TLS encryption

Rsyslog Configurations for Syslog Forwarding

The following are the examples of system logging configurations:

Example 1: TCP with TLS

- Configuration: `logging remote-server 10.32.170.30 secure-forwarding tls mode-transport tcp remote-port 525 tls-profile-id tls`
- Rsyslog config: `/etc/rsyslog.d/90-user.conf`

The logging configuration for TCP with TLS generates the following system Rsyslog configuration (`/etc/rsyslog.d/90-user.conf`):

```
[root@kvm-x86-64]# cat /etc/rsyslog.d/90-user.conf
global(DefaultNetstreamDriverCAFile="/etc/rsyslog.d/ca-list.pem")
action(type="omfwd" Target="10.32.170.30" port="525" protocol="tcp"
StreamDriver="gtls" StreamDriverMode="1" StreamDriverAuthMode="x509/certvalid"
gnutlsPriorityString="NORMAL:-VERS-SSL3.0:-VERS-TLS1.0:-VERS-TLS1.1")
```

Example 2: RELP with TLS

- Configuration: `logging remote-server 10.32.170.30 secure-forwarding tls mode-transport relp remote-port 525 tls-profile-id tls`
- Rsyslog config: `/etc/rsyslog.d/90-user.conf`

The logging configuration for RELP with TLS generates the following system Rsyslog configuration (`/etc/rsyslog.d/90-user.conf`):

```
[root@device]# cat /etc/rsyslog.d/90-user.conf
module(load="omrelp" tls.tlslib="openssl")
action(type="omrelp"
target="10.32.170.30" port="525" tls="on"
tls.cacert="/etc/rsyslog.d/ca-list.pem" tls.authmode="certvalid"
tls.tlsfcgcmd="Protocol=ALL,-SSLv2,-SSLv3,-TLSv1,-TLSv1.1")
[root@device]#
```

Syslog Forwarding Support for VRF and Source-Interface

22.2.1.x Release Support

- Supports TCP, RELP, TCP+TLS, TCP+VRF, and RELP+TLS
- RELP limitations: No VRF support due to omrelp module constraints

22.2.2.x Release Support

- All combinations supported, including VRF and source-interface
- Source-interface: Uses IP from StateDB path `/interfaces/interface[name=]/subinterfaces/subinterface`
- VRF and source-interface config: Patched rsyslog and librelp modules

Transport	VRF	Source-Interface	Example (Rsyslog configuration params)
UDP	Supported	Supported	<code>action(type="omfwd" protocol="udp" target="log.example.com" port="514" Device="vrf-blue" Address="192.0.2.10") (Device= binds to VRF; Address= (local IP) supplies source-interface address)</code>
TCP	Supported	Supported	<code>action(type="omfwd" protocol="tcp" target="log.example.com" port="514")</code> and <code>**</code>
TCP + TLS	Supported	Supported	<code>action(type="omfwd" protocol="tcp" target="log.example.com" port="6514" StreamDriver="gtls" StreamDriverMode="1" StreamDriverAuthMode="anon")</code> and <code>**</code>
RELP	Supported	Supported	<code>module(load="omrelp")</code> <code>then action(type="omrelp" target="log.example.com" port="20514")</code> and <code>**</code>
RELP + TLS	Supported	Supported	<code>module(load="omrelp")</code> <code>action(type="omrelp" target="log.example.com" port="20515" tls="on" tls.caCert="/etc/rsyslog.d/ca.pem")</code> and <code>**</code>

VRF and Source-Interface Configuration



Note

- omrelp module doesn't support source-interface or VRF natively; yocto patches applied.
- TCP connection source and VRF device binding require patches to rsyslog and librelp modules.

Local Syslog Messages

Syslog messages (RASLogs) to the local system are generated by various system services and filtered into respective microservice directories under `/var/log/tierra/`.

Filter Configuration

The filter is configured in `/etc/rsyslog.d/95-filters.conf`. For example,

```
programname,contains,"chassis-mgr" /var/log/raslogs.log
:programname,contains,"chassis-mgr" /var/log/tierra/chassis-mgr/chassis-mgr.log
& stop
```

Log Storage

- Microservice logs are stored in `/var/log/tierra/<microservice>/`.
- All RASLogs are also written to `/var/log/raslogs.log` for console/terminal display (when enabled).

Syslog Local Storage Management

- Log files are monitored by `logrotated` daemon for size growth
- Check frequency:
 - Every hour if `/var/log` disk space usage < 50%
 - Every 5 minutes if `/var/log` disk space usage > 50%
- Trace messages logged every 5 minutes (for example, `/tmp/tierra/trace/tierra-svc/tierra-svc-RASTrace.log:2499: {"Level":"debug","Service":"tierra-svc","Time":"2025-02-24 13:05:06.884 UTC +0000","Msg":"/var/log disk used: 0.35 GB and free:16.37 GB"}`)

Log Rotation Configuration

- Config files: `/etc/logrotate.d/` (for example, `/etc/logrotate.d/rsyslog`)
- Log files are stored in the `/var/log/tierra/<service>` directory:
 - Max size: 20MB
 - Max rotations: 5

Journald Configuration

- `systemd/journald.conf` settings:
 - `SystemMaxFileSize=1M`
 - `SystemMaxFiles=5`
 - `RateLimitIntervalSec=3`
 - `RateLimitBurst=10000`
- Limits journal log size and rate to prevent excessive logging

Printing Syslog Messages on Console and Terminal

RASLogs are logged to `/var/log/tierra/<service-name>` and `/var/log/raslogs.log` via the Rsyslog server.

Displaying RASLogs

- Use the `/var/log/raslogs.log` file to display RASLogs on console or terminal.
- The `logrotate` daemon config manages the log file size.
- A Go routine reads the file (tail order) and filters RASLogs based on level, LogID, and so on.
- Routine stops when feature is disabled.

Console Logging

- `Mgmt-cli` communicates with `Onlp-svc` to enable feature.
- `Onlp-svc` starts Go routine and prints logs to `/dev/console`.

```
device (config)# system
device (config-system) # logging
device (config-system-logging) # console severity info
device (config-system-logging) # 2025-12-05 08:31:28.6679 monitor-svc [3702]: Level:warn
LogID: 27006 Topic:16 Msg:Warning: cpu High Resource usage detected Current usage
Percent: 32.2 2025-12-05 08:31:30.7575 monitor-svc [3702]: Level: info LogID:0 Topic:16
Msg: Detailed System CPU Breakdown System CPU Percent Avg:33 Load Avg 15min:1.34 Load Avg
Percent 5min:33.25 Load A vg Percent 15min:33.5 CPU Count: 4 Load Avg 1min:1.47 Load Avg
5min:1.33 Load Avg Percent 1min: 36.75
2025-12-05 08:31:30.7577 monitor-svc [3702]: Level:info
LogID: 27006 Topic:16 Msg:{"system_cpu": {"per_cpu_percent":
[18.02,7.07,6.93,100], "avg_percent":33,"load_avg_1min":1.47,"load_avg_5mi
n":1.33, "load_avg_15min":1.34,"load_avg_percent_1min":36.75,
"load_avg_percent_5min":33.25, "load_avg_percent_15min":33.5,"cpu_count":4},
"top_processes":[{"name":"vpp_main", "percent":99.88 },{"name":"k35-server",
"percent":7.71},{ "name":"monitor-svc","percent":5.79},{ "name":"ifmgr","percent": 3.84},
{"name":"bgp","percent": 1.9}], "load_status":"low"} 2025-12-05 08:31:32.8727 monitor-svc
[3702]: Level:info LogID:0 Topic:16 Msg: Detailed System CPU Breakdown CPU Count: 4
System CPU Percent Avg:31.43 Load Avg 5min:1.33 Load Avg Percent 1mi n:36.75 Load Avg
Percent 5min:33.25 Load Avg Percent 15min:33.5 Load Avg 1min:1.47 Load Avg 15min:1.34
```

Terminal Logging

- `Mgmt-cli` enables feature directly
- `Mgmt-cli` starts Go routine and prints logs to `stdout` (terminal)

Logging Configurations

- Configure severity level for Syslog messages in each service (default: info)
- Enable/disable console display of RASLogs on console or SSH terminal (default: disabled)
 - When enabled without severity, default error level logs are displayed
- Configure remote-server hosts for Syslog message forwarding
 - IP address, transport protocol (UDP/TCP), port, secure forwarding, vrf, tls-profile-id, and mutual-tls

Configuration Management

- Persistent config changes stored in Mgmt-Service Conf-DB
 - Displayed via Running-Config commands
- Operational and configured remote servers stored in Mgmt-Service State-DB
 - Displayed via Show commands
- Supports restart-ability and reconciles with Mgmt-Service Conf-DB

OpenConfig Compliance

- Follows Openconfig-System-Logging Yang model
- Open-config path for logging: /system/logging

Trace Logs (Non-Syslogs)

- Debug and trace logs for internal debugging purposes
- Stored in /tmp/tierra/trace/<service> directory as .log files
- Not managed by rsyslog daemon; uses Go packages zerolog (logging) and lumberjack (file rotation)

Log File Management

- File size limit set in config.json (For example, chassis/configs/config.json)

- Example config:

```
"traceFilename": "/tmp/tierra/trace/chassis-mgr/chassis-mgr-RASTrace.log",
"traceMaxSize": 5, // MB
"traceMaxBackups": 3,
"traceMaxAge": 30,
"traceLogLevel": 0,
```

- File rotation occurs when size limit is exceeded

New DError Logging Feature

- DError level logs written to separate file in /tmp/tierra/trace/ directory
- In addition to regular trace log file
- Logging levels:
 - Debug, DebugError/DError, Trace: written to /tmp/tierra/trace/ log file
 - INFO, WARNING, ERROR, and higher severity: written to /var/log/tierra (Syslog/Raslog) and trace logs in /tmp/tierra/trace/

CLI Commands

The following table describes a brief list of logging related commands:

CLI	Description
service [NAME] severity <emergency alert critical error warning notice info debug>	Configure Syslog logging severity level for a service (default: info) Supported services: those listed in show version command output
[no] <console monitor> severity <emergency alert critical error warning notice info debug>	Enable or disable displaying Syslog messages on console or ssh terminal (default: disabled).
[no] remote-server NAME	Enable or disable displaying Syslog messages on console or ssh terminal (default: disabled). Default severity: error (can be configured, for example, 'info' to check system behaviors)
show logging raslogs	Configure remote-server to forward the Syslog messages to remote-server, choose transport mechanisms. and the available attributes under submode are: <pre> device(config-system-logging) # remote-server 2.2.2.2 device(config-system-logging-remote-server-2.2.2.2) # end End current mode and change to enable mode exit Exit current mode and down to parent mode list List all supported configuration commands mode-transport Transport method no Negate a command or set its defaults pwd Display current mode quit Exit current session remote-port Remote server port secure-forwarding Secure forwarding over TCP source-interface Source of syslog packets tls-profile-id tls-profile-id that is associated with the remote logging service vrf vrf mutual-tls Enable mutual TLS (X.509 certificate authentication) for the syslog remote-server </pre>

CLI	Description
show system logging facility	Display all the Syslog messages logged on the system, including all services, in time order.
show system logging remote-server	Display the configured severity level for each facility (service)
monitor <start stop>	Display remote-server configuration details
show logging audit config firmware security	Start or stop displaying the Syslog messages on ssh connected terminal if enabled 'logging monitor'
device# show running-config system logging console On Console session facility Facility information monitor On Monitor session remote-server Remote-server information device#	Display all the logging related configurations.

gNMI Commands

Openconfig path `/system/logging/` is extended for console and monitor display config:

- Enable/disable console display
- Enable/disable monitor display

```

module: openconfig-system
  +--rw system
    | +--rw remote-servers
    | | +--rw remote-server* [host]
    | | | +--rw host -> ../config/host
    | | | +--rw config
    | | | | +--rw host? oc-inet:host
    | | | | +--rw source-address? oc-inet:ip-address
    | | | | +--rw network-instance? oc-ni:network-
instance-ref
    | | | | +--rw remote-port? oc-inet:port-number
    | | | | +--rw tls-profile-id? string
    | | | | +--rw extr-system-logging-ext:enable? boolean
    | | | | +--rw extr-system-logging-ext:transport? syslog-remote-server-
transport
    | | | | +--rw extr-system-logging-ext:secure-forwarding? syslog-remote-server-
secure-forwarding
    | | | | +--rw extr-system-logging-ext:mutual-tls? boolean
    | | | | +--rw extr-system-logging-ext:source-interface? string
    | | | +--ro state
    | | | | +--ro host? oc-inet:host
    | | | | +--ro source-address? oc-inet:ip-address
    | | | | +--ro network-instance? oc-ni:network-
instance-ref
    | | | | +--ro remote-port? oc-inet:port-number
    | | | | +--ro tls-profile-id? string
    | | | | +--ro extr-system-logging-ext:enable? boolean

```

```

| | | +--ro extr-system-logging-ext:transport?      syslog-remote-server-
transport
| | | +--ro extr-system-logging-ext:secure-forwarding?  syslog-remote-server-
secure-forwarding
| | | +--ro extr-system-logging-ext:mutual-tls?        boolean
| | | +--ro extr-system-logging-ext:source-interface?  string
| | +--rw extr-system-logging-ext:ca-cert?   string
| +--rw extr-system-logging-ext:services
|   +--rw extr-system-logging-ext:service* [facility]
|     +--rw extr-system-logging-ext:facility   -> ../config/facility
|     +--rw extr-system-logging-ext:config
|       | +--rw extr-system-logging-ext:facility?  identityref
|       | +--rw extr-system-logging-ext:severity? syslog-severity
|       +--ro extr-system-logging-ext:state
|         +--ro extr-system-logging-ext:facility?  identityref
|         +--ro extr-system-logging-ext:severity? syslog-severity

```

Ethernet Management Interfaces

The management Ethernet network interface provides management access, including direct access to the device CLI. You must configure at least one IP address using a serial connection to the CLI before you can manage the system. You can either configure static IP addresses, or you can use a Dynamic Host Configuration Protocol (DHCP) client to acquire IP addresses automatically. For IPv6 addresses, both static IPv6 and stateless IPv6 autoconfiguration are supported.



Important

Setting static IPv4 addresses and using DHCP are mutually exclusive. If DHCP is enabled, remove the DHCP client before you configure a static IPv4 address. However, this does not apply to IPv6 addresses.

Configure Static Management Port

Before configuring a static address, connect to the device via the serial console. To configure static management port, perform the following steps:

1. In privileged EXEC mode, enter global configuration mode.

```

device# configure terminal
device(config)#

```

2. Access the interface management mode for the management interface.

```

device(config)# interface management 0
device(config-if-mgmt-0)#

```

This interface uses the default mgmt-vrf VRF.

3. Configure the IP address for the management interface.

```

device(config-if-management-0)# no ipv4 address dhcp
device(config-if-management-0)# ipv4 address 10.x.x.81/20
device(config-if-management-0)# ipv6 address 2001:DB8::xbc:y:e61f:13ff:fe67:4b94/32
device(config-if-management-0)# no shutdown
device(config-if-management-0)#

```

Use the ? symbol to display help for a command

4. Configure the static route.



Note

If you are going to use an IPv6 address, configure the address.

```
device# conf
device(config)# int ma 0
device(config-if-mgmt-0)# ipv6 address 2001::1/64
```

```
device(config)# vrf mgmt-vrf
device(config-vrf-mgmt-vrf)# static-route 0.0.x.x/0 192.x.x.0
```

5. Verify the configuration.

```
device# show running-config interface management 0
interface management 0
  ipv4 address 10.24.85.81/20
  ipv6 address 2001:DB8::xbc:832:e61f:yff:fe67:4b94/32
  no shutdown
!
device#
```

Display the Management Interface

You can display the information about the management interface on the device. If an IP address has not been assigned to the network interface, you must connect to the CLI using a console session on the serial port. Otherwise, connect to the device through Telnet or SSH. The example output may differ for various platforms based on the presence of dual nob, for example, 8820-80C, 8720-32C.

```
device# show int management 0
management 0 Admin state UP      Operational state UP
MTU 1514 bytes
Hardware is Ethernet mac address e4:44:e5:08:ac:00
Current Speed 1G, Duplex: Full
Description: Management 0
DHCPv4 Disabled
IPv4 address 10.32.83.87/24
IPv4 gateway 10.32.83.1
DHCPv6 Disabled
IPv6 address fe80::e644:e5ff:fe08:ac00/64
IPv6 address 2606:9fc0:e004:e083:10:32:83:87/64

Redundancy Mode: active-backup (Dual OOB)
  active-path: mgmt 1
  primary-path: mgmt 1
  all-paths: mgmt 2 mgmt 1

Statistics
  LastClear: 0s
Input:
  Total pkts: 2701008
  Discard pkts: 10
  Errors pkts: 0
  CRC Errors: 0
  MCast pkts: 2664267
  Octets: 150889665
Out:
  Total pkts: 17449
  Discard pkts: 0
  Errors pkts: 0
  MCast pkts: 0
  Octets: 2343705
```

```
Rate Info:
           Input: 0.004129 Mbits/sec, 7 pkts/sec 1000000000 speed 0.00% of line-
rate
           Output: 0.000651 Mbits/sec, 1 pkts/sec 1000000000 speed 0.00% of line-
rate
device#
```

show interface extMgmt 1/2 (OOB port)

The **show interface extMgmt 1/2** command is specific to the 8730 platform.

```
device# show interface extMgmt 1

extMgmt 1 Admin state UP, Oper state UP
  Interface index is 1090519072 (0x41000020)
  MTU 9216 bytes
  Hardware is Ethernet mac address b4:a3:bd:0e:00:19
  Current Speed 1G
  Description: External Management 1
device#

device# show interface brief

Flags: M - Redundant Management P - Performance-Path
Number of interfaces 37
Port      Mtu      Admin-State  Oper-State  Speed  Ifindex      Description
-----
ExtMgmt 1  9216     DOWN        DOWN        1G     0x41000020   ExtMgmt 1
ExtMgmt 2  9216     DOWN        DOWN        10G    0x41000040   ExtMgmt 2
Int 0      9216     UP          DOWN        20G    0x21000000   Internal 0
Int 1      9216     UP          DOWN        20G    0x21000020   Internal 1
Eth 0/1    9216     DOWN        DOWN        400G   0x1000020    Ethernet 0/1
Eth 0/2    9216     DOWN        DOWN        400G   0x1000040    Ethernet 0/2
device#
```

show sysinfo media detected

```
device# show sysinfo media detected

S/C      Qual      Optical    Type      PartNum      SerialNum      Vendor
Description
-----
0/1      Yes       Yes        QSFP28    EQPT1H4SR4UCM100    2218H-50292    EXTREME NETWORKS
100G SR4 QSFP28 100m

0/3      Yes       No         QSFP_PLUS EQPC40PC010C0100    2246X-50051    EXTREME NETWORKS
40G Passive DAC QSFP+ 1m

0/4      Yes       No         QSFP28    EQPC1HPC010C0100    2214A-53627    EXTREME NETWORKS
100G Passive DAC QSFP28 1m

0/5      Yes       No         QSFP-DD   EQDC4HPC020C0100    T0062319A-53729    EXTREME NETWORKS
400G-DACP-QSFPDD2M

0/7      Yes       Yes        QSFP-DD   EQDT4H8FR4FCL100    T0192337E-50030    EXTREME NETWORKS
400G-FR4-QSFPDD2KM

0/9      Yes       No         QSFP28    EQPC1HPC010C0100    2114A-56882    EXTREME NETWORKS
100G Passive DAC QSFP28 1m

0/10     Yes       No         QSFP_PLUS EQPC40PC010C0100    2203X-40362    EXTREME NETWORKS
40G Passive DAC QSFP+ 1m
```

0/11	Yes	No	QSFP-DD	EQDC4HPC010C0100	T0052319A-53726	EXTREME NETWORKS
400G-DACP-QSFPDD1M						
0/12	Yes	Yes	QSFP28	EQPT1H8DR1DCL100	T0012404E-50004	EXTREME NETWORKS
100G DR QSFP28 500M						
0/13	Yes	Yes	QSFP_PLUS	EQPT404SR4VCM100	2109H-50069	EXTREME NETWORKS
40G-SR4-QSFP150M, 850nm						
0/14	Yes	No	QSFP28	EQPC1HPC010C0100	2231A-53265	EXTREME NETWORKS
100G Passive DAC QSFP28 1m						
0/15	Yes	Yes	QSFP-DD	EQDC4HAC050C0100	T0112313E-50002	EXTREME NETWORKS
400G-AOC-QSFPDD5M						
0/16	Yes	Yes	QSFP28	EQPT1H4WM4ECL100	2238E-50070	EXTREME NETWORKS
100G 4WDM-40 QSFP28 40km						
0/17	Yes	Yes	QSFP28	EQPT1H4SR4UCM100	2218H-50396	EXTREME NETWORKS
100G SR4 QSFP28 100m						
0/18	Yes	Yes	QSFP-DD	EQDT4H8FR4FCL100	T0192343H-50016	EXTREME NETWORKS
400G-FR4-QSFPDD2KM						
0/21	Yes	Yes	QSFP28	EQPT1H4WM4WCL100	2215E-50007	EXTREME NETWORKS
100G 4WDM-20 QSFP28 20km						
0/22	Yes	Yes	QSFP28	EQPT1H4LR4LCL100	2235P-00033	EXTREME NETWORKS
100G LR4 QSFP28 10km						
0/23	Yes	Yes	QSFP_PLUS	EQPT404BD2VCL100	2023L-31062	EXTREME NETWORKS
40G-BDSR-QSFP150M, 850/900nm						
0/24	Yes	Yes	QSFP28	EQPT1H4CW4FCL100	2225H-50015	EXTREME NETWORKS
100G CWDM4 QSFP28 2km						
0/25	Yes	Yes	QSFP28	EQPT1H4LR4LCL100	22256-20003	EXTREME NETWORKS
100G LR4 QSFP28 10km						
0/26	Yes	Yes	QSFP28	EQPT1H4WM4LCL100	2211E-50002	EXTREME NETWORKS
100G 4WDM-10 QSFP28 10km						
0/27	Yes	Yes	QSFP28	EQPT1H4ER4ECL1LT	2128E-50031	EXTREME NETWORKS
100G ER4-lite QSFP28 40km						
0/28	Yes	Yes	QSFP_PLUS	EQPT404SR4SCM1NT	2236H-50406	EXTREME NETWORKS
40G-ESR4-QSFP400M-NT						
----- Management Media						

S/C	Qual	Optical	Type	PartNum	SerialNum	Vendor
Description						

extMgmt 1	Yes	No	SFP	FCLF8520P2BTL-EX	2248P-00730	FINISAR CORP.
1G BASE-T SFP 100m						
extMgmt 2	Yes	No	SFP	FCLF8520P2BTL-EX	1720P-00638	FINISAR CORP.
1G BASE-T SFP 100m						
device#						

show sysinfo media interface <extMgmt 1>

The **show sysinfo media interface <extMgmt 1>** command is specific to the 8730 platform.

```
device# show sysinfo media interface extMgmt 1

Media Information:
    Interface: extMgmt 1
    Cage: 33
    Slot: 0
    Qualified: Yes
    Optical: No
    State: Inserted
    Module Type: SFP
    Part Number: FCLF8522P2BTL-EX
    Serial Number: NBHC437
    Vendor: FINISAR CORP.
    Supports Breakout: No
    Description: 1G BASE-T SFP 100m
    Channels: 0
    Datecode: 2024-05-09
    BaudRate: 12 (units 100 megabaud)
    LengthSmfKm: 0 (units km)
    LengthSmfM: 0 (units 100 meters)
    Length50UmM: 0 (units 10 meters)
    Length625UmM: 0 (units 10 meters)
    Wavelength: 0 (units nm)
    LengthCopper: 100 (units 1 meter)
    VendorRev: A
    Options: 0012
    BrMax: 0
    BrMin: 0

device#
```

show running-config interface <extMgmt 1>

The **show running-config interface <extMgmt 1>** command is specific to the 8730 platform.

```
device# show running-config interface extMgmt 1

interface extMgmt 1
    no shutdown
!
device#
```

Configure an IPv6 Address on the OS ONE Platform

The following are the basic prerequisites for configuring an IPv6 address on the OS ONE platform:

- Ensure the PC is connected to the serial port of the device.

- Ensure the IPv6 network assignment with a netmask and router address is completed. This will generally be a /64 network.



Note

If you are provided an IPv6 prefix with a /65 to /128 netmask, assign the addresses according to your network administrator's direction, and DO NOT follow this procedure.

Follow the procedure to configure IPv6 addresses.

1. To configure the IPv6 address, run the following command:

```
device# configure terminal
device(config)# interface ethernet 0/1
device(config-if-eth-0/1)# ipv6 address 2001::100/64
device(config-if-eth-0/1)# ipv6 address 2001::101/64 secondary
device(config-if-eth-0/1)# ipv6 address 2002::100/64
device(config-if-eth-0/1)# ipv6 address 2002::101/64 secondary
device(config-if-eth-0/1)# ipv6 address 2003::/64 eui-64
device(config-if-eth-0/1)# ipv6 address fe80::/64 eui-64
device(config-if-eth-0/1)# exit
device(config)# interface ethernet 0/2
device(config-if-eth-0/2)# ipv6 address fe80::f264:26ff:fe5:c805/64
device(config-if-eth-0/2)#
```

2. To enable IPv6 address DHCP configuration, run the following command:
The DHCP server will provide only the IPv6 address, but not the Gateway Address.

```
device# configure terminal
device(config)# interface ethernet 0/1
device(config-if-eth-0/1) ipv4 address dhcp
device(config-if-eth-0/1) ipv6 address dhcp
device(config-if-eth-0/1)#
```

3. To enable the auto-configuration of IPv6 address, run the following command:

```
device# configure terminal
device(config)# interface ethernet 0/1
device(config-if-eth-0/1) ipv6 address auto-config
device(config-if-eth-0/1)#
```

Port Management

The 8730-32D port management offers:

- Total support for 32 ports at 400G
- Flexible breakout configurations of 4x100G, 4x10G, 4x25G on all 32 ports
- Forward Error Correction (FEC) enabled for 25G,100G, and 400G speeds
- Support for the various hardware platforms (8720, 8520-48y, 8520-48XT, 8820-80C, and 8820-40C). For more details, see [Supported Platforms](#) on page 14.

Platforms like the 8520-48XT, 8520-48Y, and 8820-40c have single OOB management, whereas platforms such as the 8720, 8820-80c, and 8730 feature dual OOB with failover redundancy support.

Extreme OS ONE 100G Ports

For fixed form factor Extreme OS ONE devices, all 100Gb/40Gb interfaces default to 100Gb mode.

You can configure 40G mode using the speed 40000 command from the interface configuration mode. Each 100G port also supports 4x25G and 4x10G breakout configurations.

Link Dampening

The Ethernet link dampening feature protects your network from instability caused by rapidly flapping interfaces. When a port experiences repeated up/down transitions within a defined time window, this feature automatically disables the port for a specified period to prevent network-wide disruptions.

This feature is available for all front ports on a device and must be configured at the interface level. When you configure ports in breakout mode (4x10G, 4x25G, or 4x100G), the feature operates independently on each breakout lane. Each lane maintains its own flap count and timers.

This feature is not supported on the management port or on virtual ports.

Link Dampening

Link dampening is an important concept, especially in scenarios where network interfaces have intermittent issues that might lead to link flapping. Excessive flapping can cause unnecessary network instability, especially in environments where routing protocols or network devices heavily rely on link status changes.

This feature helps mitigate network instability by delaying or suppressing link state changes temporarily through a "cooling-off" period after a link fails or recovers before it is allowed to transition again.

Why Use This Feature

A rapidly flapping interface creates serious problems in your network:

- Spanning tree recalculations disrupt the network topology.
- Routing protocol churn causes route instability.
- Flushing of MAC tables interrupts the forwarding of traffic.
- A high CPU load impacts the performance of the control plane.

How This Feature Works

The feature operates through a simple three step process:

1. **Monitor:** For each port, the system counts the link state toggles (the up to down, down to up transitions) within the sampling window that you define on that port.
2. **Evaluate:** When transitions exceed your configured toggle threshold, the system disables the port administratively.
3. **Recover:** After your configured wait period expires, the port re-enables automatically (unless you set the wait time to 0).

When the feature triggers, the port shows an operational status of DOWN (PlDown) and generates a log message for tracking.

Best Practices

Follow these recommendations for effective deployment of link dampening:

- Start with conservative thresholds: Begin with higher toggle threshold values and adjust them for your network behavior.
- Use a sampling time of least 10 seconds to ensure stable functioning of link dampening.
- Match the sampling time to your environment: Use shorter windows (30–60 seconds) in stable networks and longer windows (120-300 seconds) in environments with expected brief instabilities.
- Set reasonable wait times: Allow sufficient time to investigate issues. 300–600 seconds typically provides a good balance.
- Monitor logs regularly: Review triggered events to identify problematic interfaces and address root causes.
- Document your settings: Maintain records of configured thresholds for consistency across your network.

CLI Commands

The following sections describe how to configure link dampening on an interface and how to restart a port that is operationally down because of excessive link flapping.

Configuring Link Dampening on an Interface

By default, link dampening is disabled on every Ethernet port on the device. You can enable the feature and configure the threshold of link flapping to shut down the port. You can also configure how long it remains shut down.

1. From privileged EXEC mode, access global configuration mode.

```
device# configure terminal
```

2. Access the interface configuration mode for the port that you want to configure.

```
device(config)# interface ethernet 0/1
```

3. Configure dampening on the port.

```
device(config-if-eth 0/1)# link-error-disable toggle-threshold 10 sampling-time 3  
waittime  
300  
device(config-if-eth 0/1)#
```

This command configures three parameters to control the feature behavior:

- **toggle-threshold** sets the number of link state transitions that trigger the port disablement. The range is 1 through 50 transitions.
- **sampling-time** sets the time window for counting transitions. The range is 1 through 65535 seconds. Selecting an appropriate sampling time is important, because fast flaps are either missed by a fast timer or over-counted by a slow timer.
- **wait-time** sets how long the port remains disabled (operationally down) before it is enabled automatically. The range is 0 through 65535 seconds. 0 seconds keeps the port down until you re-enable it manually. 300 seconds (5 minutes) gives you time to investigate before the port re-enables.

4. (Optional) Verify the link dampening configuration.

```
device(config-if-eth 0/1)# do show running-config interface ethernet 0/1
interface ethernet 0/1
no shutdown
link-error-disable toggle-threshold 10 sampling-time 3 wait-time 300
!
device#
```

The following example configures link dampening on Ethernet interface 0/1. This configuration disables the port if it flaps 10 times within 3 seconds and keeps it disabled for 300 seconds:

```
device# configure terminal
device(config)# interface ethernet 0/1
device(config-if-eth 0/1)# link-error-disable toggle-threshold 10 sampling-time 3 wait-time 10
device(config-if-eth 0/1)#
```

The following example displays the configuration that is running currently on the device for all Ethernet interfaces. In this example, link dampening is enabled only on Ethernet interface 0/1:

```
device# show running-config interface ethernet

interface ethernet 0/1
no shutdown
link-error-disable toggle-threshold 10 sampling-time 3 wait-time 300
subinterface vlan 100
no shutdown
!
!
interface ethernet 0/2
shutdown
!
interface ethernet 0/3
shutdown
!
interface ethernet 0/4
shutdown
!
interface ethernet 0/5
shutdown
!
interface ethernet 0/6
shutdown
!
device#
```

The following example displays details about Ethernet interface 0/1. In this example, Link Error Disable: ON shows that link dampening is enabled on the interface:

```
device# show interface ethernet 0/1

ethernet 0/1 Admin state UP, Oper state UP
Interface index is 16777248 (0x1000020)
MTU 9216 bytes
Hardware is Ethernet mac address 50:0a:9c:97:48:1d
Current Speed 400G
Description: Ethernet 0/1
FEC:
    Mode: RS-FEC
Uncorrected Blocks: 18
Corrected Blocks: 55475033
```

```

Link Fault Signaling: ON
Link Fault Status: No Fault
Link Error Disable: ON
Auto Negotiation: ON
Carrier Transitions: 7
                LastClear: 0s
Input:
    Total pkts: 1760026664564
    Broadcast pkts: 0
    Discard pkts: 0
    Errors pkts: 0
    FCS Errors: 0
    MCast pkts: 8
    Octets: 962203743127738
    UCast pkts: 1760026664556
    Runt pkts: 0
    CRC Errors: 0
Input Distribution:
    64 byte pkts: 0
    65-127 byte pkts: 482573358216
    128-255 byte pkts: 358308712804
    256-511 byte pkts: 493289637048
    512-1023 byte pkts: 143312386065
    1024-1518 byte pkts: 181249049849
    Jumbo pkts: 101293520582
Out:
    Total pkts: 1486325156801
    Broadcast pkts: 0
    Discard pkts: 0
    Errors pkts: 0
    MCast pkts: 20485
    Octets: 803095001984686
    UCast pkts: 1486325136316
device#

```

Manually Recovering an Operationally Down Port

If a port is down because of excessive flapping, you can fix it before the wait time expires in order to give the port a "fresh start."

Triggering of link dampening causes a link to be operationally down with the PldDown (port link dampening down) reason code if the toggle count exceeds the configured toggle threshold within the configured sampling time. Also, a RASlog notification is generated to help you track flapping issues when link dampening is triggered.

1. From privileged EXEC mode, access global configuration mode.

```
device# configure terminal
```

2. Examine the operational state (Oper-State) of the ports on the device to determine or verify which link is operationally down with the PldDown reason code.

```
32d# show interface brief
```

```
Flags: M - Redundant Management P - Performance-Path
Number of interfaces 37
```

Port	Mtu	Admin-State	Oper-State	Speed	Ifindex	Description
ExtMgmt 1	9216	DOWN	DOWN	1G	0x41000020	ExtMgmt 1
ExtMgmt 2	9216	DOWN	DOWN	10G	0x41000040	ExtMgmt 2
Int 0	9216	UP	DOWN	20G	0x21000000	Internal 0
Int 1	9216	UP	DOWN	20G	0x21000020	Internal 1
Eth 0/1	9216	DOWN	DOWN	400G	0x1000020	Ethernet 0/1

```
Eth 0/2      9216   DOWN      DOWN      400G   0x1000040   Ethernet 0/2
device#
```

3. Access the interface configuration mode for the port that you want to recover.

```
device(config)# interface ethernet 0/1
```

4. Shut down the port.

```
device(config-if-eth 0/1)# shutdown
```

An administrative shutdown clears all dynamic data, including the flap count and reset timers. It also clears the PldDown reason code.

5. Restart the port.

```
device(config-if-eth 0/1)# no shutdown
```

6. (Optional) Verify that the interface is operationally up (Oper state UP) again.

```
device# show interface ethernet 0/1

ethernet 0/1 Admin state UP, Oper state UP
Interface index is 16777248 (0x1000020)
MTU 9216 bytes
Hardware is Ethernet mac address 50:0a:9c:97:48:1b
Current Speed 400G
Description: Ethernet 0/1
FEC:
    Mode: RS-FEC
    Uncorrected Blocks: 0
    Corrected Blocks: 2199
Link Fault Signaling: ON
    Link Fault Status: No Fault
    Auto Negotiation: ON
    Carrier Transitions: 1
    LastClear: 0s
Input:
    Total pkts: 0
    Broadcast pkts: 0
    Discard pkts: 0
    Errors pkts: 0
    FCS Errors: 0
    MCast pkts: 0
    Octets: 0
    UCast pkts: 0
    Runt pkts: 0
    CRC Errors: 0
Input Distribution:
    64 byte pkts: 0
    65-127 byte pkts: 0
    128-255 byte pkts: 0
    256-511 byte pkts: 0
    512-1023 byte pkts: 0
    1024-1518 byte pkts: 0
    Jumbo pkts: 0
Out:
    Total pkts: 2
    Broadcast pkts: 0
    Discard pkts: 0
    Errors pkts: 0
    MCast pkts: 2
    Octets: 318
    UCast pkts: 0
Rate Info:
    Input: 0.000000 Mbits/sec, 0 pkts/sec 0.00% of line-rate
    Output: 0.001432 Mbits/sec, 1 pkts/sec 0.00% of line-rate
device#
```

The following example show how to restart a port that is down because of excessive flapping:

```
device# configure terminal
device(config)# interface ethernet 0/1
device(config-if-eth 0/1)# shutdown
device(config-if-eth 0/1)# no shutdown
device(config-if-eth 0/1)#
```

Displaying Link Dampening Status and Configuration

To display the link dampening enabled/disabled status and the dampening configuration for all front ports on a device, use the **show interface ethernet link-error-disable** command.

The following example displays the status and the configuration for link dampening on each port. In this example, link dampening is enabled and configured only on Ethernet port 0/1:

```
device# show interface ethernet link-error-disable
```

Port	Link Error Disable	Toggle-Threshold	Sampling Time	Wait Time	Status	Last Updated
Eth 0	Disable	0	0	0	0	2025-10-09T17:52:13+05:30
Eth 0/1	Enable	10	3	300	0	2025-10-09T17:34:24+05:30
Eth 0/2	Disable	0	0	0	0	2025-10-09T17:34:25+05:30
Eth 0/3	Disable	0	0	0	0	2025-10-09T18:01:28+05:30
Eth 0/4	Disable	0	0	0	0	2025-10-09T18:01:28+05:30
Eth 0/5	Disable	0	0	0	0	2025-10-09T18:01:28+05:30
Eth 0/6	Disable	0	0	0	0	2025-10-09T18:01:28+05:30

```
device#
```

The **show interface ethernet link-error-disable** command displays the following information::

- Port: Name of the Ethernet port.
- Link Error Disable: Indicates whether link dampening is enabled or disabled on the port.
- Toggle-Threshold: Number of times that the link state cycles from up to down and down to up before the wait period is activated.
- Sampling Time: Number of seconds during which the configured toggle threshold can occur before the wait time is activated.
- Wait Time: Number of seconds that the port remains disabled (down) before it becomes enabled. A value of 0 indicates that the port will stay down until an administrative override occurs.
- Status: Status of the port.
- Last Updated: Time of the last port status change.

Troubleshooting

If a port disables unexpectedly:

1. Check the interface status for the PldDown reason code.
2. Review system logs for Link Error Disable messages.
3. Investigate physical layer issues (such as cable quality, connector problems, or transceiver compatibility).
4. Verify that connected devices operate correctly.
5. Consider adjusting thresholds if legitimate traffic patterns trigger the feature.

For persistent issues, collect diagnostic information during a maintenance window when you can safely disable the feature temporarily.

Link Fault Signaling

Extreme OS ONE supports Link Fault Signaling (LFS) detection for interface types of 40G, 100G, and 40G breakout ports. It detects local and remote faults.

Link fault signaling monitors the status and health of the link. You can enable or disable this feature in the front physical interface settings. By default, link fault signaling is enabled on all front physical interfaces.

Show Interface Ethernet

Use the **show interface ethernet <interface>** command to view the link fault signaling status, including, admin and operational state, interface index, MTU, hardware and MAC address, and speed and FEC mode

```
device# show interface ethernet 0/1

ethernet 0/1 Admin state UP, Oper state UP
Interface index is 16777248 (0x1000020)
MTU 9216 bytes
Hardware is Ethernet mac address 50:0a:9c:97:48:1b
Current Speed 400G
Description: Ethernet 0/1
FEC:
    Mode: RS-FEC
    Uncorrected Blocks: 0
    Corrected Blocks: 2199
Link Fault Signaling: ON
    Link Fault Status: No Fault
    Auto Negotiation: ON
    Carrier Transitions: 1
    LastClear: 0s
Input:
    Total pkts: 0
    Broadcast pkts: 0
    Discard pkts: 0
    Errors pkts: 0
    FCS Errors: 0
    MCast pkts: 0
    Octets: 0
    UCast pkts: 0
    Runt pkts: 0
    CRC Errors: 0
Input Distribution:
```

```

    64 byte pkts: 0
    65-127 byte pkts: 0
    128-255 byte pkts: 0
    256-511 byte pkts: 0
    512-1023 byte pkts: 0
    1024-1518 byte pkts: 0
    Jumbo pkts: 0
Out:
    Total pkts: 2
    Broadcast pkts: 0
    Discard pkts: 0
    Errors pkts: 0
    MCast pkts: 2
        Octets: 318
    UCast pkts: 0
Rate Info:
    Input: 0.000000 Mbits/sec, 0 pkts/sec 0.00% of line-rate
    Output: 0.001432 Mbits/sec, 1 pkts/sec 0.00% of line-rate
device#

```

The link fault status will be one of the following:

- No Fault: Port is administratively down
- No Fault: Port is operationally up, and no faults are set
- Local Fault: Port does not detect laser
- Remote Fault: Port receives remote fault

Show Counter Link-Fault Signaling

Use the **show counters link-fault-signaling** command to view the number of local and remote faults on the port along with the last fault seen time.

```

device# show counters link-fault-signaling

```

Port	Local-Fault-Count	Last-Local-Fault	Remote-Fault-Count	Last-Remote-Fault
Eth 1/1	2	2024-09-22T01:37:04Z	1	2024-09-22T01:36:51Z
Eth 1/2	0	NA	0	NA
Eth 1/3	0	NA	0	NA
Eth 1/4	1	2024-09-22T01:36:50Z	1	2024-09-22T01:36:52Z
Eth 1/5	0	NA	0	NA
Eth 1/6	0	NA	0	NA
Eth 1/7	1	2024-09-22T01:36:50Z	1	2024-09-22T01:36:54Z
Eth 1/8	1	2024-09-22T01:36:50Z	1	2024-09-22T01:36:53Z

```

device#

```

Show Link-Fault Signaling

Use the **show link-fault-signaling** command to view the link fault signaling status for each front port.

```

device# show link-fault-signaling

```

Rx and Tx link-fault-signaling status

Port	Link-Faults
Eth 0/1	ON
Eth 0/2	ON
Eth 0/3	ON
Eth 0/4	ON
Eth 0/5	ON

```
Eth 0/6      ON
Eth 0/7      ON
Eth 0/8      OFF
device#
```

Dual OOB Redundant Management Port Configuration

The switch has two SFP+ management ports (Primary and Backup) connected to the Extreme 8730 device. These ports support Active-Standby mode with link failover.

CLI Commands

- **show interface management 0**
- **show sysinfo media detect**
- **show sysinfo media interface <extMgmt 1>**
- **show interface <extMgmt 1>**
- **show running-config interface <extMgmt 1>**
- **<td4-config> interface <extMgmt 1>**

For more details on command syntax and parameters, see the *Extreme OS ONE SR Command Reference Guide*.

Limitations

1. If the primary link is plugged in while the secondary link is active, and then the secondary link is removed within 5 seconds, the active mode may not switch to the primary link.
2. Interface counter show/clear commands not supported on the external management port "extMgmt <1/2>".
3. IP configuration not supported on external management ports as these ports are L2 interfaces.
4. MTU configuration not supported on external management ports
5. When Management 0 interface is up or down, it has a fixed speed of 10G. The speeds of Mgmt 1 and Mgmt 2 are reflected on their respective interfaces: extMgmt 1 and extMgmt 2.



Note

When IAH TPVM boots with both external management links down, a software limitation triggers a sync logic issue. This logic syncs the link status to the TAP IAH VM interface, causing a flap. This behavior is currently a software limitation.

Interface Ethernet Ports

All Extreme device ports are pre-configured with default values that allow the device to be fully operational at initial startup without any additional configuration. In some

configuration scenarios, changes to the port parameters may be necessary to adjust to attached devices or other network requirements.

Displaying Device Interfaces

The device supports Ethernet, loopback, management, and virtual Ethernet interfaces (VEs).

Enter the **show running-config interface** command to display the interfaces and their status.

The following example displays the Ethernet interfaces on the device and are identified by the port number.

For example, the notation 0/8 indicates port 8 on a device.

```
device# show running-config interface ethernet
interface Ethernet 0/1
  no shutdown
!
interface Ethernet 0/2
  channel-group 101 mode active type standard
  lacp timeout long
  no shutdown
!
interface Ethernet 0/3
  channel-group 101 mode active
<cr>

interface Ethernet 0/4
  shutdown
!
interface Ethernet 0/5
  shutdown
!
interface Ethernet 0/6
  shutdown
!
interface Ethernet 0/8
  channel-group 143 mode active
<cr>
!
interface Ethernet 0/9
  shutdown
!
```

System Clock



Note

You can set the system clock if there are no NTP servers configured. Otherwise, an active NTP server, if configured, automatically updates and overrides the system clock.

Set the Clock

Setting the clock is not required when NTP is configured and the clock is synchronized to an external NTP server.

To set the clock, perform the following step:

1. In EXEC mode, run the following command:

```
device# clock set 2025-07-18T23:00:00
device# show clock
2025-07-18 23:00:04 UTC +0000
device#
```

2. Change the time zone in global configuration mode.

```
device# configure terminal
device(config)# system
device(config-system)# clock timezone Australia/Melbourne
device(config-system)# end
```

3. Verify the time zone.

```
device# show running-config system clock
system
  clock timezone  Australia/Melbourne
!
```

This example changes the time zone to the region of Australia and the city of Melbourne.

Management VRFs

All management services on the Extreme device are VRF aware. The management services can select a particular VRF to reach a remote server based on a VRF. The VRFs are management (mgmt-vrf), default (default-vrf), and user-defined VRFs.

By default, the device creates a VRF for management named mgmt-vrf and, all manageability services are accessible through this VRF. Multiple instances of IP services can be instantiated in multiple VRFs. For example, SSH can be in more than one VRF.

VRF Reachability

VRF reachability indicates the details of the VRF for servicing requests from the clients. It also indicates the clients specifying the VRF for reaching a source to ensure that the management packets are serviced or routed in a server VRF domain.

These two types of reachability services are also referred to as device-initiated and server-based services.

VRF Reachability for Device-Initiated Services

The following table lists the device-initiated services and associated commands that VRF reachability supports.

Service	VRF-related command	Additional information
Logging server	vrf NAME <String: 1-64 character> vrf name	Uses TCP UDP IPv4 or IPv6.
NTP	ntp server <server ip address> Configure VRF under NTP server: vrf VRFNAME <STRING 1-64> Name of the VRF instance	Uses NTP UDP IPv4 and IPv6.
Copy file	device# copy file URL Source URL disk://config-file/<file-name> disk://coredumps/<file-name> disk://firmware/<file-name> disk://iah/<file-name> disk://tech-support/<file-name> usb://<file-name> scp:// <username>[:<password>]@<host>: [port]/<filepath>	Uses TCP IPv4 or IPv6. By default, mgmt-vrf is used and a user-defined VRF is optional.

Service	VRF-related command	Additional information
TACACS+	<p>server-group tacacs+-server-address Configure user defined vrf: vrf NAME <String: 1-64 character> vrf name</p>	<p>Uses TCP IPv4 or IPv6. The following example associates a VRF instance named red-vrf with the Terminal Access Controller Access-Control System Plus (TACACS+) server host 6.6.6.6:</p> <pre> device# configure terminal device(config)# system device(config-system)# aaa device(config-system-aaa)# server-group tacacs+ device(config-system-aaa- server-group-tacacs+)# server 6.6.6.6 device(config-system- aaa-server-group-tacacs+ server-6.6.6.6)# vrf red-vrf device(config-system- aaa-server-group-tacacs+ server-6.6.6.6)# do show running-config system aaa server-group tacacs+ system aaa server-group tacacs+ server 6.6.6.6 vrf red-vrf ! ! ! ! device# </pre>

Service	VRF-related command	Additional information
RADIUS	server-group [tacacs+ radius ldap] Configure user defined vrf: vrf NAME <String: 1-64 character> vrf name	Uses UDP and TCP IPv4 or IPv6. The following example associates a VRF instance named red-vrf with the Remote Authentication Dial-In User Service (RADIUS) server host 4.4.4.4: <pre> device# configure terminal device(config)# system device(config-system)# aaa device(config-system-aaa)# server-group radius device(config-system-aaa- server-group-radius)# server 4.4.4.4 device(config-system- aaa-server-group-radius- server-4.4.4.4)# vrf red-vrf device(config-system- aaa-server-group-radius- server-4.4.4.4)# do show running-config system aaa server-group radius system aaa server-group radius server 4.4.4.4 vrf red-vrf ! ! ! ! device# </pre>
LDAP	vrf NAME <String: 1-64 character> vrf name	Default vrf is mgmt-vrf . User-defined VRF is optional. The following example associates a VRF instance named red-vrf with the Lightweight Directory Access Protocol (LDAP) server host 7.7.7.20: <pre> device# configure terminal device(config)# system device(config-system)# aaa device(config-system-aaa)# server-group ldap device(config-system-aaa- server-group-ldap)# server 7.7.7.20 device(config-system- aaa-server-group-ldap- server-7.7.7.20)# vrf red-vrf device(config-system- aaa-server-group-ldap- server-7.7.7.20)# do </pre>

Service	VRF-related command	Additional information
		<pre>show running-config system aaa server-group ldap system aaa server-group ldap server 7.7.7.20 vrf red-vrf ! ! ! ! device#</pre>

All these implementations use forward referencing of the VRF name in the **vrf defined** option, unless noted. At runtime when making the socket connection, the VRF ID by name must be resolved. If it does not resolve, it will result in a connection error.

VRF Reachability for Server-Based Services

The server services running on the Extreme device must listen to the requests in all the VRFs or a specified VRF and send the response back to the client in the same VRF where the request arrived. Thus, the services can come through any in-band interface bound to any VRF.

Each server-based service can have a maximum of 32 VRF instances; one mgmt-vrf, one default-vrf, and 30 user-defined VRFs. The following table lists the server services and associated commands that VRF reachability supports.



Note

You can configure the SNMP server to listen on any Virtual Routing and Forwarding (VRF) instance, but it is disabled by default.

Table 4: Server-based services and associated commands that VRF reachability supports

Service	VRF-related command	Additional information
gRPC	<pre>grpc-server NAME device (config-system-grpc- server-test)# vrf VRFNAME <String: 1-64 character> vrf name</pre>	By default, the gRPC server is not configured. You need to configure and enable it. Use this command to create a gRPC server instance.
SSH	<pre>ssh-server NAME #config-system-ssh-server- <ssh_name></pre>	By default, ssh-server 'DEFAULT' instance is created and is associated with 'mgmt-vrf'. A user-defined VRF is optional.

Table 4: Server-based services and associated commands that VRF reachability supports (continued)

Service	VRF-related command	Additional information
Telnet	telnet server NAME config-system-telnet-server- <server_name>#	By default, the Telnet service is not configured, and you need to configure and enable it. Use this command to create a telnet server instance. If NAME is not specified, 'DEFAULT' will be used as the name of the telnet-server instance.
SNMP notification	config-system-snmp-server-vrf-<vrf-name>-host-<host-name>-community-or-user-name>	Uses SNMP UDP IPv4 or IPv6. By default, mgmt-vrf is used to send the SNMP notifications.

Telnet and SSH Limitations and Considerations

Telnet and SSH limitations and considerations are as follows:

- You cannot remove mgmt-vrf from the SSH and Telnet services.
- Telnet and SSH server can be enabled on a maximum number of 32 VRFs.
- SSH and Telnet Services started on VRF context is applicable for both IPv4 and IPv6 addresses.
- A maximum of 32 user logins are allowed on the device. These sessions are a cumulative count of login sessions through SSH and Telnet across all the configured VRFs.
- Inter-VRF route leaking is not supported for SSH and Telnet. When you try to use any of these services to access a leaked VRF (user-vrf), the connection is refused. In addition, the access service ceases to function correctly on the local VRF (mgmt-vrf) and you must restart it; for example, to restart the SSH service on the local VRF, run the **ssh server restart** command.

Zero Touch Provisioning (ZTP) over DHCP

Learn how to configure and implement ZTP over DHCP for Extreme OS ONE platforms. ZTP streamlines device setup by automatically downloading firmware and configuring devices, eliminating manual console login and configuration.

When a customer connects a new Extreme device to their network, ZTP automatically loads the correct firmware and configurations without manual intervention. To enable ZTP, the DHCP server must be configured with two specific DHCP options

ZTP Configuration

Use this topic to learn about enabling Zero Touch Provisioning (ZTP) on devices to provision new Extreme devices in your network automatically, with minimal manual intervention.

DHCP server

DHCP Server version 4.2.4 is tested on Ubuntu 14.04 (Trusty). The `dhcpd.conf` file has the option 66 (TFTP Server Name) and the option 67 (Filename) set for ZTP. Use the option 66 for the FTP server IP address or host name, and the option 67 for the ZTP configuration file path.

When the device starts the DHCP process, it sends the DHCP client ID to the DHCP server to get the IP address and options 66/67. The device then downloads the ZTP configuration file from the FTP server. To set up a different ZTP configuration file for different devices, you can use the DHCP Client ID in the `dhcpd.conf` file. Ensure to restart the `dhcpd` server whenever `dhcpd.conf` is updated.

The following is an example of DHCP option configuration as ISC DHCP Server for option 66, option 67 and option 43:

```
subnet 10.32.129.0 netmask 255.255.255.0 {
  interface ens160;
  #dhcp option 66
  option tftp-server-name "10.22.33.105";
  #option tftp-server-name "eng.test.com";
  #dhcp option 67
  option bootfile-name "config/files/ztp.conf";
  #dhcp option 43
  option vendor-encapsulated-options
  01:00:2A:68:74:74:70:73:3A:2F:2F:31:30:2E:36:34:2E:31:33:2E:31:30:35:2F:61:70:61:63:68:65:
  2D:73:65:6C:66:73:69:67:6E:65:64:2E:63:72:74;
  #option vendor-encapsulated-options 02:00:01:01;
  range 10.32.129.121 10.32.129.250;
  option domain-name-servers 10.14.15.31;
```

Configuring Option 43 in DHCP Server

Option 43 specifies the URL or protocol for downloading certificates or configurations. It supports two types:

- **Type 01: HTTPS URL**
 - Provides the HTTPS URL to fetch the CA certificate for the server mentioned in Option 66.
 - Format: 01 (type) + 00 XX (length) + hex-encoded URL.
 - Example:
01:00:2A:68:74:74:70:73:3A:2F:2F:31:30:2E:36:34:2E:31:33:2E:31:30:35:2F:61:70:61:63:68:65:2D:73:65:6C:66:73:69:67:6E:65:64:2E:63:72:74
Decodes to: <https://10.64.13.105/apache-selfsigned.crt>
- **Type 02: Boolean Value**
 - Determines whether to use HTTPS or not.
 - Format: 02 (type) + 00 01 (length) + 00 (false) or 01 (true)
 - Examples:
 - 02 00 01 00 (use HTTP if HTTPS fails)
 - 02 00 01 01 (use HTTPS only)

e

Behavior Based on Option 43 Configuration

- **Type 01:** Device downloads CA certificate from specified HTTPS URL and ignores certificate validation.
- **Type 02 with value true:** Device uses HTTPS to download from server in Option 66, assuming a valid certificate from a well-known CA.
- **Type 02 with value false:** Device tries HTTPS first, and if it fails, falls back to HTTP.
- **No Option 43:** Device attempts both HTTP and HTTPS.

HTTP server

Apache server version 2.4.18 was installed and tested on Ubuntu 14.04 (Trusty). The HTTP server stores the ZTP configuration file, firmware, device configuration file, or Python script. The location of these configuration files under the HTTP server base directory is flexible.

ZTP configuration script

The ZTP process can run the script to set up the device configuration automatically. For now, only the Python script is supported. The script takes no parameters. The script can automate any command line, including OS ONE and Linux commands, such as the configuration download command, **copy ftp:// . . . running-config**.

ZTP Configuration File

The ZTP configuration file is a crucial component that directs the Zero Touch Provisioning process. It contains:

- Firmware upgrade locations
- Device configuration file replay locations
- Python script locations

This ZTP configuration file supports three levels of configuration settings:

1. Global (Common): Applies to all devices
2. Group-Specific: Applies to a group of devices
3. Device-Specific: Applies to individual devices, identified by DHCP Client Identifier prefix or full identifier

The configuration file is parsed in the following order of priority:

1. Device-Specific
2. Group-Specific
3. Global (Common)

If an attribute is defined in multiple sections, the most specific section's value takes precedence.



Note

- Lines starting with "#" are treated as comments and ignored.
- Lines with empty values are considered valid.
- The client ID used in ZTP does not match the one in the DHCP discover packet.

ZTP configuration file definitions

The following table contains the ZTP configuration file definitions.

Variable description	Description
version	Only version 3 is supported.
date	The last modified date.
supported_nos	The release firmware version supporting the ZTP configuration file.
host_client_id, host_end	Host_client_id marks the beginning of the section host_end marks the end. User could set up the device specific section with full DHCP client id or its prefix. For example, host_client_id=EXTREMENETWORKS##8730-32D##AD012350G-00053 host_end
common_begin, common_end	The setting in the section is shared by all devices.
fwdir	Firmware path in the FTP/HTTP server. For example, Fwdir=/fw/ExtremeOneSR-22.2.2.bin. If base directory of the server is Fwdir=/fw/ExtremeOneSR-22.2.2.bin, then the absolute path of firmware in ftp server is located at /var/www/http/fw/ExtremeOneSR-22.2.2.bin.
startup	The path to the device configuration file in the FTP server. If omitted, the device will take the default configuration. The value can be "default" or user configuration file.
scriptcfgflag	The default is 0, when not specified. The meaning of the value is: 0 - only use startup, script is ignored 1 - only use script, startup is ignored
script	The device configuration Python script file.

The following is an example ZTP configuration (ztp.cfg) file:

```
version=3
date=5/26/2025
```

```
supported_nos=22.2.2.0

common_begin
vcsmode=SA
scriptcfgflag=2
startup=startup.cfg
script=script2.py
fwdir=ExtremeOneSR-22.2.2.0.bin
common_end

host_client_id=EXTREMENETWORKS##ABCD##234567
script=script2.py
startup=/config/abc2.conf
host_end

# Model ABC_1256 and SerialNum SNU3333222
host_client_id=EXTREMENETWORKS##ABC_1256##SNU3333222
scriptcfgflag=2
script=/script/def3.py
host_end
```

Configuring DHCP Option 66: HTTPS Server IP Address

To enable Zero Touch Provisioning (ZTP), DHCP Option 66 must be set up with the IP address of the HTTPS server.

This HTTPS server will store essential files, including:

- ZTP configuration files
- Device configuration files for configuration replay
- Firmware updates
- Python scripts with startup configurations

If the HTTPS connection fails, the device will attempt to download files using HTTP.

Configuring DHCP Option 67: ZTP Configuration File Path

To complete the Zero Touch Provisioning (ZTP) setup, DHCP Option 67 must be configured with the file path of the ZTP configuration file, which is stored on the specified HTTPS server.

Configuring DHCP Option 43: CA Certificate File for HTTPS Server

Optionally, DHCP Option 43 can be configured with a hex-encoded value containing the URL where the CA certificate can be retrieved, enabling secure communication with the HTTPS server specified in Option 66.

HTTPS Server Requirements

The HTTPS server hosts essential files for Zero Touch Provisioning (ZTP), including:

- ZTP configuration files
- Firmware updates
- Device configuration files
- Python scripts

If HTTPS connectivity fails, devices will attempt to download files using HTTP.

Firmware Image

The latest device firmware will be hosted on the HTTPS server for installation during the ZTP process.

Device Configuration File

Customers can replay a set of startup configurations on their device. The replay process will continue regardless of success or failure.

Error logs for the replay process can be found at the `/var/data/ztp/ztpdhcp/log/` location.

This log file provides a record of any errors that occurred during the configuration replay.

Python Scripts

Python scripts required for automation or custom configuration tasks during the Zero Touch Provisioning (ZTP) process will be hosted on the same HTTPS server, enabling seamless execution and integration.

The response of the python script execution will be available at the `/var/data/ztp/ztpdhcp/log/pythonZtp.log` location. The following is a sample Python script:

```
#!/usr/bin/python3
import sys
sys.path.insert(1, '/usr/local/tierra/bin/scripts')
from CLI import CLI

CLI('config; system; ntp; server time1.google.com; enable')
CLI('show running-config system ntp; show clock; show ntp association')
CLI('copy file scp://user:password@1.2.3.5:/var/www/html/startup.cfg running-config')
```

These files (Python scripts), downloaded from the HTTPS server, will persist after a firmware upgrade to the version specified in the `fwdir` flag of the ZTP configuration file.

ZTP Invocation

ZTP will get automatically triggered in the following scenarios:

1. Netinstall: After a netinstall, the device reverts to its factory default state. Upon reboot, ZTP initiates automatically. This enables seamless deployment of devices shipped from the manufacturing site. Simply connect the devices to a preconfigured ZTP network, and the ZTP process will automatically upgrade firmware and configure settings.
2. Factory Reset: Running the "factory-reset" command restores the device to its factory default state, triggering an automatic reboot. Once the device is back online, ZTP starts automatically.

Without this feature, manual configuration would be required, involving:

- Connecting a console to the device
- Configuring the device management interface

This automated ZTP process simplifies large-scale device deployments, saving time and effort.

ZTP DHCP Discovery Process

Upon arrival at the customer site, the device boots with its default configuration, enabling DHCP on the management interface. The device then initiates the following steps:

1. IP Address Request: The device sends a standard DHCP request to the DHCP server to obtain an IP address.
2. ZTP Configuration Request: Along with the IP address request, the device also requests:
 - DHCP Option 66: The IP address of the HTTPS server hosting the ZTP configuration files.
 - DHCP Option 67: The location of the ZTP configuration file, which guides the device path for Firmware, startup configuration file, python scriptReplay.
 - DHCP Option 43: A hex-encoded HTTP URL in TLV format, specifying the location of the HTTPS server's CA certificate.

These requests enable the device to discover and download the necessary configuration files for automated provisioning.

ZTP Client State Machine

The ZTP process unfolds as follows:

1. Device Boot: The device boots up in its factory default state.
2. ZTP DHCP Process: The device initiates the ZTP DHCP process, discovering the HTTPS server and boot file over the management interface using DHCP.
3. ZTP Configuration File Download: The device downloads the ztp.conf file from the HTTPS server specified in DHCP Option 66.
 - The device attempts to download the file using HTTPS. For HTTPS to succeed, the device must have the CA certificate of the HTTPS server which may be optionally available from DHCP server option 43.
 - If HTTPS fails, the device tries to download the ZTP configuration file using HTTP.
4. Firmware and Configuration Download: Based on the ztp.conf file, the device downloads:
 - Firmware
 - Startup configuration files
 - Python scripts
5. Device Configuration and Firmware Upgrade: The device
 - Upgrades or downgrades firmware
 - Executes the device startup configuration file
 - Executes Python scripts
6. ZTP Completion: Once the ZTP process is complete, it will not restart unless a factory reset or net install is performed

7. ZTP Cancellation: If the ZTP process fails continuously, the user can cancel ZTP. However:
 - Once the ZTP process has started, cancellation is not allowed if the device is in the middle of a firmware upgrade or configuring the device with remote server configurations.
 - To restart the ZTP process after cancellation, the user must execute the factory-reset command, which cleans up device configurations, reboots the device, and brings it back to ZTP mode.
8. ZTP Process Restart: If the device reboots or crashes during the ZTP process, the ZTP process will restart from step 3.
9. Configuration Lockdown: During the ZTP process, configuration changes are locked out until ZTP is completed or canceled.

Error Handling and Recovery

The Zero Touch Provisioning (ZTP) process includes robust error handling mechanisms:

- Network Issues or Firmware Unavailability: If firmware package downloads fail due to network problems or image unavailability, the ZTP process will automatically restart after a 1 min delay.
- Kernel Panic or Daemon Termination: If a kernel panic or daemon termination occurs during firmware download, the device will reboot. Upon the next reboot, the ZTP process will retry, ensuring continuity and reliability.

ZTP CLI Commands

For complete information on ZTP CLI commands, such as ZTP Cancel, Factory Reset, show ztp dhcp status, and show ztp dhcp logs commands and syntax, see *Extreme OS ONE SR Command Reference Guide*.

ztp cancel

The **ztp cancel** command stops the ongoing Zero Touch Provisioning (ZTP) process. This is typically used when the network setup is incorrect, preventing ZTP from starting. By canceling ZTP, the device reverts to non-ZTP mode, allowing configuration commands. Note that the cancel request will fail if the process is in certain stages (firmware upgrade, file replay, or script execution). During ZTP process config commands are not allowed. After canceling, you can run the configuration commands.

factory reset

This exec command brings back the device to ZTP mode just as device boots up in factory.

show ztp dhcp status

```
device# show ztp dhcp status
ZTP Status: Completed
Client-id: EXTREMENETWORKS##8730-32D##AD012451G-00007
ZTP Interface: ma1
Interface IP: 10.32.129.191
Http Server IP Address: 10.64.13.105
Transfer Mode: HTTP
ZTP Configuration File: config/files/ztp.conf
Switch Configuration File: startup.cfg, /config/files/script_device.py
```

```
Firmware Image: /config/files/ExtremeOneSR-22.2.2.0.bin
Firmware Download State: firmwareInstallCompleted
device#
```

show ztp dhcp logs

The command shows the ZTP logs at CLI.

```
DHCPztpclient# show ztp dhcp logs
2025/01/31 17:25:43.932280 Received dhcption 66:1.2.3.4 and dhcption 67: config/
files/ztp.conf
2025/01/31 17:25:43.932455 Starting ZTP DHCP Process.
2025/01/31 17:25:48.934303 Downloading from URL : https://1.2.3.4/config/files/
ztp.conf.
2025/01/31 17:26:18.947195 Downloading from URL : http://1.2.3.4/config/files/ztp.conf.
2025/01/31 17:26:58.950679 Downloading from URL : https://1.2.3.4/config/files/
ztp.conf.
2025/01/31 17:27:28.954204 Downloading from URL : http://1.2.3.4/config/files/ztp.conf.
2025/01/31 17:28:08.955744 Downloading from URL : https://1.2.3.4/config/files/
ztp.conf.
2025/01/31 17:28:29.227842 Received dhcption 66:10.64.13.105 and dhcption 67:
config/files/ztp.conf
2025/01/31 17:28:29.227954 Starting ZTP DHCP Process.
2025/01/31 17:28:34.235213 Downloading from URL : https://10.64.13.105/config/files/
ztp.conf.
2025/01/31 17:28:34.305942 Downloading from URL : http://10.64.13.105/config/files/
ztp.conf.
2025/01/31 17:28:34.352092 Successfully downloaded ztp configuration file config/files/
ztp.conf to /var/data/ztp/ztp.conf file.
2025/01/31 17:28:34.352344 Downloading from URL : https://10.64.13.105/startup.cfg.
2025/01/31 17:28:35.410149 Downloading from URL : http://10.64.13.105/startup.cfg.
2025/01/31 17:28:35.456341 Successfully downloaded switch startup config file
startup.cfg to /var/data/ztp/switchConfig.conf.
2025/01/31 17:28:35.456400 Downloading from URL : https://10.64.13.105//config/files/
script.py.
2025/01/31 17:28:36.517075 Downloading from URL : http://10.64.13.105//config/files/
script.py.
2025/01/31 17:28:36.563852 Succesfully downloaded python script /config/files/
script.py to /var/data/ztp/script.py.
2025/01/31 17:28:36.563974 Starting to download firmware [ /config/files/
TOS-10.1.3.0-20250131_171456.UTC-rajans.bin ].
2025/01/31 17:28:36.564320 Downloading from URL : https://10.64.13.105//config/files/
TOS-10.1.3.0-20250131_171456.UTC-rajans.bin.
2025/01/31 17:28:37.624186 Downloading from URL : http://10.64.13.105//config/files/
TOS-10.1.3.0-20250131_171456.UTC-rajans.bin.
2025/01/31 17:28:52.247127 Successfully Downloaded firmware.
2025/01/31 17:28:52.247161 Activating new firmware and going for reboot.
2025/01/31 17:30:56.042702 Starting ZTP DHCP Process.
2025/01/31 17:31:01.043006 Device booted after ztp firmware upgrade.
2025/01/31 17:31:01.044796 Running configuration script : startup.cfg.
2025/01/31 17:31:03.331772 Completed executing script : startup.cfg.
2025/01/31 17:31:03.332278 Running configuration python script : /config/files/
script.py.
2025/01/31 17:31:06.351667 Completed executing python script : /config/files/script.py.
2025/01/31 17:31:06.352417 ZTP DHCP Completed.
```

Debugging Logs for Zero Touch Provisioning (ZTP)

To facilitate troubleshooting and debugging, ZTP logs are available at the following locations:

1. ZTP Base Logs: /tmp/tierra/trace/ztp-base/ztp-base-RASTrace.log
2. Python Script Logs: /var/data/ztp/log/pythonZtp.log

3. Device Startup Configuration Logs: `/var/data/ztp/log/configReplay.log`
4. Consolidated ZTP Logs: `/var/log/ztp/log/ztp.log`

The **show ztp logs** command uses these log files to provide a centralized view of ZTP-related logs.

Configuration and DRC (Drift & Reconcile) Tracking

The DB Audit feature enables the tracking of configuration changes on devices, facilitating various operational and reconciliation use cases. By providing a device-side RPC, it offers a robust method for retrieving metadata on the most recent configuration change. This capability supports key services, including:

- Drift detection
- State synchronization
- Configuration tracking

By leveraging this feature, organizations can enhance their change management and monitoring capabilities

Key Features and Capabilities

This feature provides a robust tracking mechanism for configuration changes, enabling:

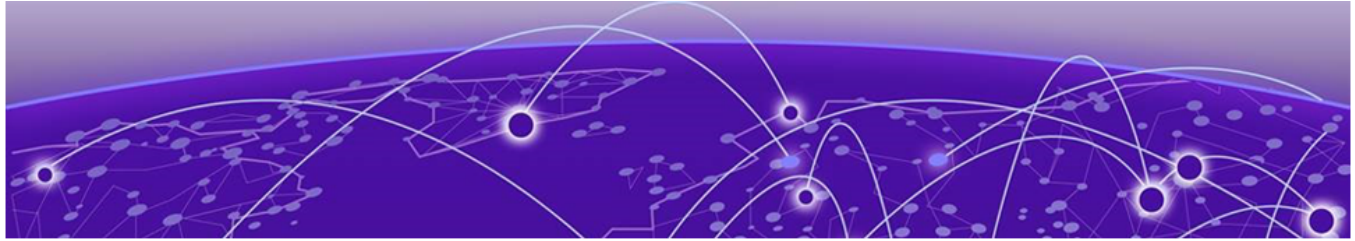
- **Reliable Change Tracking:** Accurately tracks and retrieves metadata for the latest configuration and state updates.
- **Device-Side RPC:** Implements a device-side RPC to fetch the latest version and timestamp for configuration and state changes.
- **Automatic Versioning and Timestamp Updates:** Automatically updates version and timestamp for any database changes made via CLI, gNMI, or other services.
- **Drift Detection and Reconciliation:** Enables external systems to detect configuration mismatches and trigger corrective actions.
- **Persistent Versioning:** Configuration version persists across reboots, while state version resets upon restart.

Persistence Handling in CDB vs SDB Reload

The system handles persistence across reboots and installations as follows.

Scenario	CDB Handling	SDB Handling
ONIE Install / System Full Install / Factory Reset	The version number resets to 0, but retains some values due to default sysconfig settings (x, a non-zero value).	Version resets to 0.
Restart After Installation	On restart, the version number becomes 0 + x, reflecting the retained sysconfig values.	Version resets to 0.

Scenario	CDB Handling	SDB Handling
Reload / Reboot	After a reboot, the system retrieves the persisted version number from the config database into local memory.	Version resets to 0.
Copy Default Config to Running Config	Before flushing the configuration, the system stores YANG paths and corresponding data in key-value pairs in a file. This file includes the version number.	Version resets to 0.
Restore Configuration on Reboot	On reboot, the system restores the version number from the stored file.	Version resets to 0.



OS ONE and Linux Shell Interoperability

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Admin OS ONE User Capabilities

As an Extreme OS ONE user with admin permissions, you can perform the following tasks:

- Running permitted Linux commands and scripts from the Extreme OS ONE CLI
- Accessing the Extreme OS ONE Linux shell, and:
 - Running permitted Linux commands and scripts.
 - Running Extreme OS ONE configuration and show commands.
 - Running scripts that contain multiple Extreme OS ONE commands.

Limitations

- Do not modify Extreme OS ONE user accounts from the Linux shell.

Access Linux Shell from OS ONE

Inside the Extreme OS ONE Linux shell, you can execute commands that do not require root permissions.



Note

For details on using Python commands to launch an interactive Python3 shell, see the *Extreme OS ONE SR Command Reference Guide*.

1. To access the Extreme OS ONE Linux shell, enter the **start-shell** command.

```
device# start-shell
[admin@device]#
```

2. Enter Linux commands and run scripts as needed. You can also run Extreme OS ONE commands from the Linux shell.

```
[admin@device]# cli_shell -c "show version"
```

- To exit the shell and return to the Extreme OS ONE CLI, enter **exit**.

```
[admin@device]# exit
exit
device#
```

Upon exiting, the following message appears and you return to the Extreme OS ONE CLI prompt.

```
exit
device#
```

Escalate Linux Permissions



Caution

A user with Extreme OS ONE Linux-shell root permissions can—unintentionally or maliciously—execute commands that can render the OS ONE inoperable.

Extreme OS ONE 22.2.2.0 enforces user awareness and authentication for privileged access in the start-shell using sudo, with a security warning banner and the current admin password of the user required each time.



Note

- Warning banner and password authentication are required for every sudo command.
- The sudo configuration has been updated to disable password caching, require authentication using the current admin password, and display a security banner each time a sudo command is run.
- To avoid the banner and repeated authentication prompts, enter a privileged Bash shell with sudo bash.

Follow this procedure to escalate Linux permissions.

- From the Extreme OS ONE CLI prompt, enter **start-shell** to access the Extreme OS ONE Linux shell.

```
device# start-shell
[admin@device]# sudo bash
*****
The linux shell access on this device is intended for diagnostics and
debugging purposes solely by the equipment vendor's trained engineers.
Improper use of the functionality made available through the linux shell
access could cause significant harm and disruption to the network operation.

Your use of the functionality made available through the linux shell access
is at your sole risk and you assume all liability resulting from such use.
The equipment vendor shall have no liability for any losses or damages
arising from or relating to linux shell access (and the functionality
enabled thereby) by anyone other than the equipment vendor's
authorized engineers.

Proceeding with the usage of linux shell access on this device explicitly
indicates your agreement to the terms of this disclaimer.
*****
Password:
[root@device]#
```

You can now execute commands that require root permissions.

2. To exit and return to the default Extreme OS ONE Linux shell, enter **exit**.

```
[root@device]# exit
exit
[admin@device]#
```

3. To exit the default Extreme OS ONE Linux shell and return to the Extreme OS ONE CLI, enter **exit**.

```
[admin@device]# exit
exit
device#
```

Save and Append Show Command Output to a File

1. Save the **show** command output to either config-file or tech-support file.

```
device# show running-config | append
FILENAME Name of the file
disk://config-file/<file-name>
disk://tech-support/<file-name>
```

2. Run the following command to check the copied file.

```
device# ls
config-file :
-rw-r--r--  3397   2025-10-31 16:00:19  __backup__
-rw-r--r--  699868 2025-11-05 13:21:37  mgmsvcs_scale
-rw-r--r--  1399782 2025-11-07 12:40:24  test.cfg
tech-support :
firmware :
coredumps :
iah :
drwxr-xr-x  4096   2025-10-31 14:43:11  efaboot
device#
```

The **show interface brief** command output is appended to the auth_status file.

Logs of Linux Shell Activities

By default, Extreme OS ONE logs you entering the OS ONE Linux shell, commands run in that shell, and logs you exiting from the Linux shell back to the Extreme OS ONE CLI.

Firmware Fullinstall Support

This topic outlines the step-by-step process for performing a full, clean install of the provided Extreme OS ONE firmware. The process safely removes existing partitions while preserving essential SSH and certification files.



Note

Ensure that you have a valid URL containing the appropriate Extreme OS ONE binary image.

Key Features

- Installation of firmware using the Extreme OS ONE CLI
- Deletion and creation of managed partition

- Replacement of current configuration with the default Extreme OS ONE settings
- Automatic preservation of SSH certification files

Event Log Messages

Event Type	Log Message
Pre-install event	Preparing Device for Fullinstall. This will take some time
Invalid image extension event	Fullinstall failed. Cannot be done on .app and .incr images
Successful validation event	Device ready for Fullinstall in %s. Device will reboot now.

Important Extreme OS ONE Configuration and Certificate Changes

Extreme OS ONE Configuration: Installing new firmware overwrites your current configuration with the default Extreme OS ONE settings. To preserve your existing configuration, back it up to an external server using **copy running-config file <external server details>** command. You can then restore it using **copy file <external server details> running-config** command.

Management Certificates: The following folders are automatically backed up and restored during the firmware installation. If you want to remove these certificate files, use the 'no-preserve' CLI option.

- /etc/ssh
- /var/data/cert-mgmt/ca-trust
- /var/data/cert-mgmt/app-cert
- /var/data/cert-mgmt/jwt
- /var/data/ztp

CLI Commands

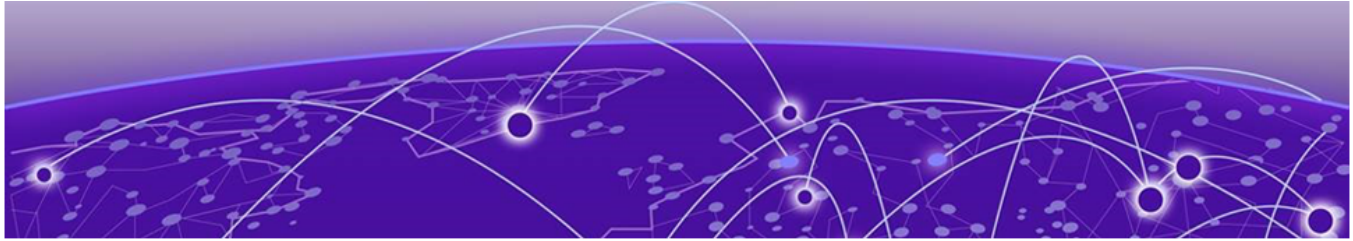
The following table describes CLI commands to complete the system firmware fullinstall:

Full Syntax	system firmware fullinstall <url path of firmware file>		
Parameter descriptions	Parameter	Type	Description
	URL	string	URL or Filepath of firmware. disk://firmware/ <filename> -OR- usb://<filename> -OR- scp[sftp]:// <username>:<password>@<host>[:port]/<filepath> [vrf vrf-name] -OR- http[https]: // [username:password@] <host>[:port]/ <filepath> [vrf vrf-name]
	no-preserve	optional argument	By default, it's preserved or optionally you can prefer not to preserve using optional parameter no-preserve. wherever applicable, modify this.
Command mode	exec mode		
Permissions & Validations	Admin user only		
Behavior description	<p>This command simulates the 'onie-nos-install' process for new Extreme OS ONE firmware. Here's what it does:</p> <ul style="list-style-type: none"> • Deletes all device partitions • Preserves management certification files by default (unless 'no-preserve' option is used) • Initiates new Extreme OS ONE firmware installation from ONIE • Restores SSH configuration file and necessary certification files 		

Help strings	<pre> 32d# system firmware commit Commit firmware version fullinstall Full Install firmware on switch rollback firmware version uninstall Uninstall App update Update firmware on switch 32d# system firmware fullinstall URL disk://firmware/<filename> -OR- usb://<filename> -OR- scp[sftp]:// <username>:<password>@<host>[:port]/<filepath> -OR- http[https]: //[username:password@]<host>[:port]/<filepath> 32d# system firmware fullinstall <image path> # system firmware fullinstall dis <cr> no-preserve Remove management certificates </pre>
Error messages	<pre> Fullinstall failed. Cannot be done on .app and .incr images. Firmware image validation failed. Invalid extension for <wrong image path> %Error: Vrf is applicable only for scp[sftp] and http[https]. </pre>
Related commands	show version, show firmware

Related PROTO files	<p>The following openconfig gNOI RPCs are used or supported:</p> <pre>rpc Activate(ActivateRequest) returns (ActivateResponse); rpc Verify(VerifyRequest) returns (VerifyResponse);</pre> <p>The following are the corresponding Request and Response messages:</p> <pre>// The ActivateRequest is sent by the Client to the Target to initiate a change // in the next bootable OS version that is to be used on the Target. // Dual Supervisor Target which requires installing the entire system with // one Install RPC MUST return NOT_SUPPORTED_ON_BACKUP error when requested // To Activate on standby Supervisor. message ActivateRequest { // The version that is required to be activated and optionally immediattely // booted. string version = 1; // For dual Supervisors setting this flag instructs the Target to perform the // action on the Standby Supervisor. bool standby_supervisor = 2; // If set to 'False' the Target will initiate the reboot process immediattely // after changing the next bootable OS version. // If set to 'True' a separate action to reboot the Target and start using // the activated OS version is required. This action CAN be executing // the gNOI.system.Reboot() RPC. bool no_reboot = 3; } // The ActivateResponse is sent from the Target to the Client in response to the // Activate RPC. It indicates the success of making the OS package version // active. message ActivateResponse { oneof response { ActivateOK activate_ok = 1; ActivateError activate_error = 2; } } // If the Target is already running the requested version in ActivateRequest, // then it replies with ActivateOK. If the Target has the OS package version // requested in ActivateRequest then it replies with ActivateOK and proceeds to // boot. // A dual Supervisor Target which requires installing the entire system with // one Install RPC, will activate the image on all Supervisors in response to // one Activate RPC. The Target should activate the image on both Supervisors // with the least impact possible to forwarding. //</pre>
----------------------------	--

	<pre> // On a dual Supervisor Target which requires one Install RPC per supervisor, // performing this RPC on the Active Supervisor triggers a switchover before // booting the (old)Active Supervisor. The Target should perform a switchover // with the least impact possible to forwarding. message ActivateOK { } message ActivateError { enum Type { // An unspecified error. Must use the detail value to describe the issue. UNSPECIFIED = 0; // There is no OS package with the version requested for activation. This is // also used for an empty version string. NON_EXISTENT_VERSION = 1; // Dual Supervisor Target which requires installing the entire system // with one Install RPC MUST return NOT_SUPPORTED_ON_BACKUP error when // requested to Activate on standby Supervisor. NOT_SUPPORTED_ON_BACKUP = 2; } Type type = 1; string detail = 2; } message VerifyRequest { } message VerifyResponse { // The OS version currently running. string version = 1; // Informational message describing fail details of the last boot. This MUST // be set when a newly transferred OS fails to boot and the system falls back // to the previously running OS version. It MUST be cleared whenever the // systems successfully boots the activated OS version. string activation_fail_message = 2; VerifyStandby verify_standby = 3; // Dual Supervisor Targets that require the Install/Activate/Verify process // executed once per supervisor reply with individual_supervisor_install set // to true bool individual_supervisor_install = 4; } </pre>
<p>Example output using gNOI</p>	<pre> \$ gnoic -a 192.x.x.x:4x3 -u admin -p <default password> --tls-ca ca.cert.pem os activate --version fullinstall-/var/data/disk/ firmware/OSOneSR-22.2.2.0.bin </pre>



TPVM IAH Extension

[Integrated Appliance Hosting \(IAH\)](#) on page 93

[Configure TPVM](#) on page 94

[Config CLI](#) on page 95

[Exec CLI or gNOI](#) on page 102

[Show or gNOI CLI](#) on page 104

[RASlog Errors or Logs](#) on page 107

Use this topic to learn about the TPVM IAH Extension.

Integrated Appliance Hosting (IAH)

IAH is a microservice in the Extreme OS ONE operating environment that manages the deployment and lifecycle of virtual appliances (preconfigured VMs). It supports open, non-proprietary VMs, allowing customers to run third-party workloads directly on the switch. IAH is built on a microservices architecture and utilizes KVM (Kernel-based Virtual Machine) for full virtualization.

Key features include:

- Deploy and manage virtual appliances
- Support for fully open VMs
- Run third-party VM-based workloads on the switch
- Eliminates the need for dedicated servers in data centers
- Leverages Qemu for machine emulation and virtualization
- Libvirt API for virtualization management
- Libvirtd daemon for managing VM activities
- Virsh command-line interface for VM management
- Passthrough mechanism for assigning physical devices to VMs

You can use IAH in the following scenario:

- Data analytics applications
- Traffic monitoring applications
- Network troubleshooting applications
- EFA and XCO applications running as VMs
- Other customer-specific applications

Configure TPVM

To utilize TPVM features and configuration CLIs, ensure the following:

- Set VM Name: The virtual machine name must be set to "TPVM".
- Copy Image: Copy the TPVM image to disk://iah/ using SCP before starting the deployment process.

```
device# copy file scp://xxx@<ip-addr>:/tmp/tpvm-4.7.6-0.amd64.deb file disk://iah/
```

Follow this procedure to configure TPVM.

For details on command syntax and parameters for TPVM configuration and management, see the *Extreme OS ONE SR Command Reference Guide*.

1. Download TPVM software.

```
# copy file <scp_url> file disk://iah/tpvm-4.7.1-0.amd64.deb
```

2. Download the LDAP CA CERT files for the system.

```
# copy file <scp_url> file LDAP_CA_CERT_FILE
```

3. Create a default IAH VM configuration named "TPVM" with CPU:=4, RAM:=8GB, and DISKS.

```
# iah import TPVM tpvm disk://iah/tpvm-4.7.1-0.amd64.deb
```

4. Verify VM configuration.

```
# show iah vm TPVM
```

5. Verify VM configuration details.

```
# show iah vm TPVM details
```

6. Switch to configuration mode.

```
# conf terminal
```

7. Access IAH configuration mode.

```
device(config)# iah
```

8. Configure the IAH TPVM configuration block.

```
device(config-iah)# vm TPVM
```

9. Example configuration to update CPU settings.

```
device(config-iah-vm-TPVM)# cpu 4
```

10. Example configuration to update RAM settings.

```
device(config-iah-vm-TPVM)# ram 6000
```

11. Set the hostname.

```
device(config-iah-vm-TPVM)# hostname ganga
```

12. Set the timezone.

```
device(config-iah-vm-TPVM)# timezone Africa/Casablanca
```

13. Set the password (default user: TPVM, sudo user: extreme).

```
device(config-iah-vm-TPVM)# password myPassPhrase
```

14. Configure any other supported attributes.

```
device(config-iah-vm-TPVM)# ...
```

15. Activate TPVM management network (can be done pre- or post-deployment).

```
device(config-iah-vm-TPVM)# activate-network
```

16. Example configuration for editing disk settings.

```
device(config-iah-vm-TPVM)# disk ...
```

17. Deploy the configuration.

```
device(config)# iah
device(config-iah)# vm TPVM
device(config-iah-vm-TPVM)# deploy
```

18. Set IPv4 address and gateway.

```
device(config-iah-vm-TPVM)# interface management ipv4 2.2.2.2/24 gw 2.2.2.1
```

19. Change the hostname.

```
device(config-iah-vm-TPVM)# hostname tpvmdut
```

20. Add or update NTP servers.

```
device(config-iah-vm-TPVM)# ntp 20.21.22.23
```

21. Update password.

```
device(config-iah-vm-TPVM)# password $6$abcd$fewofnawfnoawfnqof
```

22. Access TPVM console.

```
device# iah vm console TPVM
```

- a. Shutdown TPVM.

```
device# iah vm shutdown TPVM
```

- b. Start TPVM.

```
device# iah vm start TPVM
```

- c. Reboot TPVM

```
device# iah vm reboot TPVM
```

Config CLI

Use this topic to learn about comprehensive overview of Config CLI and gNMI examples for the TPVM feature in IAH.

OS ONE IAH Equivalence

1. IAH allows configuration for certain attributes. For extended TPVM support, additional configurable attributes are available under the sub container "tpvm".

Config Mode – There are two configuration modes. But OS ONE IAH **Console CLI** hides this complexity for better user experience. Whereas the gNMI client must use the correct keypath.

The following table shows the command list structured according to the configuration mode and key path:

IAH Config Attributes (for any vm Name)	IAH Config TPVM Extension Attributes (only for vm Name == TPVM)
a. vm name b. vm description c. cpus d. ram e. autoboot f. pwless (<i>implicit</i>) g. active-network h. network :: mac i. enable j. disks :: disk k. insight / internal	a. hostname b. timezone c. password d. ethifs :: dhcp ipv4/ipv6 address gw address e. dns f. ntp (up to 5) g. ldap h. ldap ca-cert i. trusted-peer

2. IAH Config Attributes (for any vm Name)

- Console cmd

```
device# conf terminalONEOS(config)# iah
device(config-iah)# vm TPVM
device(config-iah-vm-TPVM)#
device# conf ter
device(config)# iah

device(config-iah)# no vm TPVM
```

- gNMI keypath

```
/system/iah/vms/vm[name=TPVM]/config/name:::string:::TPVM
no form:
/system/iah/vms/vm[name=TPVM]/config/name
```

3. IAH Config Attributes (for any vm Name)

- Console cmd

```
device# conf ter
device(config)# iah
device(config-iah)# vm TPVM
device(config-iah-vm-TPVM)# deploy

device# conf ter
device(config)# iah
device(config-iah)# vm TPVM
device(config-iah-vm-TPVM)# no deploy
```

- gNMI keypath

```
/system/iah/vms/vm[name=TPVM]/config/deploy:::bool:::true
no form:
/system/iah/vms/vm[name=TPVM]/config/deploy:::bool:::false
```

4. Not Applicable. The following information should be sufficient:

```
device(config-iah-vm-TPVM)# no deploy (or)
device(config-iah)# no vm TPVM
```

5. Not Applicable.

OS ONE also provides implicit password-less access for "extreme@TPVM".

6. Implicit for OS ONE.

OS ONE has this configuration in place, rendering it unnecessary for XCO.



Note

To ensure all ports are properly initialized and configured, OS ONE restarts TPVM on every reboot due to libvirtd.

- IAH Config Attributes (for any vm Name)

- Console cmd

```
device# conf ter
device(config)# iah
device(config-iah)# vm TPVM
device(config-iah-vm-TPVM)# auto-boot

device# conf ter
device(config)# iah
device(config-iah)# vm TPVM
device(config-iah-vm-TPVM)# no auto-boot
```

- gNMI keypath

```
/system/iah/vms/vm[name=TPVM]/config/auto-boot:::bool:::true

no form:
/system/iah/vms/vm[name=TPVM]/config/auto-boot:::bool:::false
```

7. When deploying TPVM for XCO, the /apps directory is automatically created and mounted. If a specific size is required, you can utilize the following method:

- IAH Config Attributes (for any vm Name)

- Console cmd

```
device# show running-config iah
iah
  vm Ubuntu1
    description Ubuntu demo vm
    auto-boot true
    activate-network
    cpus 1
    ram 1024
    disk sda
      size 5000
      format qcow2
      bus sata
f      ile disk://iah/disk1.qcow2
      !
      network nic2
      interface management 0
      !
!
!
```

- gNMI keypath

```
/system/iah/vms/vm[name=TPVM]/disks/disk[name=sda]/config/name:::string:::sda
/system/iah/vms/vm[name=TPVM]/disks/disk[name=sda]/config/size:::uint32:::5000
/system/iah/vms/vm[name=TPVM]/disks/disk[name=sda]/config/file-format:::
string:::qcow2
/system/iah/vms/vm[name=TPVM]/disks/disk[name=sda]/config/bus-
type:::string:::virtio/system/iah/vms/vm[name=TPVM]/disks/disk[name=sda]/config/
source-file:::string:::efaApps.qcow2
```

8. IAH Config Attributes (for any vm Name)

- Console cmd

```
device# conf ter
device(config)# iah
device(config-iah)# vm TPVM
device(config-iah-vm-TPVM)# activate-network
NO form is not applicable for this configuration
```

- gNMI keypath

```
/system/iah/vms/vm[name=TPVM]/config/activate-network:::bool:::true
no form: NA
```

9. IAH Config Attributes (for any vm Name)

- Console cmd

```
device# conf ter
device(config)# iah
device(config-iah)# vm TPVM
device(config-iah-vm-TPVM)# password myPassPhrase

device# conf ter
device(config)# iah
device(config-iah)# vm TPVM
device(config-iah-vm-TPVM)# no password
```

- gNMI keypath

```
/system/iah/vms/vm[name=TPVM]/tpvm/config/password:::string:::myPassPhraseno form:
/system/iah/vms/vm[name=TPVM]/tpvm/config/password
```

10. IAH Syntax:

```
[no] interface management ipv4 { dhcp | {<ipv4>/m [gw <ipv4>]}
[no] interface management ipv6 { dhcp | {<ipv6>/m [gw <ipv6>]}
```

IAH Config Attributes (for any vm Name)

- Console cmd

```
device# conf ter
device(config)# iah
device(config-iah)# vm TPVM
device(config-iah-vm-TPVM)# interface management ipv4 2.2.2.2/24
or
device(config-iah-vm-TPVM)# interface management ipv4 2.2.2.2/24 gw 2.2.2.1
or
device(config-iah-vm-TPVM)# interface management ipv4 dhcp
device# conf ter
device(config)# iah
device(config-iah)# vm TPVM
device(config-iah)# no interface management
device(config-iah-vm-TPVM)# no interface management ipv4
```

- gNMI keypath

```
/system/iah/vms/vm[name=TPVM]/tpvm/management/config/ipv4-addr:::string:::2.2.2.2/24
/system/iah/vms/vm[name=TPVM]/tpvm/management/config/ipv4-gw:::string:::2.2.2.1
/system/iah/vms/vm[name=TPVM]/tpvm/management/config/dhcp4:::bool:::true
no form:
/system/iah/vms/vm[name=TPVM]/tpvm/management/config/ipv4-addr/system/iah/vms/
vm[name=TPVM]/tpvm/management/config/ipv4-gw
```

11. Not Applicable

- OS ONE Switching and Routing – When RME is configured, it utilizes the insight/ internal port, making it unavailable for other insight or internal purposes.

12. Configure the internal port for TPVM usage.

- Deploy a VM with the following specifications:
 - CPU: 3 vCPUs
 - RAM: 1 GB
 - Disk Space: 10 GB
 - Disk Image: QCOW2
 - Disk Bus Type: SATA
 - Auto-start VM on host reboot
- Complete the following network configuration:
 - Attach 1 management port
 - Attach 1 insight/internal port

```

device# conf t
device(config)# iah
device(config-iah)# vm ubuntu ← Name of the VM
device(config-iah-vm-ubuntu)# cpus 3
device(config-iah-vm-ubuntu)# ram 1024
device(config-iah-vm-ubuntu)# autostart
device(config-iah-vm-ubuntu)# description this is a ubuntu VM ← description
text.
device(config-iah-vm-ubuntu)# disk sda
device(config-iah-vm-disk-sda)# file disk://iah/ubuntu.qcow2 ← disk image file
should be downloaded to the /var/data/disk/iah/ before
device(config-iah-vm-disk-sda)# bus sata
device(config-iah-vm-disk-sda)# ex
device(config-iah-vm-ubuntu)# network nic1
device(config-iah-vm-network-nic1)# interface management 0
device(config-iah-vm-network-nic1)# ex
device(config-iah-vm-ubuntu)# network nic2
device(config-iah-vm-network-nic2)# interface internal 0
device(config-iah-vm-network-nic2)# ex
device(config-iah-vm-ubuntu)# deploy
device(config-iah-vm-ubuntu)# end
device# show iah vm ubuntu
device# iah vm console ubuntu
Connected to domain 'ubuntu'
Escape character is ^x (Ctrl + x) □ press control and X to exit VM console
.....
root@ubuntu-vm:~#
Closing console connection for VM: ubuntu
device#

```

13. IAH Config Attributes (for any vm Name)

- Console cmd

```

device# conf ter
device(config)# iah
device(config-iah)# vm TPVM
device(config-iah-vm-TPVM)# hostname ganga

device# conf ter
device(config)# iah
device(config-iah)# vm TPVM
device(config-iah-vm-TPVM)# no hostname

```

- gNMI keypath

```

/system/iah/vms/vm[name=TPVM]/tpvm/config/hostname:::string:::ganga
no form:
/system/iah/vms/vm[name=TPVM]/tpvm/config/hostname

```

14. IAH Config Attributes (for any vm Name)

- Console cmd

```
device# conf ter
device(config)# iah
device(config-iah)# vm TPVM
device(config-iah-vm-TPVM)# timezone Africa/Casablanca
device# conf ter

device(config)# iah
device(config-iah)# vm TPVM
device(config-iah-vm-TPVM)# no timezone
```

- gNMI keypath

```
/system/iah/vms/vm[name=TPVM]/tpvm/management/config/ipv4-addr:::string:::2.2.2.2/24
/system/iah/vms/vm[name=TPVM]/tpvm/management/config/ipv4-gw:::string:::2.2.2.1
/system/iah/vms/vm[name=TPVM]/tpvm/management/config/dhcp4:::bool:::true no form:
/system/iah/vms/vm[name=TPVM]/tpvm/management/config/ipv4-addr/system/iah/vms/
vm[name=TPVM]/tpvm/management/config/ipv4-gw
```

15. IAH

- Console cmd

```
device# conf ter
device(config)# iah
device(config-iah)# vm TPVM
device(config-iah-vm-TPVM)# dns primary-server 8.8.8.8 secondary-server 9.9.9.9
domain example.com
device(config-iah-vm-TPVM)# dns primary-server 8.8.8.8 secondary-server 9.9.9.9
device(config-iah-vm-TPVM)# dns primary-server 8.8.8.8
/* every set is a fresh set */
device# conf ter
device(config)# iah
device(config-iah)# vm TPVM
device(config-iah-vm-TPVM)# no dns - this will purge entire configuration
```

- gNMI keypath

```
/system/iah/vms/vm[name=TPVM]/tpvm/dns/config/primary-server:::string:::8.8.8.8/
system/iah/vms/vm[name=TPVM]/tpvm/dns/config/secondary-server:::string:::9.9.9.9/
system/iah/vms/vm[name=TPVM]/tpvm/dns/config/domain:::string:::example.com/*
/system/iah/vms/vm[name=TPVM]/tpvm/dns/config/apply */no form:
/system/iah/vms/vm[name=TPVM]/tpvm/dns
/system/iah/vms/vm[name=TPVM]/tpvm/dns/config/primary-server:::string:::8.8.8.8/
system/iah/vms/vm[name=TPVM]/tpvm/dns/config/secondary-server:::string:::9.9.9.9/
system/iah/vms/vm[name=TPVM]/tpvm/dns/config/domain:::string:::example.com
```

16. IAH Config Attributes (for any vm Name)

- Console cmd

```
device# conf ter
device(config)# iah
device(config-iah)# vm TPVM
device(config-iah-vm-TPVM)# ntp 1.1.1.1
device(config-iah-vm-TPVM)# ntp 2.2.2.2
device(config-iah-vm-TPVM)# ntp 3.3.3.3
device(config-iah-vm-TPVM)# ntp time.example.com
device(config-iah-vm-TPVM)# ntp 2001:db8::1
device# conf ter
device(config)# iah
device(config-iah)# vm TPVM
device(config-iah-vm-TPVM)# no ntp 3.3.3.3
device(config-iah-vm-TPVM)# no ntp - this will purge entire configuration
```

- gNMI keypath

```
/system/iah/vms/vm[name=TPVM]/tpvm/ntp/servers[server=1.1.1.1]/config/
server:::string:::1.1.1.1/system/iah/vms/vm[name=TPVM]/tpvm/ntp/
servers[server=2.2.2.2]/config/server:::string:::2.2.2.2/system/iah/vms/
vm[name=TPVM]/tpvm/ntp/servers[server=time.example.com]/config/
server:::string:::time.example.com/system/iah/vms/vm[name=TPVM]/tpvm/ntp/
servers[server=2001:db8::1]/config/server:::string:::2001:db8::1no form:
/system/iah/vms/vm[name=TPVM]/tpvm/ntp/servers[server=3.3.3.3]/config/server/
system/iah/vms/vm[name=TPVM]/tpvm/ntp
```

17. TPVM LDAP Host

- Console cmd

```
device# conf ter
device(config)# iah
device(config-iah)# vm TPVM

device(config-iah-vm-TPVM)# ldap host 1.2.3.4 basedn dc=ldap,dc=hc-fusion,dc=in \
                                rootdn cn=admin,dc=ldap,dc=hc-fusion,dc=in rootdnpw
pwdstring

device(config-iah-vm-TPVM)# ldap host 1.2.3.4 port 4000 basedn dc=ldap,dc=hc-
fusion,dc=in \
                                rootdn cn=admin,dc=ldap,dc=hc-fusion,dc=in rootdnpw
pwdstring
device(config-iah-vm-TPVM)# ldap host 1.2.3.4 port 4000 secure basedn dc=ldap,dc=hc-
fusion,dc=in \
                                rootdn cn=admin,dc=ldap,dc=hc-fusion,dc=in rootdnpw
pwdstring
/* every set is a fresh set */
device# conf ter
device(config)# iah
device(config-iah)# vm TPVM
device(config-iah-vm-TPVM)# no ldap
```

- gNMI keypath

```
/system/iah/vms/vm[name=TPVM]/tpvm/ldap/config/host:::string:::8.8.8.8/
system/iah/vms/vm[name=TPVM]/tpvm/ldap/config/port:::uint16:::4000/system/iah/vms/
vm[name=TPVM]/tpvm/ldap/config/secure:::bool:::true/system/iah/vms/vm[name=TPVM]/
tpvm/ldap/config/basedn:::string:::dc=ldap,dc=hc-fusion,dc=in/system/iah/vms/
vm[name=TPVM]/tpvm/ldap/config/rootdn:::string:::cn=admin,dc=ldap,dc=hc-
fusion,dc=in/system/iah/vms/vm[name=TPVM]/tpvm/ldap/config/
password:::string:::pwdstringno form:
/system/iah/vms/vm[name=TPVM]/tpvm/ldap/system/iah/vms/vm[name=TPVM]/tpvm/ldap/
config/basedn:::string:::dc=ldap,dc=hc-fusion,dc=in/system/iah/vms/vm[name=TPVM]/
tpvm/ldap/config/rootdn:::string:::cn=admin,dc=ldap,dc=hc-fusion,dc=in/
system/iah/vms/vm[name=TPVM]/tpvm/ldap/config/password:::string:::pwdstringno form:
/system/iah/vms/vm[name=TPVM]/tpvm/ldap
```

18. Download the TPVM LDAP CA certificates using SCP from a specified file location.

It is a **two steps process** as follows.



Note

You can specify the config attribute only using the filename. Perform the file copy operation using the COPY exec command. In the RMA use case, you can make the CERT file available on the host, and use the filename to place it on the TPVM. You can use the filename to place it at TPVM.

- a. Copy SCP URL to a file at host.

- b. Copy from host to TPVM (can be done directly).

19. IAH Config Attributes (for any vm Name)

- Console cmd

```
device# conf ter
device(config)# iah
device(config-iah)# vm TPVM

device(config-iah-vm-TPVM)# trusted-peer ipv4 1.2.3.4 password peerPwdStr sudo-user
peerUsrName/* every set is a fresh set */
device# conf ter
device(config)# iah
device(config-iah)# vm TPVM
device(config-iah-vm-TPVM)# no trusted-peer
```

- gNMI keypath

```
/system/iah/vms/vm[name=TPVM]/tpvm/trusted-peer/config/peer-
ip:::string:::8.8.8.8/system/iah/vms/vm[name=TPVM]/tpvm/trusted-peer/config/peer-
password:::string:::peerPwdStr/system/iah/vms/vm[name=TPVM]/tpvm/trusted-peer/
config/peer-sudoer:::bool:::peerUsrName no form:
/system/iah/vms/vm[name=TPVM]/tpvm/trusted-peer
```

Exec CLI or gNOI

Use this topic to learn about comprehensive overview of Exec CLI and gNOI examples for the TPVM feature in OS ONE IAH.

OS ONE IAH Equivalence

- Two step process:

Console CLI	gRPC
<p>Step 1: Download TPVM image.</p> <p>Syntax: copy file <URL> file <URL> [source-ip ADDRESS] [vrf VRF-NAME]</p> <pre>device# copy file scp://fvt:pray4green@192.x.x.x:/ / buildsjc/sre_fusion/Nightly/tpvm/ tpvm4.6.17/LATEST_BUILD/dist/ SWBD2900/tpvm-4.7.1-0.amd64.deb file disk://iah/ tpvm-4.7.1-0.amd64.deb vrf mgmt-vrf</pre> <p>Note: Src URL can be only scp/usb/file.</p>	<pre>service ConfigManagement { ... rpc CopyRunningToFile(CopyConfigRequest) returns (ConfigResponse) {}; ... }</pre>
<p>Step 2: Deploy new to upgrade.</p> <p>Syntax: iah vm <NAME> upgrade file <filename> [incremental snapshot]</p> <pre>device# iah vm TPVM upgrade file tpvm-4.7.1-0.amd64.deb device# iah vm TPVM upgrade file tpvm-4.7.1-0.amd64.deb \ snapshot device# iah vm TPVM upgrade file \ tpvm_inc_upg-4.6.17-1.amd64.deb incremental</pre>	<pre>rpc TpvmUpgrade(TpvmUpgradeReq) returns (TpvmUpgradeResp) {};</pre>

- IAH may have multiple PTM files. Displays all the PTM files by default, or displays specified file if argument is given.

Console CLI	gRPC
<p>Syntax:</p> <pre>iah fileinfo IMAGE_FILENAME IMAGE_FILENAME := disk://iah/ FILENAME FILENAME := <any_valid_filename_string></pre> <p>For TPVM debian file, this command validates the available file, filename, size, and version using Debian Meta.</p> <p>Prefix disk://iah optional. When absolute path is not provided, it will look in the disk://iah folder.</p>	<pre>rpc IahFileInfo(IahFileInfoReq) returns (IahFileInfoResp) {};</pre>

Console CLI	gRPC
Syntax iah vm TPVM snapshot create iah vm TPVM snapshot create withefa iah vm TPVM snapshot revert iah vm TPVM snapshot delete	<pre>// VM snapshot RPC rpc VmSnapshot(VmSnapshotReq) returns (VmSnapshotResp) {}</pre>

4. **syntax:** iah vm < start | shutdown | poweroff | reboot | suspend | resume > <NAME>

Console CLI	gRPC
Syntax: iah vm <NAME> start iah vm <NAME> stop	<pre>VmControlCommand(VmControlcommandReq) returns (VmControlCommandResp) {}</pre>

5. **Syntax:** iah vm <NAME> console
 iah vm TPVM console
6. Not Applicable (use COPY command)
7. Not Applicable. Refer "no vm Name" or "no deploy".
8. This is an Exec CLI. It is prerequisite step in IAH, which assist to prefill few Computing Defaults Config like CPU/RAM/DISK, before "deploy".This allows you to review these defaults and if required alter them before the deployment.

Console CLI	gRPC
Syntax: iah vm TPVM import <ova/tpvm> <FILE> device(config)# iah import TPVM tpvm disk://iah/ tpvm-4.7.1-0.amd64.deb	<pre>rpc VmImport(VmImportReq) returns (VmImportResp) {}</pre>

Show or gNOI CLI

Use this topic to learn about a summary of show or gNOI CLI examples for the TPVM feature in IAH for OS ONE.

OS ONE IAH Equivalence

1. Syntax: **show running-config iah**

Example: **show running-config iah**

Console CLI

- Sample output

```
device# show running-config iah
iah
  vm Ubuntu1
    description Ubuntu demo vm
    Auto-boot true
    activate-network
    cpus 1
```

```

    ram 1024
    disk sda
      size 1000
      format qcow2
      bus sata
      file disk://iah/disk1.qcow2
    !
    network vmmgmt
      interface management 0
      mac 11:22:33:44:55:00
    !
  !
!
```

- Fetch Config Data

The running configuration retrieves data from the Config DB (CDB), so the key path used is same to the one used during initial configuration.

```
/system/iah/vms/vm[name=TPVM]/...
```

Example: Get Time Zone - configured data

```
/system/iah/vms/vm[name=TPVM]/tpvm/config/timezone
```

2. Console CLI

- Example output

```

device# show iah vm all

Number of virtual machines: 2
Name: B
  disk: sda
    size: 5000 MB
    file: flash://iah/ubuntu-disk1.qcow2
    file format: QCOW2
    bus type: SATA
  network: 1
    interface: management 0
    connector-type: MANAGEMENT
    mac: e4:44:e5:08:ac:00
device#

device# show iah vm TPVM

Name: TPVM
  deploy-status: PERSONALITY_CONFIG_SUCCESS
  vm-status: RUNNING
  auto-boot: enabled
  activate-network: enabled
  TPVM:
    version: 4.7.9
    ssh-passwordless: enabled
device#

device# show iah vm TPVM details

show iah vm TPVM details
Name: TPVM
  deploy-status: PERSONALITY_CONFIG_SUCCESS
  vm-status: RUNNING
  last-error: -
  description: TPVM
  auto-boot: enabled
  activate-network: enabled
  cpus: 2
```

```

ram: 4096 MiB
disk: sda
  size: 10240 MB
  file: /mnt/onl/iah/images/TPVM/sda.qcow2
  file format: qcow2
  bus type: virtio
disk: sdb
  size: 40960 MB
  file: /mnt/onl/iah/images/TPVM/sdb.qcow2
  file format: qcow2
  bus type: virtio
disk: hda
  size: 1 MB
  file: /mnt/onl/iah/images/TPVM/hda.raw
  file format: raw
  bus type: ide
network: mgmt0
  interface: management 0
  connector-type: MANAGEMENT
  mac: 40:88:2f:fa:78:05
TPVM:
  hostname: TPVM-TD3-2
  user: extreme
  timezone: Asia/Kolkata
  version: 4.7.9
  ssh-passwordless: enabled
  ipaddress: 10.38.65.43/24
  gateway: 10.38.65.1
  ipv6address: -
  gatewayv6: -
  ntp:
    server: 10.64.12.81
device#

```

- Fetch Operational Data

Operational data for each configurable attribute is retrieved from the State DB (SDB), using the same key path as initial config, but with the 'state' keyword instead.

```

/system/iah/vms/vm[name=TPVM] /...

Example: Get Time Zone - operational data

/system/iah/vms/vm[name=TPVM]/tpvm/state/timezone

```

- List of important non-config attributes

- AH VM - deploy-status

```
/system/iah/vms/vm[name=TPVM]/state/deploy-status
```

- AH VM - vmstatus

```
/system/iah/vms/vm[name=TPVM]/state/vm-status
```

- IAH VM Last Oper Error - error

```
/system/iah/vms/vm[name=TPVM]/state/error
```

- TPVM Version

```
/system/iah/vms/vm[name=TPVM]/tpvm/state/version
```

- Snapshot

```
/system/iah/vms/vm[name=TPVM]/snapshot/state/version /  
system/iah/vms/vm[name=TPVM]/snapshot/state/time /system/iah/vms/  
vm[name=TPVM]/snapshot/state/size /system/iah/vms/vm[name=TPVM]/  
snapshot/state/description
```

RASlog Errors or Logs

Use this topic to learn about the CLI examples for the TPVM feature in IAH for OS ONE.

OS ONE IAH Equivalence

The IAH RASlogs is simplified to focus on key events, such as Operation start, Operation completion, and Operation failure (with reason and error details).

This approach provides following benefits:

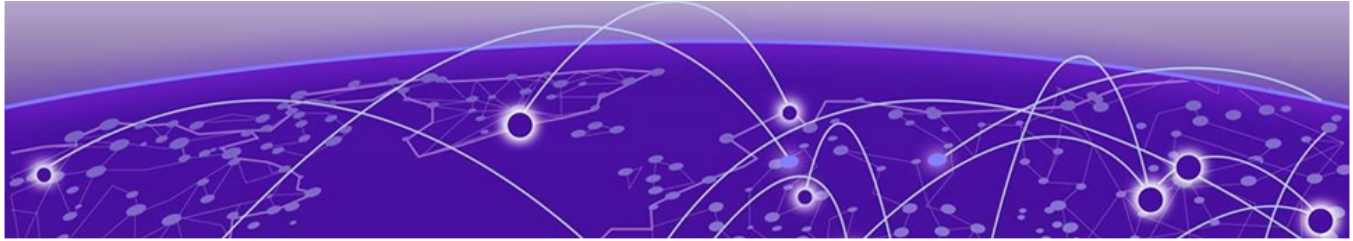
- XCO doesn't need to integrate new RASlog IDs
- Fixed string fields for operation names
- Evolving reason fields for detailed error information

The proposed RASlog IDs are:

- 27037: Operation started (VM name, operation, bid)
- 27038: Operation completed (VM name, operation, bid)
- 7039: Operation failed (VM name, operation, bid, VM status, reason)

The bid (Internal Transaction Counter ID) helps track transactions and matches them with SupportSave data and timestamps.

IAH uses OS ONE COPY command for TPVM download related RASlogs.



Network Time Protocol and Clock Management

[Network Time Protocol](#) on page 108

[Configure NTP](#) on page 110

[Display NTP Server Status](#) on page 111

Network Time Protocol

Network Time Protocol (NTP) maintains uniform time across all devices in a network. The NTP commands support the configuration of an external time server to maintain synchronization among all local clocks in a network.

To keep the time in your network current, it is recommended that each device have its time synchronized with at least one external NTP server.

NTP Features

- Uses Coordinated Universal Time (UTC) to synchronize CPU clock time
- Avoids vulnerabilities in information exchange communication
- Can configure up to eight servers and eight peers to synchronize system clock
- Supports in-band configuration with VRF mapping to the NTP service

Date and Time Settings

Extreme devices maintain the current date and time inside a battery-backed real-time clock (RTC) circuit. Date and time are used for logging events. Device operation does not depend on the date and time; a device with incorrect date and time settings can function correctly. However, because the date and time are used for logging, error detection, and troubleshooting, you should set them correctly.

Time Zone Settings

The time zone settings have the following characteristics:

- The setting automatically adjusts for Daylight Savings Time.
- Changing the time zone on a device updates the local time zone setup and is reflected in local time calculations.

- Default NTP configuration is not present.
- System services that have already started will reflect the time zone changes only after the next reboot.
- Time zone settings persist across failover for high availability.
- Time zone settings are not affected by NTP server synchronization.

Network Time Protocol Server

Use the Network Time Protocol server to obtain the correct time from an external time source and adjust the local time in each connected device. When you enable an NTP server functionality, the NTP server starts listening on the NTP port for client requests and responds with the reference time. You can configure up to eight server addresses in IPv4 or IPv6 format. When multiple NTP server addresses are configured, the NTP algorithm finds the most reliable server and uses this as the active NTP server. If there are no reachable time servers, then the local device time becomes the default time until a new active time server is configured. If an NTP server loses synchronization, it will operate in master mode to serve time using the local clock.

The NTP server is stateless and does not maintain NTP client information. Network time synchronization is guaranteed only when a common external time server is used by all devices.



Important

Although time-stepping corrects a large offset after a reload, as a best practice do not manually change the time after NTP synchronization.

Network Time Protocol Client

The NTP client maintains the server and peer state information as an association. The server and peer association is mobilized at startup, or after it has been configured. A statically configured server/peer association is not demobilized unless the configuration is removed/changed. A symmetric passive association is mobilized upon the arrival of an NTP packet from a peer which is not statically configured. This type of association is demobilized on error or timeout.

The NTP client operation can be summarized as follows:

1. The device is booted and the system initializes. The configured servers and peers are polled at the configured poll interval. Additional dynamically discovered servers/peers are also polled.
2. Multiple samples of server/peer times in the NTP packet are added to and maintained in the association database.
3. The selection, cluster, and combine algorithms choose the most accurate and reliable server/peer as system peer.



Note

See the RFC 5905.

4. Use the reference time from the system peer for system time synchronisation.
5. The NTP client increases the poll interval from the minimum poll interval to the maximum poll interval value after the clock stabilizes.

After the system peer is chosen, the system time is synchronized using one of the following ways:

- If the system time differs from the system peer by less than 128 milliseconds, then the system clock is adjusted slowly towards the system peer time reference.
- If the system time differs from the system peer by greater than 128 milliseconds, then the system clock is stepped to the system peer reference time. The old, time-related information stored in the server/peer association database is cleared.

Network Time Protocol Associations

The following modes are the NTP polling based associations:

1. NTP server
2. NTP client
3. NTP peer

NTP Server

The Server mode requires no prior client configuration; it responds to Client mode NTP packets. Use the **enable** command to set the device to operate in server mode. Use the **no enable** command to ensure NTP is configured in server mode.

NTP Client

When the system is operating in Client mode, all configured NTP servers and peers are polled. The device selects a host from all the polled NTP Servers from which to synchronize. To configure the NTP servers and peers individually, use the **server** and **peer** commands.

NTP Peer

NTP Peer mode is intended for configurations where a group of devices operate as mutual backup for one another. If one device loses a reference source, the time values flow from the remaining peers.

Configure NTP

The date and time are set in privileged EXEC mode and only have to be configured once per device because the value is written to nonvolatile memory. After the basic time information is set up, an NTP server is configured to allow the local time to be synchronized across the network.

1. Enter global configuration mode.

```
device# configure terminal
```

2. Synchronize the local time with an external source.

```
device(config)# system
device(config-system)# ntp
```

```
device(config-system-ntp)# enable
device(config-system-ntp)# vrf mgmt-vrf
device(config-system-ntp)# server 2.2.2.2
device(config-system-ntp)# peer 3.3.3.3
device(config-system-ntp)#
```

3. Exit to privileged EXEC mode.

```
device(config-system-ntp)# exit
device(config-system)# exit
device(config)# exit
```

4. Display the active NTP server IP address.

```
//Before enabling

device# show ntp status
Clock is unsynchronized, no reference clock
NTP client mode is disabled

//After time sync-up

device# show ntp status
Clock is synchronized, stratum 3, reference clock is 5.xx.xx.xx,
precision is -23,
reference time is e807413e.bf1abdc2 Thu, May 11 2023 10:26:06.746,
clock offset is +0.000000, root delay is 74.781,
root dispersion is 190.533, peer dispersion is 20579,
NTP client mode is enabled
```

Display NTP Server Status

You can verify the NTP server status. When an NTP server has been configured, the server IP address is displayed. If an NTP server is not configured or the server is unreachable, the output displays LOCL (for local device time).

NTP Server Status When an NTP Server is Not Configured

When an NTP server is not configured, the device will work with local time and the NTP status will display as shown below:

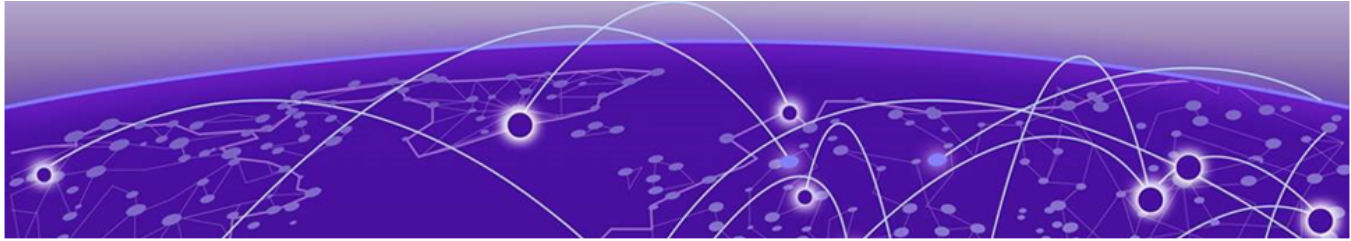
```
device# show ntp status
Clock is unsynchronized, no reference clock
NTP client mode is disabled

device#
```

NTP Server Status When an NTP Server is Configured

The following example shows the status of a configured NTP server:

```
device# show ntp status
Clock is synchronized, stratum 3, reference clock is 198.51.100.0,
precision is -23,
reference time is eb72b61a.4f9fbefd Wed, Mar 5 2025 11:38:02.311,
clock offset is +0.000000, root delay is 64.599,
root dispersion is 33.446, peer dispersion is 60510,
NTP client mode is enabled (VRF: mgmt-vrf)
device#
```



SNMP

[How SNMP Monitors Network Devices](#) on page 112

[Configure SNMPv2](#) on page 115

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How SNMP Monitors Network Devices

Simple Network Management Protocol (SNMP) is a set of application layer protocols for exchanging management information between network devices.

SNMP enables you to monitor and manage devices on a network by sending and receiving messages, known as protocol data units (PDUs). These messages, called SNMP Get-Requests, allow you to track specific data values.

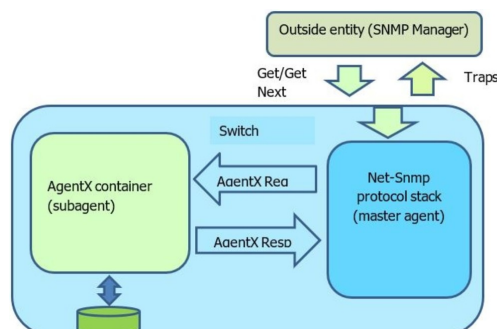
The SNMP server on the Extreme Networks device supports SNMP version 1 (SNMPv1), SNMP version 2 (SNMPv2), and SNMP version 3 (SNMPv3).

You can retrieve data from devices in the following two ways using Get/GetNext requests, supporting both IPv4 and IPv6 device addresses:

1. SNMP v1/v2c: Using a community string to authenticate.
2. SNMP v3: Using a username, authentication password (MD5/SHA), and encryption password (AES/DES) for secure authentication and data encryption.

SNMP Traps are alert messages sent from SNMP-enabled devices to a central collector (SNMP manager), notifying it of significant issues and events. An open-source 'net-snmp' protocol stack provides the SNMP support in Extreme OS ONE.

The 'agentx subagent' container collects required MIB data from the state database (and other feature services if needed) and feeds it to the 'net-snmp' protocol stack.



Network management using SNMP requires three components:

- **SNMP manager**—Typically, network management systems (NMS) manage networks by monitoring the network parameters, and optionally, setting parameters in managed devices. The SNMP manager communicates to the devices within a network using the SNMP protocol.
- **SNMP agent**—Software that resides in the managed devices in the network, and collects and stores data from these devices. Each device hosts an SNMP agent. The agent receives requests from the SNMP manager and responds with the requested data. In addition, the agent can asynchronously alert the SNMP manager about events by using special PDUs called traps.
- **Management Information Base (MIB)**—Hierarchical database where SNMP agents in the managed devices store the data about these devices. The MIB is structured on the standard specified in the RFC 2578 [Structure of Management Information Version 2 (SMIv2)].

An SNMP manager can issue read operations to retrieve and use the MIB objects to manage and monitor devices on the network. However, the MIB structure determines the scope of management access allowed by a device.

Support for Get/GetNext operations is provided for the following MIBs:

- IF-MIB: Interfaces (1.3.6.1.2.1.2.2), ifXTable (1.3.6.1.2.1.31.1.1)
- SYSTEM-MIB(RFC1213): (1.3.6.1.2.1.1)
- ENTITY-MIB: entPhysicalTable (1.3.6.1.2.1.47.1.1.1.1)

The device supports the configuration of trap hosts as a trap recipient to receive traps and optionally receive SNMP communication through a VRF. You can configure the SNMP trap receiver by specifying its IPv4/IPv6 address or hostname/domain name. Ensure to configure the SNMPv3 trap using the existing SNMPv3 user configuration. The following generic traps are supported:

- ColdStart
- LinkUp
- LinkDown



Important

- SNMP SET operation is not supported.
- Performing an SNMPwalk on all MIBs may result in the message 'No more variables left in this MIB View' indicating the end of the MIB tree has been reached.

Inband management

SNMP server can be configured to run on multiple VRF instances. SNMP trap hosts can be configured to send traps to hosts through specific VRF and specific source-interface.

Basic SNMP Operation

Every Extreme device carries an *agent* and management information base (MIB), as shown in the figure [Figure 1](#). The agent accesses information about a device and makes it available to an SNMP network management station.

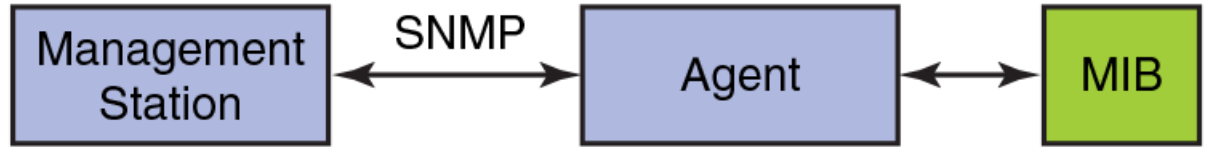


Figure 1: SNMP Structure

When active, the management station can "get" information when it queries an agent. SNMP commands, such as **get**, **getnext**, and **getresponse**, are sent from the management station, and the agent replies once the value is obtained or modified as shown in the figure [Figure 2](#). Agents use variables to report such data as the number of bytes and packets in and out of the device, or the number of broadcast messages sent and received. These variables are also known as managed objects. All managed objects are contained in a MIB.

The management station can also receive *traps*, unsolicited messages from the device agent if an unusual event occurs as shown in the next figure.



Figure 2: SNMP Trap

The agent can receive queries from one or more management stations and can send traps to up to six management stations.

SNMP Community Strings

You can use the community string to restrict the access of MIBs for SNMPv1 and SNMPv2c requests. You can configure a total of 256 read-only community strings on the device.

The software automatically hashes SNMP community strings.

By default, the community strings are displayed in hashed format in the running-config. However, you can configure the system to show them in plain text using the **unhide-secrets** CLI command.

SNMP Users

SNMP version 3 (RFC 2570 through 2575) introduces a User-Based Security model (RFC 2574) for authentication and privacy services. This model provides a user that

is associated with security information for authentication of its generated SNMP messages.

SNMP Server Hosts

For an SNMPv3 trap, you associate a SNMPv3 host with the SNMP users. When you specify the host, you also specify a community string for SNMPv1 and SNMPv2. The Extreme device sends all the SNMP traps to the specified hosts and includes the specified community string. Then, you can filter for traps from an Extreme device based on IP address or community string.

SNMP Source Interface

The specified interface acts as the source interface for SNMP trap. SNMP trap host can be configured for SNMP version 1, version 2, and version 3 per instance. If the source interface is not specified, the source IP address is the IP address of the interface through which packet exits device. If the source interface is modified (changing IP address), then it is reflected in the trap packets. Configured source interface IP address is not cached because the corresponding IP address can be modified. While sending out the SNMP trap packets to find the source IP address to use, the system checks and picks up the source interface configured. If an interface with no IP address is configured as the source interface, SNMP trap packets have the egress interface IP as the source IP.

The SNMP source interface supports the following interface types:

- Virtual routing interface
- Loopback interface
- Ethernet
- Port Channel

Configure SNMPv2

You can configure SNMP with user-defined VRF and source interface.

To configure SNMPv2, perform the following steps.

1. In privileged EXEC mode, enter global configuration mode.

```
device# configure terminal
device(config)#
```

2. Add an SNMP community string.

```
device(config)# system
device(config-system)# snmp-server DEFAULT
device(config-system-snmp-server)# community public
device(config-system-snmp-server)#
```

This example adds the extremero community string to access the MIBs for SNMPv2c requests.

3. Configure the SNMP trap host associated with community string.

```
device(config-system-snmp-server)# vrf mgmt-vrf
device(config-system-snmp-server-vrf-mgmt-vrf)# enable
device(config-system-snmp-server-vrf-mgmt-vrf)# host 192.168.1.1 public
device(config-system-snmp-server-vrf-mgmt-vrf-host-192.168.1.1-xxxx)# version 2c
```

```
device(config-system-snmp-server-vrf-rmgmt-vrf-host-192.168.1.1-xxxx)# udp-port 200
device(config-system-snmp-server-vrf-mgmt-vrf-host-192.168.1.1-xxxx)# source-interface
ethernet 0/1
device(config-system-snmp-server-vrf-mgmt-vrf-host-192.168.1.1-xxxx)
```

This example configures 192.x.x.x as a trap recipient with SNMPv2c on the target port 200 and associates the public community string.

4. Verify the configuration.

```
device(config-system-snmp-server)# do show running-config system snmp-server

system
 snmp-server DEFAULT
  vrf mgmt-vrf
  enable
  host 192.168.1.1 0ymX6XR7Za
  version 2c
  udp-port 200
  source-interface ethernet 0/1.0
  !
  !
  community-hashed 0ymX6XR7Za
  !
  !
device#
```

Configure SNMPv3

SNMPv3 uses SNMP users to restrict SNMP access. When you map an SNMP user to an SNMP group, you can restrict the access of MIBs for SNMP requests through an SNMP view.

You can configure SNMP with user-defined VRF and source interface.

To configure SNMPv3, perform the following steps.

1. In privileged EXEC mode, enter global configuration mode.

```
device(config-system)#
```

2. Configure the SNMP server.

```
device(config-system)# snmp-server DEFAULT
```

Only an SNMP server instance named DEFAULT is allowed in this release.

3. Add an SNMP user.

```
device(config-system-snmp-server)#user user1 auth noauth
device(config-system-snmp-server)#user user2 auth md5 auth-password Authkey@12 priv
nopriv
device(config-system-snmp-server)#user user3 auth sha auth-password AuthKey@12 priv
aes priv-password User1@privkey
device(config-system-snmp-server)#user user4 auth md5 auth-password-hashed
0x9f1626506dbd7540c8ce526070fb69f9
device(config-system-snmp-server)#user user5 auth md5 auth-password-
hashed 0x9f1626506dbd7540c8ce526070fb69f9 priv aes priv-password-hashed
0x9f1626506dbd7540c8ce526070fb69f9
```

This example adds the user2 user to access of MIBs for SNMPv3 requests. For SNMPv3 users, the passwords for **auth-password** and **priv-password** keywords are encrypted while storing to the persistent memory or displaying it back to the user. You can configure either with a plain-text password or an encrypted password.

In both cases, the **show running-config** command displays the passwords as encrypted.

4. Configure the SNMPv3 trap host associated with an SNMP user.

```
device# configure terminal
device(config)# system
device(config-system)# snmp-server DEFAULT
device(config-system-snmp-server)# community extremero
device(config-system-snmp-server)# vrf mgmt-vrf
device(config-system-snmp-server-vrf-mgmt-vrf)# enable
device(config-system-snmp-server-vrf-mgmt-vrf)# host 192.168.1.1 user3
device(config-system-snmp-server-vrf-mgmt-vrf-host-192.168.1.1-user3)# version 3
device(config-system-snmp-server-vrf-mgmt-vrf-host-192.168.1.1-user3)# udp-port 200
device(config-system-snmp-server-vrf-mgmt-vrf-host-192.168.1.1-user3)# source-interface
ethernet 0/1.0
device(config-system-snmp-server-vrf-mgmt-vrf-host-192.168.1.1-user3)
```

In this example, the trap host uses Ethernet interface 0/1.0 as the source interface, which determines the source IP address to be used while sending traps to the trap host:

5. Access privileged EXEC mode.

```
device(config-system)# exit
```

6. Verify the configuration.

```
device# show running-config system snmp-server
system
  snmp-server DEFAULT
  user user1 auth noauth
  user user2 auth md5 auth-password-hashed 0x9f1626506dbd7540c8ce526070fb69f9 priv
  nopriv
  user user3 auth md5 auth-password-hashed 0x9f1626506dbd7540c8ce526070fb69f9 priv
  aes priv-password-hashed 0x9f1626506dbd7540c8ce526070fb69f9
  user user4 auth md5 auth-password-hashed 0x9f1626506dbd7540c8ce526070fb69f9 priv
  nopriv
  user user5 auth md5 auth-password-hashed 0x9f1626506dbd7540c8ce526070fb69f9 priv
  aes priv-password-hashed 0x9f1626506dbd7540c8ce526070fb69f9
  community extremero
  vrf mgmt-vrf
  enable
  host 192.168.1.1 user3
  version 3
  udp-port 200
  source-interface ethernet 0/1.0
  !
  !
```

Supported MIBs

Extreme OS ONE supports standard and enterprise MIBs and traps. For a complete list and details, see the *Extreme OS ONE SR SNMP MIB Reference Guide*.



LLDP

[How Network Devices Use LLDP](#) on page 118

[Configuring and Managing LLDP](#) on page 122

How Network Devices Use LLDP

The IEEE 802.1AB Link Layer Discovery Protocol (LLDP) enhances the ability of network management tools to discover and maintain accurate network topologies and simplify LAN troubleshooting in multi-vendor environments. To efficiently and effectively operate the various devices in a LAN you must ensure the correct and valid configuration of the protocols and applications that are enabled on these devices. With Layer 2 networks expanding dramatically, it is difficult for you to statically monitor and configure each device in the network.

Using LLDP, network devices advertise information about themselves to other network devices and store the information they discover. Details such as device configuration, device capabilities, and device identification are advertised. LLDP defines the following:

- A common set of advertisement messages.
- A protocol for transmitting the advertisements.
- A method for storing the information contained in received advertisements.



Note

- LLDP runs over the data-link layer which allows two devices running different network layer protocols to learn about each other.
- Link Layer Discovery Protocol (LLDP) is enabled globally by default.

LLDP information is transmitted periodically and stored for a finite period. Every time a device receives an LLDP advertisement frame, it stores the information and initializes a timer. If the timer reaches the time to live (TTL) value, the LLDP device deletes the stored information ensuring that only valid and current LLDP information is stored in network devices and is available to network management systems.

Layer 2 Topology Mapping

As LLDP devices transmit and receive advertisements, the devices store information they discover about their neighbors. Advertisement data such as a neighbor's

management address, device type, and port identification is useful in determining what neighboring devices are in the network.

**Note**

The Extreme Networks LLDP implementation supports up to 64 neighbors per interface.

The higher level management tools, such as the Network Advisor, can query the LLDP information to draw Layer 2 physical topologies. The management tools can continue to query a neighboring device through the device's management address provided in the LLDP information exchange. As this process is repeated, the complete Layer 2 topology is mapped.

In LLDP the link discovery is achieved through the exchange of link-level information between two link partners. The link-level information is refreshed periodically to reflect any dynamic changes in link-level parameters. The basic format for exchanging information in LLDP is in the form of a type, length, value (TLV) field.

LLDP keeps a database for both local and remote configurations. The LLDP standard currently supports three categories of TLVs. The Extreme Networks LLDP implementation adds a proprietary Extreme Networks extension TLV set. The TLV sets are described in the following topics:

Basic Management TLV Set

This set provides information to map the Layer 2 topology and includes the following TLVs.

Chassis ID TLV

Provides the ID for the device where the port resides. Identifies the device transmitting the LLDP (Link Layer Discovery Protocol) frame. The Chassis ID TLV enables neighboring devices to uniquely identify the transmitting device, facilitating network discovery and management tasks. This is a mandatory TLV:

- Format
 - Type (7 bits): TLV type (typically 1 for Chassis ID)
 - Length (9 bits): Length of the TLV value field in bytes
 - Subtype (7 bits): Format or type of the Chassis ID
 - Chassis ID (Variable Length): Actual chassis identification data
- SubType Values
 - Chassis component type and number
 - Interface alias
 - Port component type and number
 - MAC address
 - Network address
 - Interface name

Port ID TLV

Provides a unique identifiable information of the port. The Port ID could be one of the following: MAC address, Network address, Interface name of the port. On the OS ONE, the interface name of the port is provided. The Port ID TLV enables neighboring devices to uniquely identify the transmitting port, facilitating network discovery, troubleshooting, and management tasks. This is a mandatory TLV.

This set provides information to map the Layer 2 topology and includes the following TLVs:

- Format
 - Type (7 bits): TLV type (typically 2 for Port ID)
 - Length (9 bits): Length of the TLV value field in bytes
 - Subtype (7 bits): Format or type of the Port ID
 - Port ID (Variable Length): Actual port identification data
- SubType Values
 - Interface alias
 - Port component type and number
 - MAC address
 - Network address
 - Interface name
 - Agent Circuit ID
 - Locally assigned value

Time to Live (TTL) TLV

Provides the remaining time for the information contained in the LLDPDU to be considered valid. The TTL TLV enables LLDP-enabled devices to manage the aging of received LLDP information, ensuring accurate network discovery and management by preventing stale information retention. This is a mandatory TLV.

- Format
 - Type (7 bits): TLV type (typically 3 for TTL TLV)
 - Length (9 bits): Length of the TLV value field in octets, typically 2 octets for TTL TLV
 - TTL (16 bits): Represents the time-to-live value in seconds, indicating the remaining time for the LLDPDU information to be considered valid

System Name TLV

Provides the system-assigned name in an alphanumeric format. The System Name TLV identifies the device transmitting the LLDP (Link Layer Discovery Protocol) frame. It provides a human-readable identifier for the device, simplifying network management, troubleshooting, and identification. This is an optional TLV.

- Format
 - Type (7 bits): Type (7 bits): TLV type (typically 2 for Port ID)
 - Length (9 bits): Length of the TLV value field (in octets)
 - System Name (Variable Length): Actual system name string

System Description TLV

Provides a description of the network entity in an alphanumeric format. This includes system name, hardware version, operating system, and supported networking software. It provides a textual description of a system, providing additional details such as model, manufacturer, firmware version, or capabilities. This TLV enables neighboring devices to access descriptive information about the transmitting device, facilitating network management, identification, and troubleshooting. This is an optional TLV.

- Format
 - Type (7 bits): Identifies the TLV type, typically set to 6 for System Description
 - Length (9 bits): Specifies the length of the TLV value field in bytes
 - System Description (Variable Length): Contains the actual system description string

Management Address TLV

Indicates the addresses of the local switch. Remote devices can use this address to obtain information related to the local switch. The Management Address TLV conveys network management addresses associated with the transmitting device, enabling remote management and monitoring. This TLV enables neighboring devices to obtain network management addresses, facilitating network management, monitoring, and troubleshooting. Additionally, you can configure the management address to be advertised via LLDP (Link Layer Discovery Protocol). This is an optional TLV.

- Format
 - Type (7 bits): Identifies the TLV type (typically 8 for Management Address TLV).
 - Length (9 bits): Specifies the TLV value field length in octets
 - Address Subtype (1 octet): Defines the management address type (e.g., IPv4, IPv6, MAC address)
 - Address Length (1 octet): Indicates the address data length in octets
 - Address (Variable Length): Contains the actual management address data

Port Description TLV

Provides a description of the port in an alphanumeric format. By providing a descriptive string, the Port Description TLV enables neighboring devices to obtain valuable information about the transmitting device's ports, facilitating network management and troubleshooting. This is an optional TLV.

- Format
 - Type (7 bits): Field indicating the TLV type. For Port Description TLV, the value is typically 4
 - Length (9 bits): Field specifying the length of the TLV value field in octets (bytes), including the port description string D
 - Description: Variable-length field containing the human-readable port description

Organizationally Defined TLV Set

Organizationally Defined TLVs are custom TLVs defined by specific organizations to convey proprietary or specialized information not covered by standard TLVs. These TLVs enable the transmission of custom data between LLDP-enabled devices within an organization's network.

- Format
 - Type (7 bits): TLV type (typically 127-255)
 - Length (9 bits): Length of the TLV value field in octets OUI (3 octets): Organizationally Unique Identifier assigned by the IEEE
 - Subtype (1 octet): Specific purpose or format of the custom TLV
 - Custom Data (Variable Length): Custom data specific to the organization
- Component
 - Type: 7-bit TLV type indicator
 - Length: 9-bit length indicator
 - OUI: 3-octet Organizationally Unique Identifier
 - Subtype: 1-octet subtype indicator

LLDP Configuration Guidelines and Restrictions

- The Extreme Networks implementation of LLDP supports standard LLDP information.
- Mandatory TLVs are always advertised.
- The exchange of LLDP link-level parameters is transparent to the other Layer 2 protocols. The LLDP link-level parameters are reported by LLDP to other interested protocols.

Configuring and Managing LLDP

The following sections discuss working with the Link Layer Discovery Protocol (LLDP) on Extreme Networks devices.

Understanding the Default LLDP

The following table lists the default LLDP configuration. Consider this when making changes to the defaults.

Table 5: Default LLDP Configuration

Parameter	Default setting
LLDP global state	Enabled
LLDP receive	Enabled
LLDP transmit	Enabled
Transmission frequency of LLDP updates	30 seconds
Hold time for receiving devices before discarding	120 seconds

Disable LLDP Globally

To globally disable LLDP, perform the following steps:

1. From privileged EXEC mode, access global configuration mode.

```
device# configure terminal
```

2. Disable LLDP globally.

```
device(config)# no protocol lldp
```

3. Verify LLDP global configuration.

```
device(config-lldp)# show running-config lldp
no protocol lldp
  system-description Extreme BR-Extreme 8730 Router
  disable
!
```

The following configuration is an example of the previous steps to disable LLDP.

```
device# configure terminal
device(config)# no protocol lldp
```

If required, re-enable LLDP.

```
device(config)# protocol lldp
```

Configuring LLDP Global Parameters

The following LLDP global parameters are available:

```
device (config)# lldp
device (config-lldp)#
  end                End current mode and change to enable mode
  exit               Exit current mode and down to parent mode
  hello-timer        LLDP hello-timer configuration in seconds
  holdtime           LLDP hold time configuration in seconds
  list               List all supported configuration commands
  management-address LLDP management IP address configuration
  no                 Negate a command or set its defaults
  pwd               Display current mode
  receive            Enable LLDP receive mode for all the ports
  suppress-tlv       Select lldp suppress TLVs
  transmit           Enable LLDP transmit mode for all the ports
```

Enabling and Disabling the Receiving and Transmitting of LLDP Frames

By default both transmit and receive for LLDP frames is enabled.

- The following example enables only receiving of LLDP frames.

```
device(config-lldp)# receive
```

- The following example enables only transmitting of LLDP frames.

```
device(config-lldp)# transmit
```

Configuring the Transmit Frequency of LLDP Frames

The default transmit frequency of LLDP frames is 30 seconds. You can change the frequency from 1 to 65535 seconds. The following example changes the frequency to 45 seconds.

```
device(config-lldp)# hello-timer 45
```

Configuring the Hold Time for Receiving Devices

The default hold time for storing peer information from LLDP packets is 30 seconds. The example below demonstrates how to modify this hold time to 60 seconds:

```
device(config-lldp)# holdtime 60
```

Advertising the Optional LLDP TLVs

By default, LLDP advertises the optional TLVs for management address, port description, system description, and system name. However, you can choose to suppress these TLVs. The following example illustrates how to suppress the management address and system description TLVs:

```
device(config-lldp)# suppress-tlv management-address system-description
```

Displaying LLDP Information

The **show lldp** command allows you to display the following information:

- LLDP status
- LLDP neighbor information
- LLDP statistics

Displaying LLDP Status

To display the global LLDP status, use the **show lldp** command.

```
device# show lldp
LLDP Config Info

Global LLDP Information:
Status: INACTIVE
LLDP advertisements are sent every 200 seconds
LLDP hold time is 120 seconds
LLDP transmit: Off
LLDP receive: On
LLDP Static Mgmtip: 1.1.1.1
LLDP Suppress Tlvs:

Interface LLDP Information:
Intf                State           Rx      Tx
-----
management 0         Enabled        On      On
ethernet 0/1        Disabled       On      On
ethernet 0/2        Disabled       On      On
ethernet 0/3        Disabled       On      On
ethernet 0/4        Disabled       On      On
ethernet 0/5        Disabled       On      On
ethernet 0/6        Disabled       On      On
ethernet 0/7        Disabled       On      On
ethernet 0/8        Disabled       On      On
ethernet 0/9        Disabled       On      On
ethernet 0/10       Disabled       On      On
ethernet 0/11       Disabled       On      On
ethernet 0/12       Disabled       On      On
ethernet 0/13       Enabled        On      On
```

To display LLDP status for an Ethernet interface, use the **show lldp interface ethernet** command.

```
device# show lldp interface ethernet 0/11:1
LLDP Interface Information:
-----

Interface: ethernet 0/11:1
Status: Enabled
Transmit: On
Receive: On
Static Mgmtip: Disabled
Suppressed Tlvs:
device#
```

Displaying LLDP Neighbor Information

To display the LLDP neighbor information, use the **show lldp neighbors** command. This command allows you to display the information for all Ethernet interfaces, a specific interface, or detailed neighbor information.

The following example displays the LLDP neighbor information for all interfaces.

```
device# show LLDP Neighbors Information

Chassis ID      Local-Port  Dead Intvl  Rem Life  Remote Port-ID  Remote Port Descr
System Name

Switch 2426    1/18       180        100      Ethernet0/26    LLDP-1            DUT-1
Switch 2426    1/22       120        50       Ethernet0/27    LLDP-2            DUT-2

Total entries displayed: 2
```

The following example displays detailed information about Ethernet interface 0/1-2 on neighbor devices discovered using LLDP:

```
show lldp neighbors interface ethernet 0/1-2

Capability codes:
  (R) Router, (B) Bridge, (T) Telephone, (C) DOCSIS Cable Device
  (W) WLAN Access Point, (P) Repeater, (S) Station, (O) Other

LLDP Interface: ethernet 0/1
Chassis id: 88f0.31f9.a340
Port id: ethernet 1/10
Local Port id: ethernet 0/1
Port Description: ethernet 1/10
System Name: Lab switch1
System Description: "ExtremeXOS (Summit) version
                    31.1.1.4 v311b4 by release-manager on Fri Feb 13 16:30:06 EST 2021"
Time remaining: 91 seconds
System Capabilities: B, R
Enabled Capabilities: B, R
Management Address: 10.77.143.43
Management Address IPV6: not advertised

LLDP Interface: ethernet 0/2
Chassis id: 88f0.31f9.a341
Port id: ethernet 1/11
Local Port id: ethernet 0/2
Port Description: ethernet 1/11
System Name: Lab switch 2
System Description: Cisco Nexus Operating System (NX-OS) Software 9.2(1) TAC support:
http://www.cisco.com/tac Copyright (c) 2002-2018, Cisco Systems, Inc. All rights reserved.
```

```

Time remaining: 85 seconds
System Capabilities: B, R
Enabled Capabilities: B, R
Management Address: 10.77.143.43
Management Address IPV6: not advertised
device#

```

Displaying LLDP Statistics

To display the LLDP statistics for all interfaces or a specific interface, use the **show counters lldp** command. The following example displays the statistics for Ethernet interface 0/18.

```

device#show counters lldp summary

LLDP Global Statistics:
    FrameIn: 110299
    FrameOut: 122258
    EntriesAgedOut: 0
    FrameDiscard: 0
    FrameErrorIn: 0
    TlvAccepted: 110299
    TlvDiscard: 0
    TlvUnknown: 16694
    LastClear: 0s

device# show counters lldp interface ethernet 0/1:1
LLDP Interface Statistics: ethernet 0/1:1
    FrameIn:
    FrameOut: 2250
    FrameDiscard:
    FrameErrorIn:
    FrameErrorOut:
    TlvDiscard:
    TlvUnknown:
    LastClear: 0s

```

Use the **show counters lldp interface ethernet all** command to display the statistics for all interfaces.

Clear LLDP-Related Information

To clear LLDP-related information, perform the following steps.

1. Clear the LLDP statistics on an interface.

```
device# clear counters lldp interface ethernet 0/2
```

This example clears the LLDP statistics for Ethernet interface 0/2.

2. Clear the LLDP statistics for all Ethernet interfaces.

```
device# clear counters lldp interface ethernet all
```

3. Clear all the LLDP statistics.

```
device# clear counters lldp all
device#
```



gNMI and gNOI

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How gNMI and gNOI Protocols Manage Networks

Extreme OS ONE platform supports gNMI, gNOI and gNSI (gRPC services).



Note

- Multiple gRPC server instances can be configured
- Each gRPC server instance can be configured to run with a unique combination of port, certificate and VRF
- Support the import of external certificates and associate them with the gRPC server instance.
- gNMI does not support Poll subscriptions.
- ONIE-install removes all certificates from the device. If you restore a previously backed-up configuration (like a gRPC server setup that uses a certificate), it will fail due to missing certificates. To resolve this, you must re-import or regenerate the required certificates before applying the configuration

Troubleshooting Information

- To enable gRPC services,
 - Ensure at least one gRPC server instance is configured and operational.

- Verify the gRPC server's status using the command `show running-state system grpc-server`.
- For issues with gNMI/gNOI clients,
 - Use open-source clients like `gnmic` with the `--debug` option for connection insights.
 - For proprietary clients, check error codes for issue understanding.

**Note**

Client-side context determines the gRPC client connection timeout if a gNMI client subscription doesn't consume the response for more than 10 seconds, then the gRPC subscription is cancelled.

- For device-level issues,
 - Check Service-level RasTrace logs in `show trace <service name>`.
 - Collect API Gateway, Security, and Ingress Gateway logs from this location.
 - View audit logs for configuration commands using `show logging audit config`.

gNMI Protocol

gNMI (gRPC Network Management Interface) is a modern network management protocol developed by the OpenConfig working group. It is designed to standardize the way network devices are configured and monitored, using efficient, secure, and scalable mechanisms. gNMI uses HTTP/2 as its transport protocol.

Key Features of gNMI

1. **Built on gRPC:** gNMI is built on top of gRPC (Google Remote Procedure Call), a high-performance, open-source RPC framework. gRPC uses a compact and efficient binary protocol (Protocol Buffers), which is significantly more efficient than text-based protocols like REST (which commonly use JSON or XML). This results in reduced bandwidth usage and faster data exchange between network devices and management systems.
2. **Data Modeling with YANG:** gNMI uses OpenConfig YANG models to define the structure of configuration and operational data. YANG is a standardized data modeling language that ensures consistency and interoperability across different vendors and platforms.
3. **Real-Time Streaming Telemetry:** gNMI supports streaming telemetry, allowing devices to continuously push real-time updates to subscribed clients. This is ideal for proactive monitoring, performance analysis, and rapid fault detection, moving away from inefficient polling methods.
4. **Enhanced Security:** gNMI secures communication using TLS (Transport Layer Security) for encryption and authentication. It also supports mutual TLS (mTLS), which ensures both the client and server authenticate each other using digital certificates, providing strong end-to-end security.
5. **Purpose-Built for Network Management:** Unlike traditional protocols like SNMP or generic interfaces like REST, gNMI is designed specifically for network configuration and state management. It supports robust operations such as Get, Set, Subscribe, and Capabilities, offering a scalable and vendor-agnostic interface.

Limitations for Subscription Paths

- Minimum Sampling Intervals for Stream Subscriptions

The following paths have minimum sampling interval requirements and you cannot set the intervals below the specified values:

```
LowestIntervalPerPath: <Time in seconds>
"/interfaces": 40
"/interfaces/interface[name=*]": 40
"/interfaces/interface": 40
"/bfd/interfaces/interface[id=*]": 30
"/bfd/interfaces/": 30
"/network-instances": 50
"/network-instances/network-instance": 50
"/network-instances/network-instance[name=*]": 50
```

- Unsupported On-Change Stream Subscriptions

The following paths do not support gNMI On-Change subscriptions. To retrieve data for these paths and their subordinate nodes, use gNMI Once or Sample subscriptions instead of querying the parent path. Explicit queries are required.

```
- /network-instances/network-instance/protocols/protocol/bgp/rib
- /network-instances/network-instance/protocols/protocol/bgp/neighbors/neighbor/
timers/state
- /network-instances/network-instance/protocols/protocol/bgp/neighbors/neighbor/afi-
safis/afi-safi/state/prefixes
- /network-instances/network-instance/protocols/protocol/bgp/global/afi-safis/afi-
safi/state/total-prefixes
- /network-instances/network-instance/protocols/protocol/bgp/global/afi-safis/afi-
safi/state/total-paths
- /network-instances/network-instance/tables-network/ipv4-unicast
- /network-instances/network-instance/tables-network/ipv6-unicast
- /network-instances/network-instance/tables-network/next-hop-groups
- /network-instances/network-instance/tables-network/next-hops
- /network-instances/network-instance/tables-network/ethernet
- /network-instances/network-instance/tables-network/ipv4-neighbor
- /network-instances/network-instance/tables-network/ipv6-neighbor
- /system/global/l3/tables-network-summary/address-family-stats
```

- Unsupported Get RPC Path Requests

The following paths are not supported on gNMI Get:

```
GetUnsupportedPaths:
- /network-instances/network-instance/protocols/protocol/bgp/rib
- /network-instances/network-instance/tables-network
- /system/global/l3/tables-network-summary
- /network-instances
- /interfaces
- /acl
- /qos
- /qos/maps/traffic-class-maps/
```

gNOI Protocol

gNOI (gRPC Network Operations Interface) is a modern, gRPC-based protocol developed by the OpenConfig working group. It is designed specifically for performing operational and lifecycle management tasks on network devices, complementing configuration and telemetry protocols like gNMI.

Key Features of gNOI

1. **gRPC-Based and High Performance:** gNOI is built on the gRPC framework, enabling efficient, bi-directional communication using HTTP/2 and Protocol Buffers (Protobuf).

This architecture ensures low latency, high throughput, and efficient binary serialization, making it ideal for real-time operational workflows.

2. **Operational and Lifecycle Focus:** Unlike gNMI, which handles configuration and telemetry, gNOI is focused solely on operational tasks such as certificate management, software installation, factory reset, boot control, and system time synchronization.

It provides well-defined RPCs to perform these tasks in a programmatic and vendor-agnostic way.

3. **Extensible Architecture:** gNOI is designed to be extensible, allowing new operational RPCs to be added as network management requirements evolve. This makes it future-proof and adaptable to modern operational needs.
4. **Standardized and Vendor-Neutral:** gNOI ensures a consistent operational interface across devices from different vendors, simplifying automation, orchestration, and tooling.

It helps eliminate the need for vendor-specific CLIs or proprietary APIs for routine operational tasks.

gRPC Network Management Interface (gNMI) Service

gNMI (gRPC Network Management Interface) is a management protocol that enables efficient configuration management and telemetry data collection from network devices. Key features include: - Modification and retrieval of device configurations - Control and generation of telemetry streams - Compatibility with OpenConfig YANG data models.

gNMI offers a scalable, secure, and real-time monitoring solution, employing a push-based model for data streaming. This approach differs from traditional pull-based protocols like SNMP. For gNMI specification, see [reference/rpc/gNMI](#).

Capabilities RPC

Extreme OS ONE support gNMI version 0.10.0.

A client can use the Capabilities RPC to discover the target's capabilities. The target provides details such as the gNMI service version, supported YANG data modules, and available data encodings. This information helps the client specify the set of models (for Get, Set, or Subscribe RPCs) and the data encoding to be used in subsequent RPC messages.

At Extreme OS ONE rendering of capabilities for YANG data modules also includes a list of module names that are internally imported by other YANG modules. The capability information can also be retrieved from CLI using exec level command ``show grpc-server gnmI capabilities``.

Get RPC

The Get RPC allows a client to request a snapshot of configuration or state data by specifying a set of paths from the data tree.



Note

- The Get RPC is designed for retrieving relatively small data sets. It is not ideal for large-scale data retrieval, such as the entire component inventory. For such cases, use Subscribe RPC.
- Wildcard-based Get operations are not supported. For example, a Get request on a path like `/interfaces/interface[name=*]` is not allowed

Set RPC

The Set RPC allows clients to modify the target's state by sending a request with desired changes. Supported operations include delete, update, and replace. The server processes these operations in the following order: delete, replace, and then update, when all operations are grouped together in a single Set request.

Set RPC allows bulking of configurations, upon receiving the request, API Gateway leverages Openconfig data model definitions to perform syntactic and semantic validations. If validation fails, entire configuration is rejected, and an appropriate error is returned to the client. Upon successful validation, the configuration data is stored in the database.

Key Points:

- Bulk configuration, including single or multiple modules, is supported through a single gNMI Set RPC. Bulk configurations are limited by the default gRPC size constraint of approximately 4MB.
- Wildcard-based Set operations are not supported. For instance, updating the MTU attribute for all interfaces is not supported.
- Any failure during the data validation phase (including syntactic and semantic errors) will result in the entire Set request failing, and an appropriate error will be returned to the client.

Delete Configuration

Upon receiving a delete request, the server removes the specified path from the target's data tree. If the path includes child elements, they must be recursively deleted. If the specified path does not exist, the delete operation is silently accepted

Replace Configuration

- If the client specifies a path-value, the server replaces it with the new value.
- If no value is provided and there is no default in the schema, the path must be deleted.

Update Configuration

When a client sends a Set RPC request, the target device will:

1. Create a new data tree element if the specified path doesn't exist, as long as the path is schema-compliant
2. Populate the element with the provided data.

Subscribe RPC

Clients can receive real-time updates about target data through the Subscribe RPC. A subscription requires:

1. Specifying one or more data paths
2. Choosing a subscription mode (periodic or event-driven)

This approach, known as streaming telemetry, replaces traditional polling with a more efficient push model. By leveraging a standardized data model over gRPC transport, clients can enjoy additional benefits, including, Real-time updates, Reduced latency, and Improved efficiency

Once Subscriptions

In ONCE mode, the subscription operates as a single request/response. The target sends the relevant updates and then closes the RPC.

Stream Subscriptions

Stream subscriptions provide ongoing updates for selected paths until cancelled, ensuring continuous access to new information. Stream mode supports the following options:

- **On Change (ON_CHANGE):** Updates are sent only when the value of the data item changes. Initially, the target sends updates for all subscribed paths, and afterward, only when values change. A heartbeat interval can be specified, in which case, the data will be re-sent at the specified interval, even if the value hasn't changed.
- **Sampled (SAMPLE):** Updates are sent at regular intervals, defined by the sample interval. If the sample interval is set to 0, the target sends updates at the shortest possible interval.

Key Points

- Wildcard-based Subscribe operations are supported. For example, a Subscribe request on a path like `/interfaces/interface[name=*]` is allowed.
- Certain restrictions will be imposed on the minimum interval that can be set for interval-based stream subscriptions.
- A few YANG paths will not be exposed for on-change subscriptions to reduce the overall system load.

gRPC Network Operational Interface (gNOI) Service

gNOI (gRPC Network Operations Interface) is a protocol within the gRPC ecosystem designed to facilitate operational and administrative tasks on network devices. It complements gNMI (gRPC Network Management Interface), which primarily focuses

on configuration and state management, by addressing the operational needs of network management. Supported gNOI version is v0.4.0.

gNOI vs gNMI

Aspect	gNOI	gNMI
Purpose	Operational and lifecycle management	Configuration and state management
Tasks	Software upgrades, certificate management, diagnostics	Configuration, telemetry, and subscription management
Scope	Focused on actions	Focused on data

Configure gRPC Server

The gRPC server is disabled by default. Follow the procedure to configure a gRPC server.



Note

After enabling gRPC server, changes to attributes require a service restart: disable with 'no enable' and then re-enable for the changes to take effect. Multiple instances can be configured with unique port, VRF, and certificate combinations.

1. Generate grpc app certificate either by generating the certificate from the device or by importing a custom certificate, and then enable the gRPC server.

Generate grpc app certificate:

```
device# certificate-manager generate ssl-profile-id ssl-reserved-generated certificate-extension
san 1.1.1.1 (1.1.1.1 is device ip)
device# certificate-manager import ssl-profile-id ssl-reserved-generated ca-certificate
protocol scp host 1.1.1.1 certificate /tmp/cert.crt user user1 password pass1 vrf mgmt-vrf
device#
```

Or import a custom certificate and associate it with the user defined ssl-profile ID.

2. Run the **grpc-server <NAME>** command to configure a gRPC server.

This command creates a gRPC server instance, defaulting to "DEFAULT" if no name is specified. Configure the port and certificate ID for use. If no VRF is specified, the system will default to mgmt-vrf.

```
device# configure terminal
device(config)# system
device(config-system)# grpc-server
device(config-system-grpc-server-DEFAULT)#
device(config-system-grpc-server-DEFAULT)# port 443
device(config-system-grpc-server-DEFAULT)# certificate-id ssl-reserved-generated
device(config-system-grpc-server-DEFAULT)# enable
device(config-system-grpc-server-DEFAULT)#
```

The gRPC server is up and running. You can use clients like gnmic for gNMI set, subscribe, and on-change operations.

- To enable mutual TLS, import the application certificate and associate it with the gRPC server instance using the certificate manager.

```
device# certificate-manager import ssl-profile-id test_cert_id app-certificate
protocol scp host 1.1.1.1 certificate /home/user/gRPCcert.pem key /home/user/
gRPCcert.key user username password password
```

- Import the CA certificate used to generate the app certificate, using the same SSL profile ID as in Step 3.

```
device# certificate-manager import ssl-profile-id test_cert_id ca-certificate protocol
scp host 1.1.1.1 certificate /home/user/root.pem user username password password
```

- Configure mutual TLS.

This command enables mutual exchange of x509 certificate-based authentication for the gRPC client. To update the gRPC server configuration parameters, disable the gRPC server first, make the changes, and then re-enable it.

```
device# configure terminal
device(config)# system
device(config-system)# grpc-server mygrpcserver
device(config-system-grpc-server-mygrpcserver)# certificate-id test_cert_id
device(config-system-grpc-server-mygrpcserver)# port 9340
device(config-system-grpc-server-DEFAULT)# no enable
device(config-system-grpc-server-mygrpcserver)# mutual-tls
device(config-system-grpc-server-mygrpcserver)# enable
device(config-system-grpc-server-mygrpcserver)#
```

- Create a gRPC instance with a custom VRF.

```
device(config)# system
device(config-system)# grpc-server
device(config-system-grpc-server-DEFAULT)# vrf vrfnew1
%Error: gRPC server DEFAULT is in enabled state, Please disable for altering any
configuration
device(config-system-grpc-server-DEFAULT)# no enable
device(config-system-grpc-server-DEFAULT)# vrf vrfnew1
device(config-system-grpc-server-DEFAULT)# enable
```

- Verify the configured gRPC server.

```
device# show running-config system grpc-server
system
  grpc-server mygrpcserver
    certificate-id test_cert_id
    port 9340
    mutual-tls
    vrf vrfnew1
    enable
  !
device#
```

Data Model and Northbound Interface

Extreme OS ONE and its supported applications rely on OpenConfig YANG modules as their core data model. These modules adhere to a strict style guide, which clearly separates configurable and operational data and organizes attributes into distinct hierarchical structures. This style guide ensures consistency in YANG module definitions, promoting clarity and simplicity.

Key aspects of the data model:

- Based on OpenConfig YANG modules
- Distinguishes between "config" and "state" data
- Organizes data hierarchically

Storage of List Key Values

YANG key values are stored in a case-sensitive manner, treating uppercase and lowercase characters as distinct. However, exceptions apply to MAC addresses and IPv6 address configurations, which are stored in lowercase.

Inband Management Support

The system allows you to configure multiple gRPC servers, each operating within its own unique Virtual Routing and Forwarding (VRF) context. Additionally, external clients can access the device for configuration and retrieval operations via either the default VRF or user-defined VRFs.

CLI Commands

For more information about syntax and parameters, see *Extreme OS ONE SR Command Reference Guide*.

Config Commands

- grpc-server
- grpc-server - certificate-id
- grpc-server - port
- grpc-server - vrf
- grpc-server - enable
- grpc-server - mutual-tls

Exec Commands

- show grpc-server gnmi statistics
- show grpc-server gnmi capabilities

Event Log Messages

gRPC server utilizes a shared logging and event framework to record messages and generate standardized events, providing insights into progress, status updates, errors, and failures.

Event ID	Event Log	Remarks
6001	gRPC request executed successfully	Indicates that the gRPC request has been executed successfully.
6007	Requisite flags for apigw service not set	Requisite flags for API Gateway not set, cannot proceed with service instantiation.
6009	Failed initializing microservice	Indicates API Gateway bring up failure
12002	gRPC server connection status	Indicates gRPC server instance is ready to process RPC requests
12003	gRPC server termination status	Indicates termination of gRPC server instance

gNMI Authentication and Encryption

Network devices utilizing the gRPC Network Management Interface (gNMI) must ensure secure, bidirectional communication over a gRPC channel while implementing standard authorization and accounting for all management operations. The figure below illustrates key components of a gNMI-based management system. In this setup, the configuration system and telemetry collectors function as RPC clients to the network device (target). The target, in turn, provides the gNMI service, offering methods for subscribing to telemetry streams and sending configuration data.

Credentials and Authentication

When configuring credentials and authentication, all operations are transmitted over an encrypted connection. Each gRPC message contains username and password credentials in its metadata. To make configuration changes, you need a user with Read-Write permissions.

The target device uses these credentials to authorize configuration operations, employing available AAA (Authentication, Authorization, and Accounting) methods. The network element's local AAA configuration determines how and where AAA requests are sent.

For example, if a network element is set up to use TACACS for command authorization, a `Get(/interfaces)` request with a username and password will trigger a TACACS command authorization request using the same credentials.

Import gNMI Client CA Root Certificate

It is assumed that your infrastructure is set up with a gNMI client. Its configuration is beyond the scope of this document.

Importing the gNMI client's CA Root Certificate for password less connection between the gNMI Server and Client.

The CA certificate of the gNMI client is imported from the remote server. Use the **certificate-manager** command to import, generate, export, and delete the certificates.

```
# certificate-manager ?
delete      Delete certificate
  export     Export Certificate to remote server
  generate   Generate switch Certificate for server application
  import     Import Certificate and Key
  import-pks Import pkcs certificate key bundle
```

Type ? after executing a command to display help for the command.



Note

Use the following command to configure the certificate expiry alert. This applies to app certificates and only those that are associated with a protocol (for example, grpc-server) .

```
device(config-system-cert-mgr)# expiry-alert ?
  info      Info severity log expiry alert period
  minor     Minor severity log expiry alert period
  major     Major severity log expiry alert period
  critical   Critical severity log expiry alert period

device(config-system-cert-mgr-exp)# info?
DAYS <1-90> Days before certificate expiry logging

device(config-system-cert-mgr-exp)# minor?
  DAYS <1-90> Days before certificate expiry logging

device(config-system-cert-mgr-exp)# major?
DAYS <1-90> Days before certificate expiry logging

device(cconfig-system-cert-mgr-exp)# critical?
DAYS <1-90> Days before certificate expiry logging
```

Security

The gRPC API Gateway ensures secure, bidirectional communication over a gRPC channel, following the "gNMI Authentication and Encryption" specifications.

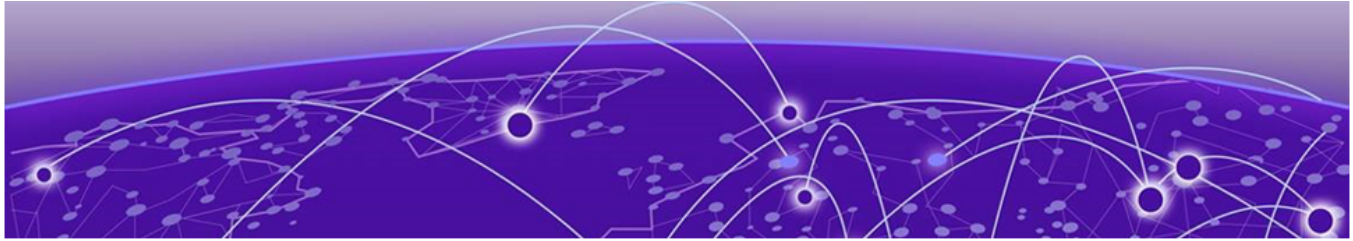
Use the TLS encryption for sessions between the gNMI server and client, with mutual authentication for new connections. Each entity verifies the remote entity's X.509 certificate for recognition and authorization.

Encryption

- TLS 1.3 is used by default, with a minimum supported version of TLS 1.2.
- The gRPC channel must be encrypted before use
- Unencrypted communication is prohibited; channel creation will fail if encryption cannot be established.

Authentication

- Certificate-based validation confirms the connecting network management system is an authorized endpoint
- Both user and token-based authentication are supported.



BMC Configuration

[Increase BMC Security](#) on page 139

[Change BMC User Password](#) on page 140

[Enable the BMC Management Interface](#) on page 140

[Configure BMC Management Interface IP Address](#) on page 142

[Reset BMC Configuration to Factory Defaults](#) on page 143

Increase BMC Security

This topic discusses the steps to increase BMC's security including changing the password for the default account, and changing the default IP address for the BMC's network interface.

Intelligent Platform Management Interface

Intelligent Platform Management Interface (IPMI) is a set of specifications that defines how to manage and monitor a device independent of its Operating System (OS), underlying Hardware, and the BIOS installed on it. IPMI also defines a set of physical interfaces that enable you to perform *out-of-band* management of IPMI-capable devices, including such devices that have been powered off or that have network issues or are unresponsive. Without IPMI, you need to be physically present near the device to resolve any issues.

IPMI is a message-based, hardware-level interface specification which exists and operates independently of the underlying operating system or the device's hardware. This enables IPMI to remotely manage a device even if the device does not have an installed OS. IPMI can also be used in scenarios where the device is powered down or even if there is a system or OS failure.

The target device can be powered down, however, for IPMI to work, it must at least be connected to an underlying local area network (LAN) and must be connected to a working power source.

IPMI can also be used to continuously monitor various statuses and statistics, such as temperature, fan speed, voltages, power supply status and physical access to the device.

Baseboard Management Controller

Baseboard Management Controller (BMC) is a dedicated microcontroller embedded on a device's motherboard and has its own dedicated firmware, RAM, and network port. Sensors on the motherboard transmit data to the BMC which in turn transmits this data to dedicated centralized monitoring servers. When connected to a LAN, the network port on the BMC enables *out-of-band* control and monitoring of the underlying hardware.

BMC enables IPMI on a device.

Securing BMC

BMC ships with a well known default User ID, password, and network configuration configured during firmware install at the factory. This provides a security vulnerability that can be exploited to gain access to the device.

Securing BMC involves changing the default User ID's password and changing the default network configuration. OS ONE provides commands that interact with the underlying BMC firmware to harden the security of your device's BMC.

Change BMC User Password

Configuration of each User ID must be done separately from within its configuration mode.



Note

Only the user with the User ID 2 can be configured. Though the command allows configuration of other User IDs, those changes are not applied on the BMC.

To change the password for a specific BMC user:

To change the password for user ID 2 on the BMC of the device, run the following command:

```
device# bmc user 2 password 1#bmcPasswd0!  
Set User Password command successful (user 2)  
device#
```

Enable the BMC Management Interface

Follow the procedure to enable the BMC Management Interface.

1. Navigate to the BMC Management Interface context.

```
device # configure terminal  
device(config)#  
device(config)# bmc  
device(bmc)#  
end          End current mode and change to enable mode  
exit        Exit current mode and down to previous mode  
interface   BMC management interface
```

```
list      Print command list
pwd       Display current mode path
```

**Note**

Only the BMC Management Interface with interface ID of 0 (zero) can be configured.

You are now within the BMC configuration mode.

- From within the BMC configuration mode, navigate to the BMC Management Interface configuration mode.

```
device(config)# bmc
device(bmc)# interface 0
device(interface-0)#
end          End current mode and change to enable mode
exit        Exit current mode and down to previous mode
ipv4        The internet protocol (ipv4) information
list        Print command list
no          Negate a command or set its defaults
pwd         Display current mode path
shutdown    Shut down the BMC management interface
```

- Enable the interface.

```
device(interface-0)#no shutdown
```

The BMC Management Interface is now enabled and ready to be configured for out-of-band access.

- (Optional) Verify if the BMC Management Interface is enabled.

The following example shows the BMC configuration that is running currently on the device:

```
device# show running-config bmc
!
bmc
  interface 0
    no ipv4 address dhcp
    ipv4 address 198.51.100.0/24
    ipv4 gateway 192.0.2.0
    no shutdown
  !
!
```

The following example shows the BMC state that is running currently on the device:

```
device# show running-state bmc
!
bmc
  interface 0
    no ipv4 address dhcp
    ipv4 address 198.51.100.0/24
    ipv4 gateway 192.0.2.0
    no shutdown
  !
!
```

Configure BMC Management Interface IP Address

Keep the IPv4 address, the netmask, and the Gateway IPv4 address that is required to be configured, ready.



Note

Extreme OS ONE configures the static IP 192.x.x.x/24 and default gateway 0.0.0.0 by default.

To configure the BMC Management Interface:

1. Navigate into the BMC Management Interface context.

```
device# configure terminal
device(config)# bmc
device(bmc)#
```



Note

Only the BMC Management Interface with interface ID of 0 can be configured.

You are now within the BMC configuration mode.

2. From within the BMC configuration mode, navigate into the BMC Management Interface configuration mode.

```
device(bmc)# interface 0
device(interface-0)#
```

You are now within the BMC Management Interface configuration mode.

3. Configure the IPv4 address for the BMC Management Interface.

- To configure the BMC Management Interface to receive the IPv4 address from a remote DHCP server, run the following command:

```
device(config)# bmc
device(bmc)# interface 0
device(interface-0)#ipv4 address dhcp
```

- To configure the BMC Management Interface's IPv4 address manually, run the following command:

```
device(config)# bmc
device(bmc)# interface 0
device(interface-0)# ipv4 address 192.x.x.x/xx
device(interface-0)# ipv4 gateway 192.x.x.x
```

The IPv4 address for the BMC Management Interface is either automatically assigned or manually configured.

4. (Optional) Verify by issuing the **show running-config bmc** command.

```
device(bmc)# show running-config bmc
!
bmc
  device(interface-0)#
device(interface-0)# ipv4 address 192.x.x.x/24
device(interface-0)# ipv4 gateway 192.x.x.x
device(interface-0)# no shutdown
device(interface-0)#
device # show running-config bmc
!
```

```
bmc
  interface 0
    no ipv4 address dhcp
    ipv4 address 192.x.x.x/24
    ipv4 gateway 192.x.x.x
    no shutdown
  !
!
device #
```

Reset BMC Configuration to Factory Defaults

To reset the device BMC configuration back to its factory defaults:

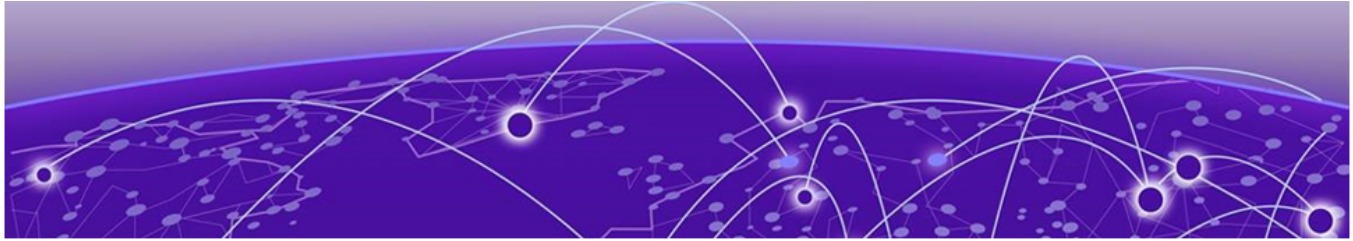
From the Executable Mode, execute the `bmc factory reset` command.

```
# bmc factory-reset
```

After receiving the factory reset command, a prompt will appear asking if you want to proceed. If you confirm (Y), the device will reboot and the BMC configuration will be restored to its factory default settings.

The following example shows the reset to BMC factory default settings.

```
bmc factory-reset
%Info: WARNING: BMC and System will be rebooted sequentially after bmc factory reset! Do
you want to continue? [y/n]:y
```



Port Mirroring

[How Mirroring Works](#) on page 144

[Configuration Validations for Mirroring](#) on page 145

[YANG Modules for Mirroring](#) on page 146

[Port Mirroring Configuration Using CLI](#) on page 147

[Use Case Scenarios and Configuration Examples for Port Mirroring](#) on page 148

Use this topic to learn about the configuration and implementation of port mirroring in Extreme OS ONE.

How Mirroring Works

Mirroring duplicates traffic from a source interface to a mirror session, which is associated with a destination interface or interfaces. This feature is supported in both ingress and egress directions, allowing for the duplication of traffic on the source and sending it to the configured destination.

The source can be a physical or port channel interface; destination can be physical, internal, or port channel interfaces. Different mirroring types are configured based on the destination location. The key components include VxLAN tunnels, Bridge domain, and Host mapping.

Types of Mirroring Supported

- Local SPAN: Mirrors traffic from one or more interfaces on the switch to one or more interfaces on the same switch.
 - Port-based mirroring: Only Extreme 8730-32D hardware platforms support port mirroring..
 - Source: Physical/Port Channel interface
 - Destination: Physical, Port Channel, or Internal interface
 - Flow-based mirroring: ACL identifies the traffic flow to mirror.
 - Source: Physical, Port Channel, or VE interface (identified via ACL)
 - Destination: Physical, Internal, or Port Channel interface

Limitations

- TD3: No true egress mirroring

- Four mirror copies per source interface; 3 available (1 used for BFDoverVxLan)
- J2: One mirror session attachment (in+out) per source interface
- "In+out" direction = 2 mirror copies
- TD4: Physical/internal interfaces only as mirror destinations
- Mirroring happens post-IFP stage; egress mirroring misses some CPU-injected packets
- Workaround: Ingress mirror on peer device for missed packets
- No flow-based egress mirroring on TD3 and TD4

Configuration Guidelines

- SPAN Destination Port: Should not be configured to carry normal traffic.
- Speed Mismatch: When mirroring with different speeds on span source and destination interfaces, traffic exceeding the destination interface's capacity will be dropped. For example: when mirroring a traffic from 40G to 10G port, the traffic exceeding 10G gets dropped.
- Port-Based Mirroring: Only physical, internal, and port-channel interfaces are supported as source.
- Max mirror sessions: J2 (4), TD3 (3)

Configuration Validations for Mirroring

The system enforces the following configuration validations for mirroring:

Single Destination Interface per Mirror Session

Each mirror session supports only one destination interface. Configuring more than one destination interface will trigger an error. The destination can be an Ethernet interface, a port-channel, or an internal interface.

```
48xt(config)# mirror mirror_session_1
48xt(config-mirror)# destination interface ethernet 0/3
48xt(config-mirror)# destination interface ethernet 0/4
Error: Mirror interface is already configured
```

No Port-Channel Members as Destination Interfaces

Interfaces that are part of a port-channel cannot be used as mirroring destination interfaces.

```
48xt(config)# mirror mirror_session_2
48xt(config-mirror)# destination interface ethernet 0/49:4
Error: Port-channel configuration is present on the interface.
```

No Port-Channel Members as Source Interfaces

Interfaces that are part of a port-channel cannot be used as mirroring source interfaces.

```
48xt(config)# int ethernet 0/49:4
48xt(config-if-eth-0/49:4)# mirror m1 in
Error: Port-channel configuration is present on the interface
```

You can configure the port-channel interface as a source for traffic mirroring.

```
32d(config-mirror)# exit
32d(config)# interface port-channel 1
32d(config-if-po-1)# mirror mirror_1 in
32d(config-if-po-1)# mirror mirror_1 out
```

YANG Modules for Mirroring

YANG modules provide a standardized way to configure and manage mirroring functionality on the system. There are multiple YANG modules involved:

Extreme Mirror YANG Module

This module defines the structure for mirroring configuration, including:

- Mirror name and description
- Truncate settings
- Destination interfaces and encapsulation settings (for example, VXLAN, GRE, ERSPAN)

```
module: extreme-mirror
  +--rw mirrors
    +--rw mirror* [name]
      +--rw name                -> ../config/name
      +--rw config
        | +--rw name?          string
        | +--rw description?  string
      +--ro state
        | +--ro name?         string
        | +--ro mirror-id?    uint32
      +--rw destination
        | +--rw interfaces
          | +--rw interface* [name]          /* Physical/LAG/Tunnel ... */
          |   +--rw interface  -> ../config/name
          |   +--rw config
          |     | +--rw name?  string
          |     +--ro state
          |       +--ro name?  string
```

OpenConfig ACL YANG Augmentation

This module augments the OpenConfig ACL YANG module to support mirroring. It adds a mirror action to ACL entries.

```
module: openconfig-acl
  +--rw acl
    +--rw acl-sets
      +--rw acl-set* [name type]
        +--rw name          -> ../config/name
        +--rw type          -> ../config/type
      +--rw acl-entries
        +--rw acl-entry* [sequence-id]
          +--rw sequence-id          -> ../config/sequence-id
          +--rw actions
            +--rw config
              | +--rw forwarding-action  identityref
              | +--rw log-action?       identityref
              | +--rw extr-acl-ext:count? boolean
              | +--rw extr-acl-ext:mirror? string
```

```

+--ro state
  +--ro forwarding-action    identityref
  +--ro log-action?          identityref
  +--ro extr-acl-ext:count?  boolean
  +--ro extr-acl-ext:mirror? string

```

OpenConfig Interfaces YANG Augmentation

This module augments the OpenConfig Interfaces YANG module to support mirroring on interfaces. It defines the structure for mirror configuration on interfaces, including the mirror name and direction (ingress or egress).

```

augment /oc-if:interfaces/oc-if:interface:
  +--rw mirrors
    +--rw mirror* [name direction]
      +--rw name          string
      +--rw direction    identityref
      +--rw config
        | +--rw name?      string
        | +--rw direction? identityref
      +--rw state
        +--rw name?      string
        +--rw direction? identityref

```

Port Mirroring Configuration Using CLI

The system provides various CLI commands to configure mirroring functionality such as mirror destination, port-based mirroring, and flow-based mirroring.

Configure Mirror Destination

Follow this procedure to configure a mirror destination.

1. Create a mirror session.

The mirror <NAME> creates a new mirror session.

```
device(config)# mirror <NAME>
```

2. Create a mirror description.

```
device(config)# mirror mirror_1
device(config-mirror)# description test mirror
device(config-mirror)#
```

3. Specify the destination interface.

The command sets the destination interface for the mirror session.

```
device(config-mirror)# destination interface (ethernet | internal ) <NAME>
```

Configure Port-Based Mirroring

Follow this procedure to configure port-based mirroring.

1. Enter interface configuration mode for the specified interface.

```
device(config)# interface ethernet 0/1
```

2. Configure mirroring.

The command configures mirroring on the interface, specifying the direction (ingress or egress) for the mirror session.

```
device(config-interface) mirror < MIRROR_SESSION_NAME > (in | out)
```

Configure Flow-Based Mirroring

Follow this procedure to configure flow-based mirroring.

1. Enter interface configuration mode for the specified interface.

```
device(config)# interface ethernet 0/1
```

2. Create a mirror session.

The command configures mirroring on the interface, specifying the direction (ingress or egress) for the mirror session.

```
device(config-interface) mirror < MIRROR_SESSION_NAME > (in | out)
```

3. Specify the destination interface.

The command sets the destination interface for the mirror session.

```
device(config-mirror)# destination interface (ethernet | internal | port-channel)
<NAME>
```

4. Create a mirror description.

```
device(config-mirror)# description flow based mirroring
```

5. Configure an ACL with mirroring.

```
device(config)# ipv4 access-list <ACCESS_LIST_NAME>
switch(config-ip-acl)# seq 10 permit ipv4 any any mirror <MIRROR_SESSION_NAME>
```

6. Apply ACL to an interface.

```
device(config)# int ethernet <NAME>
device(config-interface)# ipv4 access-list a1 in
device(config-interface)# ipv4 access-list a1 out
```

Use Case Scenarios and Configuration Examples for Port Mirroring

The following use cases demonstrate the example configuration of mirroring sessions on a network device.

Local SPAN Port-Based Mirroring

- Source: Physical, Port Channel interfaces
- Destination: Physical, Internal, Port Channel interfaces

1. Mirror session configuration with a physical interface as the mirror destination

```
device(config)# mirror mirror_session_5
device(config-mirror)# destination interface ethernet 0/6
device(config-mirror)#
```

2. Mirror session configuration with a port channel interface as the mirror destination

```
device(config)# mirror mirror_session_6
device(config-mirror)# destination interface port-channel 20
device(config-mirror)#
```

3. Mirror session attachment to a physical interface

```
device(config-mirror)# int eth 0/8
device(config-if-eth-0/8)# mirror mirror_session_6 in
device(config-if-eth-0/8)# mirror mirror_session_6 out
device(config-if-eth-0/8)#
```

4. Display the destination interface where mirror is created.

```
device# show running-config mirror
mirror mirror_session_5
  destination interface ethernet 0/6
!
mirror mirror_session_6
  destination interface port-channel 20
!
device#
```

5. Display the configuration of the mirror attachment under the interface.

```
device# show running-config interface ethernet 0/8
interface ethernet 0/8
  shutdown
  mirror mirror_session_6 in
  mirror mirror_session_6 out
!
device#

device# show mirror all
Number of mirrors: 2
      Name : mirror_session_5
      Description : -
      Destination Interface : ethernet 0/6

      Name : mirror_session_6
      Description : -
      Source Interface : ethernet 0/8
      Direction : MIRROR_INGRESS
      Source Interface : ethernet 0/8
      Direction : MIRROR_EGRESS
      Destination Interface : port-channel 20
device#
```

Local SPAN Flow-Based Mirroring

- Source: Physical, VE, Port Channel interfaces
- Destination: Physical, Internal, Port Channel interfaces

1. Mirror session configuration with Physical interface as Mirror destination

```
device(config)# mirror mirror_session_5
device(config-mirror)# description flow based mirroring
device(config-mirror)# destination interface ethernet 0/6
device(config-mirror)#
```

2. Mirror session configuration with Port channel interface as Mirror destination

```
device(config)# mirror mirror_session_6
device(config-mirror)# destination interface port-channel 20
device(config-mirror)#
```

3. Mirror session attachment under physical and port channel interface

```
device(config)# ipv4 access-list a1
device(config-ip-acl)# seq 10 permit ipv4 any any mirror mirror_session_5
device(config-ip-acl)#
```

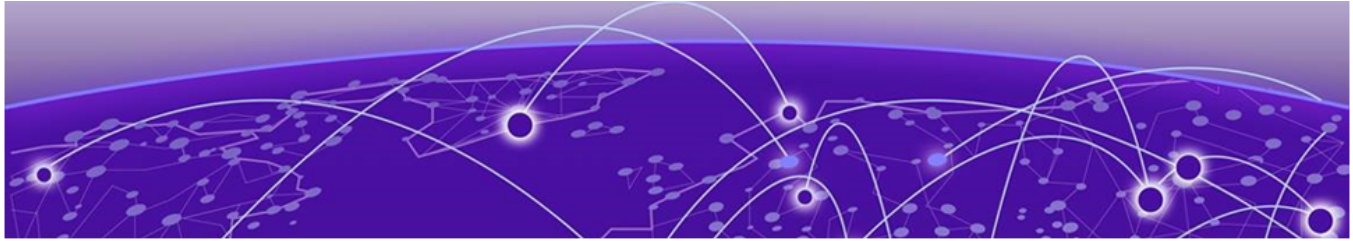
```
device(config)# interface ethernet 0/30
device(config-if-eth-0/30)# ipv4 access-list a1 in
device(config-if-eth-0/30)# ipv4 access-list a1 out
device(config-if-eth-0/30)#
```

4. Running configuration of mirror sessions

```
device# show running-config mirror mirror_session_5
mirror mirror_session_5
  description flow based mirroring
  destination interface ethernet 0/6
!
device#
```

5. Running configuration of flow-based mirror attachment under interface

```
device# show running-config access-list
ipv4 access-list a1
  seq 10 permit ipv4 any any mirror mirror_session_5
!
device#
```



Maintenance Mode

[How Maintenance Mode Works](#) on page 151

[Enable or Disable Maintenance Mode](#) on page 151

[MLAG and BGP Module Behavior](#) on page 152

[CLI Commands for Maintenance Mode](#) on page 153

[RASLog and SNMP Traps for Maintenance Mode](#) on page 155

[Enter Maintenance Mode Before Performing Device Maintenance](#) on page 156

[Rebooting into Maintenance Mode](#) on page 157

Learn about Maintenance Mode, a feature that isolates a switch from the network when it goes down for maintenance or upgrades, ensuring minimal disruption to network operations.

How Maintenance Mode Works

The Maintenance Mode feature is designed to isolate a switch from the network during maintenance operations, such as image upgrades. When enabled, all front-panel ports are disabled, diverting traffic to the peer MLAG node. This feature should only be enabled on one MLAG peer at a time.

Key Benefits

1. **Network isolation:** The switch is isolated from connected devices, preventing traffic disruption.
2. **Traffic diversion:** Traffic is diverted to the peer MLAG node, ensuring network continuity.

Configuration Options

1. **Manual enablement:** Maintenance mode can be enabled manually on a running switch.
2. **Automatic enablement on reload:** Maintenance mode can be configured to enable automatically when the switch is reloaded. When the switch comes back online, all physical ports will be in a link-down state, isolating the device from the network.

Enable or Disable Maintenance Mode

The Interface Manager processes gNOI messages to enable or disable Maintenance Mode on a switch.

Maintenance Mode Enable Sequence

When Maintenance Mode is enabled, the following steps occur:

1. **Notification to MLAG Peer Node:** Notify the MLAG peer node to prevent the peer node from entering a split-brain condition.
2. **Wait for peer node processing:** The system waits for 5 seconds to allow the peer node to process the notification.
3. **Disable front-panel ports:** Disable all front-panel ports (except internal and RME ports).
4. **Disable NVE loopback interfaces:** All NVE loopback interfaces are disabled.
5. **Traffic diversion:** Connected nodes detect the port operational state and reprogram to move traffic to the other MLAG node.

Maintenance Mode Disable Sequence

When Maintenance Mode is disabled, the following steps occur:

1. **Notification to MLAG Peer Node:** Notify the MLAG peer node to enable secondary keepalive detection.
2. **Bring up the delay timer:** MLAG peer node starts a bring-up delay timer.
3. **Enable front-panel ports:** All front-panel ports (except MLAG client and uplink ports) are enabled.
4. **ISL formation:** Once the ISL is up, the MLAG session is formed.
5. **Uplink and client port enablement:** After the bring-up delay timer expires, MLAG triggers the enablement of uplink and client ports.

Maintenance Mode On Reload

Maintenance Mode can be configured to enable automatically after a switch reload. In this mode:

1. **Physical ports and NVE loopback interfaces are down:** All physical ports and NVE loopback interfaces are in a down state when the switch comes up after reload.
2. **Maintenance mode disable:** Maintenance mode can be disabled after maintenance operations are complete to bring the switch back into operation.

MLAG and BGP Module Behavior

The MLAG and BGP modules interact with the Interface Manager to ensure smooth operation during Maintenance Mode.

MLAG Bring-up Delay

After Maintenance Mode is disabled, the MLAG bring-up delay timer starts. During this delay:

1. **MAC/ARP sync and hardware programming:** MLAG completes MAC/ARP sync and hardware programming.

2. **MLAG client and uplink track ports:** After the timer expires, MLAG client and uplink track ports are brought up.

BGP Module Behavior

IGP route filtering: During Maintenance Mode, BGP filters out IGP routes received from the peer MLAG node for NVE IP, preventing the spine from getting ECMP routes when the NVE IP is down.

CLI Commands for Maintenance Mode

The system provides various CLI commands to manage Maintenance Mode.

Operational Commands

1. **Enable/Disable Maintenance Mode:** The `system maintenance-mode enable/disable` command sends a gNOI message to enable or disable Maintenance Mode.

```
device(config)# do system maintenance-mode enable/disable

This CLI will send the GNOI message to enable/disable maintenance mode

GNOI Message
message MaintenanceModeRequest {
  /*
    true : Enable maintenance mode
    false : Disable maintenance mode
  */
  bool enable = 1;
}
```

2. **Show Maintenance Mode:** The `show system maintenance-mode` command displays Maintenance Mode information, including status and configuration.

```
device# show system maintenance-mode
Enable on reload      : disabled
Maintenance Mode     : enabled
Maintenance Mode Status : Complete
device#
```

Configuration Commands

1. **Maintenance Mode on Reload:** The `[no] enable-on-reload` command enables or disables Maintenance Mode on reload. This command takes effect when the switch is reloaded.

```
device(config-system-maintenance-mode)# [no] enable-on-reload
rw extr-sys-ext:maintenance-mode

+--rw extr-sys-ext:config
  | | +--rw extr-sys-ext:enable-on-reload?  oc-yang:bool
  | | . . .
  | +--ro extr-sys-ext:state
  | | +--rw extr-sys-ext:enable-on-reload?  oc-yang:bool
  | | +--rw extr-sys-ext:enabled?  oc-yang:bool
  | | +--rw extr-sys-ext:status?  extr-sys-ext:STATUS_TYPE

identity STATUS_TYPE {
```

```

    description
    "Base identify type for operational status";
  }

  identity IN_PROGRESS {
    base STATUS_TYPE;
    description
    "Operation In progress";
  }

  identity COMPLETED {
    base STATUS_TYPE;
    description
    "Operation Completed";
  }

```

2. **Maintenance Mode Status:** The **show running-config system maintenance-mode** command shows the maintenance mode status information.

```

device(config)# show running-config system maintenance-mode
system
  maintenance-mode
  enable-on-reload
!
!
device#

```

MLAG Commands

1. **Show MLAG Peer:** The **show mlag peer** command displays MLAG peer information, including the peer node's Maintenance Mode state.

```

spine# show mlag peer
Peer towards-leaf
=====
Peer State           : UP
MCP State            : UP
Role                  : BACKUP
Elected MAC         : 00:16:3e:54:e1:00
Extend Bridge Count  : 0
Peer Exception       : Peer Under Maintenance Mode

```

2. **Debug Commands:** The **system internal service mlag command show-peerdb** and **system internal service mlag command show-peer args detail=1** commands provide additional information about MLAG peers and the Maintenance Mode state.

```

leaf# system internal service mlag command show-peerdb
Dumping MLAG Config Data Structures:
*****

-----
Keepalive Interval   : ---
Keepalive Delay      : ---
Bringup Delay        : 30
Multiplier           : ---
Role                  : ---
Mac                   : ---
Mgmt IP              : 10.38.59.158 Idx: 22000001
System MAC           : 00:16:3e:54:e1:00
BringUpDelayTmrSt    : false
Local MaintenanceMode : Disabled

```

The following debug command displays the Remote Maintenance Mode state:

```
leaf# system internal service mlag command show-peer args detail=1

=====
Peer table:
=====
PeerName:towards-spine
=====
Mgmt IP: 10.38.59.158
ExtNetInstType: ALL
ExtBrDomains  :
Tunnels  :
      SIp: 10.2.5.5          DIp: 10.2.5.2          IDX:3100001 VRF: 2 IsIsL:
true
State      : UP, Restart: 2
MM State   : Disabled
```

Show Tech Additions

The **show-if** command output includes additional information about Maintenance Mode in the debug command output, including `Phy Info` which displays Maintenance Mode status and other physical interface information:

```
----- show-if -----
Name:ethernet 0/3
Type:TYPE_PHY
Mode:
IfIndex:0x01000060
MTU: L2 9216 Cfg MTU: L2 0
Total Number of Lifs:0

Phy Info: Admin State UP Oper State DOWN OperStatusReason MlagShut false
Phy Info: Maintenance Mode true
Phy Info: Oper FEC disabled Oper Speed SPEED_100GB Cfg FEC Cfg Speed
Phy Info: MAC e4:db:ae:5d:18:0c SetIfIndexMapPending 0
Phy Info: Link fault signaling true Link fault State No Fault LocalFaults count0
RemoteFaults count 0
```

RASLog and SNMP Traps for Maintenance Mode

The system generates RASLog messages and SNMP traps to indicate Maintenance Mode status changes. The logs and traps provide valuable information for monitoring and troubleshooting Maintenance Mode operations.

RASLog Messages

Peer Maintenance Mode Enable/Disable: The system generates a LogID 17013 when a peer node's Maintenance Mode is enabled or disabled.

```
LogID:17013 Msg:Maintenance Mode is Enabled on MLAG Peer 10.38.59.158
LogID:17013 Msg:Maintenance Mode is Disabled on MLAG Peer 10.38.59.158
```

SNMP MIBs and Traps

For details on Extreme-defined MIB traps for Maintenance Mode, see the *Extreme OS ONE SR SNMP MIB Reference Guide*.

1. **Convergence Status:** indicates whether the maintenance mode entry/exit transition completed within the expected convergence time (completed(1)) or took longer than expected (timedout(2)).
2. **Reason Code:** indicates the reason for entering/exiting Maintenance Mode, such as user action (userAction(1)) or switch reboot (onSwitchReboot(2)).

Event Log Messages

Maintenance Mode events are logged, including:

1. Maintenance Mode Enable: logged when Maintenance Mode is enabled.

```
2025-01-30 18:11:48.1094 interface-mgr[7]: Level:info LogID:25028 Msg:Maintenance mode enabled
```

```
2025-01-30 18:12:14.9646 interface-mgr[7]: Level:info LogID:25026 Msg:Entered Maintenance mode (Reason: User trigger, Status: COMPLETE)
```

2. Maintenance Mode Disable: logged when Maintenance Mode is disabled.

```
2025-01-30 18:13:10.8355 interface-mgr[7]: Level:info LogID:25029 Msg:Maintenance mode disabled
```

```
2025-01-30 18:14:42.8429 interface-mgr[7]: Level:info LogID:25027 Msg:Exited Maintenance mode (Reason: User trigger, Status: COMPLETE)
```

Enter Maintenance Mode Before Performing Device Maintenance

Planned maintenance operations may require the device to be shut down or restarted, resulting in traffic disruption even if alternative paths are available. Maintenance mode provides graceful traffic diversion to alternative traffic paths, helping to minimize traffic loss during such planned operations.

When an alternative path is available, the BGP and MLAG protocols redirect traffic away from the node that is going into maintenance mode. When maintenance mode is enabled, all protocols that are running on the maintenance mode node are notified and redirection of traffic (convergence) begins in stages.



Note

Maintenance mode is not supported for the BGP address-family, Flowspec, Layer 3 VPN, VPLS, and VLL (virtual leased line).

1. Access configuration mode.

```
device# configure terminal
```

2. Access system mode.

```
device(config)# system
```

3. Access system maintenance mode.

```
device(config-system)# maintenance-mode
```

4. Enable maintenance mode.

```
ddevice(config-system-maintenance-mode)#
```

The following example enters Maintenance system configuration (config-systemmaintenance-mode) mode:

```
device# configure terminal
device(config)# system
device(config-system)# maintenance-mode
device(config-system-maintenance-mode)#
```

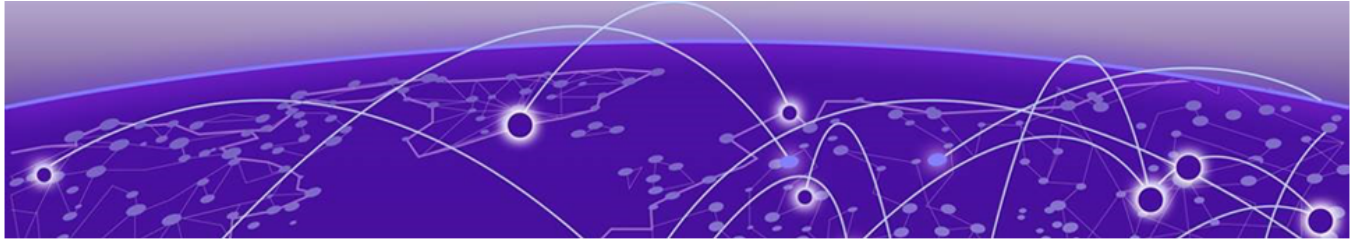
Rebooting into Maintenance Mode

Maintenance mode provides graceful traffic diversion to alternative traffic paths, helping to minimize traffic loss during such planned operations. When an alternative path is available, the BGP and MLAG protocols redirect traffic away from the node that is going into maintenance mode. When maintenance mode is enabled, all protocols that are running on the maintenance mode node are notified and redirection of traffic (convergence) begins in stages.

Use the **enable-on-reload** command to enable the device to come up in maintenance mode after a reboot or a reload. This process allows any network errors detected with Extreme OS ONE to be addressed. After the errors have been resolved, the device can be added back to the network.

The following example enables a system reboot or reload into maintenance mode

```
device# configure terminal
device(config)# system
device(config-system)# maintenance-mode
device(config-system-maintenance-mode)# enable-on-reload
device(config-system-maintenance-mode)#
```



License Management

- [Why OS ONE Devices Require License](#) on page 158
- [Deliverables](#) on page 159
- [OS ONE License Persistence](#) on page 159
- [CLI Commands and Log Messages for OS ONE License Management](#) on page 159

Learn about the license management in Extreme OS ONE.

Why OS ONE Devices Require License

Extreme OS ONE devices require license keys or Self-Authenticated Upgrade (SAU) licenses to enable specific features. Each hardware platform has its own set of license types, and customers can purchase and install licenses to access licensed features.

Extreme OS ONE supports **Self-Authenticated Upgrade (SAU) Licenses**.

Key Points

- Licenses are required to enable specific features or sets of features.
- Node-Locked Licenses are not supported.
- SAU licenses provide temporary access to features without a physical license, but require EULA acceptance and license purchase within 30 days.

Self-Authenticated Upgrade (SAU) Licenses

SAU licenses enable the use of licensed features without requiring physical license installation or activation. To use SAU licenses, you must accept the End-User License Agreement (EULA) via CLI or RPC. After accepting the EULA, you can configure and use the licensed features.

Key Characteristics

- **No physical license required:** Enables feature access without installation.
- **EULA acceptance required:** You must accept the EULA before using licensed features.
- **Temporary license-free period:** Requires purchasing a license within 30 days of accepting the EULA.

Deliverables

Key deliverables for effective OS ONE license management and constraint planning include:

- The SAU (Self-Authenticated Upgrade) license or EULA (End-User License Agreement) with Advanced features will activate IAH and BGP_EVPN functionality on all platforms, except for the 8730.

On the 8730, an Advanced Core license is required to enable IAH. Note that the Advanced feature license will only enable BGP_EVPN functionality.

- Corresponding CLI and RPCs to manage ADVANCED_FEATURES and ADVANCED_CORE licenses on Extreme OS ONE.
- Licensed feature configurations are blocked until the EULA is accepted.
- IAH and BGP EVPN configurations are restricted until EULA acceptance, with specific error messages and blocked CLI and YANG paths.

OS ONE License Persistence

The following table outlines the License persistence rules, specifying when licenses are retained or removed:

Case	License retained or removed
reboot	Retained
FW upgrade	Retained
Copy default running	Retained
Fullinstall	Retained
Fullinstall no-preserve	Removed
ONIE install	Removed
Factory reset	Removed

CLI Commands and Log Messages for OS ONE License Management

Use this topic to learn about the commands and event log messages.

CLI Commands

The following commands are applicable for License Management:

For more information about syntax and parameters, see *Extreme OS ONE SR Command Reference Guide*.

- **show license [eula]**

Use the **show license** command to display license features, descriptions, and acceptance dates.

Use the **show license eula** command to displays the End User License Agreement (EULA) statement, regardless of acceptance status.

- **license eula (accept | decline) advanced_features**

Use this command to accept or decline the End User License Agreement (EULA) for advanced features. You can run this command only with admin privileges.

- **Accept:** Enables advanced licensed features like IAH (except on 8730 platforms) and BGP EVPN (all platforms).
- **Decline:** Disables advanced licensed features.

- **license eula (accept | decline) advanced_core**

Use this command to accept or decline the EULA for ADVANCED_CORE features on the 8730 platform, enabling or disabling their use as needed.

- **Accept:** Enables advanced core features like IAH (exclusive to the 8730 platforms)
- **Decline:** Disables advanced core features.

RPCs

The following RPC is supported:

```
syntax = "proto3";

package extreme.license;

import "extreme/types/types.proto";

option go_package = "github.extremenetworks.com/Engineering/tierra-os/proto/extreme/
license";
// Specifies the semantic release version of this proto schema.
option (extreme.types.version) = "0.1.0";

service License {

    // SetEula Accept or Decline EULA (End User License Agreement)
    rpc SetEula(SetEulaRequest) returns (SetEulaResponse);

    // Get all licenses on the device
    // Optionally set type in request to EULA_INFO, to get EULA statement.
    rpc GetLicense(GetLicenseRequest) returns (GetLicenseResponse);

}
```

Event Log Messages

The log messages provide information on license EULA acceptance, declination, and expiration, with corresponding causes, remedies, and impact.

The following Security Audit log messages are generated for license-related events:

- LogID 7045 License EULA accepted successfully.
- LogID 7046: License EULA declined.
- LogID 7047: License EULA is about to expire; purchase a valid license if not already done.

The following is an example output of log messages:

```
{
  "LogID": 7045,
  "Details": {
    "Level": "Info",
    "Msg": "License EULA accepted for %s feature.",
    "Cause": "Indicates that license EULA has been accepted successfully.",
    "Remedy": "No action is required.",
    "Impact": "None"
  }
},
{
  "LogID": 7046,
  "Details": {
    "Level": "Info",
    "Msg": "License EULA declined for %s feature.",
    "Cause": "Indicates that license EULA has been declined.",
    "Remedy": "No action is required.",
    "Impact": "None"
  }
},
{
  "LogID": 7047,
  "Details": {
    "Level": "Info",
    "Msg": "EULA acceptance period is over, please purchase a valid license.
Ignore if already purchased.",
    "Cause": "Indicates that EULA license acceptance has expired.",
    "Remedy": "Purchase license, Ignore if purchased.",
    "Impact": "None"
  }
}
```