FS PoE+ Series Switches OAM Configuration Instructions

PoE+ Series Switches
OAM Configuration
Guide Instructions
Models:
S3150-8T2FP/S3260-8T2FP/3260-16T4FP
S3400-24T4FP/S3400-48T4SP

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OAM Configuration

1.1 OAM Overview

EFM OAM of IEEE 802.3ah provides point-to-point link trouble/performance detection on the single link. However, EFM OAM cannot be applied to EVC and so terminal-to-terminal Ethernet monitoring cannot be realized. OAM PDU cannot be forwarded to other interfaces. Ethernet OAM regulated by IEEE 802.3ah is a relatively slow protocol. The maximum transmission rate is 10 frames per second and the minimum transmission rate is 1 frame per second.

1.1.1 OAM Protocol's Attributes

- Support Ethernet OAM devices and OAM attributes

The Ethernet OAM connection process is called as the Discovery phase when the OAM entity finds the OAM entity

of the remote device and a stable session will be established. During the phase, the connected Ethernet OAM entities report their OAM mode,
Ethernet OAM configuration information and local-node-supported Ethernet OAM capacity to each other by interacting the information OAM PDU. If the loopback configuration, unidirectional link detection configuration and link-event configuration have been passed on the Ethernet OAM of the two terminals, the Ethernet OAM protocol will start working on the link layer.

Link monitoring

The Ethernet OAM conducts the link monitoring through Event Notification OAM PDU. If the link has troubles and the local link monitors the troubles, the local link will transmit Event Notification OAM PDU to the peer Ethernet OAM to report the normal link event. The administrator can dynamically know the network conditions through link monitoring. The definition of a normal link event is shown in table 1.
Table 1 Definition of the normal link event

Command	Purpose
Period event of error signal	Specifies the signal number N as the period. The number of error signals exceeds signals are received.
Error frame event	The number of error frames exceeds the defined threshold during the unit time.
Period event of error frame	Specifies the frame number N as the period. The number of error frames exceeds are received.
Second frame of error frame	Specifies that the number of seconds of the error frame exceeds the defined threshold in the designated M second.

- Remote trouble indication

communication continues. OAM PDU defines a flag domain to allow Ethernet OAM entity to transmit the trouble information to the peer. The flag can stand for the following emergent link events:
a. Link Fault: The physical layer detects that the reception direction of the local DTE has no effect. If troubles occur, some
devices at the physical layer support unidirectional operations and allows trouble notification from remote OAM.
b. Dying Gasp: If an irrecoverable local error occurs, such as OAM shutdown, the interface enters the error-disabled state and then is shut down.
c. Critical Event: Uncertain critical events occur (critical events are specified by the manufacturer).
Information OAM PDU is continuously transmitted during Ethernet OAM connection. The local OAM entity can report local critical link events to remote OAM entity through Information OAM PDU. The administrator thus can dynamically know the link's state and handle corresponding errors in time.

- Remote loopback

OAM provides an optional link-layer-level loopback mode and conducts error location and link performance testing through nonOAM-PDU loopback. The remote loopback realizes only after OAM connection is created. After the OAM connection is created, the OAM entity in active mode triggers the remote loopback command and the peer entity responses the command. If the remote terminal is in loopback mode, all packets except OAM PDU packets and Pause packets will be sent back through the previous paths. Error location and link performance testing thus can be conducted. When remote DTE is in remote loopback mode, the local or remote statistics data can be queried and compared randomly. The query operation can be conducted before, when or after the loopback frame is transmitted to the remote DTE. Regular loopback check can promptly detect network errors, while segmental loopback check can help locating these network errors and then remove these errors.

- Round query of any MIB variables described in chapter 30 of 802.3.

1.1.2 OAM Mode

The device can conduct the OAM connection through two modes: active mode and passive mode. The device capacity in different mode is compared in table 2. Only OAM entity in active mode can trigger the connection process, while the OAM entity in passive mode has to wait for the connection request from the peer OAM entity. After the remote OAM discovery process is done, the local entity in active mode can transmit any OAM PDU packet if the remote entity is in active mode, while the local entity's operation in active mode will be limited if the remote entity is in passive mode. This is because the device in active mode does not react on remote loopback commands and variable requests transmitted by the passive remote entity.

Table 2 Comparing device capacity in active and passive modes

Capacity	**Active Mode**
Initializing the Ethernet OAM discovery process	Yes
Responding to the OAM discovery initialization process	Yes
Transmitting the Information OAM PDU packet	Yes
Permitting to transmit the Event Notification OAM PDU packet	Yes
Allowing to transmit the Variable Request OAM PDU packet	Yes
Allowing to transmit Variable Response OAM PDU packet	Yes
Allowing to transmit the Loopback Control OAM PDU packet	Yes
Responding to Loopback Control OAM PDU	Yes, but there is a request th must be in ACTIVE mode.
Allowing to transmit specified OAM PDU	Yes	Yes

After the Ethernet OAM connection is established, the OAM entities at two terminals maintain connection by transmitting the Information OAM PDU packets. If the Information OAM PDU packet from the peer OAM entity is not received in five seconds, the connection times out and a new OAM connection then requires to be established.

1.1.3 Components of the OAM Packet

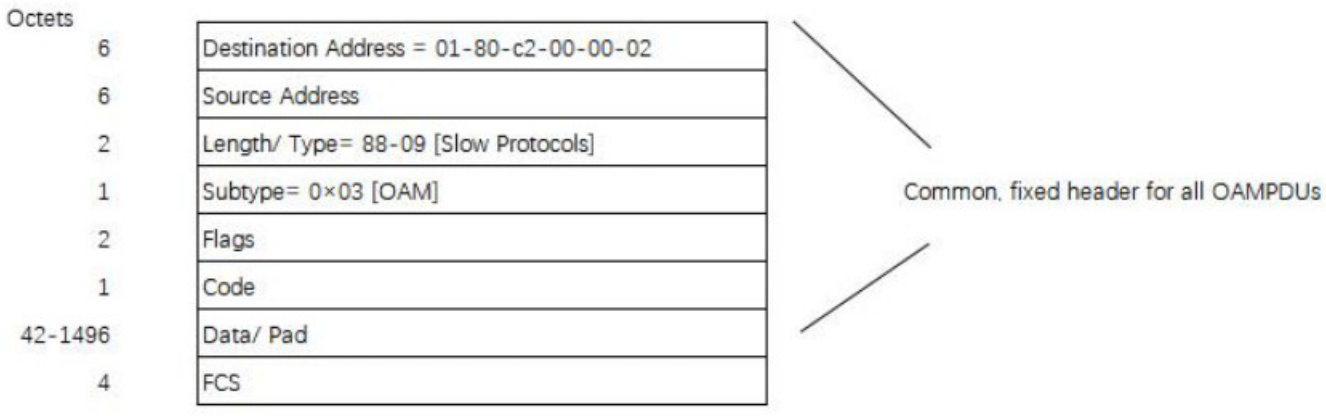

Figure 1 Components of the OAM packet

The following are the meanings of the fields of the OAM packet:

- Destination address: means the destination MAC address of the Ethernet OAM packet.
- Source address: Source MAC address of the Ethernet OAM packet It is the MAC address of the transmitter terminal's port and also a unicast MAC address.
- Length/Type: Always adopts the Type encoding. The protocol type of the Ethernet OAM packet is 0x8809.
- Subtype: The subtype of the protocol for Ethernet OAM packets is 0x03.
- Flags: a domain where the state of Ethernet OAM entity is shown
- Code: a domain where the type of the OAMPDU packet is shown
- Data/Pad: a domain including the OAMPDU data and pad values
- Checksum of the frame

Table 3 Type of the CODE domain

CODE	OAMPDU
0	Information
1	Event Notification
2	Variable Request
3	Variable Response
4	Loopback Control
05-FD	Reserved
FE	Organization Specific
FF	Reserved

The Information OAM PDU packet is used to transmit the information about the state of the OAM entity to the remote OAM entity to maintain the OAM connection.
The Event Notification OAMPDU packet is used to monitor the link and report the troubles occurred on the link between the local and remote OAM entities.
The Loopback control OAMPDU packet is mainly used to control the remote loopback, including the state of the OAM loopback from the remote device. The packet contains the information to enable or disable the loopback function. You can open or shut down the remote loopback according to the contained information.

1.2 OAM Configuration Task List

- Enabling OAM on an Interface
- Enabling Remote OAM Loopback
- Configuring OAM Link Monitoring
- Configuring the Trouble Notification from Remote OAM Entity
- Displaying the Information About OAM Protocol

1.3 OAM Configuration Tasks

1.3.1 Enabling OAM on an Interface Run the following command to enable OAM:

Procedure	Command	Purpose
Step1	config	Enters the GLOBAL configuration mode.
Step2	interface intf-type intf-id	Enters the interface configuration mode.
Step3	ethernet oam	Enables Ethernet OAM on an interface.
Step4	ethernet oam [max-rate oampdus | min-rate seconds | mode {active | pas sive} | timeout seconds]	Configures optional OAM parameters: • The max-rate parameter is used to configure the maximum nu second. It ranges between 1 and 10 and its default value is 10. • The min-rate parameter is used to configure the minimum tra econd. It ranges between 1 and 10 and its default value is 1. • The mode {active | passive} parameter is used to set the mod e established between two interfaces only when at least one in • The timeout parameter is used to set the timeout time of the (nd 30 seconds and its default value is 5 seconds.

You can run no Ethernet OAM to shut down the OAM function.
The remote OAM loopback cannot be enabled on the physical interface that belongs to the aggregation interface.

1.3.2 Configuring OAM Link Monitoring

You can configure the low threshold and the high threshold of OAM link monitoring.
The procedure to configure the remote OAM trouble indication on an interface is shown in the following table:

Procedure	Command	Purpose
Step1	config	Enters the GLOBAL configuration mode.
Step2	interface intf-type intf-id	Enters the interface configuration mode.
Step3	ethernet oam link-monitor negotiation-supported	Enables link monitoring on an interface. The

Step4	ethernet oam link-monitor symbol-period {threshold {high {symbols |none} | low {symbols}} | window symbols}	Sets the high and low threshold of the periodical event of the error signal, which triggers rameter is used to configure the high threshold. Its unit is signal number. It ranges between 1 and 65535 and its default value used to configure the low threshold. Its unit is signal number. It ranges between 0 and 65 and its default value is 1. The window parameter is used to configure the window size of dow size is the number of the 100M signal. The window size ranges between 10 and 60(ault value is 10 in this case, while the window size ranges between 1 and 60 on a 100M in this case.
Step5	ethernet oam link-monitor frame {threshold {high {symbols |none} | low {symbols}} | window symbols}	Sets the high and low thresholds of the error frame event, which triggers the link events er is used to configure the high threshold. Its unit is signal number. It ranges between 1 a e threshold high parameter is used to configure the low threshold. Its unit is signal numb efault value is 1. The window parameter is used to configure the window size of the roun between 1 and 60 and its default value is 1.
Step6	ethernet oam link-monitor frame-period {threshold {high {symbols |none} | low {symbols}} | window symbols}	Sets the high and low thresholds of the period event of error frame, which triggers the lin ld high parameter is used to configure the high threshold. Its unit is signal number. It rang value is none. The threshold high parameter is used to configure the low threshold. Its u d 65535 and its default value is 1. The window parameter is used to configure the windo f the window size is the number of the 14881 frames. The window size ranges between e and its default value is 100 in this case, while the window size ranges between 10 and efault value is 10 in this case.
Step7	ethernet oam link-monitor frame-seconds {threshold {high {symbols |none} | low {symbols}} | window symbols}	h Sets the high and low thresholds of the second event of error frame, which triggers the reshold high parameter is used to configure the high threshold. Its unit is signal number. t value is none. The threshold high parameter is used to configure the low threshold. Its and its default value is 1. The window parameter is used to configure the window size of t ranges between 10 and 900 and its default value is 60.
Step8	ethernet oam link-monitor receive-crc {threshold {high {symbols |none} | low {symbols}} | window symbols}	Sets the high and low thresholds of the error CRC frame event, which triggers the link ev d high parameter is used to configure the high threshold. Its unit is signal number. It rang ue is none. The threshold high parameter is used to configure the low threshold. Its unit 65535 and its default value is 1. The window parameter is used to configure the window cond. It ranges between 1 and 180 and its default value is 10.

1.3.3 Configuring the Trouble Notification from Remote OAM Entity

You can configure an error-disable action on an interface. The local interface will enter the errdisabled state in the following cases:

1. The high threshold of a normal link event on a local interface is exceeded.
2. The remote interface which connects the local interface enters the errdisabled state.
3. The OAM function on the remote interface which connects the local interface is shut down by the administrator.

The procedure to configure the remote OAM trouble indication on an interface is shown in the following table:

Procedure	Command	Purpose
Step1	config	Enters the GLOBAL configuration mode.
Step2	interface intf-type intf-id	Enters the interface configuration mode.
Step3	ethernet oam remote-failure {critical-event | dying-gasp | link-fault} action error-disableinterface	Configures the trigger action of a remote OAM trouble on an interface • The critical-event parameter is used to enable an interface to enter critical event occurs. • The dying-gasp parameter is used to enable the local interface to e threshold of a normal link event on a local interface is exceeded or if l interface enters the errdisabled state or if the OAM function on the r rface is shut down by the administrator. • The link-fault parameter is used to enable an interface to enter the gnal loss.

The switch cannot generate the LINK FAULT packets and the Critical Event packets. However, these packets will be handled if they are received from the remote terminal. router can transmit and receive the Dying Gasp packet. When the local port enters the err disabled state or is closed by the administrator or the OAM function of the local port is closed by the manager, the Dying Gasp packet will be transmitted to the remote terminal that connects the local port.

1.3.4 Displaying the Information about OAM Protocol

Table 4 Displaying the information about OAM protocol

Command	Purpose
show ethernet oam discovery interface [intf-type intf-id]	Displays the OAM discovery information on all interfaces or a designated interface.
show ethernet oam statistics {pdu | link-monitor | remote-failureinterface [intf-type intf-id]	Displays the OAM statistics information on all interfaces or a • The pdu parameter is used to classify and count the OAM p packet. • The link-monitor parameter is used to display the detailed s • The remote-failure parameter is to display the detailed stati
show ethernet oam configuration interface [intf-type intf-id]	Displays the OAM configuration information on all interfaces designated interface.
show ethernet oam runtime interface [intf-type intf-id]	Displays the OAM running information on all interfaces or a c des the control variables in some protocols and the latest 10

Configuration Example

1.4.1 Network Environment Requirements

You need configure the OAM protocol on the interface where two switches connect for capturing the information about the switch receiving error frames on user access side.

1.4.2 Network Topology

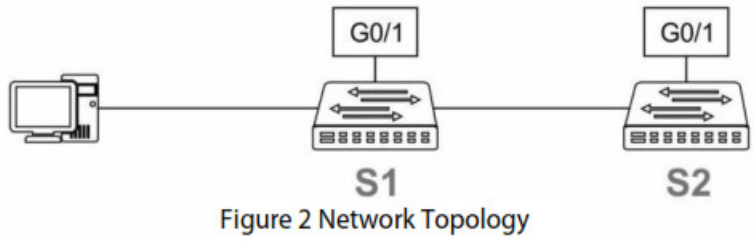

Figure 2 Network Topology

1.4.3 Configuration Procedure

Configuring switch S1:

```
Switch_config_g0/1#ethernet oam
Switch_config_g0/1#ethernet oam mode passive
Switch_config_g0/1#ethernet oam link-monitor frame threshold low 10
Switch_config_g0/1#ethernet oam link-monitor frame window 30
```

Switch_config_g0/1#show ethernet oam configuration int g0/1
GigaEthernet0/1
General
——
Admin
state: enabled
Mode: passive
PDU max rate: 10 packets/second
PDU min rate: 1 seconds/packet
Link timeout: 1 seconds
High threshold action: no action
Remote Failure
————-
Link
fault action: no action
Dying gasp action: no action
Critical event action: no action
Remote Loopback
————
Is supported: not supported
Loopback timeout: 2
Link Monitoring
————
Negotiation:
supported
Status: on
Errored Symbol Period Event
Window: 10 * 100M symbols
Low threshold: 1 error symbol(s)
High threshold: none
Errored Frame Event
Window: 30 seconds
Low threshold: 10 error frame(s)
High threshold: none
Errored Frame Period Event
Window: 100 * 14881 frames
Low threshold: 1 error frame(s)
High threshold: none
Errored Frame Seconds Summary Event
Window: 60 seconds
Low threshold: 1 error second(s)
High threshold: none
Errored CRC Frames Event
Window: 1 seconds
Low threshold: 10 error frame(s)
High threshold: none
Configuring switch S2:
Switch_config_g0/1#ethernet oam
Switch_config_g0/1#show ethernet oam statistics link-monitor int g0/1
GigaEthernet0/1
Local Link Events:
———
Errored
Symbol Period Event:
No errored symbol period event happened yet.
Errored Frame Event:
No errored frame event happened yet.
Errored Frame Period Event:
No errored frame period event happened yet.

Errored Frame Seconds Summary Event:
No errored frame seconds summary event happened yet.
Errored CRC Frames Event:
No errored CRC frame event happened yet.
Remote Link Events:

Errored
Symbol Period Event:
No errored symbol period event happened yet.
Errored Frame Event:
No errored frame event happened yet.
Errored Frame Period Event:
No errored frame period event happened yet.
Errored Frame Seconds Summary Event:
No errored frame seconds summary event happened yet.
Errored CRC Frames Event:
No errored CRC frame event happened yet.

Documents / Resources

	FS PoE+ Series Switches OAM Configuration [pdf] Instructions PoE Series Switches OAM Configuration, PoE Series, PoE Series OAM Configuration, Switches OAM Configuration, OAM Configuration, Switches OAM, Switches, OAM, S3150-8T2FP, S3260-8T2FP, S3260-16T4FP, S3400-24T4FP, S3400-48T4SP

References

- FS.com - Data Center, Enterprise, Telecom