Chapter 35: EFM

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35.1 EFM Overview

EFM (Ethernet of First Mile) as the first mile Ethernet, defined by the IEEE 802.3ah standard, used for the two devices point to point Ethernet link between the management and maintenance.

35.1.1 EFM Main Function

EFM Ethernet can effectively improve the management and maintenance capabilities toensure the stable operation of the network, its main features include:

Function	Remarks
EFM auto-discovery	EFM functionality built on the basis of connections, EFM connection establishment process is achieved by the auto-discovery of EFM. EFM work in two modes: active mode and passive mode, EFM connected only by the active mode of EFM entity initiated the passive mode EFM physical entity can only wait for the end of the connection requests are in a passive mode of the two an EFM can’t be established between the entities connected.
Remote failure indication	When the device detects a link event of an emergency, the fault will end EFM entity's Flag by Information OAMPDU fault information field (the type of emergency event link) EFM notification to the peer entity. In this way, administrators can log information by observing the dynamic understanding of the link state, the

	corresponding error in a timely manner for processing. Event types, including emergency Link Fault, Dying Gasp and Critical Event of three.
Link monitoring capabilities	Link monitoring function is used in a variety of environments and found that the link layer fault detection, EFM through interactive Event Notification OAMPDU to monitor the link: When the end of the EFM to detect the general physical link event, the Event Notification sent to its peer OAMPDU for notification, the administrator can log information by observing the network to dynamically control the situation. Event types include general link-errored-symbol-period, errored-frame, errored-frame-period, errored-frame-seconds four.
Remote loopback	Remote loopback is active mode EFM entity sends to the remote except OAMPDU than all other messages, the remote receives the packet forwarding address is not its purpose, but the road back to its original The end. Remote loopback is controlled by remote Loopback Control OAMPDU remote loopback or remote loopback operation to cancel the function can be used to detect the link quality and positioning of link failure.
Remote access to MIB variable function	EFM entities can interact with Variable Request / Response OAMPDU far end of the entity to obtain the MIB variable value.Include Ethernet MIB variable chain on the road all the performance parameters and error statistics. It provides a local EFM physical entity on the far side of the general performance and error detection mechanisms.

Description:

We said so to the EFM port functions as "EFM Entities".

35.1.2 EFM Protocol Packets

EFM working in the data link layer, the protocol packet is called OAMPDU (OAM Protocol DataUnits, OAM protocol data unit).EFM is through regular interaction between the device OAMPDU to report link status, enabling network administrators to effectively manage the network.

Message type	Effect
Information OAMPDU	EFM entity status for the information (including local information, the remote information and custom information) sent to the remote entity EFM, EFM connections to maintain.
Event Notification OAMPDU	Generally used for link monitoring on local and remote connected EFM physical link failures in the warning.
Loopback Control OAMPDU	Mainly use for remote loopback control in order to control the EFM loopback state of remote device. The packet has the information of enabling or disabling loopback .Enabling or disabling remote loopback based on this information.
Variable Request / Response OAMPDU	Mainly used for remoteMIBvariable values, in order to achieve the end of the remote state prosecution.

35.2 Configure EFM

35.2.1 EFM Configuration List

Configuration Task	Description	Detailed Configuration
EFM Basic Configuration	Required	35.2.2
Configure EFM Timer Parameter	Optional	35.2.3
Configure Remote Failure Indication	Optional	35.2.4
Configure Link Monitoring Capabilities	Optional	35.2.5
Enabling Remote Loopback	Optional	35.2.6
Rejecting Remote Loopback Requests Initiated by Remote	Optional	35.2.7
Initiating a Remote Loopback Request	Optional	35.2.8
Starting Remote Access Function MIB Variable	Optional	35.2.9
MIB Variable Access Requests Initiated by Remote	Optional	35.2.10
Display and Maintenance of EFM	Optional	35.2.11

35.2.2 EFM Basic Configuration

EFM mode of operation is divided into proactive mode and passive mode, when the EFM function enabled, the Ethernet port started to use the default mode of operation and the establishment of its peer port connected EFM.

Operation	Command	Remarks
Enter global configuration mode	**system-view**	
Enter port configuration mode.	**interface ethernet** *interface-num*	-
StartEFM	**efm**	By default, EFM is off

EFMmode configuration	**efm mode** { **passive** | **active** }	By default, EFM mode to active mode

35.2.3 Configure EFM Timer Parameter

EFM connection is established, both ends of the EFM entity will be a certain time interval to send Information OAMPDU cycle to detect whether the connection is normal, the interval is called the interval to send handshake packets. If one end of the connection timeout EFM entitywithin an entity does not receive remote EFM sent Information OAMPDU, EFM is considered disconnected.

EFM handshake by adjusting packet transmission interval and the connection timeout, the connection can change the EFM detection accuracy. With Configure OAMPDU remote request message to the response timeout, then discard the message which receiving the later response message to the OAMPDU if the time is out.

Operation	Command	Remarks
Enter global configuration mode	**system-view**	
Enter port configuration mode.	**interface ethernet** *interface-num*	
Configurethe interval to send handshake packetsEFM	**efm pdu-timeout** *time*	1s by default
Configure the connection timeoutEFM	**efm link-timeout** *time*	5s by default
Response timeout configuration	efm remote-response-timeout time	2s by default

Caution:

Because EFM connection times out, the local entity will EFM EFM aging and physical connection to the end of the relationship, the EFM connection is broken, so the connection must be greater than the timeout interval to send handshake packets (Recommended for 3 times or more) , otherwise it will lead to EFM connection instability.

35.2.4 Configure Remote Failure Indication

Operation	Command	Remarks
Enter global configuration mode	**system-view**	
Enter port configuration mode.	**interface ethernet** *interface-num*	
Startremote failure indication	**efm remote-failure** { **link-fault** | **dying-gasp** | **critical-event** }	By default,remote failure indication is enabled

Description:

Remote failure indication function device supports a single-pass function required to detect thelocal emergency link to the remote event notification, in the single-pass functions are not supported on the device, the local emergency is detected only in the event link end of reportingalarms and can’t notify the remote.

35.2.5 Configure Link Monitoring Capabilities

Operation	Command	Remarks
Enter global configuration mode	**system-view**	
Enter port configuration mode.	**interface ethernet** *interface-num*	
Startlink monitoring capabilities	**efm link-monitor** { **errored-symbol-period** | **errored-frame** | **errored-frame-period** | **errored-frame-seconds** }	By default, the link monitoring is enabled
Configureerrored-symbol-periodevent detection cycle	**efm link-monitor errored-symbol-period window high** *win-value1* **low** *win-value2*	
Configureerrored-symbol-periodevent detection threshold	**efm link-monitor errored-symbol-period threshold high** *th-value1* **low** *th-value2*	
Configureerrored-frameevent detection cycle	**efm link-monitor errored-frame window** *win-value*	
Configureerrored-frameevent detection threshold	**efm link-monitor errored-frame threshold** *th-value*	
Configureerrored-frame-periodevent detection cycle	**efm link-monitor errored-frame-period window** *win-value*	
Configureerrored-frame-periodevent detection threshold	**efm link-monitor errored-frame-period threshold** *th-value*	
Configureerrored-frame-secondsevent detection cycle	**efm link-monitor errored-frame-seconds window** *win-value*	

Configureerrored-frame-secondsev ent detection threshold	**efm link-monitor errored-frame-seconds** **threshold** *th-value*	

Description:

- errored-symbol-period threshold event detection cycle and a 64-bit integer value, **high** and **low** parameter values, respectively, after the value of the high and low 32-bit, that is, the integer value = **(high * (2 ^ 32))** + **low.**

35.2.6 Enabling Remote Loopback

By default, loopback at the far end is in the off state. It can only support the far end loopback device starts far end loopback.

Operation	Command	Remarks
Enter global configuration mode	**system-view**	
Enter port configuration mode.	**interface ethernet** *interface-num*	
Start remote loopback	**efm remote-loopback**	

35.2.7 Rejecting Remote Loopback Requests Initiated by Remote

As the remote loopback function will be affected normal business in order to avoid this situation, users can configure the local port of the peer sent from the Loopback Control OAMPDU control, which refused to end the remote initiated EFM loopback request.

Operation	Command	Remarks
Enter global configuration mode	**system-view**	
Enter port configuration mode.	**interface ethernet** *interface-num*	
Reject remote loopback requests initiated by remote	**efm remote-loopback** { **ignore** | **process** }	By default, the remote refused to initiate a remote loopback request

35.2.8 Initiating a Remote Loopback Request

Operation	Command	Remarks
Enter global configuration mode	**system-view**	
Enter port configuration mode.	**interface ethernet** *interface-num*	
Initiate a remote loopback request	**efm remote-loopback** { **start** | **stop** }	

Description:

- Only when the port EFM connection has been created, and the mode of EFM proactive mode, in order to launch on the far side of the port loopback request.
- Only the port side and far side far side loopback support feature, and in full-duplex chain on the road to achieve the far end loopback.
- In the open far end loopback, it will cause all data traffic in off; when the exit far end loopback, the local and remote port will be back to normal. Lead to far-side exit port loopback reasons: use undo EFM command to close the EFM function, use the EFM remote-loopback stop command or exit the far end loopback connected EFM over time and so on.

35.2.9 Starting Remote Access Function MIB Variable

Operation	Command	Remarks
Enter global configuration mode	**system-view**	
Enter port configuration mode.	**interface ethernet interface-num**	
		By default,
Startthe remote access		**remote access to**
	efm variable-retrieval	
functionMIBvariable		**MIB variable is**
		enabled

35.2.10 MIB Variable Access Requests Initiated by Remote

Operation	Command	Remarks
Enter global configuration mode	**system-view**	
Enter port configuration mode.	**interface ethernet** *interface-num*	
Port for the remote deviceMIBvariable value	**display efm port** *port-id-list* **remote-mib** { **phyadminstate** | **autonegadminstate** }	
Access to remote devices globalMIBvariable values	**display efm remote-mib** { **fecability** | **fecmode** }	

Description:

- Only when the port EFM connection has been created, EFM working model is for the proactive mode, the far side far side port supports MIB variable access function to the port on the far end of the MIB variable for initiating the request.
- Currently only supports remote query capability of FEC, FEC mode, port status and port to enable auto-negotiation enabled, the other MIB variables can later be added on demand to achieve.

35.2.11 Display and Maintenance of EFM

After completing the above configuration, you can use the following command to display the EFM configuration.

Operation	Command	Remarks
Display EFMprotocol running	**display efm status interface** [**ethernet** *interface-num*]	
Display summary informationEFM	**display efm summary**	
Display EFMfind information	**display efm discovery interface** [**ethernet** *interface-num*]	
Display EFMprotocol packet statistics	**display efm statistics interface** [**ethernet** *interface-num*]	
ClearEFMprotocol packet statistics	**clear efm statistics interface** [**ethernet** *interface-num*]	