CFM Support on Customer VLANs

First Published: April 19, 2010
Last Updated: February 13, 2011

CFM support on a customer VLAN (C-VLAN) allows a customer to provision maintenance intermediate points (MIPs) and Up maintenance endpoints (MEPs) on a C-VLAN component for dot1q-tunnel ports, selective Q-in-Q (QnQ) ports, and 802.1ad C-UNI (1:2 VLAN mapping) ports. MIPs and Up MEPs provide a customer with visibility to network traffic on the C-VLAN. CFM support on a C-VLAN also provides a common point for service verification and standardizes the user-network interface (UNI).

This document describes the CFM Support on C-VLANs feature, an enhancement to the current IEEE CFM implementation in Cisco IOS software.

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the "Feature Information for CFM Support on C-VLANs" section on page 5.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

Contents

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Prerequisites for CFM Support on C-VLANs

- The CFM 8.1ag module must be present in the software image.

Restrictions for CFM Support on C-VLANs

- CFM support on C-VLANs is supported only in the IEEE CFM protocol.
- CFM support on C-VLANs is supported only on switch ports.
- A port must be configured to tunnel from a C-VLAN into a service provider (S-VLAN); otherwise, the C-VLAN MEP configured for that service is inactive and does not process CFM messages. The C-VLAN MEP can still be configured but it is inactive.
- Down MEPs in a C-VLAN component can be configured but are always inactive.
- Autocreation of MIPs on double-tagged services is not supported.
- CFM is transparent if it is configured on a physical interface where cross-connect is configured.

Information About CFM Support on C-VLANs

Dot1q Tunnel and Selective QnQ Interfaces

A dot1q-tunnel or selective QnQ interface represents a demarcation point between a C-VLAN space and an S-VLAN space. For purposes of CFM protocol processing, a dot1q-tunnel port is modeled as having two components: a C-VLAN component and an S- VLAN component. The C-VLAN component processes double-tagged packets from the relay-function and single-tagged packets from the wire. The S-VLAN component processes single-tagged packets from the relay-function and untagged packets from the wire.

CFM traffic belonging to each of the C-VLAN and S-VLAN components can be distinguished based on Ethernet layer encapsulation. This distinction allows each of the components to use the entire maintenance level range (0 to 7) without violating the maintenance domain hierarchy.

The CFM traffic generated by the C-VLAN component is transparent to the S-VLAN component if the maintenance levels of the C- VLAN component are lower than those of the S-VLAN component. The Ethernet encapsulation should be used in combination with the CFM maintenance level to determine which maintenance domain a particular traffic flow belongs to.

CFM Support on C-VLANs

The current implementation of IEEE CFM for switch ports in Cisco IOS software provides for the provisioning of maintenance points only on S-VLANs; customers cannot monitor or troubleshoot their networks if they are provisioned on provider edge (PE) devices as aggregation nodes supporting QnQ or 802.1ad services. Double-tagged CFM frames going into a dot1q-tunnel port either from the wire or from the relay-function are transparently forwarded; thus, customers cannot create C-VLAN maintenance points on the PE bridge.

The CFM Support on C-VLANs feature enhances the current IEEE CFM implementation in Cisco IOS software by allowing customers to provision MIPs and Up MEPs on the C-VLAN component and adds support for a new service type, ECFM_SERVICE_CVLAN.

The two sections that follow describe the CFM functions of the S-VLAN and C-VLAN components with the CFM Support on C-VLANs feature implemented.

S-VLAN Component with CFM Support on C-VLANs

With the CFM Support on C-VLANs feature implemented, the S-VLAN component supports the following functions and attributes:

- Up MEPs at any level (0 to 7).
- All MEPs use the port's access VLAN (the outer tag or S-VLAN).
- CFM frames transmitted and received by Up MEPs have a single VLAN tag (the Ethertype may be dot1q or dot1ad), and the VID is equal to the port's access VLAN (S-VLAN).

  The reason for this configuration is that the dot1q-tunnel interface marks the endpoint of the S-VLAN domain; hence, its associated S-VLAN component should mark the endpoint of the CFM domain running over the S-VLAN space.

C-VLAN Component with CFM Support on C-VLANs

With the CFM Support on C-VLANs feature implemented, the C-VLAN component supports the following functions and attributes:

- MIPs at any maintenance level (0 to 7).
- MIPs process CFM frames that are single-tagged when they come from the wire and double-tagged when they come from the relay-function.
- Transparent point functions.
- Up MEPs at any maintenance level (0 to 7).
- Up MEPs use a stack of two tags: an outer tag with a VID equal to the port's access VLAN (S-VLAN) and an inner tag with a selected C-VLAN that is allowed through the dot1q-tunnel port.

Note CFM frames transmitted and received by Up MEPs are always double-tagged.

Additional References

Related Documents

Related Topic	Document Title
Cisco IOS commands: master list of commands with complete command syntax, command mode, command history, defaults, usage guidelines, and examples	*Cisco IOS Master Commands List, All Releases*
Cisco IOS Carrier Ethernet commands: complete command syntax, command mode, command history, defaults, usage guidelines, and examples	*Cisco IOS Carrier Ethernet Command Reference*
Configuring Carrier Ethernet	*Cisco IOS Carrier Ethernet Configuration Guide*

Standards

Standard	Title
IEEE 802.1ag-2007	*IEEE Standard for Local and Metropolitan Area Networks Virtual Bridged Local Area Networks*

MIBs

MIB	MIBs Link
IEEE8021-CFM-V2-MIB	To locate and download MIBs for selected platforms, Cisco software releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

Technical Assistance

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for CFM Support on C-VLANs

Table 1 lists the release history for this feature.

Use Cisco Feature Navigator to find information about platform support and software image support. Cisco Feature Navigator enables you to determine which software images support a specific software release, feature set, or platform. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

Note Table 1 lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Table 1 Feature Information for CFM Support on C-VLANs

Feature Name	Releases	Feature Information
802.1ag-2007 CFM MEP Support on C- VLAN Component	12.2(54)SE	CFM support on a C-VLAN allows a customer to provision Up MEPs and MIPs on a C-VLAN component for 802.1q-tunnel or 802.1ad ports. Up MEPs and MIPs provide a customer with visibility to network traffic on the C-VLAN. In 12.2(54)SE, this feature was introduced on the Cisco ME 3400, ME 3400E, and Catalyst 3750 Metro switch platforms. The following commands were introduced or modified: **debug ethernet cfm events**, **debug ethernet cfm packets**, **ethernet cfm mep crosscheck**, **ethernet cfm mep domain**, **ethernet cfm mip level**, **ping**, **service**, **show ethernet cfm errors**, **show ethernet cfm domain**, **show ethernet cfm maintenance-points local**, **show ethernet cfm maintenance-points remote**, **show ethernet cfm maintenance-points remote detail**, **show ethernet cfm mpdb**, **show ethernet cfm traceroute-cache**, **traceroute ethernet**.