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Tech Notes

System Requirements to Implement Trunking

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Contents

Introduction

Each section of this document contains the system requirements to implement trunking on Catalyst series switches.

Prerequisites

Requirements

- Trunking capabilities are hardware-dependent. See the System Requirements by Switch Type section of this document for platform-specific information.

- For Cisco Catalyst switches that run Catalyst OS (CatOS), you can issue the **show port capabilities** command to determine which trunking encapsulations have support. There is support for this command in all releases of CatOS software for the Catalyst 4500/4000 and Catalyst 6500/6000 series switches. The Catalyst 5500/5000 first introduced support for the command in release 4.1.

Components Used

This document is not restricted to specific software and hardware versions.

Conventions

For more information on document conventions, refer to the [Cisco Technical Tips Conventions](#).

Background Theory

A trunk is a point-to-point link between one or more Ethernet switch ports and another network device, such as a router or a switch. Trunks carry the traffic of multiple VLANs over a single link and allow you to extend VLANs across an entire network.

Two trunking encapsulations are available, which depend on the hardware:

- Inter-Switch Link Protocol (ISL) ISL is a Cisco-proprietary trunking encapsulation. For more information on ISL, refer to the document [InterSwitch Link and IEEE 802.1Q Frame Format](#).

- IEEE 802.1Q 802.1Q is an industry-standard trunking encapsulation. For more information on 802.1Q, refer to the document [Trunking Between Catalyst 4500/4000, 5500/5000, and 6500/6000 Series Switches Using 802.1Q Encapsulation with Cisco CatOS System Software](#).

The Dynamic Trunking Protocol (DTP) manages trunk negotiation. DTP supports autonegotiation of both ISL and 802.1Q trunks. Some Catalyst switches do not support trunk negotiation through DTP. See the [802.1Q/ISL Encapsulation and DTP Support](#) section of this document for more information.

802.1Q/ISL Encapsulation and DTP Support

The table that follows shows which Catalyst switches support 802.1Q and ISL encapsulation and DTP.

Important Notes

- Even with the indication of support for 802.1Q or ISL encapsulation, there may be exceptions for some switching modules per platform. See the [System Requirements by Switch Type](#) section of this document for any exceptions.

- Cisco routers and some Catalyst switches do not support trunk negotiation through DTP. If you want to establish a trunk between a switch that supports DTP and one that does not support DTP, use the *nonegotiate* keyword on the DTP-capable device. Use of this keyword causes the port to become a trunk but not generate DTP frames.

Platform	802.1Q	ISL	DTP
Catalyst 6500/6000 (CatOS)	Yes	Yes	Yes
Catalyst 6500/6000 (Cisco IOS® Software)	Yes	Yes	Yes
Catalyst 5500/5000	Yes	Yes	Yes
Catalyst 4500/4000 (CatOS), which includes 2948G/2980G/4912G	Yes	No	Yes
Catalyst 4500/4006 (Cisco IOS Software)	Yes	Yes	Yes
Catalyst 3750	Yes	Yes	Yes
Catalyst 3560/3550	Yes	Yes	Yes

Catalyst 2970	Yes	Yes	Yes
Catalyst 2950/2955	Yes	No	Yes
Catalyst 2940	Yes	No	Yes
Catalyst 2900XL/3500XL	Yes	Yes	No
Catalyst 2948G-L3/4908G-L3/4840G	Yes	Yes	No
Catalyst 3000	No	Yes	Yes
Catalyst 1900/2800	No	Yes	Yes
Catalyst 8500	Yes	Yes	No

Suggested Trunking Mode Between Catalyst Switches

This table displays the suggested trunking modes between Catalyst switches:

Recommended Trunking Modes Between Catalyst Platforms		Neighboring Catalyst Switch (Connection to This Switch)							
		6500/6000, 4500/4000, 5500/5000 (CatOS)	6500/6000, 4500/4000, 5500/5000 (Cisco IOS Software)	3750, 3560, 3550, 2955, 2950	3000	2900XL, 3500XL	1900, 2820	2948G-L3, 4908G-L3, 4840G	8500
Local Catalyst Switch (Point of Reference)	Catalyst 6500/6000, 4500/4000, 5500/5000 (CatOS)	Local: desirable Neighbor: desirable	Local: desirable Neighbor: dynamic desirable	Local: desirable Neighbor: dynamic desirable	Local: desirable Neighbor: desirable	Local: nonegotiate Neighbor: trunk*	Local: desirable Neighbor: desirable	Local: nonegotiate Neighbor: See below**	Local: nonegotiate Neighbor: See below**
	Catalyst 6500/6000, 4500/4000, 5500/5000 (Cisco IOS Software)	Local: dynamic desirable Neighbor: desirable	Local: dynamic desirable Neighbor: dynamic desirable	Local: dynamic desirable Neighbor: dynamic desirable	Local: dynamic desirable Neighbor: desirable	Local: nonegotiate Neighbor: trunk*	Local: dynamic desirable Neighbor: desirable	Local: nonegotiate Neighbor: See below**	Local: nonegotiate Neighbor: See below**
	Catalyst 3750, 3560, 3550, 2955, 2950	Local: dynamic desirable Neighbor: desirable	Local: dynamic desirable Neighbor: dynamic desirable	Local: dynamic desirable Neighbor: dynamic desirable	Local: dynamic desirable Neighbor: desirable	Local: nonegotiate Neighbor: trunk*	Local: dynamic desirable Neighbor: desirable	Local: nonegotiate Neighbor: See below**	Local: nonegotiate Neighbor: See below**
	2500XL, 3500XL	Local: trunk* Neighbor: nonegotiate	Local: trunk* Neighbor: nonegotiate	Local: trunk* Neighbor: nonegotiate	Local: trunk Neighbor: nonegotiate	Local: trunk* Neighbor: trunk*	Local: trunk* Neighbor: nonegotiate	Local: trunk* Neighbor: See below**	Local: trunk* Neighbor: See below**
	3000	Local: desirable Neighbor: desirable	Local: desirable Neighbor: dynamic desirable	Local: desirable Neighbor: dynamic desirable	Local: desirable Neighbor: desirable	Local: on Neighbor: trunk*	Local: desirable Neighbor: desirable	Local: on Neighbor: See below**	Local: on Neighbor: See below**

	1900, 2820	Local: trunk desirable Neighbor: desirable	Local: trunk desirable Neighbor: dynamic desirable	Local: trunk desirable Neighbor: dynamic desirable	Local: trunk desirable Neighbor: dynamic desirable	Local: trunk nonegotiate Neighor: trunk*	Local: trunk desirable Neighor: desirable	Local: trunk nonegotiate Neighbor: See below**	Local: trunk nonegotiate Neighbor: See below**

* The Catalyst 2900XL/3500XL switches only have one trunking mode, which does not support DTP. To configure trunking, issue the **switchport mode trunk** command.

** The Catalyst 2948G-L3, 4908G-L3, 4840G, and 8500 are Layer 3 (L3) switches and do not have a trunking mode. The configuration of these switches is similar to the connection of a router to a switch and configuration of the router for trunking.

System Requirements by Switch Type

Catalyst 6500/6000 Series Switches (CatOS)

This section refers to the Catalyst 6500/6000 with Supervisor Engine I, II, or 720 that runs CatOS.

- All Ethernet ports support 802.1Q and ISL encapsulation, with the exception of the 10-Gigabit Ethernet switching module. The 10-Gigabit Ethernet switching module does not support ISL.

- Issue the **show port capabilities** command to determine which encapsulation types have support with each module.

For more information on ISL/802.1Q trunk modes, configuration guidelines and restrictions, sample configurations, and troubleshoot procedures, refer to the Catalyst LAN and ATM Switches support page for Catalyst 6500 Series Switches or Catalyst 6000 Series Switches.

Catalyst 6500/6000 Series Switches (Cisco IOS Software)

This section refers to the Catalyst 6500/6000 with Supervisor Engine I, II, or 720 that runs Cisco IOS Software.

- All Ethernet interfaces support 802.1Q encapsulation.

- The 10-Gigabit Ethernet modules and certain other switching modules do not support ISL encapsulation. Issue the **show interfaces capabilities** command (which has support in Cisco IOS Software Release 12.1(11a)E and later) to determine which encapsulation types have support with each module.

For more information on ISL/802.1Q trunk modes, configuration guidelines and restrictions, sample configurations, and troubleshoot procedures, refer to the Catalyst LAN and ATM Switches support page for Catalyst 6500 Series Switches or Catalyst 6000 Series Switches.

Catalyst 5500/5000 Series Switches

This section refers to all Catalyst 5500/5000 series switches, which include the fixed configuration 2901, 2902, 2926F, 2926T, 2926GS, and 2929GL switches.

- Software releases 4.1 and later support 802.1Q encapsulation.

- Trunking capabilities are hardware-dependent. To determine whether a specific module supports trunking on a Catalyst 5500/5000 series switch and to determine which trunking encapsulations have support, issue the **show port capabilities** command.

For more information on ISL/802.1Q trunk modes, configuration guidelines and restrictions, sample configurations, and troubleshoot procedures, refer to the Catalyst LAN and ATM Switches support page for Catalyst 5500 Series Switches or Catalyst 5000 Series Switches.

Catalyst 4500/4000 Series Switches (CatOS)

The section refers to the Catalyst 4003, 4006, and 4500 with Supervisor Engine I (WS-X4012), Supervisor Engine II (WS-X4013), or the WS-C2948G, WS-C2980G, and the WS-C4912G fixed configuration switches that run CatOS.

- All Ethernet ports support 802.1Q encapsulation.

- There is no support for ISL encapsulation.

- Issue the **show port capabilities** command to determine which encapsulation types have support with each module.

For more information on ISL/802.1Q trunk modes, configuration guidelines and restrictions, sample configurations, and troubleshoot procedures, refer to the Catalyst LAN and ATM Switches support page for Catalyst 4500 Series Switches or Catalyst 4000 Series Switches.

Catalyst 4500/4006 Series Switches (Cisco IOS Software)

This section refers to the Catalyst 4006 or Catalyst 4503, 4506, and 4507R switches with the Supervisor Engine II-Plus (WS-X4013+), Supervisor Engine III (WS-X4014), or Supervisor Engine IV (WS-X4515) that run Cisco IOS Software.

- All Ethernet interfaces support 802.1Q and ISL encapsulation, with the exception of the blocking Gigabit ports on the WS-X4418-GB and WS-X4412-2GB-T modules. These blocking Gigabit ports do not support ISL.

Note: Ports 3 to 18 are blocking Gigabit ports on the WS-X4418-GB module. Ports 1 to 12 are blocking Gigabit ports on the WS-X4412-2GB-T module.

For more information on ISL/802.1Q trunk modes, configuration guidelines and restrictions, sample configurations, and troubleshoot procedures, refer to the Catalyst LAN and ATM Switches support page for Catalyst 4500 Series Switches or Catalyst 4000 Series Switches.

Catalyst 3750 Series Switches

This section refers to all Catalyst 3750 series switches.

- All Ethernet interfaces support 802.1Q and ISL encapsulation.

For more information on ISL/802.1Q trunk modes, configuration guidelines and restrictions, sample configurations, and troubleshoot procedures, refer to the Catalyst LAN and ATM Switches support page for Catalyst 3750 Series Switches.

Catalyst 3560 Series Switches

This section refers to all Catalyst 3560 series switches.

- All Ethernet interfaces support 802.1Q and ISL encapsulation.

For more information on ISL/802.1Q trunk modes, configuration guidelines and restrictions, sample configurations, and troubleshoot procedures, refer to the Catalyst LAN and ATM Switches support page for Catalyst 3560 Series Switches.

Catalyst 3550 Series Switches

This section refers to all Catalyst 3550 series switches.

- All Ethernet ports support 802.1Q and ISL encapsulation.

For more information on ISL/802.1Q trunk modes, configuration guidelines and restrictions, sample configurations, and troubleshoot procedures, refer to the Catalyst LAN and ATM Switches support page for Catalyst 3550 Series Switches.

Catalyst 2970 Series Switches

This section refers to all Catalyst 2970 series switches.

- All Ethernet interfaces support 802.1Q and ISL encapsulation.

For more information on ISL/802.1Q trunk modes, configuration guidelines and restrictions, sample configurations, and troubleshoot procedures, refer to the [Catalyst LAN and ATM Switches](#) support page for [Catalyst 2970 Series Switches](#).

Catalyst 2950/2955 Series Switches

This section refers to all Catalyst 2950 and 2955 series switches.

- All Ethernet interfaces support 802.1Q.
- There is no support for ISL encapsulation.

For more information on ISL/802.1Q trunk modes, configuration guidelines and restrictions, sample configurations, and troubleshoot procedures, refer to the [Catalyst LAN and ATM Switches](#) support page for [Catalyst 2950 Series Switches](#).

Catalyst 2940 Series Switches

This section refers to all Catalyst 2940 series switches.

- All Ethernet interfaces support 802.1Q encapsulation.
- There is no support for ISL encapsulation.

For more information on ISL/802.1Q trunk modes, configuration guidelines and restrictions, sample configurations, and troubleshoot procedures, refer to the [Catalyst LAN and ATM Switches](#) support page for [Catalyst 2940 Series Switches](#).

Catalyst 2900 XL/3500XL Series Switches

For more information on these switches, refer to the list of support pages that follows.

- Minimum software requirement for ISL trunking: Cisco IOS Software Release 11.2(8)SA4 (Enterprise Edition Software).
- Minimum software requirement for 802.1Q trunking: Cisco IOS Software Release 11.2(8)SA5 (Enterprise Edition Software).
- The standard and enterprise edition features come in one release for Cisco IOS Software Release 12.0(5)XU and later.
- When you use Customer Premises Equipment (CPE) with the 2900 Long Reach Ethernet (LRE) XL switch, there is support for only 802.1Q.
- The 4 MB Catalyst 2900XL series switches do not support trunking.
- Refer to these links to determine the modules/hardware that support trunking with Cisco IOS Software releases earlier than Cisco IOS Software Release 12.0(5)XU:
  - Cisco IOS Software Release 12.0(5)XP-EN [Hardware and Supporting Software](#).
  - Cisco IOS Software Release 11.2(8)SA6-EN [Hardware and Supporting Software](#).
  - Cisco IOS Software Release 11.2(8)SA5-EN [Software and Hardware Supported](#).
  - Cisco IOS Software Release 11.2(8)SA4-EN [Cisco IOS Software and Hardware Supported](#).
- There is no support for DTP.

Catalyst 2948G-L3/4908G-L3/4840G Switch

This section refers to the Catalyst 2948G-L3, 4840G, and 4908G-L3 switches.

- All Ethernet interfaces support 802.1Q and ISL.

- There is no support for DTP.

Note: These switches support only L3 trunks. You must configure subinterfaces in the way that you configure on a trunking-capable router.

For more information on ISL/802.1Q trunk modes, configuration guidelines and restrictions, sample configurations, and troubleshoot procedures, refer to the [Catalyst LAN and ATM Switches](#) support page for [Catalyst G-L3 Series Switches](#).

Catalyst 3000 Series Switches

This section refers to the Catalyst 3016B, 3100, and 3200 switches.

- There is support for ISL encapsulation only on the WS-X3009 two-port 100BASE-FX module and the WS-X3010 two-port 100BASE-TX module.

- There is no support for 802.1Q encapsulation.

- There is support for DTP in ISL only.

For more information on ISL configuration guidelines, refer to the [Catalyst LAN and ATM Switches](#) support page for [Catalyst 3000 Series Switches](#).

Catalyst 1900/2820 Series Switches

This section refers to the Catalyst 1900 and Catalyst 2820 switches.

- All Ethernet ports support ISL encapsulation. Enterprise Edition software is necessary.

- There is no support for 802.1Q.

- There is support for DTP in ISL only.

For more information on ISL configuration guidelines and restrictions, sample configurations, and troubleshoot procedures, refer to the [Catalyst LAN and ATM Switches](#) support pages for either [Catalyst 1900 Series Switches](#) or [Catalyst 2800 Series Switches](#).

Catalyst 8500 Series Switch Routers

This section refers to all Catalyst 8510 campus switch router (CSR)/multiservice ATM switch router (MSR) and 8540 CSR/MSR switches.

- All Ethernet interfaces support 802.1Q and ISL encapsulation.

- There is no support for DTP.

Note: These switches support only L3 trunks. You must configure subinterfaces in the way that you configure on a trunking-capable router.

For more information on ISL/802.1Q configuration guidelines and restrictions, sample configurations, and troubleshoot procedures, refer to the [Catalyst LAN and ATM Switches](#) support page for [Catalyst 8500 Series Campus Switch Routers](#).

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