IPX Encapsulation for 802.10 VLAN

This feature module describes the IPX Encapsulation for 802.10 virtual LANs (VLANs) feature. It includes information on the benefits of the new feature, supported platforms, related documents, and so forth.

This document includes the following sections:

Feature Overview

The IPX Encapsulation for 802.10 VLAN feature provides configurable IPX (Novell-FDDI, SAP, SNAP) encapsulation over 802.10 VLAN on router FDDI interfaces to connect the Catalyst 5000 VLAN switch. This feature extends Novell NetWare routing capabilities to include support for routing all standard IPX encapsulations for Ethernet frame types in VLAN configurations. Users with Novell NetWare environments can now configure any one of the three IPX Ethernet encapsulations to be routed using the Secure Data Exchange (SDE) encapsulation across VLAN boundaries. IPX encapsulation options now supported for VLAN traffic include:

- Novell-FDDI (IPX FDDI RAW to 802.10 on FDDI)
- SAP (IEEE 802.2 SAP to 802.10 on FDDI)
- SNAP (IEEE 802.2 SNAP to 802.10 on FDDI)

NetWare users can now configure consolidated VLAN routing over a single VLAN trunking FDDI interface. Not all IPX encapsulations are currently supported for SDE VLAN. The IPX interior encapsulation support can be achieved by messaging the IPX header before encapsulating in the SDE format. Fast switching will also support all IPX interior encapsulations on non-MCI platforms (for example non-AGS+ and non-7000). With configurable Ethernet encapsulation protocols, users have the flexibility of using VLANs regardless of their NetWare Ethernet encapsulation. Configuring Novell IPX encapsulations on a per-VLAN basis facilitates migration between versions of Netware. NetWare traffic can now be routed across VLAN boundaries with

standard encapsulation options (arpa, sap, and snap) previously unavailable. Encapsulation types and corresponding framing types are described in the "Configuring Novell IPX" chapter of the *Network Protocols Configuration Guide, Part 2*.

Benefits

For Novell environments migrating to Netware 4.1and later, this feature supports multiple encapsulations to facilitate Catalyst switching.

Restrictions

Only one type of IPX encapsulation can be configured per VLAN (subinterface). The IPX encapsulation used must be the same within any particular subnet; a single encapsulation must be used by all NetWare systems that belong to the same VLAN.

Related Features and Technologies

- IPX routing
- IPX fast switching

Related Documents

- *Catalyst 5000 Software Configuration Guide*, Release 5.1
- *Catalyst 5000 Command Reference*, Release 5.1
- *Cisco IOS Switching Services Configuration Guide*, Release 12.0
- *Cisco IOS Switching Services Command Reference*, Release 12.0
- *Network Protocols Configuration Guide, Part 2*, Release 12.0
- *Network Protocols Command Reference, Part 2*, Release 12.0

Supported Platforms

This feature is supported on the following platforms:

- Cisco 3600 series
- Cisco 4000-M series (Cisco 4000-M, 4500-M, 4700-M)
- Cisco 7200 series
- Cisco 7500 series

Supported Standards, MIBs, and RFCs

Standards

The IPX Encapsulation for 802.10 VLAN feature supports the IEEE standard encapsulation format 802.10.

MIBs

None

RFCs

None

Configuration Tasks

To configure Cisco IOS software on a router with connected VLANs to exchange different IPX framing protocols, perform these tasks in the order in which they are appear:

- Enabling NetWare Routing (Required)
- Defining the VLAN Encapsulation Format (Required)
- Configuring NetWare on the Subinterface (Required)

For examples of IPX configurations, see the "Configuration Examples" section later in this document.

Enabling NetWare Routing

To enable IPX routing on SDE interfaces, use the following command in global configuration mode:

Command	Purpose
`Router(config)# ipx routing [node]`	Enables IPX routing globally.

Defining the VLAN Encapsulation Format

To define the encapsulation format as SDE, use the following commands in interface configuration mode:

Step	Command	Purpose
1	`Router(config)# interface fddi slot/port.subinterface-number`	Specifies the subinterface on which SDE will be used.
2	`Router(config-if)# encapsulation sde vlan-identifier`	Defines the encapsulation format and specifies the VLAN identifier.

Configuring NetWare on the Subinterface

After you enable NetWare globally and define the VLAN encapsulation format, you need to enable the subinterface by specifying the NetWare network number (if necessary) and the encapsulation type. Use this command in interface configuration mode:

Command	Purpose
`Router(config-if)# ipx network network encapsulation encapsulation-type`	Specifies the IPX encapsulation among Novell-FDDI, SAP, or SNAP.

Configuration Examples

The following example enables IPX routing on FDDI interfaces 0.2 and 0.3 with SDE. On FDDI interface 0.2, the encapsulation type is SNAP. On FDDI interface 0.3, the encapsulation type is Novell's FDDI_RAW.

```
ipx routing

interface fddi 0.2 enc sde 2
 ipx network f02 encapsulation snap

interface fddi 0.3 enc sde 3
 ipx network f03 encapsulation novell-fddi
```

Command Reference

This section documents new or modified commands. All other commands used with this feature are documented in the Cisco IOS Release 12.0 command reference publications.

- **ipx network**

ipx network

To enable IPX routing on a FDDI interface and to optionally select the type of encapsulation (framing), use the **ipx network** interface configuration command. To disable IPX routing, use the **no** form of this command.

ipx network *network* [**encapsulation** *encapsulation-type* [**secondary**]]

no ipx network *network* [**encapsulation** *encapsulation-type*]

Syntax Description

network	Network number. This is an eight-digit hexadecimal number that uniquely identifies a network cable segment. It can be a number in the range 1 to FFFFFFFD. You do not need to specify leading zeros in the network number. For example, for the network number 000000AA you can enter AA.
encapsulation *encapsulation-type*	(Optional) Type of encapsulation (framing). It can be one of the following values: • **novell-fddi** —FDDI interfaces—Use Novell's "FDDI_RAW" encapsulation. This encapsulation consists of a standard FDDI MAC header followed directly by the IPX header with a checksum of 0xFFFF. • **sap** —FDDI interfaces—This encapsulation consists of a standard FDDI MAC header followed by an 802.2 LLC header. • **snap** — FDDI interfaces—This encapsulation consists of a standard 802.5 or FDDI MAC header followed by an 802.2 SNAP LLC header.
secondary	(Optional) Indicates an additional (secondary) network configured after the first (primary) network.

Defaults

IPX routing is disabled.

Encapsulation types:
For FDDI: **snap**

If you use NetWare Version 4.0 and Ethernet, you must change the default encapsulation type from **novell-ether** to **sap**.

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.
12.0(1)T	The command's encapsulation types was updated.

Usage Guidelines

The **ipx network** command allows you to configure a single logical network on a physical network or more than one logical network on the same physical network (network cable segment). Each network on a given interface must have a different encapsulation type.

The first network you configure on an interface is considered to be the primary network. Any additional networks are considered to be secondary networks; these must include the **secondary** keyword.

In future Cisco IOS software releases, primary and secondary networks will not be supported.

NLSP does not support secondary networks. You must use subinterfaces in order to use multiple encapsulations with NLSP.

When enabling NLSP and configuring multiple encapsulations on the same physical LAN interface, you must use subinterfaces. You cannot use secondary networks.

You can configure an IPX network on any supported interface as long as all the networks on the same physical interface use a distinct encapsulation type. For example, you can configure up to four IPX networks on a single Ethernet cable because Ethernet supports four encapsulation types.

The interface processes only packets with the correct encapsulation and the correct network number. IPX networks using other encapsulations can be present on the physical network. The only effect on the router is that it uses some processing time to examine packets to determine whether they have the correct encapsulation.

All logical networks on an interface share the same set of configuration parameters. For example, if you change the IPX RIP update time on an interface, you change it for all networks on that interface.

When you define multiple logical networks on the same physical network, IPX treats each encapsulation as if it were a separate physical network. This means, for example, that IPX sends RIP updates and SAP updates for each logical network.

The **ipx network** command is useful when migrating from one type of encapsulation to another. If you are using it for this purpose, you should define the new encapsulation on the primary network.

To delete all networks on an interface, use the following command:

```
no ipx network
```

Deleting the primary network with the following command also deletes all networks on that interface. The argument *number* is the number of the primary network.

```
no ipx network number
```

To delete a secondary network on an interface, use one of the following commands. The argument *number* is the number of a secondary network.

```
no ipx network number
no ipx network number encapsulation encapsulation-type
```

Novell's FDDI_RAW encapsulation is common in bridged or switched environments that connect Ethernet-based Novell end hosts via a FDDI backbone. Packets with FDDI_RAW encapsulation are classified as Novell packets, and are not automatically bridged when you enable both bridging and

IPX routing. Additionally, you cannot configure FDDI_RAW encapsulation on an interface configured for IPX autonomous or SSE switching. Similarly, you cannot enable IPX autonomous or SSE switching on an interface configured with FDDI_RAW encapsulation.

With FDDI_RAW encapsulation, platforms that do not use CBus architecture support fast switching. Platforms using CBus architecture support only process switching of **novell-fddi** packets received on an FDDI interface.

Examples

The following example enables IPX routing on FDDI interfaces 0.2 and 0.3 with SDE. On FDDI interface 0.2, the encapsulation type is SNAP. On FDDI interface 0.3, the encapsulation type is Novell's FDDI_RAW.

```
ipx routing

interface fddi 0.2 enc sde 2
 ipx network f02 encapsulation snap

interface fddi 0.3 enc sde 3
 ipx network f03 encapsulation novell-fddi
```

Related Commands

Command	Description
ipx routing	Enables IPX routing.