Compatible Systems Tech Notes: Frame Relay Troubleshooting

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Introduction

This document explains how to troubleshoot a Frame Relay WAN connection.

Prerequisites

Requirements

There are no specific requirements for this document.

Components Used

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

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

Conventions

Refer to Cisco Technical Tips Conventions for more information on document conventions.

Background Information

These are definitions:

- WAN Wide Area Network
- telco telephone company
- loopback These are signals that are sent from one device across a link to another device. This is done in order to test the link.
- PCV Permanent virtual circuit. This is the link to the other side of the Frame Relay connection.
- DLCI Data link connection identifier. This identifies each PVC with a unique number.
- CSU/DSU Channel Service Unit/Data Service Unit

- ANSI Annex D A Frame Relay maintenance protocol
- LMI A Frame Relay maintenance protocol
- IARP The Inverse Address Resolution Protocol is a dynamic method to determine what protocol address is on the other side of a PVC.

Contents − Knowledge Base Article C000259

These are the affected products:

900i	2200R	VSR−2
1200i	2220R	VSR−8
1220i	2250R	IntraPort Carrier−2
1250i	2270R	IntraPort Carrier−8
1270i	3500R	
2600i	3800R	
2900i		

All versions are affected.

Frame Relay Troubleshooting

Before you plug in your Frame Relay connection, ensure that your WAN port is configured for Frame Relay. If the WAN port is not, the Frame Relay connection can lock up your router.

The biggest problem during the installation of a new Frame Relay connection is that the Frame Relay Switch, which is at your telco, is not connected up to your telco line. What often happens when a Frame Relay circuit is initially installed or tested is that the telco runs a loopback test on the line. A loopback test like this kicks the Frame Relay Switch off of the link. The Switch must be manually put back onto the link before you are able to see it again from the router.

The method to use in order to determine whether your router can see the Frame Relay Switch is the Telnet **show frelay pvc**command.

This is the output from a **show frelay pvc** command:

```
Wan0 Frame Relay PVC

DLCI State     Type Interface  Flags Q.922  Ref   Use     Active (D:H:M:S)
102  Inactive  User   ni_wan0  21    1861    1     3018    0:00:00:00
101  Active    User   ni_wan0  21    1851    3     112944  10:03:49:38
16   Active    User   ni_wan0  21    0401    667   59709   2:08:22:58
 0   Active    Maint  ni_wan0  41    0001    1     175562  10:03:50:02
```

This shows that there is a Frame Relay Switch in the link and what DLCIs the router sees and their state. If your DLCI shows `Inactive`, then call your Frame Relay provider, who is usually your telco or your ISP, in order to inform them. Also let your Frame Relay provider know if you do not see any DLCIs other than the `Maint` DLCI. In this example, the `Maint` DLCI is 0, which indicates that the router is configured for ANSI Annex D. The `Maint` DLCI can also be 1023, which indicates LMI. You always see a `Maint` DLCI when the WAN port is configured for Frame Relay. If the `Maint` DLCI shows the `Inactive` message, then the router and CSU/DSU are not connected to the Frame Relay circuit, or the circuit is down. The `Maint` DLCI is the PVC, which acts as the management line for the Frame Relay link.

The second most common problem is a misconfigured Frame Relay Maintenance Protocol. Verify the Frame Relay information with your Frame Relay provider, who should provide you with the Maintenance Protocol and the DLCIs that you should see. Configure the router in order to match the information they provide.

The next most common problem is the DLCI and Protocol Address Mappings. Normally, you do not need to enter any DLCI Mappings and the router uses IARP in order to determine the protocol address on the other end of each PVC, identified by a DLCI. You can see the IARP mappings with the **show arp** command.

This is output from the **show arp** command. For this example, the information after the Frame Relay ARP Cache (IARP and Static Mappings) line is important:

```
B#  Protocol  Address      Age  Hardware Addr      Type   Interface

0    IP       198.41.9.1   0   bb:00:04:0d:04     Dynam  Ethernet A
14   IP       198.41.9.12  0   00:00:a5:2f:20:00  Dynam  Ethernet A
15   IP       198.41.9.30  0   08:00:20:08:cc:0d  Dynam  Ethernet A


Frame Relay ARP Cache (IARP and Static Mappings)

B# Prot  Address               DLCI  Type   Interface
0  IPX   0-00:00:a5:d4:b0:00  16    Iarp   Wan0
16 IP    192.168.100.1        16    FRMap  Wan0
```

You can see which protocol and which address was found at the other end of the link for that DLCI. If there is not an entry for your DLCI, but it is `Active` in the **show frelay pvc** command output, then you need to configure a Static DLCI Mapping. In the previous example, the second mapping for the IP protocol is a Static DLCI Mapping, indicated by the FRMap in the Type column. ANSI Annex A frequently requires Static DLCI Mappings.

Use these commands in order to create a Static DLCI Mapping in a command line session:

- **config frame relay wan 0** Substitute the correct WAN port for your Frame connection
- **dlci=16 ip=192.168.100.1** Where 192.168.100.1 is the IP address at the far end of DLCI 16. Substitute the correct values for your Frame connection.
- **save**
- **y**

In order to create Static DLCI Mappings with the use of CompatiView, log into the router with CompatiView, go to the WAN port you want to configure for Frame Relay and choose **Link Config**. If you have this WAN port already configured for Frame Relay, you see a button labeled DLCI. Click **DLCI** . Then add the DLCI number for the local side and the protocol address for the remote side for that DLCI. Click **OK** twice and save this configuration to the router.

Frame Relay and WAN Subinterfaces

Router OS versions 4.4.10 and later have support for IP unnumbered Frame Relay. This created a new problem with WAN subinterfaces. In the 4.4.10 and later OSs, each subinterface must be specifically configured as a numbered interface in order for the router to accept the IP address assigned to each subinterface. If you upgrade to 4.4.10 or later from an earlier OS, you must specifically configure each subinterface to be numbered.

Use these commands in order to number a subinterface in a command line session:

- **config ip wan 0.1** This configures subinterface 1 on Wan port 0.
- **numbered=true**

- **save**
- **y**

Without the `numbered=true` line, the output from the **show ip config** command shows the IP for WAN 0.1 subinterface as unnumbered. This is true even if in the **show config ip wan 0.1** output you see the correct IP addressing information.

Once you configure and save the `numbered=true` line to the subinterface, the **show ip config** output shows the IP addressing information that you have assigned it.

Another way to determine if you have this problem is to try and ping the WAN ports from a host device on the Ethernet network connected to the Ethernet port of the router. You are able to ping the WAN 0 interface IP address, but none of the IP addresses of the subinterface. Once you have configured and saved the `numbered=true` line to the subinterfaces, you are able to ping all of the IP addresses of the WAN subinterface.

Related Information

- **Technical Support & Documentation − Cisco Systems**

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