# Determining DLCI Limits From LMI Status Updates

### Document ID: 14196

### *Interactive:* This document offers customized analysis of your Cisco device.

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## Contents



## Introduction

This document provides the formula for calculating the maximum theoretical number of Data−Link Connection Identifiers (DLCIs) that can be advertised over an interface, based on the Local Management Interface (LMI) type. The method the formula was derived from is listed as well as **debug** examples.

## Prerequisites

### Requirements

Readers of this document should have knowledge of these topics:

- Frame Relay.
- Different types of LMI.

### Components Used

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

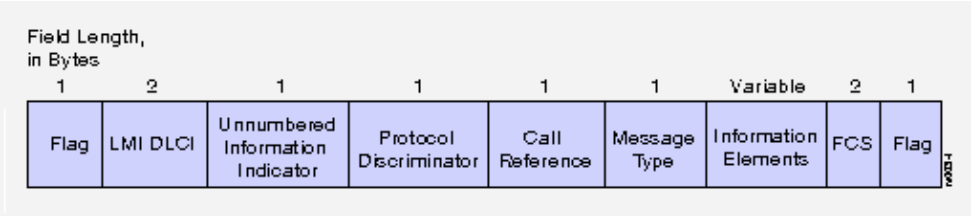
The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

### Conventions

For more information on document conventions, refer to the Cisco Technical Tips Conventions.

# Method

Below is a standard LMI packet breakdown.




Notice that the DLCI is two bytes long, and the entire packet is 10 bytes long plus a variable amount of data for the Information Elements (IEs). We can view the IE portion of the Permanent Virtual Circuit (PVC) full status packets using the **debug frame−relay lmi** command. (These are only the full status messages from the frame switch; you also see regular status messages using this **debug** command.)

# Sample IE Breakdowns

## ANSI−617d (ANSI or annex D) LMI type, DLCI 0

```
: Serial1(in): Status, myseq 3
: RT IE 1, length 1, type 0
: KA IE 3, length 2, yourseq 4 , myseq 3
: PVC IE 0x7 , length 0x3 , dlci 100, status 0x0
: PVC IE 0x7 , length 0x3 , dlci 200, status 0x0
```

## Q933a (CCITT or annex A) LMI type, DLCI 0

```
: Serial1(in): Status, myseq 1
: RT IE 51, length 1, type 0
: KA IE 53, length 2, yourseq 2 , myseq 1
: PVC IE 0x57, length 0x3 , dlci 100, status 0x0
: PVC IE 0x57, length 0x3 , dlci 200, status 0x0
```

## Cisco LMI type, DLCI 1023

```
: Serial1(in): Status, myseq 68
: RT IE 1, length 1, type 0
: KA IE 3, length 2, yourseq 68, myseq 68
: PVC IE 0x7 , length 0x6 , dlci 100, status 0x2 , bw 0
: PVC IE 0x7 , length 0x6 , dlci 200, status 0x2 , bw 0
```

## Analysis

Notice that in all three cases, the Report Type (RT) IE is one byte long and the KeepAlive (KA) IE is two bytes long. For the ANSI and Q933a LMIs, the PVC information IE is 3 bytes long, whereas for the Cisco LMI it is 6 bytes long due to the additional "bw" (for BandWidth) value. The "bw" value represents the Committed Information Rate (CIR); the actual bw value will only be seen if the frame relay switch is configured to forward this information. For detailed information on the values shown, refer to the Command Reference for **debug frame−relay lmi**.

If you have the output of a **show frame−relay lmi** command from your Cisco device, you can use to display potential issues and fixes. To use, you must be a registered customer, be logged in, and have JavaScript enabled.

You can use Output Interpreter to display potential issues and fixes. To use Output Interpreter, you must be a registered customer, be logged in, and have JavaScript enabled.

The static overhead in all three cases is 13 bytes [Entire LMI packet minus IEs (10 bytes) + RT (1 byte) + KA (2 bytes)]. We can subtract this number from the Maximum Transmission Unit (MTU) to get the total available bytes for DLCI information. We then divide that number by the length of the PVC IE (5 bytes for ANSI and Q933a, 8 bytes for Cisco) to get the maximum theoretical number of DLCIs for the interface:

For ANSI or Q933a, the formula is: (MTU − 13) / 5= max DLCIs.

For Cisco, the formula is (MTU − 13) / 8= max DLCIs.

**Note:** It is possible to share the flag between frames, which would decrease the static overhead to 12 bytes.

## Other Limitations

- Each subinterface takes one interface descriptor block (IDB). To verify the IDB limit supported for your router platform with respect to the Cisco IOS software release, use the command **show idb**. For more information on IDB and their limits for different platforms, refer to Maximum Number of Interfaces and Subinterfaces for Cisco IOS Software Platforms: IDB Limits.
- The CIR of all the PVCs added together should not exceed the clock rate (access rate) of the interface.
- Routing Information Protocol (RIP) or Interior Gateway Routing Protocol (IGRP) route updates could add substantial overhead to the interface, depending on the configuration.

## Related Information

- **Frame Relay LMI Frame Format**
- **Frame Relay Technology Support**
- **Configuring and Troubleshooting Frame Relay**
- **Frame Relay Technology Overview**
- **Technical Support − Cisco Systems**



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