Sensitive Receiver and Attenuation Troubleshooting on Cisco 7x00 and Cisco 3600 ATM Interfaces

Document ID: 27606

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Introduction

Sometimes ATM T3 interfaces, like PA−T3 on the Cisco 7x00 or NM−1A−T3 on Cisco 3600 series routers, have connectivity problems. Some of the symptoms caused by connectivity problems include:

- Line code violations (LCVs)

    - Bipolar violation
    - Excessive zeros
- Continuous interface flaps
- Error Messages
- CRC errors in the ATM interface

This document will provide a description of these symptoms and will study when those correspond to a sensitive receiver or attenuation problem and provides with a workaround.

Before You Begin

Conventions

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

Prerequisites

There are no specific prerequisites for this document.

Components Used

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

The information in this document is based on the software and hardware versions below.

The information presented in this document was created from devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If you are working in a live network, ensure that you understand the potential impact of any command before using it.

Problem

A sensitive receiver or attenuation problem can be detected on an atm interface by the symptoms listed in the introduction. The following sections explain each of those symptoms.

Many LCV Errors in 'show controller' Output

The output of the **show controller** command may report incrementing line code violations (LCVs) and other facility statistics on an ATM DS−3 port adapter or network module. Normally, LCV error counters increment when the interface experiences a mismatch in the line coding type. However, in rare cases, this problem may also occur when the router is connected to the next device using a short cable (50 foot or less). The root cause of the problem is the line interface unit (LIU) used on these PAs is overly sensitive to some far−end equipment's transmitted signal when short cables are employed. With short cables, the LIU receiver may be saturated, thus resulting in LCV's.

The following are some examples of what the CLI outputs will look like (depending on which PA/NM you are using, the actual output may vary slightly)

```
Router#show controllers atm 1/0/0
   ATM1/0/0: Port adaptor specific information
   Hardware is DS3 (45Mbps) port adaptor
   Framer is PMC PM7345 S/UNI-PDH, SAR is LSI ATMIZER II
   Framing mode: DS3 C-bit ADM
   No alarm detected
   Facility statistics: current interval elapsed 796 seconds
    lcv        fbe       ezd        pe        ppe       febe       hcse
    ----------------------------------------------------------------------
    lcv: Line Code Violation
    be: Framing Bit Error
    ezd: Summed Excessive Zeros
    PE: Parity Error
    ppe: Path Parity Error
    febe: Far-end Block Error
    hcse: Rx Cell HCS Error

Router#show controller atm 3/0
  Interface ATM3/0 is down<
  Hardware is RS8234 ATM DS3
  [output omitted]
  Framer Chip Type PM7345
        Framer Chip  ID 0x20
        Framer State  RUNNING
        Defect FRMR  OOF
        Defect ADM OOCD
        Loopback Mode  NONE
        Clock Source  INTERNAL
        DS3 Scrambling  ON
        Framing DS3  C-bit direct mapping
    TX cells 0
```

```
                    Last output  time 00:00:00
                    RX cells 1
                    RX bytes 53
                    Last input time  1w6d
                    Line  Code Violations (LCV) 25558650
                    DS3: F/M-bit   errors 401016
                    DS3: parity   errors 2744053
                    DS3: path parity   errors 1879710
                    DS3/E3: G.832  FEBE errors 3099127
                    T3/E3: excessive   zeros 25689720
                    uncorrectable   HEC errors 554
                    idle/unassigned   cells dropped 0
                    LCV  errored secs 392
                    DS3: F/M-bit   errored secs 392
                    DS3: parity   errored secs 389
                    DS3: path parity   errored secs 389
                    T3/E3: excessive   zeros errored secs 392
                    DS3/E3: G.832  FEBE errored secs 380
                    uncorrectable   HEC errored secs 67
                    LCV error-free  secs 0
                    DS3: F/M-bit   error-free secs 0
                    DS3: parity   error-free secs 3
                    DS3: path parity   error-free secs 3
                    T3/E3: excessive   zeros error-free secs 0
                    DS3/E3: G.832  FEBE error-free secs 12
                    uncorrectable   HEC error-free secs 325
```

LCV indicates the number of bipolar violation (BPV) or excessive zeros (EXZ) errors. The conditions under which these errors increment will vary with the line coding.

Bipolar violation:

- Alternate Mark Inversion (AMI) – Receiving two successive pulses of the same polarity.
- Bipolar Three Zero Substitution (B3ZS) or High–Density Bipolar Three (HDB3) – Receiving two successive pulses of the same polarity, but these pulses are not part of zero substitution.

Excessive zeros:

- AMI – Receiving more than 15 contiguous zeros.
- B3ZS – Receiving more than seven contiguous zeros.

Refer to the following document for more information about LCV errors:

Troubleshooting Line Problems and Errors on DS–3 and E3 ATM Interfaces

Continuous Interface Flaps

Execute the **show log** command. Does it show a series of link up messages on the console without a corresponding link down? Cisco bug ID CSCdm84527 resolves this problem. Normally, you should see the following log messages when the interface flaps:

```
Aug 11 02:54:46.243 UTC: %LINK-3-UPDOWN: Interface ATM2/0, changed state to  down
Aug 11 02:54:47.243 UTC: %LINEPROTO-5-UPDOWN: Line protocol on Interface  ATM2/0,
changed state to down
Aug 11 02:54:57.003 UTC: %LINK-3-UPDOWN: Interface ATM2/0, changed state  to up
Aug 11 09:59:14.544 UTC: %LINEPROTO-5-UPDOWN: Line protocol on Interface  ATM2/0,
changed state to up
```

Error Message After Enabling 'debug atm error'

Messages similar to the following appear when enabling debug atm errors:

```
Aug 11 10:01:27.940 UTC: pmon_change 0x3E, cppm_change 0x53

pmon_change 0x3E - Performance    monitoring (pmon) reports line code violations,
parity errors, path parity problems,    and related errors.

cppm_change 0x53 - Cell     and PLCP performance monitoring (cppm) reports bit
interleaved parity (BIP) errors and framing errors.
```

CRC Errors in the ATM Interface

The following is an example of the output for the **show interfaces** command:

```
Router#show interfaces atm 4/0
ATM4/0 is up, line protocol is up
[output omitted]
Last clearing of "show interface" counters never
Output queue 0/40, 0 drops; input queue 0/75, 0 drops
Five minute input rate 0 bits/sec, 0 packets/sec
Five minute output rate 0 bits/sec, 0 packets/sec
    144 packets input, 31480 bytes, 0    no buffer
    Received 0 broadcasts, 0 runts, 0    giants
    13 input errors, 12 CRC, 0 frame,    0 overrun, 1 ignored, 0 abort
    154 packets output, 4228 bytes, 0    underruns
    0 output errors, 0 collisions, 1    interface resets, 0 restarts
```

Refer to the following document for more information on CRC errors and how to troubleshoot them:

CRC Troubleshooting Guide for ATM Interfaces

Solution

The problem may be that the attenuator is causing a sensitive receiver. Follow the steps in the troubleshooting section first, then perform the following steps to resolve the sensitive receiver issue.

Solution

1. Reduce the transmit level of the device attached to the T3 network module. Many devices have a Line Build Out (LBO) configuration setting for this purpose.
2. Increase the cable length to reduce the signal strength and edge rates. The exact length required cannot be calculated but a total length of at least 100' is recommended.
3. Use an 75−ohm in−line coaxial attenuator. This should reduce or eliminate LCV errors. Cisco offers an attenuator kit (ATTEN−KIT−PA=) that contains a 3−dB, 6−dB, 10−dB, 15−dB and 20−dB attenuators with standard BNC connectors. This kit is not available through RMA. Instead, the customer needs to order the kit through their account representative or Customer Service.
4. Start with the 3−dB attenuator first, then move to the next higher value attenuator if LCV errors persist. Note that attenuators are a normal requirement, depending on line conditions and far−end equipment involved.

Troubleshooting

If the interface in the router is configured correctly for all physical−layer parameters and still reports numerous LCV and/or CRC errors, then your ATM interface may have a sensitive receiver.

Before deciding whether a sensitive receiver is the problem, please do the following:

- Check that the PA (or NM) and the far end equipment are properly configured for short cable use and that the clocking is set correctly. If the network provides the clock reference, then both ends should be set to "line" clock. Otherwise, one end must be set to internal (or local) clock and the other end set to line clock.
- Check that the CRC errors are not caused by traffic shaping misconfiguration or dropping of the ATM cells on the ATM switch.

The following are recommended troubleshooting steps:

1. Check all physical–layer parameter configurations such as framing and scrambling.
2. Check the clocking configuration on both ends of the ATM connection.
3. Enable **debug atm error** and compare collected output with above example
4. Use the **loopback diagnostic** command and check CRC errors counter on ATM interface.

If you have LCV and other physical layers errors, **CRC errors** and **debug atm error** shows above output the most probable root cause is sensitive receiver.

Related Information

- **CRC Troubleshooting Guide for ATM Interfaces**
- **Troubleshooting Line Problems and Errors on DS–3 and E3 ATM Interfaces**
- **Technical Support – Cisco Systems**
- **Tools and Utilities – Cisco Systems**
- **More ATM Information**

Updated: Dec 18, 2007   Document ID: 27606