

Basic V.110 for MICA Modems on Cisco Access Servers

Feature Overview

This feature allows V.110 calls to be originated and terminated over ISDN. The V.110 recommendation of the ITU-T rate adapts a low speed connection to an ISDN-B channel allowing the remote station or terminal adaptor to use the fast call set-up times offered by ISDN. This feature enables GSM wireless connectivity.

This document describes the Cisco IOS commands and **AT** commands required to support V.110 on MICA modems for AS5X00 Access Servers.

This MICA V.110 implementation supports 60 modems per board on the Cisco AS5300 and supports other connect standards (V.34, V.90, etc.) in addition to V.110. Modems are not dedicated to V.110 only and are allocated dynamically. On the Cisco AS5200, 30 modems per board is supported and 72 modems per board is supported on the Cisco AS5800.

This V.110 implementation for calls on MICA modems are managed by special boardware and modem code, along with the appropriate Cisco IOS image, in a manner similar to other modulation standards.

Note This document is in development. Portions of this document may not be complete or developed according to the current documentation standards. This document is subject to revision when the content is available and developed further. Please check the online version periodically until the document is completed according to the usual documentation standards.

Feature Summary

- Bearer Rate supported range from 600 bps to 38400 bps.
- Modem Management is supported.
- Modem Log for V.110 calls is supported.
- **show modem** (Number of connections at specific line speeds is supported.)
- **show modem** (Number of calls counters supported)
- **show modem** (Display of Tx/Rx line speeds is supported.)
- **show modem version** is supported.
- **show modem configuration** is supported.
- **show modem operational-status** is supported.
- **ATDI** command is added to **AT** command set for V.110 modem dialouts.

Note This feature is distinct from the Asynchronous Management Protocol for V.110 Terminal Adaptor Module that runs in the Cisco AS5200 and Cisco AS5300.

Benefits

V.110 is a digital link access protocol and for Cisco access servers. It operates over an ISDN B channel. V.110 enables Cisco access servers to connect to ISDN terminal adapters requiring V.110 compatibility. This feature enables GSM wireless connectivity.

This ISDN feature is in addition to the existing analog capability of the MICA modems.

Also, some digital cellular networks support data applications via V.110 connecting from the cell phone. These networks place these V.110 calls on the PSTN for interconnecting to the ISP of the end-customer's choice. MICA V.110 supports data rates from 600 bps up to 38,400bps.

Cisco IOS **show** commands have been changed to display additional fields reflecting the V.110 capability. See the “Command Reference” section.

An added **AT** command, **ATDI**, allows the user to command a V.110 modem to originate a V.110 call. See the “Command Reference” section.

Restrictions

This basic feature allows a V.110 call to be originated and terminated. Synchronous V.110 is not supported. In addition, V.110 calls must terminate on a TTY asynchronous IOS interface.

Transmission Speeds/Bearer Rates

The following V.110 bearer rates and intermediate rates (ITU-T Recommendation Q.931) are supported:

- V.110 Bearer Rates:
 - 600 bps
 - 1200 bps
 - 2400 bps
 - 4800 bps
 - 7200 bps
 - 9600 bps,
 - 14400 bps
 - 19200 bps
 - 28800 bps (not currently supported)
 - 38400 bps
- Intermediate Rates:
 - 8k
 - 16k
 - 32k bps

— 64k bps

Related Features and Technologies

This feature requires special modem code to be downloaded to the MICA Modems. See the online CCO modem information page.

Related Documents

See the modem code online documentation for the platform you are using:

- *Firmware and Portware Information*

<http://www.cisco.com/univercd/cc/td/doc/product/access/fwpwinfo/index.htm>

See also the following documents:

- *12.0 Dial Solutions Command Reference (DR)*
- *Cisco AS5800—Modem and System Management Features for the Cisco AS5800*
- Online product-specific release notes for the corresponding platforms on the appropriate Cisco IOS release. Start from the appropriate Cisco IOS numbered release on this page:

Cisco IOS Software Configuration:

<http://www.cisco.com/univercd/cc/td/doc/product/software/index.htm>

Supported Platforms

- Cisco AS5200 in Cisco IOS Release 12.(4)XI1
- Cisco AS5300 in Cisco IOS Release 12.(4)XI1
- Cisco AS5800 (not currently supported)

Prerequisites

Supporting boardware and modem code on the MICA modems and special versions of the CSM on certain platforms. See *Firmware and Portware Information*, under the “Related Documents” section.

Supported MIBs and RFCs

The current Modem Management MIB objects for MICA modems will also be used for V.110. One minor change is in the SNMP agent code. This change returns the correct modulation type for V.110 when it does a look up of the modulation for MICA modems.

List of Terms and Acronyms

Boardware—	Software that runs on the CPU on the certain supporting cards
CSM—	Call Switching Module
E1—	European equivalent of T1, 32 channels of 64KHz, 1 for framing, 1 for signaling
GSM—	Global System for Communications
HMM—	Hex Modem Module
IOS—	Internetworking Operating System
ISDN—	Integrated Services Digital Network
LLC—	Link Layer Control
MICA—	Modem ISDN Channel Aggregation
MSM—	Modem State Machine
Portware—	Software that runs on MICA digital modem module
PRI—	Primary Rate Interface
Q.931—	ISDN User-Network Interface Layer 3 Specification for Basic Call Control
T1—	North American Channelized TDM w/ 24 channels of 64Khz each plus 8Khz frame
TA—	Terminal Adapter
V.110—	ITU-T Standard for support by ISDN of Data Terminal Equipment with V-Series Type Interfaces

Configuration Tasks

There are no configuration tasks. All commands in this feature are modified existing **show modem** commands.

Command Reference

This section documents modified commands. All other commands used with this feature are documented in the Cisco IOS Release 12.0 command references and the Cisco AS5800 online new feature documentation. For more information, see the documentation for the existing **show modem** commands.

No new IOS commands are being added to support V.110 on MICA. However, due to the new V.110 Connect Protocol, Connected Standard, Line Speeds (Bearer Rates) and counters, the code that handles the following **show modem** commands has been modified as listed in the following logical order:

- **show modem**

http://www.cisco.com/univercd/cc/td/doc/product/software/ios120/12cgcr/dial_r/drp1/drmodmgt.htm#xtocid10451223

See also **show modem** at:

http://www.cisco.com/univercd/cc/td/doc/product/software/ios113ed/113aa/113aa_2/58cfeats/c5800uas.htm#19600

- **show modem log**

http://www.cisco.com/univercd/cc/td/doc/product/software/ios120/12cgcr/dial_r/drp1/drmodmgt.htm#xtocid10451261

- **show modem configuration**

http://www.cisco.com/univercd/cc/td/doc/product/software/ios120/12cgcr/dial_r/drp1/drmodmgt.htm#xtocid10451239

- **show modem connect-speeds**

http://www.cisco.com/univercd/cc/td/doc/product/software/ios120/12cgcr/dial_r/drp1/drmodmgt.htm#xtocid10451245

- **show modem operational-status**

http://www.cisco.com/univercd/cc/td/doc/product/software/ios120/12cgcr/dial_r/drp1/drmodmgt.htm#xtocid10451279

For the commands above, MICA Modem Management code has been modified to display the correct information for V.110 associated Connect Protocol and Connected Standard. In addition, the correct line speeds for V.110 related Bearer Rates have also be added to commands that display the information.

For other and related modem management commands, such as **modem-at mode**, see:

http://www.cisco.com/univercd/cc/td/doc/product/software/ios120/12cgcr/dial_r/drp1/drmodmgt.htm#xtocid104510

show Command Examples

The **show modem** command includes outputs for the **show modem configuration** command and the **show modem connect-speeds** command.

show modem

Fields that have been added or changed for this command are:

```
Modem Type V.110
Protocol: ISDN Mode
Connection Speeds 34000
```

The **show modem** command example is as follows:

```
router# show modem 1/0
Mdm Typ      Status      Tx/Rx      G Duration      RTS  CTS  DCD  DTR
1/0  V.110    Conn       9600/9600  0  10:12:19      x   x   x   x

Modem 1/0, Mica Hex Modem (Managed), Async1, TTY1
Firmware Rev: 2.7.0.6
Modem config: Incoming and Outgoing
Protocol: ISDN Mode, Compression: None
Management config: Status polling
RX signals: 0 dBm
```

```

Last clearing of "show modem" counters never
 23 incoming completes, 2 incoming failures
 0 outgoing completes, 0 outgoing failures
 0 failed dial attempts, 0 ring no answers, 2 busied outs
 0 no dial tones, 0 dial timeouts, 0 watchdog timeouts
 0 no carriers, 0 link failures, 0 resets, 0 recover oob
 0 recover modem, 0 current fail count
 0 protocol timeouts, 0 protocol errors, 0 lost events
 0 ready poll timeouts

```

Transmit Speed Counters:

Connection Speeds	75	300	600	1200	2400	4800
# of connections	0	0	0	0	0	1
Connection Speeds	7200	9600	12000	14400	16800	19200
# of connections	1	4	0	3	0	8
Connection Speeds	21600	24000	26400	28000	28800	29333
# of connections	0	0	0	0	0	0
Connection Speeds	30667	31200	32000	33333	33600	34000
# of connections	0	0	0	0	0	0
Connection Speeds	34667	36000	37333	38000	38400	38667
# of connections	0	0	0	0	6	0
Connection Speeds	40000	41333	42000	42667	44000	45333

Receive Speed Counters:

Connection Speeds	75	300	600	1200	2400	4800
# of connections	0	0	0	0	0	1
Connection Speeds	7200	9600	12000	14400	16800	19200
# of connections	1	4	0	3	0	8
Connection Speeds	21600	24000	26400	28000	28800	29333
# of connections	0	0	0	0	0	0
Connection Speeds	30667	31200	32000	33333	33600	34000
# of connections	0	0	0	0	0	0
Connection Speeds	34667	36000	37333	38000	38400	38667
# of connections	0	0	0	0	6	0
Connection Speeds	40000	41333	42000	42667	44000	45333
# of connections	0	0	0	0	0	0
Connection Speeds	46000	46667	48000	49333	50000	50667
# of connections	0	0	0	0	0	0
Connection Speeds	52000	53333	54000	54667	56000	
# of connections	0	0	0	0	0	

show modem operational-status

Fields that have been added or changed for this command are:

```

Parameter #1 Connect Protocol: ISDN Mode
Parameter #8 Connected standard V.110
Parameter #41 V110 frames received bad:
Parameter #42 V110 frames received good:
Parameter #43 V110 frames transmitted:
Parameter #44 V110 sync lost:

```

The **show modem operational-status** command example is as follows:

```

router# show modem operational-status 1/0
Modem(1/0) Operational-Status:

Parameter #0 Disconnect Reason Info: (0x0)
  Type (=0 ): <unknown>
  Class (=0 ): Other

```

```

Reason (=0 ): no disconnect has yet occurred
Parameter #1 Connect Protocol: ISDN Mode
Parameter #2 Compression: None
Parameter #3 EC Retransmission Count: 0
Parameter #4 Self Test Error Count: 0
Parameter #5 Call Timer: 37079 secs
Parameter #6 Total Retrains: 0
Parameter #7 Sq Value: 7
Parameter #8 Connected Standard: V.110
Parameter #9 TX,RX Bit Rate: 9600, 9600
Parameter #11 TX,RX Symbol Rate: 0, 0
Parameter #13 TX,RX Carrier Frequency: 0, 0
Parameter #15 TX,RX Trellis Coding: (n/a), (n/a)
Parameter #16 TX,RX Preemphasis Index: 0, 0
Parameter #17 TX,RX Constellation Shaping: (n/a), (n/a)
Parameter #18 TX,RX Nonlinear Encoding: (n/a), (n/a)
Parameter #19 TX,RX Precoding: (n/a), (n/a)
Parameter #20 TX,RX Xmit Level Reduction: 0, 0 dBm
Parameter #21 Signal Noise Ratio: 0 dB
Parameter #22 Receive Level: 0 dBm
Parameter #23 Frequency Offset: 0 Hz
Parameter #24 Phase Jitter Frequency: 0 Hz
Parameter #25 Phase Jitter Level: 0 degrees
Parameter #26 Far End Echo Level: 0 dBm
Parameter #27 Phase Roll: 0 degrees
Parameter #28 Round Trip Delay: 0 msecs
Parameter #30 Characters transmitted, received: 247, 308
Parameter #32 Characters received BAD: 0
Parameter #33 PPP/SLIP packets transmitted, received: 9, 9
Parameter #35 PPP/SLIP packets received (BAD/ABORTED): 0
Parameter #36 EC packets transmitted, received OK: 0, 0
Parameter #38 EC packets (Received BAD/ABORTED): 0
Parameter #39 Robbed Bit Signalling (RBS) pattern: 0
Parameter #40 Digital Pad: (n/a), Digital Pad Compensation: None
Parameter #41 V110 frames received bad: 0
Parameter #42 V110 frames received good: 7417301
Parameter #43 V110 frames transmitted: 7417310
Parameter #44 V110 sync lost: 0

```

show modem log

Fields that have been added or changed for this command are:

```

Connect Protocol: ISDN Mode
Connected Standard V.110
V110 frames received bad:
V110 frames received good:
V110 frames transmitted:
V110 sync lost:

```

The **show modem log** command example is as follows:

```

router# show modem log 1/1
Modem 1/1 Events Log:
...
...
...
4d06h :Modem State event:
      State: Train Up
4d06h :Modem State event:
      State: EC Negotiating
4d06h :Modem State event:

```

```

State: Steady
4d06h :RS232 event: RTS, DTR, CTS, DCD
4d06h :Static event:
Connect Protocol: ISDN Mode
Compression: None
Connected Standard: V.110
TX,RX Symbol Rate: 0, 0
TX,RX Carrier Frequency: 0, 0
TX,RX Trellis Coding: (n/a), (n/a)
Frequency Offset: 0 Hz
Round Trip Delay: 2 msec
TX,RX Bit Rate: 19200, 19200
Robbed Bit Signalling (RBS) pattern: 0
Digital Pad: (n/a), Digital Pad Compensation: None
4d06h :Dynamic event:
Sq Value: 7
Signal Noise Ratio: 0 dB
Receive Level: 0 dBm
Phase Jitter Frequency: 0 Hz
Phase Jitter Level: 0 degrees
Far End Echo Level: 0 dBm
Phase Roll: 0 degrees
Total Retrans: 0
EC Retransmission Count: 0
Characters transmitted, received: 0, 0
Characters received BAD: 0
PPP/SLIP packets transmitted, received: 0, 0
PPP/SLIP packets received (BAD/ABORTED): 0
EC packets transmitted, received OK: 0, 0
EC packets (Received BAD/ABORTED): 0
V110 frames received bad: 0
V110 frames received good: 51
V110 frames transmitted: 64
V110 sync lost: 0
...
...
...
1d11h :Modem State event:
State: Terminate
1d11h :RS232 event: RTS, DTR, CTS, noDCD
1d11h :Modem State event:
State: Idle
1d11h :End Connect event:
Call Timer: 87 secs
Disconnect Reason Info: (0xDF06)
Type (=6 ): Tx (host to line) data flushing - OK
Class (=31): Requested by host
Reason (=6 ): network indicated disconnect
Total Retrans: 0
EC Retransmission Count: 0
Characters transmitted, received: 308, 50042
Characters received BAD: 0
PPP/SLIP packets transmitted, received: 10, 43
PPP/SLIP packets received (BAD/ABORTED): 0
EC packets transmitted, received OK: 0, 0
EC packets (Received BAD/ABORTED): 0
V110 frames received bad: 3
V110 frames received good: 34493
V110 frames transmitted: 34710
V110 sync lost: 1
...
...
...
10:37:18:Static event:
Connect Protocol: ISDN Mode

```



```

Compression: None
Connected Standard: V.110
TX,RX Symbol Rate: 0, 0
TX,RX Carrier Frequency: 0, 0
TX,RX Trellis Coding: (n/a), (n/a)
Frequency Offset: 0 Hz
Round Trip Delay: 2 msec
TX,RX Bit Rate: 9600, 9600
Robbed Bit Signalling (RBS) pattern: 0
Digital Pad: (n/a), Digital Pad Compensation: None
10:37:20:Dynamic event:
  Sq Value: 7
  Signal Noise Ratio: 0 dB
  Receive Level: 0 dBm
  Phase Jitter Frequency: 0 Hz
  Phase Jitter Level: 0 degrees
  Far End Echo Level: 0 dBm
  Phase Roll: 0 degrees
  Total Retrans: 0
  EC Retransmission Count: 0
  Characters transmitted, received: 0, 0
  Characters received BAD: 0
  PPP/SLIP packets transmitted, received: 0, 0
  PPP/SLIP packets received (BAD/ABORTED): 0
  EC packets transmitted, received OK: 0, 0
  EC packets (Received BAD/ABORTED): 0
  V110 frames received bad: 0
  V110 frames received good: 26
  V110 frames transmitted: 33
  V110 sync lost: 0
...
...
...
1d06h :End Connect event:
  Call Timer: 105 secs
  Disconnect Reason Info: (0xDF06)
    Type (=6 ): Tx (host to line) data flushing - OK
    Class (=31): Requested by host
    Reason (=6 ): network indicated disconnect
  Total Retrans: 0
  EC Retransmission Count: 0
  Characters transmitted, received: 247, 307
  Characters received BAD: 0
  PPP/SLIP packets transmitted, received: 9, 9
  PPP/SLIP packets received (BAD/ABORTED): 0
  EC packets transmitted, received OK: 0, 0
  EC packets (Received BAD/ABORTED): 0
  V110 frames received bad: 3
  V110 frames received good: 20758
  V110 frames transmitted: 20995
  V110 sync lost: 1

```

ATDI Command (place V.110 call)

The calling user can manually communicate with a V.110 modem in order to originate a remote V.110 dialout from the called modem. The **AT** command set now includes the **ATDI** command (place V.110 call) to allow a V.110 call to be originated from the called modem. The user enters the ATDI command after establishing a session with the MICA modem in order to dial-out a V.110 call from the modem.

By specifying a value 8 in **S29**, the user causes the remote modem to implicitly assume that a V.110 connection is to be established. This command indicates that an ISDN call is being requested, and when used with the **S29=8** command, results in modem code issuing a **ISDN_DIALSTRING (0x45)** request being made to the host.

After entering the **S29=8** command, you can enter the desired user rate if different from the default value of 9600 bps. This command takes the form: **S57=speed**. For supported rates, see the “Restrictions” section. For example:

```
S57=19200
```

Debug Commands

There are no debug commands specific to this feature. Existing ISDN debug commands can be used.

Example Debug Commands for Cisco AS5200 and Cisco AS5300

```
router# debug isdn q931
router# debug modem csm
router# term mon
```

Example Debug Commands for Cisco AS5800

```
router# debug isdn q931
router# debug csm
router# term mon
```