

# ISDN BRI Voice on the Cisco MC3810

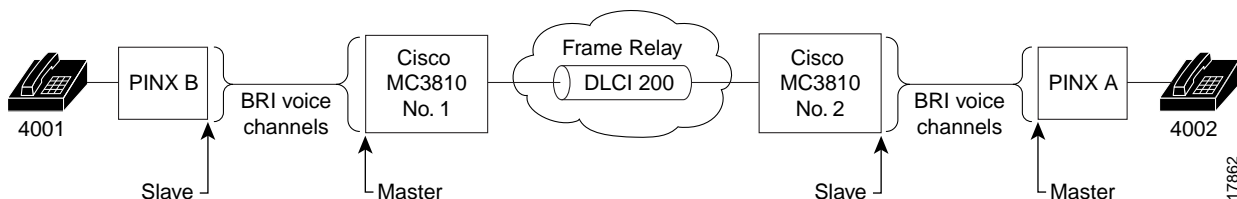
## Feature Summary

With the optional BRI voice module (BVM) installed, the Cisco MC3810 multiservice access concentrator provides four ISDN Basic Rate Interface (BRI) ports for connection to ISDN PBXs (private integrated services network exchanges, or PINXs). The BVM has four ISDN BRI ports for voice traffic. Each BRI port supports two voice channels (ISDN B channels) and one signaling channel (ISDN D channel). The BRI voice ports have the following features:

- ITU I.430 BRI
- Full-duplex S/T interfaces supporting 2 bearer channels and 1 signaling channel (2B + D)
- Total of 8 simultaneous voice channels
- LT-S mode—Line termination of subscriber lines from PINX, with port configured as network termination (NT)
- LT-T mode—Line termination of an ISDN trunk from an ISDN exchange switch, with port configured as terminal equipment (TE)
- Each port individually configurable as NT or TE
- Configurable clock recovery and distribution

Figure 1 shows an example of an ISDN BRI voice network. In the example, PINX A is the master PBX for the system and supplies clock for the BRI voice functions.

**Figure 1** Typical ISDN BRI Voice Network Showing QSIG Signaling Functions



## Benefits

The ISDN BRI voice capability in the Cisco MC3810 provides the following benefits:

- Support for BRI digital voice circuits using QSIG signaling
- WAN access from telephones connected through PINX equipment

## List of Terms

**NT**—Network termination; the network side of an ISDN BRI interface.

**PINX**—Private integrated services network exchange; a PBX or key system which, in this BRI voice application, uses QSIG signaling.

**POTS**—Plain Old Telephone Service. Basic telephone service supplying standard single-line telephones, telephone lines, and access to the public switched telephone network.

**QSIG**—Common channel signaling protocol based on ISDN Q.931 standards and used by many digital PBXs.

**S/T interface**—BRI 4-wire interface that can be configured to terminate a subscriber line (S) or a trunk (T).

**TE**—Terminal equipment; the user side of an ISDN BRI interface.

## Restrictions

The standard Cisco IOS ISDN implementation is supported with the following exceptions:

- Direct connections between ISDN BRI voice ports and ISDN phones are not supported by the Cisco IOS software.
- The BRI voice ports support only QSIG. Other ISDN switch/signaling types are *not* supported.
- Data traffic is not supported on the ISDN BRI voice interface. Calls with bearer capability indicating a non-voice type (such as video telephony) are rejected.
- Although all four BRI ports can be configured in TE (user) mode, only one will be selected as the clock slave to receive network clock from an NT device.
- If the BVM is installed, the speed (clock rate) of serial port 1 of the Cisco MC3810 is limited to a maximum of 192 kbps.

For more information about standard Cisco ISDN BRI configuration, see the *Dial Solutions Configuration Guide*.

## Platforms

This feature is supported only on the Cisco MC3810 multiservice access concentrator.

## Supported MIBs and RFCs

None.

## Configuration Tasks

To configure a Cisco MC3810 multiservice access concentrator to support ISDN BRI voice traffic, perform the following tasks:

- Configure ISDN BRI voice ports
- Configure POTS dial peers for the ISDN BRI voice ports
- Configure network-side dial peers for the ISDN BRI voice ports

## Configure ISDN BRI Voice Ports

To configure the ISDN BRI voice ports, follow these steps:

Step	Command	Purpose
1	<b>configure terminal</b>	Enter global configuration mode.
2	<b>isdn switch-type basic-qsig</b>	(Optional; see note.) Configure the global ISDN switch type as <b>basic-qsig</b> for the BRI voice ports.  <b>Note</b> You can configure the ISDN switch type in either global or interface configuration mode. If you configure it here in Step 2, it specifies the switch type for all four BVM ports. If you configure it in Step 4, it specifies the switch type for a single interface. The switch type specified in Step 4 for any individual interface will override the globally specified switch type.
3	<b>interface bri <i>number</i></b>	Enter interface configuration mode to configure parameters for the specified BRI voice port. The number can be from 1 to 4.
4	<b>isdn switch-type basic-qsig</b>	(Optional; see note in Step 2.) If the service provider switch type for this BRI port is different from the global ISDN switch type, configure the interface ISDN switch type to match the service provider switch type. The interface ISDN switch type overrides the global ISDN switch type on this interface.
5	<b>isdn protocol-emulate {user   network}</b>	Configure the layer 2 and layer 3 port protocol emulation: <ul style="list-style-type: none"> <li>• Enter <b>user</b> to configure the port as TE. This is the default.</li> <li>• Enter <b>network</b> to configure the port as NT.</li> </ul> <b>Note</b> The term <b>user</b> is equivalent to the QSIG term <b>slave</b> . The term <b>network</b> is equivalent to the QSIG term <b>master</b> .
6	<b>isdn layer1-emulate {user   network}</b>	Configure the layer 1 port mode emulation and the clock settings: <ul style="list-style-type: none"> <li>• Enter <b>user</b> to configure the port as TE and to function as a clock slave. This is the default.</li> <li>• Enter <b>network</b> to configure the port as NT and to function as a clock master.</li> </ul>
7	<b>[no] line-power</b>	Turn on or off the power supplied from an NT-configured port to a TE device. The default is <b>no line-power</b> .

Step	Command	Purpose
8	<b>network-clock-priority</b> { <b>low</b>   <b>high</b> }	<p>If this BRI voice port is configured as TE, and you want it to be the first-priority BRI voice port for recovering clock from the network NT device, enter <b>high</b>.</p> <p>If this BRI voice port is configured as TE, and you want it to be a lower-priority BRI voice port for recovering clock from the network NT device, enter <b>low</b>.</p> <p>This command is not used if this port was configured as NT in Step 6 with the command <b>isdn layer1-emulate network</b>.</p>
9	<b>isdn overlap-receiving</b>	Activate overlap signaling to the destination PBX.
10	<b>isdn network-failure-cause</b> <i>cause code</i>	Specify the cause code to pass to the PINX (PBX) when a call cannot be placed or completed because of internal network failures. Possible values are from 1 to 127.
11	<b>isdn sending-complete</b>	(Optional) Configure the BRI voice port to include the Sending Complete information element in the outgoing call setup message. This command is used in some geographic locations, such as Hong Kong and Taiwan, where the sending complete information element is required in the outgoing call setup message.
12	Exit from interface configuration mode and repeat Steps 3 through 11 for each remaining BRI voice port.	

## Verify

- To display protocol information about the ISDN D channel(s), use the **show interfaces bri** [*number*] command.

The following is sample output from the **show interfaces bri** [*number*] command for a BRI voice port on the Cisco MC3810:

```
router# show interfaces bri 1
BRI1 is up (spoofing), line protocol is up (spoofing)
  Hardware is BVM
  MTU 1500 bytes, BW 64 Kbit, DLY 20000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation HDLC, loopback not set
  Last input 1w0d, output 1w0d, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0 (size/max/drops); Total output drops: 0
  Queueing strategy: weighted fair
  Output queue: 0/1000/64/0 (size/max total/threshold/drops)
    Conversations 0/1/256 (active/max active/max total)
    Reserved Conversations 0/0 (allocated/max allocated)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    70 packets input, 278 bytes, 0 no buffer
    Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    70 packets output, 278 bytes, 0 underruns
    0 output errors, 0 collisions, 0 interface resets
    0 output buffer failures, 0 output buffers swapped out
    2 carrier transitions
```

- To display information about the physical attributes of the ISDN D channel(s), use the **show controllers bri** [*number*] command.

The following is sample output from the **show controllers bri** *[number]* command for a BRI voice port on the Cisco MC3810:

```
router# show controllers bri 1
BRI unit 1:
Layer 1 is DEACTIVATED. (ISDN L1 State F3)

S2084 registers:
Configuration register=0x1
.
.
.
QMC Timeslot Assignment Entries (Rx == Tx):
.
.
.
D Channel Information:
.
.
.
B1 Channel Information:
.
.
.
B2 Channel Information:
.
.
.
```

- To display information about the BRI voice ports, use the **show voice-port summary** command.

The following is sample output from the **show voice-port summary** command for the BRI voice ports on the Cisco MC3810:

```
router# show voice-port summary
IN  OUT  ECHO
PORT SIG-TYPE  ADMIN OPER IN-STATUS OUT-STATUS CODEC      VAD GAIN ATTN CANCEL
1/1 fxo-null    up   up   idle      on-hook  729ar8   n   0   0   y
1/2 fxo-null    up   up   idle      on-hook  729ar8   n   0   0   y
2/1 fxo-null    up   up   idle      on-hook  729ar8   n   0   0   y
2/2 fxo-null    up   up   idle      on-hook  729ar8   n   0   0   y
3/1 fxo-null    up   up   idle      on-hook  729ar8   n   0   0   y
3/2 fxo-null    up   up   idle      on-hook  729ar8   n   0   0   y
4/1 fxo-null    up   up   idle      on-hook  729ar8   n   0   0   y
4/2 fxo-null    up   up   idle      on-hook  729ar8   n   0   0   y
```

- To display information about memory, status, and layer 2 and layer 3 timers, use the **show isdn {memory | status | timers}** command.

The following is sample output from the **show isdn status** command for a BRI voice port on the Cisco MC3810:

```
router# show isdn status
Global ISDN Switchtype = basic-qsig
ISDN BRI1 interface
dsl 1, interface ISDN Switchtype = basic-qsig
**** Slave side configuration ****
  Layer 1 Status:
DEACTIVATED
  Layer 2 Status:
TEI = 0, Ces = 1, SAPI = 0, State = TEI_ASSIGNED
  Layer 3 Status:
NLCB:callid=0x0, callref=0x0, state=31, ces=0 event=0x0
0 Active Layer 3 Call(s)
  Activated dsl 1 CCBS = 0
```

```
ISDN BRI2 interface
.
.
.
Total Allocated ISDN CCBs = 0
```

## Configure POTS Dial Peers for ISDN BRI Voice Ports

Configuring POTS dial peers for ISDN BRI voice ports is similar to the POTS dial peer configuration for analog and digital voice ports. This section describes how to configure POTS dial peers specifically for ISDN BRI voice ports.

To configure a POTS dial peer, you need to uniquely identify the dial peer (by assigning it a unique tag number), define its telephone number, and associate it with a voice port. Under most circumstances, the default values for the remaining dial-peer configuration commands are sufficient to establish connections.

For more information about dial plan strategies, see the “Voice Dial Plan Considerations” chapter of the *Cisco MC3810 Multiservice Access Concentrator Software Configuration Guide*.

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**Note** Only one dial peer is required for each BRI port, and a B channel is selected automatically. For example, you configure one dial peer for BRI voice port 1/1, and it directs calls for BRI voice ports 1/1 and 1/2.

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**Note** You must configure the POTS dial peers on the Cisco MC3810 concentrators at both ends of the network.

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To configure POTS dial peers, follow these steps:

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Step	Command	Purpose
1	<b>configure terminal</b>	Enter global configuration mode.
2	<b>dial-peer voice tag pots</b>	Define a POTS peer and enter dial-peer configuration mode. All subsequent commands that you enter in dial-peer configuration mode before you exit will apply to this dial peer.  The <i>tag</i> value identifies the dial peer and must be unique on the Cisco MC3810. Do not duplicate a specific <i>tag</i> number.

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Step	Command	Purpose
3	<b>destination-pattern</b> <i>string</i>	<p>Configure the dial peer's destination pattern.</p> <p>The <i>string</i> variable is a series of digits that specify the E.164 or private dialing plan telephone number. Valid values are digits from 0 to 9 and letters from A to D. The following special characters can be entered in the string:</p> <ul style="list-style-type: none"> <li>The star character (*) and the pound sign (#) that appear on standard touch-tone dial pads can be used in any dial string. However, these characters cannot be used as leading characters in a string (for example, *650).</li> <li>The period (.) can be entered any time, and is used as a wildcard character.</li> <li>The comma (,) can be used only in prefixes, and is used to insert a one-second pause or a delay.</li> </ul> <p><b>Note</b> The plus symbol (+) is not a valid character in the string.</p>
4	<b>port</b> <i>slot/port</i>	<p>Associate this voice-telephony dial peer with a specific logical dial interface. Enter the <i>slot/port</i> number of the voice port connected to the POTS dial peer.</p> <p><b>Note</b> The <i>slot/port</i> syntax for BRI voice ports is different than for standard analog or digital voice ports on the Cisco MC3810. For a BRI voice port, the <i>slot</i> number is 1, 2, 3, or 4 to match the BRI voice port being configured, and the <i>port</i> number is always 1.</p>
5	<b>num-exp</b> <i>extension-number extension-string</i>	(Optional) If using the number expansion feature, define how to expand an extension number into a particular destination pattern.
6	<b>prefix</b> <i>string</i>	(Optional) Assign the dialed digits prefix for the dial peer.
7	<b>preference</b> <i>value</i>	<p>(Optional) Configure a preference for the POTS dial peer. The value is a number from 0 to 10 where the lower the number, the higher the preference. If POTS and voice-network (VoFR) peers are mixed in the same hunt group, POTS dial peers will be searched first, even if a voice-network peer has a higher preference number.</p> <p>For more information about hunt groups and preferences, see the "Hunt Groups and Preference Configuration" section of the <i>Cisco MC3810 Multiservice Access Concentrator Software Configuration Guide</i>.</p>
8	Exit from dial-peer configuration mode and repeat Steps 2 through 7 for the next dial peer.	

## Verify

Make sure the voice port, serial port and/or the T1/E1 controller are set to **no shutdown**.

Verify the POTS dial peer configuration by using the **show dial-peer voice number** or the **show dial-peer voice summary** command.

- The following is sample output from the **show dial-peer voice number** command for a BRI voice dial peer on the Cisco MC3810:

```
router# show dial-peer voice 1
VoiceEncapPeer1
tag = 1, destination-pattern = `2...',preference = 0,
Admin state is up, Operation state is down
DTMF Relay = disabled
type = pots, prefix = `', fwd-digits = 0,
session-target = `', voice-port =
```

- The following is sample output from the **show dial-peer voice summary** command for a BRI voice dial peer on the Cisco MC3810:

```
router# show dial-peer voice summary
TAG TYPE    ADMIN OPER PREFIX  DEST-PATTERN  FWD  PREF  SESS-TARGET  PORT
   1 pots   up    down   2...         2...         0    0
   3 pots   up    down   3...         3...         0    0
   2 pots   up    down   1...         1...         0    0
  100 vofr  up    down
```

To configure network-side dial peers, see the next section “Configuring Network-Side Dial Peers for ISDN BRI Voice Ports.”

## Configuring Network-Side Dial Peers for ISDN BRI Voice Ports

The procedure for configuring the network-side dial peers depends on the type of WAN transport between this Cisco MC3810 and the far-end Cisco MC3810. See the appropriate procedure in the *Cisco MC3810 Multiservice Access Concentrator Software Configuration Guide* as follows:

- Voice over Frame Relay (VoFR)—“Configuring Voice over Frame Relay Dial Peers” section in the “Configuring Voice over Frame Relay” chapter
- Voice over ATM (VoATM)—“Configuring Voice over ATM Dial Peers” section in the “Configuring Voice over ATM” chapter
- Voice over HDLC (VoHDLC)—“Configuring VoHDLC Dial Peers” section in the “Configuring Voice over HDLC” chapter

Make sure the voice port, serial port and/or the T1/E1 controller are set to **no shutdown**.

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**Note** You must configure the network-side dial-peers on the Cisco MC3810 concentrators at both ends of the network.

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## Verify

Verify the network-side dial peer configuration by following the verify procedure that accompanies the configuration procedure you used.

## Configuration Examples

This section contains the following configuration examples:

- Configuring an ISDN BRI voice port
- Configuring a POTS dial peer for an ISDN BRI voice port

To view configuration examples for network-side dial peers, see the configuration procedure you used (VoFR, VoATM, or VoHDLC).

## Configuring an ISDN BRI Voice Port

The following example shows typical ISDN BRI voice port configurations for BRI ports 1 and 2. In this example, both ports are set to emulate TE (user, or QSIG slave). Port 2 is configured to recover clock from the network NT device, and port 1 does not recover clock.

```
Router#
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#isdn switch-type basic-qsig
Router(config)#interface bri 1
Router(config-if)#isdn protocol-emulate user
Router(config-if)#isdn layer1-emulate user
Router(config-if)#network-clock-priority low
Router(config-if)#no shut
Router(config-if)#end
Router#s run interface bri
1w0d: %SYS-5-CONFIG_I: Configured from console by console1
Building configuration...
```

```
Current configuration:
!
interface BRI1
no ip address
no ip directed-broadcast
network-clock-priority low
isdn switch-type basic-qsig
isdn protocol-emulate user
isdn layer1-emulate user
isdn incoming-voice voice
isdn static-tei 0
no cdp enable
end
Router#
```

```
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#isdn switch-type basic-qsig
Router(config)#interface bri 2
Router(config-if)#isdn protocol-emulate user
Router(config-if)#isdn layer1-emulate user
Router(config-if)#network-clock-priority high
Router(config-if)#no shut
Router(config-if)#end
Router#s run interface bri
1w0d: %SYS-5-CONFIG_I: Configured from console by console1
Building configuration...
```

```
Current configuration:
!
interface BRI2
no ip address
no ip directed-broadcast
network-clock-priority high
isdn switch-type basic-qsig
isdn protocol-emulate user
isdn layer1-emulate user
isdn incoming-voice voice
isdn static-tei 0
no cdp enable
end
Router#
```

## Configuring POTS Dial Peers for ISDN BRI Voice Ports

The following example shows POTS dial-peer configurations for BRI ports 1, 2, and 3.

```
Router#
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#dial-peer voice 1 pots
Router(config-dial-peer)#destination-pattern 2
Router(config-dial-peer)#port 1/1
Router(config-dial-peer)#prefix 12
Router(config-dial-peer)#preference 1
Router(config-dial-peer)#exit
Router(config)#
Router(config)#dial-peer voice 2 pots
Router(config-dial-peer)#destination-pattern 3...
Router(config-dial-peer)#port 2/1
Router(config-dial-peer)#prefix 12
Router(config-dial-peer)#preference 0
Router(config-dial-peer)#exit
Router(config)#
Router(config)#dial-peer voice 3 pots
Router(config-dial-peer)#destination-pattern 1...
Router(config-dial-peer)#port 3/1
Router(config-dial-peer)#prefix 12
Router(config-dial-peer)#preference 0
Router(config-dial-peer)#end
Router#
Router#s dial-peer voice summary
TAG TYPE ADMIN OPER PREFIX DEST-PATTERN FWD PREF SESS-TARGET PORT
  1 pots up up 12 2 0 1 1/1
  2 pots up down 12 3... 0 0 2/1
  3 pots up down 12 1... 0 0 3/1
100 vofr up down 0 0
```

## Command Reference

This section documents new or modified commands. All other commands used with the ISDN BRI voice feature are documented in the Cisco IOS Release 12.0 command references.

- **isdn layer1-emulate**
- **isdn protocol-emulate**
- **isdn switch-type**
- **line-power**
- **network-clock-priority**
- **network-clock-select**
- **show controllers bri**
- **show interfaces bri**

## isdn layer1-emulate

To configure the layer 1 operation of a BRI voice port as clock master (NT) or slave (TE), use the **isdn layer1-emulate** interface configuration command. Use the **no** form of this command to restore the default (user).

```
isdn layer1-emulate { user | network }  
no isdn layer1-emulate
```

### Syntax Description

<b>user</b>	Physical interface operation in clock slave mode (as TE).
<b>network</b>	Physical interface operation in clock master mode (as NT).

### Default

Layer 1 port operation is as user (TE functionality as clock slave).

### Command Mode

Interface configuration

### Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(3)XG.

If you enter the **no isdn layer1-emulate network** command, the physical layer port operation defaults to user.

### Example

The following example configures the layer 1 operation of a BRI voice port as QSIG clock slave (TE):

```
configure terminal  
interface bri 1  
    isdn layer1-emulate user
```

### Related Commands

**isdn protocol-emulate**  
**network-clock-priority**

## isdn protocol-emulate

To configure the layer 2 and layer 3 port protocol of a BRI voice port or a PRI interface to emulate NT (network) or TE (user) functionality, use the **isdn protocol-emulate** interface configuration command. Use the **no** form of this command to restore the default (user).

```
isdn protocol-emulate {user | network}  
no isdn protocol-emulate
```

### Syntax Description

<b>user</b>	Layer 2 and layer 3 port protocol operation as TE (port functions as QSIG slave).
<b>network</b>	Layer 2 and layer 3 port protocol operation as NT (port functions as QSIG master).

### Default

Layer 2 and layer 3 port protocol emulates user (TE functionality).

### Command Mode

Interface configuration

### Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(3)XG.

If you enter the **no isdn protocol-emulate** command, the layer 2 and layer 3 protocol emulation defaults to user.

### Examples

The following example configures the layer 2 and layer 3 function of a BRI voice port to operate as TE:

```
interface bri 1  
  isdn protocol-emulate user
```

The following example configures the layer 2 and layer 3 function of an E1 PRI interface to operate as TE:

```
interface serial 1:15  
  isdn protocol-emulate user
```

The following example configures the layer 2 and layer 3 function of a T1 PRI interface to operate as TE:

```
interface serial 1:23  
  isdn protocol-emulate user
```

### Related Commands

**isdn layer1-emulate**  
**network-clock-priority**

## isdn switch-type

To specify the central office switch type on the ISDN interface, use the **isdn switch-type** command in global or interface configuration mode. To remove an ISDN switch type, use the **no** form of this command.

**isdn switch-type** *switch-type*  
**no isdn switch-type** *switch-type*

### Syntax Description

*switch-type* ISDN service provider switch type. Table 1 in the “Usage Guidelines” section lists the supported switch types.

### Default

No isdn switch type is specified.

### Command Mode

Global configuration or interface configuration

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**Note** This command can be entered in either global configuration or interface configuration mode. When entered in global configuration mode, the **basic-qsig** switch type command specifies that the Cisco MC3810 use QSIG signaling on all BRI interfaces; when entered in interface configuration mode, the command specifies that an individual BRI voice interface use QSIG signaling. The interface configuration mode setting overrides the global configuration setting on individual interfaces.

---

### Usage Guidelines

This command first appeared as a global command in Cisco IOS Release 9.21

This command first appeared as an interface command in Cisco IOS Release 11.3 T.

The **basic-qsig** switch type option to support QSIG BRI voice signaling was added in Cisco IOS Release 12.0(3)XG.

To remove an ISDN switch type from an ISDN interface, specify **no isdn switch-type** *switch-type*.

Table 1 lists supported BRI switch types by geographic area.

---

**Note** In the Cisco MC3810, ISDN BRI voice ports support *only* switch type basic-qsig; ISDN BRI backup ports support all other listed switch types, but *not* basic-qsig.

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**Note** If you are using the Multiple ISDN Switch Types feature to apply ISDN switch types to different interfaces, refer to the “Setting Up ISDN Basic Rate Service” chapter in the *Dial Solutions Configuration Guide* for additional details.

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**Note** Cisco IOS Release 11.3 T introduced ISDN switch type changes. The command parser will still accept the following switch types: basic-nwnet3, vn2, and basic-net3; however, when viewing the NVRAM configuration, the basic-net3 or vn3 switch types are displayed, respectively.

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If different Cisco MC3810 BRI ports interface with different ISDN switch types, you can use global and interface commands in any combination, as long as you remember that interface commands always override a global command. For example, if you have a BRI QSIG switch interface on BRI voice ports 1, 2, 3 and 4, but a BRI 5ess switch interface on BRI backup port 0, you can configure the ISDN switch types in any of the following combinations:

- Enter **isdn switch-type basic-qsig** in global configuration mode, and enter **isdn switch-type bri-5ess** on interface 0.
- Enter **isdn switch-type bri-5ess** in global configuration mode, and enter **isdn switch-type basic-qsig** on interfaces 1, 2, 3 and 4 individually.
- Enter **isdn switch-type bri-5ess** on interface 0, and enter **isdn switch-type basic-qsig** on interfaces 1, 2, 3 and 4 individually.

If you enter the **no isdn switch-type** command in global configuration mode, any switch type that was originally entered in global configuration mode is cancelled; however, any switch type originally entered on an interface is not affected. If you enter the **no isdn switch-type** command in interface configuration mode, any switch type configuration on the interface is cancelled.

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**Note** The voice-port **codec** command must be configured before any calls can be placed over the connection to the PINX. The default codec type is G729a.

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**Table 1 ISDN Service Provider BRI Switch Types**

Keywords by Area	Switch Type
<b>none</b>	No switch defined
<b>Australia</b>	
<b>basic-ts013</b>	Australian TS013 switches
<b>Europe</b>	
<b>basic-1tr6</b>	German 1TR6 ISDN switches
<b>basic-net3</b>	NET3 ISDN, Norway NET3, and New Zealand NET3 switches (covers the Euro-ISDN E-DSS1 signaling system and is ETSI-compliant)
<b>basic-qsig</b>	PINX (PBX) switches with QSIG signaling per Q.931
<b>vn3</b>	French VN3 and VN4 ISDN BRI switches
<b>Japan</b>	
<b>ntt</b>	Japanese NTT ISDN switches
<b>North America</b>	
<b>basic-5ess</b>	AT&T basic rate switches
<b>basic-dms100</b>	Northern Telecom DMS-100 basic rate switches
<b>basic-ni</b>	National ISDN switches

### Examples

- The following example configures the Cisco MC3810 to use BRI QSIG signaling for all of its BRI voice ports:

```
isdn switch-type basic-qsig
```

- The following example configures the Cisco MC3810 to use BRI QSIG signaling for BRI voice port 1. On port 1, this setting overrides any different signaling set in the previous example.

```
interface bri 1
  isdn switch-type basic-qsig
```

- The following example uses the Multiple ISDN Switch Types feature and shows the global ISDN switch type of basic-ni (formerly basic-ni1) and an interface level switch type of basic-qsig. ISDN switch type basic-qsig is applied to BRI interface 1 and overrides the global switch setting.

```
isdn switch-type basic-ni
!
interface bri 1
  isdn switch-type basic-qsig
```

## line-power

To configure the Cisco MC3810 BRI port to supply line power to the TE, use the **line-power** interface configuration command. To disable the line power supply, use the **no** form of this command.

**line-power**  
**no line-power**

### Syntax Description

This command has no arguments or keywords.

### Default

The BRI port does not supply line-power.

### Command Mode

Interface configuration

### Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(3)XG.

This command is supported only on the Cisco MC3810.

This command is used only on a BRI port operating in NT mode. A BRI port operating in TE mode is automatically disabled as a source of line power.

When you enter the **line-power** command, the line power provision is activated on a BRI port. When you enter **no line-power**, the line power provision is deactivated on a BRI port.

### Example

The following example configures a BRI port to supply power to an attached TE device:

```
interface bri 1
 line-power
```

## network-clock-priority

Use the **network-clock-priority** interface configuration command to specify the clock-recovery priority for the BRI voice ports in a BRI voice module (BVM). Use the **no** form of this command to restore the default (low) clock-recovery priority.

```
network-clock-priority {low | high}  
no network-clock-priority {low | high}
```

### Syntax Description

<b>low</b>	The BRI port is second priority to recover clock.
<b>high</b>	The BRI port is first priority to recover clock.

### Default

Each BRI voice port has low clock-recovery priority.

### Command Mode

Interface configuration

### Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(3)XG.

This command is supported only on the Cisco MC3810.

This command is only valid for BRI ports configured as TE. It allows you to select which PINX (PBX) is the first-priority clock source.

This command becomes effective only when the BVM is the clock source for the Cisco MC3810; this happens in three ways:

- When the BVM is specified as the first-priority network clock source through the **network-clock-select** command.
- When the BVM is specified as a lower-priority network clock source, and a higher-priority network clock source is lost.
- When the BVM is the only network clock source.

The BRI voice port supplying clock operates as a line source; if there are other BRI voice ports configured as TE, they operate in loop-timed mode.

Regardless of the **network-clock-priority** setting, the first TE-configured BRI voice port that becomes active is automatically chosen to supply clock. The clock source does not change if another BRI voice port configured for **network-clock-priority high** becomes active.

If the chosen clocking port becomes inactive, the system searches for clock on the active TE-configured ports in the following order:

- 1 Ports configured as **network-clock-priority high** in order from lowest (1) to highest (4).
- 2 Ports configured as **network-clock-priority low** in order from lowest (1) to highest (4).

If the originally chosen port then reactivates, it resumes its role as clock source regardless of its **network-clock-priority** setting.

If you enter either the **no network-clock-priority low** or the **no network-clock-priority high** command, the network clock priority defaults to low.

## Example

The following example configures BRI voice port 1 as a first priority clock source:

```
interface bri 1
  network-clock-priority high
```

## Related Commands

**network-clock-select**

## network-clock-select

Use the **network-clock-select** global configuration command to specify a clock-source selection priority. Use the **no** form of this command to cancel the network clock selection.

```
network-clock-select priority {serial 0 | system | bvm | controller}  
no network-clock-select priority {serial 0 | system | bvm | controller}
```

### Syntax Description

<i>priority</i>	Selection priority for the clock source from 1 (highest) to 4 (lowest).
<b>serial 0</b>	Clocking priority for serial interface 0.
<b>system</b>	Clocking priority for the system clock.
<b>bvm</b>	Clocking priority for the BRI voice module (BVM).
<i>controller</i>	Clocking priority for either the trunk controller (T1/E1 0) or the digital voice module (T1/E1/ 1).

### Default

No network clock source is specified.

### Command Mode

Global configuration

### Usage Guidelines

This command first appeared in Cisco IOS Release 11.3 MA.

The BVM as a possible network clock source was added in Cisco IOS Release 12.0(3)XG.

When an active clock source fails, the system chooses the next lower priority clock source specified by this command. When a higher-priority clock becomes available, the system automatically reselects the higher-priority clock source.

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**Note** If the BRI backup port (BRI 0) is installed and becomes active, it automatically recovers network clock for as long as it remains active. However, you can not give port BRI 0 a clock-selection priority.

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Enter the **network-clock-select** command to establish the clock-selection priority when there are multiple sources of line (network) clocking in a Cisco MC3810. Possible sources of line clocking for the Cisco MC3810 are the BRI voice module (BVM), the multiflex trunk module (MFT), and a serial port configured for **clock rate line**.

## Examples

The following example sets a possible clock selection priority in a Cisco MC3810 with a digital voice module (DVM) installed.

```
network-clock-select 1 T1 0
network-clock-select 2 T1 1
network-clock-select 3 serial 0
network-clock-select 4 system
```

The following example sets a possible clock selection priority in a Cisco MC3810 with a BRI voice module (BVM) installed.

```
network-clock-select 1 T1 0
network-clock-select 2 bvm
network-clock-select 3 serial 0
network-clock-select 4 system
```

## Related Commands

**network-clock-switch**  
**network-clock-priority**

## show interfaces bri

Use the **show interfaces bri** EXEC command to display statistics for ISDN BRI interfaces configured on the Cisco MC3810.

**show interfaces bri** [*number*]

### Syntax Description

*number* Specifies the BRI port number. Valid numbers are from 1 to 4.

### Command Mode

EXEC

### Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(3)XG.

If you use the **show interfaces bri** command in the Cisco MC3810 without the slot-number keywords, information for all of the configured ISDN BRI interfaces will be shown.

The BRI port numbers match the physical ports numbers on the BRI voice module (BVM).

### Example

The following example shows interface statistics for interface BRI 1:

```
Router#
Router#show interfaces bri 1
BRI1 is up (spoofing), line protocol is up (spoofing)
  Hardware is BVM
  MTU 1500 bytes, BW 64 Kbit, DLY 20000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation HDLC, loopback not set
  Last input 1w0d, output 1w0d, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0 (size/max/drops); Total output drops: 0
  Queueing strategy: weighted fair
  Output queue: 0/1000/64/0 (size/max total/threshold/drops)
    Conversations 0/1/256 (active/max active/max total)
    Reserved Conversations 0/0 (allocated/max allocated)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    70 packets input, 278 bytes, 0 no buffer
    Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    70 packets output, 278 bytes, 0 underruns
    0 output errors, 0 collisions, 0 interface resets
    0 output buffer failures, 0 output buffers swapped out
    2 carrier transitions
Router#
```

## show controllers bri

Use the **show controllers bri** command to display statistics for ISDN BRI controllers configured on the Cisco MC3810:

```
show controllers bri number
```

### Syntax Description

*number* Specifies the BRI controller number. Valid numbers are from 1 to 4.

### Command Mode

EXEC

### Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(3)XG.

If you use the **show controllers bri** command in the Cisco MC3810 without the slot-number keywords, information for all of the configured ISDN BRI controllers will be shown.

The BRI controller numbers match the physical ports numbers on the BRI voice module (BVM).

### Example

The following example shows controller statistics for interface BRI 1:

```
Router#
Router#show controllers bri 1
BRI unit 1:
Layer 1 is DEACTIVATED. (ISDN L1 State F3)

S2084 registers:
Configuration register=0x1

QMC GLOBAL MULTICHANNEL PARAMETERS (at 0x30003C00)
[MCBASE]=0x1C4AE38, [QMCSTATE]=0x0, [MRBLR]=0x5F4
[TXSPTR]=0x1C20, [RXPTR]=0x1C24, [GRFTHR]=0x1
[GRFCNT]=0x1, [INTBASE]=0x1B04124, [INTPTR]=0x1B0413C
[RXSPTR]=0x1C20, [TXPTR]=0x1C3E, [CMASK32]=0xDEBB20E3
[TSATRX]=0x30003C20, [TSATTX]=0x30003C60, [CMASK16]=0xF0B8

QMC Timeslot Assignment Entries (Rx == Tx):
[ 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0
0x0 0x0 0x0 0x0 0x540 0x8503 0x84C3 0x8483 0x0 0x400 0x400 0xC400 0xC000 ]

D Channel Information:

BVM unit 1,
qmc_channel: 18 timeslot: 26
idb at 0x1199FC8, driver data structure at 0x11D06D8
SCC Registers:
General [GSMR]=0x780:0x0000003A, Protocol-specific [PSMR]=0x80
Events [SCCE]=0x0000, Mask [SCCM]=0x000F, Status [SCCS]=0x0002
Transmit on Demand [TODR]=0x0, Data Sync [DSR]=0x7E7E
Interrupt Registers:
Config [CICR]=0x001B9981, Pending [CIPR]=0x00000240
Mask [CIMR]=0x7A000400, In-srv [CISR]=0x00000000
Command register [CR]=0x640
```

## show controllers bri

---

```
Port A [PADIR]=0x00F0, [PAPAR]=0xFFFF
      [PAODR]=0x00E0, [PADAT]=0x1AEF
Port B [PBDIR]=0x01333F, [PBPAR]=0x01033E
      [PBODR]=0x000030, [PBDAT]=0x00DFFC
Port C [PCDIR]=0x0C0C, [PCPAR]=0x0000
      [PCSO]=0x03F3, [PCDAT]=0x00FF, [PCINT]=0x0000
Port D [PDDIR]=0x000760, [PDPAR]=0x00013F
      [PDDAT]=0x000CB0
SI     [SIMODE]=0x00480048, [SIGMR]=0x0E, [SISTR]=0x00
      [SICR]=0x6D372E49
BRGC   [BRGC1]=0x00000000, [BRGC2]=0x00000000
      [BRGC3]=0x00000000, [BRGC4]=0x00000000

QMC CHANNEL PARAMETERS (at 0x30002480)
[TBASE]=0xBC0, [CHAMR]=0xB000, [TSTATE]=0x300C0FDE
[TBPTR]=0xBD0, [ZISTATE]=0xE1FF0FFF, [INTMSK]=0x3F
[RBASE]=0xB40, [MFLR]=0x5F4, [RSTATE]=0x31021C00
[RBPTR]=0xB70, [ZDSTATE]=0x25FFFFAE

buffer size 1524
RX ring with 16 entries at 0x1C4B978, Buffer size 1524
Rxhead = 0x1C4B9A8 (6), Rxp = 0x11D070C (6)
00 pak=0x145FDD0 buf=0x1CCE138 status=9000 pak_size=0
01 pak=0x145FBBC buf=0x1CCDA78 status=9000 pak_size=0
02 pak=0x145F9A8 buf=0x1CCD3B8 status=9000 pak_size=0
03 pak=0x145F794 buf=0x1CCCCF8 status=9000 pak_size=0
04 pak=0x14618D4 buf=0x1CD38F8 status=9000 pak_size=0
05 pak=0x14616C0 buf=0x1CD3238 status=9000 pak_size=0
06 pak=0x1461298 buf=0x1CD24B8 status=9000 pak_size=0
07 pak=0x1461084 buf=0x1CD1DF8 status=9000 pak_size=0
08 pak=0x1460E70 buf=0x1CD1738 status=9000 pak_size=0
09 pak=0x1460C5C buf=0x1CD1078 status=9000 pak_size=0
10 pak=0x1460A48 buf=0x1CD09B8 status=9000 pak_size=0
11 pak=0x1460834 buf=0x1CD02F8 status=9000 pak_size=0
12 pak=0x1460620 buf=0x1CCFC38 status=9000 pak_size=0
13 pak=0x146040C buf=0x1CCF578 status=9000 pak_size=0
14 pak=0x14601F8 buf=0x1CCEEB8 status=9000 pak_size=0
15 pak=0x145FFE4 buf=0x1CCE7F8 status=B000 pak_size=0

TX ring with 4 entries at 0x1C4B9F8, tx_count = 0
tx_head = 0x1C4BA08 (2), head_txp = 0x11D0818 (2)
tx_tail = 0x1C4BA08 (2), tail_txp = 0x11D0818 (2)
00 pak=0x0000000 buf=0x0000000 status=0000 pak_size=0
01 pak=0x0000000 buf=0x0000000 status=0000 pak_size=0
02 pak=0x0000000 buf=0x0000000 status=0000 pak_size=0
03 pak=0x0000000 buf=0x0000000 status=2000 pak_size=0
0 throttles, 0 enables
0 input aborts on receiving flag sequence
  0 missed datagrams, 0 overruns
  0 bad datagram encapsulations, 0 memory errors
  0 transmitter underruns

B1 Channel Information:

BVM unit 1,
qmc_channel: 0 timeslot: 0
idb at 0x119FEB0, driver data structure at 0x11D0B54
SCC Registers:
General [GSMR]=0x0:0x00000000, Protocol-specific [PSMR]=0x0
Events [SCCE]=0x0000, Mask [SCCM]=0x0000, Status [SCCS]=0x0000
Transmit on Demand [TODR]=0x9080, Data Sync [DSR]=0xA4
QMC CHANNEL PARAMETERS (at 0x0)
[TBASE]=0x0, [CHAMR]=0x0, [TSTATE]=0x7C6802A6
[TBPTR]=0x9080, [ZISTATE]=0x906000AC, [INTMSK]=0x9060
```

```
[RBASE]=0x4800, [MFLR]=0x5, [RSTATE]=0x7C8000A6
[RBPTR]=0x7C9B, [ZDSTATE]=0x3864FFDC

buffer size 1524
RX ring with 0 entries at 0x0, Buffer size 1524
Rxhead = 0x0 (0), Rxp = 0x0 (-4670172)

TX ring with 0 entries at 0x0, tx_count = 0
tx_head = 0x0 (0), head_txp = 0x0 (-4670243)
tx_tail = 0x0 (0), tail_txp = 0x0 (-4670243)
0 throttles, 0 enables
0 input aborts on receiving flag sequence
    0 missed datagrams, 0 overruns
    0 bad datagram encapsulations, 0 memory errors
    0 transmitter underruns

B2 Channel Information:

BVM unit 1,
qmc_channel: 0 timeslot: 0
idb at 0x11A5D98, driver data structure at 0x11D0F8C
SCC Registers:
General [GSMR]=0x0:0x00000000, Protocol-specific [PSMR]=0x0
Events [SCCE]=0x0000, Mask [SCCM]=0x0000, Status [SCCS]=0x0000
Transmit on Demand [TODR]=0x9080, Data Sync [DSR]=0xA4

QMC CHANNEL PARAMETERS (at 0x0)
[TBASE]=0x0, [CHAMR]=0x0, [TSTATE]=0x7C6802A6
[TBPTR]=0x9080, [ZISTATE]=0x906000AC, [INTMSK]=0x9060
[RBASE]=0x4800, [MFLR]=0x5, [RSTATE]=0x7C8000A6
[RBPTR]=0x7C9B, [ZDSTATE]=0x3864FFDC

buffer size 1524
RX ring with 0 entries at 0x0, Buffer size 1524
Rxhead = 0x0 (0), Rxp = 0x0 (-4670442)

TX ring with 0 entries at 0x0, tx_count = 0
tx_head = 0x0 (0), head_txp = 0x0 (-4670513)
tx_tail = 0x0 (0), tail_txp = 0x0 (-4670513)
0 throttles, 0 enables
0 input aborts on receiving flag sequence
    0 missed datagrams, 0 overruns
--More--          0 bad datagram encapsulations, 0 memory
>errors
    0 transmitter underruns

Router#
```

show controllers bri

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