Packet Mode Services on D Channel

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The Packet Mode Services on D Channel feature allows Japanese and European telephone switches to query Cisco routers for the availability of packet mode services on the ISDN D channel, in compliance with International Telecommunication Union (ITU) specification Q.931.

Finding Feature Information in This Module
Your Cisco IOS software release may not support all of the features documented in this module. To reach links to specific feature documentation in this module and to see a list of the releases in which each feature is supported, use the “Feature Information for Packet Mode Services on D Channel” section on page 9 and the “Related Documents” section on page 5.

Finding Support Information for Platforms and Cisco IOS Software Images
Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at http://www.cisco.com/go/fn. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click Cancel at the login dialog box and follow the instructions that appear.

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- Configuration Examples for Packet Mode Services on D Channel, page 4
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Information About Packet Mode Services on D Channel

To configure the Packet Mode Services on D Channel feature, you should understand the following concepts:

- ITU Q.931 Packet Mode Procedures, page 2
- Benefits of the Packet Mode Services on D Channel Feature, page 2

ITU Q.931 Packet Mode Procedures

Cisco IOS software prior to Cisco IOS Release 12.4(6)T provides support for X.25 over the ISDN D channel using the ITU Q.931 service access point identifier (SAPI) value 16 procedures for call setup required by some switches, but this support does not adhere to the standard for packet mode communications for the ISDN D channel using SAPI value 0 procedures for call setup. The Packet Mode Services on D Channel feature complies with the SAPI value 0 connection procedures, and allows Japanese and some European telephone switch types to query Cisco routers for availability of packet mode services on the ISDN D channel, in compliance with ITU specification Q.931, section 6, which describes packet mode communications for the ISDN D channel.

Although regular X.25 and ISDN configuration commands may be sufficient to enable this feature, the Japanese NTT ISDN switch types expect the same terminal endpoint identifier (TEI) to be shared. By default, Cisco gateways will try to use two different TEIs and expect the switch to establish an X.25 link on the TEI that responds. The Japanese NTT switch does not follow this procedure and expects the Cisco router to share the same TEI. Cisco recommends that deployments interworking with the Japanese NTT switch type use the `isdn x25 dchannel` interface configuration command with the optional `q931-broadcast` keyword to enable sharing of the TEI and avoid interworking problems. The optional `q931-broadcast` keyword can also be used in configurations for other switch types such as the European NET3 that require sharing of the TEIs. The optional `q931-broadcast` keyword is supported only on the ISDN BRI interface user side of the network.

Benefits of the Packet Mode Services on D Channel Feature

The benefit of installing the Packet Mode Services on D Channel feature is compliance with the Q.931 SAPI value 0 procedures for call setup, which allows Cisco routers to interoperate with Japanese and European (NTT and NET3) telephone switches.

How to Enable Packet Mode Services on D Channel Feature

This section contains the following procedure:

- Enabling Packet Mode Services on D Channel Feature, page 2

Enabling Packet Mode Services on D Channel Feature

The Japanese NTT (and some European NET3) ISDN switch types expect the same TEI to be shared across the ISDN interface. By default, Cisco gateways will try to use two different TEIs and expect the switch to establish an X.25 link on the TEI that responds. The NTT and NET3 switches do not follow this procedure and expect the Cisco router to share the same TEI. When this feature is installed as part
of Cisco IOS Release 12.4(6)T software, deployments interworking with the Japanese NTT switch type can use the Packet Mode Services on D Channel feature to enable sharing of the TEI and avoid interworking issues.

Following are the prerequisites, restrictions, and steps you need to follow on deployments interworking with the Japanese NTT switch type to enable sharing of the TEI and avoid interworking incompatibilities. These steps ensure that Q.931 SAPI value 0 procedures are enabled, and that X.25 calls can be accepted correctly on the ISDN D channel.

**Prerequisites**

Timer T320 must be disabled for this feature to work.

**Restrictions**

This feature is supported only on incoming calls, and only on BRI interfaces. All outgoing calls use SAPI value 16 procedures (X.25 on the D channel).

**SUMMARY STEPS**

1. enable
2. configure terminal
3. x25 routing
4. interface type number
5. isdn switch-type switch-type
6. isdn x25 dchannel q931-broadcast

**DETAILED STEPS**

<table>
<thead>
<tr>
<th>Command or Action</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong> enable</td>
<td>Enables privileged EXEC mode.</td>
</tr>
<tr>
<td><strong>Example:</strong> Router&gt; enable</td>
<td>• Enter your password if prompted.</td>
</tr>
<tr>
<td><strong>Step 2</strong> configure terminal</td>
<td>Enters global configuration mode.</td>
</tr>
<tr>
<td><strong>Example:</strong> Router# configure terminal</td>
<td></td>
</tr>
<tr>
<td><strong>Step 3</strong> x25 routing</td>
<td>Enables X.25 routing.</td>
</tr>
<tr>
<td><strong>Example:</strong> Router(config)# x25 routing</td>
<td></td>
</tr>
<tr>
<td><strong>Step 4</strong> interface type number</td>
<td>Enters interface configuration mode and, in this example, begins configuring ISDN interface BRI 0.</td>
</tr>
<tr>
<td><strong>Example:</strong> Router(config)# interface BRI 0</td>
<td></td>
</tr>
</tbody>
</table>
Packet Mode Services on D Channel: Example

The following is a typical configuration that enables SAPI 0 procedures that accept X.25 calls on the ISDN D channel, on ISDN BRI interface 0:

```plaintext
isdn switch-type basic-ntt
x25 routing
! interface BRI0
 no ip address
 no ip directed-broadcast
dialer load-threshold 1 either
isdn switch-type basic-net3
isdn x25 dchannel q931-broadcast
!
interface BRI0:0
 ip address 192.168.1.1 255.255.255.252
 no ip directed-broadcast
 no ip mrout-cache
 x25 address 12503752101
 x25 htc 2
 x25 map ip 192.168.1.2 2231146
!
```

The `debug isdn q931`, `debug isdn events detail`, and `debug isdn mgmnt` EXEC commands have been enhanced for Cisco IOS Release 12.4(6)T, to provide information about accepting X.25 calls on the ISDN D channel. For purpose of example, bold type in the following output indicates reports seen when the `isdn x25 dchannel` interface configuration command with the optional `q931-broadcast` keyword is enabled:

```
Router# debug isdn q931

* Sep 28 12:34:29.739: ISDN BR1/1 Q931: RX -> SETUP pd = 8 callref = 0x5C (re-assembled)
  Bearer Capability i = 0x88C0C2E6
  Standard = CCIIT
  Transfer Capability = Unrestricted Digital
  Transfer Mode = Packet
  Transfer Rate = Packet - not specified
```
User Info L2 Protocol = Recommendation Q921/I.441
User Info L3 Protocol = Recommendation X.25, Packet Layer

Channel ID i = 0x8C

Exclusive, No B-channel
Information Rate i = 0x8888
Packet Layer Binary Params i = 0x80
Packet Layer Window Size i = 0x8282
Packet Size i = 0x8888
Calling Party Number i = 0x0083, '144014384106'
   Plan:Unknown, Type:Unknown
User-User i = 0x02CC000000

Router# debug isdn events detail

*Sep 28 12:34:29.747: ISDN BR1/1 EVENTd: isdn_host_packet_mode_events: Host packet call received call id 0xB

Router# debug isdn mgmnt

*Jun  8 22:38:56.535: ISDN BR0 Q921: User TX -> IDREQ ri=29609 ai=127
*Jun  8 22:38:56.595: ISDN BR0 Q921: User RX <- IDASSN ri=29609 ai=86
*Jun  8 22:38:56.595: ISDN BR0 SERROR: L2_Go: at bailout DLCB ia NULL
   L2: sapi 63 tei 127 ces 0 ev 0x3
*Jun  8 22:38:56.595: ISDN BR0 MGMNT: LM_MDL_UI_DATA_IND: message 2 ri 29609 ai 86 switch type 9
   using lmtr tei 85 tei 85

Additional References

The following sections provide references related to the Packet Mode Services on D Channel feature.

Related Documents

<table>
<thead>
<tr>
<th>Related Topic</th>
<th>Document Title</th>
</tr>
</thead>
</table>
| ISDN and BRI switch configuration procedures      | • “Part 3: ISDN Configuration” in the Cisco IOS Dial Technologies Configuration Guide, Release 12.4
|                                                  | • Cisco IOS Dial Technologies Command Reference, Release 12.4 |
|                                                  | • Cisco IOS Wide-Area Networking Command Reference, Release 12.4 |

Standards

<table>
<thead>
<tr>
<th>Standard</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>ITU-T Q.931</td>
<td>ISDN USER-NETWORK INTERFACE LAYER 3 SPECIFICATION FOR BASIC CALL CONTROL</td>
</tr>
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</table>
MIBs

<table>
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<th>MIB</th>
<th>MIBs Link</th>
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</thead>
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<tr>
<td>None</td>
<td>To locate and download MIBs for selected platforms, Cisco IOS releases,</td>
</tr>
<tr>
<td></td>
<td>and feature sets, use the Cisco MIB Locator found at the following URL:</td>
</tr>
<tr>
<td></td>
<td><a href="http://www.cisco.com/go/mibs">http://www.cisco.com/go/mibs</a></td>
</tr>
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RFCs

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<td>None</td>
<td>—</td>
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</table>

Technical Assistance

<table>
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<th>Description</th>
<th>Link</th>
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<tr>
<td>The Cisco Technical Support and Documentation website contains thousands of pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content.</td>
<td><a href="http://www.cisco.com/techsupport">http://www.cisco.com/techsupport</a></td>
</tr>
</tbody>
</table>

Command Reference

This section documents the following modified command:
- `isdn x25 dchannel`
isdn x25 dchannel

To create a configurable interface for X.25 traffic over the ISDN D channel, use the isdn x25 dchannel command in interface configuration mode. To remove the interface, use the no form of this command.

```
isdn x25 dchannel [q931-broadcast]
no isdn x25 dchannel [q931-broadcast]
```

### Syntax Description
- **q931-broadcast** (Optional) Enables a gateway to share the same terminal endpoint identifier (TEI) for sending X.25 Set Asynchronous Balanced Mode Extended (SABME) and ITU Q.931 packet mode responses.

### Defaults
- Command is disabled

### Command Modes
- Interface configuration

### Command History

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2F</td>
<td>This command was introduced.</td>
</tr>
<tr>
<td>12.4(6)T</td>
<td>This command was enhanced with the optional q931-broadcast keyword to enable the ITU Q.931 service access point identifier (SAPI) value 16 procedures for call setup that accepts X.25 calls on the BRI D channel on Japanese and some European telephone switches that require that procedure.</td>
</tr>
</tbody>
</table>

### Usage Guidelines

This command creates a new, configurable interface, which can be specified as interface bri:x:0 in commands, where x is the original BRI interface number. For example, on a Cisco 4500 router with an MBRI, if the isdn x25 dchannel command is configured on interface BRI 5, the new interface is bri5:0 and can be used for configuring the other parameters for X.25 over the D channel. These parameters include the addresses and the map statements. To display the new interface, use the more system:running-config command.

The optional q931-broadcast keyword is supported only on the ISDN BRI interface user side. Although regular X.25 and ISDN configuration commands may be sufficient to enable this feature, the Japanese NTT ISDN switch types expect the same TEI to be shared. By default, Cisco gateways will try to use two different TEIs and expect the switch to establish an X.25 link on the TEI that responds. The Japanese NTT switch does not follow this procedure and expects the Cisco router to share the same TEI. Cisco recommends that deployments interworking with the Japanese NTT switch type use the optional q931-broadcast keyword to enable sharing of the TEI and avoid interworking incompatibilities. The optional q931-broadcast keyword can also be used in configurations for other switch types such as the European NET3 that require sharing of the TEIs.

You can verify the X.25 call accept procedure using the debug isdn events, debug isdn command with the optional mgmnt keyword, and debug isdn q931 EXEC commands.
Examples

The following example creates BRI interface 0 and configures it for X.25 over the ISDN D channel. This example uses dynamic TEIs, not a static TEI.

```bash
interface bri1
  isdn x25 dchannel
interface bri1:0
  ip address 10.1.1.2 255.255.255.0
  x25 address 31107000000100
  x25 htc 1
  x25 suppress-calling-address
  x25 facility windowsize 2 2
  x25 facility packetsize 256 256
  x25 facility throughput 9600 9600
  x25 map ip 10.1.1.3 31107000000200
  x25 map ip 10.1.1.4 31107000000800
```

The following is a typical configuration that enables SAPI 0 procedures that accept X.25 calls on the ISDN D channel, on ISDN BRI interface 0:

```bash
isdn switch-type basic-ntt
x25 routing
!
interface BRI0
  no ip address
  no ip directed-broadcast
  dialer load-threshold 1 either
  isdn switch-type basic-net3
  isdn x25 dchannel q931-broadcast
  !
interface BRI0:0
  ip address 192.168.1.1 255.255.255.252
  no ip directed-broadcast
  no ip mroute-cache
  x25 address 12503372501
  x25 htc 2
  x25 map ip 192.168.1.2 2231146
  !
```

Related Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>debug isdn</code></td>
<td>Displays messages about what is occurring in the structure and operation of ISDN in the Cisco IOS software.</td>
</tr>
<tr>
<td><code>debug isdn events</code></td>
<td>Displays ISDN events occurring on the user (router) side of the ISDN interface.</td>
</tr>
<tr>
<td><code>debug isdn q931</code></td>
<td>Displays information about call setup and teardown of ISDN Layer 3 network connection between the user (router) side and the network side.</td>
</tr>
<tr>
<td><code>interface bri</code></td>
<td>Configures a BRI interface and enters interface configuration mode.</td>
</tr>
<tr>
<td><code>isdn switch-type</code></td>
<td>Specifies the central office switch type on the ISDN interface.</td>
</tr>
</tbody>
</table>
Feature Information for Packet Mode Services on D Channel

Table 1 lists the release history for this feature.

Not all commands may be available in your Cisco IOS software release. For release information about a specific command, see the command reference documentation.

Cisco IOS software images are specific to a Cisco IOS software release, a feature set, and a platform. Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at http://www.cisco.com/go/fn. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click Cancel at the login dialog box and follow the instructions that appear.

Note Table 1 lists only the Cisco IOS software release that introduced support for a given feature in a given Cisco IOS software release train. Unless noted otherwise, subsequent releases of that Cisco IOS software release train also support that feature.

<table>
<thead>
<tr>
<th>Feature Name</th>
<th>Releases</th>
<th>Feature Information</th>
</tr>
</thead>
</table>
| Packet Mode Services on D Channel | 12.4(6)T | This feature allows Japanese and European telephone switches to query Cisco routers for the availability of packet mode services on the ISDN D channel, in compliance with International Telecommunication Union (ITU) specification Q.931. The following sections provide information about this feature:  
  • Information About Packet Mode Services on D Channel  
  • How to Enable Packet Mode Services on D Channel Feature  
  The following command was modified by this feature: isdn x25 dchannel. |
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