



## System Administration Support

The configuration of the Interface Controller Card (ICC) Primary Rate Interface (PRI) ISDN span is accomplished with most system administration utilities. Use the Card Maintenance screen to add ICC ISDN spans to the system database and place them in service (IS) and out of service (OOS). Place all PRI B-channels into resource groups the same way you would other system network interface ports.



### Note

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PRI D-channels cannot be added to a resource group.

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System administration utilities specific to ISDN PRI support include the ICC ISDN Span Configuration screen, ISDN Message Template Summary screen, ISDN Message Template screen, and the ISDN Supervision Templates screen.

This chapter highlights system administration support for the ISDN PRI package, concentrating on the following areas:

- Adding ICC ISDN spans into the system database
  - Card Maintenance screen
  - ICC ISDN Span Configuration screen
  - Specific ICC ISDN Span Configuration screen ICC ISDN T1 and E1 field selections
- Configuring the Host Setup Timer
- Configuring ISDN feature flags
- Defining ICC ISDN span processing on the system
  - Impulse and outpulse rule support
  - ISDN Message Template Summary screen
  - ISDN Message Templates screen
  - ISDN Supervision Templates screen
- Performing diagnostics and maintenance
  - Card Display screen
  - Port Display screen
  - Card and system alarms and their associated messages

Chapter 5, “Non-Facility Associated Signaling (NFAS),” describes the additional system administration functions provided to support ISDN Non-Facility Associated Signaling (NFAS). Use the information in Chapter 5 in conjunction with the *Cisco VCO/4K System Administrator's Guide*.

# Card Maintenance Support

ICC ISDN spans are fully supported by the system administration Card Maintenance screen. Refer to the *Cisco VCO/4K System Administrator's Guide* for detailed information on this screen. Additional information specific to ICC ISDN span support is provided in this section.

When you add an ICC T1 ISDN span to the database via the Card Maintenance screen, the system controller assigns the first available contiguous block of 24 port addresses to the span. The first 23 port addresses are assigned to the B-channels, and the twenty-fourth address is reserved for the D-channel.

When you add an ICC E1 ISDN span to the database via the Card Maintenance screen, the system controller assigns the first available contiguous block of 32 port addresses to the span as follows:

- Port 1 is the synchronization channel and cannot be assigned to a port group.
- Port 17 is reserved for the D-channel and cannot be assigned to a port group.
- Ports 2 through 16 and ports 18 through 32 are assigned to the B-channels.

The initial status of the span (either T1 or E1) is OOS. Use the **C** command (change status) to place the span in active mode. When the card comes into service, it transitions to the maintenance mode. The span remains in maintenance mode until the ICC ISDN application is downloaded, all signal alarms are cleared, and the D-channel link is established.

The span status mode reflects the state of the ICC ISDN span D-channel. All span status modes are supported for the ICC ISDN span except for the standby mode and the camped on mode. Diagnostic mode places the span into local loopback. An additional diagnostic mode, remote (**R**), has been added so you can place the span into remote loopback.

Use the card maintenance **P** command to deactivate/activate each B-channel on the span. Deactivating a B-channel places the port into a near-end OOS state. ISDN states can be viewed with the system administration Port Display screen.

When a span is manually placed into maintenance mode, the idle B-channels are placed into maintenance near-end state. Active calls are not affected. The associated B-channels of released calls are placed into the near-end maintenance mode.

The system supports autonomous channel maintenance processing through the use of the SERVICE and SERVICE ACKNOWLEDGE D-channel messages. In user mode (applicable to ICC-T1 PRI/4ESS, ICC-T1 PRI/5ESS, ICC-T1 PRI/NI-2, ICC-T1 PRI/NTI, ICC-T1 PRI/NTT, ICC-E1 PRI/NET5 (EURO), and ICC -E1 PRI/TS014 spans), when the D-channel is running and all signal alarms have cleared, B-channels assume the far-end OOS state until the network brings them into active service. In user-symmetrical mode (applicable to ICC-T1 PRI/4ESS, ICC-T1 PRI/5ESS, ICC-T1 PRI/NI-2, and ICC-T1 PRI/NTI), B-channels are automatically brought into active service.

## Interface Controller Card ISDN Span Configuration

Use the ICC ISDN Span Configuration screen to define the operating characteristics of an ICC ISDN span, and to assign port names to the B-channels associated with that span. Refer to the *Cisco VCO/4K System Administrator's Guide* for more information.

To access the ICC ISDN Span Configuration screen from the Card Summary screen, follow these steps:

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- Step 1** Use the **Prev Field** or **Next Field** key to position the cursor in the DISP CARD field corresponding to the ICC ISDN span for which you want to display configuration information.

**Step 2** Type any character and press **Enter**.



### Note

The status field of the ICC ISDN Span Configuration screen must indicate that the ICC ISDN span is in the OOS state before you can configure its operating characteristics.

There are two different ICC ISDN Span Configuration screens—only one of which will be displayed on your monitor. One screen is associated with ICC T1 spans, the other is associated with ICC E1 spans.

The ICC ISDN Span Configuration screen associated with ICC T1 spans is shown in Figure 2-1. T1 ISDN types include 4ESS, ESS, NI-2, NTI, and NTT.

*Figure 2-1 ICC ISDN Span Configuration Screen for ICC T1 Spans*

```

      I C C   I S D N   S P A N   C O N F I G U R A T I O N

SPAN LOCATION:  R,L,S 1 1 15-1-1      TYPE   :  ICC-T1 PRI/NI2
                                           STATUS:  Out of Service

ACCESS TYPE:  USER      TRX CLOCK:  SCLK  CA IP RULE:  0  SLIP MAINT LIMIT: 255
SWITCH TYPE:  NI2       REF CLOCK:  LOOP  NCA IP RULE: 0  OOF  MAINT LIMIT: 17
SPAN LENGTH:  0-133     SPAN TYPE:  ESF   A/Mu LAW:   Mu

      PORT      NAME      GROUP      GRP NAME      COS
      ----      -
      1          -         -         -         2
      2          -         -         -         2
      3          -         -         -         2
      4          -         -         -         2
      5          -         -         -         2
      6          -         -         -         2
      7          -         -         -         2
      8          -         -         -         2

```

The ICC ISDN Span Configuration screen associated with ICC E1 spans is shown in Figure 2-2. The E1 ISDN types include NET5 (EURO), QSIG, and TS014.



### Note

Figure 2-2 represents the screen for E1 ISDN types EURO and QSIG; E1 ISDN type TS014 is represented by the same screen, but excludes the OVERLAP field. The per-span overlap feature is not available for TS014 span types.

**Figure 2-2 ICC ISDN Span Configuration Screen for ICC E1 Spans**

```

      I C C  I S D N  S P A N  C O N F I G U R A T I O N

SPAN LOCATION: R,L,S 1 1 15-1-1      TYPE  : ICC-E1 PRI/NET5
                                      STATUS: Out of Service

ACCESS TYPE: USER      TRX CLOCK: SCLK  CA IP RULE: 3  SLIP MAINT LIMIT: 255
SWITCH TYPE: NET5_UK   REF CLOCK: LOOP  NCA IP RULE: 0  OOF  MAINT LIMIT: 17
SPAN LENGTH: 533-655  CRC4      : ON    A/Mu LAW:  A  OVERLAP: FORWARD

      PORT      NAME      GROUP      GRP NAME      COS
      ----      -
      1          -         -         -         2
      2          -         -         -         2
      3          -         -         -         2
      4          -         -         -         2
      5          -         -         -         2
      6          -         -         -         2
      7          -         -         -         2
      8          -         -         -         2

```

The ICC ISDN Span Configuration screen for T1 types can consist of up to three screens, each containing information on a maximum of eight ports. Ports corresponding to the 23 B-channels are displayed in ascending order.

The ICC ISDN Span Configuration screen for E1 types can consist of up to four screens, each containing a maximum of eight ports. Ports corresponding to the 30 B-channels are displayed in ascending order.

**Note**

For T1 types, port 24 (the D-channel), and information for deactivated ports (taken out of service via the **P** command), are not displayed. For E1 types, port 17 (the D-channel), and information for deactivated ports taken OOS, are not displayed.

Press **Prev Field** and **Next Field** to move between fields. Press **Tab** and **<** to move between the first field on each line. Press **Prev Screen** and **Next Screen** to page through the listings. Press **Print Screen** to obtain a hard copy of any of the screens.

## ICC ISDN Span Configuration Screen Field Definitions

The ICC ISDN Span Configuration screen contains the following fields:

**SPAN LOCATION**—*Display only*. The rack-level-slot address of the span. Refer to the “ISDN Primary Rate Interface Package” section on page 1-1 for span location conventions.

**TYPE**—*Display only*. Indicates the type of span in that location. The valid values for ISDN PRI are either ICC-T1 PRI/x or ICC-E1 PRI/x, where x represents a particular ISDN protocol. (See Chapter 5, “Non-Facility Associated Signaling (NFAS),” for ISDN NFAS values.)

**STATUS**—*Display only*. Indicates the current status of the span. To change span status, use the Card Maintenance screen. The field also reflects the status of the span due to signal alarms and establishment or release of the D-channel. Possible values for this field are listed in Table 2-1.

**Table 2-1 STATUS Field Values and Meanings**

Value	Meaning
Active	D-channel is established and all signal alarms are clear. B-channels (ports) on this span can be involved in active calls and can be allocated to new calls.
Out of Service (OOS)	D-channel is disabled. No B-channels (ports) on this span can be involved in active calls; no ports are allocated to new calls.
Maintenance	D-channel may be disabled and an alarm condition may exist. If you placed the span into maintenance through the Card Maintenance screen, the D-channel is still active. One or more B-channels (ports) on this span may be involved in active calls; no ports are allocated to new calls. The span enters this state automatically upon system reset, when the D-channel releases, or for a signal alarm. When the condition clears, the span transitions back to the active state.
Diagnostics	D-channel is disabled. No B-channels (ports) on this span are involved in calls or allocated to new calls. The span is in local loopback and sending all ones (1s).
Remote	D-channel is not disabled. No B-channels (ports) on this span are involved in calls or allocated to new calls. Span is in local and remote loopback.

**ACCESS TYPE**—The ACCESS TYPE selections vary according to span type. The ACCESS TYPE field selections for T1 spans are described in the “Field Selections for ICC T1 Span Types” section on page 2-10. The ACCESS TYPE field selections for E1 spans are described in the “Field Selections for ICC E1 Span Types” section on page 2-11.

**TRX CLOCK**—*Data entry via Select or Rev Select key.* Specifies the transmit clock (timing source) used for this span. Possible values for this field are listed in Table 2-2. You can only change this field when the span status is OOS.

**Table 2-2 TRX CLOCK Field Values and Meanings**

Value	Meaning
SCLK	Transmit PRI stream timing derived from system master timing link—as set via system administration or host T1 Synchronization Control (\$C0 02) command; default value.
LOOP	Transmit PRI stream timing derived from the received stream.
1544 (for T1 spans)	Transmit T1 PRI stream timing synchronized to the crystal clock on the ICC.
2048 (for E1 spans)	Transmit E1 PRI stream timing synchronized to the crystal clock on the ICC.

TRX CLOCK specifies which clock source is used for the transmission of data. If you set the TRX CLOCK to LOOP, the clock recovered from the received data is used to clock the data from the transmit buffer. In this case, transmit and receive slips are correlated.

If you set the TRX CLOCK to SCLK, the system clock is used to clock the data (effectively bypassing the transmit buffer). If there is any disparity between the remote system’s clock and the system’s clock, the slips are effectively exported to the remote system.

LOOP is recommended for plesiochronous networks.

1544, for T1 spans, and 2048, for E1 spans, are not recommended for normal operation; they are generally used for testing purposes.

**Note**

If selecting the ICC board crystal clock (1544 or 2048), you must make this selection for all spans in that group. For example, if you select the TRX CLOCK value of 1544 for one span in a group, you must select 1544 for all other spans in that group. Again, 1544 and 2048 are not recommended for normal operation.

Refer to Table 1-1 for a description of groups and their RLS addresses.

**CA IP RULE**—*Data entry via main keyboard.* Specifies the default impulse rule for call-associated connections. (Call-associated connections deliver services over the B-channel.) This rule applies when the channel ID information element within the SETUP message specifies a B-channel as the bearer channel. The impulse rule you choose must have already been defined in the Impulse Rule Table screens. Possible values for this field are 0 (no default impulse rule) or a number between 1 and 255. Default value is 0.

**SLIP MAINT LIMIT**—*Data entry via main keyboard.* Specifies the number of transmit or receive slips that can be detected for this span in a 24-hour period before threshold processing occurs. Threshold processing either resets the span or puts it in maintenance mode for manual intervention.

This processing is controlled when you set the manual intervention for SLIP/OOF feature flag in the System Features Configuration screen. Refer to the *Cisco VCO/4K System Administrator's Guide* for more information.

Separate slip maintenance counts are maintained for receive and transmit slips. When either of these counters reaches the limit, threshold processing occurs. The current slip count is displayed on the Card Display screen. Slip counters are reset at midnight or when you change this value in the ICC ISDN Span Configuration screen. Possible values for this field are between 0 (slip maintenance processing is inhibited—recommended when the TRX Clock setting is LOOP) and 255. Default value is 255.

**SWITCH TYPE**—The SWITCH TYPE selections vary according to span type. The SWITCH TYPE field selections for T1 spans are described in the “Field Selections for ICC T1 Span Types” section on page 2-10. The SWITCH TYPE field selections for E1 spans are described in the “Field Selections for ICC E1 Span Types” section on page 2-11.

**REF CLOCK**—*Data entry via Select or Rev Select key.* Determines the reference clock (timing source) used for this span. This rule applies only if this span has been specified as the current timing source using either the Master Timing Link Selection menu or the T1 Synchronization Control (\$C0 02) command. Possible values for this field are listed in Table 2-3. You can only change this field when the span status is OOS.

**Table 2-3 REF CLOCK Field Values and Meanings**

Value	Meaning
LOOP	Reference clock is derived from LIU (Line Interface Unit); default value.
1544 (for T1 spans)	Reference clock is derived from the crystal clock on the ICC.
2048 (for E1 spans)	Reference clock is derived from the crystal clock on the ICC.

**NCA IP RULE**—*Data entry via main keyboard.* Specifies the default impulse rule for non-call associated connections. This rule applies when the channel ID within the SETUP message specifies the D-channel as the bearer channel. The impulse rule you choose must have already been defined in the Impulse Rule Table screens. Possible values for this field are between 1 and 255. Default value is 0.

**OOF MAINT LIMIT**—*Data entry via main keyboard.* Specifies the number of out of frames (OOFs) that can be detected for this span in a 24-hour period before threshold processing occurs. Threshold processing either resets the span or puts it in maintenance mode for manual intervention. This processing is controlled by the setting of the manual intervention for SLIP/OOF feature flag on the System Features Configuration screen. Refer to the *Cisco VCO/4K System Administrator's Guide* for more information.

The OOF counter is reset at midnight and when this value is changed. Possible values for this field are between 0 (OOF maintenance processing inhibited—not recommended) and 255; default value is 17.

**SPAN LENGTH**—*Data entry via Select or Rev Select key.* Determines the line equalization used for the data stream. Choices are expressed either in terms of the cable length between the ICC ISDN span and the connected equipment or as defined by FCC Part 68 Option A. Possible values for this field are listed in Table 2-4. You can only change this field when the span status is OOS.

**Table 2-4** *SPAN LENGTH Field Values and Meanings*

Value	Meaning
0 to 133	Line length between 0 and 133 feet (0 to 40.5 meters)
133 to 266	Line length between 133 and 266 feet (40.5 to 81 meters)
266 to 399	Line length between 266 and 399 feet (81 to 121.6 meters)
399 to 533	Line length between 399 and 533 feet (121.6 to 162.4 meters)
533 to 655	Line length between 533 and 655 feet (162.4 to 199.6 meters)
PT 68 A	Equalization as defined by FCC Part 68 Option A

**SPAN TYPE**—*Data entry via Select or Rev Select key.* This field is valid for T1 spans only; refer to Figure 2-1. Specifies the format of the data stream. This value can only be changed when the span status is OOS. Possible values for this field are listed in Table 2-5.

**Table 2-5** *SPAN TYPE Field Values and Meanings*

Value	Meaning
ESF	Extended Superframe format, B8ZS (bipolar 8-zeroes signaling); default value
D3/D4	T1 D3/D4 format, B8ZS (bipolar 8-zeroes signaling)

**CRC4**—*Data entry via Select or Rev Select key.* This field is valid for E1 spans only; refer to Figure 2-2. Cyclic Redundancy Check 4 (CRC4), is an enhanced error monitoring capability providing additional protection against simulation of the frame alignment signal. This value can only be changed when the span status is OOS. Possible values for this field and their meanings are listed in Table 2-6.

**Table 2-6 CRC4 Field Values and Meanings**

Value	Meaning
ON	Cyclic Redundancy Check 4 on
OFF	Cyclic Redundancy Check 4 off



A/Mu LAW—*Data entry via Select or Rev Select key.* Specifies voice coding on the PRI stream. The system automatically turns off translation for calls which specify unrestricted digital information bearer capability. Possible values for this field are listed in Table 2-7.

**Table 2-7 A/Mu LAW Field Values and Meanings**

Value	Meaning
Mu	Mu Law encoding (T1 ISDN spans)
A	A Law encoding (E1 ISDN spans)
SYS	System backplane law; this law is selected to match the entry in the Set System to A-Law field of the System Features screen. This is especially useful to spans carrying signaling data which cannot undergo law conversion.

OVERLAP—*Data entry via Select or Rev Select key.* Specifies per-span overlap configuration. This field is used for NET5 (EURO) and QSIG E1 span types; all other span types, both E1 and T1, are not supported. Possible values for this field are listed in Table 2-8.

**Table 2-8 OVERLAP Field Values and Meanings**

Value	Meaning
FORWARD	<p>Select this value if the host is responsible for handling the sending/receiving of overlap messages on this span.</p> <p>The initial SETUP message and any subsequent INFO messages are sent by the VCO/4K, as they are received, to the host. The host is responsible for sending the SETUP ACKNOWLEDGE message.</p> <p></p> <p><b>Note</b> This value contains the same meaning as selecting Y in the now defunct Enable NET5 Overlap Receiving feature flag.</p>
ACCUMULATE	<p>Select this value if the host is not capable of handling the sending/receiving of overlap messages on this span.</p> <p>The initial SETUP message is held by the VCO/4K, while the VCO/4K generates the SETUP ACKNOWLEDGE message and accumulates any subsequent INFO messages before sending one SETUP message to the host which contains all the data from the initial SETUP message and the INFO messages.</p> <p></p> <p><b>Note</b> This value contains the same meaning as selecting N in the now defunct Enable NET5 Overlap Receiving feature flag.</p>



**Note**

The next five fields—PORT, NAME, GROUP, GRP NAME, and COS—contain information pertaining to the individual ports on the ICC ISDN span. However, for ICC-T1 ISDN types, port 24 (the D-channel), and deactivated ports (taken out of service via the **P** command) are not displayed. For ICC-E1 ISDN types, port 17 (the D-channel), and deactivated ports are not displayed.

**PORT**—*Display only*. Indicates the port number on the span. There are 23 ports, or B-channels on T1 type ICC ISDN spans, and 30 B-channels on E1 type ICC ISDN spans.

**NAME**—*Data entry via main keyboard*. Optional database entry used to identify individual B-channels. When a port name is used, each one should be unique and descriptive of port usage. This field accepts up to eight alphanumeric characters, either upper- and/or lowercase.

**GROUP**—*Display only*. Indicates the number of the resource group to which this port belongs. If no resource group assignment has been made, this field is blank. This field can be changed using the Resource Group Configuration screens. Possible values for this field range between 1 and 255.

**GRP NAME**—*Display only*. Indicates the name of the resource group to which this port belongs. If no resource group assignment has been made, this field is blank. This field can be changed using the Resource Group Summary screen, and can contain up to eight alphanumeric characters, either upper- and/or lowercase.

**COS**—*Data entry via main keyboard*. Class of service; for ISDN B-channels, used for resource grouping and B-channel allocation processing. Spans can have different COS marks, as determined by the application design. Assignable values for this field are listed in Table 2-9.

**Note**

Internal COS values such as U2 (2-way currently used as an outgoing) and T2 (2-way currently used as an incoming) may appear in this field during system operation. These values are internal processing representations and are not assignable by the user.

**Table 2-9 COS Field Values and Meanings**

Value	Meaning
O	Originating—Calls originating from the system; outgoing calls initiated by host command.
T	Terminating—Calls terminating at the system; incoming calls initiated by actions outside the system or forced by host command.
2	2-Way—Calls originating from the VCO or calls terminating at the system; outgoing calls initiated by host command, incoming calls initiated by outside actions.
AO	Always Off Hook and Originating—Calls originating from the system, port goes off hook at system reset and remains off hook; outgoing calls initiated by host command.
AT	Always Off Hook and Terminating—Calls terminating at the system, port goes off hook at VCO system reset and remains off hook; incoming calls initiated by outside actions or forced by host command.
A2	Always Off Hook and 2-Way—Calls originating from the system or calls terminating at the system, port goes off hook at system reset and remains off hook; outgoing calls initiated by host command, incoming calls initiated by outside actions or forced by host command.

## Field Selections for ICC T1 Span Types

The ICC ISDN Span Configuration screen ACCESS TYPE and SWITCH TYPE field selections vary according to ICC T1 span type. Five ICC ISDN T1 span types are supported. They include 4ESS, 5ESS, NI-2, NTI, and NTT. The ACCESS TYPE and SWITCH TYPE field selections for each ICC ISDN T1 type are described below. Refer to Figure 2-1 for the location of these fields within the screen.

**ACCESS TYPE**—*Data entry via Select or Rev Select key.* Specifies the type of access connection used for this span. You can only change this field when the span status is OOS. Refer to Table 2-10 for the different selection options available for the ICC T1 span types.

**Table 2-10 ACCESS TYPE Field Selections for ICC T1 Span Types**

Span Type	Selection Option	Selection Meaning
ICC-T1 PRI/4ESS	USER	User side implementation for the connection
	USER-SYM	User side symmetrical implementation for the connection (loop-back only)
ICC-T1 PRI/5ESS	USER	User side implementation for the connection
	USER-SYM	User side symmetrical implementation for the connection (loop-back only)
ICC-T1 PRI/NI-2	USER	User side implementation for the connection
	USER-SYM	User side symmetrical implementation for the connection (loop-back only)
ICC-T1 PRI/NTI	USER	User side implementation for the connection
	USER-SYM	User side symmetrical implementation for the connection (loop-back only)
ICC-T1 PRI/NTT	USER	User side implementation for the connection
	NETWORK	Network side implementation for the connection

**SWITCH TYPE**—For NTT spans—*Data entry via Select and Rev Select keys.* All other T1 span types are not selectable. Determines the type of switch to which this PRI ISDN span is to be connected. This allows for the correct handling of manufacturer-specific ISDN implementations. The span status must be OOS in order to change this field.

Possible values for this field are listed in Table 2-11.

**Table 2-11 SWITCH TYPE Field Selections for ICC T1 Span Types**

Span Type	Selection Option	Selection Meaning
ICC-T1 PRI/4ESS	4ESS	AT&T 4ESS
ICC-T1 PRI/5ESS	5ESS	AT&T 5ESS
ICC-T1 PRI/NI-2	NI-2	National ISDN-2
	NI2_SERV <sup>1</sup>	National ISDN-2 with SERVICE message support.
ICC-T1 PRI/NTI	NTI	Northern Telecom DMS-100/250
ICC-T1 PRI/NTT	NTT	Japanese (NTT) ISDN
	NTT_CS	Continuous Set Asynchronous Balance Mode (SABME) version of Japanese (NTT) ISDN

1. The NI2\_SERV switch type parameter allows the control of B-channel initialization, and supports SERVICE and SERVICE ACKNOWLEDGEMENT messages. The following restrictions apply:

- Transmission of RESTART message is not supported.
- Connection to a Cisco router ISDN interface is not supported.
- Supports only the USER side—ACCESS TYPE field configured as USER.
- The VCO/4K end expects the network to bring the B-channels into service.
- Used only when the far end (network side) supports B-channel availability control procedures contained in the Bellcore standard, SR-4619.

Refer to the *1999 Version of National ISDN Primary Rate Interface (PRI) Customer Premises Equipment Generic Guidelines (SR-4619)* for further information on B-channel availability control procedures.

## Field Selections for ICC E1 Span Types

The ICC ISDN Span Configuration screen ACCESS TYPE and SWITCH TYPE field selections vary according to ICC E1 span type. Three ICC ISDN E1 span types are supported. They include NET5 (EURO), QSIG, and TS014. The ACCESS TYPE and SWITCH TYPE field selections for each ICC ISDN E1 type are described below. Refer to Figure 2-2 for the location of this field within the screen.

**ACCESS TYPE—Data entry via Select or Rev Select key.** Specifies the type of access connection used for this span. You can only change this field when the span status is OOS. Refer to Table 2-12 for the different selection options available for the ICC E1 span types.

**Table 2-12 ACCESS TYPE Field Selections for ICC E1 Span Types**

Span Type	Selection Option	Selection Meaning
ICC-E1 PRI/NET5	USER	User side implementation for the connection
	NETWORK	Network side implementation for the connection
ICC-E1 PRI/TS014	USER	User side implementation for the connection
	NETWORK	Network side implementation for the connection
ICC-E1 PRI/QSIG	USER-A	One side of symmetrical inter-PINX link for the connection <sup>1</sup>
	USER-B	One side of symmetrical inter-PINX link for the connection <sup>1</sup>

1. PINX = Private Integrated Services Network Exchange.

**SWITCH TYPE**—*Data entry via Select and Rev Select keys.* Determines the type of switch to which this PRI ISDN span is to be connected. This allows for the correct handling of manufacturer-specific ISDN implementations. The span status must be OOS in order to change this field.

Possible values for this field are listed in Table 2-13.

**Table 2-13 SWITCH TYPE Field Selections for ICC E1 Span Types**

Span Type	Selection Option	Selection Meaning
ICC-E1 PRI/NET5	NET5_AUS	Austria variant
	NET5_BEL	Belgium variant
	NET5_DEN	Denmark variant
	NET5_FIN	Finland variant
	NET5_FRA	France variant
	NET5_GER	Germany variant
	NET5_GRC	Greece variant
	NET5_ICE	Iceland variant
	NET5_IRE	Ireland variant
	NET5_NED	Netherlands variant
	NET5_NOR	Norway variant
	NET5_POR	Portugal variant
	NET5_SPA	Spain variant
	NET5_SWE	Sweden variant
	NET5_SWI	Switzerland variant
	NET5_UK	United Kingdom variant
	NET5_LUX	Luxembourg variant
	NET5_ITA	Italian variant
ICC-E1 PRI/QSIG	QSIG	European private network signaling protocol
ICC-E1 PRI/TS014	TS014	Australian ISDN

## Changing ICC ISDN Span Configuration Screen Field Parameters

Use the ICC ISDN Span Configuration screen to change the ACCESS TYPE, TRX CLOCK, CA IP RULE, SLIP MAINT LIMIT, SWITCH TYPE, REF CLOCK, NCA IP RULE, OOF MAINT LIMIT, SPAN LENGTH, SPAN TYPE, CRC4, A/Mu LAW, NAME, and COS fields.



### Note

Take the span out of service through the Card Maintenance screen before changing the ACCESS TYPE, TRX CLOCK, SWITCH TYPE, REF CLOCK, SPAN LENGTH, SPAN TYPE, CRC4, or A/Mu LAW fields. Refer to the *Cisco VCO/4K System Administrator's Guide* for instructions to take your span out of service.

To change the ICC ISDN span parameters, complete the following steps:

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- Step 1** Display the ICC ISDN Span Configuration screen for the span you want to change (refer to the “Interface Controller Card ISDN Span Configuration” section on page 2-2).
- Step 2** Press **Next Field**. The cursor moves to the ACCESS TYPE field.
- Step 3** Use the **Select** and **Rev Select** keys to step through the values until the correct access type is shown, then press **Next Field**. The cursor moves to the TRX CLOCK field.
- Step 4** Use the **Select** and **Rev Select** keys to step through the values until the correct TRX clock value is shown, then press **Next Field**. The cursor moves to the CA IP RULE field.
- Step 5** Type the impulse rule number for call associated connections, if any, then press **Next Field**. The cursor moves to the SLIP MAINT LIMIT field. If no impulse rule number is entered, the field display changes to 0.
- Step 6** The SLIP MAINT LIMIT field contains a default value of 255. To change it, type the new value, then press **Next Field**. The cursor moves to the SWITCH TYPE field.
- Step 7** Use the **Select** and **Rev Select** keys to step through the values until the correct switch type is shown, then press **Next Field**. The cursor moves to the REF CLOCK field.
- Step 8** Use the **Select** and **Rev Select** keys to step through the values until the correct reference clock value is shown, then press **Next Field**. The cursor moves to the NCA IP RULE field.
- Step 9** Type the impulse rule number for non-call associated connections, then press **Next Field**. The cursor moves to the A/Mu LAW field. If you do not enter an impulse rule number, the field display changes to 0.
- Step 10** Use the **Select** and **Rev Select** keys to step through the values until the correct A/Mu Law encoding value is shown, then press **Next Field**. The cursor moves to the OOF MAINT LIMIT field.
- Step 11** The OOF MAINT LIMIT field contains a default value of 17. To change it, type the new value, then press **Next Field**. The cursor moves to the SPAN LENGTH field.
- Step 12** Use the **Select** and **Rev Select** keys to step through the values until the correct span length value is shown, then press **Next Field**. The cursor moves to the SPAN TYPE field.
- Step 13** Use the **Select** and **Rev Select** keys to step through the values until the correct span type value is shown, then press **Next Field**. The cursor moves to the NAME field for the first port on the span.
- Step 14** Type the name information, if any, and then press **Next Field**. The cursor skips over the GROUP and GRP NAME fields and moves to the **COS** field for that port.
- Step 15** Type the Class of Service character(s). Press **Next Field**. The cursor moves to the NAME field for the next port.
- Step 16** Repeat Steps 13 and 14 until all changes for the eight ports displayed have been made, then press **Next Screen** to display ports 9 to 16.
- Make any changes necessary, then press **Next Screen** to display ports 17 to 23 and make any changes necessary.
- Use **Prev Screen** and **Next Screen** to move among the screens until all changes have been made.
- Step 17** Press **Enter**; the system database is automatically updated.
- Step 18** Press **Exit** to return to the Card Summary screen.

To leave the ICC ISDN Span Configuration screen without making any changes, press **Exit**, **Prev Menu**, or **Main Menu**. No changes are made to the database unless you press **Enter**.

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## Accessing Other Menus and Screens

You can access the following screens from the ICC ISDN Span Configuration screen:

- Main menu—Press the **Main Menu** key.
- Database Administration menu—Press the **Prev Menu** key.
- Card Summary screen—Press the **Exit** key.

## System Host Configuration

The system software contains one System Host Configuration screen field that has an affect on ISDN processing—the Host Setup Timer field. The Host Setup Timer uses a timer which you configure (from 1 to 60 seconds) to trap the condition in which a host link fails to respond to a call attempt, a D-channel SETUP message.

The System Host Configuration screen is shown in Figure 2-3.

**Figure 2-3** *System Host Configuration Screen*

The screenshot shows a terminal window titled "SYSTEM HOST CONFIGURATION". Inside, there is a list of configuration options and their current values. The options are: Host Setup Timer (ENABLED, 6 Seconds), All Host Link Failure Action (MAJOR ALARM), Host Control Of Call Load (DISABLED), Host Control Checking (DISABLED), Incoming Call Distribution (BROADCAST), No Host Alarm Reports At Init (DISABLED), Report System Init To All Hosts (DISABLED), and Conf Calls in Host Failure Proc (EXCLUDED). The text is displayed in a monospaced font.

SYSTEM HOST CONFIGURATION		
Host Setup Timer:	ENABLED	6 Seconds
All Host Link Failure Action:	MAJOR ALARM	
Host Control Of Call Load:	DISABLED	
Host Control Checking:	DISABLED	
Incoming Call Distribution:	BROADCAST	
No Host Alarm Reports At Init:	DISABLED	
Report System Init To All Hosts:	DISABLED	
Conf Calls in Host Failure Proc:	EXCLUDED	

Configure the Host Setup Timer field to enable or disable host setup timing, as well as to configure the duration of the timer. In addition to this ISDN-specific field, there are the standard System Host Configuration screen fields, which are described in the *Cisco VCO/4K System Administrator's Guide*.

## Configuring the Host Setup Timer

To enable/disable the Host Setup Timer, press the **Select** and **Rev Select** keys. When it is enabled, the default time of 6 seconds is displayed in the next field. When it is disabled, this field is blank.

To modify the default time, enable the Host Setup Timer and use the keypad to enter the new time.

The Host Setup Timer, if enabled, is performed for the assigned host link. If the assigned host process does not respond to the initial call report, D-channel SETUP message, within the defined Host Setup Timer interval, the call is torn down. A line/trunk port marked as an Always Off-hook class of service is set back to idle state. Line/trunk ports with other classes of service are processed through permanent signaling conditioning (PSC).

The Host Setup Timer processing provides the reorder sequence when no host link is available to control the call.

You can modify the behavior of the Host Setup Timer with one of the following methods:

- Specify the NOHOST impulse rule token to enable the system to execute the impulse rule indicated in the token's additional data field (rule numbers 1 to 255).

If the host times out, the NOHOST impulse rule token forces rule processing to execute the impulse rule specified in the data field of the NOHOST impulse rule token. This behavior can cause delays in tearing down a call which is not responded to by a host. Note that a self-referential NOHOST token can cause the impulse rule to loop indefinitely.

Refer to the "Impulse and Outpulse Rule Support" section on page 2-16 for more information.

- Specify an impulse rule for a port to enable the Host Setup Timer to start upon rule completion, in which case the call may not be torn down immediately.
- Disable the Host Setup Timer to enable the system to wait indefinitely for the host to respond.

Refer to the *Cisco VCO/4K System Administrator's Guide* for more information on the System Host Configuration screen and impulse rules.

## System Feature Configuration

The VCO/4K system software contains the following System Features screen fields that have an affect on ISDN processing:

- Enable ISDN Manual Disconnect
- Send all ISDN Connect Reports
- Cut Thru For Non-ISDN Alerting
- \$EA Reports on DChannel RESTART
- Send All ISDN Disconnect Report
- Enable Host Call Ref

Refer to the *Cisco VCO/4K System Administrator's Guide* for a description of these features, and for feature setting instructions. The System Features screen is shown in Figure 2-4.

**Figure 2-4 System Features Screen**

S Y S T E M F E A T U R E S			
FEATURES		FEATURES	
	ALLOWED (Y,N)		ALLOWED (Y,N)
Redundant System	N	Send All ISDN Connect Reports	N
Output Periodic Alarm Reports	N	Enable \$66 Cmd Host Checking	N
Card/Alarm Status at Init.	N	Cut Thru For Non-ISDN Alerting	N
Manual Intervention For SLIP/OOF	N	Enable 4th Column DTMF	N
Enable Grace Timing On Null Rule	N	Set System to A-Law	Y
Disable Card Error Report/Reset	N	Enable AllPortsDeactivated Alrm	N
Enable Digit Field Reporting	N	\$EA Reports on DChannel RESTART	N
Suppress PSC/Rule Abort Messages	N	Send All ISDN Disconnect Report	N
Enable Host Password Check	N	Convert Reorder Tone To Busy	N
Force Bearer/Lap Activation	N	K1197 Layer 3 Testing	N
Enable MFC-R2 Supervised Clear	N	Enable Host Call Ref	N
Enable SLIC Guarded Disconnect	N	Extended Operation Mode Set	N
Enable CPA Monitor Disconnect	N	C-bus Mode Enabled	N
Revert to Basic Redundancy	N		
Send Reports Before Guard Time	N		
Enable ISDN Manual Disconnect	N		

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## Inpulse and Outpulse Rule Support

The ISDN PRI package is fully supported by inpulse and outpulse rule processing. This support is defined by the following rule processing abilities:

- ISDN RX [xx] inpulse and outpulse rule tokens, used to call ISDN message templates.
- ISDN TX [xx] inpulse and outpulse rule tokens, used to call ISDN message templates.
- ISDN SUP [xx] outpulse rule token, used to call ISDN supervision templates.
- GLARE [xx] inpulse rule token, used to execute a specified inpulse rule when a glare condition occurs.
- NOHOST [xx] inpulse rule token, used to execute a specified inpulse rule following the expiration of the Host Setup Timer.

## ISDN Associated Impulse and Outpulse Rule Tokens

The tokens used to support ISDN call processing are unique instructions that, when combined with other tokens, compose inpulse and outpulse rules. Each token takes advantage of a function within the system, and the ISDN supporting tokens are limited to two types—supervision control and processing control functions.

Supervision control consists of in-band or out-of-band signaling to the distant end (i.e., answer, wink, tone, voice prompt) or waits a specified length of time before continuing rule processing.

Processing control consists of the construction of rules with more than 16 tokens, and outpulse rule execution.

Each ISDN supporting token is described in detail below. They are listed alphabetically.



## GLARE [xx]

Token type—Processing control. Use this token in impulse rules to execute a specified impulse rule when an ISDN glare condition occurs. Refer to Chapter 4, “Call Examples,” for an explanation of glare. The GLARE [xx] token must always be the first token in the rule, where [xx] specifies the number of the impulse rule to execute. Possible values for this field are 1 to 255.

## ISDN RX [xx]

Token type—Supervision control. Use this token in either impulse or outpulse rules to specify the ISDN message template for rule processing. Use a value from 1 to 96 in the additional data entry field to specify the number of the ISDN message template to be processed. The template you specify must be configured as an ISDN receive message template and cannot have a message type of CHAINED. At the time of data entry, if the template number corresponds to a template that has been configured as a transmit template, an error message is displayed on the screen.

In addition, you can use this token in an impulse rule to specify which ISDN receive message template is to be used to handle incoming D-channel message processing. When the system encounters an ISDN RX [xx] token, processing continues with the template specified in the additional data field. Template processing is not completed until the message specified in the template is received. When template processing ends, rule processing continues with the token following ISDN RX [xx].

The receive template stores received D-channel message data in that call record and/or condition reporting of the received D-channel message to the host.

In outpulse rules, ISDN RX [xx] tokens function as setup tokens for ISDN SUP [xx] tokens. Rule processing does not wait for the messages specified in the ISDN message template to be received. Instead, the ISDN RX [xx] and the ISDN SUP [xx] token determine how the D-channel message is reported and stored.

## ISDN SUP [xx]

Token type—Supervision control. Use this token in outpulse rules to specify the ISDN supervision template for outpulse rule processing, where [xx] is the number of the template. Template numbers range from 1 to 24.

Outpulse rule processing waits for an event to occur when this token is processed. When an event, or events, are detected that satisfy the specified ISDN supervision template, outpulse rule processing continues with the token following the ISDN SUP [xx].

## ISDN TX [xx]

Token type—Supervision control. Use this token in either impulse or outpulse rules to specify the ISDN message template for constructing outgoing D-channel messages, where [xx] is the number of the template. Template numbers range from 1 to 96.

A transmitted D-channel message can be constructed by any combination of data from the following sources:

- Information elements (IEs) specified in the message template
- Data stored in system fields (ANI, 1 through 4)
- IEs specified in an ISDN Port Control (\$49) command

**Note**

IEs are the elements in D-channel messages that contain the additional information needed for call processing, such as calling party number, called party number, and channel ID. IEs vary depending on the message, action being performed, and connected equipment.

The template you specify must be an ISDN transmit message template and it cannot have a message type of CHAINED. If the template number corresponds to a template that has been configured as a receive template at the time of data entry, an error message is displayed on the screen.

When template processing ends, rule processing continues with the token following the ISDN TX [xx] token.

**NOHOST [xx]**

Token type—Processing control. Use this token in impulse rules to execute a specified impulse rule following the expiration of the Host Setup Timer. If the system does not receive a host command before the timer expires, it executes the impulse rule indicated in the NOHOST token's [xx] data field. Impulse rules are from 1 to 255.

If you disable the Host Setup Timer, the NOHOST token does not get executed; the system waits indefinitely for the host to respond before continuing. If you enable the Host Setup Timer, the NOHOST token is not used; the system automatically performs a RELEASE when the timer expires.

An overview of ISDN impulse and outpulse rule processing is provided in Chapter 3, "ISDN Processing Overview," including the FLD, I FLD, and D FLD digit field types used by ISDN call processing. The interaction among rule, template, and command/report processing is illustrated by the examples in Chapter 4, "Call Examples."

NOHOST [xx] is not a valid token for outpulse rules.

Refer to the *Cisco VCO/4K System Administrator's Guide* for information on defining impulse and outpulse rules.

## ISDN Receive and Transmit Message Templates Summary

Use the ISDN Message Template Summary screen to do the following:

- View a listing of all messages for which a template has been defined.
- Determine whether the template is an ISDN Receive Message Template (R) or an ISDN Transmit Message Template (T).
- Access the ISDN Message Template screens.

You can define up to 96 templates for use in rule processing of ISDN calls. Template processing is reported to the host via the ISDN Impulse Rule Complete (\$ED) and ISDN Port Change of State (\$EA) reports. When reporting is done in conjunction with impulse or outpulse rule processing, timing of the reports is controlled by the reporting control tokens contained in the rule, or by the supervision template.

To access the ISDN Message Template Summary screen from the Database Administration menu, type **K** and press **Enter**. The ISDN Message Template Summary screen is displayed (see Figure 2-5). The cursor is located in the DSP (display) field corresponding to Message Template 1.

**Note**

An ISDN feature must be installed in order to access any ISDN System Administration screens.

Figure 2-5 ISDN Message Template Summary Screen

I S D N M E S S A G E T E M P L A T E S U M M A R Y											
NO	MESSAGE	R/T	DSP	NO	MESSAGE	R/T	DSP	NO	MESSAGE	R/T	DSP
1	_____	—	—	17	_____	—	—	33	_____	—	—
2	_____	—	—	18	_____	—	—	34	_____	—	—
3	_____	—	—	19	_____	—	—	35	_____	—	—
4	_____	—	—	20	_____	—	—	36	_____	—	—
5	_____	—	—	21	_____	—	—	37	_____	—	—
6	_____	—	—	22	_____	—	—	38	_____	—	—
7	_____	—	—	23	_____	—	—	39	_____	—	—
8	_____	—	—	24	_____	—	—	40	_____	—	—
9	_____	—	—	25	_____	—	—	41	_____	—	—
10	_____	—	—	26	_____	—	—	42	_____	—	—
11	_____	—	—	27	_____	—	—	43	_____	—	—
12	_____	—	—	28	_____	—	—	44	_____	—	—
13	_____	—	—	29	_____	—	—	45	_____	—	—
14	_____	—	—	30	_____	—	—	46	_____	—	—
15	_____	—	—	31	_____	—	—	47	_____	—	—
16	_____	—	—	32	_____	—	—	48	_____	—	—

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The ISDN Message Template Summary screen consists of two screens; each screen lists 48 message templates in numerical order. Use the keyboard to move within the screen and between the two screens.

Press **Prev Field** and **Next Field** to move between DSP fields in the same column. Press **Tab** and **<** to move between the first DSP fields in each column. Press **Prev Screen** and **Next Screen** to page through the listings. Press **Print Screen** to obtain a hard copy of any of the screens.

## ISDN Message Template Summary Screen Field Definitions

The ISDN Message Template Summary screen contains the following fields:

**NO**—*Display only*. Template number. Templates are listed in ascending order, from 1 to 96.

**MESSAGE**—*Display only*. The ISDN message for which the template is configured. Change this value through the ISDN Message Templates screen. Possible values for this field are listed under the definition of the MESSAGE field for that screen.

**R/T**—*Display only*. Indicates whether the template is an ISDN Receive Message Template (R) or an ISDN Transmit Message Template (T).

**DSP**—*Data entry via main keyboard, access to another screen(s)*. This is the Display Template field. It provides access to the ISDN Message Template screens. To display another screen, type any character on the main keyboard, then press **Enter**. Refer to the “Accessing Other Menus and Screens from the ISDN Message Template Summary Screen” section on page 2-20 for instructions on using this field.

## Accessing Other Menus and Screens from the ISDN Message Template Summary Screen

You can access the following screens from the ISDN Message Template Summary screen:

- Main menu—Press the **Main Menu** key.
- Database Administration menu—Press the **Prev Menu** or the **Exit** key.
- ISDN Message Template screen—Use the **Prev Field**, **Next Field**, **Tab**, or < key to position the cursor in the DSP field corresponding to the message template you want to display or edit. Then type any character and press **Enter**.

## ISDN Message Templates

Use the ISDN Message Templates screen to configure up to 96 templates for use in rule processing for ISDN calls. There are two kinds of ISDN message templates: receive and transmit.

ISDN Receive Message Templates control the processing, storing, and reporting of specific D-channel messages received during inpulse or outpulse rule processing of an ISDN RX [xx] token. ISDN Transmit Message Templates control the construction and transmission of specific D-channel messages during inpulse or outpulse rule processing of an ISDN TX [xx] token.

You can set up multiple templates for a single ISDN message type. Specify the template to be used in rule processing in a data field—the receive/transmit template (R/T) designation determines whether it can be used with the ISDN RX [xx] or ISDN TX [xx] token, where [xx] is the data field containing the receive/transmit template designation. Refer to Chapter 3, “ISDN Processing Overview,” for additional information on these tokens and rule processing for ISDN.

You can access the ISDN Message Templates screen from the ISDN Message Template Summary screen. Use the **Prev Field** or **Next Field** key to position the cursor in the DSP field that corresponds to the ISDN message template that you want to display configuration information. Then type any character and press **Enter**. The ISDN Message Templates screen is displayed (see Figure 2-6).

[illegible]

Because of the number of templates available, it is often easier to return to the ISDN Message Template Summary screen and select the desired template, rather than page through template listings. To save the template information already displayed, press **Enter** before leaving the ISDN Message Templates screen.

The ISDN Message Templates screen contains the following fields:

Message—*Data entry via Select or Rev Select key or main keyboard.* Specifies the ISDN message for which the template is defined. For the standard messages listed in Table 2-14, use the **Select** and **Rev Select** keys to specify the message. You can also type the two digit hexadecimal values corresponding to these messages into the space. Table 2-14 represents the only messages that can be controlled by the host or ISDN message templates. Other ISDN messages trigger autonomous processing in the system; refer to Chapter 3, “ISDN Processing Overview,” for more information. Definitions for ISDN messages are contained in the International Telecommunications Union document *ITU-T Q.931*. Messages can be used for either transmit or receive unless otherwise specified.

**Table 2-14 Standard ISDN Messages**

Value	Meaning	Hexadecimal Value
CHAINED	Used to indicate this template is called by another message template	Not applicable
ALERTING	Alerting; call establishment	01
CALLPROC	Call proceeding; call establishment	02
CONNECT	Connect; call establishment	07
CONN ACK	Connect acknowledge; call establishment	0F
PROGRESS	Progress; call establishment	03
SETUP	Setup; call establishment	05
DISC	Disconnect; call clearing (transmit only) <sup>1</sup>	45
RELEASE	Release; call clearing (transmit only) <sup>1</sup>	4D
RLS CMPL	Release complete; call clearing (transmit only) <sup>1</sup>	3A
USERINFO	User information; call information phase	20
CONGEST	Congestion control; miscellaneous	79
FACILITY	Facility; miscellaneous	62
FACILACK	Facility acknowledge; miscellaneous	6A
FACILREJ	Facility reject; miscellaneous	72
REGISTER	Register; miscellaneous	64
NOTIFY	Notify; miscellaneous	6E
INFO	User information; call information	7B
SETUPACK	Setup acknowledge; call establishment	0D

1. System call processing handles disconnect and release processing autonomously. Control over these events is provided via the ISDN Port Control (\$49) command. These messages are provided to allow additional call control.

**R/T**—*Data entry via Select or Rev Select key and main keyboard.* Specifies whether the template is an ISDN Receive Message Template (R) or an ISDN Transmit Message Template (T). For transmit processing, the system automatically populates the connect length byte for each IE constructed. When the Channel ID IE is transmitted, the system automatically ensures that the B-channel is correctly specified. When the Channel ID IE is specified, the B-channel designator byte must be present.

**Data Entry Fields**—*Data entry via Select or Rev Select key and main keyboard.* Fifteen lines are displayed under each Tmpl, Message, R/T heading. Each of these lines contains two data entry fields. The first field is the action token field, the second is the optional IE/data field. The action token specifies the type of processing to be performed. The IE/data field specifies the D-channel message information element on which the action token operates. Action tokens, and their associated IE/data values are defined in the “Action Tokens” section on page 2-23.

## Action Tokens

Action tokens specify the type of processing that is to be performed on D-channel message IEs. The action tokens are divided into six functional groups—report control, IE storage control, processing control, transmission control, codeset shift control, and the template control group.

### Report Control

Report Control tokens specify the data that gets reported to the host computer. Timing of those reports is controlled by impulse or outpulse rule reporting control tokens in the rule from which the ISDN Message Template is called.

### IE Storage Control

Information Element (IE) Storage Control tokens specify where the IEs are stored, and the storage format.

### Processing Control

Processing Control tokens determine whether the system processes specific information elements without interaction from the host computer.

### Transmission Control

Transmission Control tokens determine how the information is formatted for transmission—as information elements, or as hexadecimal bytes. These tokens are supported in ISDN Transmit templates only.

### Codeset Shift Control

Codeset Shift Control tokens determine whether there is a shift to another codeset during template processing. All action tokens are assumed to be codeset 0 unless they are preceded by a CODESET token.

**Note**

Codesets are used to map one hexadecimal value to several entities. For example, in Codeset 0, hexadecimal 70 is CD NUM (called number). However, in another codeset, hexadecimal 70 may represent an entirely different entity. Codesets are typically vendor specific, and it is beyond the scope of this manual to discuss them. Refer to the International Telecommunications Union document *ITU-T Q.931* or Northern Telecom documentation for further information on codesets.

### Template Control

Template Control tokens allow you to construct a message template with more than 15 tokens.

Display action tokens by pressing the **Select** and **Rev Select** keys while the cursor is located in a Data Entry field of the ISDN Message Templates screen. Specify values for the associated IE/data field by using either the **Select** and **Rev Select** keys, or by typing the data in the field. When entered via the keyboard, up to four bytes of data can be specified in this field.

In addition, you can specify values for the associated IE/data field either by using the **Select** and **Rev Select** keys or by typing the data using the main keyboard. When entered via the main keyboard, up to four bytes of data can be specified in this field. Definitions for ISDN IEs are contained in the International Telecommunications Union document *ITU-T Q.931*. A unique IE can be entered as a single hexadecimal byte, if necessary.

The following sections describe the action tokens in greater detail. Each action token is defined in three ways—by functional group, template group it is applicable to (R or T, for receive or transmit template respectively), and a detailed description. They are listed in the order in which they appear as selections.

## IE Action Tokens

Functional group—Transmission control; T.

The IE action token specifies that a complete IE is to be constructed for transmission in the D-channel message for which the template is defined. An IE action token can be followed by additional data; this is specified with D FLD and DATA action tokens. The system does not check to assure that the data specified is appropriate for the IE specified in the IE/data field.

Possible IE/data field values include the IEs listed in Table 2-15 or a one-digit or two-digit hexadecimal value.

**Table 2-15 ISDN Selectable Information Elements (CODESET 0)**

Information Element	Meaning	Hexadecimal Value
BEARER	Bearer Capability	04
CAUSE	Cause	08
CONN NUM	Connected Number	0C
CALL ID	Call Identity	10
CALL ST	Call State	14
CHNGSTAT	Change Status	01
CHAN ID	Channel Identification	18
PROGRESS	Progress Indicator	1E
CP NUM	Calling Party Number	6C
FACILITY	Facility	1C
SIGNAL	Signal	34
CP SADDR	Calling Party Subaddress	6D
CD NUM	Called Party Number	70
CD SADDR	Called Party Subaddress	71
RD NUM	Redirect Number	74
TRNETSEL	Transit Network Selection	78
LL CMPAT	Low Layer Compatibility	7C
HL CMPAT	High Layer Compatibility	7D
USR-USR	User-User	7E
MOREDATA	More Data	A0
CNGCT RR	Congest Receiver Ready	B0



*Table 2-15 ISDN Selectable Information Elements (CODESET 0) (continued)*

Information Element	Meaning	Hexadecimal Value
CNGSTRNR	Congest Receiver Not Ready	BF
NET FAC	Network-Specific Facility	20
NTFY IND	Notification Indicator	27
BLOCK CH	Blocking Channel ID	03
KEYPAD	Keypad Facility	2C
FEAT ACT	Feature Activation	38
FEAT IND	Feature Indication	39
SEND_CMP	Sending Complete	A1

## DATA Action Token

Functional group—Transmission control; T.

The DATA action token specifies that hexadecimal bytes are to be used to construct an IE for transmission in the D-channel message for which the template is defined. These hexadecimal bytes are transmitted exactly as they are specified on the screen.

Use each DATA action token to specify up to four hexadecimal bytes. You can construct longer data strings by using multiple DATA action tokens in a template; the DATA tokens must appear in the order in which the hexadecimal bytes are to be sent.

DATA action tokens must be preceded by an I FLD or IE action token. It can precede D FLD action tokens.

Valid IE/data field values are up to four hexadecimal bytes. When you use a DATA action token to construct an IE header, you don't specify the length bytes—system processing automatically inserts the correct IE length byte when the message is transmitted.

When you use a DATA action token to construct a channel ID IE, specify the B-channel ID as 00. The system ensures that the correct B-channel designation is used.

In NFAS applications, the interface ID is automatically inserted. If the interface ID is specified by the host, the system verifies it. If the interface ID is found to be incorrect, the specified message is not transmitted. Indication of this error condition is provided to the host in an ISDN Port Change of State (\$EA) report with the following values: Change byte = \$08, Event Code = \$00, Status Code = \$A4.

## FLD Action Tokens

Functional group—IE storage control; R and T.

For receive templates, FLD action tokens specify that the complete IE (header and data) identified in the IE/data field is to be stored in a field. IEs are stored in the format in which they are received. There are five different FLD action tokens to indicate the field in which to store the IE. These tokens and the maximum number of bytes each field can store are listed in Table 2-16.

*Table 2-16 FLD Action Tokens*

Value	Storage Field Length
ANI	24 bytes
FLD 1	35 bytes
FLD 2	35 bytes
FLD 3	35 bytes
FLD 4	84 bytes

If the received field length is greater than the storage field length, the data is truncated. No indication of truncation for storage is provided to the host.

If the IE is reported to the host, the entire received IE is reported up to a maximum report length of 255 bytes (including the network header segment). Possible IE/data field values for receive templates include those listed in Table 2-15.

For transmit templates, FLD action tokens specify that the complete IE (header and data) stored in the field is to be transmitted in the D-channel message for which the template is defined. Because an IE can be placed into a field only as a result of processing a Receive template that contained an FLD action token or an ISDN Port Control (\$49) command that specifies FLD data, it is assumed an FLD action token always contains a complete IE.

No IE/data field entry is allowed for this token when it is used in a transmit template.

## I FLD Action Tokens

Functional group—IE storage control; R and T.

For receive templates, I FLD action tokens specify that the header (intermediate) information for the IE identified in the IE/data field is to be stored in a field. This header, or intermediate, information consists of the hexadecimal bytes which precede the digit or information bytes in the IE. This includes the IE identifier and IE length bytes. IE headers are stored in the format in which they are received. There are five different I FLD action tokens to indicate the field in which to store the IE header. These tokens and the maximum number of bytes each field can store are listed in Table 2-17.

*Table 2-17 I FLD Action Tokens*

Value	Storage Field Length
I ANI	24 bytes
I FLD 1	35 bytes
I FLD 2	35 bytes
I FLD 3	35 bytes
I FLD 4	84 bytes

The possible IE/data field values for this action token are CP NUM, CP SADDR, CD NUM, CD SADDR, RD NUM and USR-USR. If it is used for any other IE, the IE identifier and length are stored. Appendix A, "Valid Information Elements for I FLD and D FLD Action Tokens," contains examples of the valid IEs, showing the information that would be stored in an I FLD.

For transmit templates, I FLD action tokens specify that the IE header is to be transmitted in the D-channel message for which the template is defined. Because IE data can be placed into a field only as a result of processing a receive template that contained an I FLD token or an ISDN Port Control (\$49) command that specifies I FLD data, it is assumed an I FLD action token always contains an IE header.

I FLD action tokens must be followed by one or more D FLD or DATA tokens. This allows for construction of complete IEs from separate IE header and information fields. The system automatically populates the length byte with the correct value when IEs are constructed in this manner.

No IE/data field entry is allowed for this token when it is used in a transmit template.

## D FLD Action Tokens

Functional group—IE storage control; R and T

For receive templates, D FLD action tokens specify that only the data portion (following the header) of the IE identified in the IE/data field is to be stored in a field. Data is stored in the format in which it is received. There are five different D FLD action tokens to indicate the field in which to store the information. These tokens and the maximum number of bytes each field can store are listed in Table 2-18.

*Table 2-18 D FLD Action Tokens*

Value	Storage Field Length
D ANI	24 bytes
D FLD 1	35 bytes
D FLD 2	35 bytes
D FLD 3	35 bytes
D FLD 4	84 bytes

If the received field length is greater than the storage field length, the data is truncated. No indication of truncation for storage is provided to the host.

The possible IE/data field values for this token are CP NUM, CP SADDR, CD NUM, CD SADDR, RD NUM and USR-USR. Specifying any other value in the IE/data field results in no information being stored in the specified D FLD. Appendix A, “Valid Information Elements for I FLD and D FLD Action Tokens,” contains examples of the valid IEs, showing the information that would be stored in a D FLD.

For transmit templates, D FLD tokens specify that the data contained in the field is to be used to construct an IE for transmission in the D-channel message for which the template is defined. Data can be placed into this field as the result of processing a receive template that contained a D FLD token, an impulse rule that contained an IP ANI [xx] or IP FIELD [xx] token, or an ISDN Port Control (\$49) command that specifies D FLD data.

Data in this field is formatted correctly for transmission over the D-channel, regardless of the format in which it was stored. Transmit D FLD tokens must be preceded by an IE or DATA token, or an I FLD token to specify the IE header information (which includes the IE identifier).

No IE/data field entry is allowed for this token when it is used in a transmit template.

## CODESET Action Token

Functional group—Codeset shift control; R and T.

The CODESET action token specifies that all action tokens and information that follows is specified according to the codeset number indicated in the IE/data field. The default codeset used by the system is 0.

The codeset number returns to 0 when the system processes a new template as the result of a GO TMP or DO TMP action token. Once you use a CODESET action token in a template, you must enter subsequent entries requiring specification of an IE in hexadecimal.

Possible IE/data field values are 1 to 7.

## GO TMP Action Token

Functional group—Template control; R and T.

Use the GO TMP action token to instruct the system to perform processing for the ISDN message template you specify. This allows you to construct message templates with more than 15 steps. When template processing encounters this action token, processing continues with the first token of the message template you specified in the IE/data field. Processing does not return to the calling template. Consider the following important points when using the GO TMP action token:

- GO TMP tokens cannot specify the template number in which they are listed.
- Receive templates can only refer to receive templates; transmit templates can only refer to transmit templates.
- The called template must have a message type of CHAINED.

Possible IE/data field values are 1 to 96.

## DO TMP Action Token

Functional group—Template control; R and T.

Use the DO TMP action token to instruct the system to perform processing for the ISDN message template specified, and then return to this template. This allows you to construct message templates with more than 15 steps. When template processing encounters this token, processing continues with the first token of the message template specified in the IE/data field. At the end of the specified template, processing continues with the token following the DO TMP action token in the original message template. Consider the following important points when using the DO TMP action token:

- DO TMP action tokens cannot specify the template number in which they are listed.
- The subroutine must not call another template containing a DO TMP action token.
- Receive templates can only refer to receive templates; transmit templates can only refer to transmit templates.
- The called template must have a message type of CHAINED.

Possible IE/data field values are 1 to 96.

## REP Action Token

Functional group—Reporting control; R.

Use the REP token to indicate that the IE specified in the IE/data field should be reported to the host. If the IE is not received, a status byte in the report indicates that not all expected IEs were received. The entire received IE is reported to the host.

If the ISDN Impulse Rule Complete (\$ED) or ISDN Port Change of State (\$EA) report length exceeds 255 bytes, it is truncated. A status byte in the \$ED report indicates that the report has been truncated. No indication of truncation is provided for the \$EA report.

Possible IE/data field values include the IEs listed in Table 2-15.

### REP ALL Action Token

Functional group: reporting control; R.

The REP ALL action token specifies that all IEs contained in the received message should be reported to the host. The entire received IE is reported to the host.

If the ISDN Impulse Rule Complete (\$ED) report or ISDN Port Change of State (\$EA) report length exceeds 255 bytes, it is truncated. A status byte in the \$ED report indicates truncation has been performed. No indication of truncation is provided for the \$EA report.

Use of this token does not preclude the use of NO REP in the same template. When NO REP is used in the same template as REP ALL, the specified IE is not reported to the host if received.

No IE/data field entry is allowed for this token.

### NO REP Action Token

Functional group—Reporting control; R.

The NO REP token is used in conjunction with REP ALL to specify that the specific IE contained in the IE/data field should not be reported to the host.

Valid IE/data field values include the IEs listed in Table 2-15.

### PROCESS Action Token

Functional group—Reporting control; R.

The PROCESS action token is used to specify that the IE contained in the IE/data field should be processed by the system. The only IE processed autonomously is CHAN ID (Channel ID). When this token is processed, the system selects the appropriate B-channel based on the coding of the received IE and the state of the B-channel. If the IE is not received, a status byte in the report indicates that not all expected IEs were received and no B-channel selection is performed.

The B-channel selection is based on Class of Service (COS) and port state. The system selects a port that is in service, idle, and has a COS of either 2 (2-way) or T (terminating/incoming). When a B-channel has been assigned due to a PROCESS token, the port address of the selected B-channel is reported to the host in an ISDN Impulse Rule Complete (\$ED) or ISDN Port Change of State (\$EA) report.

If you use the **Select** and **Rev Select** keys, CHAN ID is the only value that can be displayed.

## Adding an ISDN Message Template

To add an ISDN message template, complete the following steps:

- 
- Step 1 Display the ISDN Message Templates screen (refer to the “ISDN Message Templates” section on page 2-20). The cursor is located in the Message field of the first template on the screen.
  - Step 2 Use the **Prev Screen**, **Next Screen**, **Tab**, and < keys to advance the cursor to the Message field of the template you want to add.

- Step 3** Use the **Select** and **Rev Select** keys to step through the token listing until the correct token is displayed, or type the correct value. Press **Next Field**. The cursor moves to the R/T field.
- Step 4** Type either R or T (or display the correct value by using the **Select** and **Rev Select** keys) and press **Next Field**. The cursor moves to the first Action field for that template field.
- Step 5** Use the **Select** and **Rev Select** keys to step through the token listing until the correct token is displayed, or type the correct value. Press **Next Field**.
- If the token you selected has no IE/data value, the cursor moves to the next Action field and you are ready to select that token.
  - If the token you selected has an action field value, use the **Select** and **Rev Select** keys to step through the token listing until the correct token is displayed *or* type the correct information. Then press the **Next Field** key. The cursor moves to the next Action field and you are ready to specify that token.
- Step 6** Repeat Step 5 until all action tokens and values for the template are displayed on the screen, then press **Enter**. The database is automatically updated.
- Step 7** Repeat Steps 2 through 6 for all ISDN message templates you want to add.
- Step 8** When all ISDN message templates are entered, press **Exit** to return to the ISDN Message Template Summary screen.
- To leave the ISDN Message Templates screen without making any changes, press **Exit**, **Prev Menu**, or **Main Menu**. No changes are made to the database unless you press **Enter**.
- 

## Deleting an ISDN Message Template

To delete an ISDN message template, complete the following steps:

- Step 1** Display the ISDN Message Templates screen (refer to the “ISDN Message Templates” section on page 2-20). The cursor is located in the Message field of the first template on the screen.
- Step 2** Use the **Prev Screen**, **Next Screen**, **Tab**, and < keys to advance the cursor to the Message field of the template you want to delete.
- Step 3** Use the **Prev Field** and **Next Field** keys to advance the cursor to the first Action field.
- Step 4** Use the **Select** and **Rev Select** keys to step through the token listing until a blank line is displayed, or use the space bar to type blank spaces over the token. Press the **Next Field** key. The cursor advances to the next action token field in the rule.
- Step 5** Repeat Step 4 until all fields in the template are blank, then press **Enter**. The database is automatically updated.
- Step 6** Repeat Steps 2 through 4 for each template you want to delete.
- Step 7** Press **Exit** to return to the ISDN Message Template Summary screen.
- To leave the ISDN Message Templates screen without making any changes, press **Exit**, **Prev Menu**, or **Main Menu**. No changes are made to the database unless you press **Enter**.
-

## Adding an Action Token to an ISDN Message Template

To add an action token to an existing ISDN message template, complete the following steps:

- 
- Step 1** Display the ISDN Message Templates screen (refer to the “ISDN Message Templates” section on page 2-20). The cursor is located in the Message field of the first template on the screen.
- Step 2** Use the **Prev Screen**, **Next Screen**, **Tab**, and < keys to advance the cursor to the Message field of the template you want to add.
- Step 3** Use the **Prev Field** and **Next Field** keys to advance the cursor to the Action field preceding the one into which you want to insert the token.
- Step 4** Press the **Insert** key. All action tokens, including that field, and the cursor, move down one line. Press the **Prev Field** key to move the cursor into the blank field.
- Step 5** Use the **Select** and **Rev Select** keys to step through the token listing until the correct action token is displayed. Press the **Next Field** key.
- If the action token you selected has no IE/data value, the cursor moves to the next Action field and you are ready to select that token.
  - If the action token you selected has an action value, use the **Select** and **Rev Select** keys to step through the token listing until the correct action token is displayed or type the correct information. Then press the **Next Field** key. The cursor moves to the next Action field and you are ready to specify that token.
- Step 6** Repeat Steps 3 through 5 for each token you want to add.
- Step 7** When all action tokens have been added, press **Enter** to automatically update the database.
- Step 8** Press **Exit** to return to the ISDN Message Template Summary screen.

To leave the ISDN Message Templates screen without making any changes, press **Exit**, **Prev Menu**, or **Main Menu**. No changes are made to the database unless you press **Enter**.

---

## Deleting an Action Token from an ISDN Message Template

To delete an action token from an existing ISDN message template, complete the following steps:

- 
- Step 1** Display the ISDN Message Templates screen (refer to the “ISDN Message Templates” section on page 2-20). The cursor is located in the Message field of the first template on the screen.
- Step 2** Use the **Prev Screen**, **Next Screen**, **Tab**, and < keys to advance the cursor to the Message field of the template from which you want to delete a token.
- Step 3** Use the **Prev Field** and **Next Field** keys to advance the cursor to the Action field from which you want to delete the token.
- Step 4** Use the **Select** and **Rev Select** keys to step through the token listing until a blank line is displayed, or use the space bar to type blank spaces over the token. To delete more than one token in a template, advance to that token and change it to a blank line. This action also clears the corresponding IE/data field. Press **Enter**. The database is automatically updated and the screen display is updated to show the deletion of the action token(s) and its associated IE/data field(s).

- Step 5** Repeat Steps 3 and 4 for each template from which you want to delete one or more action tokens.
- Step 6** Press **Exit** to return to the ISDN Message Template Summary screen.
- To leave the ISDN Message Templates screen without making any changes, press **Exit**, **Prev Menu**, or **Main Menu**. No changes are made to the database unless you press **Enter**.
- 

## Accessing Other Menus and Screens from the ISDN Message Templates Screen

You can access the following screens from the ISDN Message Templates screen:

- Main menu—Press the **Main Menu** key.
- Database Administration menu—Press the **Prev Menu** key.
- ISDN Message Template Summary screen—Press the **Exit** key.
- ISDN Supervision Templates screen—Press **Exit**, which brings you to the ISDN Message Template Summary screen. Press **Exit** again, and press **J**.

## ISDN Supervision Templates

Use the ISDN Supervision Templates screens to configure up to 24 supervision templates for use with the ISDN SUP [xx] outpulse rule token. Each template defines a set of system responses to the detection of specific ISDN messages, such as ALERTING, CONNECT, PROGRESS, and CALL PROC (call proceeding).

Use condition tokens to specify individual system responses to these messages, or events. These responses include reporting, propagation of the message to the incoming port, call failure, or error condition reporting.

ISDN calls are not marked stable when a template is being executed unless the template specifies to do so. Generally, the receipt of a CONNECT message causes the state of the port to go stable.

After the end of an outpulse rule and before receipt of a CONNECT message, the system reports all received D-channel messages (IEs and messages) to the host as supervision outside an outpulse rule (change byte = \$08) in an ISDN Port Change of State (\$EA) report. When the system receives an ISDN CONNECT message, the call is considered answered and changes to stable. The ISDN CONNECT message is also propagated back to the incoming port if the incoming port is not considered answered.

To access the ISDN Supervision Templates screen (see Figure 2-7) from the Database Administration menu, type **J** and press **Enter**. There are three screens; each contains eight template listings. The displayed screen is that of the selected template. The cursor is located in the Time token field of Template 1.

Press **Prev Screen** and **Next Screen** to page through the listings. Press **Tab** and < to move between the templates. Press **Print Screen** to obtain a hard copy of any of the screens.



### Note

A version of ISDN must be installed in order to access any ISDN System Administration screen.

---



Figure 2-7 ISDN Supervision Templates Screen

	I S D N   S U P E R V I S I O N   T E M P L A T E S							
	1	2	3	4	5	6	7	8
TIME	_____	_____	_____	_____	_____	_____	_____	_____
ALERTING	_____	_____	_____	_____	_____	_____	_____	_____
CONNECT	_____	_____	_____	_____	_____	_____	_____	_____
PROGRESS	_____	_____	_____	_____	_____	_____	_____	_____
CALLPROC	_____	_____	_____	_____	_____	_____	_____	_____
CONN ACK	_____	_____	_____	_____	_____	_____	_____	_____
USERINFO	_____	_____	_____	_____	_____	_____	_____	_____
CONGEST	_____	_____	_____	_____	_____	_____	_____	_____
FACILACK	_____	_____	_____	_____	_____	_____	_____	_____
FACILREJ	_____	_____	_____	_____	_____	_____	_____	_____

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## ISDN Supervision Templates Screen Field Definitions

The ISDN Supervision Templates screen contains nine columns of data. The leftmost column contains ten event fields, which we refer to as the Events Column. The remaining columns have eleven fields each—they begin with a template number at the top, followed by ten data entry fields below—which we refer to as Template Number Columns. As you can see in Figure 2-7, there are eight Template Number Columns. The Events Column and the Template Number Columns are described as follows:

**Events Column—*Display only.*** For the first event, TIME, identifies a timer event for which an action is specified. The remaining event fields identify the ISDN message for which an action is specified. The event values are listed in Table 2-19. Definitions for ISDN messages are contained in the International Telecommunications Union document *ITU-T Q.931*.

Table 2-19 ISDN Supervision Templates Event Values and Meanings

Value	Meaning
TIME	Expiration of a timer and ISDN message. When an ANSBK or ANSREP token is specified, the timeout functions as a grace timer. When an ERROR or FAIL condition token is specified, the timeout indicates a supervision error or a call failure, respectively. The timer is started when supervision template processing begins and cancelled when an event is detected. The timer's duration is specified in a preceding TIME SUP [xx] outputpulse rule token. If no token is specified, timing is not performed.
ALERTING	Alerting; call establishment.
CONNECT	Connect; call establishment.
PROGRESS	Progress; call establishment.
CALLPROC	Call proceeding; call establishment.

*Table 2-19 ISDN Supervision Templates Event Values and Meanings (continued)*

Value	Meaning
CONN ACK	Connect acknowledge; call establishment.
USERINFO	User information; call information phase.
CONGEST	Congestion control; miscellaneous.
FACILACK	Facility acknowledge; miscellaneous.
FACILREJ	Facility reject; miscellaneous.

Template Number Columns—The template numbers fields (1 to 8) are display only; the data entry fields are for your use—*Data entry via Select or Rev Select keys.*

The template number field identifies the specific template configuration for use with the ISDN SUP [xx] outpulse rule token.

The data entry fields specify the events to be detected, and consequent actions taken when each event is detected, including host reporting, propagating events, and indicating error conditions. These condition tokens define the action for the system to take when the event is detected during template processing.

## Condition Tokens

Ten condition tokens specify individual system responses, and combinations of responses, to a signaling event, such as report generation. Condition tokens also use the detection of the event as an indicator of error conditions and failed calls. Condition tokens are defined for each signaling event; events are disregarded when no token is defined for the event.

Use the **Select** and **Rev Select** keys to display the condition tokens, which will vary according to supervision events. The possible tokens are described below, and listed in the order in which they appear as selections.

### OK Condition Token

Indicates that an event was detected during processing of the ISDN SUP [xx] outpulse rule token. The event is not reported to the host when it occurs. When the event is detected, the ISDN SUP [xx] token is satisfied and template processing ends. Outpulse rule processing continues with the token following the ISDN SUP [xx] until the rule completes or the call goes to stable state.

### OKREP Condition Token

Indicates that an event was detected during processing of the ISDN SUP [xx] outpulse rule token. An ISDN Port Change of State (\$EA) report to the host is generated. When the event is detected, the ISDN SUP [xx] outpulse rule token is satisfied and template processing ends. Outpulse rule processing continues with the token following the ISDN SUP [xx] token until the rule completes or the call goes to stable state.

### ANSBK Condition Token

Valid only for the CONNECT event. Indicates that a CONNECT event was detected during processing of the ISDN SUP [xx] outpulse rule token and that answerback was sent to the incoming port (assuming it has not already been answered). The event is not reported to the host when it occurs. When the event is detected and answerback sent, the ISDN SUP [xx] outpulse rule token is satisfied and template processing ends.

Outpulse rule processing continues with the token following the ISDN SUP [xx] token until the rule completes or the call goes to stable state. Because the outgoing port is considered answered when answerback is sent, the call automatically goes to stable state when outpulse rule processing completes. For ISDN-to-ISDN calls, answerback takes the form of a CONNECT event message generated for the incoming call. Use of this token provides the correct answer supervision of non-ISDN incoming calls.

### ANSREP Condition Token

Valid only for the CONNECT event. Indicates that the system detected a CONNECT event during processing of the ISDN SUP [xx] outpulse rule token and sent answerback to the incoming port (assuming it has not already been answered).

The system generates an ISDN Port Change of State (\$EA) report to the host. When the event is detected and answerback sent, the ISDN SUP [xx] outpulse rule token is satisfied and template processing ends. Outpulse rule processing continues with the token following the ISDN SUP [xx] token until the rule completes, or the call goes to stable state. Because the outgoing port is considered answered when answerback is sent, the call automatically goes to stable state when outpulse rule processing completes. For ISDN-to-ISDN calls, answerback takes the form of a CONNECT event message generated for the incoming call.

Use of this token provides the correct answer supervision for non-ISDN incoming calls.

### REP Condition Token

Indicates that an event will be reported to the host when detected. An ISDN Port Change of State (\$EA) report is generated containing the event indicator. Events marked with REP condition tokens do not satisfy an ISDN SUP [xx] outpulse rule token; template processing continues until an event marked with another type of condition token is detected.

### ERROR and FAIL Condition Tokens

Indicates that a signaling event has detected a failed call. The event is not considered a supervision error. The outgoing port is removed from the call and the incoming port is left in setup. The system generates an ISDN Port Change of State (\$EA) report, indicating a failed call attempt. Template processing ends when the event is detected and the outpulse rule is aborted.

### QUIT Condition Token

Indicates that an event caused outpulse rule processing to abort. Template processing ends and the outgoing port returns to the state it was in prior to outpulse rule processing, but is not removed from the call. An ISDN Port Change of State (\$EA) report is generated, indicating an outpulse rule failure. The QUIT condition token event can occur at any time during outpulse rule processing, even after the port is considered answered.

### PRP Condition Token

Valid only for ALERTING, PROGRESS, and CALL PROC events. Indicates that an event was detected during processing of the ISDN SUP [xx] outpulse rule token and that the event is to be propagated (sent back) to the incoming port.

If the incoming port is a non-ISDN resource, only the ALERTING message can be propagated, and the incoming port is presented with ringback tone. No report is generated. Events marked with PRP tokens do not satisfy an ISDN SUP [xx] outpulse rule token; template processing continues until an event marked with another type of condition token is detected. The CONNECT message can be propagated back to the incoming port through the ANSBK and ANSREP tokens.

## PRPREP Condition Token

Valid only for ALERTING, PROGRESS, and CALLPROC events. Indicates that the system detected an event while processing the ISDN SUP [xx] output pulse rule token, and that the event is to be propagated (sent back) to the incoming port.

If the incoming port is a non-ISDN resource, only the ALERTING message can be propagated and the incoming port is presented with audible ringback tone. The system generates an ISDN Port Change of State (\$EA) report containing the event indicator. Events marked with PRPREP tokens do not satisfy an ISDN SUP [xx] output pulse rule token; template processing continues until an event marked with another type of condition token is detected.

## Adding an ISDN Supervision Template

To add an ISDN supervision template, complete the following steps:

- 
- Step 1** Display the ISDN Supervision Templates screen (refer to the “ISDN Supervision Templates” section on page 2-32). The cursor is located in the first token field of Template 1.
  - Step 2** Use the **Prev Screen**, **Next Screen**, **Tab**, **Prev Field**, and **Next Field** keys to advance the cursor to the first token field of the template you want to add.
  - Step 3** Use the **Select** and **Rev Select** keys to step through the condition token listing until the correct token is displayed. Press **Next Field**.
  - Step 4** Repeat Step 3 until all condition tokens for the template are displayed on the screen. Use the **Prev Screen**, **Next Screen**, **Tab**, **<**, **Prev Field**, and **Next Field** keys to advance the cursor to the first token field of any other templates you want to add. Repeat Steps 2 through 4 for all other templates.
  - Step 5** When all templates are entered, press **Enter**. The database is automatically updated.
  - Step 6** When all templates are entered, press **Exit** to return to the Database Administration menu.

To leave the ISDN Supervision Templates screen without making any changes, press **Exit**, **Prev Menu**, or **Main Menu**. No changes are made to the database unless you press **Enter**.

---

## Deleting an ISDN Supervision Template

To delete an ISDN supervision template, complete the following steps:

- 
- Step 1** Display the ISDN Supervision Templates screen (refer to the “ISDN Supervision Templates” section on page 2-32). The cursor is located in the first token field of Template 1.
  - Step 2** Use the **Prev Screen**, **Next Screen**, **Tab**, **Prev Field**, and **Next Field** keys to advance the cursor to the first token field of the template you want to delete.
  - Step 3** Use the **Select** and **Rev Select** keys to step through the condition token listing until a blank line is displayed. Press **Next Field**. The cursor advances to the next token field in the template.
  - Step 4** Repeat Step 3 until all fields in the template are blank.
  - Step 5** Repeat Steps 2 through 4 for each template you want to delete. Press **Enter** after all deletions are made. The database is automatically updated.

- Step 6** Press **Exit** to return to the Database Administration menu.

To leave the ISDN Supervision Templates screen without making any changes, press **Exit**, **Prev Menu**, or **Main Menu**. No changes are made to the database unless you press **Enter**.

---

## Adding a Condition Token to an ISDN Supervision Template

To add a condition token to an existing ISDN supervision template, complete the following steps:

- 
- Step 1** Display the ISDN Supervision Templates screen (refer to the “ISDN Supervision Templates” section on page 2-32). The cursor is located in the first token field of Template 1.
- Step 2** Use the **Prev Screen**, **Next Screen**, **Tab**, **Prev Field**, and **Next Field** keys to advance the cursor to the token field into which you want to insert the token.
- Step 3** Use the **Select** and **Rev Select** keys to step through the condition token listing until the correct token is displayed. Press **Next Field**.
- Step 4** Repeat Steps 2 through 4 for each condition token you want to add.
- Step 5** When you have completed adding all condition tokens, press **Enter**. The database is automatically updated.
- Step 6** Press **Exit** to return to the Database Administration Menu.

To leave the ISDN Supervision Templates screen without making any changes, press **Exit**, **Prev Menu**, or **Main Menu**. No changes are made to the database unless you press **Enter**.

---

## Deleting a Condition Token from an ISDN Supervision Template

To delete a condition token from an ISDN Supervision Template, complete the following steps:

- 
- Step 1** Display the ISDN Supervision Templates screen (refer to the “ISDN Supervision Templates” section on page 2-32). The cursor is located in the first token field of Template 1.
- Step 2** Use the **Prev Screen**, **Next Screen**, **Tab**, **Prev Field**, and **Next Field** keys to advance the cursor to the token field you want to delete.
- Step 3** Use the **Select** and **Rev Select** keys to step through the condition token listing until a blank line is displayed. If you want to delete more than one condition token in a template, advance to that token and change it to a blank line. The screen display is updated to show the deletion of the token(s).
- Step 4** Repeat Steps 2 and 3 for each template from which you want to delete one or more condition tokens. Press **Enter** after all deletions are made. The database is automatically updated.
- Step 5** Press **Exit** to return to the Data Base Administration menu.

To leave the ISDN Supervision Templates screen without making any changes, press **Exit**, **Prev Menu**, or **Main Menu**. No changes are made to the database unless you press **Enter**.

---

## Accessing Other Menus and Screens from the ISDN Supervision Template Screen

You can access the following screens from the ISDN Supervision Template screen:

- Main menu—Press the **Main Menu** key.
- Database Administration menu—Press the **Prev Menu** or **Exit** key.

## Display Card Data

The Display Card Data screen fully supports the ICC ISDN span. No changes have been made to the screen fields or layout for this ISDN functionality; additional values have been added to the Card Status and Alarm States fields.



### Note

Although additional values can be displayed for other span types, the span status values listed in Table 2-20 are specific to the ICC ISDN span. Alarm states for the ICC ISDN spans are listed in the “Card Alarm State Messages” section on page 2-41.

When you use the Display Card Data screen to display a ICC ISDN span, the status field indicates the status of the span's D-channel. Possible values for this field are listed in Table 2-20.

**Table 2-20 ICC ISDN Span Status Values and Meanings**

Value	Meaning
Active	Active
Out of Srvc	Out of Service
Maintenance	Maintenance (valid for ICC ISDN span when card alarms are present or when PRI application software is being downloaded to the card)
Diagnostic	Diagnostics (set from Card Maintenance display—ICC ISDN span is in local loopback mode)
Remote	Remote Diagnostics (set from Card Maintenance display—ICC ISDN span is in remote loopback mode)

The Display Card Data screen is fully documented in the *Cisco VCO/4K System Administrator's Guide*.

# Port Display

The Port Display screen is shown in Figure 2-8.

*Figure 2-8 Port Display Screen*

```

PORT DISPLAY

RLSP: 1 1 15-1-1 1 PA ____ COS ____ TRACE: Host _ NBC _ Voice _
CURRENT STATE In/Outpulse Rule ____ Token ____ CURRENT LINKS
Major CP_IDLE Resource Group ____ Conference ____ R L S P
Supplementary 0 Listening To RLSP _ _ _ _ _ PA ____ _ _ _ _ _
ISDN IN-SERV IDLE Conf/Assoc Port RLSP _ _ _ _ _ PA ____ _ _ _ _ _
Call Id _ _ _ _ _
Port Pointer ____ Attempts ____ _ _ _ _ _
Dynamic Port Pointer ____ Completions ____ _ _ _ _ _
Start Record Pointer ____ Errors/Threshold ____/_ _ _ _ _
End Record Pointer ____ Rehunts/Threshold _/_ _ _ _ _
                                     _ _ _ _ _

ANI ____ _ _ _ _ _ _ _ _ _ _
(1) ____ _ _ _ _ _
(2) ____ _ _ _ _ _
(3) ____ _ _ _ _ _
(4) ____ _ _ _ _ _
      _ _ _ _ _
      _ _ _ _ _
      _ _ _ _ _

```

## Port Display Screen Field Definitions—ISDN Specific

Three fields in the Port Display screen are specific to ISDN channels—IN-SERV, which indicates the ISDN port state; IDLE, which indicates the ISDN port state’s associated call state; and Call Id. These fields are described in detail below.

In addition to the three ISDN specific fields, there are the standard Port Display screen fields, which are described in the *Cisco VCO/4K System Administrator's Guide*.

**IN-SERV—Display only.** Identifies the state of the ISDN port (channel) being displayed. Possible values are listed in Table 2-21.

Table 2-21 ISDN Port State Field Values and Meanings

Value	Meaning
IN-SERV	In service. Port is currently in service and available for use in a call.
OOS-NE	Out of service, near end. Port is currently out of service due to some system action (system administration). Port is unavailable to call processing. System action is required to put the port back into service.

**Table 2-21 ISDN Port State Field Values and Meanings (continued)**

Value	Meaning
OOS-FE	Out of service, far end. Port is currently out of service due to some action at the far end. Port is unavailable to call processing. Action at the far end is required to put the port back into service.
MAINT-NE	Maintenance, near end. Port is currently in maintenance mode due to some system action (system administration) or signal alarm condition. Port is unavailable to processes calls.
MAINT-FE	Maintenance, far end. Port is currently in maintenance mode due to some action at the far end. Port is unavailable to call processing. Action at the far end is required to put the port back into service.

IDLE—*Display only*. Identifies the state of the ISDN call carried on the displayed port (channel). Possible values and corresponding User-Side call states and state numbers are listed in Table 2-22.

Definitions for user-side call states and state numbers are contained in the International Telecommunications Union document *ITU-T Q.931*.

**Table 2-22 ISDN Call State Field Values, States, and Numbers**

Value	Call State	Call State Number
IDLE	Null State	0/Rest 0
O_INITED	Call Initiated	1
I_OVERLAP or O_OVERLAP	Overlap Sending	2—reserved for future use
O_PROCEED	Outgoing Call Proceeding	3
O_DELIVRD	Call Delivered	4
I_CALLPRS	Call Present	6
I_RECEIVD	Call Received	7
I_CONNECT	Connect Request	8
I_PROCEED	Incoming Call Proceeding	9
I_ACTIVE or O_ACTIVE	Active	10
DISC_REQ	Disconnect Request	11
DISC_IND	Disconnect Indication	12
DISC_RLS	Release Request	19

CALL ID—*Display only*. Indicates the call identification assigned to this call attempt by the system. The system ensures that call identification values are unique for the life of the call. CALL ID values range from 1 to 127 for each D-channel.



# Card Alarm State Messages

ICC ISDN spans are supported by the card alarm state display function. The Card Alarm Display screen displays these card alarm messages which are defined in Table 2-23. Two abbreviations, which precede each message, indicate alarm importance.

- MA indicates a major alarm.
- MI indicates a minor alarm.

The alarm state messages accommodate both ICC ISDN T1 spans and ICC ISDN E1 spans.

Refer to the *Cisco VCO/4K System Administrator's Guide* for further information on the Card Alarm Display screen. Refer to the *Cisco VCO/4K System Messages* for more information on card alarm state messages.

**Table 2-23 Card Alarm State Messages and Meanings**

Message	Meaning
MA PRI D-Channel Failure	The D-channel of an ICC ISDN span has been released. No calls can be placed. The D-channel gets reestablished only after all the Layer 1 alarms are cleared.
MA PRI/T1/E1 Carrier Failure	System has detected loss of carrier on an ICC ISDN span.
MA PRI/T1/E1 Card Failure	ICC ISDN T1 span or ICC ISDN E1 span has been removed from service via system administration, or NBC can no longer communicate with the span.
MA Interface Hardware Failure	A single span or service engine has failed on the ICC or SPC. The hardware needs to be replaced.
MA Wrong Hardware Installed	Incompatible hardware is installed in your system. For example, an ICC T1 I/O module may be connected to an ICC E1 span. This message pertains only to the ICC and SPC.
MA Module Hardware Failure	All spans or service engines have failed on the ICC or SPC I/O module. The hardware needs to be replaced.
MI PRI/T1/E1 Remote Alarm	Indicates receipt of remote failure indication (yellow alarm).
MI PRI/T1/E1 Out Of Frame	Indicates an out of frame (OOF) condition has been detected for an ICC ISDN T1 span or an ICC ISDN E1 card.
MI PRI/T1/E1 Blue Alarm	Indicates an AIS/Blue alarm has been detected for an ICC ISDN span. It is essentially receiving an out of frame (OOF) condition, all 1s (ones).
MI E1 CRC Error	Indicates the occurrence of E-bit error in the receiving data stream for an ICC ISDN span. This is the result of the far end having detected the Cyclic Redundancy Check 4 (CRC4) error.
MI PRI/T1/E1 OOF Maint. Limit	Indicates the maintenance threshold for the PRI/T1 out of frame (OOF) condition has been reached. For ICC ISDN E1 spans, this threshold is set through the ICC ISDN Span Configuration screen. For ICC ISDN T1 spans, this threshold is fixed at 4.

*Table 2-23 Card Alarm State Messages and Meanings (continued)*

Message	Meaning
MI PRI/T1/E1 Slip Maint. Limit	Indicates the maintenance threshold for PRI/T1 SLIPS has been reached. For ICC ISDN E1 spans, this threshold is set through the ICC ISDN Span Configuration screen. For T1, this threshold is fixed at 255.
MI All Ports Deactivated	Request to deactivate all the ports or an ICC ISDN span is received. This allows the administrator to perform maintenance action on the ports. No calls can be placed.