



## CHAPTER 9

# Managing Radios and Radio Descriptors

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The Cisco IPICS administrator is responsible for configuring the radios and radio descriptors that are used with Cisco IPICS. This chapter provides detailed information about managing these items. In includes these topics:

- [“Managing Radios” section on page 9-1](#)
- [“Managing Radio Descriptors” section on page 9-23](#)

## Managing Radios

Cisco IPICS provides support for tone-controlled radios by enabling the definition of radio channels in the Cisco IPICS server configuration. The IDC sends RFC 2198 and RFC 2833 packets to control tone sequences on a per-channel basis. Cisco IPICS supports up to 50 configured channels, with up to 36 channels active at any one time.

At the LMR gateway, these packets get converted into audible tones via the configured ear and mouth (E&M) interface to the physical radio to provide tone control for radios.

Cisco IPICS also provides support for serial-controlled radios through an integrated radio control service that translates control commands from Cisco IPICS to proprietary serial protocols. Cisco IPICS access serial controlled radios via asynchronous serial ports on the LMR gateway.

Cisco IPICS also supports P25 radios.

Using radio control to manage radios involves the following general steps:

1. Configure hardware as described in *Solution Reference Network Design (SRND)* (latest version).
2. Create a location that the radio uses for multicast. (See the [“Managing Locations” section on page 2-25.](#))
3. Create and provision a radio descriptor. (See the [“Adding Descriptors” section on page 9-43.](#))
4. Add the radio and assign the desired descriptor to it. (See the [“Adding a Radio” section on page 9-9.](#))

This section contains the following radio management topics:

- [Tone Control Radio Overview, page 9-2](#)
- [Serial Control Radio Overview, page 9-3](#)
- [ISSI Gateway Overview, page 9-3](#)
- [Understanding How Buttons Display on the IDC, page 9-4](#)
- [Radio Frequency Channels, page 9-4](#)

- [Configuring Channel Selectors and Control Sequences, page 9-4](#)
- [Understanding the Radios Window, page 9-7](#)
- [Adding a Radio, page 9-9](#)
- [Viewing and Editing Radio Details, page 9-15](#)
- [Associating a User to a Radio From the Radios Window, page 9-16](#)
- [Enabling or Disabling a Radio, page 9-19](#)
- [Deleting a Radio, page 9-20](#)
- [Accessing and Using the Serial Radio Control Interface, page 9-20](#)

You perform the radio management tasks in the **Configuration > Radios** window in the Administration Console. For more information about these windows, including how to access them, see the [“Understanding the Radios Window” section on page 9-7](#).

## Tone Control Radio Overview

Each radio channel that you configure in the Cisco IPICS Administration Console represents a physical radio that you can configure with one or more tone sequences. Tone sequences control various tones and functionality. Each tone sequence includes the frequency or frequencies, volume (power), duration, and other parameters that are necessary to generate a specific tone and invoke a specific action.

Tone control, also referred to as *Tone Remote Control* (TRC), refers to the use of inband tone sequences to control a radio that is connected to an LMR gateway (typically a base station). In Cisco IPICS, you can use tone control to modify or tune to a different radio frequency (RF) channel, change the transmit power level, enable or disable radio built-in encryption, and control other operations. TRC uses well-defined audio sounds (also referred to as *tones*) to change the behavior of a device. A tone-keyed radio system requires that a specific tone be present on the incoming analog (e-lead) port. If this tone is not present, the radio does not transmit audio.

The Radio Details page shows available controls and channels. The IDC generates the necessary radio control tone sequences when users press the associated button. For more information about channel selectors, see the [“Configuring Channel Selectors and Control Sequences” section on page 9-4](#).



### Note

- For information about various Requests for Comment (RFCs), access the RFC repository that is maintained by the Internet Engineering Task Force (IETF).
- For more detailed information about how to use the tone-controlled radio functionality on the IDC, see *IPICS Dispatch Console User Guide* for this release.

Channel selector buttons, signals, and commands are defined in descriptor files. The following list describes these descriptor files:

- **Radio Descriptor Files**—Channel selector buttons that provide the functionality for specific radio types are defined in the radio descriptor files. The radio descriptor file defines the tones or events that must be sent to the radio to enable or disable specific capabilities. For more information, see the [“Tone Radio Descriptors” section on page 9-24](#).
- **Tone Descriptor Files**—Contain signals and commands. You can associate signals, that are defined in a tone descriptor file, to channels. Commands in a tone descriptor can be referenced by any radio descriptor file. See the [“Tone Descriptors” section on page 9-23](#) for more information.

## Serial Control Radio Overview

Serial controlled radios can be configured to have channel selectors and control functions. Channel selectors represent controls that allow an IDC or Administration Console user to select a radio channel or talkgroup and to set up a private or group call. Control functions are controls that allow an IDC or Administration Console user to invoke functions or modes of operation.

For serial control, Cisco IPICS defines generic control commands that are configured in a radio descriptor. A radio control service that is integrated with Cisco IPICS translates these commands to proprietary commands.

The Serial Radio Control Interface (SRCI) and the IDC provide access to the channel selectors and control functions that are defined in the radio descriptor, if a radio is in a location other than the location that you logged in to. The SRCI and IDC also provide feedback from the controlled radio when a channel selector is changed or a control function is invoked. For radios that support these features, the SRCI and IDC provide the talker ID for incoming calls and emergency detection.

## ISSI Gateway Overview

A Project 25 (P25) Inter-RF Subsystem Interface (ISSI) Gateway allows multiple RF subsystems (RFSSs) to be connected together into wide area networks that extends area coverage for P25 compliant digital radios. With the ISSI gateway, a radio from IPICS can roam to another RFSS. The ISSI gateway is composed of two parts:

- The P25G (or IPICSG) serves as a proxy for all non-P25 clients within IPICS and is responsible for transcoding between multicast RTP streams (using G.711 codec) and SIP based P25 CAI frames (using IMBE codec). It is also responsible for encryption and decryption when necessary.
- The (or RNC) serves as a local RFSS for IPICS and is responsible for interfacing with other RFSSs via ISSI. It can be a home RFSS to subscribers and groups or serving RFSS for subscribers and groups homed elsewhere. It performs all SIP based call processing between IPICS and remote RFSSs.

Before an ISSI gateway is provisioned within the IPICS Server, a descriptor must be created that describes groups that a given ISSI gateway may need to affiliate and supplementary services that are available via the ISSI gateway. An example ISSI gateway descriptor is available from the **Configuration > Descriptors** page on the IPICS Administration console. For more information about adding an ISSI gateway descriptor, see the [“Adding Descriptors” section on page 9-43](#).

An ISSI gateway is provisioned much like a serial radio within IPICS and is accessible from the **Configuration > Radios** page on the IPICS Administration console. The main difference is that the ISSI gateway Connection block has information unique to ISSI gateways. For more information about provisioning an ISSI gateway, see the [“Adding a Radio” section on page 9-9](#).

Channels representing P25 groups are provisioned similar to other channels from the **Configuration > Channels** page on the IPICS Administration console. The difference in this case is that the Media Connection Assignment is set to ISSI gateway. For more information about provisioning channels representing P25 groups, see the [“Viewing and Editing Channel Details” section on page 2-5](#).

An existing IPICS user can be assigned a P25 subscriber unit ID from the Communications tab of the User Details page accessible via User Management on the IPICS Administration Console. For more information about assigning P25 Subscriber Unit IDs to IPICS users, see the [“Managing Communications Preferences for a User” section on page 3-13](#).

## DFSI Gateway Overview

A Digital Fixed Station Interface (DFSI) gateway is responsible for controlling conventional P25 Fixed Stations and providing a communications bridge between Cisco IPICS and these P25 Fixed Stations. It handles transcoding between G.711 streams on the Cisco IPICS side (multicast) and IMBE over a digital fixed station interface (DFSI). It can also encrypt and decrypt voice traffic.

## Understanding How Buttons Display on the IDC

When you use tone control, the buttons that display on the IDC get populated from information that the IDC receives from the Cisco IPICS server. The Cisco IPICS server performs a one-to-one mapping of the available IDC buttons and sends it to the IDC.

For more detailed information about the IDC, see *Cisco IPICS Dispatch Console User Guide* for this release.

## Radio Frequency Channels

In Cisco IPICS, a channel can refer to the RF channel (the frequency) to which the radio is tuned and on which content is streaming. Be aware of the following RF caveats when you use the IDC:

- A radio frequency does not define a channel and the audio content may differ depending on the location of the frequency. For example, a channel that is tuned to one frequency in one location may receive different content from the same type of radio that is tuned to the same radio frequency in another location.
- A channel may appear on more than one frequency, so the same content may be audible on several different frequencies.
- Any radio frequency in a specific location may carry several different content streams simultaneously.

You can associate radios and IDC users to enable user access to specified radios. You also can specify channel selector and control permissions to users by choosing the level of permission that pertains to each individual channel selector or radio control button. These permissions determine which channel selector buttons and radio controls the users can access. For example, if you do not configure any channel selector buttons for a user, the user can listen to the channel but cannot change the channels or control the radio.

Examples of radio control functions include MON (monitor), POW (power level) and Enc (encryption).

See the [“Configuring Channel Selectors and Control Sequences” section on page 9-4](#) for more information about channel selectors and tone control sequences for radios.

## Configuring Channel Selectors and Control Sequences

This section describes how to configure channel selectors and tone control sequences. It includes the following topics:

- [Channel Selector Configuration, page 9-5](#)
- [Tone Sequence Configuration \(Tone Control Radios\), page 9-5](#)
- [Caveats for Configuring Default Tone Sequences \(Tone Control Radios\), page 9-6](#)

## Channel Selector Configuration

You select channel descriptors and controls that are available to radio users in the Configuration > Descriptors window. When you configure or update descriptors and controls, the IDC of the any user who is associated to a radio gets updated.



### Note

- When you configure channel selectors, consider the different actions that users may want to perform on the channel and which commands need to be sent to the radio when those actions are performed.
- Assigning a key to a channel selector in a P25 Fixed Station or ISSI gateway instructs the gateway to use that key when communicating on that selector in secure mode. Associating a key to an ISSI gateway or DFSI gateway ensures that the gateway receives the key so that the gateway can perform encryption and decryption. You must assign and associate keys for encryption and decryption using keys to function. For related information, see the [“Associating a Key to an ISSI or DFSI Gateway From the Radios Window”](#) section on page 9-18.

The channel selector attributes include the following elements:

- Label—This field specifies the name of the radio channel selector, as defined in the radio descriptor file. See the [“Managing Radio Descriptors”](#) section on page 9-23 for more information about descriptors.



### Note

When you configure channel selector attributes, be aware that mixing left-to-right (LTR) and right-to-left (RTL) character sets for different languages may cause undesirable behaviors in the server or IDC.

- Enabled—If checked, this box indicates whether a PTT channel is allowed to associate to this channel. That is, this channel selector displays in the drop-down list for the radio connection for the channel.
- Key—(applies only to P25 Fixed Stations and ISSI gateways) Choose the key that the channel uses for encryption and decryption.
- Strapping—(applies only to P25 Fixed Stations and ISSI gateways) If you choose a key in the Key field, one of the following strapping methods. If you do not choose a key, the value of the Strapping field is **CLEAR**.
  - **CLEAR**—Outbound voice traffic from an IDC user on this channel is always in clear mode. The user can listen to secure traffic that is received on this channel only if there is a key associated to that channel and user.
  - **SELECTABLE**—An IDC user can switch between clear and secure modes for outbound voice traffic on this channel.
  - **SECURE**—Outbound voice traffic from an IDC user on this channel is always in secure mode.
- Associated Channel—This field displays the name of the currently associated channel and its short name (a condensed name of the channel).

## Tone Sequence Configuration (Tone Control Radios)

The tone control sequences, which are defined in a radio descriptor file, contain information about how to tune the radio to another channel within that radio. See the [“Managing Radio Descriptors”](#) section on page 9-23 for more information.

You can also configure default tone sequences. However, be aware of the caveats that the [“Caveats for Configuring Default Tone Sequences \(Tone Control Radios\)”](#) section on page 9-6 describes before you configure these sequences.

The control attributes for tone sequences include the following elements:

- **Label**—This field indicates the name of the tone sequence, as defined in the tone descriptor file. These sequences may include names such as Monitor On/Off or Hi/Medium/Low Power and are used to identify a tone sequence.
- **Enabled**—If checked, this check box indicates that this control can be made available to the IDC.
- **Description**—This field indicates a description of the tone control sequence. A tone control can be either a stateful or momentary operation.

If a control is stateful, the IDC displays the button.

For example, Encryption is a stateful operation and the IDC monitors its setting. Another example is a Transmit Power setting that can be toggled between High, Medium, and Low.

A momentary control is one in which the functional state is not monitored or remembered. Most signals are momentary, meaning that they are sent without being monitored by the system.

**Note**

Because of the limitations of tone-controlled radios, you may be able to toggle a feature on, but you may not have any way to know when the feature has been toggled back. For example, even though you can enable monitor mode, this mode can be turned off for a variety of reasons, including pressing the PTT button or changing the radio channel.

For more information about tone and radio descriptors, see the [“Tone Descriptors”](#) section on page 9-23 and the [“Understanding the Descriptors Window”](#) section on page 9-42.

## Caveats for Configuring Default Tone Sequences (Tone Control Radios)

Cisco IPICS allows you to configure a default tone sequence that transmits on the last used channel whenever the currently-tuned channel is unknown.

**Note**

Be aware that the channel on which the tone sequence transmits is determined by the capabilities of the specific radio equipment systems that are being used and you should configure the channel based on that information.

You can configure the following options for a default channel:

- Associate to no tones
- A tone sequence that instructs that the radio transmits on a default channel, such as F1
- A tone sequence that instructs that the radio transmits on the currently-tuned channel, if that capability is available

**Note**

When some users do not have access to channel selectors and cannot select a channel on which to transmit, the IDC does not know which channel the radio has been tuned to. Therefore, the IDC does not provide the user with a visual indicator and does not allow the user to transmit under those conditions. The channel that gets used depends on the configuration and on the radio capabilities as described earlier in this chapter.

Be aware that when you configure a default tone sequence, it may transmit over an unintended channel under the following conditions:

- If you configure the system so that a default tone sequence transmits on the currently-tuned channel, Cisco IPICS uses the last used channel to transmit if the transmission occurs before a specific channel has been selected.
- If an IDC user pushes a PTT button to talk, the tone control sequence may transmit over that specific channel, even if it was not the intended channel to use for transmission.
- If an IDC user begins to transmit while another user attempts to change channels in the same radio, transmission may occur in the channel that was selected by the second user. Or, the channel may not actually be changed but the tone control sequence sent by the attempted channel change may transmit over an unintended frequency.

**Note**

The behavior of the IDC depends on the capabilities of the radio system that is being used.

## Understanding the Radios Window

The Configuration > Radios window, in the Administration Console, lists information about each of the radios that you have added in Cisco IPICS.

Table 9-1 describes the items in the Radios window.

**Table 9-1** *Items in the Radios Window*

Item	Description	Reference
<b>Table Columns</b>		
Name	Indicates the names of radios that are configured in Cisco IPICS.	See the <a href="#">“Adding a Radio”</a> section on page 9-9 and the <a href="#">“Viewing and Editing Radio Details”</a> section on page 9-15.
Radio Type	Indicates the name of the radio descriptor that is associated with the radio. The radio descriptor describes the radio type and associated channel selectors and control functions.	
Control Type	Indicates the control type of the radio.	

**Table 9-1** *Items in the Radios Window (continued)*

Item	Description	Reference
Pooled  (Serial controlled radios only)	Indicates whether the radio is enabled as a pooled resource and whether it is currently allocated. Pooled radios cannot be controlled manually. They are automatically allocated and configured by Cisco IPICS on demand when a channel is activated via a VTG or a user on an IDC.  The value does not apply if the radio is tone controlled.	See the “Adding a Radio” section on page 9-9 and the “Viewing and Editing Radio Details” section on page 9-15.
Status	Indicates whether the radio is enabled or disabled. Disabled radios cannot be controlled and are not available on the pool.	
Control Status (Serial controlled radios only)	Indicates the control status of the radio. The value does not apply if the radio is tone controlled.	
Reserved By (Serial controlled radios only)	Indicates whether a radio that is not a pooled resource is reserved by a user or VTG.  The value does not apply if the radio is tone controlled or if the radio is a pooled resource.	
VTG	Indicates whether the radio can be assigned to a VTG.	
User	Indicates whether the radio can be assigned to a user.	
Buttons		
Add	Click this button to configure new radios.	See the “Adding a Radio” section on page 9-9.
Delete	Click this button to delete radios from Cisco IPICS.	See the “Deleting a Radio” section on page 9-20.
Associations	Click this button to associate radios to users or to keys.  (Associating a DFSI gateway to a user does not apply. Associating to keys applies to ISSI gateways and DFSI gateways only.)	See the “Associating a User to a Radio From the Radios Window” section on page 9-16 or the “Associating a Key to an ISSI or DFSI Gateway From the Radios Window” section on page 9-18.
Radio Control (Non-pooled serial controlled radios only)	Opens a browser-based control user interface. This button is active only if you check the check box for a single non-pooled serial controlled radio. It is dimmed if the radio is tone controlled or pooled, or if multiple check boxes are checked.	See the “Accessing and Using the Serial Radio Control Interface” section on page 9-20.
Display Controls		
Rows per page drop-down list	Specifies the number of rows of radios that are included in a radios list page.	See the “Navigating Item Lists” section on page 1-13.
Page field	Displays radios on a specific page.	
< (First page) button	Displays the first page of the radio list.	
< (Previous page) button	Displays the previous page of the radio list.	
> (Next page) button	Displays the next page of the radio list.	
>  (Last page) button	Displays the last page of the radio list.	



## Adding a Radio

When you add a radio it becomes available for use by Cisco IPICS.

Before you add a radio, make sure that you configure locations, as described in the [“Managing Locations” section on page 2-25](#).

If you are adding a P25 Fixed Station, add a DFSI gateway before you perform the following procedure. In addition, make sure to determine which DFSI gateway will control which set of P25 Fixed Stations.

To add a new radio, perform the following procedure:

### Procedure

- Step 1** From the Cisco IPICS Administration Console, navigate to the **Configuration > Radios** window.
- Step 2** In the Radios window, click **Add** and designate the type of radio that you want to add by choosing one of the following options from the drop-down list that displays.
- **Add Tone Controlled Radio**
  - **Add Serial Controlled Radio**
  - **Add ISSI Gateway**
  - **Add DFSI Gateway**
  - **Add Fixed Station**
- A fixed station is a conventional P25 repeater or base station.
- The General tab for a new radio displays.
- Step 3** Enter information in the General tab. [Table 9-2](#) describes the fields in this tab.



**Note** Depending on the type of radio being added, the fields available in the General tab for a new radio differ. When a field does not apply to all three radio types, [Table 9-2](#) indicates to which radio types the field does apply.

**Table 9-2** General Tab Fields in Radios Window

Field	Description
<b>General Information Area</b>	
Name	Enter the name of the radio.
Radio Type	Choose the type of radio from the drop-down list.  The choices that display for radio type are based on the radio types that are in the radio descriptor files. For more information about radio descriptor files, see the <a href="#">“Managing Radio Descriptors” section on page 9-23</a> .
Description	Enter a description of the radio.

**Table 9-2**      **General Tab Fields in Radios Window (continued)**

Field	Description
Pooled Resource	<p><b>Note</b> This field is available only when adding a serial controlled radio.</p> <p>Check this check box to designate that the radio is a pooled resource. Pooled radios are not controlled manually. They are automatically allocated and configured by Cisco IPICS on demand when a channel is activated via a VTG or a user on an IDC. In addition, pooled radios cannot be associated to users and all user associations to a radio are removed after configuring the radio as a pooled resource.</p>
<b>Content Source Information Area</b>	
Location	<p>Choose a location for the radio from the drop-down list.</p> <p>Location is used to determine how the IDC client can reach the radio (via multicast or unicast).</p> <p><b>Note</b> IDC users must log in from the same location as the radio to access it. Cisco IPICS supports remote log in only if the Cisco IPICS server is configured with an RMS in the same location as the radio.</p> <p>See the <a href="#">“Managing Locations” section on page 2-25</a> for information about configuring locations.</p>
Multicast Address	<p>Depending on the radio type, do one of the following:</p> <ul style="list-style-type: none"> <li>For a tone controlled radio, enter the multicast address that is used to transmit audio and tones.</li> <li>For a serial controlled radio or an ISSI gateway, enter the multicast address that is defined in the dial peer configuration of the LMR gateway.</li> </ul>
Multicast Port	<p>Depending on the radio type, do one of the following:</p> <ul style="list-style-type: none"> <li>For a tone controlled radio, enter the multicast port for the radio.</li> <li>For a serial controlled radio or an ISSI gateway, enter the port number that is defined in the dial peer configuration of the LMR gateway.</li> </ul>
Codec	<p><b>Note</b> This option is available only when adding a serial controlled radio or tone controlled radio.</p> <p>Enter the codec that is defined in the dial peer configuration of the LMR gateway.</p>
Secure Radio	<p><b>Note</b> This option is available only when adding a serial controlled radio or tone controlled radio.</p> <p>Choose <b>Yes</b> or <b>No</b> from the drop-down list.</p> <p><b>Note</b> This field defines the security label of the radio only, and not the security of the individual channels that can be carried over the radio.</p>

**Table 9-2 General Tab Fields in Radios Window (continued)**

Field	Description
Voice Delay (msec)	<p><b>Note</b> This field is available only when adding a tone controlled radio.</p> <p>This field specifies a value, in milliseconds, that is set on the LMR gateway that you must replicate on the server for radio instances that are associated to the router.</p> <p>The value of this parameter on the router determines how long the LMR gateway delays the audio before sending it to the radio. The delay is necessary to ensure that tones do not overlap with audio when the static tone configuration is used in the dial peers.</p> <p><b>Note</b> Make sure that the value that you enter for this parameter is the same that is configured on the LMR gateway. This field must map to the value that is entered in the timing delay-voice tdm CLI command. see <i>Solution Reference Network Design (SRND)</i> (latest version) for more information.</p>
Hangover Time (msec)	<p><b>Note</b> This field is available only when adding a tone controlled radio.</p> <p>This field specifies a value, in milliseconds, that is set on the LMR gateway that you must replicate on the server for radio instances that are associated to the router.</p> <p>The value of this parameter on the router determines how long the LMR gateway keeps the radio keyed after the last audio packet is received on a talk spurt. This setting is used to protect the system against packet loss and to accommodate for the configured delay time.</p> <p>Hangover time is usually larger than the delay time to ensure that all the buffered audio is played before unkeying the radio.</p> <p><b>Note</b> Make sure that the value that you enter for this parameter is the same that is configured on the LMR gateway. See <i>Solution Reference Network Design (SRND)</i> (latest version) for more information.</p> <p>Valid values: 0 through 10000</p> <p><b>Note</b> This option is available only when adding a tone controlled radio.</p>
<b>Ops Views Area</b>	
Ops Views— <i>Display only</i>	<p>Indicates that the radio is associated to the System ops view.</p> <p>For general information about ops views, see <a href="#">Chapter 7, “Configuring and Managing Cisco IPICS Operational Views.”</a></p>
<b>Restrictions Area</b>	
Allow association to users	Check this check box if you want the radio to be available for association with one or more users.

**Table 9-2 General Tab Fields in Radios Window (continued)**

Field	Description
Allow use in VTGs	<p><b>Note</b> This option is available only when adding a serial controlled radio or tone controlled radio.</p> <p>Check this check box if you want the radio to be available for use in one or more VTGs.</p> <p>If you do not check this check box, the radio can be used only for the following:</p> <ul style="list-style-type: none"> <li>For a tone controlled radio, as a channel media connection.</li> <li>For a serial controlled radio, only to place private calls to another serial radio.</li> </ul>
<b>Radio Controlled Service Area</b>	
RCS Name	<p><b>Note</b> This field is available only when adding a serial controlled radio or ISSI Gateway.</p> <p>Valid values: <b>local-rcs</b> or <b>Auto Select</b>. <b>Auto Select</b> is reserved for future use.</p>
<b>Radio Connection Area</b>	
<b>Note</b> The Radio Connection area is available only when adding a serial controlled radio or fixed station.	
IP Address	<p>For a serial radio, enter the IP address of the LMR gateway to which the radio connects.</p> <p>For a fixed station, enter the IP address of the fixed station.</p>
Port	<p>For a serial radio, enter the port number of the auxiliary or asynchronous line of the LMR gateway to which the radio is physically connected. If you used an asynchronous line to connect your serial radio, determine this port number by adding 4,000 to the line number to which the radio is serially connected. If you used the auxiliary line to connect your serial radio, determine this port number by adding 2,000 to the line number to which the radio is serially connected. To find the line number, use the <b>show line</b> command on the LMR gateway.</p> <p>For a fixed station, enter the control port number of the fixed station.</p>
User Name	<p><b>Note</b> This option is available only when adding a serial controlled radio.</p> <p><i>Optional.</i> Enter the user name of the LMR gateway.</p>
Password	<p><b>Note</b> This option is available only when adding a serial controlled radio.</p> <p><i>Optional.</i> Enter the password of the LMR gateway.</p>
DFSI Gateway	<p><b>Note</b> This option is available only when adding a fixed station radio.</p> <p>Choose the DFSI gateway to control, transcode, encrypt, and decrypt media for the fixed station.</p>
<b>ISSIG Connection Area</b>	
<b>Note</b> The ISSIG Connection area is available only when adding an ISSI Gateway.	

**Table 9-2**      **General Tab Fields in Radios Window (continued)**

Field	Description
P25G Unit ID	Enter the unit ID number for the P25 gateway (P25G). When a multicast client streams media, the P25G converts the G.711 stream to an IMBE stream over the ISSI. This requires the use of a unit ID. The P25G unit ID serves as proxy unit ID for multicast communications. The P25G Unit ID must be entered as a 6-digit hexadecimal value.  Valid values: 000001 through FFFFFC
P25G IP Address	Enter the IP address of the P25G.
RFSSG ID	Enter the ID number for the radio frequency sub-system gateway (RFSSG). The RFSSG serves as a gateway to other radio frequency sub-systems (RFSSs). The RFSSG ID is comprised of the following three IDs, from left to right: <ul style="list-style-type: none"> <li>• Site ID; valid values: 01 through FF</li> <li>• System ID; valid values: 001 through FFF</li> <li>• Wide Area Connection Number (WACN) ID; valid values: 00001 through FFFFF</li> </ul>
RFSSG IP Address	Enter the IP address for the RFSSG, which is the same IP address as the deployed ISSI gateway.

**DFSIG Connection Area**

**Note**    The DFSIG Connection area is available only when adding an DFSI Gateway.

Unit ID	Enter the proxy unit ID number for the DFSI gateway. When a multicast client streams media, the gateway converts the G.711 stream to an IMBE stream over the ISSI. This requires the use of a unit ID. The unit ID serves as proxy unit ID for multicast communications. The Unit ID must be entered as a 6-digit hexadecimal value.  Valid values: 000001 through FFFFFC
IP Address	Enter the IP address of the DFSI gateway.

**Step 4**    Click **Save**.

If you do not want to add the radio, click **Cancel**.




**Note**    If you are adding a serial radio and the IP address/port provided in the radio connection section is unreachable, the radio could take as long as 30 seconds to save.

**Step 5**    (Tone controlled radio, serial controlled radio, and fixed station only) To configure the IDC details for this radio, take these actions:

- a. Click the **IDC** tab.

The IDC tab for the selected item displays. This window contains IDC information for this item. [Table 9-3](#) describes the fields in the IDC tab.

**Table 9-3 IDC Tab Fields in Radios Window**

Field	Description
<b>IDC Tab</b>	
RX Mute During PTT	<p>This attribute specifies the transmission settings for all radios or only one radio. It controls the audio for the active radios while you are transmitting.</p> <p>The following values affect how the mute functionality is configured on the IDC:</p> <ul style="list-style-type: none"> <li>None—When PTT is engaged, the radio is muted</li> <li>All—When PTT is engaged, RX (receive transmission) is muted on all channels</li> <li>Radio—When radio is engaged, RX is muted for this radio only</li> </ul> <p><b>Note</b> When you initially assign a radio to the IDC, the RX mute settings that you have configured apply. The IDC user can modify this setting. However, if you change the setting after the radio has been assigned to the user, the changes do not become effective.</p>
Allow Latch	<p>When set to true (attribute check box is checked) on a radio or VTG, the user can use latch (lock in radios) on any radio that you specify.</p> <div>  <p><b>Caution</b> Use the latch functionality with caution. Be aware that when you latch the PTT button, this action blocks transmissions from half-duplex radios when these devices are attached to the channel or VTG via an LMR gateway.</p> </div> <p>By default, this attribute is set to false (attribute check box is unchecked).</p>
Listen Only	When set to true (attribute check box is checked), the user can hear but cannot talk, on the radio.
Radio Color	<p>Color tag that you can choose from a drop-down list.</p> <p>With this setting, you can uniquely identify specific radios by using predefined colors for the background text that appears on the radio. You configure the color by choosing from the options in the drop-down list.</p> <p><b>Note</b> If you do not want the radio to be tagged with a color, you can choose <b>Not colored</b> from the drop-down list.</p>
Region	<p>Choose an IDC region from the drop-down list. When configured, the regions appear as tabs in the IDC display for IDC users who are associated with this radio.</p> <p>To create IDC regions, see the <a href="#">“Adding IDC Regions” section on page 2-112</a>.</p>

b. Click **Save**.

If you do not want to save these configurations, click **Cancel**.

To associate users to a radio, see the [“Associating a User to a Radio From the Radios Window” section on page 9-16](#).

To associate keys to an ISSI gateway or a DFSI gateway, see the [“Associating a Key to an ISSI or DFSI Gateway From the Radios Window” section on page 9-18](#).

## Viewing and Editing Radio Details

You can view and edit information for any radio. Information that you can modify for a radio includes changing the name of a radio, enabling or disabling the channel selectors and tone control sequences, enabling or disabling the radio, and associating the radio to users or to keys (supported association depend on the device type).

To view or edit radio details, perform the following procedure:

### Procedure

- 
- Step 1** From the Administration Console, navigate to the **Configuration > Radios** window.
- Step 2** In the Name column, click the link for the radio for which you want to view or change information. The General tab for the selected radio displays.
- Step 3** Take any of the following actions:
- To view or edit general information, update information in the General tab, then click **Save**.  
For descriptions of the fields in the General tab, see [Table 9-2 on page 9-9](#).
  - To view or edit IDC information, update information in the IDC tab, then click **Save**.  
For descriptions of the fields in the IDC tab, see [Table 9-3 on page 9-14](#).
  - To enable or disable channel selectors for the radio, check or uncheck the check boxes next to the channel selectors that you want to modify in the Selectors tab, then click **Save**.
  - To enable or disable tone control sequences for the radio, check or uncheck the check boxes next to the tone control sequences that you want to modify in the Controls tab, then click **Save**.



### Note

- If you are saving a serial radio and the IP address/port provided in the radio connection section is unreachable, the radio could take as much as 30 seconds to save.
- If radio descriptor files are renamed, deleted, or corrupted, an error message displays in the Radio Management window. This message includes the affected radio descriptor files and a recommendation about how to proceed.

- 
- Step 4** (Tone controlled radio, serial controlled radio, and fixed station only) To view or edit the IDC attributes, make the desired changes in the **IDC** tab, then click **Save**.

For descriptions of the fields in the IDC tab, see [Table 9-3 on page 9-14](#).

- Step 5** To view or edit radio associations, see the [“Associating a User to a Radio From the Radios Window” section on page 9-16](#) or the [“Associating a Key to an ISSI or DFSI Gateway From the Radios Window” section on page 9-18](#).
-

## Associating a User to a Radio From the Radios Window

You can associate specific users to a radio in the Radios window. When you do so, the radios that you choose become available on an IDC.

When you associate a user with a radio, the user has the permission to change to any enabled channel on that radio. However, you can restrict the channels to which the user can tune by setting radio permissions for that user.

Because the radio permissions are separate from channel permissions, a user could have permission to tune a channel on a radio but not have access to the association Cisco IPICS channel.

**Note**

- You can perform this procedure only if users have already been added in Cisco IPICS.
- A user cannot be associated to a DFSI gateway

You can also associate a user with a radio in the Users window. For information, see the [“Associating Radios with a User” section on page 3-22](#).

To associate a user to a radio, perform the following procedure:

**Procedure**

- 
- Step 1** From the Administration Console, navigate to the **Configuration > Radios** window.
- Step 2** Take either of these actions to display the Associations window for the radio with which you want to associate users:
- Click the link for the radio in the Name column; then, click the **Associations** button, which appears at the bottom of each tab.
  - Check the check box to the left of the name of the radio; then, click the **Associations** button at the bottom of the Radios window.

**Note**

The Associations button appears dimmed if you do not check a radio or if you check more than one radio.

- Step 3** Choose the Users tab.
- The Users tab displays for the radio. This tab displays a list of the users that are associated with the radio and the status of each user.
- Step 4** To add a user to be associated with the radio, click **Add**.
- The Search Users window displays. This window allows you to search for users to associate to the radio by choosing criteria that is based on the following filters:
- User Name field—Specifies the user name of a user
  - First Name field—Specifies the first name of a user
  - Last Name field—Specifies the last name of a user
  - Location drop-down list—Choose from a list of locations
- See the [“Managing Locations” section on page 2-25](#) for detailed information about how to configure locations.



- Role drop-down list—Choose from a list of Cisco IPICS roles
- Ops View drop-down list—Choose from a list of ops views

**Step 5** To search for a user, enter your search criteria; then, click **Go**. To clear your criteria, click **Clear Filter**.



**Note** To display all the users in Cisco IPICS, click the **Go** button without entering any search criteria.

The results of your search criteria display in a list.

**Step 6** To choose a user to associate to the radio, check the check box to the left of the user name and click **OK**. The user that you choose displays in the user list in the Users tab.



**Note** You can add multiple users simultaneously by clicking the check boxes next to each user and clicking **OK**.

**Step 7** To view or edit radio permissions for a user, select the user by checking the check box next to the user name and choose one of the following options from the Radio Permissions drop-down list:

- **Channel Selector Permissions**—When you choose this option, a separate window displays for channel selector permissions. In this window, you can configure specific channels that the user can communicate on.
- **Control Function Permissions**—When you choose this option, a separate window displays for radio control function permissions. In this window, you can configure specific radio controls that the user can access to control the radio.



**Note** The Radio Permissions drop-down list appears dimmed if you do not have any users checked or if you have more than one user checked.

**Step 8** To select the radio permissions on this radio for the user, take any of the following actions in the applicable radio permissions window:

- To move a channel selector or control function from one list to the other, click the item to highlight it; then, click > or <. Or, double-click the item.
- To move several channel selectors or control functions from one list to the other at one time, **Shift-click** or **Ctrl-click** to select the items, then, click > or <.
- To move all channel selectors/control functions from one list to the other at one time, click >> or <<.

**Step 9** Click **Save**.



**Note** If you are saving a serial radio and the IP address/port provided in the radio connection section is unreachable, then the radio could take as much as 30 seconds to save.

**Step 10** To remove a user from the association to the radio, check the check box to the left of the user name; then, click the **Delete** button.

You can remove multiple users from the association at the same time by checking the check boxes that display by the user names of the users that you want to remove and clicking **Delete**.

## Associating a Key to an ISSI or DFSI Gateway From the Radios Window

You can associate keys to an ISSI gateway or a DFSI gateway in the Radios window. When you do so, the gateways that you choose use the designated keys for encryption and decryption of voice traffic on P25 channels.

**Note**

- You can perform this procedure only if keys have already been added in Cisco IPICS.
- Associating a key to an ISSI gateway or DFSI gateway ensures that the gateway receives the key so that the gateway can perform encryption and decryption. Assigning a key to a channel selector in an ISSI gateway instructs the gateway to use that key when communicating on that selector in secure mode. You must associate and assign keys for encryption and decryption using keys to function. For related information, see the [“Channel Selector Configuration” section on page 9-5](#).

To associate a key to an ISSI gateway or a DFSI gateway, perform the following procedure:

**Procedure**

- Step 1** From the Administration Console, navigate to the **Configuration > Radios** window.
- Step 2** Take either of these actions to display the Associations window for the gateway with which you want to associate keys:
- Click the link for the radio in the Name column; then, click the **Associations** button, which appears at the bottom of each tab.
  - Check the check box to the left of the name of the radio; then, click the **Associations** button at the bottom of the Radios window.

**Note**

The Associations button appears dimmed if you do not check a radio or if you check more than one radio.

- Step 3** Choose the Keys tab.
- The Keys tab displays for the gateway. This tab displays a list of the keys that are associated with the gateway, and the algorithm, storage location number, and type of each key.
- Step 4** To add a key to be associated with the radio, click **Add**.
- The Search Keys window displays. This window allows you to search for keys to associate to the radio by choosing criteria that is based on the following filters:
- Name field—Specifies the name of a key
  - Ops View drop-down list—Choose from a list of ops views
- Step 5** To search for a key, enter your search criteria; then, click **Go**. To clear your criteria, click **Clear Filter**.

**Note**

To display all the keys in Cisco IPICS, click the **Go** button without entering any search criteria.

The results of your search criteria display in a list.

- Step 6** To choose a key to associate to the radio, check the check box to the left of the key name and click **OK**.
- The key that you choose displays in the key list in the Keys tab.

**Note**

You can add multiple keys simultaneously by clicking the check boxes next to each key and clicking **OK**.

- Step 7** To remove a key from the association to the radio, check the check box to the left of the key name; then, click the **Delete** button.

You can remove multiple keys from the association at the same time by checking the check boxes that display by the names of the keys that you want to remove and clicking **Delete**.

## Enabling or Disabling a Radio

You can enable or disable a radio in Cisco IPICS. If the radio is disabled, you can still modify the multicast address, location, low lever guard tone (LLGT), and all of the other attributes of the radio. However, if the radio is enabled, you cannot modify these attributes.

If the radio is part of an active VTG and you disable the radio, it disconnects from the VTG.

**Note**

- After you define a radio, the radio type cannot be changed even if you disable the radio. If you want to change the radio type after you define the radio, you must delete the radio and create a new radio instance. If you only want to modify the types of tones on a radio type, you can upload a new descriptor file for the same radio type and the changes get applied to that radio instance. For more information about descriptors, see the [“Managing Radio Descriptors” section on page 9-23](#).
- If a pooled radio is allocated to a channel, the name of the channel and a link to the channel display for Pooled Usage in the General area when you view the radio. You cannot disable a pooled radio that is allocated to a channel until it is released by all IDC users and VTGs that activated the channel that uses the pooled radio. You also can force a radio to be deallocated by clicking the **Deallocate** button in the radio details page.

To enable or disable a radio, perform the following procedure:

### Procedure

- Step 1** From the Administration Console, navigate to the **Configuration > Radios** window.
- Step 2** Under the Name column, click the link of the radio that you want to enable or disable. The General tab displays for the radio.
- Step 3** To enable or disable the radio, click the **Enable/Disable** button at the bottom of the window.

**Note**

If the radio is currently enabled, only the **Disable** button displays. If the radio is currently disabled, only the **Enable** button displays.

If you do not want to enable or disable the radio, click **Cancel**.

## Deleting a Radio

If a radio is no longer needed, you can delete it from Cisco IPICS. You can delete a single radio or you can delete several radios at one time.

Before you delete a radio, you must remove any associated media connections in all of the channels for that radio.

**Note**

You cannot delete a pooled radio that is allocated to a channel. Before deleting the radio, deactivate the VTG that caused the channel activation or have all users that activated the channel deactivate it. You can also force a radio to be deallocated by clicking the **Deallocate** button in the radio details page. After the radio is forcibly deallocated, you can delete it. You cannot delete a gateway that includes channels or P25 Fixed Stations.

To delete a radio, perform the following procedure:

**Procedure**

- 
- Step 1** From the Administration Console, navigate to the **Configuration > Radios** window.
- Step 2** Check the check box next to each radio that you want to delete.
- Step 3** Click **Delete**.
- A dialog box prompts you to confirm the deletion.
- Step 4** To confirm the deletion, click **OK**.
- If you do not want to delete the radio, click **Cancel**.
- 

## Accessing and Using the Serial Radio Control Interface

After you configure a serial controlled radio, you can access and use the SRCI from an IDC, as described in *IPICS Dispatch Console User Guide* for this release, or from the Cisco IPICS Administration Console.

To access the SRCI from the Administration Console, perform any of the following actions:

- Navigate to the **Configuration > Radios** window, click the link for the desired radio in the Name column, then click **Controls**, which displays at the bottom of each tab.
- Navigate to the **Configuration > Radios** window, check the check box next to the radio for which you want to access the SRCI, then click **Radio Control**.
- Navigate to the **VTG Management > Virtual Talk Groups** window, and click a VTG name. In the **Participants** tab, double-click a radio in the Participants or Resources box.
- If the radio is associated with a user, navigate to **User Management > Users**, choose a user, click **Associations**, choose the Radio tab, choose the desired radio, then click **Radio Control**.

The SRCI displays in its own page and is organized as follows:

**Radio Information**

The top area of the SRCI provides the following information and functions:

- Name of the radio, as configured in the Name field in the General tab for the radio.

- Type of the radio, as defined in the radio descriptor.
- Connection status of the radio, which can be any of the following:
  - CONNECTED\_ONLINE—Radio is ready for control.
  - CONNECTED\_OFFLINE—Radio connection to the LMR gateway is active, but Cisco IPICS cannot communicate with the radio. This situation can occur if the radio is turned off or is not connected to the correct asynchronous line on the correct LMR gateway, or if the connected radio is of the wrong type.
  - AUTHENTICATION\_FAILURE—The login credentials provided in the radio details are not correct and IPICS cannot connect to the specified port on the LMR Gateway.
  - SOCKET\_FAILURE—Cisco IPICS cannot connect to the LMR gateway IP address and port that are as configured in the General tab for the radio. This situation can occur if the IP address or port number are incorrect, the LMR gateway is turned off, the LMR gateway is disconnected from the network or in an unreachable network, or the LMR gateway is in use and needs to be cleared.
  - DISCONNECTED—Cisco IPICS has not initialized the connection or is in the process of re-initializing the connection because of a SOCKET\_FAILURE or AUTHENTICATION\_FAILURE situation.
  - RADIO CONTROL SERVICE UNAVAILABLE: The Cisco IPICS Radio Control Service is down and needs to be restarted.
- **Reserve/Release** toggle button—The **Reserve** button allows you to indicate to other users that you would like to use this radio. When you click this button, your Cisco IPICS user name and full name appear in the Reserved By field and the date and time that you clicked it appear in the Reserved On field. In addition, the name of the button changes to **Release**. In this case, other SRCI and IDC users see the **Release** button and they see your information in the Reserved By and Reserved On fields.

This function is provided as a courtesy only and does not block any user from controlling the radio. Any SRCI or IDC user can click the **Release** button, which clears the Reserved By and Reserved On information and changes the button name to **Reserve**.

If the radio is in an active VTG, Cisco IPICS disables the **Reserve/Release** button. In addition, the VTG name and the date and time that this radio was added to the VTG appear in the Reserved by field, with the date and time this radio was added to the active VTG. (Any user can control a radio that is reserved by a VTG.)

### Radio Display and Controls

The second-from-the-top area of the SRCI provides the following information:

- The type of call that is active on the controlled radio, followed by the channel selector name, the private call alias/ID, or the group call name. Call types are indicated as follows:
  - [Channel/TG]—Conventional channel and trunked talkgroup operation
  - [Private Call]—Unit to unit calls (iDEN and Sprint Nextel only)
  - [Group Call]—Dynamic group operation (iDEN and Sprint Nextel only)
- A green icon that appears when there is inbound voice traffic on the channel.
- When there is inbound voice to the radio and the radio detects the talker ID, this ID displays below the channel selector for the duration of the inbound voice.
- Configured control functions. Each function appears as a button, and the current state of each function displays above the corresponding button.

### Channel Selectors

The third-from-the-top area of the SRCI includes channel selectors. Each configured channel selector displays as a button. Depending on the radio control configuration, a user may be able to press a channel selector button to change the channel/talkgroup on the radio or place a private or group call.

### IPICS Connect

Applies to Nextel and TETRA radios only.

The bottom area of the SRCI allows you to make private calls, group calls, and call alerts (pages). This area applies to Nextel radios only.

Making private and group calls from the channel selector area is a one touch operation. From the IPICS Connect box, you can make ad-hoc private and group calls, including combining users from different predefined groups. You can also send a call alert (page) to a predefined participant or ad-hoc participant.

The names that display in the Select From Groups/Users list come from channel selectors for private and group calls that are defined in the serial radio descriptor, and from Cisco IPICS users that are associated with a Nextel radio.

To make a private call, follow these steps:

- 
- Step 1** Take either of these actions:
- Enter a direct connect number to call in the Direct Connector Number field and then click << to move the number to the Participants list. The number must be in a Nextel-supported format.
  - Click a name of a user to call in the Groups/Users list and then click << to move the name to the Participants list.
- Step 2** Click **Call** to initiate the private call to the selected number or user.
- 

To make a group call, follow these steps:

- 
- Step 1** Enter a group name (from 1 to 20 characters) in the Group/User Alias field.
- Step 2** Take either or both of these actions:
- Enter a direct connect number in the Direct Connector Number field and then click << to move the number to the Participants list.
  - Click a name in the Groups/Users list and then click << to move the item to the Participants list.
- Repeat this step as needed to specify up to 20 items in the Participants list.
- Step 3** Click **Call** to initiate the group call.
- 

To send a call alert, also known as a page, follow these steps:

- 
- Step 1** Take either of these actions:
- Enter a direct connect number to page in the Direct Connector Number field and then click << to move the number to the Participants list.
  - Click a name of the user to page in the Groups/Users list and then click << to move the name to the Participants list.

- Step 2** Click **Alert** to initiate the alert to the selected direct connect number or user.
- You can send a call alert only to one participant at a time.
- 

## Managing Radio Descriptors

This section describes radio and tone descriptor management tasks and includes the following topics:

- [Tone Descriptors, page 9-23](#)
- [Tone Radio Descriptors, page 9-24](#)
- [Serial Radio Descriptors, page 9-27](#)
- [ISSI Gateway Descriptors, page 9-33](#)
- [DFSI Gateway Descriptor, page 9-36](#)
- [P25 Fixed Station Descriptor, page 9-36](#)
- [Caveats for IDC Operation, page 9-41](#)
- [Understanding the Descriptors Window, page 9-42](#)
- [Adding Descriptors, page 9-43](#)
- [Updating Radio and Tone Descriptors, page 9-44](#)
- [Deleting Radio and Tone Descriptors, page 9-45](#)

## Tone Descriptors

A tone descriptor file is an .xml file that defines commands and over-the-air signals that can be associated to one or more Cisco IPICS channels. Commands can be referenced by any radio descriptor and signals can be associated to any channel.

A tone sequence is a list of tones and events that are used to either control a radio or to signal a channel. For more information about tone sequences, see the [“Configuring Channel Selectors and Control Sequences” section on page 9-4](#).

Most tone control radios support a standard set of tone sequences. Some sequences are used to change the RF channel, while other sequences are used to enable the scan functionality on a radio. There are many more tone sequences that are used for tone signaling.

For tone sequences, Cisco IPICS supports both RFC 2833 tone and RFC 2833 event (DTMF) commands. For more information, see the [“Caveats for IDC Operation” section on page 9-41](#).

For some examples of valid and invalid descriptor file entries, see the [“Examples of descriptor .xml files” section on page 9-26](#).

Unlike momentary controls, signals do not cause the radio to change configuration; rather, signals are treated like voice and are transmitted over the currently-tuned radio channel frequency.

Each tone in a sequence is specified by the frequency (from 0 to 3999 Hz), a decibel (db) level (0 to –63), and a duration in milliseconds. This sequence of tones can be used by different radios. For tone signaling purposes, each telephony event in a sequence is specified by the event type (from 0 to 255), a db level (0 to –63), and a duration in milliseconds.

**Note**

Any RFC 2833 tone or event has a maximum duration of eight seconds. See the [“Caveats for IDC Operation” section on page 9-41](#) for more information.

The Cisco IPICS server provides signaling sequences in an example tone descriptor file called ExampleToneSet.xml; however, you may need to modify this example file or create additional tone descriptors that properly model your specific radio hardware. To add or update descriptors, see the [“Managing Radio Descriptors” section on page 9-23](#).

**Note**

- If you must modify or create tone descriptors, see the documentation that you received with your radio or other device that you need to control for the specific signaling sequences that it supports.
- When choosing a descriptor type in the Administration Console, be aware that a *Tone Radio* descriptor type refers to a radio descriptor file and a *Tones* descriptor type refers to a tone descriptor file. See the [“Adding Descriptors” section on page 9-43](#) and [“Updating Radio and Tone Descriptors” section on page 9-44](#) for more information.

**Caution**

Improperly constructing an .xml file, removing a tone descriptor file, or removing elements from a tone descriptor file that is referenced by a radio descriptor file may have unpredictable results. Cisco recommends that you only modify the tone descriptor file when absolutely necessary.

For information about the descriptor management functions in the Descriptors window, see the [“Understanding the Descriptors Window” section on page 9-42](#).

## Tone Radio Descriptors

Radio descriptors define the controls that a particular type of tone control or serial control radio supports.

**Note**

A radio type may refer to a specific make and model of radio or special tone-controlled hardware, such as a CPI box, which interprets the inband tones and causes the configuration of an attached radio to be changed.

Radio descriptors are .xml files that contain commands that are used to control functions on a radio. These files contain the following elements:

- Channel selectors—Used to change the frequency on a radio
- Control functions—Stateful controls, such as power settings and encryption on/off, and simple (momentary) controls, such as monitor and scan

**Note**

When choosing a descriptor type in the Administration Console, be aware that a *Tone Radio* descriptor type refers to a radio descriptor file and a *Tones* descriptor type refers to a tone descriptor file. See the [“Adding Descriptors” section on page 9-43](#) and [“Updating Radio and Tone Descriptors” section on page 9-44](#) for more information.



For each radio capability, the radio descriptor defines the tones (events) that need to be sent to the radio to enable or disable that capability.

**Note**

For tone control channel selectors and control functions (both stateful and simple), Cisco IPICS supports only RFC 2833 tones. See the [“Caveats for IDC Operation” section on page 9-41](#) for more information.

The tone control sequences that define the control functions can be included directly in the radio descriptor, or can be referenced by name in a tone descriptor file. For more information about tone descriptors, see the [“Tone Descriptors” section on page 9-23](#).

The Cisco IPICS server provides an example radio descriptor file; however, you may need to modify this example and/or create additional radio descriptors that properly model your specific radio hardware. The example file is in the list of descriptors.

If you must modify or create radio descriptors, see the documentation that came with your radio, or other device that is being controlled, for the specific tone sequences that it supports.

**Caution**

Because improperly constructing an .xml file, removing a radio descriptor file, or removing elements from a radio descriptor file may have unpredictable results, Cisco recommends that you only modify the radio descriptor file when absolutely necessary.

For more information about adding or modifying descriptor files, see the [“Managing Radio Descriptors” section on page 9-23](#). To see examples of valid and invalid descriptor file .xml entries, see the [“Examples of descriptor .xml files” section on page 9-26](#).

See the [“Radio Descriptor Format” section on page 9-25](#) for an example of the format of a radio descriptor.

## Radio Descriptor Format

The following example shows the format of a radio descriptor .xml file:

### Radio Descriptor File Format

```
<?xml version="1.0" encoding="UTF-8"?>
<ipics:RadioTypeDescriptor... name="CPITestBox">
```

where:

*name*= represents the name of the radio type that displays in the UI; this name should be unique.

```
<Commands>... </Commands>
```

Commands define “macro-like” tone/event sequences that can be used elsewhere within the radio descriptor.

```
<ChannelSelectors>... </ChannelSelectors>
```

Channel selectors define the available tone sequences needed to use each channel on the radio.

```
<ControlFunctions>... </ControlFunctions>
```

Control functions define the available stateful control sequences and the tones that need to be sent to enable each stateful state.

## Examples of descriptor .xml files

The following example shows valid radio signaling .xml entries. Even though this example shows more than six consecutive RFC 2833 tone sequences, it is still valid because the tones are separated by a pause entry of at least 1 ms (frequency = 0 tone).

```
<Signal shortName="TV" longName="Start TV" description="Start the Television">
  <Action type="pressed">
    <Command>
      <Rfc2833Tone db="0" duration="40" frequency="100" />
      <Rfc2833Tone db="0" duration="40" frequency="200" />
      .
      .
      .
    duration="40" frequency="600" />
      <Rfc2833Tone db="0" duration="1" frequency="0" />
      <Rfc2833Tone db="0" duration="40" frequency="700" />
      <Rfc2833Tone db="0" duration="40" frequency="800" />
    </Command>
  </Action>
</Signal>
```

The remaining examples involve invalid entries.

The following example shows more than six RFC 2833 tone entries as part of a radio signaling tone sequence and does not include any pause entries.

```
<Signal shortName="TV" longName="Start TV" description="Start the Television">
  <Action type="pressed">
    <Command>
      <Rfc2833Tone db="0" duration="40" frequency="100" />
      <Rfc2833Tone db="0" duration="40" frequency="200" />
      <Rfc2833Tone db="0" duration="40" frequency="300" />
      <Rfc2833Tone db="0" duration="40" frequency="400" />
      <Rfc2833Tone db="0" duration="40" frequency="500" />
      <Rfc2833Tone db="0" duration="40" frequency="600" />
      <Rfc2833Tone db="0" duration="40" frequency="700" />
    </Command>
  </Action>
</Signal>
```

The following example shows DTMF events as part of a radio control tone sequence.

```
<ChannelSelector label="F2">
  <Action type="tune">
    <CommandRef href="hlgt" />
    <Command>
      <Rfc2833Tone db="-10" duration="40" frequency="1850" />
      <Rfc2833Event db="-30" duration="200" event="5" />
    </Command>
  </Action>
  <Action type="begintransmit">
    <CommandRef href="hlgt" />
    <Command>
      <Rfc2833Tone db="-10" duration="40" frequency="1850" />
      <Rfc2833Event db="-30" duration="200" event="5" />
    </Command>
    <CommandRef href="llgt" />
  </Action>
</ChannelSelector>
```

The following example shows more than six consecutive RFC 2833 radio control tone sequences.

```
<State shortName="On">
  <Action type="pressed">
    <Command>
      <Rfc2833Tone db="-10" duration="200" frequency="1105" />
      .
      .
      .
      <Rfc2833Tone db="-10" duration="200" frequency="1605" />
      <Rfc2833Tone db="-10" duration="200" frequency="1705" />
    </Command>
  </Action>
</State>
```

## Serial Radio Descriptors

The following sections describe the general steps for creating a serial descriptor for serial radio control:

- [Step 1: Create the Header, page 9-27](#)
- [Step 2: Create the Body, page 9-27](#)

### Step 1: Create the Header

A radio descriptor begins with the element `<SerialRadioTypeDescriptor>`. This element includes the following attributes:

- **name**—Contains 1 through 64 characters and specifies the name of the radio descriptor.
- **controlType**—Always set to SERIAL.
- **controlModule**—Specifies the type of radio that is controlled. Use “Nextel” for iDEN radios in a Sprint Nextel or private iDEN network. Use “EFJohnson” for EF Johnson model 5300 mobile radios. Use “TetraPEI” for TETRA radios.

The following is an example of a serial descriptor header:

```
<ipics:SerialRadioTypeDescriptor xmlns:ipics="urn:com.cisco.ipics.RadioDescriptor"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="urn:com.cisco.ipics.RadioDescriptor
  ../../SerialRadioTypeDescriptor.xsd "
  name="Nextel"
  controlType="SERIAL"
  controlModule="Nextel">
```

### Step 2: Create the Body

The body of the radio descriptor has two main sections, `<ChannelSelectors>` and `<ControlFunctions>`, each of which define buttons that the SRCI renders.

#### Channel Selectors

`<ChannelSelector>` elements are controls that set up the radio for a specific mode of communication. The controls include selecting a channel/talkgroup on the radio or placing a private or dynamic group all.

Each `<ChannelSelector>` has a required “label” attribute that is 1 through 12 characters in length and that defines the name of a button that the SRCI renders.

The `<Action>` element within each `<ChannelSelector>` includes the “type” attribute. This attribute must be set to “tune” and indicates that this control is communications related.

The <Action> element includes the <Command> element. This attribute specifies the tuning action and can be either <Channel> or <GroupCall>.

### Selecting a Channel or Talkgroup

For channel or talkgroup controls, the element within <Command> must be <Channel>. The <Channel> element must include these attributes:

- zone—Must be set to a valid zone in the radio that represents this channel selector.
- channel—Must be set to a valid channel in the radio that represents this channel selector.

iDEN radios do not have the concept of zones and channels. For these radios, always set the zone attribute 1. The channel attribute represents the talkgroup ID and can range from 1 to 200.

The following example shows the use of the <ChannelSelector> element:

```
<ChannelSelector label="CHAN 5">
  <Action type="tune">
    <Command>
      <Channel zone="1" channel="5" />
    </Command>
  </Action>
</ChannelSelector>
```

### Setting up a Private Call

This feature applies only to iDEN radios.

To define a channel selector that can set up a private call, the <Command> element must contain a child element called <GroupCall>. The <GroupCall> element includes the “name” attribute, which defines the name of the button that represents this private call. The “name” attribute can contain 1 through 12 characters.

The <GroupCall> element contains the ID of the remote radio that will participate in this call. The radio is represented by the <Call> element and contains an attribute called “number.”

The following example represents an iDEN private call with the direct connect number of the participant in the <Call> element:

```
<ChannelSelector label="W Plinge">
  <Action type="tune">
    <Command>
      <GroupCall groupName="W Plinge">
        <Call number="123*45678*9" />
      </GroupCall>
    </Command>
  </Action>
</ChannelSelector>
```

### Setting up a Group Call

This feature applies only to iDEN radios that are in iDEN networks that are capable of dynamic group calls.

To define a channel selector that can set up a group call, the <Command> element contains one or more child elements called <GroupCall>. Each <GroupCall> element includes the “name” attribute, which defines the name of the button that represents this private call. The “name” attribute can contain 1 through 12 characters.

The following example represents an iDEN group call with the direct connect numbers of the participants in <Call> elements:

```

<ChannelSelector label="My Team">
  <Action type="tune">
    <Command>
      <GroupCall groupName="My Team">
        <Call number="123*45678*9" />
        <Call number="123*45678*10" />
        <Call number="123*45678*11" />
        <Call number="123*45678*12" />
      </GroupCall>
    </Command>
  </Action>
</ChannelSelector>

```

## Control Functions

Control functions define buttons on the SRCI that can control certain functions of the control radio. Control functions do not exist in iDEN radios. These control functions are listed as <Simple> elements, with the following attributes:

“shortName” is an attribute of a control function. It is 1 through 12 characters in length and defines the name of the control as rendered on the SRCI.

“description” is an attribute of a control function. It describes the nature of the control function.

Each <Simple> element contains an <Action> element, which defines the control functions with the “type” attribute. An <Action> element is always set to a value of “pressed” and contains a <Command> element, which determines the specific command for the control function.

Cisco IPICS provides the following control functions:

- **Monitor**—When representing a control function to enable or disable monitor mode in the controlled radio, use the following xml within <ControlFunctions>:

```

<Stateful shortName="MON" longName="Monitor" description="Set Monitor Mode"
presentation="multiple">
  <State shortName="ON" longName="ON" description="Monitor mode is
on" user_selectable="true">
    <Action type="pressed">
      <Command>
        <SetMonitorMode value="ON" />
      </Command>
    </Action>
  </State>
  <State shortName="OFF" longName="OFF" description="Monitor mode
is off" user_selectable="true">
    <Action type="pressed">
      <Command>
        <SetMonitorMode value="OFF" />
      </Command>
    </Action>
  </State>
  <State shortName="UNKWN" longName="UNKNOWN" description="Monitor
mode is in an unknown state" user_selectable="false">
    <Action type="pressed">
      <Command>
        <SetMonitorMode value="UNKNOWN" />
      </Command>
    </Action>
  </State>
  <State shortName="UNSPRT" longName="UNSUPPORTED"
description="Monitor mode is not supported" user_selectable="false">
    <Action type="pressed">
      <Command>

```

```

        <SetMonitorMode value="UNSUPPORTED" />
    </Command>
</Action>
</State>
</Stateful>

```

- **Secure Transmit Mode**—When representing a control function to toggle between secure and clear transmit modes in the controlled radio, use the following xml within <ControlFunctions>:

```

<Stateful shortName="SEC" longName="Secure Tx Mode" description="Select Between Secure
and Clear Transmit Modes" presentation="multiple">
    <State shortName="SEC" longName="SECURE" description="Secure
transmit mode is set to SECURE" user_selectable="true">
        <Action type="pressed">
            <Command>
                <SetSecureTxMode value="SECURE" />
            </Command>
        </Action>
    </State>
    <State shortName="CLR" longName="CLEAR" description="Secure
transmit mode is set to CLEAR" user_selectable="true">
        <Action type="pressed">
            <Command>
                <SetSecureTxMode value="CLEAR" />
            </Command>
        </Action>
    </State>
    <State shortName="KEYFL" longName="KEYFAIL" description="Keyfail.
Key required for encryption is not present" user_selectable="false">
        <Action type="pressed">
            <Command>
                <SetSecureTxMode value="KEYFAIL" />
            </Command>
        </Action>
    </State>
    <State shortName="NOENC" longName="NO_ENCRYPT" description="No
encryption module present" user_selectable="false">
        <Action type="pressed">
            <Command>
                <SetSecureTxMode value="NO_ENCRYPT" />
            </Command>
        </Action>
    </State>
    <State shortName="MSMTCH" longName="MISMATCH"
description="Mismatch between user selected secure transmit mode and actual
fixed/strapped tx mode" user_selectable="false">
        <Action type="pressed">
            <Command>
                <SetSecureTxMode value="MISMATCH" />
            </Command>
        </Action>
    </State>
    <State shortName="UNKWN" longName="UNKNOWN"
description="Secure/Clear Transmit mode is in an unknown state"
user_selectable="false">
        <Action type="pressed">
            <Command>
                <SetSecureTxMode value="UNKNOWN" />
            </Command>
        </Action>
    </State>
    <State shortName="UNSPRT" longName="UNSUPPORTED"
description="Encryption is not supported" user_selectable="false">
        <Action type="pressed">

```

```

        <Command>
            <SetSecureTxMode value="UNSUPPORTED" />
        </Command>
    </Action>
</State>
</Stateful>

```

- **Repeater/Talkaround**—When representing a control function to toggle between repeater and talkaround modes in the controlled radio, use the following xml within <ControlFunctions>:

```

<Stateful shortName="RTA" longName="Repeater/Talkaround" description="Select Between
Repeater and Talkaround Transmit Modes" presentation="multiple">
    <State shortName="RPTR" longName="REPEATER" description="Transmit
mode is set to REPEATER" user_selectable="true">
        <Action type="pressed">
            <Command>
                <SetRepeaterTaMode value="REPEATER" />
            </Command>
        </Action>
    </State>
    <State shortName="TA" longName="TALKAROUND" description="Transmit
mode is set to TALKAROUND" user_selectable="true">
        <Action type="pressed">
            <Command>
                <SetRepeaterTaMode value="TALKAROUND" />
            </Command>
        </Action>
    </State>
    <State shortName="UNKWN" longName="UNKNOWN"
description="Repeater/Talkaround mode is in an unknown state" user_selectable="false">
        <Action type="pressed">
            <Command>
                <SetRepeaterTaMode value="UNKNOWN" />
            </Command>
        </Action>
    </State>
    <State shortName="UNSPRT" longName="UNSUPPORTED"
description="Repeater/TA mode selection is not supported" user_selectable="false">
        <Action type="pressed">
            <Command>
                <SetRepeaterTaMode value="UNSUPPORTED" />
            </Command>
        </Action>
    </State>
</Stateful>

```

- **Transmit Power**—When representing a control function to toggle transmit power in the controlled radio, use the following xml within <ControlFunctions>:

```

<Stateful shortName="PWR" longName="Transmit Power Mode" description="Change the
transmit power level" presentation="multiple">
    <State shortName="HIGH" longName="HIGH" description="Transmit
power mode is set to HIGH" user_selectable="true">
        <Action type="pressed">
            <Command>
                <SetTxPowerMode value="HIGH" />
            </Command>
        </Action>
    </State>
    <State shortName="LOW" longName="LOW" description="Transmit power
mode is set to LOW" user_selectable="true">
        <Action type="pressed">
            <Command>
                <SetTxPowerMode value="LOW" />
            </Command>
        </Action>
    </State>
</Stateful>

```

```

        </Command>
      </Action>
    </State>
    <State shortName="UNKWN" longName="UNKNOWN" description="Transmit
power mode is in an unknown state" user_selectable="false">
      <Action type="pressed">
        <Command>
          <SetTxPowerMode value="UNKNOWN" />
        </Command>
      </Action>
    </State>
    <State shortName="UNSPRT" longName="UNSUPPORTED"
description="Transmit power mode selection is not supported" user_selectable="false">
      <Action type="pressed">
        <Command>
          <SetTxPowerMode value="UNSUPPORTED" />
        </Command>
      </Action>
    </State>
  </Stateful>

```

- **Scan**—When representing a control function to toggle scan mode in the controlled radio, use the following xml within <ControlFunctions>:

```

<Stateful shortName="SCN" longName="Scan" description="Set Scan Mode"
presentation="multiple">
  <State shortName="ON" longName="ON" description="Scan is on"
user_selectable="true">
    <Action type="pressed">
      <Command>
        <SetScanMode value="ON" />
      </Command>
    </Action>
  </State>
  <State shortName="OFF" longName="OFF" description="Scan is off"
user_selectable="true">
    <Action type="pressed">
      <Command>
        <SetScanMode value="OFF" />
      </Command>
    </Action>
  </State>
  <State shortName="UNKWN" longName="UNKNOWN" description="Scan is
in an unknown state" user_selectable="false">
    <Action type="pressed">
      <Command>
        <SetScanMode value="UNKNOWN" />
      </Command>
    </Action>
  </State>
  <State shortName="UNSPRT" longName="UNSUPPORTED"
description="Scan is not supported" user_selectable="false">
    <Action type="pressed">
      <Command>
        <SetScanMode value="UNSUPPORTED" />
      </Command>
    </Action>
  </State>
</Stateful>

```



- **Emergency Mode**—When representing a control function to toggle emergency mode in the controlled radio, use the following xml within <ControlFunctions>:

```
<Stateful shortName="EMG" longName="Emergency" description="Enable/Disable Emergency
Mode" presentation="multiple">
  <State shortName="ON" longName="ON" description="Emergency mode
is on" user_selectable="true">
    <Action type="pressed">
      <Command>
        <SetEmergencyMode value="ON" />
      </Command>
    </Action>
  </State>
  <State shortName="OFF" longName="OFF" description="Emergency mode
is off" user_selectable="true">
    <Action type="pressed">
      <Command>
        <SetEmergencyMode value="OFF" />
      </Command>
    </Action>
  </State>
  <State shortName="UNKWN" longName="UNKNOWN"
description="Emergency mode is in an unknown state" user_selectable="false">
    <Action type="pressed">
      <Command>
        <SetEmergencyMode value="UNKNOWN" />
      </Command>
    </Action>
  </State>
  <State shortName="UNSPRT" longName="UNSUPPORTED"
description="Emergency mode is not supported" user_selectable="false">
    <Action type="pressed">
      <Command>
        <SetEmergencyMode value="UNSUPPORTED" />
      </Command>
    </Action>
  </State>
</Stateful>
```

## ISSI Gateway Descriptors

An ISSI gateway descriptor is identified by the following XML block:

```
<ipics:SerialRadioTypeDescriptor
xmlns:ipics="urn:com.cisco.ipics.RadioDescriptor"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="urn:com.cisco.ipics.RadioDescriptor
../SerialRadioTypeDescriptor.xsd "
name="ISSIG-Example" controlType="P25G"
controlModule="P25Gateway">
```

The controlType and controlModule attributes determine that it is an ISSI gateway descriptor.

Each group accessible by the ISSI gateway is defined as channel selectors in the following format:

```
<ChannelSelector label="TG 1">
  <Action type="tune">
    <Command>
      <P25GroupCall groupId="0001" systemId="001" wacnId="00001" alias="TG 1" type="Standard" />
    </Command>
  </Action>
</ChannelSelector>
```

The <P25GroupCall> element describes the subscriber group. The groupId attribute describes the subscriber group ID and is always a 4-digit hexadecimal value. The systemId attribute is always 3-digit hexadecimal value and is equal to that of the RFSS where the group is “homed” (provisioned). The wacnId attribute is always a 5-digit hexadecimal value and is that of the RFSS where the group is “homed” (provisioned). All hexadecimal values must be in upper case. The alias attribute is similar to other channel selectors. The type attribute indicates whether the talkgroup is a “standard” talkgroup; currently “standard” is the only valid option.

Control functions represent functions that can be toggled between their respective states. IPICS supports two control functions for ISSI interoperability: emergency and secure transmit mode.

Each control function element is call Simple and requires two attributes. The shortName attribute is the label that will appear on the radio control user interface within IPICS, and the description attribute appears as a description for the respective control function in the radio details screen in IPICS. The actual control function is represented within the Command element. The following examples show how the control functions should appear in a descriptor.

```
<ControlFunctions>
  <Stateful shortName="SEC" longName="Secure Tx Mode" description="Select Between Secure a
nd Clear Transmit Modes" presentation="multiple">
    <State shortName="SEC" longName="SECURE" description="Secure transmit mode is set to S
ECURE" user_selectable="true">
      <Action type="pressed">
        <Command>
          <SetSecureTxMode value="SECURE" />
        </Command>
      </Action>
    </State>
    <State shortName="CLR" longName="CLEAR" description="Secure transmit mode is set to CL
EAR" user_selectable="true">
      <Action type="pressed">
        <Command>
          <SetSecureTxMode value="CLEAR" />
        </Command>
      </Action>
    </State>
    <State shortName="KEYFL" longName="KEYFAIL" description="Keyfail. Key required for enc
ryption is not present" user_selectable="false">
      <Action type="pressed">
        <Command>
          <SetSecureTxMode value="KEYFAIL" />
        </Command>
      </Action>
    </State>
    <State shortName="NOENC" longName="NO_ENCRYPT" description="No encryption module prese
nt" user_selectable="false">
      <Action type="pressed">
        <Command>
          <SetSecureTxMode value="NO_ENCRYPT" />
        </Command>
      </Action>
    </State>
    <State shortName="MSMTCH" longName="MISMATCH" description="Mismatch between user selec
ted secure transmit mode and actual fixed/strapped tx mode" user_selectable="false">
      <Action type="pressed">
        <Command>
          <SetSecureTxMode value="MISMATCH" />
        </Command>
      </Action>
    </State>
  </Stateful>
</ControlFunctions>
```

```

    <State shortName="UNKWN" longName="UNKNOWN" description="Secure/Clear Transmit mode is
in an unknown state" user_selectable="false">
      <Action type="pressed">
        <Command>
          <SetSecureTxMode value="UNKNOWN" />
        </Command>
      </Action>
    </State>
    <State shortName="UNSPRT" longName="UNSUPPORTED" description="Encryption is not suppor
ted" user_selectable="false">
      <Action type="pressed">
        <Command>
          <SetSecureTxMode value="UNSUPPORTED" />
        </Command>
      </Action>
    </State>
  </Stateful>
</ControlFunctions>

```

The `<SupplementaryServices>` element represent features that require user interaction and are directed to one or more remote units. They have their own user interface on the dispatch console for processing the service, where the dispatcher selects from a list of units or enters a unit ID.

```

<SupplementaryServices>
  <SupplementaryService shortName="ALRT" longName="Call Alert" />
  <SupplementaryService shortName="CALL" longName="Individual Call" />
  <SupplementaryService shortName="MSSG" longName="Status Message" />
  <SupplementaryService shortName="QUERY" longName="Status Query" />
  <SupplementaryService shortName="RMON" longName="Radio Unit Monitor" />
  <SupplementaryService shortName="CHEK" longName="Radio Check" />
  <SupplementaryService shortName="DTCH" longName="Radio Detach" />
  <SupplementaryService shortName="INHB" longName="Radio Inhibit" />
  <SupplementaryService shortName="UNHB" longName="Radio Uninhibit" />
</SupplementaryServices>

```

The `<StatusMessages>` element is a list of pre-defined short messages intended to be used on a system capable of sending such messages. These are not considered Short Message Service (SMS) where a text message is sent. In this case, the system sends a numeric value that represents a text message. All radios in the system must be provisioned with the same set of IDs for the respective messages. The example below uses 16-bit hexadecimal values for the id attributes, and “longName” values (per the P25 short message specification) for the alias attributes.

```

<StatusMessages>
  <StatusMessage id="01" alias="Request To Talk" />
  <StatusMessage id="02" alias="Request To Patch" />
  <StatusMessage id="03" alias="NCIC Check" />
  <StatusMessage id="04" alias="License Check" />
</StatusMessages>

```

The `<StatusUpdates>` element is a list of pre-defined update messages intended to be used on a system capable of sending such messages. It is intended to represent the status of a radio or radio user. In this case, the system sends a numeric value that represents a specific status. The example below uses two 8-bit hexadecimal values for the id attributes, and “longName” values (per the P25 short message specification) for the alias attributes.

```

<StatusUpdates>
  <StatusUpdate id="10" alias="On Duty" />
  <StatusUpdate id="20" alias="Off Duty" />
  <StatusUpdate id="30" alias="Lunch Break" />
  <StatusUpdate id="40" alias="Do No Disturb" />
</StatusUpdates>

```

## DFSI Gateway Descriptor

A DFSI gateway descriptor is identified by the following XML block:

```
<?xml version="1.0" encoding="UTF-8"?>

<!-- Generally, a Serial Radio Type Descriptor defines the controls that a particular type
of radio supports. Specifically, the descriptor contains a list of channel selectors and
control functions. Channel Selectors are used to configure the radio to communicate on a
specific channel, talkgroup, private or dynamic group call. Control Functions are used to
toggle certain features like monitor, scan, etc. -->

<!-- The SerialRadioTypeDescriptor defines the following attributes: - name = Identifies
the descriptor. This is the name that appears within the IPICS Admin Console when managing
the descriptor - controlType = Always SERIAL for serial controlled radios. - controlModule
= Identifies the type of radio or gateway. -->
<ipics:SerialRadioTypeDescriptor controlModule="P25DFSIGGateway" controlType="P25DFSIG"
name="DFSIG-Example" xsi:schemaLocation="urn:com.cisco.ipics.RadioDescriptor
../../SerialRadioTypeDescriptor.xsd "
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:ipics="urn:com.cisco.ipics.RadioDescriptor">
  <!-- Channel selectors are not defined for DFSI gateways. They will be defined in the
fixed station's descriptor. <ChannelSelectors> </ChannelSelectors> -->

  <!-- Control functions are not defined for DFSI gateways. They will be defined in the
fixed station's descriptor. <ControlFunctions> </ControlFunctions> -->

  <!-- SupplementaryServices are not defined for DFSI gateways. They will be defined in
the fixed station's descriptor. <SupplementaryServices> </SupplementaryServices> -->

  <!-- StatusMessages are not defined for DFSI gateways. They will be defined in the
fixed station's descriptor. <StatusMessages> </StatusMessages> -->

  <!-- StatusUpdates are not defined for DFSI gateways. They will be defined in the
fixed station's descriptor. <StatusUpdates> </StatusUpdates> -->
</ipics:SerialRadioTypeDescriptor>
```

## P25 Fixed Station Descriptor

A P25 Fixed Station descriptor is identified by an XML block similar to the following:

```
<?xml version="1.0" encoding="UTF-8"?>
<!--
  Generally, a Serial Radio Type Descriptor defines the controls that a particular type
of radio supports. Specifically, the descriptor contains a list of channel selectors and
control functions. Channel Selectors are used to configure the radio to communicate on a
specific channel, talkgroup, private or dynamic group call. Control Functions are used to
toggle certain features like monitor, scan, etc.
-->

<!--
The SerialRadioTypeDescriptor defines the following attributes:
- name = Identifies the descriptor. This is the name that appears within the IPICS Admin
Console when managing the descriptor
- controlType = Always SERIAL for serial controlled radios.
- controlModule = Identifies the type of radio. IPICS 2.2 supports iDEN (Sprint/Nextel and
other iDEN Networks) and EFJohnson only.
-->
<ipics:SerialRadioTypeDescriptor xmlns:ipics="urn:com.cisco.ipics.RadioDescriptor"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
```

```

        xsi:schemaLocation="urn:com.cisco.ipics.RadioDescriptor
../SerialRadioTypeDescriptor.xsd "
        name="FixedStation-Tait"
        controlType="FIXED_STATION"
        controlModule="P25DFSIGateway">

<!--
    Channel selectors are defined here. Each channel selector has an attribute called
    "label" that is a maximum of 12 characters in length. The Action element within each
    channel selector element contains the command represented by the channel selector. The
    attribute "type" for Action elements must always be "tune". The Command element defines
    the behavior of the channel selector. Below are examples of channel selectors with
    commands representing talkgroups, private calls
    and dynamic group calls.
-->
<ChannelSelectors>
    <!--
        The following are examples of channel selectors representing channels or
        talkgroups. Zone and channel are required attributes,
        while the remaining are only needed for DFSI fixed stations. These attributes are
        explained below:
        "zone" must always be blank as it isn't relevant to fixed stations
        "channel" represents the rx/tx channel numbers in that particular order
        "txMode" indicates whether the channel is configured for "ANALOG" or "DIGITAL"
        transmit
        "talkgroup" represents the hex value for a conventional talkgroup. This is needed
        for analog channels as well, because they may be setup for mixed mode rx
        "nac" is the Network Access Code for a P25 conventional channel and is represented
        in hex. This is needed for analog channels as well, because they may be setup for mixed
        mode rx
    -->
    <ChannelSelector label="CHAN 1 DIG">
        <Action type="tune">
            <Command>
                <Channel zone="" channel="1/1" txMode="DIGITAL" talkgroup="0001"
nac="659" />
            </Command>
        </Action>
    </ChannelSelector>

    <ChannelSelector label="CHAN 2 DIG">
        <Action type="tune">
            <Command>
                <Channel zone="" channel="2/2" txMode="DIGITAL" talkgroup="0001"
nac="659" />
            </Command>
        </Action>
    </ChannelSelector>

    <ChannelSelector label="CHAN 3 DIG">
        <Action type="tune">
            <Command>
                <Channel zone="" channel="3/3" txMode="DIGITAL" talkgroup="0001"
nac="659" />
            </Command>
        </Action>
    </ChannelSelector>

    <ChannelSelector label="CHAN 4 DIG">
        <Action type="tune">
            <Command>
                <Channel zone="" channel="4/4" txMode="DIGITAL" talkgroup="0001"
nac="659" />
            </Command>

```

```

        </Action>
    </ChannelSelector>

    <ChannelSelector label="CHAN 5 ANA">
        <Action type="tune">
            <Command>
                <Channel zone="" channel="5/5" txMode="ANALOG" talkgroup="0001"
nac="659" />
            </Command>
        </Action>
    </ChannelSelector>

    <ChannelSelector label="Invalid">
        <Action type="tune">
            <Command>
                <Channel zone="" channel="100/100" txMode="ANALOG" talkgroup="0001"
nac="659" />
            </Command>
        </Action>
    </ChannelSelector>
</ChannelSelectors>

```

<!--  
Control functions represent functions on the radio that can be toggled between their respective states.

Below are the 4 control functions supported by IPICS and this radio. These functions must be supported by the radio in the appropriate mode for it to work. Unsupported control functions will be marked as such in IPICS. The shortName must appear in the format below along with the matching command for proper functionality.

Each control function element is called Stateful and has the following required attributes. The "State" attribute is the label that will appear on the radio control user interface within IPICS. The actual control functions is represented within the Command element.

```

-->
<ControlFunctions>
    <Stateful shortName="MON" longName="Monitor" description="Set Monitor Mode"
presentation="multiple">
        <State shortName="ON" longName="ON" description="Monitor mode is on"
user_selectable="true">
            <Action type="pressed">
                <Command>
                    <SetMonitorMode value="ON" />
                </Command>
            </Action>
        </State>
        <State shortName="OFF" longName="OFF" description="Monitor mode is off"
user_selectable="true">
            <Action type="pressed">
                <Command>
                    <SetMonitorMode value="OFF" />
                </Command>
            </Action>
        </State>
        <State shortName="UNKWN" longName="UNKNOWN" description="Monitor mode is in an
unknown state" user_selectable="false">
            <Action type="pressed">
                <Command>
                    <SetMonitorMode value="UNKNOWN" />
                </Command>
            </Action>
        </State>
        <State shortName="UNSPRT" longName="UNSUPPORTED" description="Monitor mode is
not supported" user_selectable="false">

```

```

        <Action type="pressed">
            <Command>
                <SetMonitorMode value="UNSUPPORTED" />
            </Command>
        </Action>
    </State>
</Stateful>

    <Stateful shortName="RTA" longName="Repeater/Talkaround" description="Select
Between Repeater and Talkaround Transmit Modes" presentation="multiple">
        <State shortName="RPTR" longName="REPEATER" description="Transmit mode is set
to REPEATER" user_selectable="true">
            <Action type="pressed">
                <Command>
                    <SetRepeaterTaMode value="REPEATER" />
                </Command>
            </Action>
        </State>
        <State shortName="TA" longName="TALKAROUND" description="Transmit mode is set
to TALKAROUND" user_selectable="true">
            <Action type="pressed">
                <Command>
                    <SetRepeaterTaMode value="TALKAROUND" />
                </Command>
            </Action>
        </State>
        <State shortName="UNKWN" longName="UNKNOWN" description="Repeater/Talkaround
mode is in an unknown state" user_selectable="false">
            <Action type="pressed">
                <Command>
                    <SetRepeaterTaMode value="UNKNOWN" />
                </Command>
            </Action>
        </State>
        <State shortName="UNSPRT" longName="UNSUPPORTED" description="Repeater/TA mode
selection is not supported" user_selectable="false">
            <Action type="pressed">
                <Command>
                    <SetRepeaterTaMode value="UNSUPPORTED" />
                </Command>
            </Action>
        </State>
    </Stateful>

    <Stateful shortName="SEC" longName="Secure Tx Mode" description="Select Between
Secure and Clear Transmit Modes" presentation="multiple">
        <State shortName="SEC" longName="SECURE" description="Secure transmit mode is
set to SECURE" user_selectable="true">
            <Action type="pressed">
                <Command>
                    <SetSecureTxMode value="SECURE" />
                </Command>
            </Action>
        </State>
        <State shortName="CLR" longName="CLEAR" description="Secure transmit mode is
set to CLEAR" user_selectable="true">
            <Action type="pressed">
                <Command>
                    <SetSecureTxMode value="CLEAR" />
                </Command>
            </Action>
        </State>
        <State shortName="KEYFL" longName="KEYFAIL" description="Keyfail. Key required
for encryption is not present" user_selectable="false">

```

```

        <Action type="pressed">
            <Command>
                <SetSecureTxMode value="KEYFAIL" />
            </Command>
        </Action>
    </State>
    <State shortName="NOENC" longName="NO_ENCRYPT" description="No encryption
module present" user_selectable="false">
        <Action type="pressed">
            <Command>
                <SetSecureTxMode value="NO_ENCRYPT" />
            </Command>
        </Action>
    </State>
    <State shortName="MSMTCH" longName="MISMATCH" description="Mismatch between
user selected secure transmit mode and actual fixed/strapped tx mode"
user_selectable="false">
        <Action type="pressed">
            <Command>
                <SetSecureTxMode value="MISMATCH" />
            </Command>
        </Action>
    </State>
    <State shortName="UNKWN" longName="UNKNOWN" description="Secure/Clear Transmit
mode is in an unknown state" user_selectable="false">
        <Action type="pressed">
            <Command>
                <SetSecureTxMode value="UNKNOWN" />
            </Command>
        </Action>
    </State>
    <State shortName="UNSPRT" longName="UNSUPPORTED" description="Encryption is
not supported" user_selectable="false">
        <Action type="pressed">
            <Command>
                <SetSecureTxMode value="UNSUPPORTED" />
            </Command>
        </Action>
    </State>
</Stateful>

    <Stateful shortName="KEY" longName="Key Selection" description="Select a key for
encryption" presentation="multiple">
        <State shortName="NONE" longName="NONE" description="No key selected"
user_selectable="false">
            <Action type="pressed">
                <Command>
                    <SetKey value="NONE" />
                </Command>
            </Action>
        </State>
        <State shortName="UNKWN" longName="UNKNOWN" description="Selected key is
unknown" user_selectable="false">
            <Action type="pressed">
                <Command>
                    <SetKey value="UNKNOWN" />
                </Command>
            </Action>
        </State>
        <State shortName="UNSPRT" longName="UNSUPPORTED" description="Key selection is
not supported" user_selectable="false">
            <Action type="pressed">

```



```

        <Command>
            <SetKey value="UNSUPPORTED" />
        </Command>
    </Action>
</State>
</Stateful>

</ControlFunctions>

<!--
    The following element contains features that are enabled in this descriptor. For iDEN
    networks that
        are capable for dynamic group calls, the feature name "selective call" should be
    added. This enables the
        capability to make ad-hoc private and group calls as well as call alerts from the
    IPICS Connect box in the
        radio control user interface.
-->
<Features>
    <Feature name="selective-call" supported="true"/>
</Features>

</ipics:SerialRadioTypeDescriptor>

```

## Caveats for IDC Operation

For Serial Control the CTRL button opens a browser-based UI to control radios.

If you are using a tone controlled radio, be aware of the following IDC operation caveats when configuring tone sequences in radio and tone descriptor files:

- For tone control sequences (channel selectors and radio control functions), Cisco IPICS supports only RFC 2833 tones (DTMF entries are not supported).
- You cannot enter more than six consecutive RFC 2833 tones in a tone control sequence.

The following example shows the format of an RFC 2833 tone:

```

<Rfc2833Tone db="0" duration="40" frequency="100" />
A tone sequence is a sequence of tones, as shown in the following example:
<Rfc2833Tone db="0" duration="40" frequency="100" />
<Rfc2833Tone db="0" duration="40" frequency="200" />
<Rfc2833Tone db="0" duration="40" frequency="300" />
<Rfc2833Tone db="0" duration="40" frequency="400" />
<Rfc2833Tone db="0" duration="40" frequency="500" />
<Rfc2833Tone db="0" duration="40" frequency="600" />

```



### Note

The tone sequence in the previous example does not display more than six consecutive RFC 2833 tones ("100" through "600").

- For tone signaling, Cisco IPICS supports both RFC 2833 tone and RFC 2833 event (DTMF) commands.

You can enter more than six consecutive RFC 2833 tones only if the sixth tone event is separated by a pause entry (such as one ms) or a DTMF digit entry (such as digit one for 200 ms).



### Note

When you enter DTMF digits, be sure to configure a delay between the digits so that DTMF gets detected, as required by the local specifications. U.S. specifications require a delay of 40 ms.

There is no limit to the number of DTMF entries that are allowed in a signaling tone sequence.

**Note**

You can define a pause by a tone with a frequency of zero, as in the following example:

```
<Rfc2833Tone db="0" frequency="0" duration="40" />
```

where:

*db= "0"* *frequency= "0"* represents the pause entry.

- Because tone sequences, whether in signaling or control sequences, are grouped into RFC 2198 packets, a maximum duration gets imposed for some of the tones. For example, if 'n' is the total number of tones in the tone sequence, where  $\max(n) = 6$ , the maximum duration for the first (n-1) tones cannot be more than two seconds.
- The maximum duration for any RFC 2833 tone or event is 8 seconds.
- Because preamble tones that are longer than one second compromise the beginning of talk spurts, there is a maximum possible voice delay of one second.

For some examples of valid and invalid descriptor file entries, see the [“Examples of descriptor .xml files” section on page 9-26](#).

## Understanding the Descriptors Window

The Descriptors window lists information about each of the radio and tone and serial descriptor files that you have added in Cisco IPICS.

This window also enables you to perform several radio and tone descriptor management functions. To display the Descriptors window, navigate to **Configuration > Descriptors** in the Administration Console.

[Table 9-4](#) describes the items in the Descriptors window.

**Table 9-4** *Fields in the Descriptors Window*

Field	Description	Reference
Name field	This field indicates the name of the radio type that Cisco IPICS supports.	See these sections <ul style="list-style-type: none"> <li>• <a href="#">:Tone Radio Descriptors, page 9-24</a></li> <li>• <a href="#">Tone Radio Descriptors, page 9-24</a></li> <li>• <a href="#">Serial Radio Descriptors, page 9-27</a></li> <li>• <a href="#">ISSI Gateway Descriptors, page 9-33</a></li> <li>• <a href="#">DFSI Gateway Descriptor, page 9-36</a></li> <li>• <a href="#">Adding Descriptors, page 9-43.</a></li> </ul>
File Name field	This field indicates the name of the radio/tone descriptor .xml file.	
Type field	This field indicates the type of descriptor.  <b>Note</b> When choosing a descriptor type in the Administration Console, be aware that a <i>Tone Radio</i> descriptor type refers to a radio descriptor file and a <i>Tones</i> descriptor type refers to a tone descriptor file.	
File Size (KB) field	This field indicates the size of the descriptor file.	
Last Update field	This field indicates the date and time of the last modified descriptor file.	

**Table 9-4**      *Fields in the Descriptors Window (continued)*

Field	Description	Reference
Add button	Click this button to add new descriptor files.	See the <a href="#">“Adding Descriptors”</a> section on page 9-43.
Update button	Click this button to update existing descriptor files.	See the <a href="#">“Updating Radio and Tone Descriptors”</a> section on page 9-44.
Delete button	Click this button to delete descriptor files from Cisco IPICS.	See the <a href="#">“Deleting Radio and Tone Descriptors”</a> section on page 9-45.
<b>Display Controls</b>		
Rows per page drop-down list	Specifies the number of rows of descriptors that are included in a descriptors list page.	See the <a href="#">“Navigating Item Lists”</a> section on page 1-13.
Page field	Displays descriptors on a specific page.	
< (First page) button	Displays the first page of the descriptors list.	
< (Previous page) button	Displays the previous page of the descriptors list.	
> (Next page) button	Displays the next page of the descriptors list.	
>  (Last page) button	Displays the last page of the descriptors list.	

## Adding Descriptors

You can add descriptors to Cisco IPICS in the Configuration > Descriptors window in the Administration Console.

For detailed information about descriptors, see the [“Tone Radio Descriptors”](#) section on page 9-24 and [“Tone Descriptors”](#) section on page 9-23.

For examples of valid and invalid descriptor file .xml entries, see the [“Examples of descriptor .xml files”](#) section on page 9-26.



### Note

When choosing a descriptor type in the Administration Console, be aware that a *Tone Radio* descriptor type refers to a radio descriptor file and a *Tones* descriptor type refers to a tone descriptor file.

To add a new descriptor file, perform the following procedure:

### Procedure

- Step 1** From the Cisco IPICS Administration Console, navigate to the **Configuration > Descriptors** window.
- Step 2** In the Descriptors window, click **Add**.  
The New Descriptor window displays.
- Step 3** From the Descriptor Type drop-down list, choose one of the following options:
  - **Tone Radio**—Choose this option to add a descriptor file for a tone control radio.
  - **Serial Radio**—Choose this option to add a descriptor file for a serial control radio.
  - **Tones**—Choose this option to add a tone descriptor file.

- **ISSI Gateway**—Choose this option to add an ISSI Gateway descriptor file.
- **FIXED\_STATION**—Choose this option to add a P25 Fixed Station descriptor file.
- **P25DFSIG**—Choose this option to add DFSI gateway descriptor.

**Step 4** To locate the descriptor file that you want to add, click **Browse**.

**Step 5** In the Choose File window, navigate to the location of the descriptor file that you want to add and highlight the file.

**Step 6** Click **Open**.

The File to Upload field gets populated with the descriptor file that you selected.

**Step 7** Click **Save**.

If you do not want to add the descriptor, click **Cancel**.



**Note** If you need to modify an existing descriptor file, follow the steps in the [“Updating Radio and Tone Descriptors” section on page 9-44](#).

## Updating Radio and Tone Descriptors

You can update an existing descriptor file in Cisco IPICS in the Descriptors window.



**Note**

When choosing a descriptor type in the Administration Console, be aware that a *Tone Radio* descriptor type refers to a radio descriptor file and a *Tones* descriptor type refers to a tone descriptor file.

When you update a radio descriptor to add new channel selectors or control functions, all of the radio instances that are currently using this descriptor get updated accordingly. If there are any IDC users using these radio instances, their IDC clients get updated also.

If you update a tone descriptor, the system checks the newly uploaded file for missing commands that may be in use by the radio descriptor file.



**Note**

If you upload a new file that is missing a command, which is in use by the radio descriptor, the system does not allow the update.

For more detailed information about radio and tone descriptors, see the [“Tone Radio Descriptors” section on page 9-24](#) and the [“Tone Descriptors” section on page 9-23](#).

To update radio and tone descriptors, perform the following procedure:

### Procedure

**Step 1** From the Cisco IPICS Administration Console, navigate to the **Configuration > Descriptors** window.

**Step 2** Click the radio button next to the descriptor that you want to update.

**Step 3** Click **Update**.

**Step 4** Click the **Browse** button, that is next to the File to Upload field.

**Step 5** In the Choose File window, navigate to the location of the descriptor file that you want to use to update and highlight the file.

**Step 6** Click **Open**.

The File to Upload field gets populated with the descriptor file that you selected.

**Step 7** Click **Save**.

If you do not want to update the descriptor, click **Cancel**.



**Note** If there are multiple radio descriptor files for the same type of radio, the Cisco IPICS server uses the latest uploaded file. This feature allows you to update the radio descriptor file for a given radio type by uploading a new descriptor file.

## Deleting Radio and Tone Descriptors

You can delete radio and tone descriptor files from Cisco IPICS.

You cannot delete radio descriptor files that are being used by radios.

For more detailed information about radio and tone descriptors, see the [“Tone Radio Descriptors” section on page 9-24](#) and the [“Tone Descriptors” section on page 9-23](#).

To delete a radio, perform the following procedure:

### Procedure

**Step 1** From the Administration Console, navigate to the **Configuration > Radios** window.

**Step 2** Check the check box next to each radio that you want to delete.

**Step 3** Click **Delete**.

A dialog box prompts you to confirm the deletion.

**Step 4** To confirm the deletion, click **OK**.

If you do not want to delete the radio(s), click **Cancel**.











