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CTP Series Circuit To Packet Platform

Using VComp Bundles to Group Analog Circuits into One IP Circuit

Release

6.1

Published: 2010-10-27

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Overview

Overview of VComp Bundles

VComp Bundle Overview

Voice compression (VComp) bundles compress and aggregate voice channels going between the same IP endpoints into a single IP flow.

Figure 1 on page 4 shows the common voice architecture and key components of the CTP Series.

Figure 1: CTP Series Voice Architecture and Key Components
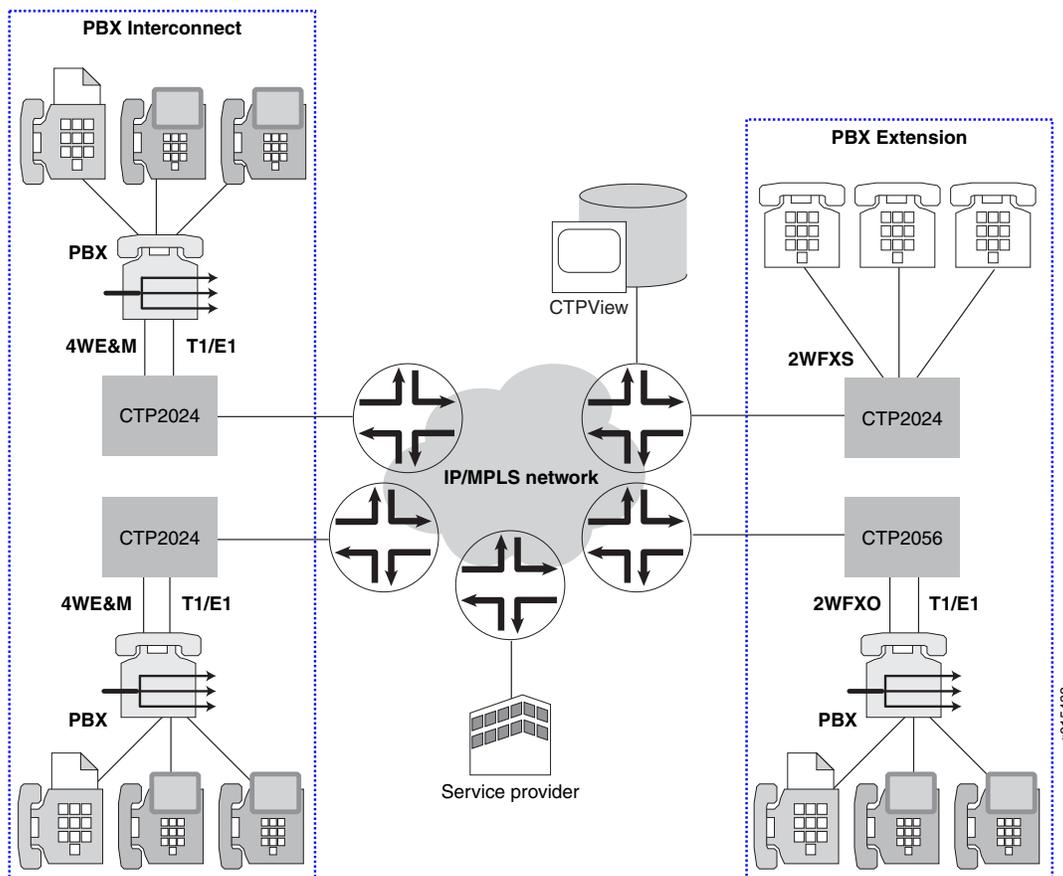
As shown in Figure 1 on page 4, VComp bundles support the following applications:

- PBX interconnect—The 4W-E&M interfaces enable CTP devices to connect directly to analog PBX voice switch trunks and interconnect those trunks over the IP/MPLS network. Interworking between 4W-E&M and T1 or E1 DS0s enables small analog sites to be aggregated into larger digital T1 or E1 PBX voice switches.

- PBX extension—The 2W-FXS and 2W-FXO interfaces enable CTP devices to connect directly to two-wire analog PBX voice switch interfaces to extend the phone extension over the IP/MPLS network. Interworking between 2W-FXS and 2W-FXO to T1 or E1 DS0s enables small analog sites to be aggregated into larger digital T1 or E1 PBX voice switches.

Digital and Analog Voice Interworking Overview

VComp bundles solve the following interoperability requirements:

- Interoperability between digital and analog voice channels. For example, when remote sites use analog trunks and the central site voice switch location uses digital T1/E1 connections. In this case, you can use VComp bundles to aggregate the analog sites into higher-density digital interfaces on the central voice switch.

- Interoperability between sites inside and outside the United States. Generally, mu-law companding is used inside the United States and a-law companding is used in Europe and elsewhere. You can use mu-law to a-law conversion between E1 and T1 voice interfaces to connect these sites.

Interface Modules That Support Voice Compression Overview

This topic describes the interface modules that support voice compression. Voice compression (VComp) bundles can originate on 4WE&M, 2W-FXS, and 2W-FXO analog modules and on T1/E1 modules. Traffic from the analog or T1/E1 modules is passed to the voice compression module, which compresses the traffic and builds the IP packet.

Voice Compression Module Overview

The CTP2000 compression interface module enables serial data and voice bundles to be compressed and passed through a CTP2000 device. The voice compression module is a server module within the CTP2000 device. Any T1 or E1 DS0 or analog channel on a 4W-E&M, 2W-FXS, or 2W-FXO can use the compression module features.

The voice compression module provides the following features:

- A-law to mu-law conversion—Allows you to connect sites that use a-law companding to sites that use mu-law companding.

- Echo cancellation—Provides a 32-ms end path delay on each bundle channel. This feature can eliminate the need for external echo cancellation devices.

- Silence detection—Provides bandwidth savings. Silence suppression can result in significant bandwidth savings. When silence is detected on the channel, the network bandwidth used for that channel is reduced drastically when this attribute is enabled.

- Fax and modem detection—Detects fax and modem tones and if detected, disables compression and reverts the channel to pulse code modulation (PCM). Enabling this feature increases the network bandwidth needed for that channel in the bundle for the duration of the fax or modem session. However, it succeeds in negotiation and transfer of fax and modem data at high speeds.

Related Documentation
- 4WE&M Interface Module with VComp Bundles Overview on page 6
- 2W-FXS and 2W-FXO Interface Module with VComp Bundles Overview on page 6
- T1/E1 Interface Module with VComp Bundles Overview on page 7
- Calculating Resource Usage on Voice Compression Modules Overview on page 8
- Configuring Compression Parameters for VComp Bundles (CTPView) on page 18
- Configuring Compression Parameters for VComp Bundles (CTP Menu) on page 20

4WE&M Interface Module with VComp Bundles Overview

The 4WE&M module is a four-wire audio interface with E and M signaling interfaces. E and M is a type of supervisory line signaling that uses separate leads, called the E (ear) lead and the M (mouth) lead. In 4WE&M signaling, two wires are used to receive and two wires are used to transmit, incorporating simplex control and differential payload in each channel. The 4WE&M module supports type I, II, and V signaling.

The 4WE&M module provides the following features:

- Enables a CTP device to connect directly to analog PBX voice switch trunks and transport those trunks over the IP/MPLS network.

- Minimizes IP overhead by bundling multiple analog channels from a single module or multiple modules into one packet.

- Works with T1/E1 DS0s to enable small analog sites to be aggregated into larger digital T1 or E1 PBX voice switches.

Related Documentation
- CTP2000 4WE&M Interface Module
- Configuring 4WE&M Port Parameters for VComp Bundles (CTPView) on page 30
- Configuring 4WE&M Port Parameters for VComp Bundles (CTP Menu) on page 31

2W-FXS and 2W-FXO Interface Module with VComp Bundles Overview

The CTP Series supports the following modules for extending analog service from the PBX voice switch to remote locations for remote phone extensions or for accessing central office (CO) dial-tone or other services:

- 2W-FXS—Foreign eXchange Subscriber interface.

- 2W-FXO—Foreign eXchange Office interface.

FXS and FXO interfaces support two types of signaling:

- Loop start—Plain old telephone service (POTS), such as for residential telephones, commonly uses loop-start signaling.

- Ground start—Trunk circuits between a central office (CO) and a PBX generally use ground-start signaling. Ground-start signaling prevents glare, which occurs when a call is established by the FXS device and the FXO device tries to make a call before the ring is detected.

Connecting Two 2W-FXS Interfaces or Two 2W-FXO Interfaces

Normally a 2W-FXS interface connects to a 2W-FXO interface across the IP network. However, you can connect two interfaces of the same type by using private line automatic ringdown (PLAR) signaling. With PLAR, two handsets are directly connected so that when someone picks up a handset, the handset at the remote end starts to ring. There is no call routing (dialing) involved. You can enable PLAR on VComp bundles for modules that are configured for loop-start signaling. Both ends of the VComp bundle must have PLAR enabled.

Related Documentation
- CTP2000 2W-FXS and 2W-FXO Interface Modules

- Configuring 2W-FXS Port Parameters for VComp Bundles (CTPView) on page 25

- Configuring 2W-FXS Port Parameters for VComp Bundles (CTP Menu) on page 26

- Configuring 2W-FXO Port Parameters for VComp Bundles (CTPView) on page 27

- Configuring 2W-FXO Port Parameters for VComp Bundles (CTP Menu) on page 29

T1/E1 Interface Module with VComp Bundles Overview

You can use both full and fractional T1 and E1 interface modules with voice compression modules to interconnect PBX voice switches over the IP/MPLS network.

T1 interfaces use channel-associated signaling (CAS). You can enable or disable CAS on T1 interfaces. E1 interfaces can use either CAS or common channel signaling (CCS).

- With CCS, signaling information is transmitted on a separate channel from the data, and the signaling channel controls multiple data channels.

- With CAS, also known as per-trunk signaling (PTS), routing information is used to direct the payload of voice or data to its destination. The routing information is encoded and transmitted in the same channel as the payload itself.

Related Documentation
- Configuring T1 and E1 Port Parameters for VComp Bundles (CTPView) on page 21

- Configuring T1 and E1 Port Parameters for VComp Bundles (CTP Menu) on page 23

Gain Control for Analog Voice Modules Overview

You can control the gain on analog voice modules in both the analog-to-digital and the digital-to-analog directions. The Rx direction corresponds to the analog-to-digital direction, and the Tx direction corresponds to the digital-to-analog direction. Table 1 on page 8 shows the minimum and maximum gain for each direction and the granularity for the module.

Table 1: Ranges and Granularity of Gains for Analog Voice Modules

Module	Minimum Rx Gain	Maximum Rx Gain	Minimum Tx Gain	Maximum Rx Gain	Granularity
4WE&M	-7.1 dB	18.3 dB	-24.8 dB	0.6 dB	0.1 dB
2W-FXS	-19.4 dB	6.0 dB	-9.1 dB	16.3 dB	.1 dB
2W-FXO	-10.0 dB	15.0 dB	-13.0 dB	12.0 dB	1.0 dB

Calculating Resource Usage on Voice Compression Modules Overview

The voice compression module must have enough resources available to process VComp bundles. The number of channels and the voice compression features that you enable on a bundle each consume processing resources on the module. Each module has a processing resource of 950 units. Table 2 on page 8 shows the processing resources used by each compression technique and by each compression option.

For example, suppose you configure a VComp bundle with 16 channels and G.729AB compression, and you enable echo cancellation, silence suppression, fax/modem relay, and tone relay. You calculate voice compression usage as follows:

16 x (30 + 13 + 1 + 7 + 8) = 944

The outcome of 944 can be handled by one voice compression module if there are no other bundles using the module.

Table 2: Compression Options and Voice Compression Module Usage

Compression Technique	Rate/Channel	Compression	Echo Cancellation	Silence Suppression	Fax/Modem Relay	Tone Relay
PCM	64 kbps	3	6	1	5	4
MELP (Mixed Excitation Linear Prediction)	2.4 kbps	55	6	1	5	4
G.729.AB	8 kbps	30	10	1	8	7
G.728	16 kbps	61	13	1	9	11
G.726_16K	16 kbps	13	7	1	5	5

Table 2: Compression Options and Voice Compression Module Usage *(continued)*

Compression Technique	Rate/Channel	Compression	Echo Cancellation	Silence Suppression	Fax/Modem Relay	Tone Relay
G.726_24K	24 kbps	13	7	1	5	5
G,.726_32K	32 kbps	13	7	1	5	5
G.726_40K	40 kbps	13	7	1	5	6

Related Documentation

- Voice Compression Module Overview on page 5
- Configuring Compression Parameters for VComp Bundles (CTPView) on page 18
- Configuring Compression Parameters for VComp Bundles (CTP Menu) on page 20

Providing QoS for VComp Bundles by Using Service Type Overview

In IP networks, the IP flow is typically classified based on the Differentiated Services Code Point (DSCP) setting in the type of service (TOS) byte of the IP header. DSCP is a scalable solution for classifying flows in a large IP network based on the class of service desired on specific IP traffic flows.

With the CTP device, you can configure DSCP settings for each circuit's IP flow. For example, some circuits could be configured for the expedited forwarding (EF) class. When the network routers receive this EF-marked flow from the CTP device, they place the marked traffic into a high-priority queue, enabling this traffic to be serviced before lower-priority traffic. As an EF-marked flow traverses the IP network, routers can use its classification to provide the flow a more predictable level of performance across the network.

When you configure the service type of a bundle, you specify the ToS byte to be used in IP headers of packets sent from the CTP device to the IP network. The ToS setting is applied to circuits created by the bundle for which the service type is configured.

Table 3 on page 9 shows the mapping for each DSCP class and setting to the ToS setting that you configure as the service type for a bundle. The expedited forwarding (EF) class (ToS setting 184) is commonly used for voice traffic.

Table 3: DSCP Classes and Service Type

DSCP Class	DSCP Setting	ToS Setting
CS7	56	224
CS6	48	192
EF	46	184
CS5	40	160

Table 3: DSCP Classes and Service Type *(continued)*

DSCP Class	DSCP Setting	ToS Setting
AF43	38	152
AF42	36	144
AF41	34	136
CS4	32	128
AF33	30	120
AF32	28	112
AF31	26	104
CS3	24	96
AF23	22	88
AF22	20	80
AF21	18	72
CS2	16	64
AF13	13	52
AF12	12	48
AF11	10	40
CS1	8	32

Related Documentation

- Configuring IP Parameters for VComp Bundles (CTPView) on page 15

- Configuring IP Parameters for VComp Bundles (CTP Menu) on page 17

Adding Bundles

- Adding a Bundle (CTPView) on page 13
- Adding a Bundle (CTP Menu) on page 13

Adding a Bundle (CTPView)

Before you begin:

- Log in to the CTPView software at least at the Net_Admin level.
- Connect the CTPView server to the CTP device for which you want to configure bundles.
- Disable the bundle before you modify the bundle options.

To add a bundle using CTPView:

1. In the side pane, select **Bundle** > **Configuration**.
2. Run your mouse over the **Open Add Bundles Display** bar.
3. Under **New Bndl Number**, select a bundle number.
4. Under the type of bundle you want to add, select a source port, and click the button for the type of bundle.
5. Enter the parameters, and **Click to Submit Bundle AND Port Changes**.

Adding a Bundle (CTP Menu)

To add a bundle using the CTP Menu:

1. From the Main Menu, select **1) Bundle Operations**.
2. Select the type of bundle that you want to configure.
3. Enter **add** to add a new bundle.
4. Select the port you want to attach the bundle to.

Configuring VComp Bundles

Configuring IP Parameters for VComp Bundles (CTPView)

The CTP software uses the IP parameters to create IP packets.

Before you begin:

- Log in to the CTPView software at least at the Net_Admin level.
- Connect the CTPView server to the CTP device for which you want to configure bundles.
- Disable the bundle before you modify the bundle options.

To configure IP parameters for VComp bundles using CTPView:

1. In the side pane, select **Bundle** > **Configuration**.
2. Run your mouse over the **Display and Select an Existing Bundle** bar.

3. In the table of bundles, select the bundle that you want to modify.

4. Under **Bundle Options**, configure the parameters described in Table 4 on page 16, and click **Click to Submit Bundle AND Port Changes**.

Table 4: VComp Bundle IP Parameter Settings in CTPView

Field	Function	Your Action
Bundle Description	Specifies identifying information about the bundle.	Type a description for the bundle.
State	Specifies whether the bundle is active or disabled.	Select DISABLED or ACTIVE.
Remote Address	Specifies the name and IP address of the remote CTP device.	In the first field, select the CTP device. In the second field, select an interface on the CTP device.
Circuit ID	Specifies the bundle on the local CTP device. You must use the same circuit ID for the VComp bundle at the remote CTP device.	Enter a number from 1 through 249.
Min Buffer	Specifies the minimum average buffer size. Use a value that is greater than the expected jitter and less than the Buffer Set parameter. The minimum buffer ensures that the buffer does not become too small because of timing variances between the local and remote serial interfaces. The entire buffer is available for accommodating and smoothing packet delay jitter, regardless of the minimum buffer setting.	Select a number from 10 to 80 ms.
Buffer Set	Specifies the buffer size when the circuit enters a running state. This value must be large enough to accommodate the anticipated packet delay, and it must be set to a value greater than the minimum buffer size and lower than the maximum buffer size.	Select a number from 20 through 90 ms.
Max Buffer	Specifies the maximum buffer size. The maximum buffer ensures that the buffer does not become too large because of timing variances between the local and remote serial interfaces. If the buffer size exceeds the maximum buffer size, the buffer is recentered to the Buffer Set value. Periodic buffer recenters are not expected. If you notice recenters, we recommend that you verify the reference to the CTP device (if used) or that you configure one port with adaptive clocking.	Select a number from 30 through 100 ms.
Service Type	Specifies the ToS byte to be used in the IP headers of packets sent from the CTP device to the IP network. For a mapping of ToS byte values to DSCP classes and settings, see "Providing QoS for VComp Bundles by Using Service Type Overview" on page 9. You do not need to set the ToS value to the same value on local and remote bundles.	Enter a number from 0 through 255.

Table 4: VComp Bundle IP Parameter Settings in CTPView *(continued)*

Field	Function	Your Action
Calculated Packet Size	VComp packet size is calculated automatically depending on the number of DS0s and channels in the VComp bundle.	

Related Documentation
- Providing QoS for VComp Bundles by Using Service Type Overview on page 9

Configuring IP Parameters for VComp Bundles (CTP Menu)

The CTP software uses the IP parameters to create IP packets.

Before you begin:

- Disable the bundle before you modify the bundle options.

To configure IP parameters for VComp bundles using the CTP Menu:

1. From the Main Menu, select **1) Bundle Operations**.

2. Select **4) VCOMP**.

3. Select a bundle from the list.

   If you select an active bundle, you are prompted to disable the bundle before configuring it.

4. Select **2) Config** to configure the bundle.

5. Configure the options as described in Table 5 on page 17.

Table 5: VComp Bundle IP Parameter Settings in the CTP Menu

Field	Function	Your Action
Destination IP	Specifies the IP address of the remote CTP device.	Enter the address of the remote CTP device.
Circuit ID	Specifies the bundle on the local CTP device. You must use the same circuit ID for the VComp bundle at the remote CTP device.	Enter a number from 1 through 249.
Buffer Min	Specifies the minimum average buffer size. Use a value that is greater than the expected jitter and less than the Pkt Buffer Set parameter. The minimum buffer ensures that the buffer does not become too small because of timing variances between the local and remote serial interfaces. The entire buffer is available for accommodating and smoothing packet delay jitter, regardless of the minimum buffer setting.	Enter a number from 10 through 100 ms in increments of 10. None of the buffer settings can be the same.

Table 5: VComp Bundle IP Parameter Settings in the CTP Menu *(continued)*

Field	Function	Your Action
Buffer Set	Specifies the buffer size when the circuit enters a running state. This value must be large enough to accommodate the anticipated packet delay, and it must be set to a value greater than the minimum buffer size and lower than the maximum buffer size.	Enter a number from 20 through 100 ms in increments of 10. None of the buffer settings can be the same.
Buffer Max	Specifies the maximum buffer size. The maximum buffer ensures that the buffer does not become too large because of timing variances between the local and remote serial interfaces. If the buffer size exceeds the maximum buffer size, the buffer is recentered to the Buffer Set value. Periodic buffer recenters are not expected. If you notice recenters, we recommend that you verify the reference to the CTP device (if used) or that you configure one port with adaptive clocking.	Enter a number from 30 through 100 ms in increments of 10. None of the buffer settings can be the same.
Service Type	Specifies the ToS byte to be used in the IP headers of packets sent from the CTP device to the IP network. For a mapping of ToS byte values to DSCP classes and settings, see "Providing QoS for VComp Bundles by Using Service Type Overview" on page 9. You do not need to set the ToS value to the same value on local and remote bundles.	Enter a number from 0 through 255.
Bundle Description	Specifies identifying information about the bundle.	Type a description for the bundle.

Related Documentation

- Providing QoS for VComp Bundles by Using Service Type Overview on page 9

Configuring Compression Parameters for VComp Bundles (CTPView)

This topic describes how to configure compression options for VComp bundles.

Before you begin:

- Log in to the CTPView software at least at the Net_Admin level.
- Connect the CTPView server to the CTP device for which you want to configure bundles.
- Disable the bundle before you modify the bundle options.

To configure compression parameters for VComp bundles using CTPView:

1. In the side pane, select **Bundle** > **Configuration**.
2. Run your mouse over the **Display and Select an Existing Bundle** bar.
3. In the table of bundles, select the bundle that you want to modify.
4. Under **Bundle Options**, configure the parameters described in Table 6 on page 19, and click **Click to Submit Bundle AND Port Changes**.

Table 6: VComp Bundle Compression Parameter Settings in CTPView

Field	Function	Your Action
Companding	Specifies the pulse-code modulation (PCM) encoding standard used on the port PCM input to the VComp bundle. When a VComp bundle is built with: • Analog voice interfaces, this configuration is applied on both the analog voice port and the voice compression module, so there are no compatibility issues. • T1/E1 channels, set companding to match the type of companding that is used for the external connecting equipment. Generally, mu-law is used in the US, and a-law is used in Europe and elsewhere.	Select one: • Transparent—Applies to T1/E1 ports only. Choose this option to transport lossless data in a VComp bundle (that is, for carrying a CCS signaling D channel). • Mu-law—Generally used in the United States. • A-law—Generally used in Europe and elsewhere.
Codec	Specifies the level and type of voice compression performed on voice channels. See "Calculating Resource Usage on Voice Compression Modules Overview" on page 8 for information about the voice compression module utilization and compression level for each compression type.	Select one: • MELP (2.4k) • G.729AB (8k) • G.728 (16k) • G.726 (16k) • G.726 (32k) • G.711 (64k)
Echo Cancellation	Enables or disables echo cancellation. When this option is enabled, 32 ms of local tail echo cancellation is performed on every bundle channel.	Select one: • No • Yes
Silence Detection	Enables or disables silence detection. When this option is enabled and silence is detected on the channel, the network bandwidth used for that channel is reduced drastically. This behavior can create significant network bandwidth savings.	Select one: • No • Yes
Fax/Modem Support	Enables or disables detection of fax and modem tones. When enabled and fax or modem tones are detected on the line, compression is disabled and the channel reverts to PCM. Although enabling this attribute increases the amount of network bandwidth needed for that channel in the bundle for the duration of the fax or modem session, it succeeds in negotiation and transfer of fax and modem data at high speeds.	Select one: • No • Yes
Tone Relay	When enabled and tones are detected at the local end port, they are transported and regenerated at the remote end. This is an important option particularly for high compression levels, where tones may be distorted if they are compressed. The tone relay types supported are DTMF and MFR1.	Select one: • No • Yes

Related Documentation

• Voice Compression Module Overview on page 5

• Calculating Resource Usage on Voice Compression Modules Overview on page 8

Configuring Compression Parameters for VComp Bundles (CTP Menu)

This topic describes how to configure compression options for VComp bundles.

Before you begin:

- Disable the bundle before you modify the bundle options.

To configure compression parameters for VComp bundles using the CTP Menu:

1. From the Main Menu, select **1) Bundle Operations**.

2. Select **4) VCOMP**.

3. Select a bundle from the list.

   If you select an active bundle, you are prompted to disable the bundle before configuring it.

4. Select **2) Config** to configure the bundle.

5. Select **4) Compression Options**.

6. Configure the options as described in Table 7 on page 20.

Table 7: VComp Bundle Compression Parameter Settings in the CTP Menu

Field	Function	Your Action
Companding	Specifies the pulse-code modulation (PCM) encoding standard used on the port PCM input to the VComp bundle. When a VComp bundle is built with: • Analog voice interfaces, this configuration is applied on both the analog voice port and the voice compression module, so there are no compatibility issues. • T1/E1 channels, set companding to match the type of companding that is used for the external connecting equipment. Generally, mu-law is used in the US, and a-law is used in Europe and elsewhere.	Select one: • 0) Transparent—Applies to T1/E1 ports only. Choose this option to transport lossless data in a VComp bundle (that is, for carrying a CCS signaling D channel). • 1) Mu-law—Generally used in the United States. • 2) A-law—Generally used in Europe and elsewhere.
Compression type	Specifies the level and type of voice compression performed on voice channels. See "Calculating Resource Usage on Voice Compression Modules Overview" on page 8 for information about the voice compression module utilization and compression level for each compression type.	Select one: • 0) MELP (2.4k) • 1) G.729AB (8k) • 2) G.728 (16k) • 3) G.726 (16k) • 4) G.726 (32k) • 5) G.711 (64k)
Echo Cancellation	Enables or disables echo cancellation. When this option is enabled, 32 ms of local tail echo cancellation is performed on every bundle channel.	Select one: • YES • NO

Table 7: VComp Bundle Compression Parameter Settings in the CTP Menu *(continued)*

Field	Function	Your Action
Silence Detection	Enables or disables silence detection. When this option is enabled and silence is detected on the channel, the network bandwidth used for that channel is reduced drastically. This behavior can create significant network bandwidth savings.	Select one: • YES • NO
Fax/Modem Support	Enables or disables detection of fax and modem tones. When enabled and fax or modem tones are detected on the line, compression is disabled and the channel reverts to PCM. Although enabling this attribute increases the amount of network bandwidth needed for that channel in the bundle for the duration of the fax or modem session, it succeeds in negotiation and transfer of fax and modem data at high speeds.	Select one: • YES • NO
Tone Relay	Enables or disables tone relay. When enabled and tones are detected at the local end port, the tones are transported and regenerated at the remote end. This is an important option particularly for high compression levels, where tones may be distorted if they are compressed. The tone relay types supported are DTMF and MFR1.	Select one: • YES • NO

Related Documentation

- Voice Compression Module Overview on page 5
- Calculating Resource Usage on Voice Compression Modules Overview on page 8

Configuring T1 and E1 Port Parameters for VComp Bundles (CTPView)

This topic describes how to configure port parameters for T1/E1 interfaces.

If you create a new VComp bundle on a T1/E1 interface module and there are no other bundles configured on the interface, you are prompted to specify whether the T1/E1 interface is dedicated to VComp bundles.

```
Do you want to configure this card for all VCOMP?
```

- If you specify yes, all ports on the interface can be used for VComp bundles, and you cannot configure any other bundle types on the interface.
- If you specify no, you can configure other types of bundles on the interface. However, you cannot use port 2 for VComp bundles.

Before you begin:

- Log in to the CTPView software at least at the Net_Admin level.
- Connect the CTPView server to the CTP device for which you want to configure bundles.
- Disable the bundle before you modify the bundle options.

To configure T1 and E1 port parameters using CTPView:

1. In the side pane, select **Bundle > Configuration**.

2. Run your mouse over the **Display and Select an Existing Bundle** bar.

3. In the table of bundles, select the bundle that you want to modify.

4. Under **Port Options**, configure the parameters described in Table 8 on page 22.

    The options vary depending on whether the bundle is T1 or E1.

5. Click **Click to Submit Bundle AND Port Changes**.

Table 8: VComp Bundle T1 and E1 Port Parameter Settings in CTPView

Field	Function	Your Action
T1/E1 Choice	Specifies the type of interface. The type of interface that you select affects the default packet size and buffer sizes for the bundle.	Select one: • T1 • E1
T1 Line Coding	For T1 interfaces, specifies the T1 encoding method used on this bundle.	Select one: • B8ZS • AMI
Framing Mode	For T1 interfaces, specifies the framing method.	Select one: • ESF—Extended Superframe (ESF) Framing. Frame synchronization, data link, and CRC framing bits are passed across the IP network untouched. • D4—Superframe Framing.
Line Buildout	For T1 interfaces, specifies the line buildout.	Select one: • ~133 ft • ~266 ft • ~399 ft • ~533 ft • ~655 ft • -7.5dB CSU • -15dB CSU • -22.5dB CSU
Signaling (for T1)	For T1 interfaces, specifies whether or not CAS signaling is used.	Select one: • On—Signaling is on. Signaling lead input on each channel is transported end-to-end. • Off—Signaling is off.

Table 8: VComp Bundle T1 and E1 Port Parameter Settings in CTPView *(continued)*

Field	Function	Your Action
Signaling (for E1)	For E1 interfaces, specifies the signaling method used.	Select one: • CSS—Common channel signaling. The common channel carries data messages that convey signaling for the circuits between two devices. • CAS—Channel associated signaling. Each traffic channel has a dedicated signalling channel (channel 16).

Related Documentation

• T1/E1 Interface Module with VComp Bundles Overview on page 7

Configuring T1 and E1 Port Parameters for VComp Bundles (CTP Menu)

This topic describes how to configure port parameters for T1/E1 interfaces.

Before you begin:

• Disable the bundle before you modify the bundle options.

To configure port parameters for T1/E1 interfaces for VComp bundles using the CTP Menu:

1. From the Main Menu, select **1) Bundle Operations**.

2. Select **4) VCOMP**.

3. If you are creating a new VComp bundle on a T1/E1 interface module and there are no other bundles configured on the interface, you are prompted to specify whether the T1/E1 interface is dedicated to VComp bundles.

   ```
   Do you want to configure this card for all VCOMP?  y[n]:
   ```

   • If you specify yes, all ports on the interface can be used for VComp bundles, and you cannot configure any other bundle types on the interface.

   • If you specify no, you can configure other types of bundles on the interface. However, you cannot use port 2 for VComp bundles.

4. If you are configuring an existing bundle, select a bundle from the list.

   If you select an active bundle, you are prompted to disable the bundle before configuring it.

5. Select **3) Port Config**.

6. Follow the onscreen instructions, and configure the options as described in Table 9 on page 24.

   The options vary depending on whether the bundle is T1 or E1.

Table 9: VComp Bundle T1/E1 Port Parameter Settings in the CTP Menu

Field	Function	Your Action
Port descriptor	Specifies a description for the port.	Enter a description of up to 62 alphanumeric characters. Do not use the following characters: (; ' ")]
Type	Specifies the type of interface. The type of interface that you select affects the default packet size and buffer sizes for the bundle.	Select one: • T1 • E1
LineCoding	Specifies the T1 encoding method used on this bundle.	Select one: • B8ZS • AMI
BuildOut	For T1 interfaces, specifies the line buildout.	Select one: • 0) ~133 ft • 1) ~266 ft • 2) ~399 ft • 3) ~533 ft • 4) ~655 ft • 5) -7.5dB CSU • 6) -15dB CSU • 7) -22.5dB CSU
Frame Mode	For T1 interfaces, specifies the framing method.	Select one: • ESF—Extended Superframe (ESF) Framing. Frame synchronization, data link, and CRC framing bits are passed across the IP network untouched. • D4—Superframe Framing.
Signal (for T1)	For T1 interfaces, specifies whether or not CAS signaling is used.	Enter one: • On—Signaling is on. Signaling lead input on each channel is transported end-to-end. • Off—Signaling is off.
Signal (for E1)	For E1 interfaces, specifies the signaling method used.	Select one: • CSS—Common channel signaling. The common channel carries data messages that convey signaling for the circuits between two devices. • CAS—Channel associated signaling. Each traffic channel has a dedicated signalling channel (channel 16).

Related Documentation

• T1/E1 Interface Module with VComp Bundles Overview on page 7

Configuring 2W-FXS Port Parameters for VComp Bundles (CTPView)

This topic describes how to configure port parameters for 2W-FXS interfaces.

Before you begin:

- Log in to the CTPView software at least at the Net_Admin level.

- Connect the CTPView server to the CTP device for which you want to configure bundles.

- Disable the bundle before you modify the bundle options.

To configure port parameters for 2W-FXS interfaces using CTPView:

1. In the side pane, select **Bundle > Configuration**.

2. Run your mouse over the **Display and Select an Existing Bundle** bar.

3. In the table of bundles, select the bundle that you want to modify.

4. Under **Port Options**, configure the parameters described in Table 10 on page 25.

5. Click **Click to Submit Bundle AND Port Changes**.

Table 10: VComp Bundle 2W-FXS Port Parameter Settings in CTPView

Field	Function	Your Action
Voice Port Tx Gain [-15.0 to 10.4 dB]	Specifies the gain in the direction from the analog interface toward the IP network.	Select a dB value from the list.
Voice Port Rx Gain [-15.0 to 10.4 dB]	Specifies the gain in the direction from the IP network to the analog interface.	Select a dB value from the list.
Voice Port Signaling	Specifies the type of analog signaling used.	Select one: • ground start—Typically used between a central office (CO) and a PBX to prevent glare. Glare occurs when the FXS device establishes a call and the FXO device attempts to make a call before the ring is detected. • loop start—Typically used for residential phones.

Table 10: VComp Bundle 2W-FXS Port Parameter Settings in CTPView *(continued)*

Field	Function	Your Action
Voice Port PLAR	Enables or disables private line automatic ringdown (PLAR) signaling. PLAR allows you to connect two 2W-FXS interfaces. You must set signaling to loop start before you enable PLAR. For PLAR to work, both ends of the bundle must have PLAR enabled. With PLAR, two handsets are directly connected so that when someone picks up a handset, the handset at the remote end starts to ring. There is no call routing (dialing) involved. To hear ringback, the audible tone in the handset indicating that the far end is ringing, you must enable tone detection for the bundle.	Select one: • Disabled • Enabled

Related Documentation
- Gain Control for Analog Voice Modules Overview on page 8
- 2W-FXS and 2W-FXO Interface Module with VComp Bundles Overview on page 6

Configuring 2W-FXS Port Parameters for VComp Bundles (CTP Menu)

This topic describes how to configure port parameters for 2W-FXS interfaces.

Before you begin:

- Disable the bundle before you modify the bundle options.

To configure port parameters for 2W-FXS interfaces using the CTP Menu:

1. From the Main Menu, select **1) Bundle Operations**.

2. Select **4) VCOMP**.

3. Select a bundle from the list.

   If you select an active bundle, you are prompted to disable the bundle before configuring it.

4. Select **3) Port Config**.

5. Follow the onscreen instructions, and configure the options as described in Table 11 on page 26.

Table 11: VComp Bundle 2W-FXS Port Parameter Settings in the CTP Menu

Field	Function	Your Action
Voice port Tx gain	Specifies the gain in the direction from the analog interface toward the IP network.	Enter a number from -15.db through 10.4 db.

Table 11: VComp Bundle 2W-FXS Port Parameter Settings in the CTP Menu *(continued)*

Field	Function	Your Action
Voice port Rx gain	Specifies the gain in the direction from the IP network to the analog interface.	Enter a number from -15.db through 10.4 db.
Signaling	Specifies the type of analog signaling used.	Select one: • ground start—Typically used between a central office (CO) and a PBX to prevent glare. Glare occurs when the FXS device establishes a call and the FXO device attempts to make a call before the ring is detected. • loop start—Typically used for residential phones.
PLAR	Enables or disables private line automatic ringdown (PLAR) signaling. PLAR allows you to connect two 2W-FXS interfaces. You must set signaling to loop start before you enable PLAR. For PLAR to work, both ends of the bundle must have PLAR enabled. With PLAR, two handsets are directly connected so that when someone picks up a handset, the handset at the remote end starts to ring. There is no call routing (dialing) involved. To hear ringback, the audible tone in the handset indicating that the far end is ringing, you must enable tone detection for the bundle.	Select one: • Enabled • Disabled

Related Documentation

• Gain Control for Analog Voice Modules Overview on page 8

• 2W-FXS and 2W-FXO Interface Module with VComp Bundles Overview on page 6

Configuring 2W-FXO Port Parameters for VComp Bundles (CTPView)

This topic describes how to configure port parameters for 2W-FXO interfaces.

Before you begin:

• Log in to the CTPView software at least at the Net_Admin level.

• Connect the CTPView server to the CTP device for which you want to configure bundles.

• Disable the bundle before you modify the bundle options.

To configure port parameters for 2W-FXO interfaces using CTPView:

1. In the side pane, select **Bundle > Configuration**.

2. Run your mouse over the **Display and Select an Existing Bundle** bar.

3. In the table of bundles, select the bundle that you want to modify.

4. Under **Port Options**, configure the parameters described in Table 12 on page 28.

5. Click **Click to Submit Bundle AND Port Changes**.

Table 12: VComp Bundle 2W-FXO Port Parameter Settings in CTPView

Field	Function	Your Action
Voice Port Tx Gain [-15.0 to 10.4 dB]	Specifies the gain in the direction from the analog interface toward the IP network.	Select a dB value from the list.
Voice Port Rx Gain [-15.0 to 10.4 dB]	Specifies the gain in the direction from the IP network to the analog interface.	Select a dB value from the list.
Voice Port Signaling	Specifies the type of analog signaling used.	Select one: • ground start—Typically used between a central office (CO) and a PBX to prevent glare. Glare occurs when the FXS device establishes a call and the FXO device attempts to make a call before the ring is detected. • loop start—Typically used for residential phones.
Voice Port PLAR	Enables or disables private line automatic ringdown (PLAR) signaling. PLAR allows you to connect two 2W-FXO interfaces. You must set signaling to loop start before you enable PLAR. For PLAR to work, both ends of the bundle must have PLAR enabled. With PLAR, two handsets are directly connected so that when someone picks up a handset, the handset at the remote end starts to ring. There is no call routing (dialing) involved. To hear ringback, the audible tone in the handset indicating that the far end is ringing, you must enable tone detection for the bundle.	Select one: • Disabled • Enabled

Related Documentation

• Gain Control for Analog Voice Modules Overview on page 8

• 2W-FXS and 2W-FXO Interface Module with VComp Bundles Overview on page 6

Configuring 2W-FXO Port Parameters for VComp Bundles (CTP Menu)

This topic describes how to configure port parameters for 2W-FXO interfaces.

Before you begin:

- Disable the bundle before you modify the bundle options.

To configure port parameters for 2W-FXO interfaces using the CTP Menu:

1. From the Main Menu, select **1) Bundle Operations**.

2. Select **4) VCOMP**.

3. Select a bundle from the list.

   If you select an active bundle, you are prompted to disable the bundle before configuring it.

4. Select **3) Port Config**.

5. Follow the onscreen instructions, and configure the options as described in Table 13 on page 29.

Table 13: VComp Bundle 2W-FXO Port Parameter Settings in the CTP Menu

Field	Function	Your Action
Voice port Tx gain	Specifies the gain in the direction from the analog interface toward the IP network.	Enter a number from -23.8 through 1.6 dB in intervals of 0.1 dB.
Voice port Rx gain	Specifies the gain in the direction from the IP network to the analog interface.	Enter a number from -7.6 to 17.7 dB in intervals of 0.1 dB.
Signaling	Specifies the type of analog signaling used.	Select one: • ground start—Typically used between a central office (CO) and a PBX to prevent glare. Glare occurs when the FXS device establishes a call and the FXO device attempts to make a call before the ring is detected. • loop start—Typically used for residential phones.

Table 13: VComp Bundle 2W-FXO Port Parameter Settings in the CTP Menu *(continued)*

Field	Function	Your Action
PLAR	Enables or disables private line automatic ringdown (PLAR) signaling. PLAR allows you to connect two 2W-FXO interfaces. You must set signaling to loop start before you enable PLAR. For PLAR to work, both ends of the bundle must have PLAR enabled. With PLAR, two handsets are directly connected so that when someone picks up a handset, the handset at the remote end starts to ring. There is no call routing (dialing) involved. To hear ringback, the audible tone in the handset indicating that the far end is ringing, you must enable tone detection for the bundle.	Select one: • Enabled • Disabled

Related Documentation

• Gain Control for Analog Voice Modules Overview on page 8
• 2W-FXS and 2W-FXO Interface Module with VComp Bundles Overview on page 6

Configuring 4WE&M Port Parameters for VComp Bundles (CTPView)

This topic describes how to configure port parameters for 4WE&M interfaces.

Before you begin:

• Log in to the CTPView software at least at the Net_Admin level.
• Connect the CTPView server to the CTP device for which you want to configure bundles.
• Disable the bundle before you modify the bundle options.

To configure port parameters for 4WE&M interfaces using CTPView:

1. In the side pane, select **Bundle > Configuration**.
2. Run your mouse over the **Display and Select an Existing Bundle** bar.
3. In the table of bundles, select the bundle that you want to modify.
4. Under **Port Options**, configure the parameters described in Table 14 on page 30.
5. Click **Click to Submit Bundle AND Port Changes**.

Table 14: VComp Bundle 4WE&M Port Parameter Settings in CTPView

Field	Function	Your Action
Voice Port Tx Gain [-23.8 to 1.6 dB]	Specifies the gain in the direction from the analog interface toward the IP network.	Select a dB value from the list.
Voice Port Rx Gain [-7.6 to 17.7 dB]	Specifies the gain in the direction from the IP network to the analog interface.	Select a dB value from the list.

Configuring 4WE&M Port Parameters for VComp Bundles (CTP Menu)

This topic describes how to configure port parameters for 4WE&M interfaces.

Before you begin:

- Disable the bundle before you modify the bundle options.

To configure port parameters for 4WE&M interfaces using the CTP Menu:

1. From the Main Menu, select **1) Bundle Operations**.

2. Select **4) VCOMP**.

3. Select a bundle from the list.

   If you select an active bundle, you are prompted to disable the bundle before configuring it.

4. Select **3) Port Config**.

5. Follow the onscreen instructions, and configure the options as described in Table 15 on page 31.

Table 15: VComp Bundle 4WE&M Port Parameter Settings in the CTP Menu

Field	Function	Your Action
Voice port Tx gain	Specifies the gain in the direction from the analog interface toward the IP network.	Enter a number from –23.8 through 1.6 dB in intervals of 0.1 dB.
Voice port Rx gain	Specifies the gain in the direction from the IP network to the analog interface.	Enter a number from –7.6 to 17.7 dB in intervals of 0.1 dB.

Allocating Channels for Analog Interfaces for VComp Bundles (CTPView)

This topic describes how to allocate channels for VComp bundles.

You can configure up to 30 voice channels on a VComp bundle. These channels can be one type only; for example, if the first channel of a VComp bundle is a 4WE&M type; any additional channels added to the bundle must be of the same type.

Before you begin:

- Log in to the CTPView software at least at the Net_Admin level.

- Connect the CTPView server to the CTP device for which you want to configure bundles.

- Disable the bundle before you modify the bundle options.

To allocate channels using CTPView:

1. In the side pane, select **Bundle > Configuration**.

2. Run your mouse over the **Display and Select an Existing Bundle** bar.

3. In the table of bundles, select the bundle that you want to modify.

4. Under **Bundle Options**, configure the parameter described in Table 16 on page 32.

5. Click **Click to Submit Bundle AND Port Changes**.

Table 16: VComp Bundle Channel Allocation Parameter Settings in CTPView

Field	Function	Your Action
Attached Voice Ports	Specifies the interfaces and channels to use in the bundle. The top number is the port, and the bottom number is the channel. It is important to note that the order of the channels corresponds to the relative channel positions of the channels in the bundle. They connect on a one-to-one basis with the channels in the VComp bundle on the remote end of the network. When channels are removed from a VComp bundle, remaining channels are shifted left.	To select a port for the bundle, click on the port (the top number). Green ports are selected. Gray ports are not selected. To change the channel number, click on the channel number you want to change, and click on the channel number to which you want the number changed. Conflicts in channel order are designated with a red background to the conflicting sections. You cannot submit the bundle configuration if a channel order conflict exists.

Allocating Channels for Analog Interfaces for VComp Bundles (CTP Menu)

This topic describes how to allocate channels for VComp bundles.

You can configure up to 30 voice channels on a VComp bundle. These channels can be one type only. For example, if the first channel of a VComp bundle is a 4WE&M type; any additional channels added to the bundle must be of the same type.

Before you begin:

- Disable the bundle before you modify the bundle options.

To allocate channels using the CTP Menu:

1. From the Main Menu, select **1) Bundle Operations**.

2. Select **4) VCOMP**.

3. Select a bundle from the list.

   If you select an active bundle, you are prompted to disable the bundle before configuring it.

4. Select **2) Config**.

5. Select **3) Channel Allocation**.

6. Follow the onscreen instructions, and configure the option as described in Table 17 on page 33.

Table 17: VComp Bundle Channel Allocation Parameter Settings in the CTP Menu

Field	Function	Your Action
Channel Allocation (for analog interfaces)	Adds interfaces to or removes interfaces from the bundle. It is important to note that the order of the channels (indicated by the XX: prefix on the channel allocation display) corresponds to the relative channel positions of the channels in the bundle. They connect on a one-to-one basis with the channels in the VComp bundle on the remote end of the network. When channels are removed from a VComp bundle, remaining channels are shifted left.	Select one: • 1) remove—Enter the port that you want to remove. • 2) add—Enter the port that you want to add.

Allocating DS0 Time Slots for T1 and E1 Ports for VComp Bundles (CTPView)

This topic describes how to configure the DS0 time slots used by the VComp bundle.

If VComp bundles are built from T1/E1 DS0s, all DS0s for that bundle must come from the same T1/E1 port; for example, te-0/1 or te-0/2.

Before you begin:

• Log in to the CTPView software at least at the Net_Admin level.

• Connect the CTPView server to the CTP device for which you want to configure bundles.

• Disable the bundle before you modify the bundle options.

To allocate DS0s using CTPView:

1. In the side pane, select **Bundle > Configuration**.

2. Run your mouse over the **Display and Select an Existing Bundle** bar.

3. In the table of bundles, select the bundle that you want to modify.

4. Under **Bundle Options**, configure the parameter described in Table 18 on page 33.

5. Click **Click to Submit Bundle AND Port Changes**.

Table 18: VComp Bundle DS0 Allocation Parameter Settings in CTPView

Field	Function	Your Action
Channels	Specifies the DS0s to use in the bundle.	To select a DS0 for the bundle, click on the port. Green DS0s are selected. Gray DS0s are not selected.

Allocating DS0 Time Slots for T1 and E1 Ports for VComp Bundles (CTP Menu)

If VComp bundles are built from T1/E1 channels, all channels for that bundle must come from the same T1/E1 port. For example, te-0/1 or te-0/2.

Before you begin:

- Disable the bundle before you modify the bundle options.

To allocate channels using the CTP Menu:

1. From the Main Menu, select **1) Bundle Operations**.

2. Select **4) VCOMP**.

3. Select a bundle from the list.

   If you select an active bundle, you are prompted to disable the bundle before configuring it.

4. Select **2) Config**.

5. Select **3) Channel Allocation**.

6. Follow the onscreen instructions, and configure the option as described in Table 19 on page 34.

Table 19: VComp Bundle DS0 Allocation Parameter Settings in the CTP Menu

Field	Function	Your Action
Channel Allocation	Specifies the time slots assigned to this bundle. The software displays the configured timeslots and the available time slots.	Enter the number of the time slots that you want to configure for the bundle. • To enter a list of time slots, separate the list with commas. • To enter a range of time slots, separate the range with a hyphen (-).

CHAPTER 4

Administration

Activating, Disabling, or Deleting VComp Bundles (CTPView)

This topic describes how to change the status of bundles. You can recenter only active CTP and SAToP bundles. You cannot recenter VComp bundles.

Before you begin:

- Log in to the CTPView software at least at the Net_Admin level.
- Connect the CTPView server to the CTP device for which you want to configure bundles.
- Disable the bundle before you modify the bundle options.

To change the status of bundles:

1. In the side pane, select **Bundle > Change Status**.
2. Place check marks in the appropriate boxes, and click **Submit**.

Activating, Disabling, or Deleting VComp Bundles (CTP Menu)

This topic describes how to change the status of bundles. You can recenter only active CTP and SAToP bundles. You cannot recenter VComp bundles.

To activate, disable, delete, or recenter bundles using the CTP Menu:

1. From the Main Menu, select **1) Bundle Operations**.
2. Select **4) VCOMP**.

3. Select a bundle from the list.

4. From the menu, select the option that you want to perform on the bundle.

- 4) **Activate**

- 5) **Disable**

- 7) **Delete**

Displaying Running VComp Bundle Configuration, State, and Counters (CTPView)

This topic describes how to display the running configuration of your bundle along with the state and counters.

Before you begin:

- Log in to the CTPView software at least at the Net_Admin level.

- Connect the CTPView server to the CTP device for which you want to configure bundles.

- Disable the bundle before you modify the bundle options.

To view the configuration of a bundle:

1. In the side pane, select **Bundle > Runtime Query**.

2. Run your mouse over the **Display and Select an Existing Bundle** bar.

3. In the table of bundles, select the bundle that you want to view.

4. Click **Display Selected Bundles**.

The running configuration of the bundle appears along with the bundle state and counters. Table 20 on page 34 describes the fields in the bundle state and counters sections.

Table 20: VComp Bundle Runtime State and Counters in CTPView

Field Name	Field Description
Runtime State	ACTIVE or DISABLED
DSP Info(dsp/bndl)	Indicates which voice compression module (DSP) the bundle is built on, as well as the bundle allocation ID on the voice compression module.
Voice Channel Signaling	Current voice signaling. This field is displayed for VComp bundles that carry analog voice interfaces as well as VComp bundles that transport T1/E1 ports with signaling enabled. This information is not displayed for VComp bundles transporting channels from T1/E1 interfaces with signaling disabled. Under Chan Src, the XX: prefix indicates the channel number.
I/F bound packets	Number of packets received from the IP network destined for the bundle.
NET bound packets	Number of packets created by the bundle and sent to the IP network.

Table 20: VComp Bundle Runtime State and Counters in CTPView *(continued)*

Field Name	Field Description
Missing pkts	Number of packets destined for the bundle that were not available at the time when that data was needed. This unavailability may be due to a dropped packet in the IP network or to a packet that arrived too late at the CTP device to be processed out the interface. Both dropped and late packets cause the missing packet counter to increment.
Buffer underflows	Number of times the buffer reached the minimum set threshold.
Buffer overflows	Number of times the buffer reached the maximum set threshold.
Buffer starves	Indicates an exceeded threshold. The CTP device is designed to tolerate strings of consecutive missing packets without the loss of bit count integrity. The number of packets is configurable; the default is five (5). Exceeding this threshold is called a starvation, and a counter is incremented each time this event occurs.
Buffer average	Average buffer size in ms.

Displaying Running VComp Bundle Configuration and Counters (CTP Menu)

To display a bundle using the CTP Menu:

1. From the Main Menu, select **1) Bundle Operations**.
2. Select **4) VCOMP**.
3. Select a bundle from the list.
4. Select **1) Query**.

Table 21: VComp Bundle Runtime State Counters in the CTP Menu

Field Name	Field Description
Runtime State	ACTIVE or DISABLED
DSP Info(dsp/bndl)	Indicates which voice compression module (DSP) the bundle is built on, as well as the bundle allocation ID on the voice compression module.
Voice Channel Signaling	Current voice signaling. This field is displayed for VComp bundles that carry analog voice interfaces as well as VComp bundles that transport T1/E1 ports with signaling enabled. This information is not displayed for VComp bundles transporting channels from T1/E1 interfaces with signaling disabled. Under Chan Src, the XX: prefix indicates the channel number.
T1E1 flags	Current T1 or E1 flag: • LOS—Loss of signal • LOF—Loss of frame
I/F bound packets	Number of packets received from the IP network destined for the bundle.

Table 21: VComp Bundle Runtime State Counters in the CTP Menu *(continued)*

Field Name	Field Description
NET bound packets	Number of packets created by the bundle and sent to the IP network.
Missing pkts	Number of packets destined for the bundle that were not available at the time when that data was needed. This unavailability may be due to a dropped packet in the IP network or to a packet that arrived too late at the CTP device to be processed out the interface. Both dropped and late packets cause the missing packet counter to increment.
Buffer underflows	Number of times the buffer reached the minimum set threshold.
Buffer overflows	Number of times the buffer reached the maximum set threshold.
Buffer starves	Indicates an exceeded threshold. The CTP device is designed to tolerate strings of consecutive missing packets without the loss of bit count integrity. The number of packets is configurable; the default is five (5). Exceeding this threshold is called a starvation, and a counter is incremented each time this event occurs.
Buffer average	Average buffer size in ms.