Configuring the Cisco SM-X-PVDMModule

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Introduction

The Cisco SM-X-PVDM module provides DSP for IP-based voice applications. This document provides information about how to configure the Cisco SM-X-PVDM module.

Overview of Cisco SM-X-PVDM Module

The Cisco Service Module Packet Voice Digital Signal Processor Module (SM-X-PVDM) enables Cisco 4300 and Cisco 4400 Series Integrated Services Routers (ISRs) to provide rich-media capabilities such as high-density voice connectivity, conferencing, transcoding, media optimization, transrating, and secure voice in Cisco Unified Communications Solutions.

Software Requirements

The Cisco SM-X-PVDM module requires the Cisco IOS XE Release 3.16.1S or later releases.

Information about Configuring the Cisco SM-X-PVDM Module

Cisco SM-X-PVDM Module provides DSP resources that enable Cisco Integrated Services Routers to provide voice, conference, transcoding, and other collaboration services.

You should understand the following concepts for configuring the Cisco SM-X-PVDM module.

DSP-farm Profiles

A DSP-farm is the collection of DSP resources. The DSP farm uses the DSP resources in network modules on Cisco routers to provide voice-conferencing, transcoding, and MTP services. A DSP-farm profile allows you to group DSP resources based on the service type. Under a DSP farm profile, you select the service type (conference, transcode, or Media Termination Point [MTP]), associate an application, and specify service-specific parameters such as codecs and maximum number of sessions. Applications associated with the profile, such as SCCP and CUBE, can use the resources allocated under the profile. You can configure multiple profiles for the same service. If the associated application is SCCP, the profiles can be registered with one Cisco Unified Communications Manager group. If the associated application is CUBE, then the DSP farm profile registers to CUBE itself.

The profile ID and service type uniquely identify a profile, allowing the profile to uniquely map to a Cisco Unified Communications Manager group that contains a single pool of Cisco Unified Communications Manager servers.

Conferencing

Voice conferencing involves adding several parties to a phone conversation. In a traditional circuit-switched voice network, all voice traffic passes through a central device such as a PBX. Conference services are provided within this central device. In contrast, IP phones normally send voice signals directly between phones, without

the need to go through a central device. Conference services, however, require a network-based conference bridge.

In an IP telephony network using Cisco Unified Communications Manager, the Conferencing and Transcoding for Voice Gateway Routers feature provides the conference-bridging service. Cisco Unified Communications Manager uses a DSP farm to mix voice streams from multiple participants into a single conference-call stream. The mixed stream is played to all conference attendees, minus the voice of the receiving attendee.

A conference can be either an Ad Hoc conference or Meet-Me conference. In an Ad Hoc conference, the person controlling the conference presses the telephone conference button and adds callers one by one. While in a Meet-Me conference, participants call in to a central number and are joined in a single conference.

Participants whose end devices use different codec types are joined in a single conference; no additional transcoding resource is needed.

Transcoding

Transcoding compresses and decompresses voice streams to match endpoint-device capabilities. Transcoding is required when an incoming voice stream is digitized and compressed (by means of a codec) to save bandwidth, but the local device does not support that type of compression. Ideally, all IP telephony devices would support the same codecs, but this is not the case. Rather, different devices support different codecs.

Transcoding is processed by DSPs on the DSP farm; sessions are initiated and managed by Cisco Unified Communications Manager which also refers to transcoders as hardware MTPs.

Media Termination Point

A Media Termination Point (MTP) bridges the media streams between two connections, allowing Cisco Unified Communications Manager to relay calls that are routed through SIP or H.323 endpoints.

Restrictions for Configuring the Cisco SM-X-PVDM Module

The Cisco SM-X-PVDM module supports the following DSP farm profiles:

- Cisco Unified Border Element (CUBE) application transcode profile
- Skinny Call Control Protocol (SCCP) application transcode profile
- SCCP application conference profile

Configuring a DSP-farm Profile on the Cisco SM-X-PVDM Module for SCCP

Perform this procedure to define a DSP-farm on Cisco SM-X-PVDM module for SCCP. Configure a separate profile for each conferencing transcoding, and MTP profile.

Summary Steps

1. **enable**
2. **configure terminal**
3. **sccp ccm** {*ip-address*|*dns*} identifier *identifier-number* [port *port-number*]
4. **sccp local** *interface-type interface-number*
5. **sccp**

6 **voice-card** *slot / subslot*
7 **dsp services dspfarm**
8 **exit**
9 **dspfarm profile** *profile-identifier* {**conference** | **mtp** | **transcode** [**universal**]}
10 **description** *text*
11 **maximum conference-participants** *number*
12 **codec** *codec-type*
13 **maximum sessions** *number*
14 **associate application sccp**
15 **no shutdown**
16 **exit**
17 **sccp ccm group** *group-number*
18 **associate ccm** *identifier-number* **priority** *priority-number*
19 **associate profile** *profile-identifier* **register** *device-name*
20 **bind interface** *interface-type interface-number*
21 **end**

Detailed Steps

Step	Command	Purpose
Step 1	**enable** Router> enable	Enables privileged EXEC mode.Enter your password if prompted.
Step 2	**configure terminal** Router# configure terminal	Enters global configuration mode.
Step 3	**sccp ccm** {*ip-address* | *dns*} **identifier** *identifier-number* [**port** *port-number*] Router(config)# sccp ccm 10.0.0.1 identifier 1 version 7.0	Adds a Cisco Unified Communications Manager server to the list of available servers to which the Cisco voice gateway can register.
Step 4	**sccp local** *interface-type interface-number* Router(config)# sccp local GigabitEthernet0/0/0	Selects the local interface that SCCP applications use to register with Cisco Unified Communications Manager.
Step 5	**sccp** Router(config)# sccp	Enables SCCP and brings it up administratively.
Step 6	**voice-card** *slot/subslot* Router(config)# voice-card 0/4	Enters voice-card configuration mode for the network module on which you want to enable DSP-farm services.

Step	Command	Purpose
Step 7	**dsp services dspfarm** Router(config-voicecard)# dsp services dspfarm	Enables DSP-farm services for the voice card.
Step 8	**exit** Router(config-voicecard)# exit	Exits voice-card configuration mode.
Step 9	**dspfarm profile** *profile-identifier* {**conference** | **mtp** | **transcode** [**universal**]} Router(config)# dspfarm profile 20 conference	Enters DSP-farm profile configuration mode to define a profile for DSP-farm services. **Note** Note: The profile-identifier and service type uniquely identify a profile. If the service type and profile-identifier pair is not unique, you are prompted to choose a different profile-identifier.
Step 10	**description** *text* Router(config-dspfarm-profile)# description art_dept	(Optional) Includes a specific description about the Cisco DSP-farm profile.
Step 11	**maximum conference-participants** *number* Router(config-dspfarm-profile)# maximum conference-participants 8	(Optional) Specifies the maximum number of conference participants. In most situations, the default value of 8 is appropriate. Possible values: 8, 16, 32, or 64. The range of possible values depends on the codec being used. For example, if using a G.722, G.729, or ilbc codec, the possible values are 8, 16, or 32. Default: 8
Step 12	**codec** *codec-type* Router(config-dspfarm-profile)# codec ilbc	Specifies the codecs supported by a DSP farm profile. Repeat this step for each codec supported by the profile.

Step	Command	Purpose
Step 13	**maximum sessions** *number* Router(config-dspfarm-profile)# maximum sessions 4	Specifies the maximum number of sessions that are supported by the profile. *number* —Range is determined by the available registered DSP resources. Default is 0.
Step 14	**associate application sccp** Router(config-dspfarm-profile)# associate application sccp	Associates the SCCP protocol to the DSP-farm profile.
Step 15	**no shutdown** Router(config-dspfarm-profile)# no shutdown	Enables the profile, allocates DSP-farm resources, and associates the application.
Step 16	**exit** Router(config-dspfarm-profile)# exit	Exits DSP-farm profile configuration mode.
Step 17	**sccp ccm group** *group-number* Router(config)# sccp ccm group 1	Creates a Cisco Unified Communications Manager group and enters SCCP Cisco Unified Communications Manager configuration mode.
Step 18	**associate ccm** *identifier-number* **priority** *priority-number* Router(config-sccp-ccm)# associate ccm 1 priority 1	Adds a Cisco Unified Communications Manager server to the Cisco Unified Communications Manager group and establishes its priority within the group.
Step 19	**associate profile** *profile-identifier* **register** *device-name* Router(config-sccp-ccm)# associate profile 4 register abgz12345	Associates a DSP farm profile to the Cisco Unified Communications Manager group.
Step 20	**bind interface** *interface-type interface-number* Router(config-sccp-ccm)# bind interface GigabitEthernet0/0/0	Binds an interface to the Cisco Unified Communications Manager group.
Step 21	**end** Router(config-sccp-ccm)# end	Exits to privileged EXEC mode.

Configuring a DSP-farm Profile on the Cisco SM-X-PVDM Module for CUBE

Perform this procedure to define a DSP-farm on the Cisco SM-X-PVDM module for CUBE.

Summary Steps

1. **enable**
2. **configure terminal**
3. **voice-card** *slot/subslot*
4. **dsp services dspfarm**
5. **exit**
6. **dspfarm profile** *profile-identifier* {**conference** | **mtp** | **transcode** [**universal**]}
7. **description** *text*
8. **codec** *codec-type*
9. **maximum sessions** *number*
10. **associate application cube**
11. **no shutdown**
12. **end**

Detailed Steps

Step	Command	Purpose
Step 1	**enable** Router> enable	Enables privileged EXEC mode.Enter your password if prompted.
Step 2	**configure terminal** Router# configure terminal	Enters global configuration mode.
Step 3	**voice-card** *slot/subslot* Router(config)# voice-card 0/4	Enters voice-card configuration mode for the network module on which you want to enable DSP-farm services.
Step 4	**dsp services dspfarm** Router(config-voicecard)# dsp services dspfarm	Enables DSP-farm services for the voice card.
Step 5	**exit** Router(config-voicecard)# exit	Exits voice-card configuration mode.

Step	Command	Purpose
Step 6	**dspfarm profile** *profile-identifier* {**conference** | **mtp** | **transcode** [**universal**]} Router(config)# dspfarm profile 20 conference	Enters DSP-farm profile configuration mode to define a profile for DSP-farm services. **Note** Note: The profile-identifier and service type uniquely identify a profile. If the service type and profile-identifier pair is not unique, you are prompted to choose a different profile-identifier.
Step 7	**description** *text* Router(config-dspfarm-profile)# description art_dept	(Optional) Includes a specific description about the Cisco DSP-farm profile.
Step 8	**codec** *codec-type* Router(config-dspfarm-profile)# codec ilbc	Specifies the codecs supported by a DSP farm profile. Repeat this step for each codec supported by the profile.
Step 9	**maximum sessions** *number* Router(config-dspfarm-profile)# maximum sessions 4	Specifies the maximum number of sessions that are supported by the profile. *number* —Range is determined by the available registered DSP resources. Default is 0.
Step 10	**associate application cube** Router(config-dspfarm-profile)# associate application cube	Associates the CUBE application to the DSP farm profile.
Step 11	**no shutdown** Router(config-dspfarm-profile)# no shutdown	Enables the profile, allocates DSP-farm resources, and associates the application.
Step 12	**end** Router(config-sccp-ccm)# end	Exits to privileged EXEC mode.

Example: Configuring DSP Farm Services on the Cisco SM-X PVDM Module

The following example shows a configuration of conferencing, transcoding and MTP services on a Cisco SM-X PVDM module.

```
Router# show running-config
Current configuration : 7469 bytes
!
! Last configuration change at 15:24:36 PDT Mon May 24 2010
!
version 15.5
service timestamps debug datetime msec localtime show-timezone
service timestamps log datetime msec localtime show-timezone
service internal
no platform punt-keepalive disable-kernel-core
platform shell
platform trace runtime slot 0 bay 1 process iomd module ngio-osal level debug
platform trace runtime slot 2 bay 0 process iomd module ngio-osal level info
platform trace runtime slot 2 bay 0 process iomd module srvcs-if-module level info
!
hostname cisco
!
boot-start-marker
boot-end-marker
!
!
logging buffered 6553600
no logging console
enable password lab
!
no aaa new-model
clock timezone PDT -7 0
!
!
ip host dirt 171.70.42.150
ip host CUCM 128.107.147.80
ip domain round-robin
!
subscriber templating
!
multilink bundle-name authenticated
!
!
voice dsp crash-dump destination bootflash:
!
voice service voip
 no ip address trusted authenticate
 allow-connections h323 to h323
 allow-connections h323 to sip
 allow-connections sip to h323
 allow-connections sip to sip
 fax protocol t38 version 0 ls-redundancy 0 hs-redundancy 0 fallback none
 h323
  h245 passthru tcsnonstd-passthru
 sip
  bind control source-interface GigabitEthernet0/0/0
  bind media source-interface GigabitEthernet0/0/0
  asymmetric payload full
!
voice class codec 1
 codec preference 1 g711ulaw
 codec preference 2 g711alaw
 video codec h264 profile 1
!
voice class codec 2
 codec preference 1 g711ulaw
 codec preference 2 g729r8
 video codec h264 profile 1
!
!
```

```
voice pcm capture destination tftp://223.255.254.254/simonzh/test.dat
voice pcm capture on-demand-trigger
voice pcm capture user-trigger-string *** ### stream 7 duration 0
!
voice-card 0/1
 no watchdog
!
voice-card 0/4
 no watchdog
!
voice-card 1/0
 dsp services dspfarm
 no watchdog
!
voice-card 2/0
 no watchdog
!
license udi pid ISR4452/K9 sn FOC15507S6V
license boot level uck9
license boot level securityk9
no memory lite
!
spanning-tree extend system-id
!
!
redundancy
 mode none
!
vlan internal allocation policy ascending
!
!
!
!
!
interface GigabitEthernet0/0/0
 ip address 172.19.155.10 255.255.255.0
 media-type rj45
 negotiation auto
!
interface GigabitEthernet0/0/1
 ip address 1.4.134.200 255.255.255.0
 media-type rj45
 negotiation auto
!
interface GigabitEthernet0/0/2
 ip address 10.1.1.1 255.255.255.0
 media-type rj45
 negotiation auto
!
interface GigabitEthernet0/0/3
 ip address 2.2.2.100 255.255.255.0
 media-type rj45
 negotiation auto
!
interface Service-Engine0/1/0
!
interface Service-Engine0/4/0
!
interface Service-Engine1/0/0
!
interface Service-Engine2/0/0
!
interface GigabitEthernet0
 no ip address
 shutdown
 negotiation auto
!
interface Vlan1
 no ip address
 shutdown
!
ip default-gateway 172.19.155.1
ip forward-protocol nd
```

```
no ip http server
no ip http secure-server
ip route 0.0.0.0 0.0.0.0 GigabitEthernet0/0/0
ip route 1.4.0.0 255.255.0.0 GigabitEthernet0/0/1
ip route 2.2.0.0 255.255.0.0 GigabitEthernet0/0/3
ip route 10.1.0.0 255.255.0.0 GigabitEthernet0/0/2
ip route 14.0.0.0 255.0.0.0 GigabitEthernet0/0/1
ip route 223.255.0.0 255.255.0.0 GigabitEthernet0/0/1
!
!
!
snmp-server community public RW
snmp-server community server RW
snmp-server enable traps tty
snmp-server host 128.107.151.60 version 2c public
!
!
control-plane
!
!
voice-port 0/1/0
!
voice-port 0/1/1
!
voice-port 0/1/2
!
voice-port 0/1/3
!
voice-port 0/1/4
!
voice-port 0/1/5
 !
 !
 !
 !
!
mgcp behavior rsip-range tgcp-only
mgcp behavior comedia-role none
mgcp behavior comedia-check-media-src disable
mgcp behavior comedia-sdp-force disable
!
mgcp profile default
!
sccp local GigabitEthernet0/0/0
sccp ccm 128.107.147.80 identifier 1 version 7.0
sccp ccm 172.19.155.91 identifier 2 version 7.0
!
sccp ccm group 1
 bind interface GigabitEthernet0/0/0
 associate ccm 1 priority 1
 associate profile 4 register sword-skye
 associate profile 3 register xcode-skye
 associate profile 2 register O2_155_10
!
!
!
dspfarm profile 1 transcode
 codec g729abr8
 codec g729ar8
 codec g711alaw
 codec g711ulaw
 maximum sessions 10
 associate application CUBE
!
dspfarm profile 3 transcode
 codec g729abr8
 codec g729ar8
 codec g711alaw
 codec g711ulaw
 maximum sessions 10
 associate application SCCP
!
dspfarm profile 2 conference
```

```
 codec g729br8
 codec g729r8
 codec g729abr8
 codec g729ar8
 codec g711alaw
 codec g711ulaw
 maximum sessions 10
 associate application SCCP
!
dspfarm profile 4 mtp
 codec g711ulaw
 maximum sessions 10
 associate application SCCP
!
codec profile 1 h264
 fmtp "fmtp:97 profile-level-id=42801E; packetization-mode=0;level-asymmetry-allowed=1"
!
!
dial-peer voice 100 pots
 destination-pattern 100
 incoming called-number 100
 direct-inward-dial
 forward-digits all
 prefix 6
!
dial-peer voice 6100 voip
 destination-pattern 6100
 modem relay nse codec g711ulaw gw-controlled
 session protocol sipv2
 session target ipv4:1.4.134.100
 codec g711ulaw
 fax protocol t38 version 3 ls-redundancy 0 hs-redundancy 0 fallback none
!
dial-peer voice 70001 voip
 destination-pattern 11...
 rtp payload-type cisco-codec-fax-ack 106
 rtp payload-type cisco-codec-mp4a-latm 102
 rtp payload-type cisco-codec-video-h264 97
 session protocol sipv2
 session target ipv4:172.19.155.91
 voice-class sip bandwidth video tias-modifier 1000000
 codec g711alaw
!
dial-peer voice 70000 voip
 session protocol sipv2
 incoming called-number 11...
 voice-class sip bandwidth video tias-modifier 1000000
 codec g711ulaw
!
dial-peer voice 6622 voip
 destination-pattern 6622
 video codec h264 profile 1
 session protocol sipv2
 session target ipv4:128.107.147.80
 voice-class sip bandwidth video tias-modifier 1000000
 codec g711alaw
!
dial-peer voice 622 voip
 video codec h264 profile 1
 session protocol sipv2
 incoming called-number 6622
 voice-class sip bandwidth video tias-modifier 1000000
!
dial-peer voice 2000 voip
 session protocol sipv2
 incoming called-number 2...
 dtmf-relay sip-notify
 codec g711ulaw
!
dial-peer voice 2001 voip
 destination-pattern 2...
 session protocol sipv2
 session target ipv4:1.4.134.100
```

```
 codec g711alaw
!
dial-peer voice 3000 voip
 session protocol sipv2
 incoming called-number 3...
 codec g711ulaw
!
dial-peer voice 3001 voip
 destination-pattern 3...
 session protocol sipv2
 session target ipv4:1.4.134.100
 codec g711alaw
!
dial-peer voice 9991 pots
 destination-pattern 2019
!
dial-peer voice 5250900 voip
 session protocol sipv2
 incoming called-number 52509..
 codec g711ulaw
!
dial-peer voice 5250901 voip
 destination-pattern 52509..
 session protocol sipv2
 session target ipv4:2.2.2.27
 codec g711alaw
!
dial-peer voice 5250600 voip
 session protocol sipv2
 incoming called-number 52506..
 codec g711ulaw
!
dial-peer voice 5250601 voip
 destination-pattern 52506..
 session protocol sipv2
 session target ipv4:2.2.2.16
 codec g711alaw
!
dial-peer voice 5250700 voip
 session protocol sipv2
 incoming called-number 52507..
 codec g711ulaw
!
dial-peer voice 5250701 voip
 destination-pattern 52507..
 session protocol sipv2
 session target ipv4:2.2.2.26
 codec g711alaw
!
dial-peer voice 7100 voip
 destination-pattern 7100
 session protocol sipv2
 session target ipv4:128.107.147.80
!
!
!
line con 0
 exec-timeout 0 0
 privilege level 15
 stopbits 1
line aux 0
 stopbits 1
line vty 0 4
 exec-timeout 0 0
 privilege level 15
 password lab
 no login
 transport input all
!
!
end
```

Troubleshooting

The following table shows the commands useful for diagnostic information related to Cisco SM-X-PVDM module and also for verifying the configuration.

Table 1: Commands Useful for Troubleshooting Cisco SM-X-PVDM Module

Command	Description
show hw-module subslot [*slot*/*subslot*]	Displays diagnostic information about the Cisco SM-X-PVDM module
show platform hardware subslot [*slot*/*bay*] **module** [**host-if** [**status**]]	Displays the configuration, status, and interface ID for the host interface.
show dspfarm profile [*profile-number*]	Displays information about the configured DSP farm profiles.
show sccp	Verifies that DSP farm is registered.

Additional Resources

Related Documentation

- Connecting the Cisco SM-X-PVDM module

http://www.cisco.com/c/en/us/td/docs/routers/access/interfaces/sm/hardware/installation/guide/sm-x-pvdm.html

- Open source license

http://www.cisco.com/c/dam/en/us/td/docs/routers/access/interfaces/sm/software/license/sm-x-pvdm-opensource.pdf

- Cisco Fourth-Generation Packet Voice Digital Signal Processor Module for Cisco Unified Communications Solutions Data Sheet

Technical Assistance

The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.

http://www.cisco.com/cisco/web/support/index.html

Conventions

This document uses the following conventions.

Conventions	Indication
bold font	Commands and keywords and user-entered text appear in **bold** font.
italic font	Document titles, new or emphasized terms, and arguments for which you supply values are in *italic* font.
[ ]	Elements in square brackets are optional.
{x | y | z }	Required alternative keywords are grouped in braces and separated by vertical bars.
[x | y | z]	Optional alternative keywords are grouped in brackets and separated by vertical bars.
string	A nonquoted set of characters. Do not use quotation marks around the string or the string will include the quotation marks.
courier font	Terminal sessions and information the system displays appear in courier font.
< >	Nonprinting characters such as passwords are in angle brackets.
[ ]	Default responses to system prompts are in square brackets.
!, #	An exclamation point (!) or a pound sign (#) at the beginning of a line of code indicates a comment line.

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, using the Cisco Bug Search Tool (BST), submitting a service request, and gathering additional information, see What's New in Cisco Product Documentation at: http://www.cisco.com/c/en/us/td/docs/general/whatsnew/whatsnew.html .

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