Virtual DSP

Virtual DSPs

A virtual DSP resource is a software-based DSP solution that

- provides voice processing functions such as transcoding, conferencing, and hardware media termination point services,
- operates using router CPU resources rather than dedicated DSP chips, and,
- enables hardware-independent deployment of voice services.

Benefits

- Virtual DSP eliminates the need for physical DSP hardware modules and can be deployed on routers that do not have physical DSP slots.
- Virtual DSP capacity can be adjusted based on CPU availability and call volume.

Restrictions

- For 17.18.2, vDSP is supported in autonomous mode only.
- No multi-app support. vDSP cannot co-exist with another container applications such as UTD , TE or any other vDSP on the same box.

Supported vDSP profiles

The table provides an insight into the supported vDSP profiles on Cisco 8200 Series Secure Routers and Cisco 8300 Series Secure Routers.

Table 1: Supported vDSP profiles

vDSP profile	C8231-G2 C8235-G2	C8231-E-G2 C8235-E-G2	C8355-G2	C8375-E-G2
vDSP-32	Y	Y	Y	Y
vDSP-64	Y	Y	Y	Y
vDSP-256	Y	Y	Y	Y
vDSP-512			Y	Y
vDSP-1024			Y	Y
vDSP-2048			Y	Y

Use the command **show voice dsp capabilities** to show the supported vDSP profiles on the router.

This example shows the vDSP capabilities of C8375-E-G2.

```
Device#show voice dsp capabilities
Supported vDSP profiles are:
vDSP-32     (Max credits 3360)
vDSP-64     (Max credits 6720)
vDSP-256    (Max credits 26880)
vDSP-512    (Max credits 53760)
vDSP-1024   (Max credits 107520)
vDSP-2048   (Max credits 215040)

Current active vDSP profile is vDSP-2048

Credit Information:

Transcode Credit:
LC (G711) Credits: 105
MC (G722/G729a) Credits: 240
HC (iLBC/G729) Credits: 420
VHC (iSAC/Opus) Credits: 420

Universal Transcode Credit:
LC (G711) Credits: 105
MC (G722/G729a) Credits: 336
HC (iLBC/G729) Credits: 672
VHC (iSAC/Opus) Credits: 840

Conference 8-party credits:
LC (G711) Credits: 420
MC (G722) Credits: 672
HC (G729/G729a) Credits: 1120
VHC (iLBC) Credits: 1120
```

The max credits for each capability is the processing power of the IP-IP services supported such as transcoding and conferencing.

Download vDSP container

The vDSP container software is hosted on Cisco Software Central.

Note Each IOS XE version has a corresponding recommended vDSP version to ensure optimal performance. The vDSP package name specifies both the vDSP version and the compatible IOS XE version.

If the vDSP file name is `vDSP package name: vDSP_2.1.0_17.18.2.aarch64.tar` , then

vDSP version	2.1.0 Major version : 2 Minor version : 1 Official release 0
IOS-XE version	17.18.2

Download the vDSP package fthat matches the IOS XE version and install it on the router bootflash. Copy the vDSP image to the router flash using any supported method, such as tftp, scp, ftp or http.

```
copy tftp://IPaddress/vDSP.tar flash:
```

Enable Cisco IOx

Enable IOx service using these commands.

```
Device#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Device(config)#iox
```

Configure a VirtualPortGroup

This task outlines steps to configure a VirtualPortGroup.

Procedure

Step 1 Configure the VirtualPortGroup interface and enter interface configuration mode. The valid range for <number> is 0 to 31.

Example:

```
Device(config)#interface VirtualPortGroup0
 Device(config)#description vDSP
 Device(config)#ip address 192.168.253.250 255.255.255.252
```

Note
The `ip address` configured here is a private IP address, which is used only within a local network and is not intended to be reachable or routed on the public internet or outside the local device or network segment.

Step 2 Verify that VPG 0 has an IP address, and ensure the status is up.

Example:

```
Device#show ip int brief
Interface              IP-Address      OK? Method Status                Protocol
Tw0/0/0                172.19.155.52   YES NVRAM  up                    up
Tw0/0/1                3.3.3.52        YES NVRAM  up                    up
Tw0/0/2                4.4.4.52        YES NVRAM  up                    up
Tw0/0/3                2.2.2.52        YES NVRAM  up                    up
Te0/0/4                192.168.10.52   YES NVRAM  down                  down
Te0/0/5                unassigned      YES NVRAM  administratively down down
GigabitEthernet0       unassigned      YES NVRAM  up                    up
VirtualPortGroup0      192.168.253.250 YES NVRAM  up                    up
```

Configure vDSP application

This task outlies the steps to configure a vDSP application on your device.

Procedure

Step 1 Use this command to enters global configuration mode, and then enter configuration commands, one per line. Press CTRL-Z when you are finished entering configuration commands.

Example:

```
Device# configure terminal
```

Step 2 Use this command to configure the application and enter the application configuration mode.

Example:

```
Device(config)# app-hosting appid vdsp
```

The `appid` name can be defined by user using any string. However, vdsp is recommended.

Step 3 Use the app-vnic command to configure the application interface and the gateway of the application.

Example:

```
Device(config-app-hosting)# app-vnic gateway0 virtualportgroup 0 guest-interface 0
```

The virtualportgroup number must match with the number configured earlier. And the guest-interface number could be 0.

Step 4 Use the guest-ipaddress command to configure the application Ethernet interface IP address.

Example:

```
Device(config-app-hosting-gateway0)# guest-ipaddress 192.168.253.249 netmask 255.255.255.255
```

Step 5 Use the app-default-gateway command to configure the default gateway for the application.

Example:

```
Device(config-app-hosting-gateway0)# app-default-gateway 192.168.253.250 guest-interface 0
```

The app-default-gateway IP should be the same as VPG IP. And the guest-interface number should match virtualportgroup number.

Step 6 Assign a profile size for the device. This profile size determines the number of resources allocated for application hosting on the device. Use the command **`show voice dsp capabilities`** to show the supported vDSP profiles or see Supported vDSP profiles.

Step 7 Enter this command to exit global configuration mode and return to privileged EXEC configuration mode.

Example:

```
Device# end
```

Install vDSP container

This task oulines the steps to follow to install a vDSP container.

Procedure

Step 1 Install the vDSP container application.

Example:

```
app-hosting install appid vdsp package flash: vDSP_2.1.0_17.18.02eftr1.aarch64.tar
```

Note
Use the `appid` defined in the app-hosting config.

Step 2 Manually activate and start the vDSP application.

Example:

```
app-hosting activate appid vdsp
app-hosting start appid vdsp
```

If `start` is configured in the `app-hosting appid vdsp`, the vdsp application will automatically be activated and started.

Step 3 Verify all the DSP groups.

Example:

```
Device#show voice dsp group

DSP groups on vdsp
DSP recommended version: 2.1.0

dsp 1:
  State: UP, firmware version: 2.1.0
  Max voice channel: 256
  Max credits: 26880.  Transcoding channels allocated: 0
```

```
Group: FLEX_GROUP_VOICE, complexity: FLEX
  Shared credits: 26880, reserved credits: 0
  Voice channels allocated: 0
  Credits used (rounded-up): 0
```

Step 4 Configure dspfarm profile to reserve transcoding or conference resources and start making calls. For more information on how to configure dspfarm profile see, Configuring Conferencing and Transcoding for Voice Gateway Routers.

Uninstall vDSP

To uninstall a vDSP configuration, use these commands.

```
app-hosting stop appid vdsp
app-hosting deactivate appid vdsp
app-hosting uninstall appid vdsp
```

Upgrade or downgrade vDSP

To upgrade or downgrade a vDSP version, it is recommended to uninstall vDSP, change the IOS image, and then install the matching vDSP again.

The `app-hosting upgrade appid vdsp package bootflash:new-vDSP-image.tar` command to automatically stops, deactivates, upgrades, activates, and restarts vDSP.

Use these commands to manually upgrade the vDSP:

```
app-hosting stop appid vdsp
app-hosting deactivate appid vdsp
app-hosting upgrade appid vdsp package bootflash:new-vDSP-image.tar
app-hosting activate appid vdsp
app-hosting start appid vdsp
```

Verification commands

Use the commands listed to verify the vDSP installation or configuration.

Commands	Description
show app-hosting list	Displays information about the applications hosted on the device. It lists the application IDs along with their current states, such as RUNNING or ACTIVATED.
show app-hosting detail appid vdsp	Displays detailed information about the application with the application ID "vdsp" hosted on the device.
show app-hosting utilization appid vdsp	Displays the resource utilization information for the application with the application ID "vdsp" hosted on the device.

Commands	Description
`show voice dsp group`	Displays information about DSP groups related to voice resources on the device.
`show voice dsp capabilities`	Displays the capabilities of a specific DSP on the device.