Q&A

CISCO HIGH-DENSITY ANALOG AND DIGITAL EXTENSION MODULE FOR VOICE AND FAX

COMPONENTS OF THE CISCO HIGH-DENSITY EXTENSION MODULE

Q. What are the components of the Cisco® High-Density Extension Module?

A. The Cisco High-Density Extension Module (Figure 1) consists of a baseboard and up to two optional expansion modules. The 8-port FXS/DID extension module baseboard (part number EVM-HD-8FXS/DID) supports eight foreign exchange station (FXS) or direct inward dialing (DID) ports. Customers may select 0, 1, or 2 expansion modules, which simply plug into the extension module baseboard to increase the voice and fax session capacity of the extension module—up to a maximum of 24 total voice and fax ports.

Figure 1. Cisco High-Density Analog and Digital Extension Module for Voice and Fax

Q. Which Cisco IOS® Software release introduces support for the Cisco High-Density Extension Module?

A. Cisco IOS Software Release 12.3(8)T4

Q. Which expansion modules work with the Cisco High-Density Extension Module baseboard in Cisco IOS Software Release 12.3(8)T4?

A. Two expansion modules are available with Cisco IOS Software Release 12.3(8)T4:

- A 4-port BRI expansion module (part number EM-4BRI-NT/TE)—A 4-port voice and fax expansion module supporting BRI (NT and TE)
- An 8-port FXS expansion module (part number EM-HDA-8FXS)—An 8-port voice and fax expansion module supporting FXS

Table 1 lists the configurations available for the Cisco High-Density Extension Module with Cisco IOS Software Release 12.3(8)T4.

Table 1. High-Density Extension Module Configurations Available with Cisco IOS Software Release 12.3(8)T4

Baseboard 8 FXS or DID	EM0	EM1	Total					
			FXS or DID	FXS	FXO	BRI		Module
						Ports	B-Ch	
EVM-HD-8FXS/DID	-	-	8					8
	EM-HDA-8FXS		8	8				16
	EM-HDA-8FXS	EM-HDA-8FXS	8	16				24
	EM-HDA-8FXS	EM-4BRI-NT/TE	8	8		4	8	24
	EM-4BRI-NT/TE	-	8			4	8	16
	EM-4BRI-NT/TE	EM-4BRI-NT/TE	8			8	16	24

Note: Each BRI port supports: two B-channels plus one D-channel

Q. Which expansion modules work with the Cisco High-Density Extension Module baseboard in Cisco IOS Software Release 12.3(11)T?

A. Cisco IOS Software Release 12.3(11)T introduces two additional expansion modules for the Cisco High-Density Extension Module:

- A 6-port FXO expansion module (part number EM-HDA-6FXO)—A 6-port voice and fax expansion module supporting FXO
- A 7-port FXS and FXO expansion module (part number EM-HDA-3FXS/4FXO)—A 7-port voice and fax expansion module with 3 FXS and 4 FXO ports

Table 2 lists the configurations available for the Cisco High-Density Extension Module with Cisco IOS Software Release 12.3(11)T.

Table 2. High-Density Extension Module Configurations Available with Cisco IOS Software Release 12.3(11)T

Baseboard 8 FXS or DID	EM0	EM1	Total					
			FXS or DID	FXS	FXO	BRI		Module
						Ports	B-Ch	
EVM-HD-8FXS/DID	-	-	8					8
	EM-HDA-8FXS		8	8				16
	EM-HDA-8FXS	EM-HDA-8FXS	8	16				24
	EM-HDA-8FXS	EM-HDA-3FXS/4FXO	8	11	4			23
	EM-HDA-8FXS	EM-HDA-6FXO	8	8	6			22
	EM-HDA-8FXS	EM-4BRI-NT/TE	8	8		4	8	24
	EM-HDA-3FXS/4FXO	-	8	3	4			15
	EM-HDA-3FXS/4FXO	EM-HDA-3FXS/4FXO	8	6	8			22
	EM-HDA-3FXS/4FXO	EM-HDA-6FXO	8	3	10			21
	EM-HDA-3FXS/4FXO	EM-4BRI-NT/TE	8	3	4	4	8	23
	EM-HDA-6FXO	-	8		6			14
	EM-HDA-6FXO	EM-HDA-6FXO	8		12			20
	EM-HDA-6FXO	EM-4BRI-NT/TE	8		6	4	8	22
	EM-4BRI-NT/TE	-	8			4	8	16
	EM-4BRI-NT/TE	EM-4BRI-NT/TE	8			8	16	24

Note: Each BRI port supports: two B-channels plus one D-channel

CISCO ROUTER SUPPORT FOR THE CISCO HIGH-DENSITY EXTENSION MODULE

Q. Which Cisco Systems® routers support the Cisco High-Density Extension Module?

A. Cisco 2821, Cisco 2851, Cisco 3825, and Cisco 3845 integrated services routers support the Cisco High-Density Extension Module. The Cisco 2821 and Cisco 2851 include a special-purpose extension voice module (EVM) slot. The Cisco High-Density Extension Module operates in the EVM slot only on the Cisco 2821 and Cisco 2851 routers. The Cisco High-Density Extension Module operates in any network module (NM) or enhanced network module (NME) slot on the Cisco 3825 and Cisco 3845 integrated services routers.

Q. Can the Cisco High-Density Extension Module operate in an NME slot on the Cisco 2821 or Cisco 2851 router?

A. On the Cisco 2821 and Cisco 2851 the High-Density Extension Module operates only in the EVM slot.

Q. Can a network module operate in the EVM slot in the Cisco 2821 or Cisco 2851 router?

A. On the Cisco 2821 and Cisco 2851, network modules are designed to operate only in the NME slot. Network modules do not operate in the EVM slot.

Table 3 lists the slot in which the Cisco High-Density Extension Module operates and the number of High-Density Extension Modules supported on each router.

Table 3. Cisco High-Density Extension Module Placement and Number of Modules Supported by Router

Integrated Services Router	Slot	EVM-HD Modules Supported
Cisco 2821	EVM only	1
Cisco 2851	EVM only	1
Cisco 3825	NME	1
Cisco 3845	NME	2

SIGNALING INTERFACES AND APPLICATIONS FOR THE CISCO HIGH DENSITY EXTENSION MODULE

Q. What are the differences between the public switched telephone network (PSTN) signaling interfaces available with the Cisco High-Density Extension Module baseboard and expansion modules?

A. On-premises **FXS** ports can be used to connect directly to analog phones, fax machines, and key systems. An FXS interface connects directly to a standard telephone, fax machine, or similar device and supplies ring, voltage, and dial tone. FXS interfaces are typically used in an enterprise for Cisco AVVID (Architecture for Voice, Video and Integrated Data) integration or enterprise toll-bypass applications. Service providers may require FXS interfaces for managed-services customer premises equipment (CPE) deployments.

Analog **DID** trunks from the central office can be connected to the Cisco High-Density Extension Module baseboard ports when configured as DID for off-premises connection. A service offered by telephone companies, DID enables callers to dial directly to an extension on a private branch exchange (PBX) or packet voice system (for example, Cisco CallManager and Cisco IOS Software routers and gateways) without the assistance of an operator or automated call attendant. This service makes use of DID trunks, which forward only the last three to five digits of a phone number to the PBX, router, or gateway. For example, if a company has phone extensions 555-1000 to 555-1999, and a caller dials 555-1234, the local central office (CO) would forward 234 to the PBX or packet voice system. The PBX or packet voice system would then ring extension 234. This entire process is transparent to the caller.

BRI allows connection to an ISDN S/T network by replicating either the network side or the terminal side. In ISDN, the 2B+D “S” interface (also called the “T” interface) uses four unshielded normal telephone wires (two twisted wire pairs) to deliver two “bearer” 64K bits per second channels and one “data” signaling channel of 16K bits per second. In NT mode the port replicates the public switched network interface to a PBX that is compatible with European Telecommunications Standards Institute (ETSI) NET3 and QSIG switch types. In TE mode the port supports connection ISDN protocols to allow connection to ISDN S/T networks or through an external NT1 to ISDN U-interfaces. The 4-port BRI expansion module (part number EM-4BRI-NT/TE) provides four on-premise S/T BRI trunk connections. Ports are configurable for NT or TE mode.

An **FXO** interface allows an analog connection to be directed at the PSTN's central office or to a station interface on a PBX. The FXO sits on the switch end of the connection. It plugs directly into the line side of the switch so the switch acts as if the FXO interface is a telephone. The FXO interface does not provide dial tone. The FXO interface provides off-premise analog connections to the central office for loop length (the length of wire between the FXO module and the central office) up to 8,000 feet (2438 meters) in the United States, Canada, and other countries (configurable). FXO interfaces are typically used in an enterprise for Cisco AVVID integration. Service providers may require FXO interfaces in countries where digital interfaces are not available. In this case the Cisco High-Density Extension Module FXO interfaces connect the voice gateway router to the end-office switch and provide answer and disconnect supervision.

Q. Does the 4-port BRI expansion module support voice and data?

A. The 4-port BRI expansion module supports voice services only. A BRI service provides two 64-kbps B-channels for voice or data and one 16-kbps D-channel for signaling information or data. BRI data support is available with the Cisco 1-Port BRI S/T WAN card (part number WIC-1B-S/T-V3.

Q. Which components of the Cisco High-Density Extension Module support DID?

A. Support for DID is available on the Cisco High-Density Extension Module baseboard only. Individual ports on the Cisco High-Density Extension Module baseboard can be configured for FXS or DID signaling. Adjacent ports must share the same configuration; paired ports are: 0 and 1; 2 and 3; 4 and 5; 6 and 7. The 8-port FXS expansion module (part number EM-HDA-8FXS) does not support DID.

DIGITAL SIGNAL PROCESSOR (DSP) RESOURCES FOR THE CISCO HIGH-DENSITY EXTENSION MODULE

Q. How are DSP resources provided for the Cisco High-Density Extension Module?

A. Packet voice DSP modules (PVDM2s) are used in combination with the Cisco High-Density Extension Module baseboard and its expansion modules. PVDM2s provide support for multiple voice codecs, fax, conferencing and transcoding services. PVDM2s are purchased separately and installed in the DSP module slots located inside the router chassis. Initial orders for a Cisco 2821, Cisco 2851, Cisco 3825, or Cisco 3845 router that include a Cisco High-Density Extension Module should also include an appropriate number of PVDM2s to be installed in the router chassis.

Q. Where can I find more information about PVDM2s?

A. Refer to this data sheet: High-Density Packet Voice Digital Signal Processor Module for Cisco IP Communications Solution which can be found at http://www.cisco.com/en/US/products/hw/modules/ps3115/products_data_sheet0900aecd8016e845.html

Q. Which type and how many PVDM2s are required to provide DSP resources for the following Cisco High-Density Extension Module configuration: G.729A medium complexity codec for all channels; EVM-HD-8FXS/DID + EM-4BRI-NT/TE + EM-HDA-8FXS (24 channels total)

A. Select one PVDM2-48 to provide DSP resources for this Cisco High-Density Extension Module configuration. Table 4 compares the channel capacity of PVDM2 modules and the number of channels each supports for different codec complexity types.

Table 4. Channel Capacity of PVDM2 Modules

PVDM Module	Description	# G.711 Channels	# Medium Complexity Channels	# High Complexity Channels
PVDM2-8	8-Channel Packet Fax/Voice DSP Module	8	4	4
PVDM2-16	16-Channel Fax/Voice DSP Module	16	8	6
PVDM2-32	32-Channel Fax/Voice DSP Module	32	16	12
PVDM2-48	48-Channel Fax/Voice DSP Module	48	24	18
PVDM2-64	64-Channel Fax/Voice DSP Module	64	32	24

Q. Which type and how many PVDM2s are required to provide DSP resources for the following Cisco High-Density Extension Module configuration: G.711 codec for all channels; EVM-HD-8FXS/DID + EM-HDA-8FXS + EM-HDA-8FXS (24 channels total)

A. Select one PVDM2-16 plus one PVDM2-8 to provide DSP resources for this High-Density Extension Module configuration.

CISCO CALLMANAGER AND CISCO CALLMANAGER EXPRESS RELEASE SUPPORT

Q. What is the minimum Cisco CallManager software release that interoperates with the High-Density Extension Module?

A. Cisco CallManager Release 3.3(5), Release 4.1 and Release 4.0(2) include support for the Cisco High-Density Extension Module.

Q. What is the minimum Cisco CallManager Express release that interoperates with the Cisco High-Density Extension Module?

A. Cisco CallManager Express (CME) Release 3.1

NEBS COMPLIANCE

Q. What is the Network Equipment Building Standards (NEBS) compliance level for each of the Cisco High-Density Extension Module components?

A. All of the Cisco High-Density Extension Module components are designed for NEBS Level 3 compliance: GR-63 and GR-1089. The NEBS standard defines the minimum spatial and environmental requirements that new telecommunications equipment must meet before it can be used in a central office. NEBS defines four interface types (1, 2, 3, and 4). Interface Type 1 is for an outside plant connection at a Central Office (CO) site. Interface Type 3 is also for an outside plant connection, but at the customer premise (CPE). Interface Type 2 is for an inside building connection only in a central office site. Interface Type 4 is for an inside building connection in a CPE installation. The Cisco High-Density Extension Module baseboard (part number EVM-HD-8FXS/DID) is designed to meet NEBS Level 3, Type 1/3 requirements. The 4-port BRI and 8-port FXS expansion modules (part numbers EM-4BRI-NT/TE and EM-HDA-8FXS) are designed to meet NEBS Level 3, Type 2/4 requirements. Formal NEBS certification testing is in progress. Compliance results will be published when testing is complete.

RJ-21 CONNECTOR

Q. The Cisco High-Density Extension Module baseboard has an RJ-21 connector. Is there a patch panel available to breakout the RJ-21 connection into individual analog (RJ-11) and BRI (RJ-45) connections?

A. Patch panels are generally available from multiple cable and network adaptor vendors. Customers may, at their sole discretion, consider using a patch panel from Black Box Corporation. **Note:** Mention of non-Cisco products or services is for information purposes only and constitutes neither an endorsement nor a recommendation. The Black Box patch panel accommodates all RJ-11 and RJ-45 combinations and offers complete flexibility for expansion module upgrades (analog or digital). The Black Box patch panel (**Figure 2**) is available direct from the manufacturer or from several national resellers and distributors.

Black Box Corporation: http://blackbox.com/

Technical Support and Ordering: 724 746-5500

Black Box part number: **JPM2194A**

Description: Distribution Panel for Cisco High Density Analog and Digital Extension Module for Voice and Fax (EVM-HD)

Additional accessories available from Black Box Corporation include the following:

- Telco cables (RJ21), ELN29T series (multiple lengths available)
- CAT5e patch cords, EVNSL81 series (multiple colors and lengths available)
- RJ11 4-wire patch cable, EL04MS (cross) and EL04M (straight) series (multiple lengths available)

Figure 2
Black Box Patch Panel JPM2194A

CISCO HIGH-DENSITY EXTENSION MODULE AND CISCO HIGH-DENSITY NETWORK MODULE COMPARISON

Q. What are the differences between the Cisco High-Density Extension Module (part number EVM-HD-8FXS/DID) and the High-Density Analog Voice and Fax Network Module (part number NM-HDA-4FXS)?

A. Table 5 compares the products' features.

Table 5. Cisco High-Density Extension Module and Cisco High-Density Analog Voice and Fax Network Module Comparison

Feature	EVM-HD-8FXS/DID	NM-HDA-4FXS
Analog DID trunk support on baseboard	Yes	No
Support for EM-HDA-8FXS expansion module	Yes	Yes
Number of EM-HDA-8FXS expansion modules supported on the baseboard	2	1
Support for EM-4BRI-NT/TE	Yes	No
Support for EM-HDA-4FXO	No	Yes
Support for EM-HDA-3FXS/4FXO and EM-HDA-6FXO	Yes	No
DSP resources: • PVDM2 DSP modules are installed in DSP module slots located inside the router chassis. PVDM2 DSP modules are purchased separately.	Yes	No
DSP resources: • DSP resources to service 8 high-complexity codecs or 16 medium-complexity codecs are built into the module. A DSP-HDA-16 daughter module provides support for an additional 8 high-complexity or 16 medium-complexity calls.	No	Yes
NEBS compliance	Designed for Level 3, Type 1/3 Compliance testing in progress	Level 3, Type 2/4
Operates in which slot of the Cisco 2821 and Cisco 2851 routers	EVM	NM
Operates in which slot of the Cisco 3825 and Cisco 3845 routers	NM	NM

FOR MORE INFORMATION

For more information about the Cisco High-Density Analog and Digital Extension Module for Voice and Fax (EVM-HD), visit http://www.cisco.com or contact your Cisco account representative.

Corporate Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 526-4100

European Headquarters
Cisco Systems International BV
Haarlerbergpark
Haarlerbergweg 13-19
1101 CH Amsterdam
The Netherlands
www-europe.cisco.com
Tel: 31 0 20 357 1000
Fax: 31 0 20 357 1100

Americas Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-7660
Fax: 408 527-0883

Asia Pacific Headquarters
Cisco Systems, Inc.
168 Robinson Road
#28-01 Capital Tower
Singapore 068912
www.cisco.com
Tel: +65 6317 7777
Fax: +65 6317 7799

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