



Ericsson MD-110 PBX with CallManager using 6608-E1 PRI EURO Gateway

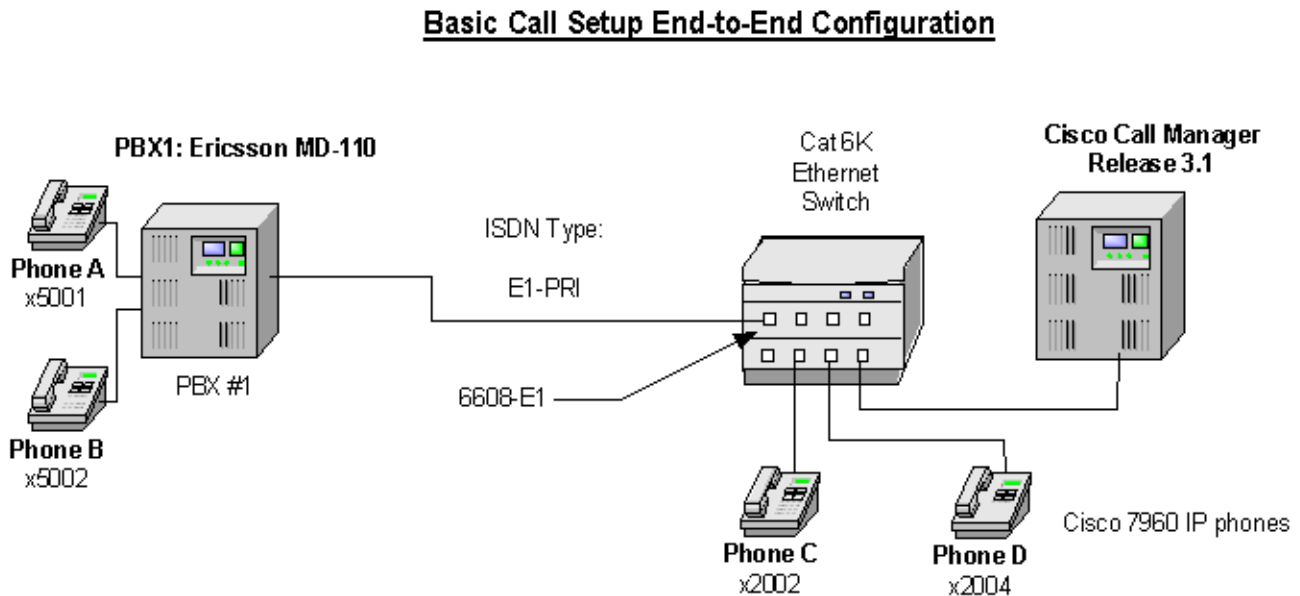


Integration Description

- Connectivity is achieved by using the ETSI standard PRI protocol. The Ericsson MD-110 can be configured as either NETWORK or USER side.

Network Topology

Figure 1 Network Topology or Test Setup



Limitations

Calling Name and Number Feature

- Calling Name delivery and presentation features are not supported by the Ericsson MD-110 PBX.
- When calling from Cisco 7960 IP phone to Ericsson digital phone, Calling/Called Number is displayed on both phones after the call is answered as expected.
- When calling from Ericsson digital phone to Cisco 7960 IP phone, IP phone displays Connected Number after the call is answered. Ericsson phone however does NOT get updated when the call is answered. It displays the trunk name. It was verified using ISDN protocol analyzer that the CallManager was not sending "Connected Number" information in the connect message back to PBX.

System Components

Cisco Hardware and Software Requirements

- Hardware (Gateway): 6608 E1 Port
- Software: CallManager Release 3.1

PBX Hardware and Software Requirements

- Hardware: TLU76/1

- Software: Version BC9

Features

Calling/Called Number

Configuration

Configuration Sequence and Tasks

Configure in the following sequence:

Step 1. ROCAI Route Category Initiate

Setup internal characteristics for the route. Ex. Traffic direction, services, Bearer capabilities.

```
<_ROCAP:ROU=20;
```

```
ROUTE CATEGORY DATA
```

ROU SEL	TRM SERV	NODG	DIST	DISL	TRAF	SIG	BCAP
20	711000000000 7	3110000010	0	5	20	03151515 211100000031	111111

```
END
```

Step 2. RODAI Route Data Initiate

E1-PRI Route Protocol Characteristics, protocol side "User"

```
<_RODAP:ROU=20;
```

```
ROUTE DATA
```

ROU	TYPE	VARC	VARI	VARO	FILTER
20	SL60	H'00000010	H'05400000	H'06110000	NO

```
END
```

E1-PRI Route Protocol Characteristics, protocol side "Network"

```
<_RODAP:ROU=20;
```

```
ROUTE DATA
```

ROU	TYPE	VARC	VARI	VARO	FILTER
20	SL60	H'00000010	H'05400000	H'06310000	NO

```
END
```

Step 3. ROEQI Route Equipment Initiate

E1-PRI trunk lines (B-channels)

```
<_ROEDP:ROU=20,TRU=ALL;  
ROUTE EQUIPMENT DATA
```

ROU	TRU	EQU	SQU	INDDAT
20	001-1	001-1-40-01		H'000000000000
20	001-2	001-1-40-02		H'000000000000
20	001-3	001-1-40-03		H'000000000000
20	001-4	001-1-40-04		H'000000000000
20	001-5	001-1-40-05		H'000000000000
20	001-6	001-1-40-06		H'000000000000
20	001-7	001-1-40-07		H'000000000000
20	001-8	001-1-40-08		H'000000000000
20	001-9	001-1-40-09		H'000000000000
20	001-10	001-1-40-10		H'000000000000
20	001-11	001-1-40-11		H'000000000000
20	001-12	001-1-40-12		H'000000000000
20	001-13	001-1-40-13		H'000000000000
20	001-14	001-1-40-14		H'000000000000
20	001-15	001-1-40-15		H'000000000000
20	001-17	001-1-40-17		H'000000000000
20	001-18	001-1-40-18		H'000000000000
20	001-19	001-1-40-19		H'000000000000
20	001-20	001-1-40-20		H'000000000000
20	001-21	001-1-40-21		H'000000000000
20	001-22	001-1-40-22		H'000000000000
20	001-23	001-1-40-23		H'000000000000
20	001-24	001-1-40-24		H'000000000000
20	001-25	001-1-40-25		H'000000000000
20	001-26	001-1-40-26		H'000000000000
20	001-27	001-1-40-27		H'000000000000
20	001-28	001-1-40-28		H'000000000000
20	001-29	001-1-40-29		H'000000000000
20	001-30	001-1-40-30		H'000000000000
20	001-31	001-1-40-31		H'000000000000

END

Step 4. RODDI Route External Destination Data Initiate

Route and Access Code for the trunk Information- Note PRI uses Route 20

<_RODDP:DEST=ALL;

EXTERNAL DESTINATION ROUTE DATA

DEST	DRN	ROU	CHO	CUST	ADC	TRC	SRT	NUMACK	PRE
2		20			100500000000025000	0	1	0	
30		1			100500000000025000	0	3	0	
31		2			100500000000025000	0	3	0	
32		3			100500000000025000	0	3	0	
33		4			100500000000025000	0	3	0	
34		5			100500000000025000	0	3	0	
35		6			000500000000025000	0	3	0	
36		7			000500000000025000	0	3	0	
37		8			000500000000025000	0	3	0	
39		21			100500000000025000	0	3	0	
40		11			100500000000025000	0	3	0	

END

Note: The Ericsson MD-110 PBX user interface is very cryptic. All parameters and options are mapped to position-dependent numeric fields within the various commands listed below. You must have the correct revision of the Ericsson MD-110 PBX Administration manual to be able to decipher each field position to determine its meaning. Therefore, it is advised not to make changes to an MD-110 PBX unless you know exactly what you are doing. A single number out of place in a command string can cause unusual behavior on the PBX.

Configuration Menus and Commands

Configuring the Cisco Call Manager

Figure 2 6608 Gateway Configuration

The screenshot shows the Cisco CallManager Administration web interface. At the top, there is a navigation menu with items: System, Route Plan, Service, Feature, Device, User, Application, and Help. Below the menu is a header banner with the text "Cisco CallManager Administration For Cisco IP Telephony Solutions" and the Cisco Systems logo. The main content area is titled "Gateway Configuration" and includes a link "Back to Find/List Gateways".

The configuration details for the gateway are as follows:

- Product : Cisco Catalyst 6000 E1 VoIP Gateway
- Gateway : S0/DS1-0@SDA0001C9D8633E
- Device Protocol: Digital Access PRI
- Registration: Registered with Cisco CallManager 10.1.1.2
- IP Address: [10.1.1.104](#)

The status is "Ready". Below this, there are four buttons: Update, Delete, Reset Gateway, and Cancel Changes.

At the bottom, there are four input fields:

- MAC Address*: 0001C9D8633E
- Description: SDA0001C9D8633E
- Device Pool*: Default
- Media Resource Group List: < None >

The browser's status bar at the bottom shows "Done" and "Local intranet".

Figure 3 6608 Gateway Configuration, cont.

Network Hold Audio Source	< None >
User Hold Audio Source	< None >
Calling Search Space	< None >
Location	< None >
Load Information	
Channel Selection Order*	Top Down
PCM Type*	A-law
Protocol Side*	User
Caller ID DN	
Calling Party Selection*	Originator
Channel IE Type*	Use Number when 1B
Interface Identifier Present**	<input type="checkbox"/>
Interface Identifier Value**	0
Display IE Delivery	<input type="checkbox"/>
Redirecting Number IE Delivery	<input checked="" type="checkbox"/>
Delay for first restart (1/8 sec ticks)	32

Missing Art

Figure 4 6608 Gateway Configuration - Product Specific Configuration

Product Specific Configuration	
Clock Reference*	Network
Framing*	CRC4
Audio Signal Adjustment into IP Network*	NoDbPadding
Audio Signal Adjustment from IP Network*	NoDbPadding
Zero Suppression*	HDB3

* indicates required item
** applicable to DMS-100 protocol only
*** may be required to force ringback from some PBXs

[Back to Find/List Gateways](#)

Figure 5 Route Pattern Configuration

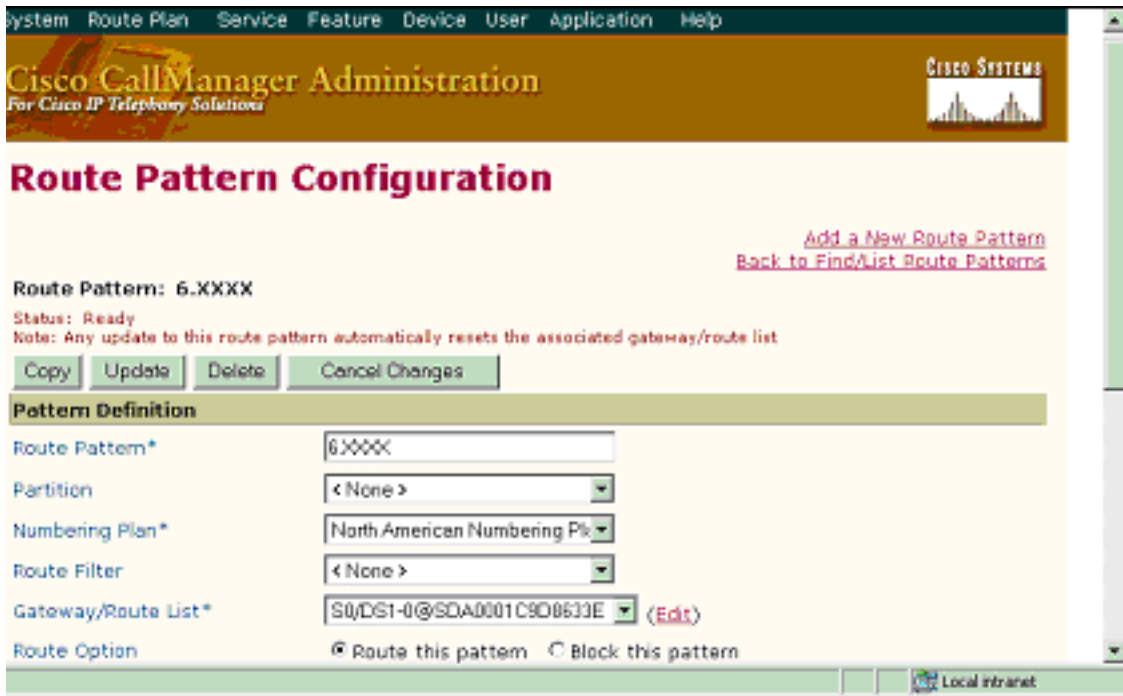
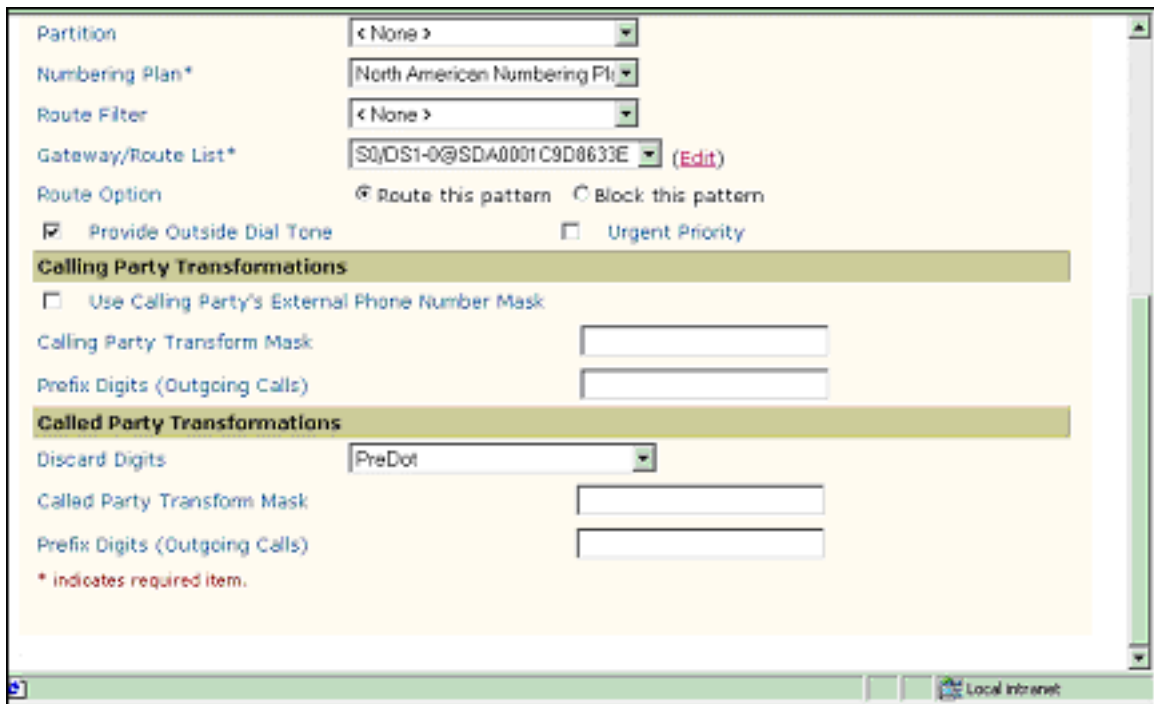


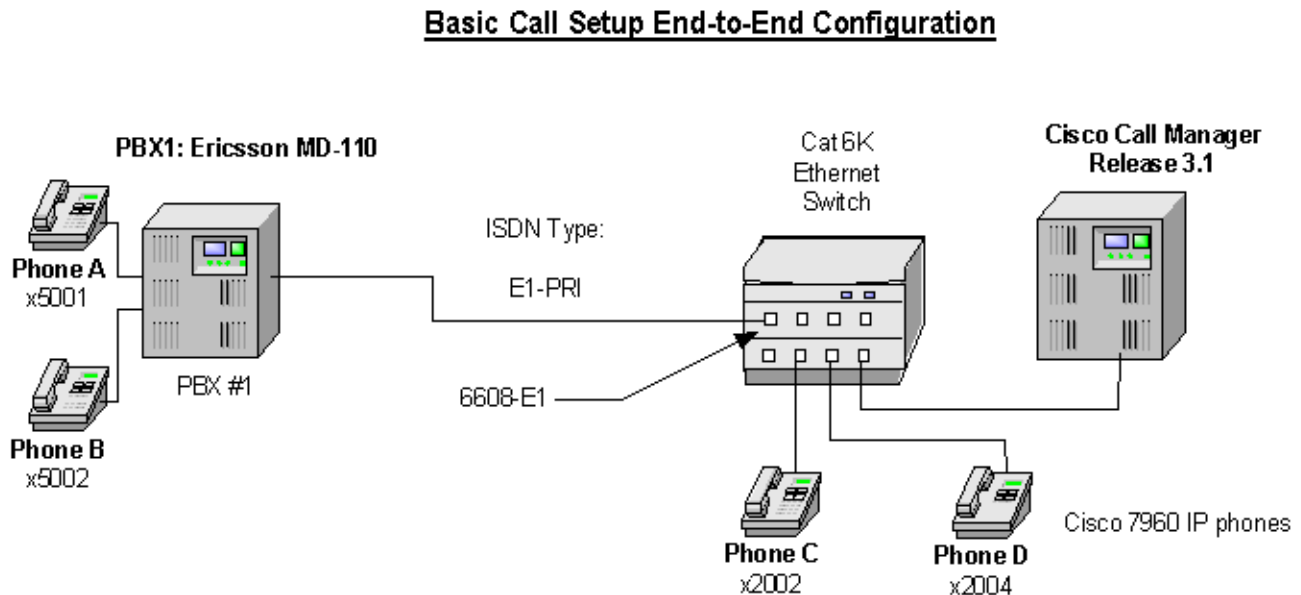
Figure 6 Route Pattern Configuration, Cont.



Test Configuration

As shown in Figure 7 below, an Ericsson MD-110 PBX was connected via an ISDN E1 PRI link to a Cisco 6608-E1 Gateway, which in turn, was connected to an Ethernet switch. The interoperability testing involved Layers 1, 2 and 3 on the ISDN PRI link between a Cisco 6608-E1 and the PBX.

Figure 7 Test Configuration



Layer 1 (Physical Layer)

The Ericsson MD-110 uses a command line interface which allows you to change many switch features with a single command. The PBX documentation must be consulted to make changes. Physical layer parameters (along with many other features) are controlled by using RODAI command.

Layers 2 & 3 (Q.921 and Q.931)

Layer 2 and 3 packet exchanges were monitored using an Acacia Clarinet protocol analyzer, bridged across the PRI link in high impedance mode.

Layer 2 Q.921 packets were monitored to ensure that each PBX/6608-E1 software configuration properly exchanged SABME/UA packets to initialize the ISDN link, and then RR packets were exchanged every 30 seconds.

Layer 3 Q.931 packets were monitored to ensure that the appropriate call setup/trade-in packets were exchanged for each configuration, and that the SETUP packets contained the mandatory Information Elements (IEs) with the necessary details, as well as optional IEs such as Calling Name and Number.

Telephone calls were made end-to-end in both directions through the Cisco 6608-E1 Gateway. A check was made to ensure that there was an audio path in both directions for each call.

User/Network Settings

The Cisco 6608-E1 Gateway with ISDN protocol type setting of PRI-EURO supports both protocol sides by selecting "Network/User" in the protocol side field when configuring the Gateway via CallManager.

The Ericsson MD-110, supports both “USER” (peer-slave) and “NETWORK” (peer-master) protocol sides by using RODAI command.

Test Results

PBX1 configured as ETSI (emulate Network) and Cisco 6608-E1 Gateway configured as PRI EURO (emulate User).

Ericsson MD-110 Switch-type/ Protocol side setting	Cisco 6608-E1 ISDN protocol-type/ Protocol side setting
ETSI/Network	PRI EURO/User

Basic Calls: (Enbloc Sending)

Calls Made	Call Comp?	" Calling Number" Passed to Final Destination?	" Calling Name" Passed to Final Destination?	" Called Number" Passed to Orig. Side?	" Called Name" Passed to Orig. Side?	Notes
Phone A to Phone C	Yes	Yes	No	No ¹	No	2
Phone C to Phone A	Yes	Yes	No	Yes	No	

1. CallManager is not sending "Connected Number" information in the connect message back to PBX.
2. Calling Name delivery and presentation features are not supported by the Ericsson ISDN PRI Link.

Call Transfers: (Supervised Local Transfers)

Calls Made	Call Comp?	Orig. " Calling Number" displayed on Final Dest. phone?	Orig. " Calling Name" displayed on Final Dest. phone?	" Called Number" display on Orig. phone updated after transfer?	" Called Name" display on Orig. phone updated after transfer?	Notes
Phone C to Phone A Xfr to Phone B	Yes	Yes	No	No	No	
Phone A to Phone C Xfr to Phone D	Yes	Yes	No	No	No	

Call Conferencing (Local)

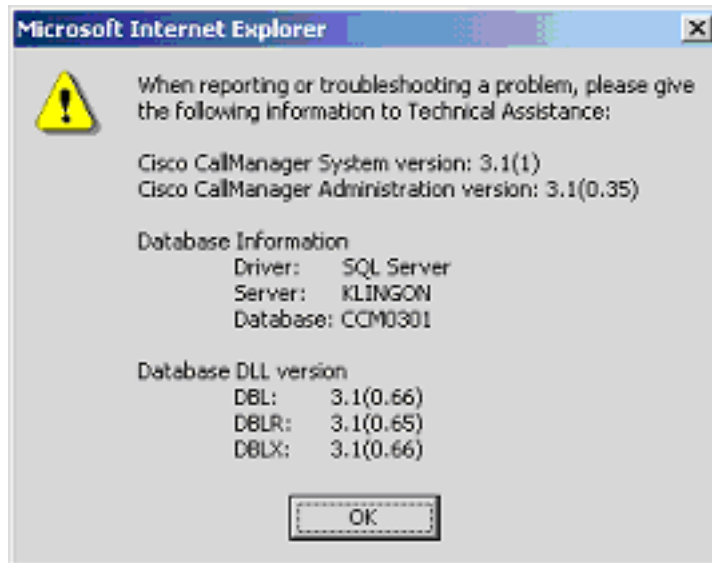
Calls Made	Call Comp?	" Calling Number" passed to remaining conferee when the conferencing phone drops out?	" Calling Name" passed to remaining conferee when the conferencing phone drops out?	" Connected Number" updated on Orig. Caller phone display when a conferee drops out?	" Connected Name" updated on Orig. Caller phone display when a conferee drops out?	Notes
Phone C to Phone A, Phone A conf Phone B	Yes	(A Drops out) Yes	(A Drops out) No	(A Drops out) No	(A Drops out) No	
Phone C to Phone A, Phone C conf Phone D	Yes	(C Drops out) No	(C Drops out) No	(D Drops out) No	(D Drops out) No	
Phone A to Phone C, Phone C conf Phone D	Yes	(C Drops out) No	(C Drops out) No	(C Drops out) No	(C Drops out) No	
Phone A to Phone C, Phone A conf Phone B	Yes	(A Drops out) No	(A Drops out) No	(B Drops out) No	(B Drops out) No	

Call Forward (Local)

Calls Made	Call Comp?	Original " Calling Number" passed to Final Dest.?	Original " Calling Name" passed to Final Dest.?	Forwarding " Called Number" passed to Final Dest.?	Forwarding " Called Name" passed to Final Dest.?	Final dest. " Connected Number" updated at orig. side?	Final dest. " Connected Name" updated at orig. side?	Notes
Phone C to Phone A fwd to Phone B	Yes	Yes	No	Yes	No	No	No	
Phone A to Phone C fwd to Phone D	Yes	Yes	No	No	No	No	No	

Appendix

Figure 8 CallManager Software Release:



Ericsson MD-110 Software Version

```
<_CADAP;  
CALENDAR DATA  
  
IDENTITY=DANDS-EURO-TEST  
VERSION=ASB50104-R6-SES-R9-BC90D/CNI80  
  
14:49:24  
THU 16 AUG 2001
```

Catalyst 6000 Switch Configuration

Console> **sh version**

WS-C6006 Software, Version NmpSW: 5.5(6a)
 Copyright (c) 1995-2001 by Cisco Systems
 NMP S/W compiled on Feb 23 2001, 10:23:18

System Bootstrap Version: 5.3(1)

Hardware Version: 2.0 Model: WS-C6006 Serial #: TBA04511172

Mod	Port	Model	Serial #	Versions
1	2	WS-X6K-SUP1A-2GE	SAD05010NBK	Hw : 7.0 Fw : 5.3(1) Fw1: 5.4(2) Sw : 5.5(6a) Sw1: 5.5(6a)
3	48	WS-F6K-PFC WS-X6348-RJ-45	SAD05020221 SAD04420N7B	Hw : 1.1 Hw : 1.4 Fw : 5.4(2) Sw : 5.5(6a)
4	24	WS-F6K-VPWR WS-X6624-FXS	SAD050203M8	Hw : 1.0 Hw : 3.0 Fw : 5.4(2) Sw : 5.5(6a)
5	8	WS-X6608-T1	SAD04400EM0	HP : A00203010007; DSP : A003C031 (3.3.30) Hw : 1.1 Fw : 5.4(2) Sw : 5.5(6a) HP1: D00403010013; DSP1: D005C031 (3.3.30) HP2: D00403010013; DSP2: D005C031 (3.3.30) HP3: D00403010013; DSP3: D005C031 (3.3.30) HP4: D00403010013; DSP4: D005C031 (3.3.30) HP5: D00403010013; DSP5: D005C031 (3.3.30) HP6: D00403010013; DSP6: D005C031 (3.3.30) HP7: D00403010013; DSP7: D005C031 (3.3.30) HP8: D00403010013; DSP8: D005C031 (3.3.30)
6	8	WS-X6608-E1	SAD04380DW1	Hw : 1.1 Fw : 5.4(2) Sw : 5.5(6a) HP1: D00403010013; DSP1: D005C031 (3.3.30) HP2: D00403010013; DSP2: D005C031 (3.3.30) HP3: D00403010013; DSP3: D005C031 (3.3.30) HP4: D00403010013; DSP4: D005C031 (3.3.30) HP5: D00403010013; DSP5: D005C031 (3.3.30) HP6: D00403010013; DSP6: D005C031 (3.3.30) HP7: D00403010013; DSP7: D005C031 (3.3.30) HP8: D00403010013; DSP8: D005C031 (3.3.30)

Module	DRAM			FLASH			NVRAM		
	Total	Used	Free	Total	Used	Free	Total	Used	Free
1	65408K	37541K	27867K	16384K	11546K	4838K	512K	198K	314K

Uptime is 27 days, 4 hours, 16 minutes

Console>

Console> **sh module**

Mod	Slot	Ports	Module-Type	Model	Sub	Status
1	1	2	1000BaseX Supervisor	WS-X6K-SUP1A-2GE	yes	ok
3	3	48	10/100BaseTX Ethernet	WS-X6348-RJ-45	yes	ok
4	4	24	FXS	WS-X6624-FXS	no	ok
5	5	8	T1	WS-X6608-T1	no	ok
6	6	8	E1	WS-X6608-E1	no	ok

Mod	Module-Name	Serial-Num
1		SAD05010NBK
3		SAD04420N7B
4		SAD050203M8
5		SAD04400EM0
6		SAD04380DW1

Mod	MAC-Address(es)	Hw	Fw	Sw
1	00-04-c0-f8-42-02 to 00-04-c0-f8-42-03 00-04-c0-f8-42-00 to 00-04-c0-f8-42-01 00-04-9b-f0-78-00 to 00-04-9b-f0-7b-ff	7.0	5.3(1)	5.5(6a)
3	00-02-fc-20-5e-50 to 00-02-fc-20-5e-7f	1.4	5.4(2)	5.5(6a)
4	00-03-32-ba-2e-35	3.0	5.4(2)	5.5(6a)
5	00-01-c9-d9-3a-98 to 00-01-c9-d9-3a-9f	1.1	5.4(2)	5.5(6a)
6	00-01-c9-d8-63-3e to 00-01-c9-d8-63-45	1.1	5.4(2)	5.5(6a)

Mod	Sub-Type	Sub-Model	Sub-Serial	Sub-Hw
1	L3 Switching Engine	WS-F6K-PFC	SAD05020221	1.1
3	Inline Power Module	WS-F6K-VPWR		1.0

Console>

Console> **sh port 6**

Port	Name	Status	Vlan	Duplex	Speed	Type
6/1		connected	1	full	2.048	E1
6/2		notconnect	1	full	2.048	E1
6/3		notconnect	1	full	2.048	E1
6/4		notconnect	1	full	2.048	E1
6/5		notconnect	1	full	2.048	E1
6/6		notconnect	1	full	2.048	E1
6/7		notconnect	1	full	2.048	E1
6/8		notconnect	1	full	2.048	E1

Port	DHCP	MAC-Address	IP-Address	Subnet-Mask
6/1	enable	00-01-c9-d8-63-3e	10.1.1.104	255.255.255.0
6/2	enable	00-01-c9-d8-63-3f	10.1.1.118	255.255.255.0
6/3	enable	00-01-c9-d8-63-40	10.1.1.123	255.255.255.0
6/4	enable	00-01-c9-d8-63-41	10.1.1.117	255.255.255.0
6/5	enable	00-01-c9-d8-63-42	10.1.1.120	255.255.255.0
6/6	enable	00-01-c9-d8-63-43	10.1.1.121	255.255.255.0
6/7	enable	00-01-c9-d8-63-44	10.1.1.122	255.255.255.0
6/8	enable	00-01-c9-d8-63-45	10.1.1.124	255.255.255.0

Port	Call-Manager(s)	DHCP-Server	TFTP-Server	Gateway
6/1	10.1.1.2	10.1.1.2	10.1.1.2	10.1.1.7

6/2	10.1.1.2	10.1.1.2	10.1.1.2	10.1.1.7
6/3	10.1.1.2	10.1.1.2	10.1.1.2	10.1.1.7
6/4	10.1.1.2	10.1.1.2	10.1.1.2	10.1.1.7
6/5	10.1.1.2	10.1.1.2	10.1.1.2	10.1.1.7
6/6	10.1.1.2	10.1.1.2	10.1.1.2	10.1.1.7
6/7	10.1.1.2	10.1.1.2	10.1.1.2	10.1.1.7
6/8	10.1.1.2	10.1.1.2	10.1.1.2	10.1.1.7

Port	DNS-Server(s)	Domain
6/1	-	-
6/2	-	-
6/3	-	-
6/4	-	-
6/5	-	-
6/6	-	-
6/7	-	-
6/8	-	-

Port	CallManagerState	DSP-Type
6/1	registered	C549
6/2	registered	C549
6/3	registered	C549
6/4	registered	C549
6/5	registered	C549
6/6	registered	C549
6/7	registered	C549
6/8	registered	C549

Port	NoiseRegen	NonLinearProcessing
6/1	enabled	enabled
6/2	enabled	enabled
6/3	enabled	enabled
6/4	enabled	enabled
6/5	enabled	enabled
6/6	enabled	enabled
6/7	enabled	enabled
6/8	enabled	enabled

Console>

