



**Intel® NetStructure™ Host Media
Processing Software:
Interoperability Test with
Cisco 2611XM Router,
Cisco AS5400,
Cisco CallManager 3.3(2), and
Cisco 79xxG IP Phones**

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1. Introduction

Purpose of This Document

This is the test report for the IP interoperability assessment of Intel® NetStructure™ Host Media Processing (HMP) software with Cisco* products. This document summarizes and discusses the results of the interoperability tests with Cisco 2611XM, Cisco AS5400, Cisco CallManager* 3.3(2), and Cisco 79xxG IP phone and analog phone/fax. This document also details how the Cisco products were configured for the tests.

Status

Issues found during the test will be handled with the Intel NetStructure HMP development and test team. Also we will initiate Cisco TAC support if necessary. All problems will be tracked in the *HMP-IP Interoperability Test Result* spreadsheet based on PTR# or Cisco TAC#. We also list all the PTR and Cisco TAC for the open problems found during the test in section 6 Interoperability Issues. This document will be updated when a problem is resolved in a PTR or Cisco TAC and the test is re-executed.

Definitions & Acronyms

| Acronym | Term | Definition/Description |
|---------|---|--|
| CCM | Cisco CallManager | Cisco IP telephony solution, part of Cisco AWID (Architecture of Voice, Video, and Integrated Data) |
| CCME | Cisco CallManager Express* | Cisco IP telephony solution embedded in Cisco IOS Software that provides call processing for Cisco IP phones. |
| DSP | Digital Signal Processing | |
| FP | Feature Pack | |
| FXO | Foreign Exchange Office | The interface receives POTS (Plain Old Telephone Service) from CO (Central Office) of PSTN. |
| FXS | Foreign Exchange Station/Subscriber | The interface delivers POTS service from CO and must connect to subscriber equipment (phones, fax machine, modems) |
| LAN | Local Area Network | |
| MRD | Marketing Requirement Document | |
| PIMG | Intel NetStructure PBX-IP Media Gateway | |
| PRD | Project Requirement Document | |
| PSTN | Public Switched Telephone Network | Telephone system based upon copper wires that carry analog voice signals |
| PTP | Project Test Plan | |
| TAC | Cisco's Technical Assistance Center | Cisco products technical support. |
| TC | Test Case | |
| TCS | Test Case Specification | Refines the TDS to a level at which tests can be executed. It provides input and output specifications required of the test items. It may also be used to specify the steps for executing a set of test cases. |
| TDS | Test Design Specification | The core test planning document. It enumerates the test cases that will be required to test the product with an appropriate level of coverage. |
| TR | Test Report | Summarizes the results of the designated test activities and provides evaluations based on the results. |

| | | |
|-----|--------------------------|--|
| VAD | Voice Activity Detection | |
|-----|--------------------------|--|

References

| Ref# | Name | Author | Comments |
|------|---|-------------------|---|
| 1 | IP Interoperability Requirements | Intel Corporation | |
| 2 | HMP IP Media Server Building Blocks PRD | Intel Corporation | PRD (SYS-PR-195) |
| 3 | HMP-based IP Media Server Resource Building Blocks MRD | Intel Corporation | MRD (PMD-PR-045) |
| 4 | Global Call IP for Host Media Processing Technology Guide – April 2004 | Intel Corporation | Document #05-2039-002 |
| 5 | Intel NetStructure HMP Interoperability Test with Cisco 2611XM Router (Embedded with Cisco IOS Software 12.3(4) & Cisco CallManager Express 3.0) Cisco AS5400 Media Gateway (Embedded with Cisco IOS Software 12.3) Cisco CallManager 3.3 Cisco CallManager 4.0 Cisco 79xxG IP phones Test Design Specification | Intel Corporation | TDS |
| 6 | Cisco CallManager Express 3.1 Data sheet | Cisco Corporation | http://www.cisco.com/en/US/products/sw/voicesw/ps4625/products_data_sheet0900aecd8016c267.html |
| 7 | Cisco CallManager Administration Guide, Release 3.3(2) | Cisco Corporation | http://www.cisco.com/en/US/products/sw/voicesw/ps556/products_administration_guide_book09186a008011b41c.html |
| 8 | Cisco AS5400 Configuration Guide | Cisco Corporation | |
| 9 | Cisco IOS Release 12.3 Configuration Guides and Command References | Cisco Corporation | http://www.cisco.com/univercd/cc/td/doc/product/software/ios123/123cgcr/index.htm |
| 10 | Cisco CallManager Administration Guide, Release 4.0(1) | Cisco Corporation | http://www.cisco.com/en/US/products/sw/voicesw/ps556/products_administration_guide_book09186a00801e8ada.html |

2. Software Validated

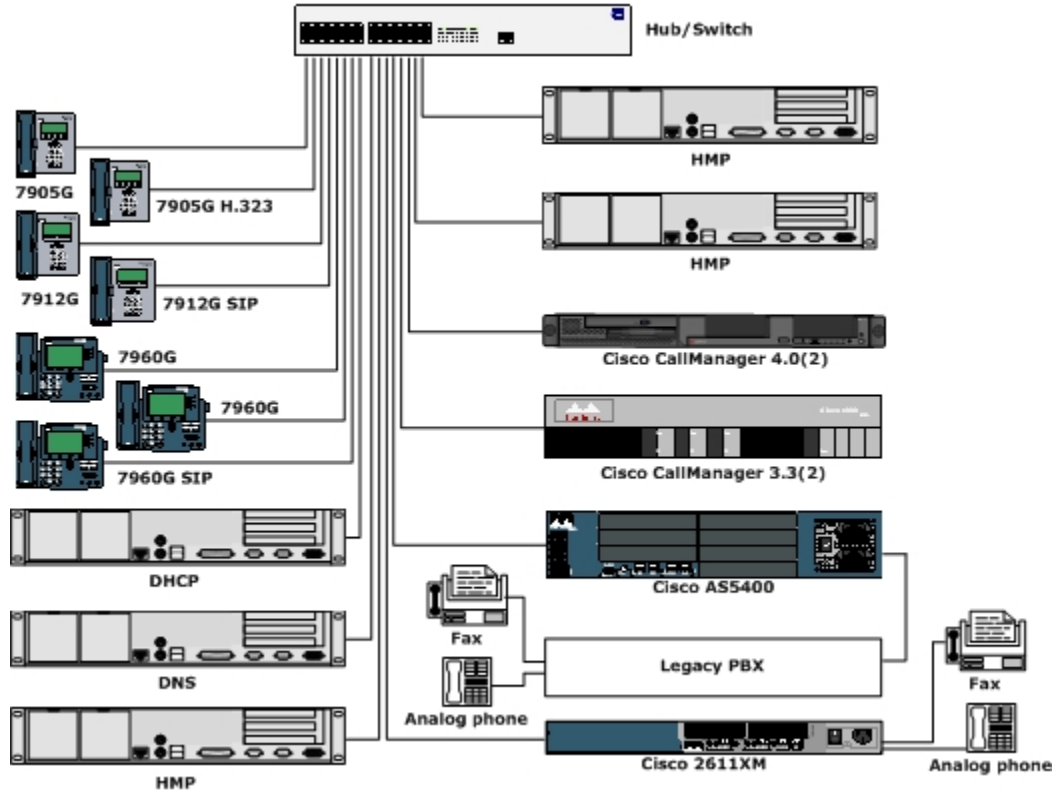
| System | Software Version and Description |
|--------------------------|---|
| HMP 1.1 | <p><u>For most of the test cases:</u> Intel® NetStructure (TM) Host Media Processing (HMP) Software Release 1.1 SU for Windows on Intel Architecture Build Date=10/21/2004 Build Number=10 IP Host=3.1.0.25</p> <p><u>For SIP blind/supervised transfer:</u> HMP 1.1 SU for Windows on Intel Architecture Build Date=11/24/2004 Build Number=13 IP Host=4.0.0.13</p> <p><u>For Cisco CallManager 4.0(2):</u> HMP 1.1 SU for Windows on Intel Architecture Build Date=01/21/2005 Build Number=16 IP Host=4.0.0.16</p> |
| Cisco 2611XM | IOS Version 12.3(8)T5 with gatekeeper feature set CCME Version 3.1 Telephony Service |
| Cisco AS5400 | IOS Version 12.3(8)T5 |
| Cisco CallManager 3.3(2) | Version 3.3(2)es63 (engineer special 63) |
| Cisco CallManager 4.0(2) | Version 4.0(2)a |

Note: See

Appendix B. Software Version for detail.

3. Test Environment

The following diagram is the system setup for the HMP IP interoperability test with Cisco 2611XM, AS5400, CallManager 3.3(2), and Cisco IP phones.



Switch

| Equipment | Description |
|---------------------------------------|--------------------------|
| 3Com* SuperStack* Switch 3300 24-Port | 24-Port Ethernet* Switch |

HMP 1.1 Service Update #10

| Item | Description |
|------------------------|---|
| Platform | Intel SR2300 with SE7501WV2 motherboard |
| CPU | Intel® Xeon™ processor 2.4 GHz |
| RAM | 1GB DDR 266 MHz SDRAM |
| CD-ROM drive | 56X |
| Hard Disk | 65GB, SCSI |
| Network Interface Card | 10/100/1000Base-T |
| Size | 2U |

HMP 1.1 Service Update #13

| Item | Description |
|------|-------------|
|------|-------------|

| | |
|------------------------|---|
| Platform | Intel® SR2300 with Intel® SE7501WV2 motherboard |
| CPU | Dual Intel® Xeon™ processor 2.2 GHz |
| RAM | 2GB DDR 266 MHz SDRAM |
| CD-ROM drive | 56X |
| Hard Disk | 17GB, SCSI |
| Network Interface Card | 10/100/1000Base-T |
| Size | 2U |

HMP 1.1 Service Update #16

| Item | Description |
|------------------------|---|
| Platform | Intel SR2300 with SE7501WV2 motherboard |
| CPU | Dual Xeon 2.2 GHz |
| RAM | 2GB DDR 266 MHz SDRAM |
| CDROM drive | 56X |
| Hard Disk | 17GB, SCSI |
| Network Interface Card | 10/100/ 1000BT |
| Size | 2U |

DNS/DHCP

| Item | Description |
|------------------------|---------------------------------------|
| Platform | PCI |
| CPU | Intel® Pentium® III processor 600 MHz |
| RAM | 256MB |
| CD-ROM drive | 12X |
| Hard Disk | 20GB, SCSI |
| Network Interface Card | 10Base-T |
| Size | 2U |

Cisco 2600 Router

| Components | Description |
|---|--|
| Cisco 2611XM Multiservice Router | 128MB DRAM factory upgrade 32MB Flash factory upgrades One 2 ports Foreign Exchange Office (FXO) Voice Interface Card (VIC) One 2 ports Foreign Exchange Station (FXO) Voice Interface Card (VIC) |
| Cisco IOS with Multimedia Conference Manager (MCM) | IOS 12.3(8)T5 with MCM gatekeeper feature set running under 2611XM |
| Cisco CallManager Express 3.1 with 36 user licenses | IOS Telephony Service 3.1 |

Cisco AS5400

| Components | Description |
|------------|---|
| AS5400 | 108 Universal Port Card Octal T1/PRI DFC card Dual AC Power Supply 512MB Main SDRAM upgrade 128MB Shared I/O upgrade 16MB Boot Flash upgrade |

| | |
|------------|---|
| | 64MB System Flash upgrade 192 Data License |
| AS5400 IOS | IOS 12.3(8)T5 |

Cisco CallManager 3.3(2)

The Cisco CallManager 3.3 software runs on a Cisco Media Convergence Server (MCS) 7835-1266.

| Product Description | MCS 7835-1266 |
|-----------------------------|--|
| Product Type | Cisco Media Convergence Server |
| CPU | Intel® Pentium® III processor 1.26 GHz |
| RAM | 1GB 133 MHz SDRAM |
| Hard Drives | Dual redundant 18.2 GB SCSI hot-plug |
| Hardware RAID Controller | Yes |
| Size | 2U |
| Maximum IP Phones supported | 2500 |
| Dual Power Supply | Yes |

Cisco CallManager 4.0(2)

The Cisco CallManager 4.0(2) software runs on a Cisco Media Convergence Server (MCS) 7825H-3000.

| Product Description | MCS 7825H-3000 |
|-----------------------------|--------------------------------|
| Product Type | Cisco Media Convergence Server |
| CPU | Pentium 4 3.06 GHz |
| RAM | 1GB 2x512 MHz SDRAM |
| Hard Drives | 40GB ATA/100 |
| Hardware RAID Controller | Yes |
| Size | 1U |
| Maximum IP Phones supported | 1000 |
| Dual Power Supply | Yes |

Cisco IP phones

| Model | 7905G | 7912G | 7960G |
|------------------------|---|---|---|
| Type | IP phone | IP phone | IP phone |
| Main Features | <ul style="list-style-type: none"> – Four soft keys – Volume control – Hearing-aid compatible – A single position foot stand | <ul style="list-style-type: none"> – Four soft keys – Volume control – Hearing-aid compatible – A single position foot stand | <ul style="list-style-type: none"> – Four soft keys – Volume control – Hearing-aid compatible – A single position foot stand |
| Protocols | SCCP, H.323v2 , SIP | SCCP, SIP | SCCP, SIP, MGCP |
| Voice Coders | G.711a, G.711u G.729ab | G.711a, G.711u, G.729ab | G.711, G.729a |
| VAD | Yes | Yes | Yes |
| Speaker | Yes | Yes | Yes |
| Call Waiting | Yes | Yes | Yes |
| Call Forward | Yes | Yes | Yes |
| Call Transfer | Yes | Yes | Yes |
| Conference | Yes | Yes | Yes |
| Voice Mail | Yes | Yes | Yes |
| Display | <ul style="list-style-type: none"> – Pixel-based display – Display calling party information, time, calling time. | <ul style="list-style-type: none"> – Pixel-based display – Display calling party information, time, calling time. | <ul style="list-style-type: none"> – Pixel-based display – Display calling party information, time, calling time. |
| Network | 10Base-T Ethernet | 10/100Base-T Ethernet | 10/100Base-T Ethernet |
| Dimensions (H x W x D) | 8 x 7 x 6 in. 20.3 x 17.7 x 15.2 cm | 6.5 x 7 x 6 in. 16.4 x 17.7 x 15.2 cm | 8 x 10.5 x 6 in. 20.3 x 26.7 x 15.2 cm |
| Weight | 1.9 lb (0.9 kg) | 1.9 lb (0.9 kg) | 3.5 lb (1.6 kg) |
| Reference | http://www.cisco.com/en/US/products/hw/phones/ps379/products_data_sheet09186a00800c835a.html | http://www.cisco.com/en/US/products/hw/phones/ps379/products_data_sheet09186a00801739c0.html | http://www.cisco.com/en/US/products/hw/phones/ps379/products_data_sheet09186a0080091984.html |

4. Test Summary

Overview of the Test Results

Each test case specified below contains one or more system configurations. Therefore the result uses the following notations. For detail configurations and test scenarios, refer to the TDS (Reference #5).

- P** Pass on all the system configurations and test scenarios.
- P*** Pass only on the system configurations which we are able to configure at this time. Or pass only on the setups which the test scenarios are supported by the features of the HMP. See Appendix A. Test Note.
- F** Fail on all the system configurations. See section 6. Interoperability Issues.
- F*** Fail on some test scenarios. See section 6. Interoperability Issues.
- D** Features required to execute this test case is not yet available in our product. See Appendix A. Test Note.
- D*** Test case was originally planned on more configurations than it was run on due to limitations of configurations. See Appendix A. Test Note.
- Test case is not valid on all the system configurations. Some features are not supported in third-party equipment or the test case only concludes the HMP internal features, not the interoperability with Cisco products. See Appendix A. Test Note.

All test cases regarding handling incoming/outgoing calls verified the voice path and full duplex by applying play and record (see Ref. #5 for details.) All the call progress tests are deferred because Intel NetStructure HMP 1.1 SU#10 does not support the early media feature.

Cisco 2611XM, AS5400, CallManager 3.3(2) and CallManager 4.0(2) H.323 Test Cases

| Use Case Category | Scenarios | Test Case ID | Result |
|--|--|--------------|-----------|
| Initialization/ Shutdown | Perform Gatekeeper discovery on Cisco 2611XM IOS Gatekeeper. | TC1 | P |
| | Perform registration with Cisco 2611XM IOS Gatekeeper using E.164 prefix. | TC2 | P |
| | Change registration information with the Cisco 2611XM IOS Gatekeeper. | TC3 | P* |
| | Cancel Registration with Cisco 2611XM IOS Gatekeeper | TC4 | P |
| Handle incoming call from Cisco 79xxG IP Phone | Connect multiple simultaneous incoming calls from Cisco 79xxG IP Phones using symmetric coders. | TC5 | P |
| | Connect multiple simultaneous incoming call from Cisco 79xxG IP Phones using asymmetric coders | TC6 | F |
| | Connect multiple simultaneous incoming H.323 call from Cisco 79xxG IP Phones using slow start procedure, H.245 tunneling disabled. | TC7 | P |
| | Connect multiple simultaneous incoming H.323 call from Cisco 79xxG IP Phones using slow start procedure, H.245 tunneling enabled. | TC8 | P |
| | Connect multiple simultaneous incoming H.323 call from Cisco 79xxG IP Phones using fast connect procedure, H.245 tunneling disabled. | TC9 | P |

| | | | |
|---|---|------|---|
| Handle incoming call from Cisco 79xxG IP Phone | Connect multiple simultaneous incoming H.323 call from Cisco 79xxG IP Phones using fast connect procedure, H.245 tunneling enabled. | TC10 | P |
| | Connect multiple simultaneous incoming calls from Cisco 7960G SCCP IP Phones via Cisco CallManager x.x(x) session controller using symmetric coders using symmetric coders. | TC63 | P |
| | Connect multiple simultaneous incoming calls from Cisco 7960G SCCP IP Phones via Cisco CallManager x.x(x) session controller using symmetric coders using asymmetric coders. | TC64 | F |
| | Place multiple, simultaneous calls from Cisco 7960G SCCP IP Phones via Cisco CallManager x.x(x) session controller using slow start procedure, H.245 tunneling disabled. | TC65 | P |
| | Connect multiple simultaneous incoming calls from Cisco 7960G SCCP IP Phones via Cisco CallManager x.x(x) session controller using slow start procedure, H.245 tunneling enabled. | TC66 | — |
| | Connect multiple simultaneous incoming calls from Cisco 7960G SCCP IP Phones via Cisco CallManager x.x(x) session controller using fast connect procedure, H.245 tunneling disabled. | TC67 | — |
| | Connect multiple simultaneous incoming calls from Cisco 7960G SCCP IP Phones via Cisco CallManager x.x(x) session controller using fast connect procedure, H.245 tunneling enabled. | TC68 | — |
| | Connect multiple simultaneous incoming calls from Cisco 7905G H.323 Phones via Cisco CallManager 3.3(2) session controller | TC69 | P |
| | Retrieve the call party information from the SETUP message for an incoming call arriving from a Cisco 7960G SCCP IP Phone and Cisco 7905G H.323 Phone via a Cisco Call Manager x.x(x) session controller. | TC70 | P |
| Handle incoming call from analog phone connected to Cisco 2611XM. | Connect multiple simultaneous incoming calls from analog phone connected to Cisco 2611XM. | TC11 | P |
| Process DTMF input | Perform In-band DTMF detection | TC12 | P |
| | Perform H.245 UII DTMF detection | TC13 | P |
| | Perform RFC2833 DTMF detection | TC58 | P |
| | Perform In-band DTMF detection with Cisco CallManager x.x(x) | TC71 | P |
| | Perform H.245 UII DTMF detection with Cisco CallManager x.x(x) | TC72 | P |
| Process DTMF input | Perform RFC2833 DTMF detection with Cisco CallManager x.x(x) | TC73 | P |

| | | | |
|--|---|------|----|
| Make an outgoing call to an Cisco 29xxG IP Phone | Place multiple simultaneous H.323 calls to Cisco 79xxG IP Phones using symmetric coders. | TC14 | P* |
| | Place multiple simultaneous H.323 calls to Cisco 79xxG IP Phones using asymmetric coders | TC15 | F |
| | Place multiple, simultaneous H.323 calls to Cisco 79xxG IP Phones using slow start procedure, H.245 tunneling disabled. | TC16 | P* |
| | Place multiple, simultaneous H.323 calls to Cisco 79xxG IP Phones using slow start procedure, H.245 tunneling enabled. | TC17 | P* |
| | Place multiple, simultaneous H.323 calls to Cisco 79xxG IP Phones using fast start procedure, H.245 tunneling disabled. | TC18 | P* |
| | Place multiple, simultaneous H.323 calls to Cisco 79xxG IP Phones using fast start procedure, H.245 tunneling enabled. | TC19 | P* |
| | Process call failure: called party does not answer. | TC21 | P* |
| | Process call failure: called party is busy. | TC22 | P* |
| | Process call failure: capability not supported by Cisco 79xxG IP Phone | TC23 | P* |
| Make an outgoing call to an analog Phone connected to Cisco 2611XM and perform call progress analysis. | Place a H.323 call to an analog phone connected to Cisco 2611XM. | TC20 | P* |
| Make an outgoing call to an analog Phone connected to Cisco AS5400 | Place a H.323 call to an analog phone connected to Cisco AS5400 via a Legacy PBX. | TC56 | P |
| Handle incoming call from an analog phone connected to Cisco AS5400 | Connect multiple simultaneous incoming H.323 calls from analog phone connected to Cisco AS5400 via a Legacy PBX. | TC54 | P |
| Send/Receive T.38 fax over IP using H.323 to setup the call. | Send T.38 fax in an established voice call. | TC29 | P |
| | Receive T.38 fax in an established voice call. | TC30 | P |
| | Receive T.38 fax without an established voice session. | TC31 | F |
| | Send T.38 fax without an established voice session. | TC32 | F |
| Hold/Retrieve | Verify a connected H.323 call between HMP-based IP Media Server and a Cisco 79xxG IP phones can be put on hold and retrieved using Cisco 79xxG IP phones' Hold/Retrieve keys. | TC24 | D |
| Bridge calls | Bridge two H.323 calls that use different coders | TC33 | — |
| Transfer | Perform a blind transfer to another H.323 IP phone via a gatekeeper-model or direct-called model. HMP is the transferring endpoint. | TC25 | P |

| | | | |
|--|---|------|----------|
| | Perform a supervised transfer to another H.323 IP phone via a gatekeeper-model or direct-called model. HMP is the transferring endpoint. | TC26 | F |
| | Participate a blind transfer to another H.323 IP phone via a gatekeeper-model or direct-called model. HMP is the transferred endpoint. | TC27 | — |
| | Participate a supervised transfer to another H.323 IP phone via a gatekeeper-model or direct-called model. HMP is the transferred endpoint. | TC28 | — |
| | Perform a blind transfer to another analog phone. HMP is the transferring endpoint via Cisco AS5400. | TC59 | P |
| | Perform a supervised transfer to another analog phone. HMP is the transferring endpoint via Cisco AS5400. | TC60 | F |

Cisco 2611XM, AS5400 and CallManager 4.0(2) SIP Test Cases

| Use Case Category | Scenarios | Test Case ID | Result |
|--|---|--------------|-----------|
| Handle incoming call from Cisco 79xxG SIP Phone | Connect multiple simultaneous incoming calls from Cisco 79xxG IP Phones using SIP. | TC34 | P |
| | Switch coders using re-INVITE after call connected with Cisco 79xxG IP Phone. | TC35 | D |
| Handle incoming SIP call from analog Phone connected to Cisco 2611XM | Connect multiple incoming calls from analog phones using SIP. | TC36 | P |
| | Switch coders using re-INVITE after call connected with analog phone. | TC37 | D |
| Handle incoming SIP call from analog phone connected to Cisco AS5400 | Connect multiple incoming SIP calls from analog phones connected to Cisco AS5400. | TC55 | P |
| Make an outgoing call to an Cisco 79xxG SIP Phone | Place a SIP call to Cisco 79xxG IP Phone connected to Cisco 2611XM | TC38 | P* |
| | Handle unsuccessful call to Cisco 79xxG IP Phones. | TC40 | D* |
| Make an outgoing call to an Cisco 79xxG SIP Phone and perform call progress analysis | Place a call to Cisco 79xxG IP phone and perform call progress analysis on the in-band tones. | TC44 | D |
| Make an outgoing SIP call to an analog phone connected to Cisco 2611XM | Place a call to an analog phone connected to Cisco 2611XM | TC39 | P |
| Place a SIP call to an analog phone connected and perform call progress analysis | Place a call to an analog phone and perform call progress analysis on the in-band tones. | TC45 | D |
| Make an outgoing SIP call to an analog | Place a SIP call to an analog phone connected to Cisco AS5400 | TC57 | F* |

Cisco AS5400, IOS 12.3(8)T5

```
CISCOAS5400#show ver
Cisco IOS Software, 5400 Software (C5400-JS-M), Version 12.3(8)T5, RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2004 by Cisco Systems, Inc.
Compiled Wed 20-Oct-04 16:20 by cmong
```

```
ROM: System Bootstrap, Version 12.2(1r)1, RELEASE SOFTWARE (fc1)
BOOTLDR: 5400 Software (C5400-BOOT-M), Version 12.2(2)XB2, EARLY DEPLOYMENT RELEASE
SOFTWARE (fc1)
```

```
CISCOAS5400 uptime is 5 weeks, 5 days, 3 hours, 5 minutes
System returned to ROM by reload at 21:12:50 UTC Sun Jan 2 2000
System image file is "flash:c5400-js-mz.123-8.T5.bin"
```

```
Cisco AS5400 (R7K) processor (revision T) with 524288K/131072K bytes of memory.
Processor board ID JAE0822KM7W
R7000 CPU at 250MHz, Implementation 39, Rev 1.0, 256KB L2, 2048KB L3 Cache
Last reset from IOS reload
Manufacture Cookie Info:
EEPROM Type 0x0001, EEPROM Version 0x01, Board ID 0x31,
Board Hardware Version 3.34, Item Number 800-5171-02,
Board Revision C0, Serial Number JAE0822KM7W,
PLD/ISP Version 2.2, Manufacture Date 31-May-2004.
Processor 0x14, MAC Address 0x0FF7D04B48
Backplane HW Revision 1.0, Flash Type 5V
2 FastEthernet interfaces
54 Serial interfaces
216 terminal lines
8 Channelized T1/PRI ports
512K bytes of NVRAM.
65536K bytes of processor board System flash (Read/Write)
16384K bytes of processor board Boot flash (Read/Write)
```

```
Configuration register is 0x2102
```

```
CISCOAS5400#
```

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