Doc. No. 78-4313-04

Installing 56K 12-Port Modules in Cisco AS5200 Universal Access Servers

Product Numbers: AS52-12-M-56K=, AS52-24B-M-56K=, AS52-12-M-56K-UPG=

This document describes how to install 56K 12-port modules in Cisco AS5200 universal access servers, and includes the following sections:

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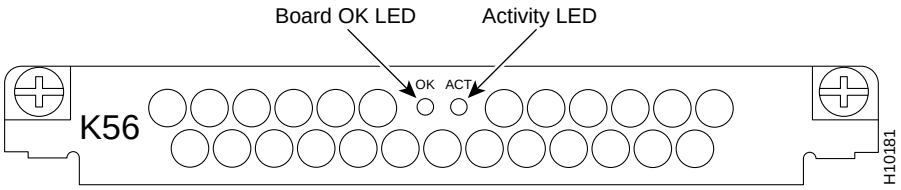
Product Overview

The 56K 12-port module uses Rockwell's K56flex technology. The module can send data at up to 56 kbps and receive data at up to 33.6 kbps. However, the actual speed that you can achieve with the module depends on the condition of your local telephone network. Figure 1 shows the 56K 12-port module.

Note Actual speeds vary depending on line conditions. Due to FCC limitations, speeds in the U.S. are less than 56 kbps.

Figure 1 56K 12-Port Module



Prerequisites

The following prerequisites apply to the 56K module:

- K56flex compatible modems must be present at both ends of a digital connection in a digital network. If not, 56 kbps cannot be achieved. The speed will fall back to V.34 or less.
- Only one analog-to-digital conversion can be in the end-to-end communications path.
- You cannot have any A-law to U-law conversions, which exist at some international gateways.
- Cisco IOS Release 11.2(8)P or later.

Safety Recommendations

Follow these guidelines to ensure general safety:

- Keep the chassis area clear and dust-free during and after installation.
- Keep tools away from walk areas where you or others could fall over them.
- Do not wear loose clothing that could get caught in the chassis. Fasten your tie or scarf and roll up your sleeves.
- Wear safety glasses when working under any conditions that might be hazardous to your eyes.
- Do not perform any action that creates a potential hazard to people or makes the equipment unsafe.

Safety Warnings

Safety warnings appear throughout this publication in procedures that, if performed incorrectly, may harm you. A warning symbol precedes each safety warning.

Warning This warning symbol means *danger.* You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.

Waarschuwing Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van standaard maatregelen om ongelukken te voorkomen. Voor vertalingen van de waarschuwingen die in deze publicatie verschijnen, kunt u het document *Regulatory Compliance and Safety Information* (Informatie over naleving van veiligheids- en andere voorschriften) raadplegen dat bij dit toestel is ingesloten.

Varoitus Tämä varoitusmerkki merkitsee vaaraa. Olet tilanteessa, joka voi johtaa ruumiinvammaan. Ennen kuin työskentelet minkään laitteiston parissa, ota selvää sähkökytkentöihin liittyvistä vaaroista ja tavanomaisista onnettomuuksien ehkäisykeinoista. Tässä julkaisussa esiintyvien varoitusten käännökset löydät laitteen mukana olevasta *Regulatory Compliance and Safety Information* -kirjasesta (määräysten noudattaminen ja tietoa turvallisuudesta).

Attention Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant causer des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers posés par les circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents. Pour prendre connaissance des traductions d'avertissements figurant dans cette publication, consultez le document *Regulatory Compliance and Safety Information* (Conformité aux règlements et consignes de sécurité) qui accompagne cet appareil.

Warnung Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu einer Körperverletzung führen könnte. Bevor Sie mit der Arbeit an irgendeinem Gerät beginnen, seien Sie sich der mit elektrischen Stromkreisen verbundenen Gefahren und der Standardpraktiken zur Vermeidung von Unfällen bewußt. Übersetzungen der in dieser Veröffentlichung enthaltenen Warnhinweise finden Sie im Dokument *Regulatory Compliance and Safety Information* (Informationen zu behördlichen Vorschriften und Sicherheit), das zusammen mit diesem Gerät geliefert wurde.

Avvertenza Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di lavorare su qualsiasi apparecchiatura, occorre conoscere i pericoli relativi ai circuiti elettrici ed essere al corrente delle pratiche standard per la prevenzione di incidenti. La traduzione delle avvertenze riportate in questa pubblicazione si trova nel documento *Regulatory Compliance and Safety Information* (Conformità alle norme e informazioni sulla sicurezza) che accompagna questo dispositivo.

Advarsel Dette varselsymbolet betyr fare. Du befinner deg i en situasjon som kan føre til personskade. Før du utfører arbeid på utstyr, må du vare oppmerksom på de faremomentene som elektriske kretser innebærer, samt gjøre deg kjent med vanlig praksis når det gjelder å unngå ulykker. Hvis du vil se oversettelser av de advarslene som finnes i denne publikasjonen, kan du se i dokumentet *Regulatory Compliance and Safety Information* (Overholdelse av forskrifter og sikkerhetsinformasjon) som ble levert med denne enheten.

Aviso Este símbolo de aviso indica perigo. Encontra-se numa situação que lhe poderá causar danos físicos. Antes de começar a trabalhar com qualquer equipamento, familiarize-se com os perigos relacionados com circuitos eléctricos, e com quaisquer práticas comuns que possam prevenir possíveis acidentes. Para ver as traduções dos avisos que constam desta publicação, consulte o documento *Regulatory Compliance and Safety Information* (Informação de Segurança e Disposições Reguladoras) que acompanha este dispositivo.

¡Advertencia! Este símbolo de aviso significa peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considerar los riesgos que entraña la corriente eléctrica y familiarizarse con los procedimientos estándar de prevención de accidentes. Para ver una traducción de las advertencias que aparecen en esta publicación, consultar el documento titulado *Regulatory Compliance and Safety Information* (Información sobre seguridad y conformidad con las disposiciones reglamentarias) que se acompaña con este dispositivo.

Varning! Denna varningssymbol signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanligt förfarande för att förebygga skador. Se förklaringar av de varningar som förkommer i denna publikation i dokumentet *Regulatory Compliance and Safety Information* (Efterrättelse av föreskrifter och säkerhetsinformation), vilket medföljer denna anordning.

Safety with Electricity

Follow these guidelines when working on equipment powered by electricity:

- Locate the emergency power-OFF switch in the room in which you are working. Then, if an electrical accident occurs, you can quickly shut the power OFF.

Warning Read the installation instructions before you connect the system to its power source.

Warning Ultimate disposal of this product should be handled according to all national laws and regulations.

Warning Only trained and qualified personnel should be allowed to install or replace this equipment.

Warning To ensure your safety and the safety of others, be sure the power is OFF and the power cord is unplugged before working on the router.

- Disconnect all power before doing the following:
  - Installing or removing a chassis
  - Working near power supplies

Warning Before working on equipment that is connected to power lines, remove jewelry (including rings, necklaces, and watches). Metal objects will heat up when connected to power and ground and can cause serious burns or weld the metal object to the terminals.

Warning Before opening the chassis, disconnect the telephone-network cables to avoid contact with telephone-network voltages.

Warning Do not work on the system or connect or disconnect cables during periods of lightning activity.

Warning Do not touch the power supply when the power cord is connected. For systems with a power switch, line voltages are present within the power supply even when the power switch is off and the power cord is connected. For systems without a power switch, line voltages are present within the power supply when the power cord is connected.

Warning This warning symbol means *danger.* You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.

Warning To avoid electric shock, do not connect safety extra-low voltage (SELV) circuits to telephone-network voltage (TNV) circuits. LAN ports contain SELV circuits, and WAN ports contain TNV circuits. Some LAN and WAN ports both use RJ-45 connectors. Use caution when connecting cables.

Warning Hazardous network voltages are present in WAN ports regardless of whether power to the router is OFF or ON. To avoid electric shock, use caution when working near WAN ports. When detaching cables, detach the end away from the router first.

- Do not work alone if potentially hazardous conditions exist.
- Never assume that power is disconnected from a circuit. Always check.
- Look carefully for possible hazards in your work area, such as moist floors, ungrounded power extension cables, and missing safety grounds.
- If an electrical accident occurs, proceed as follows:
  - Use caution; do not become a victim yourself.
  - Turn OFF power to the system.
  - If possible, send another person to get medical aid. Otherwise, determine the condition of the victim and then call for help.
  - Determine if the person needs rescue breathing or external cardiac compressions; then take appropriate action.

Preventing Electrostatic Discharge Damage

Electrostatic discharge (ESD) can damage equipment and impair electrical circuitry. It occurs when electronic printed circuit cards are improperly handled and can result in complete or intermittent failures. Always follow ESD prevention procedures when removing and replacing cards. Ensure that the chassis is electrically connected to earth ground. Wear an ESD-preventive wrist strap, ensuring that it makes good skin contact. Connect the clip to an unpainted surface of the chassis frame to safely channel unwanted ESD voltages to ground. To properly guard against ESD damage and shocks, the wrist strap and cord must operate effectively. If no wrist strap is available, ground yourself by touching the metal part of the chassis.

Caution For safety, periodically check the resistance value of the antistatic strap, which should be between 1 and 10 megohm (Mohm).

Installation Overview

The use of 56K modems introduces new steps for installing and configuring modem code. With some Cisco IOS releases, you must first install the 56K modem code (modem firmware and DSP software). The following steps provide an overview of the installation process:

1. Verify that the Cisco AS5200 is running Cisco IOS Release 11.2(8)P or later. If necessary, upgrade your system software.
2. Install the module, as described in the section "Installing the 56K 12-Port Module."
3. If necessary, upgrade the modem code, as described in the sections "Downloading Modem Code for Releases Requiring Two Files" or "Downloading Modem Code for Releases Requiring a Single File."

Note Depending on how often modem code images are downloading in to your boot Flash memory, the boot Flash memory in your Cisco AS5200 may not have the available space to accept the additional 56K images. If you experience this, refer to the section "Erase Boot Flash Memory and Restore the Boot Image," page 29.

Installing the 56K 12-Port Module

You must install 56K modules in a carrier card or a dual E1/PRI card, which are not included with this kit. The carrier card, shown in Figure 2, is a wide, narrow card with two slots in which you can install up to two 56K modules (or other supported modules). Figure 3 shows the dual E1/PRI card, which has only one slot. You can install 56K modules with any combination of other supported modules.

Figure 2 Carrier Card

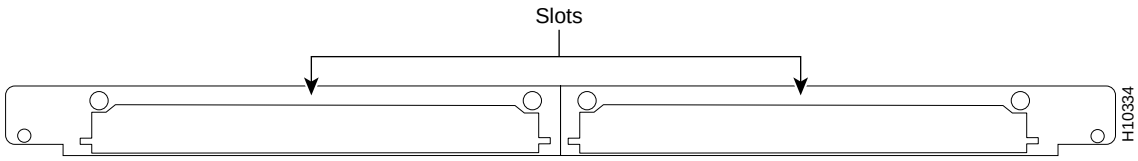
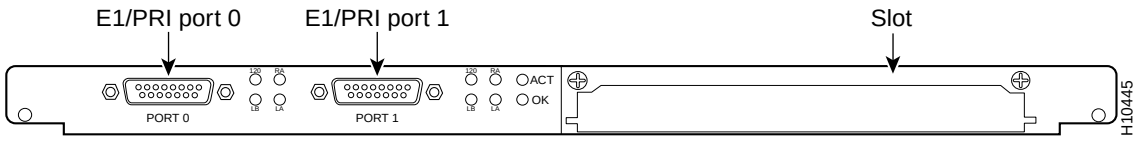


Figure 3 Dual E1/PRI Card



Required Tools

You will need the following tools:

- ESD-preventive wrist strap
- Medium-size flat-blade screwdriver (1/4 in. [0.625 cm])

Installation

Refer to Figure 4 and take these steps:

Step 1 Attach an ESD-preventive wrist strap.

Step 2 Power OFF the access server.

Caution Unlike some other Cisco access servers, the modules are not hot-swappable (that is, you cannot remove or install them when the access server power is ON). Be sure to power OFF the access server before installing or removing modules. *Failure to do so can damage the access server.*

Step 3 Remove all interface cables from the back panel of the access server.

Step 4 Remove the blank cover or module installed in the carrier card or dual E1/PRI card.

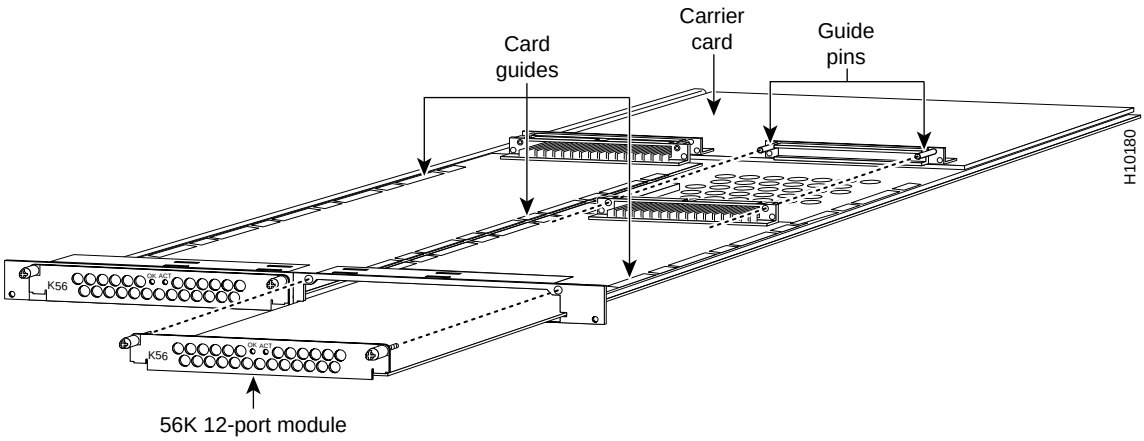
Note If the carrier card or dual E1/PRI card is already installed in the access server, you can install 56K modules in the card without removing it from the chassis.

Step 5 Remove the 56K module from the ESD-preventive shipping material.

Step 6 Slide the 56K module into the carrier card or dual E1/PRI card slot until it is seated completely.

Step 7 Tighten the two captive screws on the 56K module to secure it to the carrier card or dual E1/PRI card.

Figure 4 56K 12-Port Module Installation (Carrier Card Shown)



If you have questions or need assistance, refer to the section “Cisco Connection Online” at the end of this document. Otherwise, proceed to one of these sections, “Downloading Modem Code for Releases Requiring Two Files” or “Downloading Modem Code for Releases Requiring a Single File.”

Decisions about Downloading 56K Modem Code

The modem code download process depends on your Cisco IOS software release and your configuration. Select one of the following actions:

- You must download two files (modem firmware and DSP software) if you are running the following releases:
  - Cisco IOS Release 11.2(8)P
  - Cisco IOS Release 11.2(9)P
  - Cisco IOS Release 11.3(1)T (future)
  - Cisco IOS Release 11.3(1) and later (future)

  For instructions, see "Downloading Modem Code for Releases Requiring Two Files," page 8.
- Because default modem code is bundled with some versions of Cisco IOS software, you do not need to download any modem code if you are running the following releases:
  - Cisco IOS Release 11.2(10)P or later (future)
  - Cisco IOS Release 11.3(2)T or later (future)
- You can decide to override the modem code automatically selected by Cisco IOS Release 11.2(10)P or later or Cisco IOS Release 11.3(2)T (future) or later. See "Downloading Modem Code for Releases Requiring a Single File," page 17.

Downloading Modem Code for Releases Requiring Two Files

Access servers running Cisco IOS Release 11.2(8)P, 11.2(9)P, 11.3(1)T (future), or 11.3(1) (future) and later must contain two compatible files:

- 56K modem firmware—Located in Flash memory on the 56K modems
- DSP software—Located in boot Flash memory on the Cisco AS5200

First shipments of the 12-port module contained version 3.1.30 modem firmware. You must always download the compatible DSP software from the disk shipped with the module.

Table 1 describes the current firmware and software versions. In the middle column, note that the filenames are similar, which indicates that the files are compatible.

Table 1 56K Modem Firmware and DSP Software

File Type	File Posted to Cisco's FTP Server	File Destination
56K modem firmware	mcom-modem-fw-3.1.30-1.1.0.bin	Flash memory on the 56K modems
56K DSP software	mcom-modem-dsp-3.1.30-1.1.0.bin	Boot Flash memory on the Cisco AS5200

You must download the files identified in Table 1 to a TFTP server on your LAN, then copy the files to the access server's boot Flash memory.

Choose a method to download the files:

- Download Method 1—Use an Internet Browser
- Download Method 2—Use a Traditional FTP Application
- Download Method 3—Use the Disk Shipped with the Module (for DSP software only)

Download Method 1—Use an Internet Browser

Log in to Cisco's Software Center at the following URL to download both 56K files. You must log in as a Cisco registered user (nonregistered users must use the DSP software on the disk shipped with the module):

http://www.cisco.com/cgi-bin/tablebuild.pl/56K

Alternately, you can access Cisco at http://www.cisco.com, login, and take the following path to the files:

- Service and Support
- Software Center
- Access Products
- Cisco AS5200 Series Software
- Download Microcom 56K Modem Firmware

After the files are downloaded to your desktop computer, you must transfer them to a TFTP server on your network using an FTP application.

Download Method 2—Use a Traditional FTP Application

Take the following steps to download the 56K files mentioned above from Cisco's FTP server using an FTP client application. The steps assume that you want to download both the modem firmware and the DSP software. (For initial installations, only the DSP software is required. These instructions are provided for future versions of modem firmware.)

Note The directory path leading to the 56K images on cco.cisco.com is subject to change without notice. If you cannot access the files using an FTP application, use Download Method 1.

Step 1 Log in to Cisco System's CCO FTP server, which is called cco.cisco.com:

```
terminal> ftp cco.cisco.com
Connected to cio-sys.cisco.com.
220-
220-  Cisco Connection Online       |        |      Cisco Systems, Inc.
220-  Email: cco-team@cisco.com    |||      |||     170 West Tasman Drive
220-  Phone: +1.800.553.2447    .:|||||:..:|||||:.  San Jose, CA 95134
220-
220-  NOTE: As of February 1, 1997 ftp.cisco.com will now point to this
220-  service.  Please be advised.  To use the former ftp.cisco.com after
220-  February 1, connect to ftpeng.cisco.com
220-
220-  You may login with:
220-         + Your CCO username and password, or
220-         + A special access code followed by your e-mail address, or
220-         + "anonymous" followed by your e-mail address for guest access.
220-
220-
220 cio-sys FTP server (CIOESD #103 Sun Dec 15 14:43:43 PST 1996) ready.
```

Step 2 Enter your CCO registered username and password (for example, **harry** and **letmein**):

```
Name (cco.cisco.com:harry): harry
331 Password required for harry.
Password: letmein
```

```
230-###############################################################################
230-#  Welcome to the Cisco Systems CCO FTP server.
230-#  This server has a number of restrictions.  If you are not familiar
230-#  with these, please first get and read the /README or /README.TXT
file.
230-#  http://www.cisco.com/acs/info/cioesd.html for more info.
230-###############################################################################
230-
230-  *****  NOTE: As of February 1, 1997, "cco.cisco.com",   *****
230-  *****  "www.cisco.com" and "ftp.cisco.com" are now all  *****
230-  *****  logical names for the same machine.              *****
230-  *****                                                   *****
230-  *****  The old "ftp.cisco.com" is an entirely           *****
230-  *****  different machine, which is now known as         *****
230-  *****  "ftpeng.cisco.com" or "ftp-eng.cisco.com".       *****
230-  *****                                                   *****
230-  *****  In general, "ftpeng.cisco.com" is used only for  *****
230-  *****  distribution of Cisco Engineering-controlled     *****
230-  *****  projects, such as beta programs, early field     *****
230-  *****  trials, developing standards documents, etc.     *****
230-  *****                                                   *****
230-  *****  Be sure to confirm you have connected to         *****
230-  *****  the machine you need to interact with.           *****
230-
230-  If you have any odd problems, try logging in with a minus sign (-)
as
230-  the first character of your password.  This will turn off a feature
230- that may be confusing your ftp client program.
230-  Please send any questions, comments, or problem reports about this
230-  server to cco-team@cisco.com.
230-
230-  NOTE:
230-  o To download files from CCO, you must be running a *passive-mode*
230-    capable FTP client.
230-  o To drop files on this system, you must cd to the /drop directory.
230-  o Mirrors of this server can be found at
230-
230-     + ftp://www-europe.cisco.com European (Amsterdam)
230-     + ftp://www-fr.cisco.com     France     (Paris)
230-     + ftp://www-au.cisco.com     Australia  (Sydney)
230-     + ftp://www-jp.cisco.com     Japan      (Tokyo)
230-     + ftp://www-kr.cisco.com     Korea      (Seoul)
230-
230-
230-
230-Please read the file README
230-  it was last modified on Sat Feb  1 12:49:31 1997 - 163 days ago
230 User harry logged in.  Access restrictions apply.
Remote system type is UNIX.
Using binary mode to transfer files.
```

Step 3 Specify the directory that holds the modem firmware and DSP software files, which is /cisco/access/5200/56k:

```
ftp> cd /cisco/access/5200/56k
250-Please read the file README
250-  it was last modified on Tue May 27 10:07:38 1997 - 48 days ago
250-Please read the file README.txt
250-  it was last modified on Tue May 27 10:07:38 1997 - 48 days ago
250 CWD command successful.
```

Step 4 View the contents of the directory with the **ls** command:

```
ftp> ls
227 Entering Passive Mode (192,31,7,130,218,128)
```

```
150 Opening ASCII mode data connection for /bin/ls.
total 2688
drwxr-s--T   2 ftpadmin ftpcio       512 Jun 30 18:11 .
drwxr-sr-t  19 ftpadmin ftpcio       512 Jun 23 10:26 ..
lrwxrwxrwx   1 root     3             10 Aug  6  1996 README -> README.txt
-rw-rw-r--   1 root     ftpcio      2304 May 27 10:07 README.txt
-r--r--r-- 1 ftpadmin ftpint 96708 Jul 10 18:08 mcom-modem-dsp-3.1.30-1.1.0.bin
-r--r--r-- 1 ftpadmin ftpint 280208 Jul 10 18:08 mcom-modem-fw-3.1.30-1.1.0.bin
226 Transfer complete.
```

Step 5 Specify a binary image transfer:

```
ftp> binary
200 Type set to I.
```

Step 6 Copy the modem firmware and/or DSP software files from the server to your local environment with the **get** command. The filenames follow:

- mcom-modem-fw-3.1.30-1.1.0.bin
- mcom-modem-dsp-3.1.30-1.1.0.bin

Note For initial installations, you will only need to copy the DSP software (mcom-modem-dsp-3.1.30-1.1.0.bin) because the modem firmware is installed on the module at the factory. When Cisco releases updated modem firmware in the future, use these instructions to download the files.

The following example downloads the DSP software file:

```
ftp> get mcom-modem-dsp-3.1.30-1.1.0.bin
PORT command successful.
Opening BINARY mode data connection for mcom-modem-dsp-3.1.30-1.1.0.bin (96708
bytes).
Transfer complete.
local: mcom-modem-dsp-3.1.30-1.1.0.bin remote: mcom-modem-dsp-3.1.30-1.1.0.bin
96708 bytes received in 0.30 seconds (3.2e+02 Kbytes/s)
```

The following example downloads the modem firmware file:

```
ftp> get mcom-modem-fw-3.1.30-1.1.0.bin
PORT command successful.
Opening BINARY mode data connection for mcom-modem-fw-3.1.30-1.1.0.bin (280208
bytes).
Transfer complete.
local: mcom-modem-fw-3.1.30-1.1.0.bin remote: mcom-modem-fw-3.1.30-1.1.0.bin
280208 bytes received in 0.63 seconds (4.4e+02 Kbytes/s)
```

Step 7 Quit your terminal session:

```
ftp> quit
Goodbye.
```

Step 8 If you have not already done so, you must now transfer these files to a local TFTP server that your Cisco AS5200 can access.

Note If you loaded Cisco IOS software from a feature pack CD-ROM, note that the CD contains a TFTP server program for PCs using Windows 95. Run the server program from the directory where you installed the Router Software Loader (RSL) program. Remember to set the Root directory to the directory where the AS5200 56K files are located. RSL is available on the software feature pack CD and on CCO in the software library in the Access Products section.

Download Method 3—Use the Disk Shipped with the Module

If you do not have access to the Cisco Software Center or the Cisco FTP server and decide to use the software on the disk shipped with your module, you must first copy the file mcom-modem-dsp-3.1.30-1.1.0.bin to your tftp server, then download the software to the modem using the method described in the next section "Upgrade the 56K Modems to the Latest 56K Modem Firmware."

Upgrade the 56K Modems to the Latest 56K Modem Firmware

The procedure for copying the 56K modem firmware from a local TFTP server to the 56K modem's Flash memory is described in this section. Note that the firmware shipped with your 56K 12-port module matches the DSP software on the disk. This step is unnecessary with the 56K modem firmware version 3.1.30. As revised modem code is available, you can use the procedures in this section to upgrade the 56K modes to the latest version.

- Step 1—Create an Empty Boot Flash Memory Image File on Your UNIX TFTP Server (UNIX TFTP only)
- Step 2—Back Up the Boot Flash Image and Disable Modem Autoconfigure
- Step 3—Upgrade to the Latest 56K Modem Firmware

Step 1—Create an Empty Boot Flash Memory Image File on Your UNIX TFTP Server

Before you back up your boot Flash image with the **copy bootflash tftp** command using a UNIX TFTP server, you must create an empty destination file on your local TFTP server:

Step 1 Log on to the Cisco AS5200 and find out the name of the boot image file in boot Flash memory with the **show bootflash** command:

```
router> enable
Password: letmein
router# show bootflash

Boot flash directory:
File  Length   Name/status
  1   6465584  c5200-is-l.112-6.4
[6465648 bytes used, 1922960 available, 8388608 total]
8192K bytes of processor board Boot flash (Read/Write)

router#
```

Step 2 Go to your TFTP server and create an empty file using your boot image's filename, then change its permissions to be world writable:

```
henry-sun:/tftpboot> touch c5200-is-l.112-6.4
henry-sun:/tftpboot> chmod 666 c5200-is-l.112-6.4
henry-sun:/tftpboot> ls -l c5200-is-l.112-6.4
-rw-rw-rw-   1 henry cisco     6465584 Jul 14 15:25 c5200-is-l.112-6.4
```

The placeholder or destination file is now created and prepared for the backup copy operation. Proceed to the next section "Step 2—Back Up the Boot Flash Image and Disable Modem Autoconfigure."

Step 2—Back Up the Boot Flash Image and Disable Modem Autoconfigure

Perform the following steps on the Cisco AS5200:

Step 1 Back up your boot Flash image to a local TFTP server on your network with the **copy bootflash tftp** command. This provides a recovery mechanism for you in case you accidentally erase or damage your boot Flash image in one of the later steps.

```
router# copy bootflash tftp
```

Step 2 Enter global configuration mode and disable the **modem autoconfigure** command on the TTY lines that correspond with the 56K modems. Ignore this step if this command is not enabled in your system configuration. In the following example, one 12-port 56K modem card is installed in slot 2:

```
router# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
router(config)# line 13 24
router(config-line)# no modem autoconfigure
router(config-line)# exit
router(config)# exit
router#
%SYS-5-CONFIG_I: Configured from console by console
```

The boot image is now backed up and modem autoconfigure is disabled. Proceed to the next section "Step 3—Upgrade to the Latest 56K Modem Firmware."

Step 3—Upgrade to the Latest 56K Modem Firmware

Perform the following steps:

Step 1 Log in to the Cisco AS5200 and copy the new modem firmware file from your TFTP server directly to the installed 56K modems using the **copy tftp modem** Privileged EXEC command:

```
router# copy tftp modem
```

Step 2 Specify the range of 56K modems that you want to upgrade. This example shows the range of modems to be 2/12 through 2/23:

```
Modem Numbers (<slot>/<port>[-<slot>/<port>] | group <number> | all)? 2/12-2/23
```

Step 3 Specify the name or address of the TFTP server holding the new modem firmware. Press the **Return** key to accept the default name or IP address enclosed in the brackets []. Also specify the source path/filename of the firmware.

```
Address or name of remote host [255.255.255.255]? tftp-server
Source file name? mcom-modem-fw-3.1.30-1.1.0.bin
Accessing file 'mcom-modem-fw-3.1.30-1.1.0.bin' on tftp-server...
Loading mcom-modem-fw-3.1.30-1.1.0.bin from 172.16.1.129 (via Ethernet0):
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 280208/557056 bytes]

router#
*Mar  2 08:18:49.143: %MODEM-5-DL_START: Modem (2/12) started firmware download
*Mar  2 08:18:51.147: %MODEM-5-DL_START: Modem (2/13) started firmware download
*Mar  2 08:18:53.151: %MODEM-5-DL_START: Modem (2/14) started firmware download
```

```
*Mar  2 08:18:55.155: %MODEM-5-DL_START: Modem (2/15) started firmware download
*Mar  2 08:18:57.159: %MODEM-5-DL_START: Modem (2/16) started firmware download
*Mar  2 08:18:59.163: %MODEM-5-DL_START: Modem (2/17) started firmware download
*Mar  2 08:19:01.167: %MODEM-5-DL_START: Modem (2/18) started firmware download
*Mar  2 08:19:03.171: %MODEM-5-DL_START: Modem (2/19) started firmware download
*Mar  2 08:19:05.175: %MODEM-5-DL_START: Modem (2/20) started firmware download
*Mar  2 08:19:07.179: %MODEM-5-DL_START: Modem (2/21) started firmware download
*Mar  2 08:19:09.179: %MODEM-5-DL_START: Modem (2/22) started firmware download
*Mar  2 08:19:11.183: %MODEM-5-DL_START: Modem (2/23) started firmware download
*Mar  2 08:20:01.959: %MODEM-5-DL_GOOD: Modem (2/17) completed firmware download:
MNPClass10K56flexModemRev3.1.30/85
*Mar  2 08:20:02.251: %MODEM-5-DL_GOOD: Modem (2/18) completed firmware download:
MNPClass10K56flexModemRev3.1.30/85
*Mar  2 08:20:03.019: %MODEM-5-DL_GOOD: Modem (2/15) completed firmware download:
MNPClass10K56flexModemRev3.1.30/85
*Mar  2 08:20:03.023: %MODEM-5-DL_GOOD: Modem (2/16) completed firmware download:
MNPClass10K56flexModemRev3.1.30/85
*Mar  2 08:20:03.347: %MODEM-5-DL_GOOD: Modem (2/14) completed firmware download:
MNPClass10K56flexModemRev3.1.30/85
*Mar  2 08:20:03.355: %MODEM-5-DL_GOOD: Modem (2/19) completed firmware download:
MNPClass10K56flexModemRev3.1.30/85
*Mar  2 08:20:04.711: %MODEM-5-DL_GOOD: Modem (2/13) completed firmware download:
MNPClass10K56flexModemRev3.1.30/85
*Mar  2 08:20:05.739: %MODEM-5-DL_GOOD: Modem (2/12) completed firmware download:
MNPClass10K56flexModemRev3.1.30/85
*Mar  2 08:20:05.747: %MODEM-5-DL_GOOD: Modem (2/20) completed firmware download:
MNPClass10K56flexModemRev3.1.30/85
*Mar  2 08:20:05.751: %MODEM-5-DL_GOOD: Modem (2/21) completed firmware download:
MNPClass10K56flexModemRev3.1.30/85
*Mar  2 08:20:06.007: %MODEM-5-DL_GOOD: Modem (2/22) completed firmware download:
MNPClass10K56flexModemRev3.1.30/85
*Mar  2 08:20:09.375: %MODEM-5-DL_GOOD: Modem (2/23) completed firmware download:
MNPClass10K56flexModemRev3.1.30/85
```

The 56K modems are now upgraded to the latest version of modem firmware. Proceed to the next section “Copy the RAM-Based DSP Software.”

Copy the RAM-Based DSP Software

The procedure for copying the DSP software from to a local file server to the access server’s boot Flash memory is described in this section:

- Step 1—Copy the RAM-Based DSP Software to Boot Flash Memory
- Step 2—Copy the DSP Software Filename to the 56K Modems

These two steps are performed only once. Although the DSP software runs from RAM, the Cisco IOS software automatically copies the DSP code from boot Flash memory to the 56K modems each time the access server power cycles in the future. After you copy the DSP software filename into boot Flash memory for the first time, you should not have to perform these steps again.

Note A list of download failure reasons and recommended actions is provided in Table 5 on page 28.

Step 1—Copy the RAM-Based DSP Software to Boot Flash Memory

Step 1 Copy the DSP software file from your TFTP server to the access server's boot Flash memory using the **copy tftp bootflash** command. The Cisco IOS software prompts you with a sequence of questions such as name/address of the TFTP server and the DSP filename to be copied. Answer all of the questions accordingly.

```
router# copy tftp bootflash

Boot flash directory:
File  Length   Name/status
1   2348148  as5200-boot-l.111-7.AA
[2348212 bytes used, 6040396 available, 8388608 total]
```

Step 2 Specify the address or name of the server that currently holds the DSP software. You must also specify the source path/filename of the DSP software and the destination filename. The system software proposes a destination filename for you, which is enclosed in square brackets []. Press the **Return** key to accept the default destination name.

```
Address or name of remote host [255.255.255.255]? tftp-server
Source file name? mcom-modem-dsp-3.1.30-1.1.0.bin
Destination file name [mcom-modem-dsp-3.1.30-1.1.0.bin]?
Accessing file 'mcom-modem-dsp-3.1.30-1.1.0.bin' on tftp-server...
Loading mcom-modem-dsp-3.1.30-1.1.0.bin from 172.16.1.129 (via Ethernet0): ! [OK]
```

Step 3 When the system asks to confirm erasing the Flash memory device before copying the DSP file, enter **no**. You will now see a warning message appear that says the DSP file cannot be executed on the system (unlike a feature set or system image). Ignore this message.

```
Erase flash device before writing? [confirm] no
%Warning: File not a valid executable for this system
```

Step 4 Initiate the copy operation by entering **y** then pressing the **Return** key at the [confirm] prompt:

```
Copy file? [confirm] y
```

Step 5 Continue with the copy operation by entering **yes** and pressing the **Return** key:

```
Copy 'mcom-modem-dsp-3.1.30-1.1.0.bin' from server as
'mcom-modem-dsp-3.1.30-1.1.0.bin' into Flash WITHOUT erase? [yes/no] yes
Loading mcom-modem-dsp-3.1.30-1.1.0.bin from 172.16.1.129 (via Ethernet0):
!!!!!!!!!!!!!!!!!!![OK - 96708/6040396 bytes]

Verifying checksum...  OK (0x9B87) Flash device copy took 00:00:02 [hh:mm:ss]
```

Now the DSP software is in the access server's boot Flash memory. Proceed to the next section, "Step 2—Copy the DSP Software Filename to the 56K Modems" for step-by-step instructions on how to transfer the DSP image to the 56K modems.

Step 2—Copy the DSP Software Filename to the 56K Modems

Step 1 Copy the DSP software filename to the 56K modems by entering the **copy flash modem** Privileged EXEC command. After you enter this command, specify the range of 56K modems that you want to target with the DSP software. In this example, only one 12-port 56K modem board is installed in the Cisco AS5200.

```
router# copy flash modem
Modem Numbers (<slot>/<port>[-<slot>/<port>] | group <number> | all)? 2/12-2/23
```

Step 2 Specify the filename of the DSP software and press the **Return** key. Note that the filename must be preceded by **bootflash:**, which is necessary to address the file that is stored in boot Flash memory.

```
Name of file to copy? bootflash:mcom-modem-dsp-3.1.30-1.1.0.bin
[OK - 96708/278528 bytes]

Downloading modem DSP file: bootflash:mcom-modem-dsp-3.1.30-1.1.0.bin
DSP Rev: 1.1(0)
```

Step 3 Proceed with the DSP download by entering **y** and pressing the **Return** key:

```
Proceed with DSP download? [n]: y
Downloading modem DSP file. Check current modem firmware version.
If firmware version is not the correct version to run with DSP image,
the correct firmware version must also be downloaded.
router#
*Mar  2 08:22:10.535: %MODEM-5-DL_DSP_START: Modem (2/12) started DSP download
*Mar  2 08:22:12.539: %MODEM-5-DL_DSP_START: Modem (2/13) started DSP download
*Mar  2 08:22:14.543: %MODEM-5-DL_DSP_START: Modem (2/14) started DSP download
*Mar  2 08:22:16.543: %MODEM-5-DL_DSP_START: Modem (2/15) started DSP download
*Mar  2 08:22:18.563: %MODEM-5-DL_DSP_START: Modem (2/16) started DSP download
*Mar  2 08:22:20.567: %MODEM-5-DL_DSP_START: Modem (2/17) started DSP download
*Mar  2 08:22:22.567: %MODEM-5-DL_DSP_START: Modem (2/18) started DSP download
*Mar  2 08:22:24.567: %MODEM-5-DL_DSP_START: Modem (2/19) started DSP download
*Mar  2 08:22:26.567: %MODEM-5-DL_DSP_START: Modem (2/20) started DSP download
*Mar  2 08:22:28.571: %MODEM-5-DL_DSP_START: Modem (2/21) started DSP download
*Mar  2 08:22:30.575: %MODEM-5-DL_DSP_START: Modem (2/22) started DSP download
*Mar  2 08:22:32.579: %MODEM-5-DL_DSP_START: Modem (2/23) started DSP download
*Mar  2 08:22:56.795: %MODEM-5-DL_DSP_GOOD: Modem (2/13) completed DSP download:
MNPClass10K56flexModemRev3.1.30/85
*Mar  2 08:22:57.055: %MODEM-5-DL_DSP_GOOD: Modem (2/12) completed DSP download:
MNPClass10K56flexModemRev3.1.30/85
*Mar  2 08:22:57.311: %MODEM-5-DL_DSP_GOOD: Modem (2/14) completed DSP download:
MNPClass10K56flexModemRev3.1.30/85
*Mar  2 08:22:57.315: %MODEM-5-DL_DSP_GOOD: Modem (2/15) completed DSP download:
MNPClass10K56flexModemRev3.1.30/85
*Mar  2 08:22:57.575: %MODEM-5-DL_DSP_GOOD: Modem (2/17) completed DSP download:
MNPClass10K56flexModemRev3.1.30/85
*Mar  2 08:22:57.835: %MODEM-5-DL_DSP_GOOD: Modem (2/18) completed DSP download:
MNPClass10K56flexModemRev3.1.30/85
*Mar  2 08:22:58.091: %MODEM-5-DL_DSP_GOOD: Modem (2/16) completed DSP download:
MNPClass10K56flexModemRev3.1.30/85
*Mar  2 08:22:58.351: %MODEM-5-DL_DSP_GOOD: Modem (2/19) completed DSP download:
MNPClass10K56flexModemRev3.1.30/85
*Mar  2 08:22:58.355: %MODEM-5-DL_DSP_GOOD: Modem (2/20) completed DSP download:
MNPClass10K56flexModemRev3.1.30/85
*Mar  2 08:23:00.059: %MODEM-5-DL_DSP_GOOD: Modem (2/21) completed DSP download:
MNPClass10K56flexModemRev3.1.30/85
*Mar  2 08:23:04.119: %MODEM-5-DL_DSP_GOOD: Modem (2/22) completed DSP download:
MNPClass10K56flexModemRev3.1.30/85
*Mar  2 08:23:05.387: %MODEM-5-DL_DSP_GOOD: Modem (2/23) completed DSP download:
MNPClass10K56flexModemRev3.1.30/85
```

Note Now the 56K modems are equipped with the DSP software. The modems are configured to transmit at speeds up to 56 kbps. Each time the access server is power cycled, the system software automatically loads the 56K modems with the DSP software in boot Flash memory. If you erase the DSP software file from boot Flash memory, the 56K modems will revert to V.34 operation on the next power cycle.

Step 4 Verify that the DSP software copied to the 56K modems with the **show modem version** command. In this example, modems 2/12 through 2/23 are loaded with the new DSP software:

```
router# show modem version


         Modem module     Firmware   Boot          DSP
 Mdm     Number           Rev        Rev           Rev
 2/0              0       2.2(8)   1.0(5)
 2/1              0       2.2(8)   1.0(5)
 2/2              0       2.2(7)   1.0(5)
 2/3              0       2.2(7)   1.0(5)
 2/4              0       2.2(7)   1.0(5)
 2/5              0       2.2(7)   1.0(5)
 2/6              0       2.2(7)   1.0(5)
 2/7              0       2.2(7)   1.0(5)
 2/8              0       2.2(7)   1.0(5)
 2/9              0       2.2(7)   1.0(5)
 2/10             0       2.2(7)   1.0(5)
 2/11             0       2.2(7)   1.0(5)
 2/12             1       3.1(30)  3.0(4)    1.1(0)/1.1(0)
 2/13             1       3.1(30)  3.0(4)    1.1(0)/1.1(0)
 2/14             1       3.1(30)  3.0(4)    1.1(0)/1.1(0)
 2/15             1       3.1(30)  3.0(4)    1.1(0)/1.1(0)
 2/16             1       3.1(30)  3.0(4)    1.1(0)/1.1(0)
 2/17             1       3.1(30)  3.0(4)    1.1(0)/1.1(0)
 2/18             1       3.1(30)  3.0(4)    1.1(0)/1.1(0)
 2/19             1       3.1(30)  3.0(4)    1.1(0)/1.1(0)
 2/20             1       3.1(30)  3.0(4)    1.1(0)/1.1(0)
 2/21             1       3.1(30)  3.0(4)    1.1(0)/1.1(0)
 2/22             1       3.1(30)  3.0(4)    1.1(0)/1.1(0)
 2/23             1       3.1(30)  3.0(4)    1.1(0)/1.1(0)

Modem board HW version info:

Slot 2:
  Carrier card:
    hw version= 8, number_of_ports= 24, max_modules= 2, max_oob_ports= 2
  Modem Module 0:
    number_of_modems= 12, option_bits= 1,
    rev_num= 03.00, vendor_model_number= 01,
    vendor_banner= Microcom MNP10 V34 Modem
  Modem Module 1:
    number_of_modems= 12, option_bits= 1,
    rev_num= 03.00, vendor_model_number= 02,
    vendor_banner= Microcom MNP10 K56 Modem
```

Downloading Modem Code for Releases Requiring a Single File

Cisco IOS Release 11.2(10)P or later and Cisco IOS Release 11.3(2)T (future) or later support bundled modem code for the 12-port module. This modem code image is in a single-file format and consists of the following files:

- Modem controller firmware, which is stored in the modem card Flash memory. This firmware does not have to be downloaded after power cycles or software reloads.
- DSP software, which runs from modem RAM. This software needs to be downloaded from boot Flash memory after power cycles or software reloads.

Modem code can reside on the access server in two locations: one version is bundled with Cisco IOS software, and another version can exist in boot Flash memory. This modem code residing in boot Flash memory is a single file comprised of the modem firmware image combined with the DSP software image.

After power on, Cisco IOS software uses its bundled modem code file or the existing modem code file in boot Flash memory to automatically update the DSP software. This means that after you install or replace a 12-port module, you can allow the system software to download compatible DSP software and then proceed directly to the configuration steps (page 29). However, because you can control the version of modem code used by the modems, the remainder of this section provides information about how Cisco IOS software processes modem code updates and how you can load a different version than the one automatically selected.

Note Systems running Cisco IOS Release 11.2(10)P or later or Cisco IOS Release 11.3(2)T (future) or later have bundled modem code and do not require download of the modem code shipped on the disk with the module. However, the disk may contain a later version of modem code than the version bundled with Cisco IOS software. You have the option of downloading this version and overriding the version selected by Cisco IOS software.

When you install a new 12-port module, Cisco IOS software examines the following versions of modem code:

- Cisco IOS bundled modem code
- Firmware in modem Flash memory
- Any mapped modem code file in boot Flash memory

Then, Cisco IOS software ensures that the system uses matching DSP software and modem firmware—which may include overriding the current firmware on the modem. In some circumstances you may decide to manually update the modem code after the automatic download process completes.

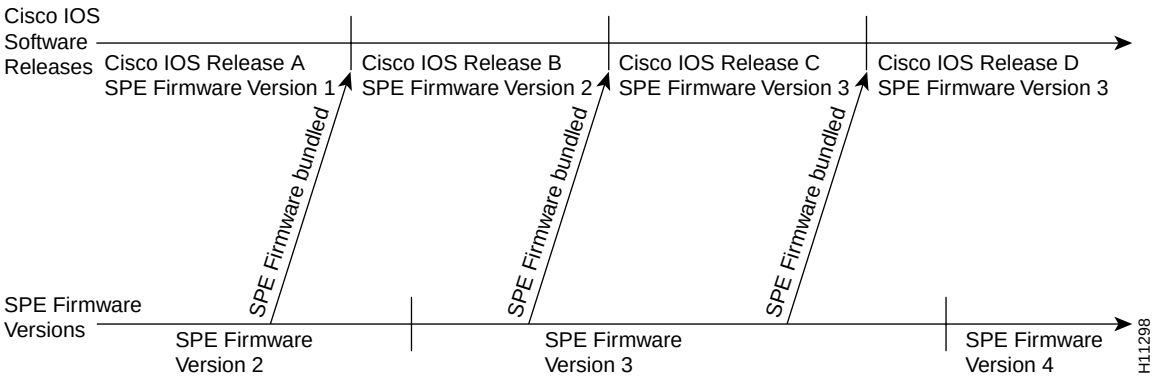
Deciding on an Update Strategy

Because of the possibility of multiple versions of modem code and the way Cisco IOS software processes these versions, Cisco suggests that you decide between the following two strategies:

- Always allow Cisco IOS software to use the bundled modem code (quick install approach)
- Always control the version of modem code used by the modules, independent of Cisco IOS selections

To help with the decision, Figure 5 shows a hypothetical release process. We recommend that you use the modem code bundled with Cisco IOS software because it is the easier strategy and enables you to take advantage of new modem code whenever you upgrade your Cisco IOS software. You can also control the modem code move directly—use the **copy** command as discussed later.

Figure 5 Release Timeline for Cisco IOS Software and Modem Code



Modem Code Upgrade Scenarios

When you add or replace a 12-port module, Cisco IOS software handles the initial modem code download. However, you may decide to download a different version from the one selected by software. Because Cisco IOS software maps modem code (either the bundled Cisco IOS version or a boot Flash memory version) to a given slot/port and not the physical modem, Cisco IOS software will automatically load the modem code mapped to the previous module (for more information, see the description of mapping in Table 4 on page 21). Whenever Cisco IOS software recognizes the modem code as invalid, it uses the bundled version.

Table 2 provides scenarios that occur when you upgrade Cisco IOS software or modem code.

Table 2 Modem Code Scenarios—Cisco IOS Software or Modem Code Upgrades

No.	Scenario	Update Process
1	You update Cisco IOS software, and you decide to use the version of modem code selected by Cisco IOS software.	• Update Cisco IOS software. • No further action needed—Cisco IOS software automatically downloads either its bundled version or a mapped version from boot Flash memory.[1]
2	You update Cisco IOS software, and you decide *not* to use the modem code selected by Cisco IOS software.	• Update Cisco IOS software. • Copy the desired version of modem code file to boot Flash memory, then copy that file to the integrated modems on the 12-port module. See "Using the Modem Code from an External File," page 21.
3	The modems are running a version of modem code from boot Flash memory that is different than the version bundled with Cisco IOS software. You decide to revert to the bundled version.	• Use the Cisco IOS command **copy system:/ucode/***filename* **modem** (or, for Cisco IOS releases earlier than 11.3AA or 12.0, **copy ios-bundled modem**). To view a list of microcode filenames, use the **dir system:/ucode** command. See "Using the Modem Code Bundled with Cisco IOS Software," page 27.
4	Cisco releases new modem code, which is a later version than the version currently running on the modems. You decide to use Cisco's newest modem code.[2]	• Copy the desired version of modem code file to boot Flash memory, then copy that file to the integrated modems on the 12-port module. See "Using the Modem Code from an External File," page 21.

1. In part, Cisco IOS software bases this decision on the last **copy** command issued. For more details about *mapping*, see Table 4 on page 21.
2. Cisco ships new modem code on a disk packed with the 12-port module.

Figure 6 shows a location on the release timeline where updates might take place, and Table 3 explains the resulting versions of Cisco IOS software and modem code.

Figure 6 Release Timeline for Cisco IOS Software and Modem Code

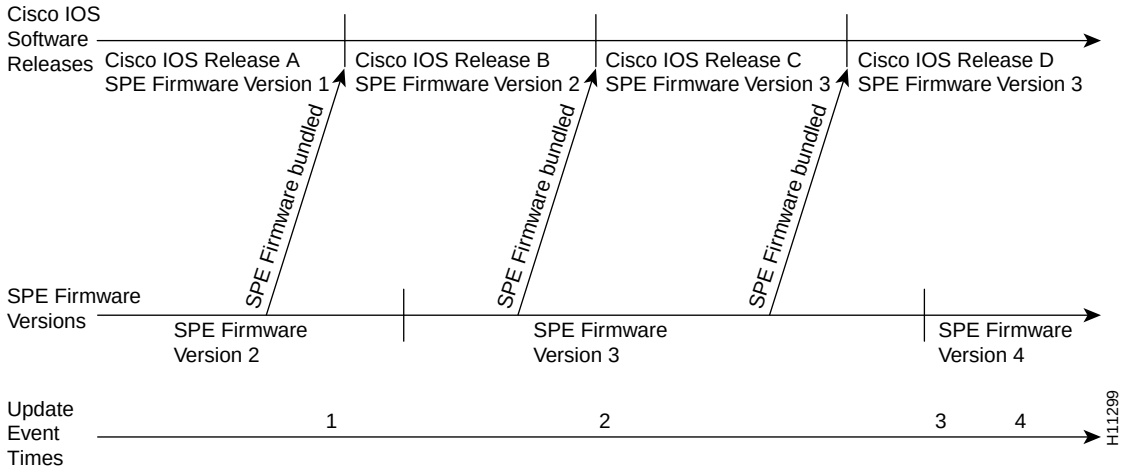


Table 3 Resulting Versions of Cisco IOS Software and Modem Code

Update Time	Update Event	Resulting Version of Cisco IOS Software and Modem Code
1	You upgrade Cisco IOS software to Release B.	
	• If there is no previous **copy** command (Cisco IOS software uses the bundled version).	• Cisco IOS Release B Modem Mode Version 2
	• If invalid mapping is found (Cisco IOS software uses the bundled version).	• Cisco IOS Release B Modem Mode Version 2
	• If last copy command was **copy system:/ucode/***filename* **modem** (or, for Cisco IOS releases earlier than 11.3AA or 12.0, **copy ios-bundled modem**) (Cisco IOS software uses the bundled version).	• Cisco IOS Release B Modem Mode Version 2
	• If last copy command was **copy flash modem** and Modem Code Version 1 was specified.	• Cisco IOS Release B Modem Mode Version 1
2	You upgrade Cisco IOS software to Release C. (Cisco IOS software uses mapping from last **copy** command at Time 1).[1]	Cisco IOS Release C Modem Mode Version 1
	You enter **copy system:/ucode/***filename* **modem** (or, for Cisco IOS releases earlier than 11.3AA or 12.0, **copy ios-bundled modem**).	Cisco IOS Release C Modem Mode Version 3
3	New Modem Code Version 4 is released, you copy the file to boot Flash memory, enter **copy flash modem** and specify Modem Code Version 4.	Cisco IOS Release C Modem Mode Version 4
4	You upgrade Cisco IOS software to Release D.	Cisco IOS Release D Modem Mode Version 4[2]
	You enter the **copy system:/ucode/***filename* **modem** command (or, for Cisco IOS releases earlier than 11.3AA or 12.0, the **copy ios-bundled modem** command).	Cisco IOS Release D Modem Mode Version 3[3]

1. This example assumes the last copy command was **copy flash modem**, and Modem Code Version 1 was specified.
2. You upgraded Cisco IOS code only; therefore, the modem code remains as Version 4 (upgraded in Step 3).
3. You upgraded to the Modem Mode Version 3, which was bundled with Cisco IOS Release D.

Table 4 provides a list of terms and commands and a description of how they are used in the modem code update process.

Table 4 Modem Code Terminology

Term	Description
Modem firmware	Modem controller firmware that resides in modem Flash memory.
DSP software	DSP controller software that resides in modem RAM. Cisco IOS software transfers a version of DSP software to modem RAM on each reboot.
Modem code	Two images: • Modem controller firmware • DSP software These images reside separately in the modems and as a single-file version in the access server's boot Flash memory. System Flash memory can contain several versions of modem code: a version bundled with Cisco IOS software and multiple versions that resulted from previous **copy tftp flash** commands.
copy tftp flash mcom-modem-code-x.x.x.bin command	Places a copy of the modem code in boot Flash memory.
copy flash modem command	Transfers the **copy tftp flash** version of modem code to the modems. This command transfers the modem firmware file to modem Flash memory and the DSP software file to modem RAM. Maps the boot Flash memory version to the modems.
copy system:/ucode/*filename* **modem** command (or, for Cisco IOS releases earlier than 11.3AA or 12.0, **copy ios-bundled** command	Instructs the modems to use the version of modem code bundled with Cisco IOS software. This command does not affect any existing versions of modem code that reside in boot Flash memory. After one such command, future Cisco IOS upgrades will potentially result in the downloading of new Cisco IOS bundled firmware to the modems. (If the new Cisco IOS image contains the same modem code as the old one, no new code will be downloaded to the modems.) Maps the bundled Cisco IOS software version to the modems.
Mapping	The **copy** commands map a specific version of modem code to a group of modem slots/ports. The **copy system:/ucode/***filename* **modem** (or **copy ios-bundled modem**) command maps the slots/ports to the bundled version, and the **copy flash modem** command maps the slots/ports to a specific modem code file located in boot Flash memory. Cisco IOS software uses the mapping to determine which version of modem code should be downloaded to the modems. If Cisco IOS software finds no mapping or invalid mapping, it downloads the bundled version.

Using the Modem Code from an External File

Use the procedures in this section to transfer modem code from Cisco Connection Online (CCO) to the integrated modems on the 12-port module. The procedure consists of the following tasks:

- Download the modem code to a TFTP server
- Copy the modem code from the TFTP server to the modems

Downloading Modem Code to a TFTP Server

You can download the single file (mcom-modem-code-x.x.x.bin) to a TFTP server on your LAN two ways:

- Using an Internet browser
- Using a traditional FTP application

Download Modem Code to a TFTP Server—Method 1, Use an Internet Browser

Log in to Cisco's Software Center at the following URL to download the modem code file. You must log in as a Cisco registered user. (If you are not a registered user, note that Cisco provides modem code on a disk when are updates are necessary. This disk is shipped with the 12-port module.)

After downloading to your desktop computer, you must transfer it to a TFTP server on your network using an FTP application.

```
http://www.cisco.com/cgi-bin/tablebuild.pl/56K
```

Alternatively, you can access Cisco at http://www.cisco.com, login, and take the following path to the file:

- Service and Support
- Software Center
- Access Products
- Cisco AS5200 Series Software
- Download Microcom 56K Modem Firmware

Download Modem Code to a TFTP Server — Method 2, Use a Traditional FTP Application

Take the following steps to download the modem code file from Cisco's FTP server using an FTP client application. These steps assume that you want to download both the modem firmware and the DSP software.

Note The directory path leading to the 56K images on cco.cisco.com is subject to change without notice. If you cannot access the files using an FTP application, use Download Method 1.

Step 1 Log in to Cisco System's CCO FTP server, which is called cco.cisco.com:

```
terminal> ftp cco.cisco.com
Connected to cio-sys.cisco.com.
220-
220-  Cisco Connection Online       |        |      Cisco Systems, Inc.
220-  Email: cco-team@cisco.com    |||      |||     170 West Tasman Drive
220-  Phone: +1.800.553.2447    .:|||||:..:|||||:.  San Jose, CA 95134
220-
220-  NOTE: As of February 1, 1997 ftp.cisco.com will now point to this
220-  service.  Please be advised.  To use the former ftp.cisco.com after
220-  February 1, connect to ftpeng.cisco.com
220-
220-  You may login with:
220-         + Your CCO username and password, or
220-         + A special access code followed by your e-mail address, or
220-         + "anonymous" followed by your e-mail address for guest access.
```

```
220-
220-
220 cio-sys FTP server (CIOESD #103 Sun Dec 15 14:43:43 PST 1996) ready.
```

Step 2 Enter your CCO registered username and password (for example, **harry** and **letmein**):

```
Name (cco.cisco.com:harry): harry
331 Password required for harry.
Password: letmein
230-##############################################################################
230-#  Welcome to the Cisco Systems CCO FTP server.
230-#  This server has a number of restrictions.  If you are not familiar with
230-#  these, please first get and read the /README or /README.TXT file.
230-#  http://www.cisco.com/acs/info/cioesd.html for more info.
230-##############################################################################
230-
230-  *****  NOTE: As of February 1, 1997, "cco.cisco.com",   *****
230-  *****  "www.cisco.com" and "ftp.cisco.com" are now all  *****
230-  *****  logical names for the same machine.              *****
230-  *****                                                   *****
230-  *****  The old "ftp.cisco.com" is an entirely           *****
230-  *****  different machine, which is now known as         *****
230-  *****  "ftpeng.cisco.com" or "ftp-eng.cisco.com".       *****
230-  *****                                                   *****
230-  *****  In general, "ftpeng.cisco.com" is used only for  *****
230-  *****  distribution of Cisco Engineering-controlled     *****
230-  *****  projects, such as beta programs, early field     *****
230-  *****  trials, developing standards documents, etc.     *****
230-  *****                                                   *****
230-  *****  Be sure to confirm you have connected to         *****
230-  *****  the machine you need to interact with.           *****
230-
230-  If you have any odd problems, try logging in with a minus sign (-)
230-  as the first character of your password. This will turn off a feature
230- that may be confusing your ftp client program.
230-  Please send any questions, comments, or problem reports about this
230-  server to cco-team@cisco.com.
230-
230-  NOTE:
230-  o To download files from CCO, you must be running a *passive-mode*
230-    capable FTP client.
230-  o To drop files on this system, you must cd to the /drop directory.
230-  o Mirrors of this server can be found at
230-
230-     + ftp://www-europe.cisco.com European (Amsterdam)
230-     + ftp://www-fr.cisco.com     France     (Paris)
230-     + ftp://www-au.cisco.com     Australia  (Sydney)
230-     + ftp://www-jp.cisco.com     Japan      (Tokyo)
230-     + ftp://www-kr.cisco.com     Korea      (Seoul)
230-
230-
230-
230- Please read the file README
230- it was last modified on Sat Feb  1 12:49:31 1997 - 163 days ago
230- User harry logged in.  Access restrictions apply.
Remote system type is UNIX.
Using binary mode to transfer files.
```

Step 3 Specify the directory that holds the modem code file, which is /cisco/access/5200:

```
ftp> cd /cisco/access/5200
250- Please read the file README
250- it was last modified on Tue May 27 10:07:38 1997 - 48 days ago
250- Please read the file README.txt
```

```
250- it was last modified on Tue May 27 10:07:38 1997 - 48 days ago
250- CWD command successful.
```

Step 4 View the contents of the directory with the **ls** command:

```
ftp> ls
227 Entering Passive Mode (192,31,7,130,218,128)
150 Opening ASCII mode data connection for /bin/ls.
total 2688
drwxr-s--T   2 ftpadmin ftpcio       512 Aug 23 18:11 .
drwxr-sr-t  19 ftpadmin ftpcio       512 Jul 18 10:26 ..
lrwxrwxrwx   1 root     3             10 Aug  9 1996 README -> README.txt
-rw-rw-r--   1 root     ftpcio      2304 Nov 8:07 README.txt
-r--r--r-- 1 ftpadmin ftpint 377112 Jul 10 18:08 mcom-modem-code.3.1.30.bin
-r--r--r-- 1 ftpadmin ftpint 635 Jul 10 18:08 mcom-modem-code.3.1.30.readme

226 Transfer complete.
```

Step 5 Specify a binary image transfer:

```
ftp> binary
200 Type set to I.
```

Step 6 Copy the modem code file from the server to your local environment with the **get** command. The filename is mcom-modem-code-3.1.30.bin.

The following example downloads the modem code file:

```
ftp> get mcom-modem-code-3.1.30.bin
PORT command successful.
Opening BINARY mode data connection for mcom-modem-code-3.1.30.bin (377112 bytes).
Transfer complete.
local: mcom-modem-code-3.1.30.bin
remote: mcom-modem-code-3.1.30.bin
385503 bytes received in 3.6 seconds (1e+02 Kbytes/s)
```

Step 7 Quit your terminal session:

```
ftp> quit
Goodbye.
```

Step 8 Verify that you successfully transferred the modem code file to your local directory:

```
server% ls -al
total 596
-r--r--r-- 1 377112 Jul 10 18:08 mcom-modem-code-3.1.30.bin
server% pwd
/auto/tftpboot
```

Step 9 If you have not already done so, transfer this file to a local TFTP server that your Cisco AS5200 can access.

Note In some cases, Cisco ships modem software on a disk. To use this software, first upload the software to your TFTP server, then download the software to the modem using the method described in the next section "Copying the Modem Code File from a Local TFTP Server to the Modems."

If you loaded Cisco IOS software from a feature pack CD using Router Software Loader (RSL), note that the CD contains a TFTP server program for PCs using Windows 95. Run the server program from the directory where you installed the RSL program. Remember to set the Root directory to the directory where the Cisco AS5200 56K modem code is located. RSL is also available on CCO in the software library in the Access Products section.

Copying the Modem Code File from a Local TFTP Server to the Modems

The procedure for copying the modem code file from your local TFTP server to the access server boot Flash memory is a two-step process. First, transfer the code to the access server. Then, transfer the code to the modems.

These two steps are performed only once. After you copy the modem code file into boot Flash memory for the first time and map that file to a specific modem using the **copy bootflash modem** command, you do not have to perform these steps again. Because the DSP software runs from modem RAM, the Cisco IOS software must automatically copy the DSP software to each modem each time the access server power cycles.

Note A list of download failure reasons and recommended actions is provided in the section "Download Failure Reasons and Recommended Actions."

Step 1 Copy the modem code file from your TFTP server to the access server's boot Flash memory using the **copy tftp bootflash** command. Cisco IOS software prompts you with a sequence of questions such as name/address of the TFTP server and the filename to be copied. Answer all of the prompts according to your configuration. The following example shows a typical download.

```
5200# copy tftp bootflash

Boot flash directory:
File  Length   Name/status
  1   37712   mcom-modem-code.3.1.30.bin
[4195272 bytes used, 12581944 available, 16777216 total]
Address or name of remote host [255.255.255.255]? modem_server
Source file name? as5200/mcom-modem-code.3.1.30.bin
Destination file name [as5200/mcom-modem-code.3.1.30.bin]?
as5200/mcom-modem-code.3.1.30.bin
Accessing file 'as5200/mcom-modem-code.3.1.30.bin' on modem_server...
Loading as5200/mcom-modem-code.3.1.30.bin from 223.255.254.254 (via Ethernet0): !
[OK]

Erase flash device before writing? [confirm] no
Copy 'as5200/mcom-modem-code.3.1.30.bin' from server
  as 'mcom-modem-code.3.1.30.bin' into Flash WITHOUT erase? [yes/no] yes
Loading as5200/mcom-modem-code.3.1.30.bin from 223.255.254.254 (via Ethernet0):
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 282106/557056 bytes]

Verifying checksum...  OK (0xB163)
Flash device copy took 00:00:04 [hh:mm:ss]
```

Step 2 Copy the modem code file to the modems by entering the **copy bootflash modem** Privileged EXEC command.

```
5200# copy bootflash modem
Modem Numbers (<slot>/<port> | group <number> | all)? 1/0

Boot flash directory:
File  Length   Name/status
  1   5424872  c5200-js-mz
  2   377112   mcom-modem-code-3.1.30.bin
[5801984 bytes used, 10975232 available, 16777216 total]
Name of file to copy? mcom-modem-code-3.1.30.bin
Copy 'mcom-modem-code-3.1.30.bin' from Flash to modems? [yes/no]yes
[OK - 377112/278528 bytes]

5200#
*Mar  1 20:21:55: %MODEM-5-DL_START: Modem (1/0) started firmware download
*Mar  1 20:23:24: %MODEM-5-DL_GOOD: Modem (1/0) completed firmware download:
MNPClass10K56flexModemRev3.1.30/85
```

Note On the display, notice that the command copies the concatenated modem code file, mcom-modem-code-3.1.30.bin. When the DSP software and modem firmware download is complete, the display reports the modem firmware component, MNPClass10K56flexModemRev3.1.30/85, was downloaded to the modems.

If you want to verify that the DSP software and modem firmware copied to the modems, use the **show modem version** command. In this example, modems 2/12 through 2/23 are loaded with the modem controller firmware and DSP software:

```
5200# show modem version

        Modem module     Firmware   Boot          DSP
Mdm     Number           Rev        Rev           Rev
2/0              0       2.2(8)   1.0(5)
2/1              0       2.2(8)   1.0(5)
2/2              0       2.2(7)   1.0(5)
2/3              0       2.2(7)   1.0(5)
2/4              0       2.2(7)   1.0(5)
2/5              0       2.2(7)   1.0(5)
2/6              0       2.2(7)   1.0(5)
2/7              0       2.2(7)   1.0(5)
2/8              0       2.2(7)   1.0(5)
2/9              0       2.2(7)   1.0(5)
2/10             0       2.2(7)   1.0(5)
2/11             0       2.2(7)   1.0(5)
2/12             1       3.1(30)  3.0(4)    1.1(0)/1.1(0)
2/13             1       3.1(30)  3.0(4)    1.1(0)/1.1(0)
2/14             1       3.1(30)  3.0(4)    1.1(0)/1.1(0)
2/15             1       3.1(30)  3.0(4)    1.1(0)/1.1(0)
2/16             1       3.1(30)  3.0(4)    1.1(0)/1.1(0)
2/17             1       3.1(30)  3.0(4)    1.1(0)/1.1(0)
2/18             1       3.1(30)  3.0(4)    1.1(0)/1.1(0)
2/19             1       3.1(30)  3.0(4)    1.1(0)/1.1(0)
2/20             1       3.1(30)  3.0(4)    1.1(0)/1.1(0)
2/21             1       3.1(30)  3.0(4)    1.1(0)/1.1(0)
2/22             1       3.1(30)  3.0(4)    1.1(0)/1.1(0)
2/23             1       3.1(30)  3.0(4)    1.1(0)/1.1(0)
```

```
Modem board HW version info:

Slot 2:
  Carrier card:
    hw version= 8, number_of_ports= 24, max_modules= 2, max_oob_ports= 2
  Modem Module 0:
    number_of_modems= 12, option_bits= 1,
    rev_num= 03.00, vendor_model_number= 01,
    vendor_banner= Microcom MNP10 V34 Modem
  Modem Module 1:
    number_of_modems= 12, option_bits= 1,
    rev_num= 03.00, vendor_model_number= 02,
    vendor_banner= Microcom MNP10 K56 Modem
```

Now the modems are equipped with code. The modems are configured to transmit at speeds up to 56 kbps. Each time the access server is power cycled, Cisco IOS software automatically loads the modems with the modem code in boot Flash memory. If you erase the modem code file from boot Flash memory, the Cisco IOS default modem code (that is, the bundled modem code) will be automatically downloaded to the modem.

Using the Modem Code Bundled with Cisco IOS Software

If you already have a version of modem code in the Flash memory on your access server, and you upgrade to a Cisco IOS release that includes newer modem firmware, only the modems that are mapped to the bundled Cisco IOS version are updated. In order to set the modem firmware mapping to the firmware version bundled with Cisco IOS software, enter the following command:

```
5200# copy system:/ucode/filename modem
```

Note For Cisco IOS releases earlier than 11.3AA or 12.0, use the **copy ios-bundled modem** command.

Note This command does not affect any existing modem code that resides in boot Flash memory in case you later want to revert to it. If you decide to delete the code from boot Flash memory, remember that *all* files in boot Flash memory will be deleted, therefore save and restore any important files (for example, the Cisco IOS software image).

As a result of the **copy system:/ucode/***filename* **modem** (or **copy ios-bundled modem**) command, future Cisco IOS upgrades will potentially result in the mapping of new Cisco IOS bundled firmware to the modems. (If the new Cisco IOS image contains the same modem code as the old one, no new code will be downloaded to the modems.)

Note To determine the version of modem code bundled with your Cisco IOS software, refer to the Cisco IOS release notes shipped with the chassis.

Download Failure Reasons and Recommended Actions

During the DSP download process, you may receive an error message if the download fails. See Table 5.

Table 5 Download Failure Reasons and Recommended Actions

Error Message	Description	Recommended Action
%%ERROR: Modem <slot/port>, Modem Firmware file is not valid for modem type.	The specified modem firmware is not compatible with the target modem. For example, V.34 modems cannot be upgraded with 56K firmware. If you have a bank of non-56K modems in the access server and specify the **all** option in the **copy tftp modem** command, this error message will appear and not download 56K firmware where appropriate.	Verify that you are copying 56K modem firmware to 56K modems. Also use the **show modem** command to verify that you specified the correct slot/port or range.
%%ERROR: Modem <slot/port> currently being downloaded.	The DSP software is currently downloading to the 56K modems.	The download process is temporarily delayed or performed twice, which is acceptable. The download is not interrupted or damaged. Simply wait until the download is finished.
%%ERROR: DSP file not found in boot Flash.	The system software cannot find the 56K DSP file in Flash memory.	Copy the DSP file from your local file server to boot Flash memory using the **copy tftp bootflash** command.
%%ERROR: Get NVRAM download DSP file/modem list failed.	An internal system error occurred with NVRAM.	Try power cycling the router to fix the problem.
%%ERROR: DSP Firmware file header is not valid.	The specified file is not intended for the 56K DSP download operation.	Verify that you are copying the correct DSP file, which is mcom-modem-dsp-3.1.30-1.1 .0.bin.
%%ERROR: Modem <slot/port>, download functions not initialized.	The DSP code cannot be downloaded to the specified modem.	Use the **show modem** command to verify that you are downloading to a supported 56K modem.
%%ERROR: Modem <slot/port>, download not done.	The DSP software is currently downloading to the 56K modems.	The download process will be temporarily delayed. Wait until the download is complete.
%%ERROR: Modem <slot/port> is held in reset.	The specified modem is held in reset mode. The DSP software will not download to this modem.	Take the modem out of reset mode then copy the DSP software again.
%%ERROR: NVRAM write for DSP download filename entry failed.	There is a NVRAM table problem.	Reissue the **copy tftp bootflash** command and copy the DSP file again.
%%ERROR: NVRAM table is bad. Use Copy command to set DSP filename.	There is a NVRAM table problem.	Reissue the **copy tftp bootflash** command and copy the DSP file again.

Table 5 Download Failure Reasons and Recommended Actions (Continued)

Error Message	Description	Recommended Action
%%ERROR: NVRAM is bad, Report this as a problem.	The NVRAM is not functioning properly.	Try power cycling the router to fix the problem.
%%ERROR: Ran out of Memory, Install more memory.	The system software needs more memory to complete the copy operation.	Install additional memory.

Erase Boot Flash Memory and Restore the Boot Image

The boot Flash memory in your Cisco AS5200 may not have the available space to accept the additional 56K images or files. If you experience this, you must erase the entire boot Flash memory followed by restoring the boot image before performing the necessary 56K copy operations. Because the Cisco AS5200's Flash file system does not allow individual files to be erased from boot Flash memory, you must erase the entire contents of boot Flash memory at one time. To do this, refer to Table 6.

Warning Do not proceed with erasing your boot Flash memory unless you have a back up of your boot image on your TFTP server.

Table 6 Erasing Boot Flash Memory and Restoring the Boot Image

Task		Command
Step 1	If you have not already done so, upload your current boot image to a local TFTP server. The contents of the boot Flash memory is displayed and the system software prompts you for the source filename to be copied.	**copy bootflash tftp**
Step 2	Erase the entire contents of the boot Flash memory.	**erase bootflash**
Step 3	Copy the boot image from your local file server to the Cisco AS5200's boot Flash memory. Specify the destination filename that was copied in Step 1.	**copy tftp bootflash**

Configuring the Cisco AS5200 for 56K Modems

This section describes how to configure the Cisco AS5200 for 56K modems.

If you are experienced with the Cisco IOS software, refer to the "Configuration Example" section at the end of the following task tables for a working configuration example. Or take the steps described in the following task tables to configure the access server:

- Table 7, Configuring the Asynchronous Group Interface
- Table 8, Configuring the Modems
- Table 9, Configuring the Controller
- Table 10, Configuring the Serial Interfaces

Table 7 Configuring the Asynchronous Group Interface

Step	Command	Purpose

1	`5200> enable`
	`Password:`
	`5200#`
		Enter enable mode.
		Enter the password.
		You have entered enable mode when the prompt changes to `5200#`.

2	`5200# config term`
	`Enter configuration commands, one per line. End with CNTL/Z.`
	`5200(config)#`
		Enter global configuration mode. You have entered global configuration mode when the prompt changes to `5200(config)#`.

3	`5200(config)# interface group-async 1` `5200(config-if)#`	Place all asynchronous interfaces in a single group, so that you configure the same parameters quickly on all interfaces at one time.
4	`5200(config-if)# ip unnumbered ethernet 0`	To conserve IP addresses, configure the asynchronous interfaces as unnumbered and assign the IP address of the Ethernet interface to them.
5	`5200(config-if)# encapsulation ppp`	Enable PPP[1] to run on the set of interfaces in the group.
6	`5200(config-if)# async mode interactive`	Configure interactive mode on the asynchronous interface.
7	`5200(config-if)# ppp authentication chap pap`	Enable CHAP[2] and PAP[3] authentication on the interface.

8	`5200(config-if)# group-range 1 48`
	`Building configuration...`
	`5200(config-if)#`
		Define the group range of the interface. The number you use with the **group-range** command depends on the number of asynchronous interfaces you have on your access server. That is, if your access server has 48 asynchronous interfaces, you can specify **group-range 1 48**. If 60, specify **group-range 1 60**.

1. PPP = Point-to-Point Protocol.
2. CHAP = Challenge Handshake Authentication Protocol.
3. PAP = Password Authentication Protocol.

Table 8 Configuring the Modems

Step	Command	Purpose
1	`5200(config-if)# line 1 48` `5200(config-line)#`	Enter the number of modem lines to configure. If you have 48 modems, enter **line 1 48**. If 60, enter **line 1 60**. Note: There are 12 modems on each 56K module.
3	`5200(config-line)# transport input all`	Allow all protocols to be used when connecting to the line.
4	`5200(config-line)# autoselect ppp`	Enable remote IP users running a PPP application to dial in, bypass the EXEC facility, and connect directly to the network.
5	`5200(config-line)# modem inout`	Enable both incoming and outgoing calls.
6	`5200(config-line)# flowcontrol hardware`	Enable hardware flow control.
7	`5200(config-line)# exit` `5200(config)#`	Exit to global configuration mode.

Table 9 Configuring the Controller

Step	Command	Purpose
1	`5200(config)# isdn switch-type primary-5ess`	Enter your telco's switch type. The following switch types are available: primary-4ess, primary-5ess, primary-dms100, primary-net5, primary-ntt, and primary-ts014.

2	`5200(config)# controller t1 0`
	`[or]`
	`5200(config)# controller e1 0`
	`5200(config-controller)#`
		Enter controller configuration mode to configure your controller port. The controller ports are labeled 0 and 1 on the dual T1/PRI and dual E1/PRI cards.

3	`5200(config-controller)# framing esf`	Enter your telco's framing type. The following framing types are available: esf, sf, crc4, and nocrc4.
4	`5200(config-controller)# linecode b8zs`	Enter your telco's line code type. The following line code types are available: ami, b8zs, and hdb3.
5	`5200(config-controller)# clock source line primary`	Enter the clock source for the line. Configure one line as the primary or most stable clock source line. Configure the other line as the secondary clock source line.

6	`5200(config-controller)# pri-group timeslots 1-24`
	`[or]`
	`5200(config-controller)# pri-group timeslots 1-31`
		Configure all channels for ISDN. Enter **pri-group timeslots 1-24** for T1. If E1, enter **pri-group timeslots 1-31**.

7	`5200(config-controller)# controller t1 1`
	`[or]`
	`5200(config)# controller e1 0`
	`5200(config-controller)# framing esf`
	`5200(config-controller)# linecode b8zs`
	`5200(config-controller)# clock source line secondary`
	`5200(config-controller)# pri-group timeslots 1-24`
	`[or]`
	`5200(config-controller)# pri-group timeslots 1-31`
		Repeats Steps 2 to 6 to configure the second controller. Note that the controller number is 1, instead of 0. And the clock source is secondary, instead of primary.

Table 10 Configuring the Serial Interfaces

Step	Command	Purpose
1	`5200(config-controller)# interface serial0:23` `5200(config-if)#`	Enter serial interface configuration mode. After you have configured the controller, a corresponding D channel serial interface is created instantly. Serial interface 0:23 is the D channel for controller 0. You must configure each serial interface to receive incoming and send outgoing modem signaling.
2	`5200(config-if)# isdn incoming-voice modem`	Configure all incoming voice calls to go to the modems.

3	`5200(config-if)# end`
	`5200#`
	`%SYS-5-CONFIG_I: Configured from console by console <Return>`
	`5200#`
		Return to privileged EXEC mode.
		
		When this message appears, press **Return** to get the `5200#` prompt.

Table 10 Configuring the Serial Interfaces (Continued)

Step	Command	Purpose
4	5200# **copy running-config startup-config** Building configuration... [OK]	Save the configuration changes to NVRAM.

Configuration Example

The following example shows the output of the **show config** command for a system configured with 56K modules. If you are experienced with the Cisco IOS software, you might find this a useful reference for configuration.

```
5200# show config
Using 1888 out of 126968 bytes
!
version 11.2
service timestamps debug uptime
service udp-small-servers
service tcp-small-servers
!
hostname 5200
!
enable secret 5 $1$60L4$X2JYOwoDc0.kqa1loO/w8/
enable password lab
!
username modem password 7 020A0559
username janeiro-t1 password 7 060A0E23
partition flash 2 8 8
!
no ip domain-lookup
ip host jurai 223.255.254.254
ip host brios 223.255.254.253
isdn switch-type primary-5ess
chat-script dial "" "ATDT\T" TIMEOUT 120 CONNECT \p
!
controller T1 0
 framing esf
 clock source line primary
 linecode b8zs
 pri-group timeslots 1-24
!
controller T1 1
 framing esf
 clock source line secondary
 linecode b8zs
 pri-group timeslots 1-24
!
interface Ethernet0
 ip address 1.18.0.99 255.255.0.0
 hold-queue 512 in
!
interface Serial0
 no ip address
 shutdown
!
interface Serial1
 no ip address
 shutdown
!
interface Serial0:23
```

```
 ip address 20.0.0.1 255.0.0.0
 no ip mroute-cache
 encapsulation ppp
 no keepalive
 isdn incoming-voice modem
 dialer idle-timeout 2147483
 dialer map ip 20.0.0.2 name as5200-uut broadcast 8940166
 dialer load-threshold 50 either
 dialer-group 1
 no fair-queue
 ppp authentication chap
!
interface Serial1:23
 ip address 21.0.0.1 255.0.0.0
 no ip mroute-cache
 encapsulation ppp
 isdn incoming-voice modem
 dialer idle-timeout 2147483
 dialer map ip 21.0.0.2 name as5200-uut broadcast 4341608
 dialer load-threshold 50 either
 dialer-group 1
 no fair-queue
 ppp authentication chap
!
interface Group-Async1
 ip unnumbered Ethernet0
 encapsulation ppp
 async default routing
 async mode interactive
 no peer default ip address
 no fair-queue
 no cdp enable
 ppp authentication chap
 group-range 1 48
!
no ip classless
ip route 223.255.254.254 255.255.255.255 1.18.0.1
snmp-server community public RW
!
line con 0
line 1 48
 exec-timeout 0 0
 autoselect ppp
 modem InOut
 transport input all
line aux 0
line vty 0 4
 password lab
 login
!
end

5200#
```

This concludes the procedure for configuring the access server for use with the 56K module. If you have questions or need assistance, refer to the last section “Cisco Connection Online.”

FCC Class B Compliance

The equipment described in this document generates and may radiate radio-frequency energy. If it is not installed in accordance with Cisco's installation instructions, it may cause interference with radio and television reception. This equipment has been tested and found to comply with the limits for a Class B digital device in accordance with the specifications in part 15 of the FCC rules. These specifications are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation.

You can determine whether your equipment is causing interference by turning it off. If the interference stops, it was probably caused by the Cisco equipment or one of its peripheral devices. If the equipment causes interference to radio or television reception, try to correct the interference by using one or more of the following measures:

- Turn the television or radio antenna until the interference stops.
- Move the equipment to one side or the other of the television or radio.
- Move the equipment farther away from the television or radio.
- Plug the equipment into an outlet that is on a different circuit from the television or radio. (That is, make certain the equipment and the television or radio are on circuits controlled by different circuit breakers or fuses.)

Modifications to this product not authorized by Cisco Systems, Inc. could void the FCC approval and negate your authority to operate the product.

Cisco Connection Online

Cisco Connection Online (CCO) is Cisco Systems' primary, real-time support channel. Maintenance customers and partners can self-register on CCO to obtain additional information and services.

Available 24 hours a day, 7 days a week, CCO provides a wealth of standard and value-added services to Cisco's customers and business partners. CCO services include product information, product documentation, software updates, release notes, technical tips, the Bug Navigator, configuration notes, brochures, descriptions of service offerings, and download access to public and authorized files.

CCO serves a wide variety of users through two interfaces that are updated and enhanced simultaneously: a character-based version and a multimedia version that resides on the World Wide Web (WWW). The character-based CCO supports Zmodem, Kermit, Xmodem, FTP, and Internet e-mail, and it is excellent for quick access to information over lower bandwidths. The WWW version of CCO provides richly formatted documents with photographs, figures, graphics, and video, as well as hyperlinks to related information.

You can access CCO in the following ways:

- WWW: http://www.cisco.com
- WWW: http://www-europe.cisco.com
- WWW: http://www-china.cisco.com
- Telnet: cco.cisco.com
- Modem: From North America, 408 526-8070; from Europe, 33 1 64 46 40 82. Use the following terminal settings: VT100 emulation; databits: 8; parity: none; stop bits: 1; and connection rates up to 28.8 kbps.

For a copy of CCO's Frequently Asked Questions (FAQ), contact cco-help@cisco.com. For additional information, contact cco-team@cisco.com.

Note If you are a network administrator and need personal technical assistance with a Cisco product that is under warranty or covered by a maintenance contract, contact Cisco's Technical Assistance Center (TAC) at 800 553-2447, 408 526-7209, or tac@cisco.com. To obtain general information about Cisco Systems, Cisco products, or upgrades, contact 800 553-6387, 408 526-7208, or cs-rep@cisco.com.

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