Release Notes for Cisco Catalyst 4224 Access Gateway Switch for Cisco IOS Release 12.1(5)YE4

December 3, 2001

Note You can find the most current Cisco IOS documentation on Cisco.com. This set of electronic documents may contain updates and modifications made after the hard-copy documents were printed.

These release notes for the Cisco Catalyst 4224 Access Gateway Switch describe the enhancements provided in Cisco IOS Release 12.1(5)YE4. These release notes are updated as needed.

Contents

These release notes describe the following topics:

CISCO SYSTEMS

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Introduction

The Cisco Catalyst 4224 Access Gateway Switch is an Ethernet switching router that provides Voice over IP (VoIP) gateway and IP telephony services. It is designed to be part of a centralized Cisco CallManager application.

System Requirements

This section describes the system requirements for Cisco IOS Release 12.1(5)YE4 and includes the following sections:

- Memory Recommendations, page 2
- Supported Hardware, page 2
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Memory Recommendations

Table 1   Minimum Memory Recommendations for the Cisco Catalyst 4224 Access Gateway Switch

Platforms	Image Name	Software Image	Flash Memory Recommended	DRAM Memory Recommended	Runs From
Cisco c4224	IP Plus (standard)	c4224-isx3-mz	32 MB Flash	64 MB DRAM	RAM
	IP Plus / FW	c4224-io3sx3-mz	32 MB Flash	64 MB DRAM	RAM
	IP Plus / IPsec 56	c4224-isx356i-mz	32 MB Flash	64 MB DRAM	RAM
	IP Plus / IPsec 56 / FW	c4224-io3sx356i-mz	32 MB Flash	64 MB DRAM	RAM
	IP Plus / 3DES	c4224-ik2sx3-mz	32 MB Flash	64 MB DRAM	RAM
	IP Plus / 3DES / FW	c4224-ik2o3sx3-mz	32 MB Flash	64 MB DRAM	RAM

Supported Hardware

Cisco IOS Release 12.1(5)YE4 supports:

- Cisco Catalyst 4224 Access Gateway Switch

Determining the Software Version

To determine the version of Cisco IOS software running on your Cisco Catalyst 4224 Access Gateway Switch, log in to the Cisco Catalyst 4224 Access Gateway Switch and enter the **show version** EXEC command:

```
Router> show version
Cisco Internetwork Operating System Software
IOS (tm) 12.1(5) Software (c4224-isx3-mz), Version 12.1(5)YE4, RELEASE SOFTWARE
```

New and Changed Information

The following sections list the new hardware and software features as well as bug fixes in Cisco IOS Release 12.1(5)YE and subsequent releases.

New Hardware Features in Cisco IOS Release 12.1(5)YE

Cisco IOS Release 12.1(5)YE supports the Catalyst 4224 Access Gateway Switch.

New Software Features in Cisco IOS Release 12.1(5)YE1

Cisco IOS Release 12.1(5)YE1 supports Survivable Remote Site Telephony (SRST).

New Software Features in Cisco IOS Release 12.1(5)YE2

Cisco IOS Release 12.1(5)YE2 supports:

- CLI to disable 8 Port FXS Module voice ports
- Inline power for 24 phones of 7910/7940/7960 family
- Firewall feature set: NAT, Proxy, CBAC, and IDS

Bug Fixes

This section lists bugs that have been fixed or resolved in the indicated software releases for the Catalyst 4224.

Bug Fixes in Cisco IOS Release 12.1(5)YE2

The following reported bugs have been fixed or resolved in Cisco IOS Release 12.1(5)YE2:

- CSCdr76149

    The Catalyst 4224 Access Gateway Switch supports only two codecs, G.711u and G.711a. The default codec appears as G.729r8 and needs to be set to G.711 using the CLI.

- CSCds02576

    Caller ID is not supported on analog and digital ports (T1-CAS and Analog FCS) in this release.

- CSCdu40116

    The IP address table for mib2 is missing. This table is required to do network management on the Access Gateway Module.

- CSCdu66264

    New DSP (3.3.81) with echo canceller fix and FAX relay fix.

- CSCdu68219

    Ports do not work after reloading the gateway.

- CSCdu89151

  Loss of IP connectivity within the same VLAN of the Catalyst 4224.

  The Catalyst 4224 connects multiple devices within the same VLAN. At some point, a device can lose IP connectivity to other devices connected to the same switch; however, this same device retains IP connectivity to the switch itself. Other devices connected directly to this switch lose IP connectivity to the failed device, yet these other devices maintain IP connectivity with each other. Remote devices maintain IP connectivity to all devices connected to the switch.

- CSCdv01742

  IP phones in fallback mode connected to the Catalyst 4224 are unable to transfer calls.

  When IP phones are connected to the Catalyst 4224 and they are operating in fallback mode, these phones lose the ability to transfer calls. If a user tries to transfer to an invalid directory number, the transferring phone receives a reorder tone but is able to resume the original call. However, if the user enters a valid directory number, both the calling phone and the transferring phone are disconnected.

- CSCdv02746

  ISDN BRI on the Catalyst 4224 cannot receive calls on the second B-channel.

  This problem occurs in a Catalyst 4224 with an ISDN BRI interface module. The first B-channel of the BRI interface module can receive calls, but the second B-channel cannot. When a call is sent to the second B-channel number, the router sees two ISDN SETUP messages approximately 3 seconds apart. For the first SETUP message, the router does not answer. For the second SETUP message, the router responds with a DISCONNECT with Cause i = 0x80A2 (No circuit/channel available). All the ISDN SETUP messages for both calls contain the channel id = 0x89.

  At this point, if someone tries to call the first B-channel number again, the call will not work. You have to perform a **shut**/**no shut** to the BRI interface before the first B-channel can receive calls again. In addition, you will have to wait for some time before you can call the router. If you call the first B-channel right after Layer 2 is up, the router will respond with a DISCONNECT message with Cause i = 0x80AF (Quality of service unavailable). This error occurs because the VTSP still shows that the router is in the S_CONNECT state. Only after a while does the router go back to a normal state, and call can be place to the first B-channel again. This behavior is cyclical.

  From the **show** and **debug** commands, it appears that the router did not release the CCB for the first call to the first B-channel. The **sh isdn status** command shows that there are no Layer 3 calls active, but there is still a CCB present for the VOICE. This occurs only after a call is placed to the second B-channel of the BRI interface.

- CSCdv08920

  FXO supervisor disconnect fails on incoming calls.

  Incoming calls to the FXO port may ring a device such as an IP phone connected to the Catalyst 4224. If the caller goes back on-hook within a few seconds, the called phone continues to ring. The remote on-hook is apparently not being detected.

- CSCdv12080

  IP phones are not getting powered up.

Bug Fixes in Cisco IOS Release 12.1(5)YE3

The following reported bugs have been fixed or resolved in Cisco IOS Release 12.1(5)YE3:

- CSCds63736

  ATM interface crash due to CSCdr56182.

  Fixed the interface null reference that caused the router to crash at boot time.

- CSCdu64055

  ipx help not available.

  Fixed CLI help function so that help text now displays for the **ipx** command.

- CSCdv28941

  The **ibd** feature set is bundled with **snasw**; they need to be separated.

  The **ibd** feature set is now available as a separate image or bundled with **snasw**.

- CSCdv45074

  Serial TXCLK on SCC2 not programmed correctly.

  The serial transmit clock was reprogrammed to produce the proper output signal.

Bug Fixes in Cisco IOS Release 12.1(5)YE4

The following reported bugs have been fixed or resolved in Cisco IOS Release 12.1(5)YE4:

- CSCdp60924

  TEI remains assigned when L1 goes down.

  TEI released for designated switch types when L1 goes down.

- CSCds87266

  No ringback played to PSTN when IP phone initiates a transfer.

  Ringback tone is now provided on transfers between two IP phones.

- CSCdt03449

  ISDN BRI callout results in VOICE ERROR when ALERTING is received.

  Resolved; error message no longer appears.

- CSCdu24635

  IPSec anti-replay checking is ineffective 32-64 sequence numbers below the highest sequence number.

  Fixed the IPSec sequence number checking.

- CSCdu81936

  Received gratuitous ARP overwrites of interface MAC address in ARP table.

  Fixed ARP table to prevent overwrites of MAC address entry.

- CSCdu88505

  Out of range PCI port adaptor bay message on bootup.

  Removed unnecessary message.

- CSCdv02306

  No logging buffered overwrites NVRAM's **logging buffered** command.

  Fixed code to preserve the effects of a **logging buffer** command after a reload.

- CSCdv05656

  Red zone crash on IPX image after BSTUN is configured.

  Fixed the initialization of the packet offset.

- CSCdv44139

  BRI L1 not coming up after first call.

  Modified code to enable subsequent calls.

- CSCdv48137

  Configuration lost after reload of the gateway.

  Fixed code to retain the configuration after a reload.

- CSCdv48261

  Improvements to dynamic ACLs for Cisco IOS firmware.

  Added improvements to dynamic ACLs in Cisco IOS firmware.

- CSCdv51384

  Unable to rejoin an active meet-me conference.

  In a conference with six participants (maximum allowed), if a seventh participant tries to join the conference, that person hears a busy tone and is denied access, as expected. After that, if any of the original six participants hangs up and later tries to rejoin, that person also gets a busy tone. The sixth participant should be able to rejoin the conference.

  Fixed the conference feature to allow any participant to leave and rejoin the conference.

- CSCdv71760

  Catalyst 4224 crashes on some incoming PRI calls.

  Resolved problem with PRI calls.

- CSCdv80579

  Intermittent loss of IP phone power supply.

  Resolved power supply problem.

- CSCdv85861

  Mechanism to enable promiscuous mode in BCM 5602.

  Function added to put a port in promiscuous mode.

Limitations and Restrictions

The following MIBs are supported:

- SNMP MIB-II
- ENTITY-MIB
- IF-MIB
- BRIDGE-MIB

The following Cisco proprietary MIBs are supported:

- CISCO-PROCESS-MIB
- CISCO-MEMORY-POOL-MIB
- CISCO-CDP-MIB

The following MIB will be supported later:

- CISCO-STACK-MIB

Important Notes

The following sections contain important notes about Cisco IOS Release 12.1(5)YE4 that can apply to the Cisco Catalyst 4224 Access Gateway Switch.

Hardware Change in Catalyst 4224

Cisco IOS Release 12.1(5)YE3 is being shipped in conjunction with a hardware Engineering Change Order (ECO) for the Catalyst 4224 platform. Cisco IOS Release 12.1(5)YE3 is backward compatible with previous non-ECO hardware versions of the Catalyst 4224.

Note Cisco recommends that you do *not* run software releases prior Cisco IOS Release 12.1(5)YE3 on the ECO hardware because serial WICs running in slot 1 might not operate correctly.

You can recognize ECO hardware by running the **cookie** command from ROMMON and looking at the hardware revision level. All boards with a revision level of 1.3 (Major 01/Minor 03) or greater are ECO hardware.

Tighten Screws on VICs and WICs

You must tighten the screws when installing the interface cards in the Catalyst 4224 Access Gateway Switch. If you do not tighten the screws properly, the VIC or WIC can malfunction.

TDM Clocking

The TDM clock reference on the Catalyst 4224 Access Gateway Switch can be derived from one of seven sources. Each VIC slot that contains an E1/T1 card has five free running on-board clock sources and two recovered clock sources.

The default reference is the on-board clock. You can use the **frame-clock-select** command to select one of the E1/T1 ports as the primary reference. You can also use this command to select up to three prioritized backups if the primary clock fails. Switching over to a backup source is non-revertive. The system does not switch back to a higher priority clock if it recovers after a failure.

The **frame-clock-select** command has the following syntax:

```
[no] frame-clock-select priority E1/T1 slot/port
```

The clock source with priority one is the primary reference and the clock with priority four is the lowest priority backup.

The clock reference selection that uses the **frame-clock-select** command is independent from the clock selection between lines or internal on an E1/T1 controller. Framing and CRC errors due to clock slips can be observed on E1/T1 interfaces if the on-board clock is used as the reference.

Need to Support 56 Kbps Operation for Slot 3 WIC

The 8260 Rev1A device in the Catalyst 4224 Access Gateway Switch has a defect that can cause data corruption when configuring the MCC SI Ram for 2 entries (7 bits forming the 56-kbps channel and 1 bit being discarded).

As a workaround, 3 SI RAM entries would have to be used, but the Catalyst 4224 Access Gateway Switch does not have enough available space. Therefore, only 64-kbps channels are supported.

If absolutely required, you could implement this feature in slots 1 and 2 using the SCCs and limit it to two channels or super-channels per slot. This feature requires more design work and will not be addressed unless really needed.

Customers that need 56 kbps should use the WIC-56K4 WIC.

Survivable Remote Site Telephony Marks Control Packets Differently

The Survivable Remote Site Telephony software feature marks the control traffic as a **10100000** or **dscp** of **cs5**. Non-Survivable Remote Site Telephony IOS software marks it as **01101000**.

MTP Not Used on Cisco CallManager Unless Transcoding is Required

All H.323 gateways that use IOS 12.0(7) or later support H.323 Version 2. Prior to H.323 Version 2, MTP was required for H.323 gateways. Ordinarily, the MTP box on Cisco CallManager should not be checked when defining the Catalyst 4224 as an H.323 gateway. You should check the MTP box on Cisco CallManager only if transcoding is required at the central site. For example, transcoding would be required when the Catalyst 4224 uses G.729 for IP WAN calls and the voice mail system at central site only supports G.711.

With the MTP box checked on Cisco CallManager for the H.323 gateway definition for Catalyst 4224, a locally connected analog FXS phone call to a local IP phone must traverse the IP WAN because the call between the analog FXS phone and the IP phone is anchored by the transcoding device at the central site. This behavior is normal for an IOS H.323 gateway when the MTP box on Cisco CallManager is checked, but this behavior is obviously not optimal. Therefore, unless transcoding is required, the MTP box should *not* be checked on the H.323 gateway definition for Catalyst 4224.

Connecting the Catalyst 4224 as a Gateway Over a Low Speed Serial Link

Use the **h323-gateway voip bind srcaddr** command to connect the Catalyst 4224 as a gateway over a low speed serial link.

To configure the Catalyst 4224 as an H.323 gateway, use the following configuration:

```
interface Loopback1
description h323 gateway address
ip address 10.253.1.1 255.255.255.0
h323-gateway voip bind srcaddr 10.253.1.1
```

This configuration provides the IP address for the H.323 end point. Use the same address in Cisco CallManager to configure the H.323 gateway. This address can be attached to a physical interface.

Portfast Command Not Supported for Trunks

If the Catalyst 422410/100 Ethernet ports are configured in trunk mode, the **portfast** command is not supported. The workaround is to use the global configuration commands for each VLAN to reduce the forwarding timers to a minimum value of 4 seconds.

```
spanning-tree portfast bpduguard
spanning-tree vlan 60 forward-time 4
spanning-tree vlan 160 forward-time 4
```

Warning   **If you connect the Catalyst 4224 to another switch, ensure that the timers are the same on both links. Otherwise, you might experience spanning tree issues.**

Use the Portfast Command with a Separate VLAN for Voice and Data

To use the **portfast** command, configure the Catalyst 4224 ports with an access VLAN for data and a separate VLAN for voice. The following configuration provides an example:

```
interface FastEthernet5/22
no ip address
duplex auto
speed auto
switchport access vlan 60
switchport voice vlan 160
snmp trap link-status
spanning-tree portfast
```

Note   Trunking should be used only to connect to another switch.

Configuring a Single PVC on Frame Relay with CBWFQ

To configure a single PVC on Frame Relay with CBWFQ until LLQ becomes available, see the following notes.

Note LLQ is currently disabled.

The Catalyst 4224 currently supports LLQ/CBWFQ only on a PPP or HDLC encapsulated serial link. The Catalyst 4224 supports LFI on MLPPP links but not LLQ/CBWFQ or ip rtp priority.

LLQ/CBWFQ are not currently supported for Frame Relay. The Service Policy output command is currently disabled. Therefore, currently only ip rtp priority is supported as a voice priority queuing scheme. FRF.12 is also supported on Frame Relay links.

The following configuration example is recommended for FRF.12 and ip priority.

Define the map class:

```
map-class frame-relay VOIP_256
no frame-relay adaptive-shaping
frame-relay cir 250000
frame-relay bc 1000
frame-relay be 0
frame-relay mincir 250000
frame-relay fair-queue
frame-relay fragment 320
frame-relay ip rtp priority 16384 16383 170
```

Apply the map class to a frame-relay sub interface:

```
interface Serial0/0.300 point-to-point
ip address 1.1.1.1
frame-relay interface-dlci 300
frame-relay class VOIP_256
```

Apply frame-relay shaping to the main interface:

```
interface ser0/0
encapsulation frame-relay
frame-relay traffic-shaping
```

IGMP Snooping Support

One or more users might need to connect to local/remote server(s) via IP WAN or other LAN connection to access a MULTICAST application, such as IPTV or WEBCast. The Catalyst 4224 should send the multicast stream only to the requesting user PC and should not flood the rest of user PCs with such streams.

IGMP is a multicast protocol that directly affects PCs (hosts). IGMP allows hosts to inform Layer 3 devices (routers) that they want to receive multicast traffic for a specific multicast group address.

Multicast Address Range

The multicast address range includes any IP address in the range 224.0.0.0 to 239.255.255.255. The range of addresses between 224.0.0.0 and 224.0.0.255 (inclusive) is RESERVED for the use of routing protocols and other low-level topology discovery or maintenance protocols.

Any multicast server defined in the network will be part of one or more multicast groups.

Whenever a user's PC (referred to as host) requests the services of a multicast server, for example, it asks for an application (such as a movie channel), and it will send a message to join the particular group (join-group) the server uses to multicast (transmit) such movie.

The Catalyst 4224 will send the movie stream only to the hosts that have sent a join request. The Catalyst 4224 keeps track of the multicast entries via two tables known as Multicast address count and IGMP snooping count. As in any system, these tables are finite, and specifically in the Catalyst 4224 their max value is 255. Once this value is reached, further joins (join-group) or VLAN definitions cannot be executed.

Other IGMP Requirements

In order to enable IGMP within the Catalyst 4224, a multicast protocol such as PIM must be configured for the corresponding interface(s), which are mainly VLAN interfaces. The user cannot enable IGMP directly as it is done in other Cisco switches.

TIPS on how to keep track of the multicast tables to prevent them from getting full (based on test observations),

- For every VLAN added to the system, the multicast address count will increase by 4. (IGMP snooping address Count does not get impacted by VLAN addition.)

- Whenever a multicast protocol is added (for example, ip pim dense-mode) both counters increase by 3. (The first instance will increase counters by 4 because Multicast group 224.0.1.40 is added too.)

- You can add up to 62 VLANs without IGMP support. Any additional VLAN will get added, but cdp and EIGRP for these VLANs will not work (among other things).

- When a multicast group is added via the join-group command, both counters are increased by 1.

- When you delete a VLAN interface that was multicasting (for example, pim) no counters get decreased. (A bug report exists for this issue.)

- When you delete a multicast protocol (for example, no ip pim value) from an interface, the counters get increased by 1.

- When a multicast group leaves (via the no ip igmp join-group ip-address), both counters get properly decremented by 1. This is the case when a host finishes using the multicast application, like viewing a movie.

Design

The Catalyst 4224 hardware is designed to support many IGMP groups and VLAN interfaces, as long as the multicast address count is <= 255 and/or IGMP snooping address count is <= 255.

Note When the table limit is exceeded, no friendly message is displayed.

IP Phones Running SRST Fail to Get DHCP Reply

This section explains what happens when the lease time expires for IP phones running Survivable Remote Site Telephony (SRST) that are assigned by the DHCP server in a central site.

IP Phones will try to renew the lease, but they will fail to get any DHCP replies due to the WAN failure. Eventually IP phones will not only lose IP addresses but also lose phone services. Resetting or power cycling the phones will not clear this situation. IP address and phone services cannot be restored until a valid DHCP response is received by the IP Phone or the phone's IP address is manually configured (DHCP is disabled).

When the IP address leased from the DHCP server is not infinite, the DHCP client will start sending DHCP renew messages to extend the lease before the lease expires. When the lease time expires, IP phones will start sending DHCP request messages and go to DHCP init state after a certain amount of time without receiving DHCP replies from the server (this time is configurable). In the case when IP phones already register with the SRST router in Cisco CallManager fall back mode, renewing the IP address request will not be replied unless the SRST router itself is a DHCP server or there is a DHCP server that can be reached. IP phones will lose their IP addresses assigned by the DHCP server in the central site due to WAN failure, and hence lose the phone services, which cannot be recovered until a valid DHCP response is received by the IP phone or the phone's IP address is manually configured, thus disabling the DHCP service.

Note that loosing the lease is not the same as resetting. If the phone resets, it comes up in the INIT-REBOOT state; this is the state where it has an IP address stored in flash. If it cannot contact the DHCP server, it will use its stored address and continue to do DHCP Discovers in the background until the server responds. In the case were the lease expires, the phone clears the IP address stored in flash and goes to the INIT state. It cannot reinitialize until it gets a response from the DHCP server. This behavior is as specified in the DHCP protocol RFC 2131.

Configuring Fractional T1 PRI ISDN

This release supports fractional T1 PRI ISDN on the following switch types:

- DMS-100
- 5ESS
- NI-1

To configure a fractional T1 for PRI ISDN, perform this procedure:

1. Make sure the PRI VIC is configured last (after you configure all the VIC cards that require the DSP resources).

2. Allocate all 24 timeslots for the PRI group. For example:

```
controller T1 1/0
framing esf
linecode b8zs
pri-group timeslots 1-24
```

Note The DSP resources are not sufficient for the 24 timeslots, and you will receive a message indicating insufficient DSP resources. You need to configure the switch/PBX to make the timeslots out-of-service. If you do not allocate 24 timeslots, a SERVICE message will not be sent for the unallocated timeslots.

3. Use the **show voice dsp** command to check how many channels could be allocated with the available DSP resources. For example, in one case 16 timeslots could be allocated DSP resources.

4. Busy out the remaining timeslots for which the DSP resources could not be allocated. For example:

```
isdn service dsl 0 b_channel 17-24 state 2
```

5. Use the **show isdn service** to make sure the channel is out-of-service.

```
c4224#sh isdn ser
PRI Channel Statistics:
ISDN Se1/0:23, Channel [1-24]
Configured Isdn Interface (dsl) 0
Channel State (0=Idle 1=Proposed 2=Busy 3=Reserved 4=Restart
5=Maint_Pend)
Channel : 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4
State   : 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 3
Service State (0=Inservice 1=Maint 2=Outofservice)
Channel : 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4
State   : 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 2 2 2 2 2 2
```

Now for any incoming call, only timeslots 1-16 will be used by the switch or the PBX.

Caveats

This section lists unresolved caveats that apply to this release of the Cisco Catalyst 4224 Access Gateway Switch. Caveats describe unexpected behavior or defects in the switch and its related software. For a list of bugs that have been resolved in this release, see the "Bug Fixes" section on page 3.

Note If you have an account with Cisco.com, you can use Bug Navigator II to find caveats of any severity for any release. To reach Bug Navigator II, log in to Cisco.com and click **Software Center: Cisco IOS Software: Bug Toolkit: Bug Navigator II**. Another option is to go to http://www.cisco.com/support/bugtools/.

Open Caveats—Cisco IOS Release 12.1(5)YE2

This section documents possible unexpected behavior in Cisco IOS Release 12.1(5)YE2 and subsequent related releases. It describes only severity 1 and 2 caveats and select severity 3 caveats.

- CSCds18197

  The Access Gateway Module does not support **fxs-ground-start signalling** in the **ds0-group** command. See the following example:

```
Gateway(config-controller)#ds0-group 0 time 1 type ?
  e&m-delay-dial       E & M Delay Dial
  e&m-immediate-start  E & M Immediate Start
  e&m-wink-start       E & M Wink Start
  ext-sig              External Signaling
  fxo-ground-start     FXO Ground Start
  fxo-loop-start       FXO Loop Start
  fxs-loop-start       FXS Loop Start
```

- CSCdt16105

  The Access Gateway Module supports the following types of layer 2 software compression:

  - HDLC

  - PPP

  - Frame Relay

The Access Gateway Module supports two types of Frame Relay software compression:

- Cisco proprietary encapsulation
- FRF.9 (not working)

FRF.9 is not working at this time.

- CSCdv20595

    Cannot communicate with Catalyst 4224 via console after configuring stopbits 1.

    Workaround: Use the default configuration settings for the console port. Configure your console to match these settings.

Related Documentation

The following sections describe the documentation available for the Cisco Catalyst 4224 Access Gateway Switch. These documents consist of hardware and software installation guides, Cisco IOS configuration guides and command references, system error messages, feature modules, and other documents.

Documentation is available as printed manuals or electronic documents, except for feature modules, which are available online on Cisco.com and the Documentation CD-ROM.

Use these release notes with these documents:

Platform-Specific Documents

These documents are available for the Cisco Catalyst 4224 Access Gateway Switch on Cisco.com and the Documentation CD-ROM:

- *Catalyst 4003 and 4006 Switch Installation Guide*
- *Switch Software Documentation, Release 5.5*
- *Catalyst 4000 Family Release Notes*
- *Catalyst 4000 Family Installation & Configuration Notes*
- *Site Preparation and Safety Guide*
- *Troubleshooting Tips*

On Cisco.com at:

Technical Documents: Documentation Home Page: Multilayer LAN Switches: Catalyst 4000 Family Switches: Installation and Configuration Notes

On the Documentation CD-ROM at:

Cisco Product Documentation:Multilayer LAN Switches: Catalyst 4000 Family Switches: Installation and Configuration Notes

Feature Modules

Feature modules describe new features supported by Cisco IOS Release 12.1(5)YE4 and are updates to the Cisco IOS documentation set. A feature module consists of a brief overview of the features, benefits, and configuration tasks as well as a command reference. As updates, the feature modules are available online only. Feature module information is incorporated in the next printing of the Cisco IOS documentation set.

On Cisco.com at:

> **Technical Documents: Documentation Home Page: Cisco IOS Software Configuration: Cisco IOS Release 12.2: New Feature Documentation**

On the Documentation CD-ROM at:

> **Cisco Product Documentation: Cisco IOS Software Configuration**: **Cisco IOS Release 12.2: New Feature Documentation**

Feature Navigator

Feature Navigator is a web-based tool that enables you to quickly determine which Cisco IOS software images support a particular set of features and which features are supported in a particular Cisco IOS image.

Feature Navigator is available 24 hours a day, 7 days a week. To access Feature Navigator, you must have an account on Cisco.com. If you have forgotten or lost your account information, e-mail the Contact Database Administration group at cdbadmin@cisco.com. If you do not have an account on Cisco.com, go to http://www.cisco.com/register and follow the directions to establish an account.

To use Feature Navigator, you must have a JavaScript-enabled web browser such as Netscape 3.0 or later, or Internet Explorer 4.0 or later. Internet Explorer 4.0 always has JavaScript enabled. To enable JavaScript for Netscape 3.x or Netscape 4.x, follow the instructions provided with the web browser. For JavaScript support and enabling instructions for other browsers, check with the browser vendor.

Feature Navigator is updated when major Cisco IOS software releases and technology releases occur. You can access Feature Navigator at the following URL:

http://www.cisco.com/go/fn

Cisco IOS Software Documentation Set

The Cisco IOS software documentation set consists of the Cisco IOS configuration guides, Cisco IOS command references, and several other supporting documents. The Cisco IOS software documentation set is shipped with your order in electronic form on the Documentation CD-ROM, unless you specifically ordered the printed versions.

Documentation Modules

Each module in the Cisco IOS documentation set consists of one or more configuration guides and one or more corresponding command references. Chapters in a configuration guide describe protocols, configuration tasks, and Cisco IOS software functionality, and contain comprehensive configuration examples. Chapters in a command reference provide complete command syntax information. Use each configuration guide with its corresponding command reference.

On Cisco.com at:

Technical Documents: Documentation Home Page: Cisco IOS Software Configuration: Cisco IOS Release 12.2: Configuration Guides and Command References

On the Documentation CD-ROM at:

Cisco Product Documentation: Cisco IOS Software Configuration: Cisco IOS Release 12.2: Configuration Guides and Command References

Cisco IOS Release 12.2 Documentation Set Contents

Table 2 lists the contents of the Cisco IOS Release 12.0 software documentation set, Table 3 lists the contents of the Cisco IOS Release 12.1 software documentation set, and Table 4 lists the contents of the Cisco IOS Release 12.2 software documentation set. These documents are available in electronic form and in printed form if ordered.

> **Note** You can find the most current Cisco IOS documentation on Cisco.com and the Documentation CD-ROM. These electronic documents may contain updates and modifications made after the hard-copy documents were printed.

On Cisco.com at:

Technical Documents: Documentation Home Page: Cisco IOS Software Configuration: Cisco IOS Release 12.2

On the Documentation CD-ROM at:

Cisco Product Documentation: Cisco IOS Software Configuration: Cisco IOS Release 12.2

Table 2   Cisco IOS Release 12.0 Documentation Set

Books	Major Topics
• *Configuration Fundamentals Configuration Guide* • *Configuration Fundamentals Command Reference*	Configuration Fundamentals Overview Cisco IOS User Interfaces File Management System Management
• *Bridging and IBM Networking Configuration Guide* • *Bridging and IBM Networking Command Reference*	Bridging and IBM Networking Overview Bridging IBM Networking

Table 2   Cisco IOS Release 12.0 Documentation Set (continued)

Books	Major Topics
• *Dial Solutions Configuration Guide*	Overview of Interfaces, Controllers, and Lines Used for Dial Access
	Configuring Modem Support and Other Asynchronous Devices
	Managing Modems
	Configuring Terminal Operating Characteristics for Dial-In Sessions
	Setting Up ISDN Basic Rate Service
	Configuring Synchronous Serial Ports
	Configuring Channelized E1 and T1
	Configuring ISDN Special Signaling
	Configuring X.25 on ISDN Using A0/D1
	Configuring AppleTalk Remote Access
	Preparing for Asynchronous DDR
	Configuring Asynchronous PP and SLIP
	Configuring the Bandwidth Allocation Control Protocol
	Configuring PPP Callback for DDR
	Configuring ISDN Caller ID Callback
	Configuring Dial Backup for Dialer Profiles
	Configuring Dial Backup Using Dialer Watch
	Configuring Dial Backup for Serial LInes
	Configuring Peer-to-Peer DDR with Dialer Profiles
	Configuring DialOut
	Enterprise Dial Scenarios and Configurations
	Configuring Easy IP
	Deciding and Preparing to Configure DDR
	Configuring Legacy DDR Hubs
	Configuring Multichassis Multilink PPP
	Configuring Support For NASI Clients to Access Network
	Resources
	Dial Networking Business Applications
	Configuring the Cisco PAD
	Per-User Configuration
	Configuring Media-Independent PPP and Multilink PPP
	Configuring Protocol Translation and Virtual Asynchronous Devices
	Establishing a Reverse Telenet Session to a Modem
	Configuring Snapshot Routing
	Telco and ISP Dial Scenarios and Configurations
	Configuring Legacy DDR Spokes
	Configuring Dial-In Terminal Services
	Configuring V.120 Access
	Configuring Virtual Private Dialup Networks
	Configuring Virtual Profiles
	Configuring Virtual Template Interfaces
	Configuring X.25 on ISDN

Table 2   Cisco IOS Release 12.0 Documentation Set (continued)

Books	Major Topics
• *Dial Solutions Command Reference*	Dial-In Port Setup Dial-In Terminal Service and Remote Node Configuration Dial-on-Demand Routing Dial Backup Dial-Out Modem Pooling Large-Scale Dial Solutions Cost-Control Solutions Virtual Private Dialup Networks Other Network Traffic on ISDN Channels Dial-Related Addressing Services
• *Cisco IOS Interface Configuration Guide* • *Cisco IOS Interface Command Reference*	Interface Configuration Overview LAN Interfaces Serial Interfaces Logical Interfaces
• *Network Protocols Configuration Guide, Part 1* • *Network Protocols Command Reference, Part 1*	IP Overview IP Addressing and Services IP Routing Protocols
• *Network Protocols Configuration Guide, Part 2* • *Network Protocols Command Reference, Part 2*	AppleTalk and Novell IPX Overview AppleTalk Novell IPX
• *Network Protocols Configuration Guide, Part 3* • *Network Protocols Command Reference, Part 3*	Network Protocols Overview Apollo Domain Banyan VINES DECnet ISO CLNS XNS
• *Security Configuration Guide* • *Security Command Reference*	Security Overview Authentication, Authorization, and Accounting (AAA) Security Server Protocols Traffic Filtering and Firewalls IP Security and Encryption Other Security Features
• *Cisco IOS Switching Services Configuration Guide* • *Cisco IOS Switching Services Command Reference*	Cisco IOS Switching Services Overview Cisco IOS Switching Paths Cisco Express Forwarding NewFlow Switching Tag Switching Multilayer Switching Multicast Distributed Switching Virtual LANs MPOA Commands
• *Wide-Area Networking Configuration Guide* • *Wide-Area Networking Command Reference*	Wide-Area Network Overview ATM Frame Relay SMDS X.25 and LAPB

Table 2 Cisco IOS Release 12.0 Documentation Set (continued)

Books	Major Topics
• *Voice, Video, and Home Applications Configuration Guide* • *Voice, Video, and Home Applications Command Reference*	Using Voice, Video, and Home Applications Voice Video Broadband
• *Quality of Service Solutions Configuration Guide* • *Quality of Service Solutions Command Reference*	Quality of Service Overview Classification Congestion Management Congestion Avoidance Policy and Shaping Overview Signaling Link Efficiency Mechanisms
• *Caveats* (Caveat documentation for Cisco IOS Releases 12.0 and 12.0 T—includes open and resolved severity 1 and 2 caveats for all platforms) • *Cisco IOS Release 12.0 Configuration Guide Master Index* • *Cisco IOS Release 12.0 Command Reference Master Index* • *Cisco IOS Release 12.0 Master Indexes* • *Cisco IOS Software Command Summary* • *Cisco IOS Software System Error Messages* • *Debug Command Reference* • *Dial Solutions Quick Configuration Guide* • *New Features in 12.0-Based Limited Lifetime Releases* • *New Features in Early Deployment Release 12.0T* • Release Notes (Release notes for 12.0-based releases and various platforms)	

Table 3 *Cisco IOS Release 12.1 Documentation Set*

Books	Major Topics
• *Cisco IOS Configuration Fundamentals Configuration Guide* • *Cisco IOS Configuration Fundamentals Command Reference*	Configuration Fundamentals Overview Cisco IOS User Interfaces Cisco IOS File Management Cisco IOS System Management Cisco IOS User Interfaces Commands Cisco IOS File Management Commands Cisco IOS System Management Commands
• *Cisco IOS Bridging and IBM Networking Configuration Guide* • *Cisco IOS Bridging and IBM Networking Command Reference, Volume I* • *Cisco IOS Bridging and IBM Networking Command Reference, Volume II*	Using Cisco IOS Software Overview of SNA Internetworking Bridging IBM Networking
• *Cisco IOS Dial Services Configuration Guide: Terminal Services* • *Cisco IOS Dial Services Configuration Guide: Network Services* • *Cisco IOS Dial Services Command Reference*	Preparing for Dial Access Modem Configuration and Management ISDN and Signaling Configuration PPP Configuration Dial-on-Demand Routing Configuration Dial-Backup Configuration Terminal Service Configuration Large-Scale Dial Solutions Cost-Control Solutions Virtual Private Networks X.25 on ISDN Solutions Telco Solutions Dial-Related Addressing Services Interworking Dial Access Scenarios
• *Cisco IOS Interface Configuration Guide* • *Cisco IOS Interface Command Reference*	Interface Configuration Overview Configuring LAN Interfaces Configuring Serial Interfaces Configuring Logical Interfaces
• *Cisco IOS IP and IP Routing Configuration Guide* • *Cisco IOS IP and IP Routing Command Reference*	IP Addressing and Services IP Routing Protocols IP Multicast
• *Cisco IOS AppleTalk and Novell IPX Configuration Guide* • *Cisco IOS AppleTalk and Novell IPX Command Reference*	AppleTalk and Novell IPX Overview Configuring AppleTalk Configuring Novell IPX
• *Cisco IOS Apollo Domain, Banyan VINES, DECnet, ISO CLNS, and XNS Configuration Guide* • *Cisco IOS Apollo Domain, Banyan VINES, DECnet, ISO CLNS, and XNS Command Reference*	Apollo Domain, Banyan VINES, DECnet, ISO CLNS, and XNS Overview Configuring Apollo Domain Configuring Banyan VINES Configuring DECnet Configuring ISO CLNS Configuring XNS

Table 3   Cisco IOS Release 12.1 Documentation Set (continued)

Books	Major Topics
• *Cisco IOS Multiservice Applications Configuration Guide* • *Cisco IOS Multiservice Applications Command Reference*	Multiservice Applications Overview Voice Video Broadband
• *Cisco IOS Quality of Service Solutions Configuration Guide* • *Cisco IOS Quality of Service Solutions Command Reference*	Quality of Service Overview Classification Congestion Management Congestion Avoidance Policing and Shaping Signaling Link Efficiency Mechanisms Quality of Service Solutions
• *Cisco IOS Security Configuration Guide* • *Cisco IOS Security Command Reference*	Security Overview Authentication, Authorization, and Accounting (AAA) Security Server Protocols Traffic Filtering and Firewalls IP Security and Encryption Other Security Features
• *Cisco IOS Switching Services Configuration Guide* • *Cisco IOS Switching Services Command Reference*	Cisco IOS Switching Services Overview Cisco IOS Switching Paths Cisco Express Forwarding NetFlow Switching Multiprotocol Label Switching Multilayer Switching Multicast Distributed Switching Virtual LANs LAN Emulation
• *Cisco IOS Wide-Area Networking Configuration Guide* • *Cisco IOS Wide-Area Networking Command Reference*	Wide-Area Networking Overview Configuring ATM Configuring Frame Relay Configuring Frame Relay-ATM Interworking Configuring SMDS Configuring X.25 and LAPB
• *Cisco IOS Configuration Guide Master Index* • *Cisco IOS Command Reference Master Index* • *Cisco IOS Debug Command Reference* • *Cisco IOS Dial Services Quick Configuration Guide* • *Cisco IOS Software System Error Messages* • New Features in 12.1-Based Limited Lifetime Releases • New Features in Release 12.1 T • Release Notes (Release note and caveat documentation for 12.1-based releases and various platforms)	

Table 4   Cisco IOS Release 12.2 Documentation Set

Books	Major Topics
• *Cisco IOS Configuration Fundamentals Configuration Guide* • *Cisco IOS Configuration Fundamentals Command Reference*	Cisco IOS User Interfaces File Management System Management
• *Cisco IOS Bridging and IBM Networking Configuration Guide* • *Cisco IOS Bridging and IBM Networking Command Reference, Volume 1 of 2* • *Cisco IOS Bridging and IBM Networking Command Reference, Volume 2 of 2*	Transparent Bridging SRB Token Ring Inter-Switch Link Token Ring Route Switch Module RSRB DLSW+ Serial Tunnel and Block Serial Tunnel LLC2 and SDLC IBM Network Media Translation SNA Frame Relay Access NCIA Client/Server Airline Product Set DSPU and SNA Service Point SNA Switching Services Cisco Transaction Connection Cisco Mainframe Channel Connection CLAW and TCP/IP Offload CSNA, CMPC, and CMPC+ TN3270 Server
• *Cisco IOS Dial Technologies Configuration Guide: Dial Access* • *Cisco IOS Dial Technologies Configuration Guide: Large-Scale Dial Applications* • *Cisco IOS Dial Technologies Command Reference, Volume 1 of 2* • *Cisco IOS Dial Technologies Command Reference, Volume 2 of 2*	Dial Access Modem and Dial Shelf Configuration and Management ISDN Configuration Signaling Configuration Point-to-Point Protocols Dial-on-Demand Routing Dial Backup Dial Related Addressing Service Network Access Solutions Large-Scale Dial Solutions Cost-Control Solutions Internetworking Dial Access Scenarios
• *Cisco IOS Interface Configuration Guide* • *Cisco IOS Interface Command Reference*	LAN Interfaces Serial Interfaces Logical Interfaces
• *Cisco IOS IP Configuration Guide* • *Cisco IOS IP Command Reference, Volume 1 of 3: Addressing and Services* • *Cisco IOS IP Command Reference, Volume 2 of 3: Routing Protocols* • *Cisco IOS IP Command Reference, Volume 3 of 3: Multicast*	IP Addressing IP Services IP Routing Protocols IP Multicast
• *Cisco IOS AppleTalk and Novell IPX Configuration Guide* • *Cisco IOS AppleTalk and Novell IPX Command Reference*	AppleTalk Novell IPX

Table 4   Cisco IOS Release 12.2 Documentation Set (continued)

Books	Major Topics
• *Cisco IOS Apollo Domain, Banyan VINES, DECnet, ISO CLNS, and XNS Configuration Guide* • *Cisco IOS Apollo Domain, Banyan VINES, DECnet, ISO CLNS, and XNS Command Reference*	Apollo Domain Banyan VINES DECnet ISO CLNS XNS
• *Cisco IOS Voice, Video, and Fax Configuration Guide* • *Cisco IOS Voice, Video, and Fax Command Reference*	Voice over IP Call Control Signaling Voice over Frame Relay Voice over ATM Telephony Applications Trunk Management Fax, Video, and Modem Support
• *Cisco IOS Quality of Service Solutions Configuration Guide* • *Cisco IOS Quality of Service Solutions Command Reference*	Packet Classification Congestion Management Congestion Avoidance Policing and Shaping Signaling Link Efficiency Mechanisms
• *Cisco IOS Security Configuration Guide* • *Cisco IOS Security Command Reference*	AAA Security Services Security Server Protocols Traffic Filtering and Firewalls IP Security and Encryption Passwords and Privileges Neighbor Router Authentication IP Security Options Supported AV Pairs
• *Cisco IOS Switching Services Configuration Guide* • *Cisco IOS Switching Services Command Reference*	Cisco IOS Switching Paths NetFlow Switching Multiprotocol Label Switching Multilayer Switching Multicast Distributed Switching Virtual LANs LAN Emulation
• *Cisco IOS Wide-Area Networking Configuration Guide* • *Cisco IOS Wide-Area Networking Command Reference*	ATM Frame Relay SMDS X.25 and LAPB
• *Cisco IOS Mobile Wireless Configuration Guide* • *Cisco IOS Mobile Wireless Command Reference*	General Packet Radio Service

Table 4 Cisco IOS Release 12.2 Documentation Set (continued)

Books	Major Topics
• *Cisco IOS Terminal Services Configuration Guide* • *Cisco IOS Terminal Services Command Reference*	ARA LAT NASI Telnet TN3270 XRemote X.28 PAD Protocol Translation
• *Cisco IOS Configuration Guide Master Index* • *Cisco IOS Command Reference Master Index* • *Cisco IOS Debug Command Reference* • *Cisco IOS Software System Error Messages* • New Features in 12.2-Based Limited Lifetime Releases • New Features in Release 12.2 T • Release Notes (Release note and caveat documentation for 12.2-based releases and various platforms)	

Obtaining Documentation

The following sections provide sources for obtaining documentation from Cisco Systems.

World Wide Web

The most current Cisco documentation is available on the World Wide Web at http://www.cisco.com. Translated documentation can be accessed at http://www.cisco.com/public/countries_languages.shtml.

Documentation CD-ROM

Cisco documentation and additional literature are available in a CD-ROM package, which ships with your product. The Documentation CD-ROM is updated monthly and may be more current than printed documentation. The CD-ROM package is available as a single unit or as an annual subscription.

Ordering Documentation

Cisco documentation is available in the following ways:

- Registered Cisco Direct Customers can order Cisco product documentation from the Networking Products MarketPlace:

  http://www.cisco.com/cgi-bin/order/order_root.pl

- Registered Cisco.com users can order the Documentation CD-ROM through the online Subscription Store:

  http://www.cisco.com/go/subscription

- Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco corporate headquarters (California, USA) at 408 526-7208 or, in North America, by calling 800 553-NETS(6387).

Documentation Feedback

If you are reading Cisco products documentation on the World Wide Web, you can submit technical comments electronically. Click **Feedback** in the toolbar and select **Documentation**. After you complete the form, click **Submit** to send it to Cisco.

You can e-mail your comments to bug-doc@cisco.com.

For your convenience, many documents contain a response card behind the front cover for submitting your comments by mail. Otherwise, you can mail your comments to the following address:

Cisco Systems, Inc.
Document Resource Connection
170 West Tasman Drive
San Jose, CA 95134-9883

We appreciate your comments.

Obtaining Technical Assistance

The following sections provide sources for obtaining technical assistance from Cisco Systems.

Cisco.com

Cisco.com is the foundation of a suite of interactive, networked services that provides immediate, open access to Cisco information and resources at anytime, from anywhere in the world. This highly integrated Internet application is a powerful, easy-to-use tool for doing business with Cisco.

Cisco.com provides a broad range of features and services to help customers and partners streamline business processes and improve productivity. Through Cisco.com, you can find information about Cisco and our networking solutions, services, and programs. In addition, you can resolve technical issues with online technical support, download and test software packages, and order Cisco learning materials and merchandise. Valuable online skill assessment, training, and certification programs are also available.

Customers and partners can self-register on Cisco.com to obtain additional personalized information and services. Registered users can order products, check on the status of an order, access technical support, and view benefits specific to their relationships with Cisco.

To access Cisco.com, go to the following website:

http://www.cisco.com

Technical Assistance Center

The Cisco TAC website is available to all customers who need technical assistance with a Cisco product or technology that is under warranty or covered by a maintenance contract.

Contacting TAC by Using the Cisco TAC Website

If you have a priority level 3 (P3) or priority level 4 (P4) problem, contact TAC by going to the TAC website:

http://www.cisco.com/tac

P3 and P4 level problems are defined as follows:

*   P3—Your network performance is degraded. Network functionality is noticeably impaired, but most business operations continue.
*   P4—You need information or assistance on Cisco product capabilities, product installation, or basic product configuration.

In each of the above cases, use the Cisco TAC website to quickly find answers to your questions.

To register for Cisco.com, go to the following website:

http://www.cisco.com/register/

Cisco.com registered users who cannot resolve a technical issue by using the TAC online resource can open a case online by using the TAC Case Open tool at the following website:
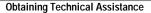
http://www.cisco.com/tac/caseopen

Contacting TAC by Telephone

If you have a priority level 1(P1) or priority level 2 (P2) problem, contact TAC by telephone and immediately open a case. To obtain a directory of toll-free numbers for your country, go to the following website:

http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml

P1 and P2 level problems are defined as follows:

- P1—Your production network is down, causing a critical impact to business operations if service is not restored quickly. No workaround is available.

- P2—Your production network is severely degraded, affecting significant aspects of your business operations. No workaround is available.

This document is to be used in conjunction with the documents listed in the "Related Documentation" section on page 14.