



Cisco VCO/4K ANSI Integrated SS7 ISUP, V5.0(1), Release Notes

July 2000

These release notes describe new features and caveats in ANSI Integrated SS7 ISUP system software release 5.0(1) for use with the Cisco VCO/4K switch and ANSI Integrated SS7 system software.

For information on how to install and use the ANSI Integrated SS7 product, refer to the *Cisco ANSI Integrated SS7, V5.0, System Supplement*.



Note

These release notes are intended for programmers familiar with VCO systems, SS7 concepts, UNIX, and Ethernet.

Contents

These release notes contain the following sections:

- System Requirements, page 2
- New and Changed Information, page 3
- Installation Notes, page 3
- Limitations and Restrictions, page 5
- Important Notes, page 6
- Caveats, page 10
- Troubleshooting, page 15
- Related Documentation, page 15
- Obtaining Documentation, page 16
- Obtaining Technical Assistance, page 16



System Requirements

This section provides a list of system requirements for running ANSI Integrated SS7 system software. These requirements are categorized by hardware, firmware, and software. Contact Cisco Systems TAC (Technical Assistance Center) for any site-specific information.

Hardware Requirements

In addition to the Integrated SS7 system software, ANSI Version 5.0(1) requires the following hardware:

- One of the following systems:
 - VCO/80
 - VCO/20 with an SS7 VME shelf
 - VCO/4K with an SS7 VME shelf
- A SPARC CPU5V card or SPARC CPU2V (2K mode only) card
- 32 MB RAM (2K Mode) or 64 MB RAM (4K Mode) available on the system

Firmware Requirements

There are no special firmware requirements for ANSI V5.0(1). However, the firmware in the VCO must have the appropriate revision level required by the system software. For information, refer to the *Cisco VCO/4K System Software Version 5.x Release Notes*.

Software Requirements

ANSI Version 5.0(1) requires the following software:

- VCO/4K System Software V4.2 (Standard/2K Mode only) or V5.x or higher
- Solaris Release V2.4 or V2.6
- AccessManager V3.5.3

New Integrated SS7 systems have Solaris V2.6 and AccessManager V3.5.3 installed at the factory.

New and Changed Information

New Software Features in ANSI Integrated SS7 ISUP V5.0(1)

Three New CktInt.cfg Feature Flags

There are three new feature flags for the CktInt.cfg file:

- **-FEATURE_FLAG10** — Suppresses protocol violation messages from the log file.
- **-FEATURE_FLAG11** — Ignores the impulse rule number in ckt_ss7_to_sds file.
- **-FEATURE_FLAG12** — When a \$70 command gets rejected with “Invalid Class of Service,” cktint releases a call, if one exists, and sends an \$EA REL report to the host and a \$70 on-hook command to the VCO.

Standards Supported by ANSI Integrated SS7 ISUP V5.0(1)

This release supports the ANSI standards listed in Table 1.

Table 1 *ANSI Standards Supported by V5.0(1)*

SS7 Layer	Standard
MTP-2	ANSI T1.111.3, 1991
MTP-3	ANSI T1.111.4, 1991
ISUP	ANSI T1.113, 1992

Installation Notes

Startup Procedure Changed

The startup procedure has changed for this release. **Prior to installing the new software, you must complete the following steps:**

-
- Step 1** Remove all current ebs drivers.
- Log in to the Integrated SS7 system as **root**.
 - Enter the following command and press **Return**:
 - `/export/home/EBS/access/install/rmEBSdrv`
- Step 2** Turn power off.

Step 3 Turn power back on for the ecpt drivers to be recognized by the system.



Note

NOTE: If you are running a 4-link or 8-link configuration, the ecp drivers will not be loaded. Instead, the ecpt drivers will get loaded. **The port assignments for these drivers are slightly different from ecp. No matter which slot is occupied, the first occupied slot will have port numbers 1 through 4, the second one will have 5 through 8, and so on.**

For example, if there are two 4-port cards in the Sbus on a system, and they occupy ecpt1 and ecpt2, the card that occupies ecpt2 will still take ports 5 through 8. Previously, ecp would have taken ports 9 through 12.

Step 4 Follow the usual startup sequence as described in the *Cisco ANSI Integrated SS7, V5.0, System Supplement*.

Redundancy Configuration Changes for Upgrades

In redundant systems running ANSI Version 5.0 and higher, you must make new modifications to your **AccessRd.cfg** file as follows:

Step 1 Log in as **root** to the Integrated SS7 system side A, **<hostname>a**.

Step 2 Enter the following command and press **Return**:

```
chmod 644 $EBSHOME/access/config/AccessRd.cfg
```

Step 3 Use the vi editor to open the file **\$EBSHOME/access/config/AccessRd.cfg**.

a. Check the following lines. The lines should read:

```
MONITOR_OPTION    OFF
CTS_CONFIGURATION  INVERTED
```

b. If the lines do not match, modify them accordingly.

c. Save the changes and close the file.

Step 4 Log on as **root** to the Integrated SS7 system side B, **<hostname>b**, and repeat Step 2 through Step 3.

a. This time the lines in Step 3 should read:

```
MONITOR_OPTION    OFF
CTS_CONFIGURATION  INVERTED
```

Step 5 Check to make sure the SS7 Integrated Software version matches that on side A. Enter the following commands and press **Return** after each:

```
%cd $XNV
%version cktint
```

Step 6 To bring the Integrated SS7 system into operation, go to *Section 5* of the *Cisco ANSI Integrated SS7, V5.0, System Supplement* and start the SS7 stack and Circuit Interworking software.

Limitations and Restrictions

Known Design Constraints

The following are design constraints which have been identified in ANSI Integrated SS7 system software. Cisco Systems currently has no plans to address the following known design constraints.

CSCsf63489 (U611070001): CktInt Loses Info. When No Host Connected

CktInt does not maintain a socket connection dedicated to the VCO. If no host is connected, circuit state change information from the system is lost.

CSCsf73966 (U705050007): No Switchover When SS7 Is Stopped On Active Side

The system does not switch over automatically when one of the following conditions occur:

- If the Active CktInt and EBS stacks are stopped
- If CktInt hangs or dies
- If any EBS stack process dies and the MONITOR_OPTION is OFF (needs to be off to fix the problem where the Ethernet cable is detached and the system will flip flop sides).

Workaround

Set the All Host Link Failure Action, on the SDS System Host Configuration Screen, to Conditional Switchover. When the Conditional Switching option is selected, a major alarm is generated if all host links fail and a system switchover is initiated if the Standby controller is on-line (file sync. completed) and has active host links.

CSCsf74160 (U707160004): Associated Ports Are Lost After Switchover

CktInt associates ports as specified in the SS7 \$49 Command and the association is maintained until call tear down. If the controlling port is a VCO port, and the associated port is an SS7 port, the two ports are associated until one or the other is released by the host. When one of the ports is released, CktInt automatically releases the other.

However, if the system switches over while the call is stable, CktInt, on what is now the Active side, has no knowledge of port association established prior to switchover. This is because the CktInt on side A does not communicate with CktInt on side B and vice versa. If the host attempts to release the call by its port association, the release will fail.

If the system switches over a second time, and the call is still stable, the CktInt module that established the port association is now on the Active side, and host can release the call by its port association.

Workaround

Do not use the port association option in host applications.

Important Notes

This section describes the special considerations you should be aware of while using ANSI Integrated SS7, V5.0(1). This section provides explanations for the following areas:

- Commands and reports
- Debug flags
- EBS configuration
- Host considerations
- Redundancy
- System configuration

Commands and Reports

CktInt Requires \$DA And \$DB Reports

Do not suppress the \$DA and \$DB Reports in your SS7 application. These reports are required by CktInt for non-SS7 to SS7 calls and SS7 to non-SS7 calls because of the disconnect control byte. Cktint must see an on-hook.

Debug Flags

Turning on the debug flags may negatively impact performance.



Note

Make sure all debug flags are turned off for production systems.

EBS Configuration

Routing Alarm Messages to the Console

To route alarm messages to the system console, complete the following steps:

-
- Step 1** Start the MML utility by entering the following command and pressing **Return**:
`mml 0`
 - Step 2** At the system prompt, enter the following command and press **Return**:
`MODIFY-ALARM-CONFIG:DISPLAY=ON;`
 - Step 3** Exit the MML utility by entering the following command and pressing **Return**:
`EXIT;;`
-

Configuration for a Combined Linkset with Two A-Links

In order for link inhibit/uninhibit to work properly in a combined linkset with two A-links, you must set up alternate routes in the **mtp mml** file, as shown in lines 6 and 7 below.

```

MODIFY-SP:NAME=HOME,SPC=3-8-3,NI=NATIONAL,TYPE=SEP;
ADD-LSET:LSET=LSET1,DPC=1-1-1,ACTIVE=1,LOADED=1,TYPE=ALINK,BR=56000;
ADD-LSET:LSET=LSET2,DPC=1-1-2,ACTIVE=1,LOADED=1,TYPE=ALINK,BR=56000;
ADD-LINK:LINK= LINK-0,LSET=LSET1,SLC=0,PORT=1,TYPE=DTE,PRIORITY=0;
ADD-LINK:LINK=LINK-0,LSET=LSET2,SLC=0,PORT=2,TYPE=DTE,PRIORITY=0;
ADD-ROUTE:RTSET=LSET1STP,LSET=LSET2,PRIORITY=1;
ADD-ROUTE:RTSET=LSET2STP,LSET=LSET1,PRIORITY=1;
ADD-CMBLSET:CMBLSET=CLSET12,LSET1=LSET1,LSET2=LSET2;
ADD-RTSET:RTSET=RSET12,DPC=2-2-2,ROUTE1=CLSET12;
MODIFY-LSET:LSET=LSET1,ADMINSTATE=ACTIVE;
MODIFY-LSET:LSET=LSET2,ADMINSTATE=ACTIVE;
EXIT;

```

Host Considerations

Multiple Hosts Affect Call Handling

Additional TCP connections affect VCO call handling capacity. Optimal performance can be achieved with four or fewer simultaneously active TCP connections.

Redundancy

Host Connected to Both Sides

A host must be connected to both the active and standby sides of the SS7 system for reliable redundancy operation.

No Switchover When Ethernet Fails

If Ethernet fails, the system does not switch over.

Workaround

Add a routine to your host application that can detect when the Integrated SS7 system is unreachable and initiates a switchover.

ASCII Terminals On Redundant Systems

If you turn the Integrated SS7 console off, or power to the terminal is lost, the SPARC5V CPU may abort and return to the boot prompt.

It is possible to connect a single ASCII terminal to both side A and side B via an electronic A/B selector switch. However, the selector must be capable of providing surgeless, spikeless change-overs. If the selector switch does not have this feature, the SPARC5V CPU may abort and return to the boot prompt when a change-over occurs.

Calls During Switchover

Only stable (answered) calls are preserved by the system during a redundancy switchover.

Loss of Network or SS7 Selector Switch Links

The loss of network links does not cause a switchover. Also, the loss of SS7 selector switch links does not cause a switchover. If you are going to perform maintenance on any of the links, you must first switch the system over to the standby side.

SDS and VCO/80 Do Not Boot Without SPARC CPU Installed

An SDS or VCO/80 system configured for SS7 does not boot if one of the SPARC CPUs is removed from the Control Subrack. The NBC does not download, the NBC's LEDs stay illuminated, and the SDS/VCO system freezes.

Time Between Consecutive Switchovers

Depending on the number of SS7 circuits in your configuration, the SS7 system needs 10 to 30 seconds between two consecutive switchovers to avoid a mismatch in redundancy states of the VCO, cktint, and EBS.

System Configuration

GRPID and TRNKGRPID Numbering Per DPC

For each distant end DPC, if your Circuit Group IDs (GRPID) are numbered consecutively (i.e. 1, 2, 3, 4...), Cisco Systems recommends you also number your Trunk Group IDs (TRNKGRPIDs) consecutively (i.e. 50, 51, 52, 53...).

Choosing No Name Service

During system configuration, if you set the Name Service screen to “NONE” and press the **F2** key to continue, the sys-config program will generate an error message and gets into a loop.

Workaround

When running the system sys-config, the system expects any name service to be defined. When you set the Name Service screen option to “NONE,” the system still tries to look for any service type and gets into a loop. To run with no name service, you need to create two empty files, as described below, and then rerun the sys-config program from the beginning.

-
- Step 1** From the Name Server screen, mark the “NONE” field and press **F2** to continue.
- Step 2** An error message containing a path and file name will be generated. Write down the path and file name.
- Step 3** If using a UNIX/Solaris terminal, press **Stop** and then **a**. This will get the “OK” prompt.
If using a WYSE terminal, press **Ctrl** and then **Pause/Break** or **F5**. Pressing **Alt** and then **Pause/Break** or **F5** may also work. This will get the “OK” prompt.
- Step 4** At the “OK” prompt, enter the following command and press **Return**:
- ```
boot -s
```
- This will bring up the system in single user mode. The following message appears:
- ```
press cntrl-D or enter root password
```
- Step 5** At the password prompt, enter the following root password and press **Return**:
- ```
abc123
```
- Step 6** Change the directory (**cd**) to **/etc** and create the files **nsswitch.conf** and **nsswitch.files**, or the file names you wrote down in Step 2 if they differ.
- Basically, you are creating any files that the system was complaining about in the original error message.
- To create the files with vi editor, enter the following command(s) and press **Return**:
- ```
vi /etc/nsswitch.conf
vi /etc/nsswitch.files
```
- Step 7** Press the **Esc** key. Then, type **:wq** and press **Return**.
- Step 8** Verify that the files now exist under directory **/etc**.
- Step 9** Change the directory (**cd**) to **/usr/sbin**.
- Step 10** Type **sys-unconfig** and press **Return** to un-configure the system and revert to a blank system.
- Step 11** Type **reboot** and press **Return** to bring the system back in configuration mode (sys-config).
- Step 12** Continue with the regular sys-config procedure. This time, when you set the Name Service option to “NONE,” the system will allow you to configure the rest of the fields without any problem.
-

Caveats

This section contains open and resolved software caveats for this release of the ANSI Integrated SS7 V5.0(1) system software. Caveats describe unexpected behavior or defects in the ANSI Integrated SS7 system software or related hardware.

Complete the following steps to access detailed information on resolved and open caveats:

Step 1 Open an Internet browser application.

Step 2 Go to <http://www.cisco.com>

Step 3 Click on the site menu's Login hypertext.

The Username and Password Required dialog box is displayed.

Step 4 Enter your username and password.



Note If you do not have a valid username and password contact your Cisco Systems representative or send e-mail to *cco-team*.

Step 5 Click the OK button.

A Cisco Systems Web page is displayed.

Step 6 Click on the Technical Assistance Center hypertext, which is located beneath the Service & Support section.

Step 7 Click on the Tools hypertext.

Step 8 Click on the Software Bug Toolkit hypertext.

Step 9 Click on Search for Bug by ID Number hypertext.

The Search for Bug by ID Number tool is displayed.

Step 10 Use the Search for Bug by ID Number search tool to find detailed information on caveats for the VCO/4K-related product.

Open Caveats - ANSI Integrated SS7 ISUP V 5.0(1)

Cisco Systems, Inc. has identified and evaluated functional constraints in ANSI Integrated SS7 V5.0(1) system software. This section provides explanations and, where applicable, workarounds for possible unexpected behavior by V5.0(1) system software.

CSCsf74269 (U708200008): Warmboot With Autostart Takes 20 Minutes

If autostart is configured and the system is warm booted, it will take at least 20 minutes for the SS7 software to start. This will ensure that the VCO is entirely operational before the SS7 software is started.



Note Do not change this timer value unless you are instructed to do so by Cisco Systems Technical Support.

Workaround

You may disable the autostart feature. If disabled, the SS7 software must be manually started. To disable autostart, complete the following steps:

-
- Step 1** Log in to the Integrated SS7 system as **root**.
 - Step 2** Enter the following command and press **Return**:

```
rm /etc/rc3.d/S85ss7
```
 - Step 3** Reboot the Sparc and autostart will be inactive.

To re-enable autostart, complete the following steps:

-
- Step 1** Log in to the Integrated SS7 system as **root**.
 - Step 2** Enter the following command and press **Return**:

```
cp /export/home/cktint/cktint-x/bin/S85ss7 /etc/rc3.d/S85ss7
```
 - Step 3** Enter the following command and press **Return**:

```
chmod +x /etc/rc3.d/S85ss7
```
 - Step 4** Reboot the Sparc and autostart will be available.

-OR-

Re-install the cktint software. Autostart is automatically enabled with cktint software installation.

CSCsf84706 (U803110006): Synchronization Failure

If EBS and cktint are brought down and back up on the standby side, sometimes the “tli” process does not sync up with the tli process on the active side and the following messages are repeatedly displayed:

```
srv_connect:: An event requires attention
```

```
Enabling connect timer ....
```

This impacts the redundancy operation of the system.

Workaround

Bring down the tli processes on both sides. Then, bring both tli processes back up.

To bring down the tli processes:

-
- Step 1** Log in as **root** to the Standby side of the Integrated SS7 system.
 - Step 2** Type **px** and press **Return** to verify which active processes are running.
 - Step 3** Find the tli process I.D. number.
 - Step 4** Enter the following command and press **Return**:


```
kill -9 <process I.D. #>
```
 - Step 5** Log in as **root** to the Active side of the Integrated SS7 system, then repeat Step 1 through Step 4.
-

To bring both tli processes back up:

-
- Step 1** Log in as **root** to the Active side of the Integrated SS7 system.
 - Step 2** Enter the following command and press **Return**:


```
tli &
```
 - Step 3** Log in as **root** to the Standby side of the Integrated SS7 system, then repeat Step 1 through Step 2.
-

CSCsf84706 (U803110006): Outbound CCR Not Working

When a CCR is sent from the host, continuity check fails with the following messages:

```
SsIsTx()- FAILED PUTTING header:
```

```
isup_error- EINVPRMTYP (0x12c)
```

```
spmerr@pid(2514): [300] invalid primitive
```

Resolved Caveats - ANSI Integrated SS7 ISUP V 5.0(1)

Table 2 list the caveats issued against the ANSI Integrated SS7 system software that have been resolved in system software version 5.0(1).

Table 2 *Resolved Caveats for Release 5.0(1)*

DDTs Issue	Description
CSCdk84405	Cktint cored when accessing port in wrong port. This issue has been fixed.
CSCdk85064	Incorrect acknowledgments were sent to the host for successful \$49 commands in extended mode. This issue has been fixed.
CSCsf73802 (U703060005)	If an SS7 \$49 Command was rejected, the host that sent the command became permanently associated with the circuit (or circuit group) specified in the command. This could stop other hosts from using the circuit. This issue has been fixed.
CSCsf73844 (U703140003)	If only one host was up and running in a multihost environment, the ROUNDROBIN mode for host load sharing did not work correctly. This issue has been fixed.
CSCsf73857 (U703230001)	If the SDS/VCO Host Control of Call Load feature (set from the System Host Configuration screen of the SDS/VCO Administration Console) was enabled when cktint started up, all of the \$70 commands CktInt sent to the SDS/VCO to ensure that all of the SS7 ports were on hook were rejected with a network status byte of 3C (\$6C or \$72 command received before host issued \$C0 04 command). If the Host Control of Call Load feature was not enabled, the \$C0 04 command failed, but the \$70 commands succeeded. Cktint now supports both the Host Control of Call Load feature and processing of \$C0 04 commands.
CSCsf84643 (U802250002)	When cktint received a BLO from the network, the circuit state became remotely blocked in cktint. If the network then sent a CCR, the circuit state became active instead of remotely blocked in cktint. This issue has been fixed.
CSCsf84644 (U802250003)	When SS7 sends an outbound IAM and the network does not respond with an ANM, the T9 timer fires and sends a REL message.
CSCsf84743 (U803170002)	Cktint sent two OGC_SELECTED primitives, causing an ERROR_INVMSG, when sending an outbound ACM after receiving a COT success. This issue has been fixed.
CSCsf84744 (U803170003)	If a continuity check has been performed and a COT indicating “continuity check successful” is received, cktint disconnects the internal loopback.
CSCsf84745 (U803170004)	If a received COT indicates “continuity check failure,” cktint releases the outgoing circuit and waits for a Continuity Check Request (CCR) message. When this happens, an erroneous MAINTENANCE_TIMER_INFO log message no longer appears in the log file.
CSCsf84746 (U803170005)	If a received COT indicates “continuity check failure,” cktint releases the outgoing circuit and waits for a Continuity Check Request (CCR) message. During this time, the circuit cannot be in the idle state. Cktint and EBS both stay in an “IN-BUSY” state.

Table 2 Resolved Caveats for Release 5.0(1)

DDTs Issue	Description
CSCsf84747 (U803170006)	When there is a COT failure on a “previous circuit,” EBS stays “IN-BUSY” while cktint goes idle. When a REL is received from the network, EBS now forwards it to cktint.
CSCsf84825 (U804140002)	If the disconnect control byte in the SS7 \$49 command was dynamically changed by the host, cktint did not adapt to these changes. This issue has been fixed.
CSCsf84828 (U804160001)	If the system switched over after receipt of a SUS message on an active call, the subsequent RES message was not passed to cktint from EBS on the newly active side. This issue has been fixed.
CSCsf85105 (U809100003)	When a COT success message was received from the network for a continuity check on the present circuit, cktint put that port to an ON HOOK state and sent an \$EA report to the host with a port inactive message. This issue has been fixed.
CSCsf85254 (U811120002)	When glare control was set to “all” in the grp_ss7_sds file (value 3) and a CVT was received from the network, cktint responded with a CVR that had glare control set to “none.” This issue has been fixed.
CSCsf85255 (U811120003)	If a REL is received for a call established with the IAM having the "nature of connection" indicator set to 10, an \$EA report is still sent to host.
CSCsf85256 (U811120004)	Whenever a COT message is received from the network, a \$66 command is sent to the VCO. The host link I.D. is now set properly in this \$66 command.
CSCsf85290 (U812150002)	When a \$49 command is sent from the host, cktint automatically sets the disconnect control bits and adapts to the \$49 disconnect bit settings.
CSCsf85287 (U812170001)	When a \$70 command was rejected with “Invalid Class of Service,” cktint hardware blocked the circuit. By enabling -FEATURE_FLAG12 in the CktInt.cfg file, cktint now releases a call, if one exists, and sends an \$EA REL report to the host and a \$70 on-hook command to the SDS/VCO

Troubleshooting

Checksums

Table 3 lists valid software checksums and file sizes for the ANSI V5.0(1) software.

Table 3 *Cktint Version: ANSI ISUP Version 5.0 FSR01*

Filename	Checksum /usr/bin/sum	Size ls -l
cktint.cpio.Z	4801 3528	1806197
install_cktint.sh	40085 11	5140



Note

To get the version of cktint, run the following command in **\$XNV**:
`% version cktint`

Table 4 lists valid software checksums and file sizes for the AccessManager Version 3.5.3 FP3 QF17 software running on Solaris V2.4 or V2.6.

Table 4 *EBS Version: 3.5.3_FP3_QF17*

Filename	Checksum /usr/bin/sum	Size ls -l
ebs.cpio.Z	24528 9674	4952781
install_ebs.sh	5300 7	3185



Note

To get the version of EBS, run the following command in **\$EBSHOME/access**:
`% more version.dat`

Related Documentation

The following documents contain information that may be useful to ANSI Integrated SS7 system software V5.0(1) users.

- *Cisco ANSI Integrated SS7, V5.0, System Supplement*
- *Cisco VCO/4K System Software Version 5.x Release Notes*
- *Cisco VCO/4K Standard Programming Reference*
- *Cisco VCO/4K Extended Programming Reference*

Obtaining Documentation

World Wide Web

You can access the most current Cisco documentation on the World Wide Web at <http://www.cisco.com>, <http://www-china.cisco.com>, or <http://www-europe.cisco.com>.

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. Therefore, it is probably more current than printed documentation. The CD-ROM package is available as a single unit or as an annual subscription.

Ordering Documentation

Registered CCO users can order the Documentation CD-ROM and other Cisco Product documentation through our online Subscription Services at <http://www.cisco.com/cgi-bin/subcat/kaojump.cgi>.

Nonregistered CCO users can order documentation through a local account representative by calling Cisco's corporate headquarters (California, USA) at 408 526-4000 or, in North America, call 800 553-NETS (6387).

Obtaining Technical Assistance

Cisco provides Cisco Connection Online (CCO) as a starting point for all technical assistance. Warranty or maintenance contract customers can use the Technical Assistance Center. All customers can submit technical feedback on Cisco documentation using the web, e-mail, a self-addressed stamped response card included in many printed docs, or by sending mail to Cisco.

Cisco Connection Online

Cisco continues to revolutionize how business is done on the Internet. Cisco Connection Online 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.

CCO's broad range of features and services helps customers and partners to streamline business processes and improve productivity. Through CCO, you will find information about Cisco and our networking solutions, services, and programs. In addition, you can resolve technical issues with online support services, 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 CCO to obtain additional personalized information and services. Registered users may order products, check on the status of an order and view benefits specific to their relationships with Cisco.

You can access CCO in the following ways:

- WWW: www.cisco.com
- Telnet: cco.cisco.com
- Modem using standard connection rates and the following terminal settings: VT100 emulation; 8 data bits; no parity; and 1 stop bit.
 - From North America, call 408 526-8070
 - From Europe, call 33 1 64 46 40 82

You can e-mail questions about using CCO to cco-team@cisco.com.

Technical Assistance Center

The Cisco Technical Assistance Center (TAC) is available to warranty or maintenance contract customers who need technical assistance with a Cisco product that is under warranty or covered by a maintenance contract.

To display the TAC web site that includes links to technical support information and software upgrades and for requesting TAC support, use www.cisco.com/techsupport.

To contact by e-mail, use one of the following:

Language	E-mail Address
English	tac@cisco.com
Hanzi (Chinese)	chinese-tac@cisco.com
Kanji (Japanese)	japan-tac@cisco.com
Hangul (Korean)	korea-tac@cisco.com
Spanish	tac@cisco.com
Thai	thai-tac@cisco.com

In North America, TAC can be reached at 800 553-2447 or 408 526-7209. For other telephone numbers and TAC e-mail addresses worldwide, consult the following web site:
<http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml>.

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