

Study guide by ExamNotes.net

Exam 640-506

CIT

Abstract

This ExamNotes Study Guide intends to provide you with information to prepare for the Cisco 640-506 Exam.

Before you start

This study guide provides you with information on the many different aspects of "Building scalable Cisco Network". Before you proceed with this subject, please read through the study material for the following and make sure you are 100% comfortable with the Routing technology:

- o CCNA 1.0 and 2.0

You need the basic knowledge about Cisco Router as well as concepts of routing. It would be nice for you to have real experience with IOS. Use Router Simulator if you do not have access to real routers:

www.routersim.com

According to Cisco's published objective at <http://www.cisco.com/warp/public/10/wwtraining/cust/classes/C-TRN-CIT.html>

candidates should have the following skills and knowledge in order to prepare for the exam:

- o Troubleshooting Processes
- o Routing and Routed Protocol Troubleshooting
- o Campus Switch and VLAN Troubleshooting
- o WAN Troubleshooting

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In addition, it is suggested that students possess certain prerequisite skills using Cisco equipment, including:

- Working knowledge of the OSI reference model and the hierarchical model
- Understanding internetworking fundamentals
- Operating and configuring a Cisco IOS device
- Working knowledge of the TCP/IP stack and how to configure a routed protocol such as IP
- Understanding distance vector routing protocol operation and configuring RIP and IGRP
- Determining when to use static and default routes and enabling them on a Cisco router
- Displaying and interpreting a Cisco router routing table
- Enabling a WAN serial connection
- Configuring an IP standard and extended access list
- Verifying router configurations with available tools like show and debug commands

This study guide was written with Cisco's official documentation as the primary source of information. Do NOT rely solely on this study notes for the exam. By all means read more than one book on the subject and make sure you understand the material well enough so that you could be ready for the questions. There is no quick way to succeed for this topic. Ideally you must work things out and gain experience before even trying to sign up for the exam.

You MUST read as many different Cisco documentations as possible. This will help you thoroughly understand the technology. If you just rely on the Study Guides, when Cisco revise the questions in the test (which is likely to occur frequently) you will have difficulties answering any of them.

Another important thing to note is that this study guide was not written with the specifications of the different technologies in mind, as you can find much better coverage of all the details from Cisco's web site directly. Instead, we will place our focus on the troubleshooting issues.

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Your Study Track for CIT

1, Make sure you are comfortable with TCP/IP. There are many tutorials for TCP/IP on the net, and additionally you are encouraged to visit 3com's tutorial on IP addressing at: <http://www.3com.com/nsc/501302.html>.

For information on the OSI model, visit <http://www.rad.com/networks/1994/osi/intro.htm>

Apart from TCP/IP, you should also be familiar with other types of protocols, including IPX and Appletalk.

2, Make sure you know the basic concept of Router configuration and IOS. To gain a better understanding, visit the following link:

<http://www.examnotes.net/cisco/router.shtml>

3, Know all the LAN and WAN connectivity standards and protocols.

For ATM:

<http://www.rad.com/networks/1994/atm/tutorial.htm>

For HDLC:

<http://www.rad.com/networks/1994/hdlc/hdlc.htm>

For Packet Switching:

<http://www.rad.com/networks/1994/pak-swi/intro.htm>

For FDDI:

<http://www.rad.com/networks/1995/fddi/fddi.htm>

For ISDN:

<http://www.ralphb.net/ISDN/>
<http://public.swbell.net/ISDN/connect.html>

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For Frame Relay:

<http://www.alliancedatacom.com/framerelay.asp>

<http://www.uswest.com/products/data/frame/tutorial/>

For X.25:

<http://www.rad.com/networks/1996/x25/x25.htm>

For Token Ring:

<http://www.rad.com/networks/1996/toknring/toknring.htm>

4, Know the 506 specific topics. 506 is all about Troubleshooting.

According to Cisco:

“CIT 4.0 teaches students how to baseline and troubleshoot an environment using Cisco routers and switches for multiprotocol client hosts and servers connected with the following:

- o Ethernet, Fast Ethernet, and Token Ring LANs
- o Serial, Frame Relay, and ISDN BRI WANs “

You should get yourself familiar with Cisco’s line of troubleshooting tools:

http://www.cisco.com/univercd/cc/td/doc/cisintwk/itg_v1/tr1902.htm

Additionally, visit

http://www.cisco.com/warp/public/cc/serv/mkt/sup/gen/svspg_rg.htm

to learn about Cisco’s support services.

For those who want to read the big books, check out the following 640-506 titles from Amazon:

- [Cisco CCNP Preparation Library, Second Edition \(Cisco Career Certifications\)](#) Diane Teare, et al; Paperback
- [CCNP Support Study Guide \(Exam 640-506\)](#) by Syngress Media Inc(Editor). Hardcover (December 6, 2000)

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The troubleshooting exam covers not only troubleshooting, but also the basic architectures and theories of the related protocols and technologies. To completely prepare yourself for the exam, I strongly recommend that you pay a visit to the Cisco Internetwork Troubleshooting Guide at http://www.cisco.com/univercd/cc/td/doc/cisintwk/itg_v1/ for in depth coverage of every topic.

Plan your troubleshooting steps

Cisco has produced a troubleshooting worksheet which can be used as a guideline for your troubleshooting venture. You are recommended to use that as a reference:

http://www.cisco.com/univercd/cc/td/doc/cisintwk/itg_v1/tr19ae.htm

For troubleshooting, you should always define a clear problem statement to indicate the symptoms and the potential causes. Gather the related facts by asking users questions and collecting information from different sources, such as network management systems, protocol analyzers, IOS diagnostic commands ... etc.

The key to successful troubleshooting is the ability to isolate the problem to one device. You do this by changing only one variable at a time until the problem is identified and resolved. If unfortunately the problem still persists, you may need to undo all the changes, redefine the problem statement and restart the whole process again.

It is always recommended that you should carry out regular management and maintenance activities to prevent the "troubles" from coming up in advance. Types of management activities defined by Cisco include Fault management, Performance management, Configuration and device management, Accounting management and Security management. The key is, proactive measures are always more desirable than reactive measures.

Hardware Problems

Sometimes the hardware itself may crash. You may obtain a core dump when a router crashes by using the **exception dump ip-address** command to assist in troubleshooting. You may also use **show stacks** together with memory map information to determine the cause of the crash.

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http://www.cisco.com/univercd/cc/td/doc/cisintwk/itg_v1/tr1903.htm

provides detailed information on troubleshooting Cisco hardware problems. You are encouraged to take a look at it.

At the least, you should be able to tell what goes wrong from the LED:

- Green LED means the port is operational
- Orange LED means the link is disabled
- LED flashes in orange color means a serious hardware failure
- Off LED means no signal at all

One common hardware related problem is the corruption of system image. Whenever this happens, you should power cycle the router and hold the break key within 60 seconds during boot up. You will soon be in the ROM monitor screen. Key in "o/r 0x1" to set the router to boot from ROM, or key in 1 to have the router obtain the correct system image via TFTP. Alternatively, you may enter "boot system flash" to force the router to boot from flash memory.

Tools

General Troubleshooting Commands

- **show**
 - monitor installation and network behavior
 - isolate problem areas
- **debug**
 - isolate protocol and configuration problems
- **ping**
 - determine network connectivity between devices
- **trace**
 - determine routes by which packets travel

There are some common counters you can watch out for during investigation. Runt represents the number of packets being discarded by the router due to the fact that

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they are smaller than the medium's minimum packet size. On the other hand, Underruns indicate the number of times the transmitter run faster than the router can handle. Interface reset indicates the number of times the interface was completely reset, while Ignored indicates the number of received packets ignored by the interface due to low internal buffers. CRC indicates the number of times incoming packets fail the Cyclic Redundancy Checksum.

CiscoWorks

- Device Monitor - monitor network devices for environmental and interface statistics
- Health Monitor - monitor status of a device itself
- Path Tool - analyze path between two devices
- Device Polling - extract data about the condition of network devices.
- CiscoView – provide graphical display of devices, statistics, and comprehensive configuration data
- Offline Network Analysis - for historical network data offline analysis
- CiscoConnect - ask Cisco for help

TrafficDirector

- monitor all seven layers of network traffic
- work with IOS embedded RMON agents and SwitchProbe standalone probes

VlanDirector

- for monitoring VLAN, use the VlanDirector switch management application
- VLAN problems are often associated with VTP, as incorrect VTP configuration will cause a VLAN to be slow or even non-operational.
- for concepts of VLAN, visit <http://www.cisco.com/univercd/cc/td/doc/product/lan/cat2100/c2100ug/csfcnpt.htm#xtocid1489416>
- to learn more about VLAN management, visit http://www.cisco.com/univercd/cc/td/doc/product/rtrmgmt/cw2000/fam_pro d/user_reg/1_2_1/use_reg/ur1man.htm

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Other Tools

- Volt-Ohm meters, digital multimeters, and cable testers are for testing cabling physical connectivity
- Time domain reflectors and optical time domain reflectors are for locating cable breaks and impedance mismatches
- Breakout boxes and fox boxes are for troubleshooting peripheral interfaces problems
- Sniffer is for decoding problems exist at all seven OSI layers
- Network Monitor is for determining baseline and establishing trends in your network
- Stack Decoder is for providing meaningful comments in a stack trace
- NetSYS is for simulating network changes in a virtual setup
- CCO bug toolkit includes the Bug Navigator, Bug Alert and Bug Watcher to assist in debugging.
- If nothing helps, try to get technical information from the Cisco website. If you really cannot handle the problems, call the Cisco TAC and ask for help.

Ethernet Problems

Excessive noise

- Use **show interfaces ethernet** to see if there are many CRC errors but not that many collisions, then check to make sure that cables do not have physical damage. The speed of the cable should match that of the network adapters.

Excessive collisions

- Use **show interfaces ethernet** to find out if the total number of collisions with respect to the total number of output packets exceed 0.1 percent. Also use TDR to see if there is any un-terminated Ethernet cables.

Excessive runt frames

- Mostly due to excessive collision. If runt frames occur when there are little collisions, use protocol analyzer to locate the source address of the runt frames.

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Late collisions

- Occur when cables are not within specification. You can find this out with a protocol analyzer.

No link integrity

- Make sure you have perfect match for adapters, cable, hub and ports. Make sure the correct cables are being used.

LAN Switching

- To check out specific LAN switching troubleshooting methods, please visit [this site](#)

Token Ring Problems

Nonfunctional Token Ring

- Use **show interfaces token** to determine the status of the Token Ring interfaces, and check the cable from the router to the MAU to make sure it is in good condition.

Ring speed mismatch

- Use **show running-config** to determine the ring speed specified on the router. Note that ring speed configured for all stations must be the same.

Relay open in MAU

- Use **show interfaces token** to verify that the interface and line protocol are up, check the cable connection to the MAU, and use **clear interface** to reset the Token Ring interface. You may also need to reset the MAU's relay in some cases.

Duplicate MAC address

- Use network analyzer to check the Duplicate Address test frames from a booting station, and change the MAC address of the conflicting stations.

Congested ring

- You should segment your network.

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FDDI Problems

Nonfunctional FDDI ring

- First use **show interfaces fddi** to determine the interface status, and then use ping between routers to test connectivity to make sure that neighbors MAC addresses are correct. If you see all zeros in any of the address fields, a physical connection problem is likely happening.
- For FDDI, always make sure that signal strength is not out of specifications.

Upstream neighbor has failed and bypass switch is installed

- First check and see if the upstream neighbor is still operational. If it is down and a bypass switch is there, resolve the problems found in the upstream neighbor.
- Bypass switch does not repeat signals
- Various FDDI port statuses include: 'A' means upstream neighbor is Physical A type DAS. 'B' indicates Physical B type DAS. 'S' indicates Physical A type SAS. 'M' indicates that neighbor is a physical M type concentrator. 'UNK' means that CMT process is not completed, so there is no way to find out about its neighbor. Note that the valid states of Physical A or B interface are Off, Active, Trace, Connect, Next, Signal, Join, Verify, or Break.
- FDDI has Dual ring fault tolerant capability, meaning if a station fails the dual ring will automatically doubled back on itself into a single ring. However, in a big FDDI setup, you may have multiple failures occur in multiple areas, which will create isolated rings that cannot talk to each other.
- Optical bypass switches can be deployed to automatically eliminate failed stations from the ring, thus preventing ring segmentation.

WAN Connections Problems

Serial Line

- use **show interfaces serial** to display information specific to serial interfaces
- use **debug** to provide diagnostic information relating to protocol status and network activity
- use extended **ping** options of a number of successive pings to look for increasing input errors that indicates hardware problems

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- clocking problems may come from Incorrect DSU/CSU configuration, cables out of specification, poor patch panel connections, or several cables connected together in a row. If the **show interfaces serial** command output for CRC, framing errors, and aborts exceed 2.0% of the traffic, clocking problem is likely happening. You should then use series of **ping** tests and loopback tests to isolate the problem.
- bandwidth utilization over 70% cause intermittent failures. You must increase the bandwidth of the link if possible, or adjust the buffer. Use **show buffers** to determine the current buffer statistics
- Use **hold-queue** to increase the number of data packets queued before packets are dropped

ISDN

- You may want to inspect the dialer map interface configuration command entries in the local and remote router.
- You need to ensure that speed setting of router interface is matching that of your ISDN service
- Use **show isdn status** to check for current status
- Use **show running-config** to view router configuration.
- Use **debug isdn event** for ISDN debugging
- Use **debug isdn q921 / debug isdn q931** to troubleshoot problems in ISDN BRI layer 2 and 3
- Use **show controller bri** to view status on the D channel of a BRI line
- Use **debug dialer** to debug dial-on-demand routing information
- Use **debug PPP negotiation** to debug the negotiation of Point-to-Point Protocol options as well as the Network Control Protocol parameters.
- Use **debug PPP authentication** to debug the exchange of Challenge Authentication Protocol and Password Authentication Protocol packets

Frame Relay

- Use **show interfaces serial** to show the status of interface and line protocol
- Use **show frame-relay lmi** to see what LMI type is configured on the Frame Relay interface, as you must ensure that the LMI type is the same for all devices in the path from source to destination

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- Use **show interfaces** command to look for current keepalives settings, and use **keepalive seconds** to configure if necessary
- Use **encapsulation frame-relay ietf** to configure IETF encapsulation on the Cisco Frame Relay interface when connecting Cisco device with non-cisco device
- Use **show frame-relay pvc** to view the status of PVC.
- Use **no frame-relay map** to delete any incorrect DLCI number entry
- Use **frame-relay map** to define mapping between an address and a DLCI
- Keep in mind that you must configure subinterfaces to avoid problems with split horizon in a hub-and-spoke Frame Relay environment.

X.25

- Use **show interfaces serial** and watch out for the following fields:
 - REJs - rejects
 - SABMs - Set Asynchronous Balance Mode requests
 - RNRs - Receiver Not Ready events
 - FRMRs - protocol frame errors
 - RESTARTs - restarts
 - DISCs - Number of disconnects
- use **debug lapb** to determine why X.25 interfaces / LAPB connections are down
- use **debug x25 events** instead of **debug lapb** when there is NO SABMs

ATM

- Use **show port *port-number* all** to perform port check or bit rate check. If the bit rate is illegal, use **set port** to fix
- Use **set port *port-number* loop remote** to start loopback test
- Use **set port *port-number* loop internal** to run an internal loop
- Use **set port *port-number* unloop** to stop the loop

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- Use **set port *port-number* loop remote** to run remote loop
- Use **show port *port-number* statistics** to check the port at each end of the trunk
- Use **show chassis congestion** to check for network congestion

Protocol Problems

- common problems in an IPX network typically come from mis-configured client or server, insufficient user licenses, and mismatched network numbers. Keep in mind that for IPX, all servers on the same LAN must have the same external network number. In addition, you must make sure that their frame type are properly configured.
- You may use **show ipx interface** to identify mismatched Ethernet encapsulation methods, or use **ipx routing node** to identify duplicate node numbers on routers / use **show ipx servers** and **show ipx route** to identify duplicate network numbers on servers
- You may use **debug apple events** to obtain information about AppleTalk special events or to find out if neighbors are becoming unreachable. Through this command you may also find out the status of the corresponding interfaces.
- You may use **debug spanning-tree** to find out whether spanning-tree hello frames are being exchanged properly

Additional Troubleshooting

- To troubleshoot TCP/IP, visit http://www.cisco.com/univercd/cc/td/doc/cisintwk/itg_v1/tr1907.htm
- To troubleshoot IPX, visit http://www.cisco.com/univercd/cc/td/doc/cisintwk/itg_v1/tr1908.htm
- To troubleshoot Appletalk, visit http://www.cisco.com/univercd/cc/td/doc/cisintwk/itg_v1/tr1909.htm
- To troubleshoot basic problems with the Catalyst 6000 family switch, Catalyst 5000 family switch, Catalyst 4000 family switch, Catalyst 2926G series switch, Catalyst 2926 series switch, Catalyst 2948G switch, or Catalyst 2980G switch, visit http://www.cisco.com/univercd/cc/td/doc/product/lan/cat5000/trbl_ja.htm
- To troubleshoot MLS, please visit <http://www.cisco.com/warp/public/473/13.html> for more information.
- To troubleshoot STP, please visit <http://www.cisco.com/warp/public/473/16.html>

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