

# CCNP4

## Documenting Baselining & Troubleshooting

Halmstad University

Olga Torstensson

035-167575 [olga.torstensson@ide.hh.se](mailto:olga.torstensson@ide.hh.se)

## CCNP4 Internetwork Troubleshooting

- **Focus of CCNP4 Internetwork troubleshooting is troubleshooting issues relating to technologies previously studied in CCNP 1-3.**
- **Typically theory review of the technology area followed by specific troubleshooting labs**

# Documenting and Baselining the Network

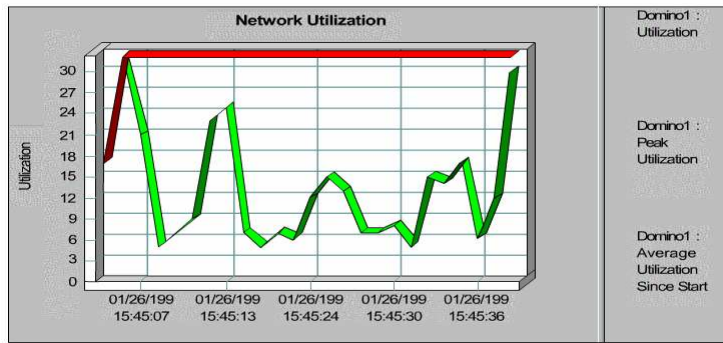
## Baseline

**To effectively troubleshoot a network, a baseline must first be established. The baseline information will be included in the network documentation**

- **network monitoring**
- **data collection**

# Network Utilisation

Cisco.com



© 2003, Cisco Systems, Inc. All rights reserved.

5

# Station Statistics

Cisco.com

Station Statistics - LAN:D1					
Nodename/ Address	Total # Bytes	Total # Frames	Avg Size	Min Frame	Max Frame
0000AAA.0000C0931C95	4085530	9043	451	64	1092
0000AAA.00AA003EF4A0	3903568	40581	96	66	498
198.85.45.254	999236	2889	345	64	550
0000AAA.02000000BADC	833189	10309	80	64	1082
0000AAA.0080E5700FB3	381322	2067	184	66	498
0000AAA.0000C0736CB8	268409	1290	208	66	544
0000AAA.00AA005942F5	271338	1506	180	66	498
0000AAA.02000000BADC	266826	1481	180	66	498
0000AAA.00AA005944E0	258637	1447	178	66	498
0000AAA.02000000BADE	257485	1447	177	66	498
0000DDD1.02000000BADE	203744	2042	99	64	570
00022AAA.0080E5700FB3	197853	937	211	98	501
00032AAA.00AA003EF4A0	179533	790	225	98	501

© 2003, Cisco Systems, Inc. All rights reserved.

6

## Devices of Interest

Cisco.com

The screenshot shows the Fluke Network Inspector Console interface. On the left is a tree view of the network topology. The main pane displays a table of devices with the following columns: Name, IPV Name, NetBIOS Name, IP Address, and MAC Address. Below the table, there are sections for 'Traffic Analysis' (showing 0 errors and 618 warnings) and 'Most Recent Warning' (Interface utilization exceeded warning threshold).

Name	IPV Name	NetBIOS Name	IP Address	MAC Address
PC1	PC1	PC1E	129.196.195.124	3Com-D15C72
pc10.torinet.com	PC10	PC10_NT4	129.196.195.080	3Com-C58A71
PC5	PSS	PS_WIN95	129.196.195.107	Kingpin-162C23
pc5.torinet.com	R00	R00	129.196.195.162	3Com-SF1811
pc10.torinet.com	10aj000400c704		129.196.194.182	DEC-00C704
rschaffe.torinet.com	RUSCHAFPE	SCHAFPE D.	129.196.195.07	Dell-1FA28A
RUSSM	RUSISM	RUSISLAPTOP	129.196.195.225	3Com-D3840C
russem2.torinet.com	RUSISM2	RUSISM2	129.196.195.130	Dell-D2EE7a
sdowlin.torinet.com	S00WLIN	S00WLIN	129.196.195.212	3Com-22CF6A
shiva.torinet.com	1066803443710		129.196.195.215	SNet-443710
sstraigh.torinet.com	SSTRAIGH	DLAJ_WINNT	129.196.195.05	3Com-D15BFS
tdohley.torinet.com	TDOHLEY	T. DOHLEY'S D.	129.196.194.222	Dell-8E7605
tbscope.torinet.com	TBSCOPE		129.196.195.186	ALCOTON-52A66D
whiz_wizky.torinet.com			129.196.195.176	EXTREM-4F9000
Fluke Traffic Analysis			129.196.195.245	FLIKE-900000
			129.196.195.246	FLIKE-940001
			129.196.195.247	3Com-40529F
			129.196.195.248	Dell-SE5E51
TRICORD_2	TRICORD_2	TRICORD_2	129.196.195.132	Compaq-E90281
ttschapp1.torinet.com	TSCHAPPL	TSCHAPPLANT	129.196.195.208	Dell-89F2FF
ttschapp2.torinet.com	TSCHAPPL	TSCHAPPL2	129.196.195.206	3Com-1AD566
TWH	TWH	HOCKMAN'S D.	129.196.195.013	Dell-D15B82
twittwer.torinet.com	TWITTWER	TWITTWER_08	129.196.195.094	3Com-45980A
twittwer.torinet.com			129.196.195.00	CISCO-78D324
wilmar-4955			129.196.195.119	FLIKE-495564
yer2.torinet.com	YER	YER'S DELL	129.196.195.001	Dell-814FC9
zappa1.torinet.com			129.196.195.189	FLIKE-400033
zappa10.torinet.c...			129.196.195.241	FLIKE-40000A

© 2003, Cisco Systems, Inc. All rights reserved.

7

## Ports of Interest

Cisco.com

```
cat6k(config)#interface vlan10
cat6k(config-if)#ip address 10.10.10.19 255.255.255.0
cat6k(config-if)#description VLAN for Engineering PC's
and DHCP Server
cat6k(config-if)#interface vlan110
cat6k(config-if)#ip address 11.1.1.19 255.255.255.0
cat6k(config-if)#ip helper-address 10.10.10.2
cat6k(config-if)#description VLAN for Voice Traffic
```

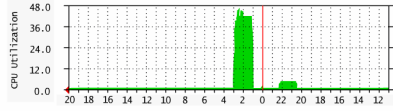
© 2003, Cisco Systems, Inc. All rights reserved.

8

# Duration of Baseline

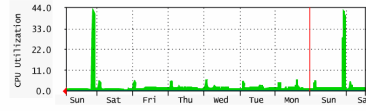
Cisco.com

'Daily' Graph (5 Minute Average)



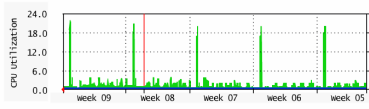
Max Load: 46% Average Load: 3% Current Load: 1%

'Weekly' Graph (30 Minute Average)



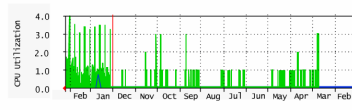
Max Load: 43% Average Load: 2% Current Load: 1%

'Monthly' Graph (2 Hour Average)



Max Load: 43% Average Load: 2% Current Load: 1%

'Yearly' Graph (1 Day Average)



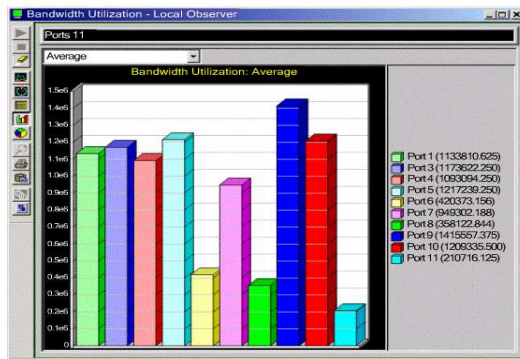
Max Load: 43% Average Load: 0% Current Load: 1%

© 2003, Cisco Systems, Inc. All rights reserved.

9

# Bandwidth Utilisation

Cisco.com



© 2003, Cisco Systems, Inc. All rights reserved.

10

## Using the Baseline Data

Cisco.com

- Identifying undesired network behavior
- Identifying thresholds for fault and performance monitoring
- Predicting long-term performance and capacity trends
- Verifying policies

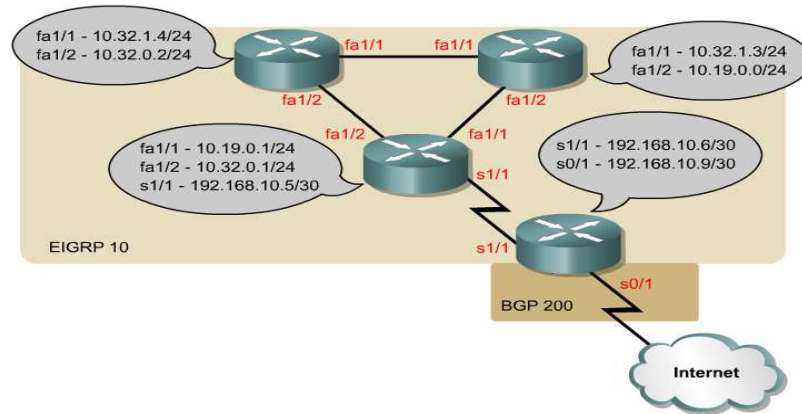
## Topology Diagram Components

Cisco.com

Layer	Commands
Physical Layer	<ul style="list-style-type: none"><li>• Device Name</li><li>• Media Types</li></ul>
Data Link Layer	<ul style="list-style-type: none"><li>• MAC Addresses</li></ul>
Network Layer	<ul style="list-style-type: none"><li>• IP Address</li><li>• Subnet Mask</li><li>• Interface Names</li><li>• Routing Protocols</li><li>• Media Type</li></ul>

## Topology Example

Cisco.com



© 2003, Cisco Systems, Inc. All rights reserved.

13

## Discover Configuration

Cisco.com

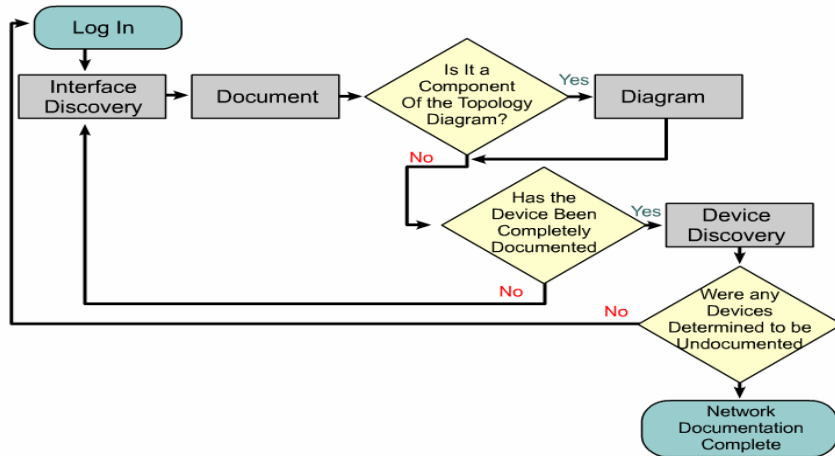
- show version
- show ip interfaces.
- show ip interfaces brief.
- show ip interface *{interface-name}* **for each interface or enter show interfaces to see a list of all interfaces at once.**
- show ip protocols.
- show spanning-tree **or** show spantree.
- show cdp neighbors.
- show cdp entry *{device id}*.

© 2003, Cisco Systems, Inc. All rights reserved.

14

# Creating Network Documentation

Cisco.com

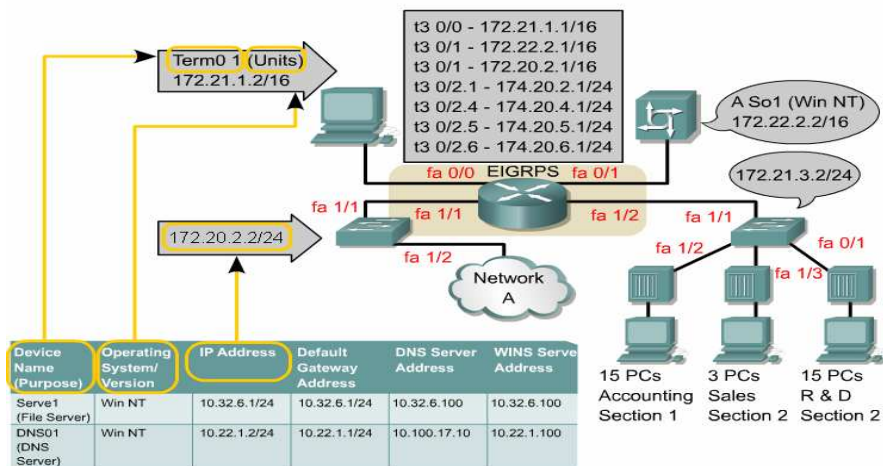


© 2003, Cisco Systems, Inc. All rights reserved.

15

# Components of Topology Diagram

Cisco.com



© 2003, Cisco Systems, Inc. All rights reserved.

16



## Components of Topology Diagram

Cisco.com

Physical Layer	Network Layer	Application Layer
<ul style="list-style-type: none"><li>• Physical Location</li></ul>	<ul style="list-style-type: none"><li>• IP Address</li><li>• Subnet Mask</li><li>• Device Name</li><li>• Device Purpose</li><li>• VLANs</li><li>• Interface Names</li></ul>	<ul style="list-style-type: none"><li>• Operating System/version</li><li>• Operating System/viewer</li></ul>

© 2003, Cisco Systems, Inc. All rights reserved.

17

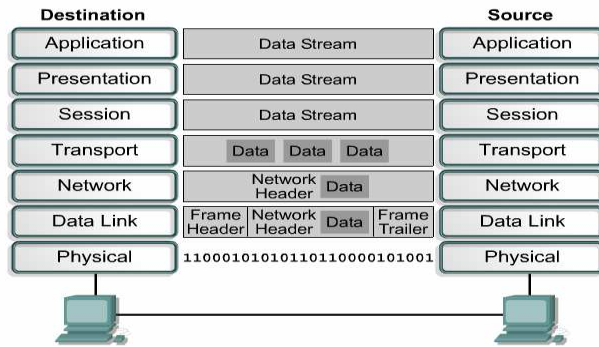
Cisco.com

## Troubleshooting Methodologies & Tools

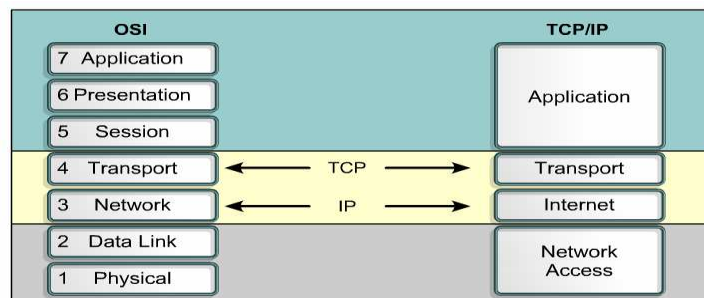
© 2003, Cisco Systems, Inc. All rights reserved.

18

# Data Encapsulation

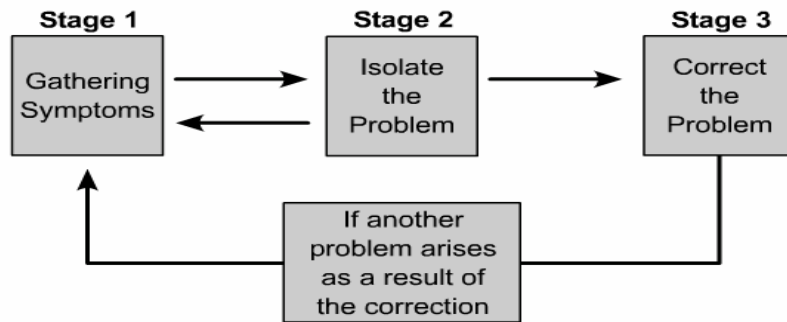


# OSI v TCP/IP



# General Troubleshooting

Cisco.com

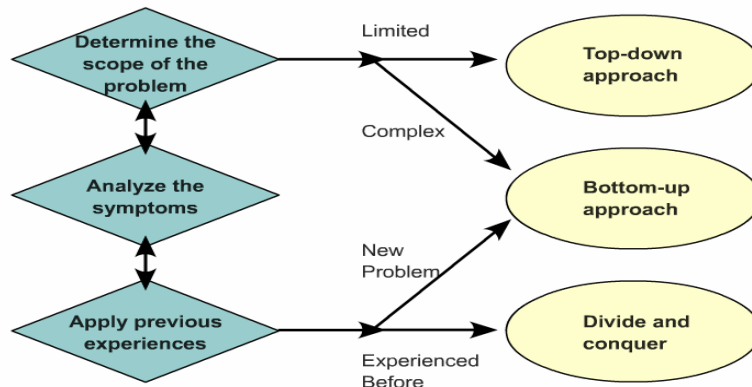


© 2003, Cisco Systems, Inc. All rights reserved.

21

# Selecting a Troubleshooting Approach

Cisco.com



© 2003, Cisco Systems, Inc. All rights reserved.

22

## Questions to Ask

Cisco.com

### Question Criteria

- Ask questions that are pertinent to the problem.
- Use questions to either eliminate or discover possible problems.
- Speak at a technical level the user can understand.
- Match user symptoms with common problem causes.

### Questions to End-User

- When did the user first notice the problem?
- Can the user re-create the problem?
- What sequence of events took place before the problem happened?

© 2003, Cisco Systems, Inc. All rights reserved.

23

## Troubleshooting Commands

Cisco.com

Command	Description
<code>ping {host   ip-address}</code>	Sends an echo request packet to an address, then waits for a reply. The <i>host   ip-address</i> variable is the IP alias or IP address of the target system
<code>tracert {destination}</code>	Identifies the path a packet takes through the networks. The destination variable is the hostname or IP address of the target system.
<code>telnet {host   ip-address}</code>	Connects to an IP address using the Telnet application.
<code>show ip interface brief</code>	Displays a summary of the status of all interfaces on a device.
<code>show ip route</code>	Displays the current state of the IP routing table.
<code>show running-config interface</code>	Displays the contents of the currently running configuration file.
<code>[no] debug ?</code>	Displays a list of options for enabling or disabling debugging events on a device.
<code>show protocols</code>	Displays the configured protocols and shows the global and interface-specific status of any configured Layer 3 protocol.

© 2003, Cisco Systems, Inc. All rights reserved.

24

## Gathering Symptoms from End User Hardware

Cisco.com

Command	Description
<code>ping</code> {host   ip-address}	Sends an echo request packet to an address, then waits for a reply. The <code>host ip-address</code> variable is the IP alias or IP address of the target system.
<code>arp -a</code>	Displays the current mappings of the IP address to the MAC address in the ARP table.
<code>netstat -n</code>	Displays the status of all connected devices and links without querying a DNS server.
<code>netstat -r</code>	Displays the routing table.
<code>ipconfig /all</code>	Displays IP information for hosts running Windows NT/2000/XP.
<code>tracert [destination]</code>	Verifies connectivity to a destination device for Windows hosts. The destination variable is the IP alias or IP address of the target system.
<code>winipcfg</code>	Displays IP information for hosts running Windows 9x and Me.

© 2003, Cisco Systems, Inc. All rights reserved.

25

## Router diagnostics

Cisco.com

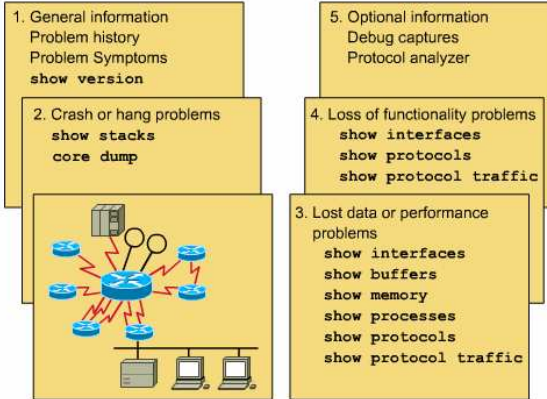
- show
  - show buffers, show interfaces, show controllers
  - show memory, show processes
- debug
  - **Disabled with – ‘no debug all’ ‘undebug all’**
  - **High processor overhead - use sparingly**
  - **Minimise impact –**
    - **CPU awareness**
      - show processes cpu
    - **access lists**
      - access-list 10 permit 10.2.2.2
      - debug ip packet detail 10

© 2003, Cisco Systems, Inc. All rights reserved.

26

## Interacting with technical support

Cisco.com



- `show tech-support`