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CCNP4

Troubleshooting Layer 1

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Upper Layer Components

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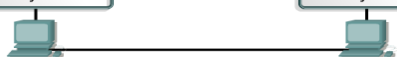
Destination

7 Application
6 Presentation
5 Session
4 Transport
3 Network
2 Data Link
1 Physical

HTTP	TELNET	
TCP	UDP	
IP	ARP	ICMP

Source

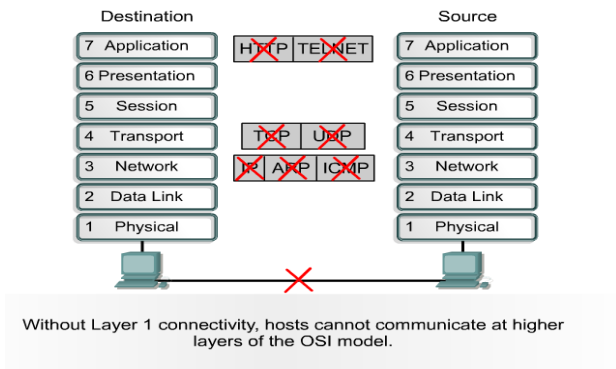
7 Application
6 Presentation
5 Session
4 Transport
3 Network
2 Data Link
1 Physical



Upper layer protocols depend on the physical layer.

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Upper Layer Components



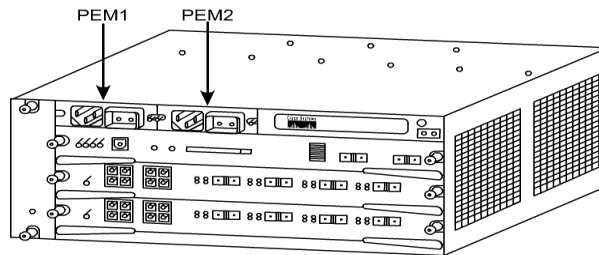
Equipment Indicator



While the LEDs on a device do not necessarily indicate good physical connectivity, they can quickly alert an administrator to a connectivity problem.

Power Failures

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Power Entry Modules (PEMs) locations on a Catalyst 6503 Switch

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Interface Status

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```
RTA#show interface fastethernet 0/0
Interface is down, line protocol is down
Hardware is AmdFE, address is 0003.e38d.db20
(bia 0003.e38d.db20)
Internet address is 10.30.18.41/24
```

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Interface Status

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Interface Type	Interface Status	Line Protocol	Possible Cause
Any	Administratively Down	Down	Interface is shutdown.
Fast Ethernet	Down	Down	Interface has a hardware problem.
Fast Ethernet	Up	Down	Interface does not have Layer 1 connectivity to hub, switch, or other device.
Serial	Down	Down	Interface does not have Layer 1 connectivity to Telco.
Serial	Up	Down	Encapsulations are mismatched.
Serial (HDLC)	Up	Down	Interface has Layer 1 connectivity to Telco, but does not have Layer 2 connectivity to remote router.
Serial (PPP)	Up	Down	PPP authentication is unsuccessful.
Serial (Frame)	Up	Down	Interface has Layer 1 connectivity to Telco, but does not have Layer 2 connectivity to frame switch.

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Poor Network Performance

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- Exceeding the design limits of the media
- Large collision domains in shared media networks such as CSMA/CD Ethernet
- Electromagnetic Interference (EMI) effects
- Faulty media or hardware

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Noise

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There are four types of noise that are most significant to data networks:

- Impulse noise
- Random (white) noise
- Alien crosstalk
- Near End Cross Talk (NEXT)

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Ethernet Errors – Half Duplex

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Causes	Error Type				
	Late Collision	Short Frame	Jabber	FCS	Ghost
Bad SW Drivers	•	•	•	•	
Faulty/Marginal NIC	•	•	•	•	•
Transceiver Fault	•		•	•	•
Repeater Fault	•		•	•	•
Too Many Repeaters	•			•	
Coax Taps Too Close	•			•	•
Illegal HW Configuration	•		•	•	•
Cable Too Long	•			•	
Cable Fault	•		•	•	•
Termination	•		•	•	•
Bad Grounding	•		•	•	•
Induced Noise	•		•	•	•
Duplex Mismatch	•			•	

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Ethernet Errors – Full Duplex

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Causes	Error Type					
	Collision Fragment	Short Frame	Jabber	FCS*	Dropped Link	Alignment
Bad SW Drivers		•	•	•		
Faulty/Marginal NIC	•	•	•	•	•	•
Duplex Mismatch	•			•		•
Cable Too Long				•	•	
Cable Fault			•	•	•	•
Induced Noise			•	•	•	•

* FCS errors are likely to include late collision.

Full-duplex Ethernet errors chart

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Slow or Poor Performance

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Reasons for slow or poor performance

- Network resources operating at maximum capacity
- Recent changes on problem server or station
- Network resources operating at maximum capacity
- Viruses on user station

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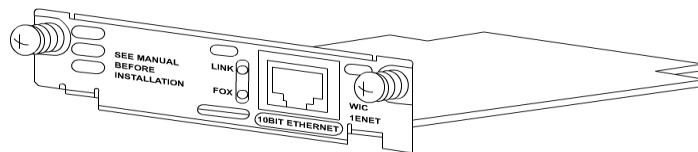
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Congestion

Symptoms of network bottlenecks

- Highly variable response times
- Network time-outs or server disconnects
- Inability to establish network connections
- Slower application loading or running

Faulty NIC



Faulty Network Interface Cards can be a cause of late collisions, short frames, and jabber.

Collisions

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Things to watch for in relation to collisions:

- Does the detected collision level track approximately with the utilization level?
- Are there spikes of detected collisions that do not follow the utilization level?
- Are there collisions when there is no apparent utilization to cause them?
- Are there approximately 33% or 100% collisions?

Configuration Errors

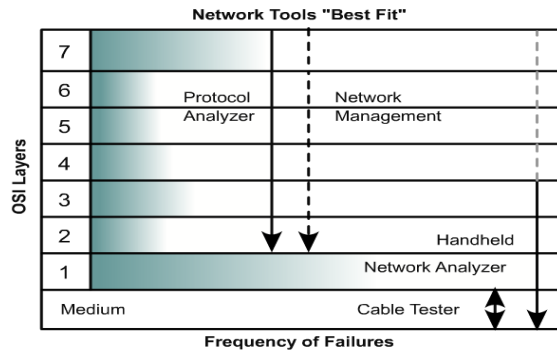
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Misconfigurations which are directly related to the physical layer are:

- Serial links re-configured as asynchronous instead of synchronous
- Incorrect clock rate
- Incorrect clock source
- Interface shutdown

Network Testing Tools

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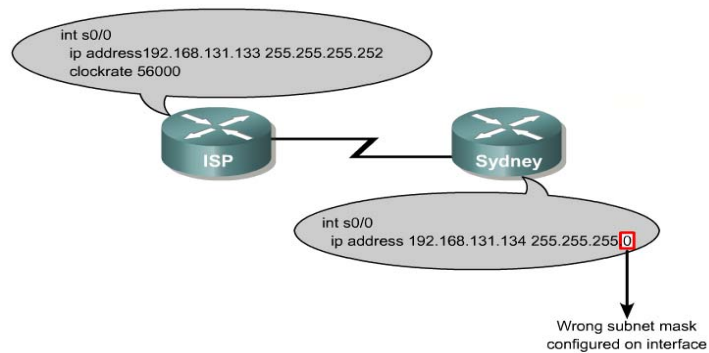


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Interface Configuration Error

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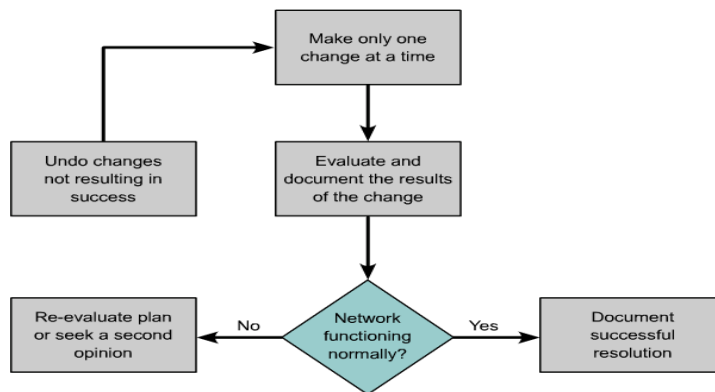


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Physical Layer Methodology

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IOS Commands

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- interface is down, line protocol is down
- interface is up, line protocol is down

Command	Description
<code>clock rate {value}</code>	Supply clocking on DCE interfaces.
<code>configure terminal</code>	Enter global configuration mode.
<code>copy running-config starting-config</code>	Copy the current configuration into NVRAM as the newest startup configuration file.
<code>disable</code>	Exit privileged mode.
<code>enable</code>	Enter privileged mode.
<code>encapsulation {options}</code>	Specify an encapsulation type on serial WAN interfaces.
<code>exit</code>	Move up to the next level in the configuration mode.
<code>interface {type} {slot/number}</code>	Access a particular interface while in global configuration mode.
<code>no shutdown</code>	Administratively activate an interface.
<code>shutdown</code>	Administratively deactivate an interface.

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