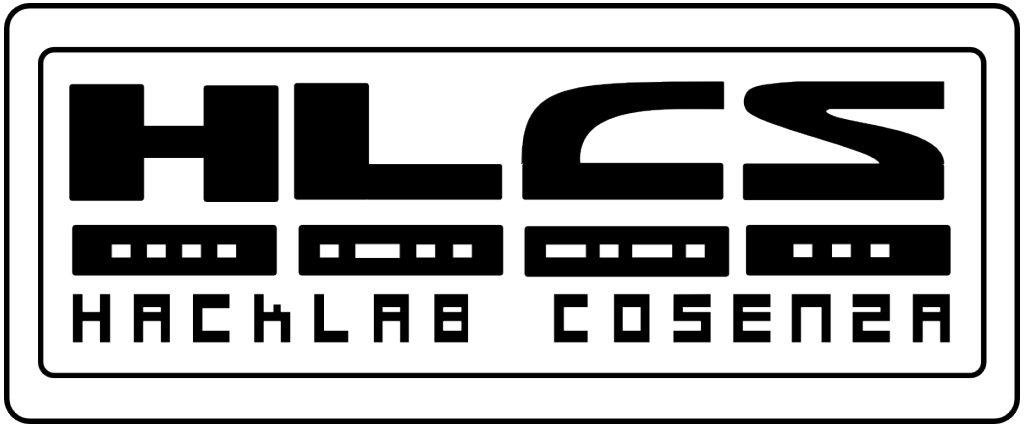
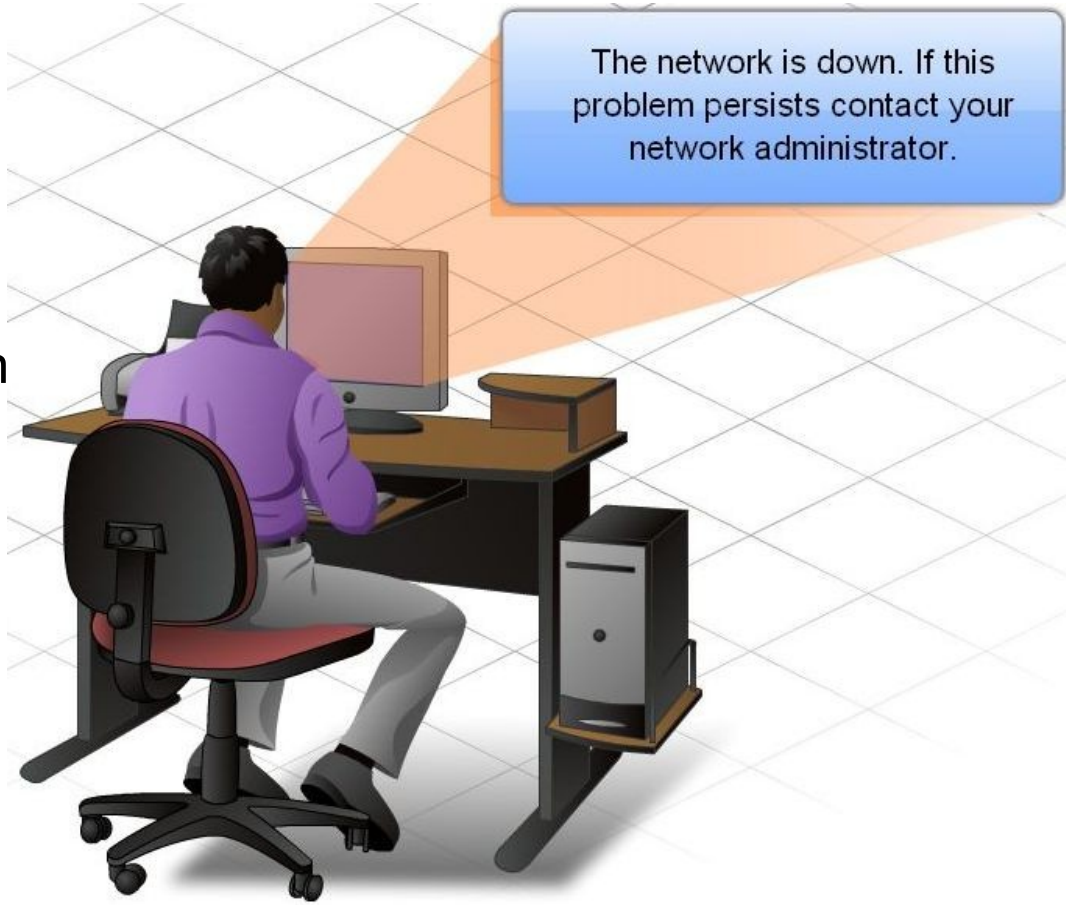


Troubleshooting Your Network

Networking for Home and Small Businesses – Chapter 9

The Troubleshooting Process

- Most people rely on **instinct** to help troubleshoot
- Important to maintain **documentation** to help in the process
  - **record problems** encountered
  - what **steps** were taken to determine the cause
  - what steps have been taken to make sure it doesn't occur again.

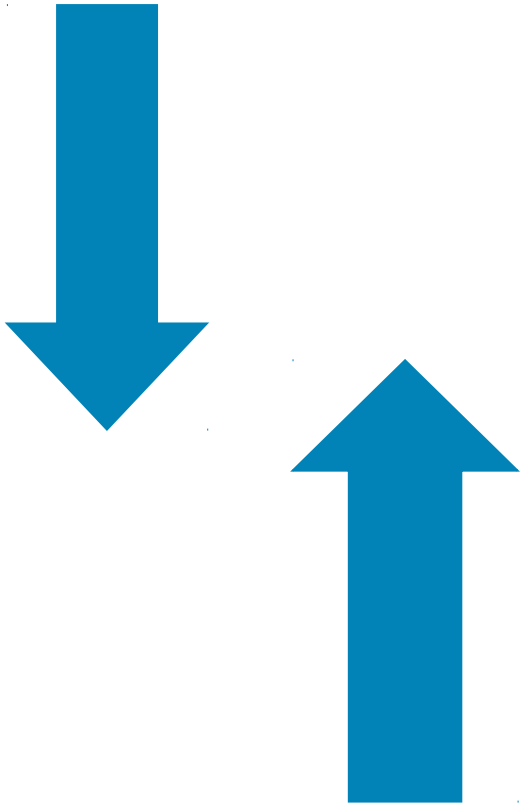


The Troubleshooting Process

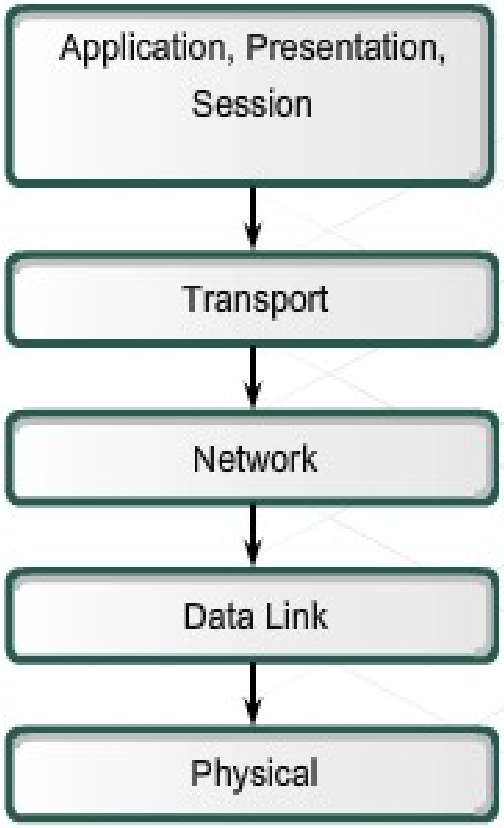
- **Step 1** – Gather information
  - Question the individual who has the problem
    - end user experiences
    - observation by the user
    - error messages
- **Step 2** – Collect information about affected equipment
  - look at log files
  - changes
  - warranty information
  - network monitoring tools
    - used for larger networks

Troubleshooting Techniques

- Use OSI layered approach
- **Top-down**
  - start at application layer
  - work down until faulty error occurs
- **Bottom-up**
  - start at physical layer and work up
  - hardware, cabling, etc problems
  - more complex
- **Divide and Conquer**
  - begins in the middle layers
  - based on experience

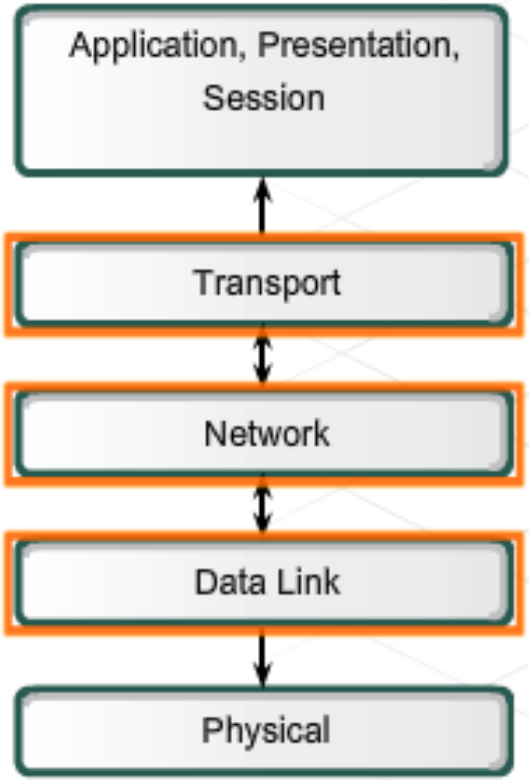


Top Down



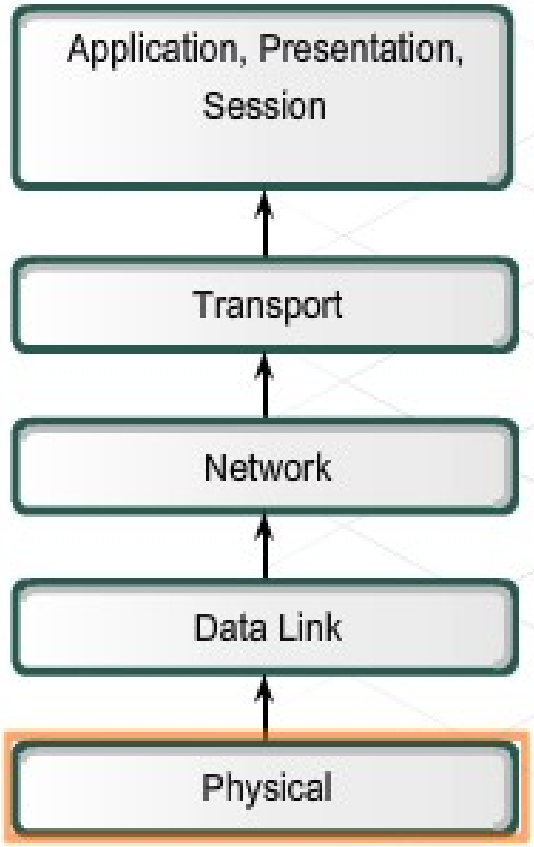
Troubleshooting Approach	How it operates	Cases for which it is suitable	Advantages/ Disadvantages
Top-down	Always starts at the application layer and works its way down until it finds a faulty layer.	More suitable for simpler problems or those that are suspected to be application/user or upper-layer related.	If the problem turns out to be related to lower layers, you have wasted a lot of time and effort at the upper or application layers.

Divide and conquer



Troubleshooting Approach	How it operates	Cases for which it is suitable	Advantages/ Disadvantages
Divide-and-conquer	Based on the circumstances (reported issues) and your experience, you might decide to start at any layer and work up or down the OSI stack.	Most suitable when you are experienced and the problem has precise symptoms.	It approaches the layer of the culprit faster than the other approaches. You need experience to use this approach effectively.

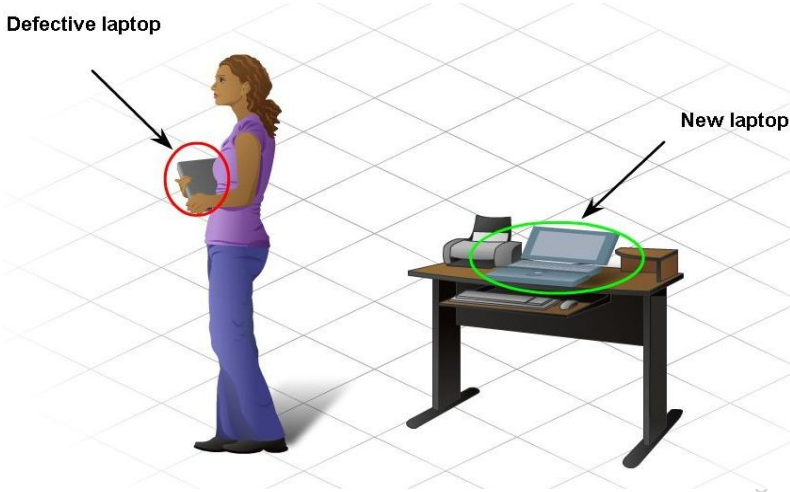
Bottom UP



Troubleshooting Approach	How it operates	Cases for which it is suitable	Advantages/ Disadvantages
Bottom-up	Always starts at the physical layer and works its way up until it finds a faulty layer.	More Suited for complex cases.	It is a slow, but solid approach. When the problem is application (or upper layer) related, this approach can take a long time.

Approaches to Troubleshooting

- **Trial and Error**
  - relies on an individual's knowledge
  - educated guess based on past experiences
  - if it doesn't work, try, try again
- **Substitution**
  - problem assumed to be caused by a specific part
  - the solution – replace the part
  - used for inexpensive items
    - cables, etc

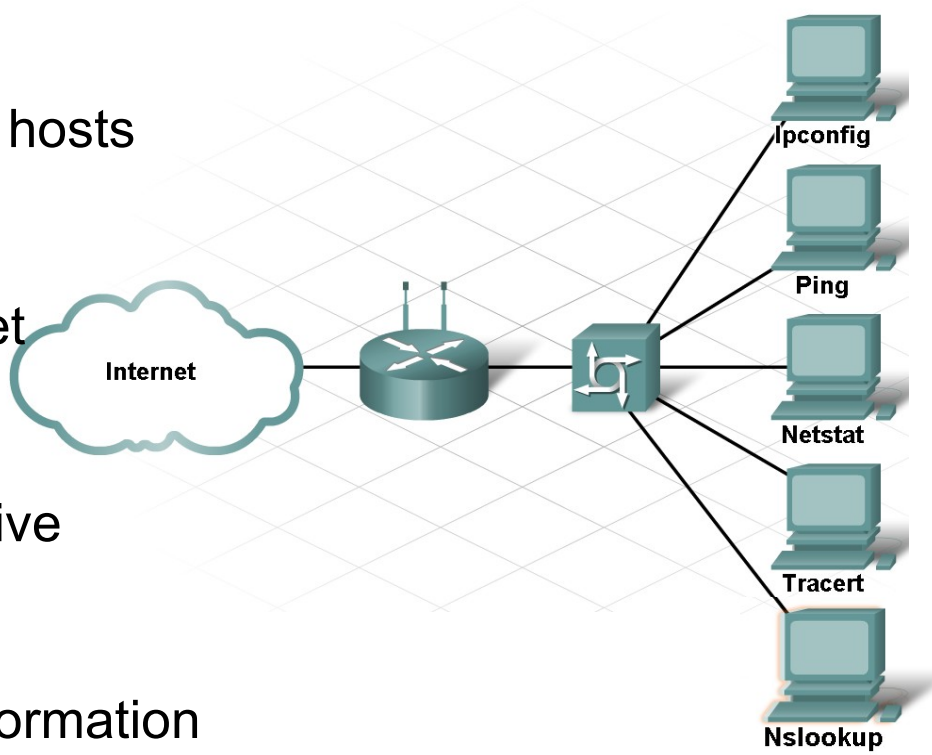


Utilities Used to Detect Physical Problems

- **Use your senses**
- Sight
- Smell
- Touch
- Hearing

Utilities Used to Verify TCP/IP Connectivity

- Use CLI
- **IP Config / ifconfig**
  - checks to make sure correct IP and subnet mask
- **Ping**
  - verifies connectivity to other hosts
- **Tracert / traceroute**
  - traces the route of the packet
- **Netstat**
  - show what networks are active
- **Nslookup or dig**
  - asks the name server for information



IP CONFIG / ifconfig commands

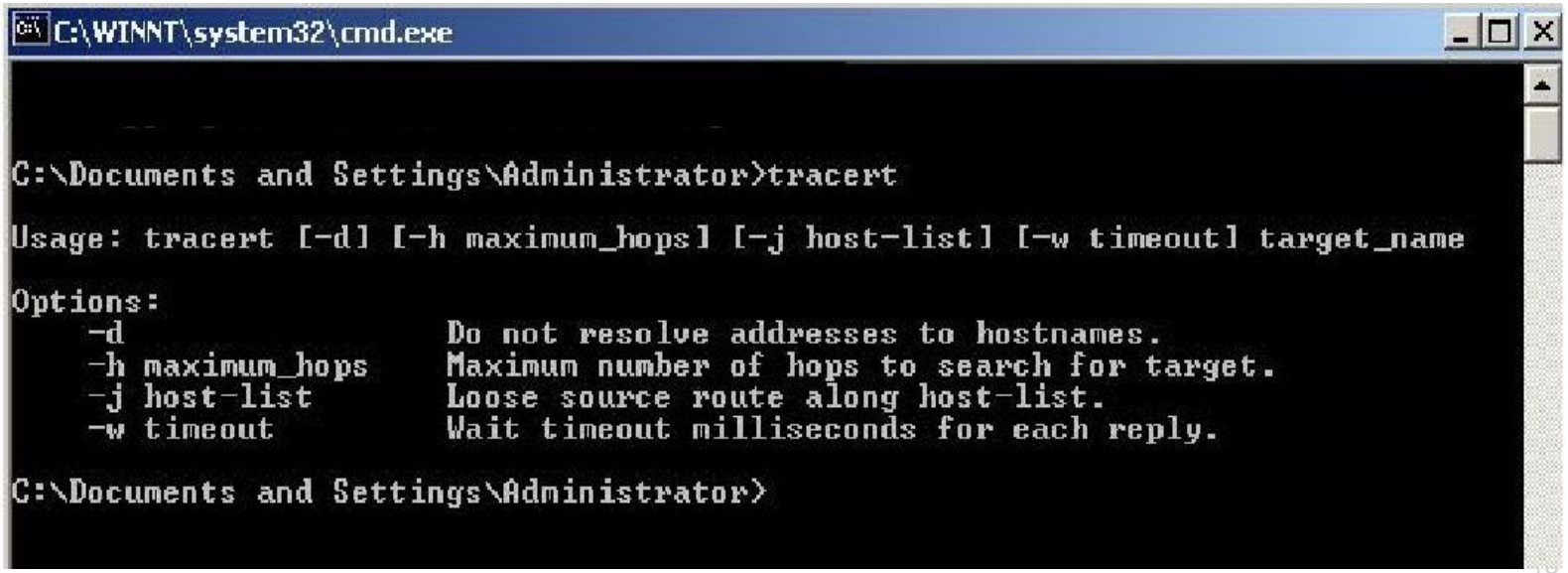
- **Ipconfig** - displays current IP configuration
  - IP address
  - Subnet Mask
  - Default Gateway
- **Ipconfig /all** – displays additional information
  - DHCP (/etc/resolv.conf on Linux)
  - DNS information
- **Ipconfig /release** – used with DHCP
  - release IP address
- **Ipconfig /renew** – used with DHCP
  - refreshes IP (dhclient on Linux)

The Ping Command

- Used to determine whether or not the host is reachable
- Can be used with either an IP address of name of destination
- **Echo request** – ping sent
- **Echo reply** – destination host responds
- **Ping issues**
  - able to ping both IP and name, but unable to access application
    - problem likely at destination host
  - Unable to ping both IP and name
    - network connectivity problem
    - if able to ping default gateway, problem not at local level

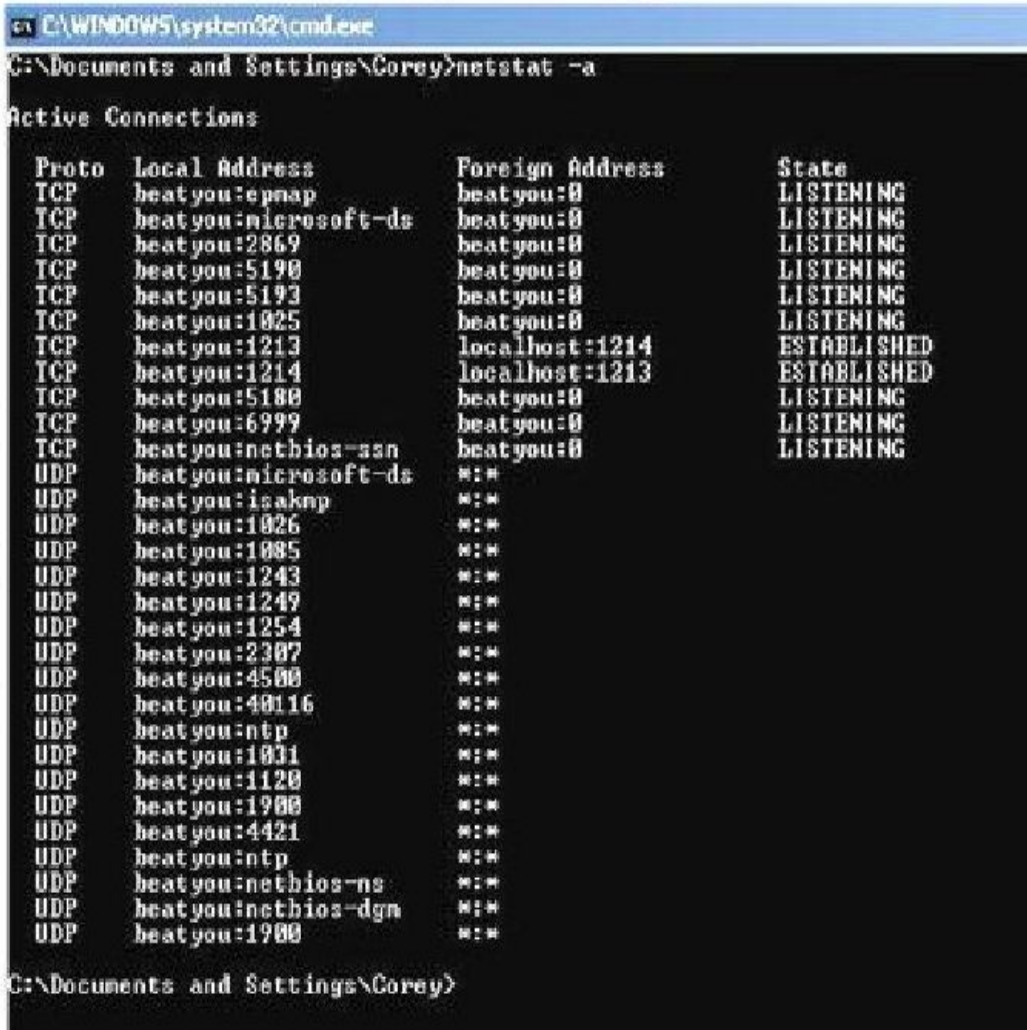
The Tracert / traceroute Command

- Shows each **hop** along the way
- Tells how long it takes for the packet to be sent and get a response (round trip time)
- 30 hops – network/user deemed unreachable
  - default settings
  - can be changed



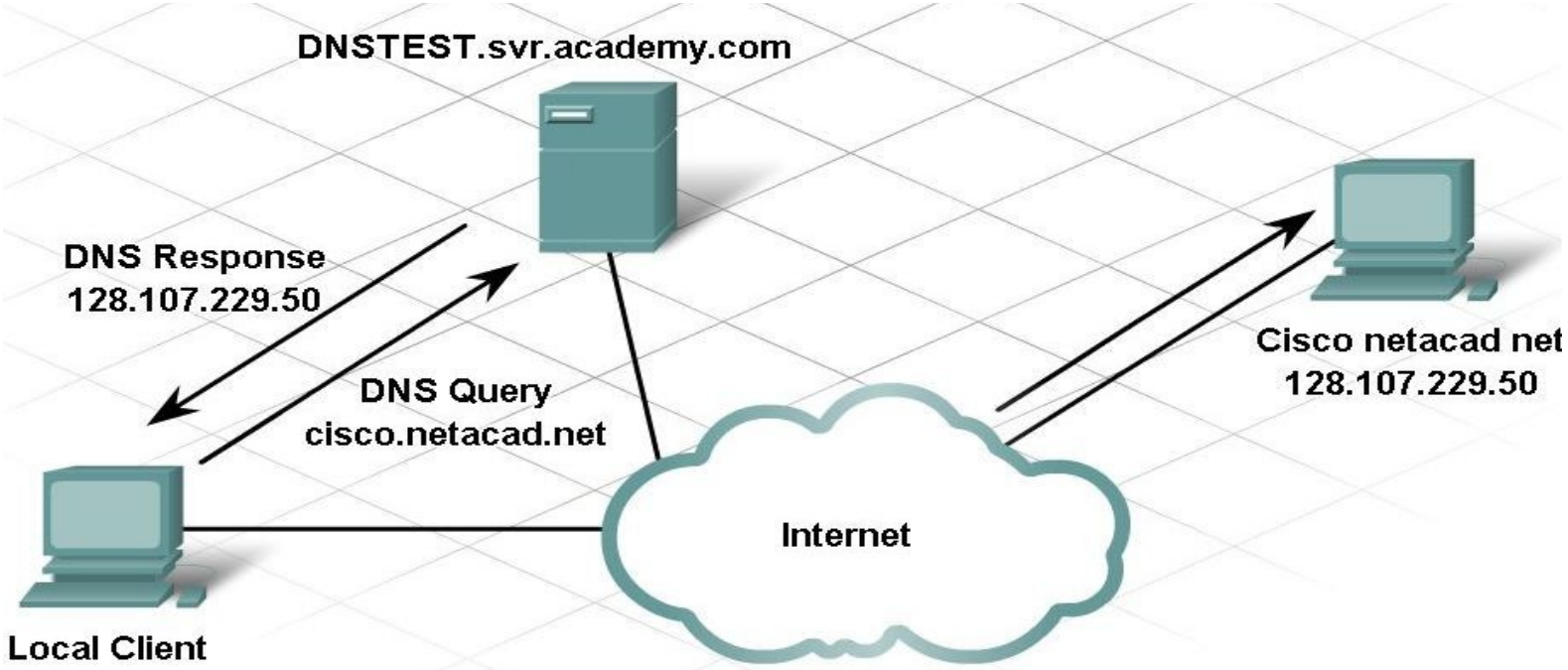
The Netstat Command

- Views **open connections** on a host
- Informs user about:
  - protocols
  - local address
  - port numbers
  - connection state



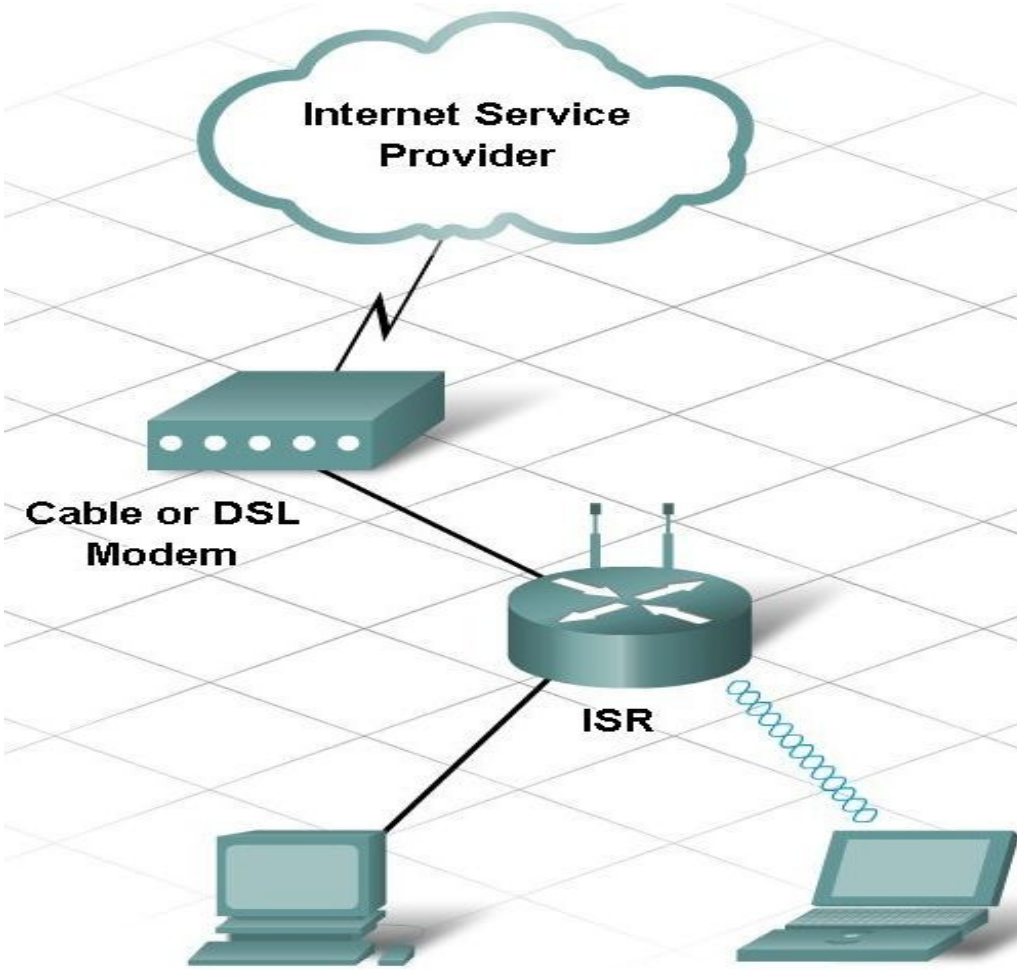
The Nslookup / dig Command

- Allows end user to **look up** information about DNS name and DNS server
- Used as a troubleshooting tool to see if DNS server has the correct IP with the correct name



Hardware and Connection Issues in Wired & Wireless Networks

- Use **divide-and-conquer** technique
- To determine where the problem exists:
  - **ping from wireless** client to default gateway
  - **ping from wired** client to default gateway
  - **ping** wireless client to wired client

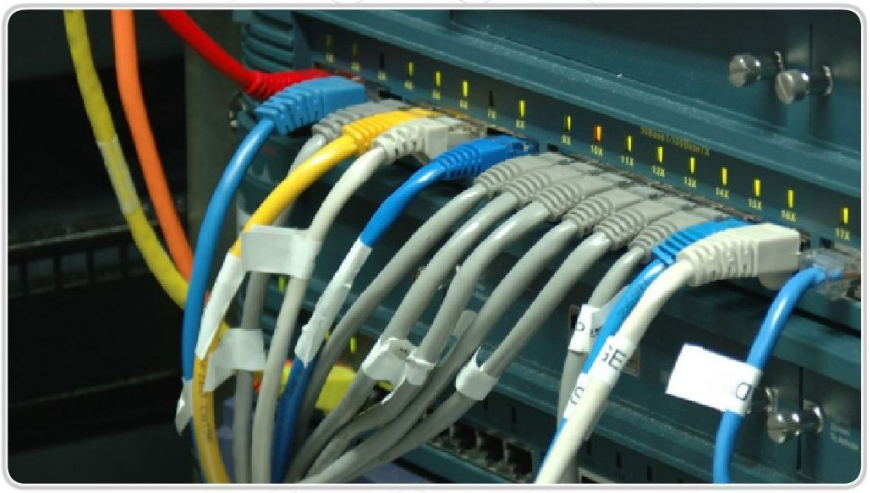


LED Indicators

- Used to show activity
- **Security LED**
  - solid green = security enabled
- **Link Lights**
  - solid green = plugged in with no traffic
  - flashing green = plugged in with traffic
  - amber = making adjustments
- **Power LED**
  - solid green = operational

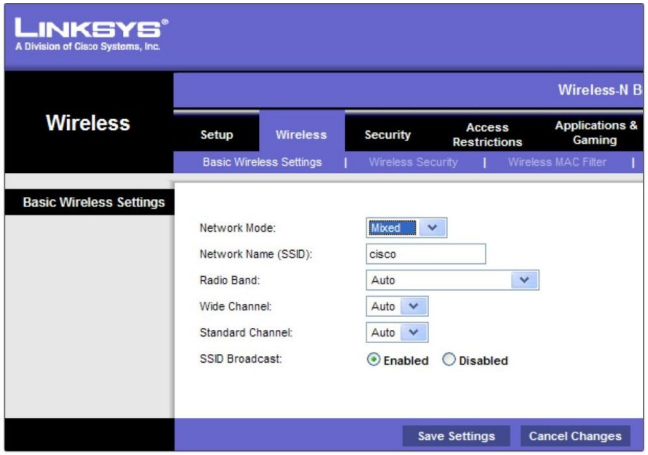
Cable Issues

- One of the most common problems
- Check for:
  - correct cable type
  - improper cable termination
  - too long of cable runs
  - verify correct ports
  - protect cables from damage



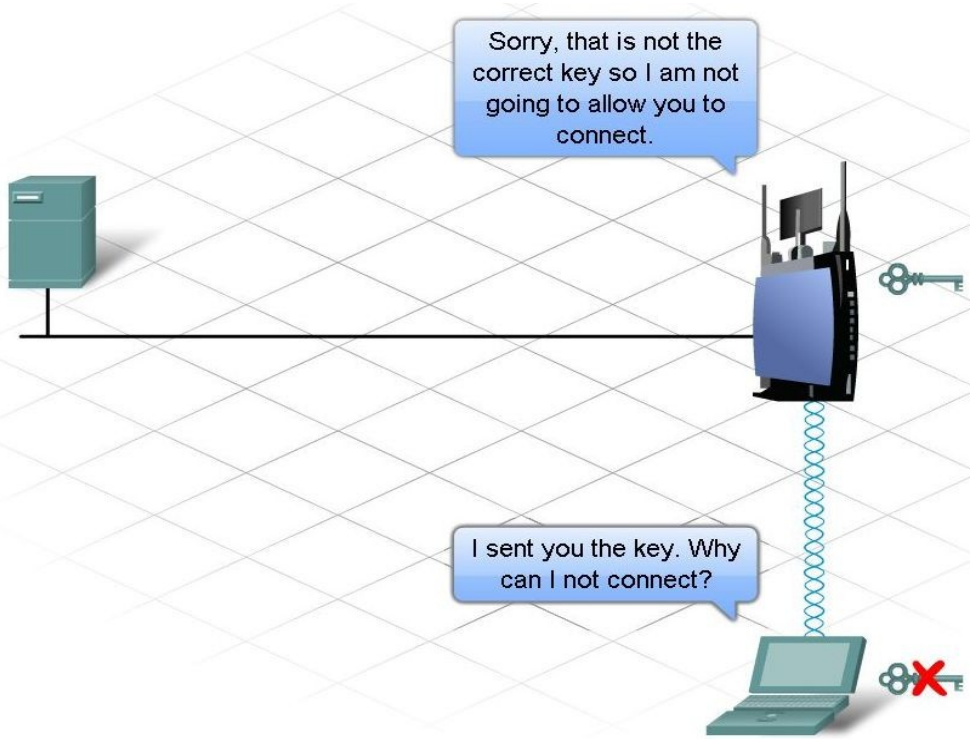
Radio Problems with a Wireless Network

- **What if . . .**
  - the wireless client is unable to connect to the access point
- **Possible fixes:**
  - check wireless standards being used
  - check channels
  - check signal strength
    - may be too far away from AP
  - check for outside interference
  - check available bandwidth
    - too many clients on one channel



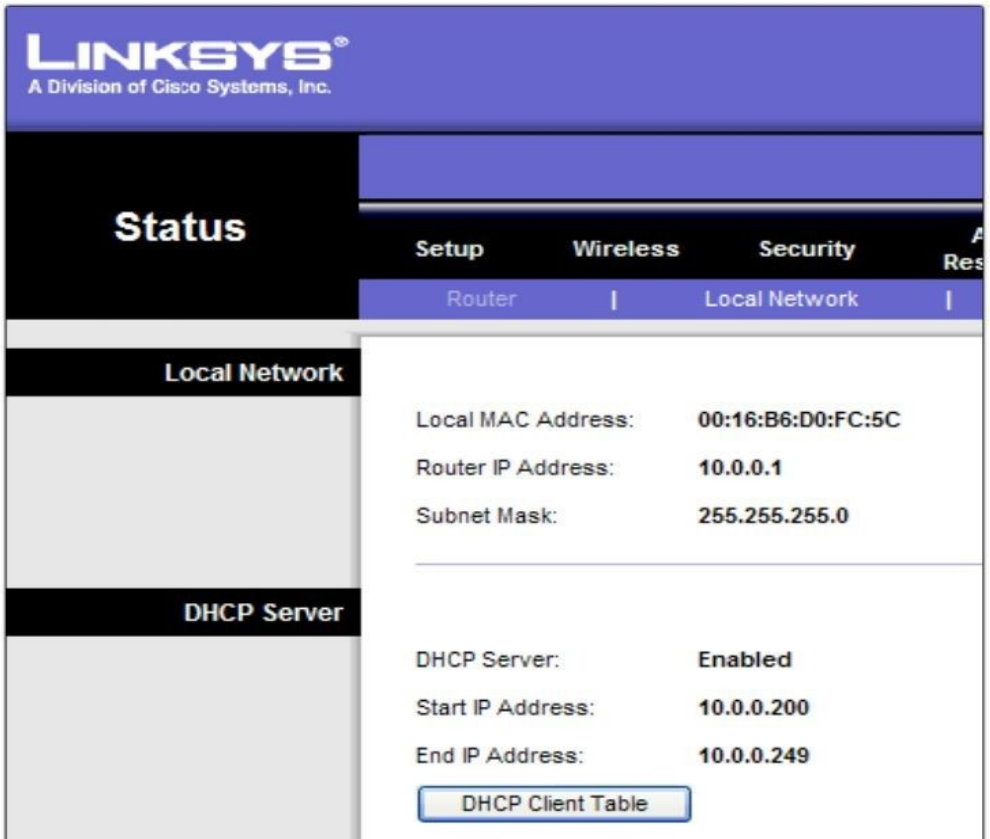
Association and Authentication Issues

- **SSID**
  - make sure client is configured with the correct SSID
- **Check Authentication**
  - open (by default)
  - might have be changed
    - check to make sure the correct key is being used
- **Encryption**
  - key needed by the client



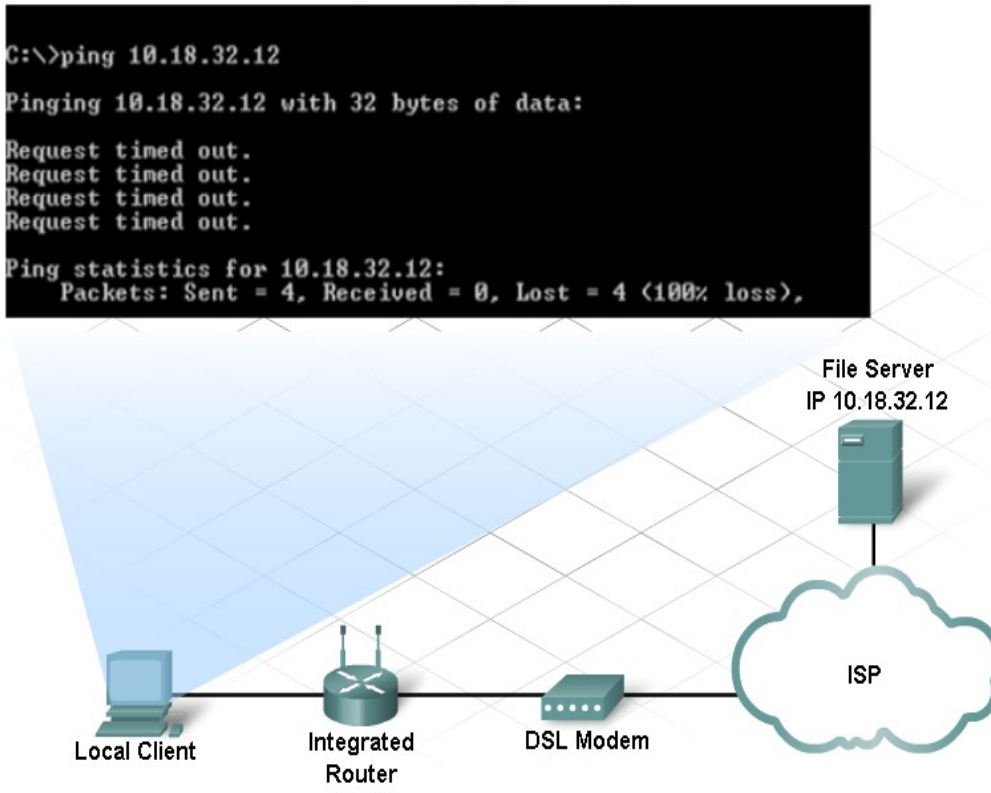
DHCP Problems

- Make sure the IP address of the client is on the same network as the ISR
- If both client and access point are not on the same network, use release and renew



ISR Router to the ISP Problems

- Wired and Wireless devices can **connect to each other,** but not the Internet . . . Why??
- May be a connection between the access point and the ISP
  - check out the router status page
  - check physical connections (including indicator lights)
  - verify passwords
  - may be that the Internet site is just down



Documentation

- **Set a performance baseline**
  - do this just after the network is installed and running efficiently
- **When documenting a problem, include the following**
  - initial problem
  - steps taken
  - result of the steps
  - determined cause of problem
  - how the problem was resolved
  - preventive measures taken

Using the Helpdesk

- Provides assistance for the end user to help fix a problem
  - via email
  - via live chat
  - via phone
- Use of remote access
  - help desk takes control of your machine
- Inform the help desk of the following:
  - symptoms
  - who had the problem
  - when it happened
  - steps taken
  - results of steps taken

Helpdesk: Good Afternoon Ms. Smith, Thank you for calling the help desk. My name is Pat. How may I be of assistance?
Customer: I cannot connect to the Cisco web site.
Helpdesk: In order to help you I will have to gather some additional information.

Summary

- Effective troubleshooting **combines instinct, experience, and structured techniques** to identify, locate, and correct network or computer problems.
- **Documentation is essential** in effective troubleshooting, and should contain baseline information about the network.
- A large proportion of networking problems relate to **physical** components.
- Many networking problems can be identified with software utilities such as **ping, tracert, and netstat**.
- In a network containing both wired and wireless connections, it is important to **isolate the problem** to either the wired or wireless network.