ALGONQUIN COLLEGE

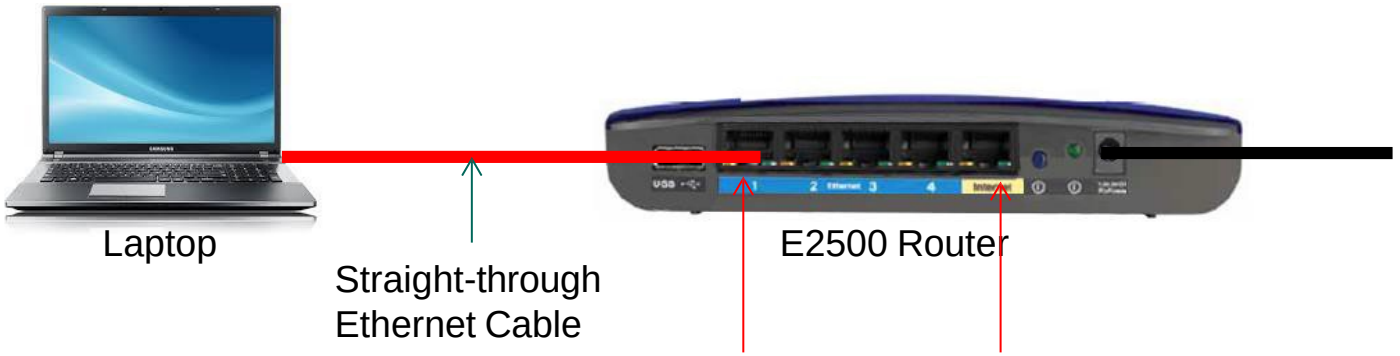
CST8108:
LAB 2: PREVIEW

Build and Test an Ethernet Network

- Get to know the Linksys E2500 router
- Build and test a Wired (Ethernet) network consisting of two nodes
- Connect your laptop to the Linksys E2500 router via the devices respective Ethernet ports using a UTP cable
- Configure static and dynamic IPv4 addresses
- Learn to use ipconfig to determine your IPv4 address
- Learn to use ping to test basic network connectivity (Layer 3)
- Learn to use Wireshark to capture network traffic

Physical Topology

Actual Components



Schematic View

E2500 Router Information

http://www.linksys.com/ca/support-article?articleNum=142360

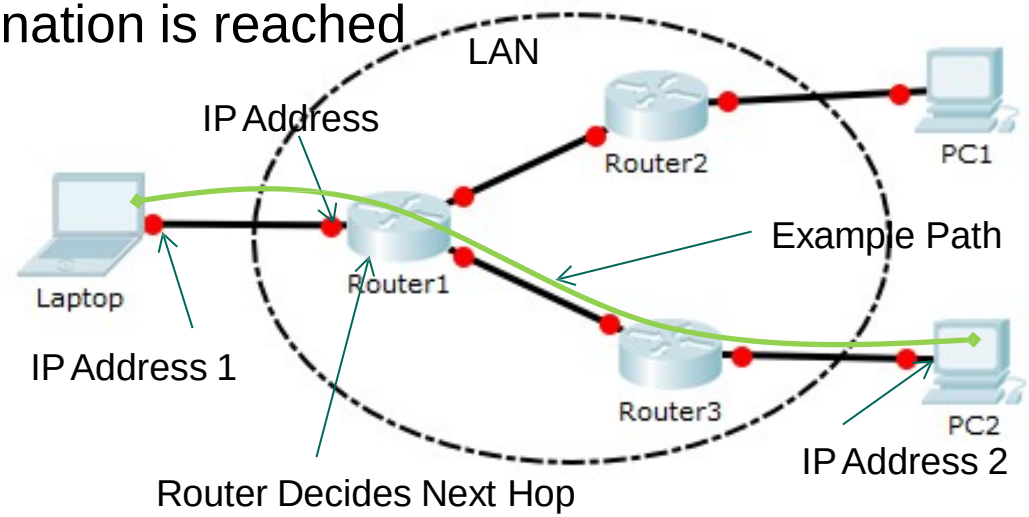
Internet Protocol

IP = Internet Protocol:

This is a protocol which has rules to forward packets from a source node to a destination node on the Internet.

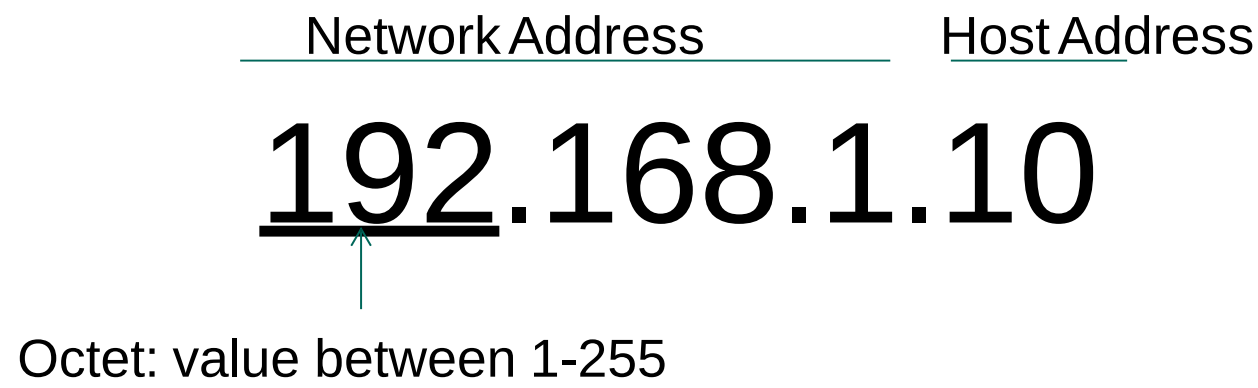
IP Address:

This is an address assigned to a device interface.
It is used by IP to determine the path to reach the destination.
Each router makes a next-hop decision and forwards the packet until the destination is reached



IP Address

IP Address Length: 32 Binary Digits (bits)
Dotted Decimal Notation



This is also called an IPv4 Address.
This is based on version 4 of the IP protocol.

IP Subnet Mask

The network address portion is variable.
The Subnet Mask is used to identify which portion of the IP Address forms the Network Address

Subnet Mask 255.255.255.0

Identifies Network Address

IP Address 192.168.1.10

Special IP Address

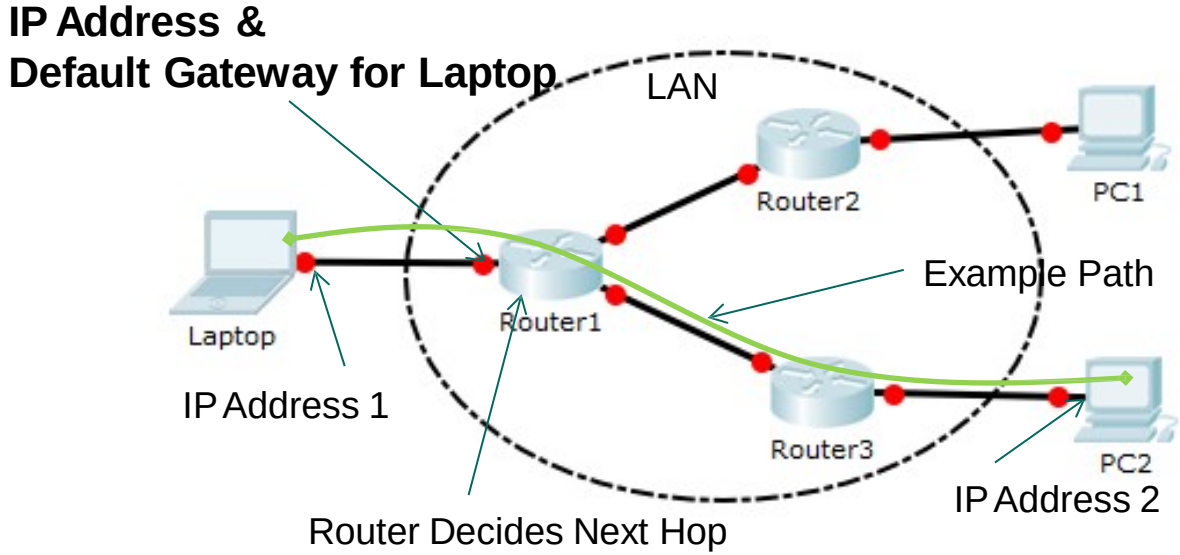
This is a special IP address which the interface assigns to it self if:

- a static address was not assigned or
- an address could not be obtained from a DHCP server

169.254.x.x

This is called a link-local address.

Default Gateway



The default gateway is the IP address of a device's connected router.

It is the next hop IP Address for the device.

The device sends packets to the Default Gateway and the router forwards the packet to the destination.

Task 1.4: Reset the Router

Product overview

E900/E1200/E1500/E2500/E3200

Back view

Your router's appearance may vary

- **USB port (E2500V3 and E3200 only)**—To easily share disk storage with other users on your network or on the Internet, connect a USB drive to this port.
- **Ethernet ports**—Connect Ethernet cables (also called network cables) to these Fast Ethernet (10/100, for E900, E1200, E1500 and E2500) or Gigabit (10/100/1000, for E3200) ports, color coded blue, and to other wired Ethernet network devices on your network.
- **Internet port**—Connect an Ethernet cable (also called a network or Internet cable) to this port, color coded yellow, and to your modem.

  Wi-Fi Protected Setup™ button—Press this button to easily configure wireless security on Wi-Fi Protected Setup-enabled network devices. For more information, see "Wireless Security" on page 8.

- **Power indicator**—Stays on steadily while power is connected and following a successful Wi-Fi Protected Setup connection. Flashes slowly during bootup, during firmware upgrades, and during a Wi-Fi Protected Setup connection. Flashes quickly when there is a Wi-Fi Protected Setup error.
- **Power**—Connect the included AC power adapter to this port.

  CAUTION
  Use only the adapter that came with your router.

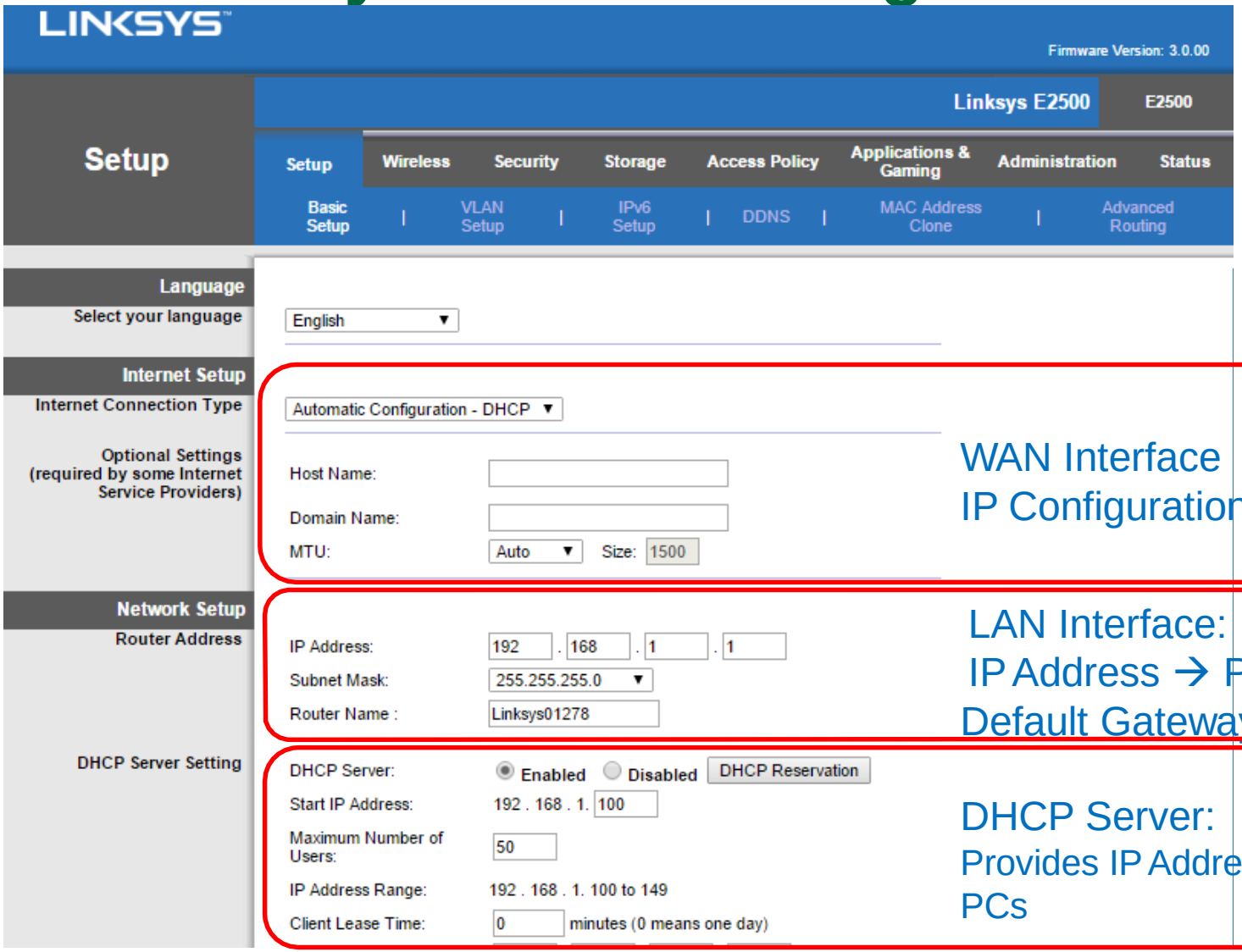
- **Power button**—Press | (on) to turn on the router.

Bottom view

Your router's appearance may vary

- **Reset button**—Press and hold this button for 5-10 seconds (until the port lights flash at the same time) to reset the router to its factory defaults. You can also restore the defaults using the browser-based utility.

Default Linksys Router Configuration



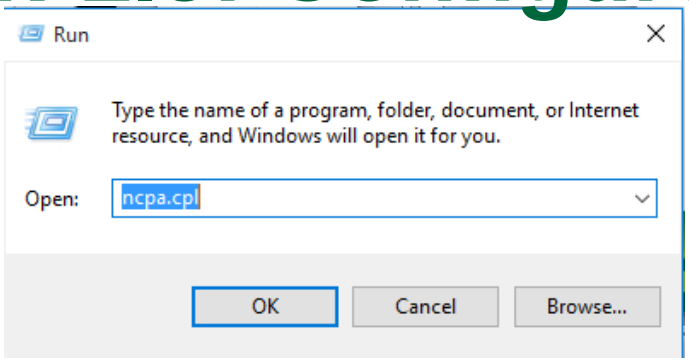
WAN Interface
IP Configuration

LAN Interface:
IP Address → PCs
Default Gateway

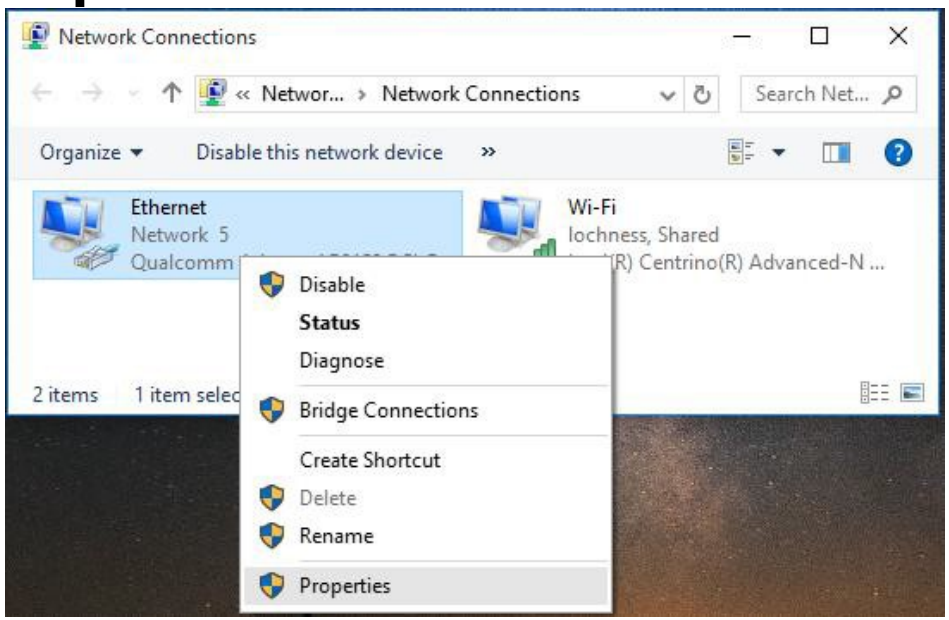
DHCP Server:
Provides IP Addresses to PCs

Task 1.5: Configure DHCP

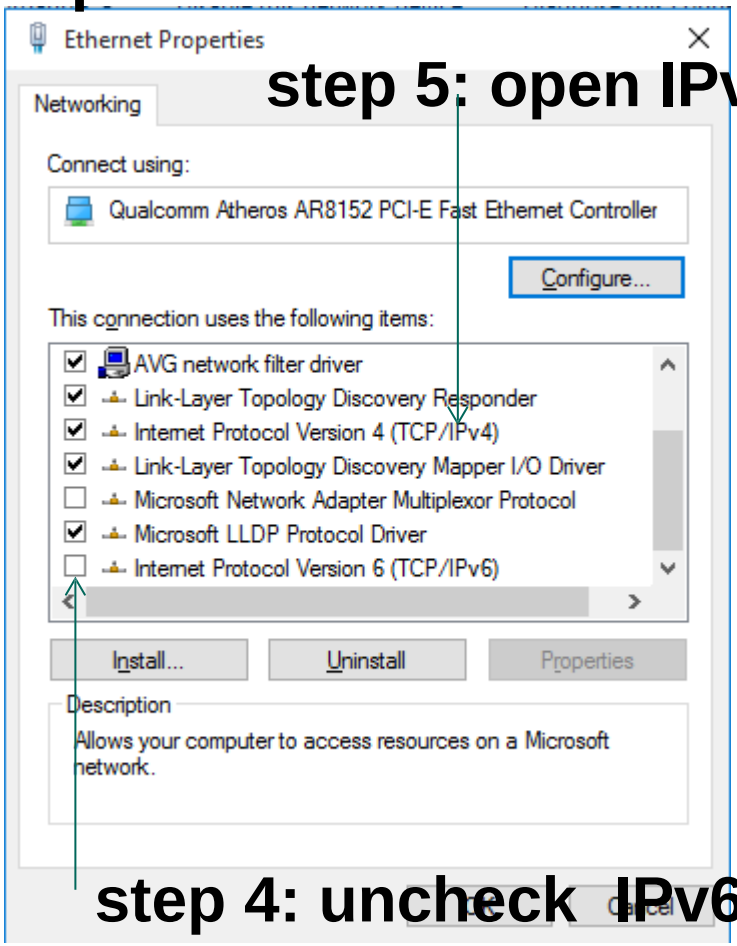
step 1



step 2



step 3

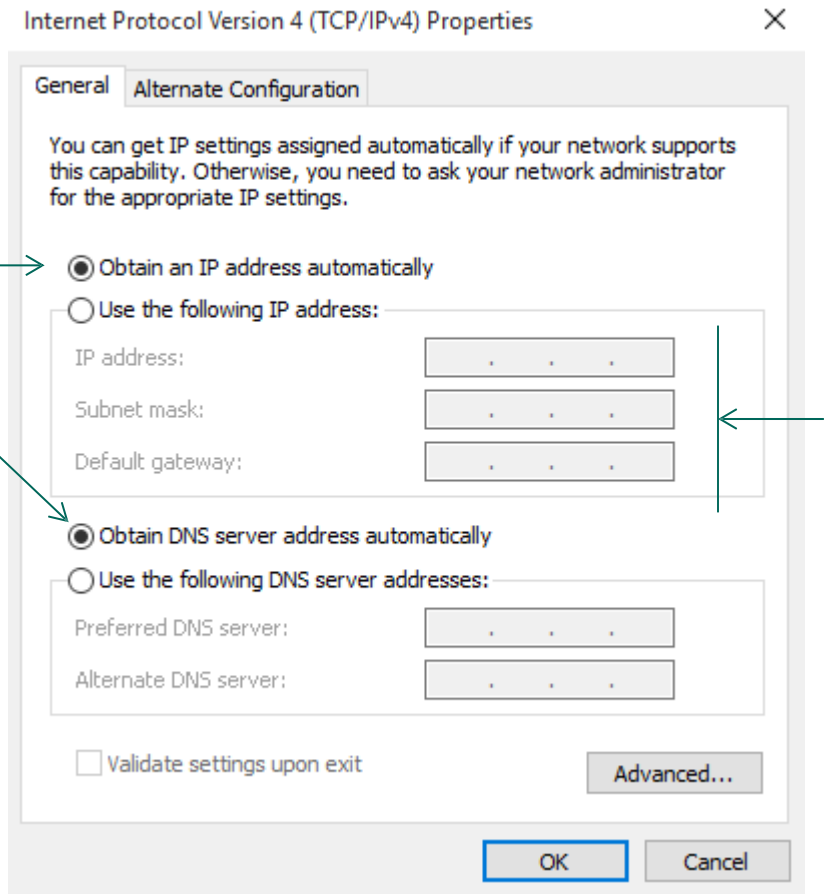


step 5: open IPv4

step 4: uncheck IPv6

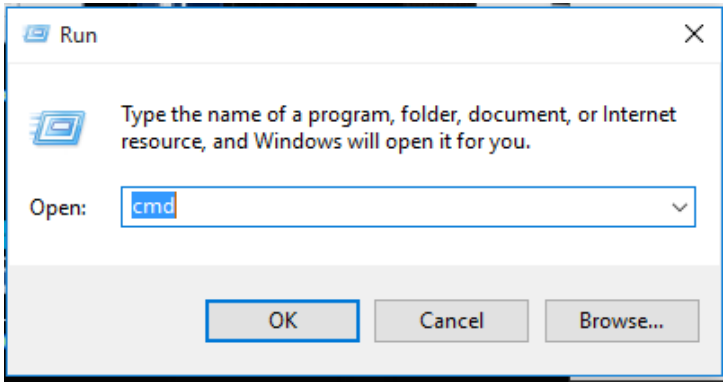
Task 1.5: Configure DHCP - 2

step 6
Use DHCP Server



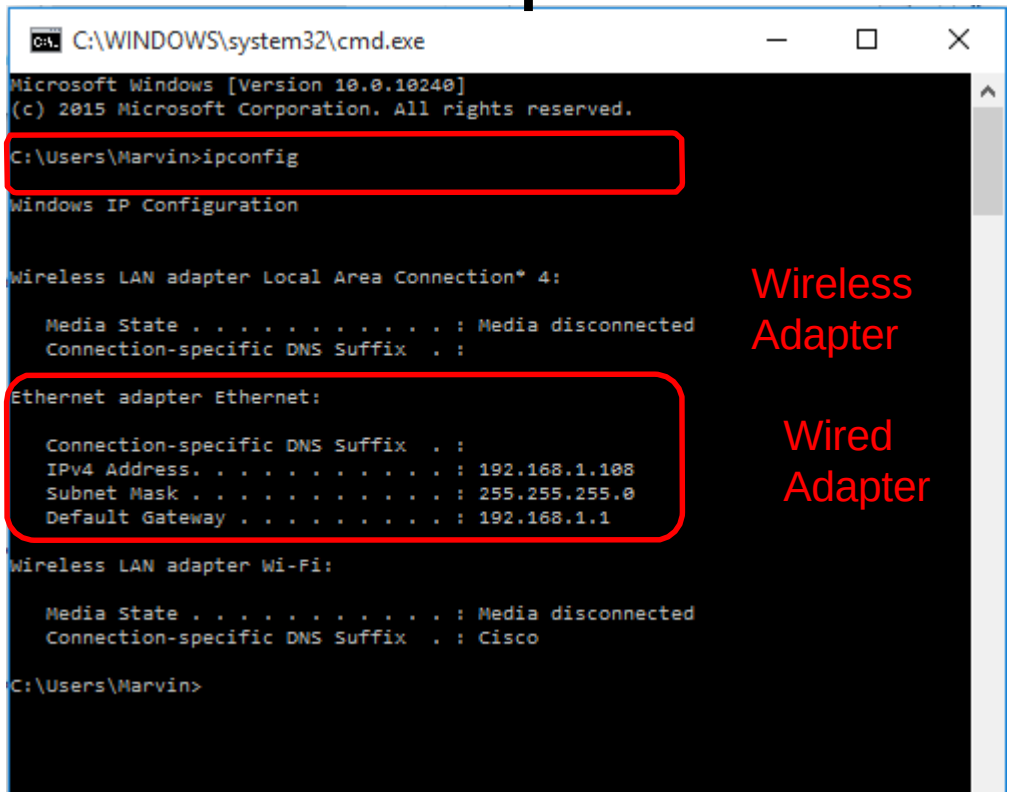
Task 2
Enter Static IP Address Info.

Task 1.8: Show PC's IP Configuration



step 1

Command Prompt Window



step 2:
Enter "ipconfig"
to see IP information for each interface

Extended ipconfig Command

Command: **ipconfig /all**

- Shows more information
- Info Includes:
  - Physical Address
  - IP Address
  - Subnet Mask
  - DHCP Server
  - DHCP Lease
  - DNS Address

- The purpose of these fields will be covered later in the course.

```
C:\Users\Marvin>ipconfig /all

Windows IP Configuration

   Host Name . . . . . . . . . . . . : labpc
   Primary Dns Suffix  . . . . . . . :
   Node Type . . . . . . . . . . . . : Hybrid
   IP Routing Enabled. . . . . . . . : No
   WINS Proxy Enabled. . . . . . . . : No

Wireless LAN adapter Local Area Connection* 4:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Microsoft Hosted Network Virtual Adapter #2
   Physical Address. . . . . . . . . : 00-23-14-46-5D-35
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes

Ethernet adapter Ethernet:

   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Qualcomm Atheros AR8152 PCI-E Fast Ethernet
   Physical Address. . . . . . . . . : 00-26-6C-4A-2C-71
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes
   IPv4 Address. . . . . . . . . . . : 192.168.1.108(Preferred)
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Lease Obtained. . . . . . . . . . : Tuesday, January 12, 2016 9:29:12 PM
   Lease Expires . . . . . . . . . . : Friday, January 15, 2016 12:06:58 PM
   Default Gateway . . . . . . . . . : 192.168.1.1
   DHCP Server . . . . . . . . . . . : 192.168.1.1
   DNS Servers . . . . . . . . . . . : 192.168.1.1
   NetBIOS over Tcpip. . . . . . . . : Enabled

Wireless LAN adapter Wi-Fi:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . : Cisco
   Description . . . . . . . . . . . : Intel(R) Centrino(R) Advanced-N 6200 AGN
   Physical Address. . . . . . . . . : 00-23-14-46-5D-34
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes

C:\Users\Marvin>
```

Task 1.11 ICMP and Ping (Echo)

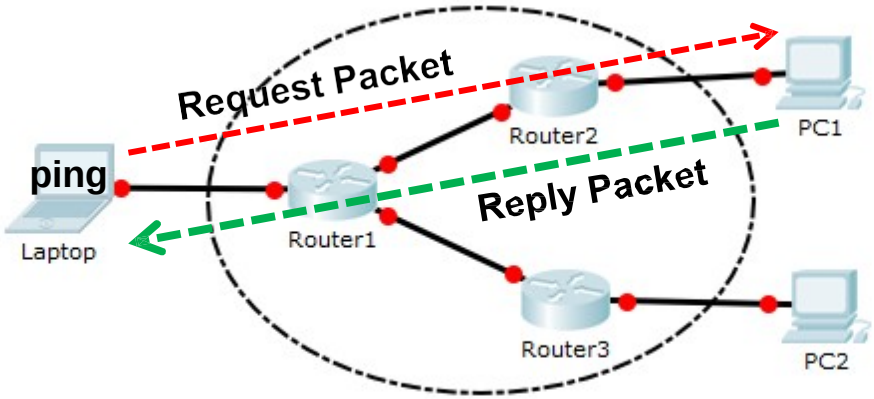
ICMP – Internet Control Message Protocol

An extension of the IP Protocol which includes utilities to facilitate and troubleshoot packet forwarding.

Ping

An ICMP troubleshooting utility to test connectivity.

1. Source device sends an request packet to a destination interface
2. Destination interface responds with a reply packet
3. If the Sender gets the reply, then IP layer connectivity is verified



Task 1.11 ICMP and Ping

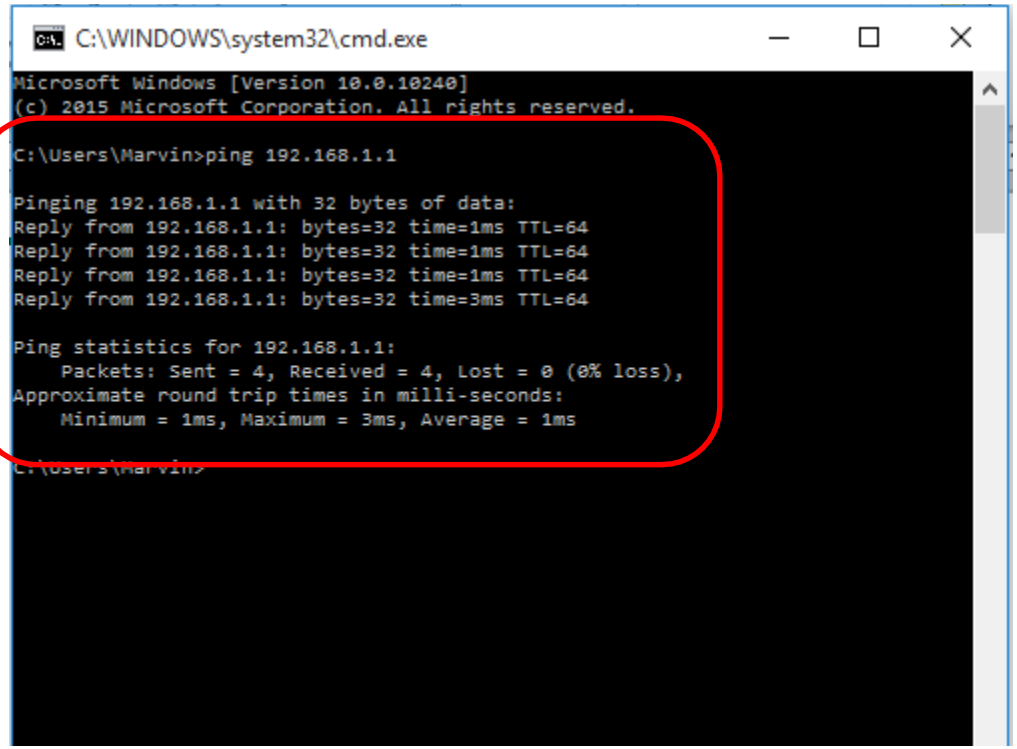
Basic Ping Command for your PC:

ping a.b.c.d where a.b.c.d is the IP Address

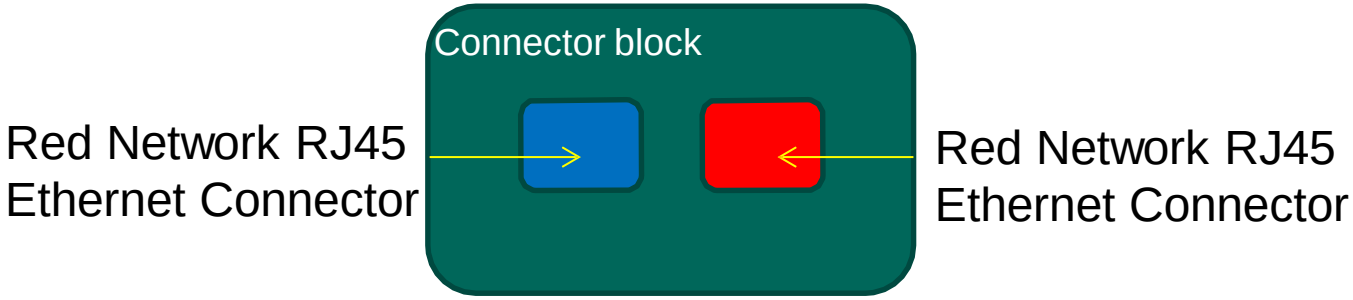
Pinging the Router Gateway

- Ping utility sends 4 ping packets
- Replies are shown

- Ping statistics are shown



Task 3: Blue and Red Networks

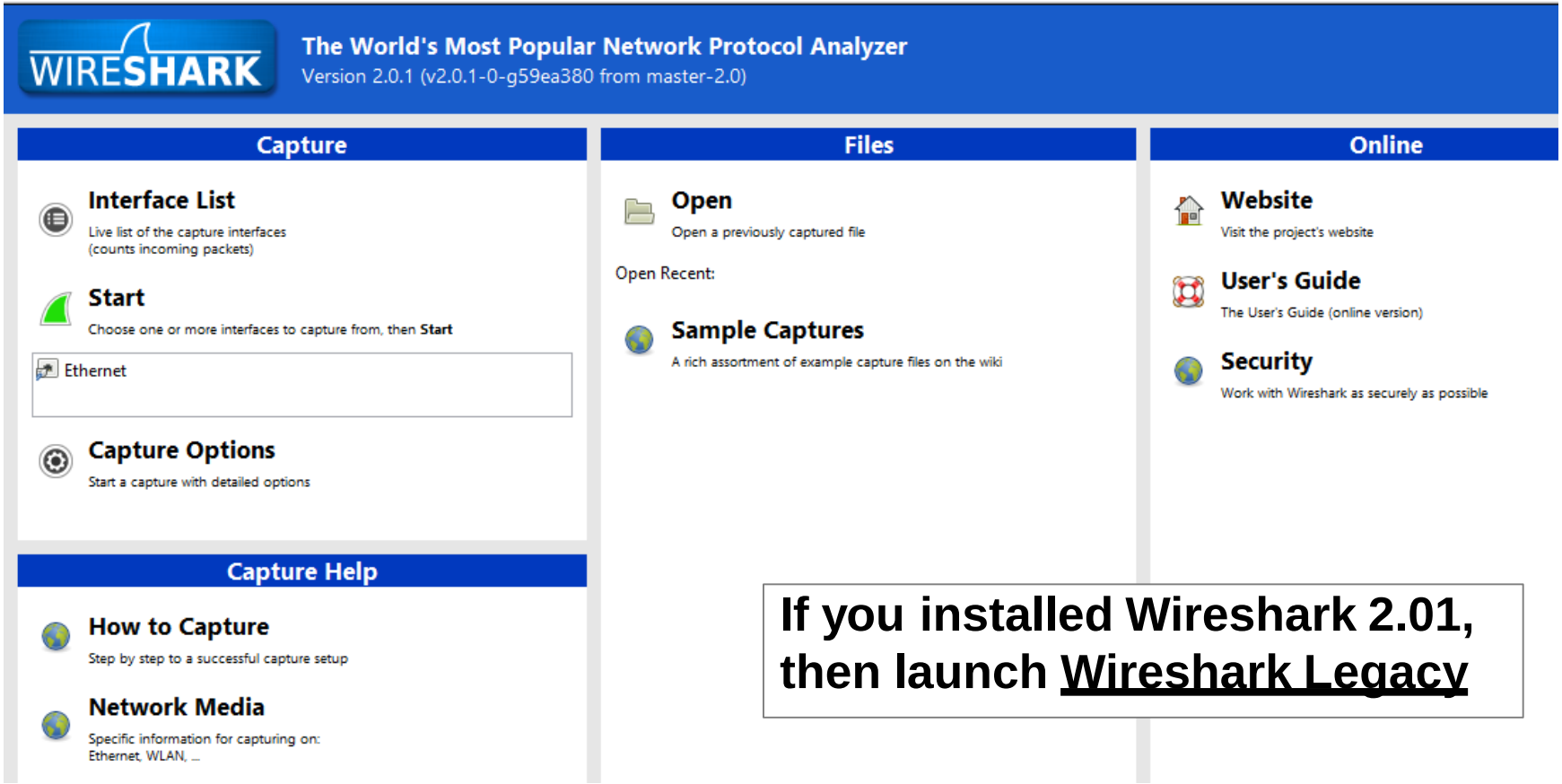


Each desk has a network connector block with two network connections.

Blue Network:
College network with access to the Public Internet

Red Network:
Network that simulates the equipment at an Internet Service Provider. It includes several servers.

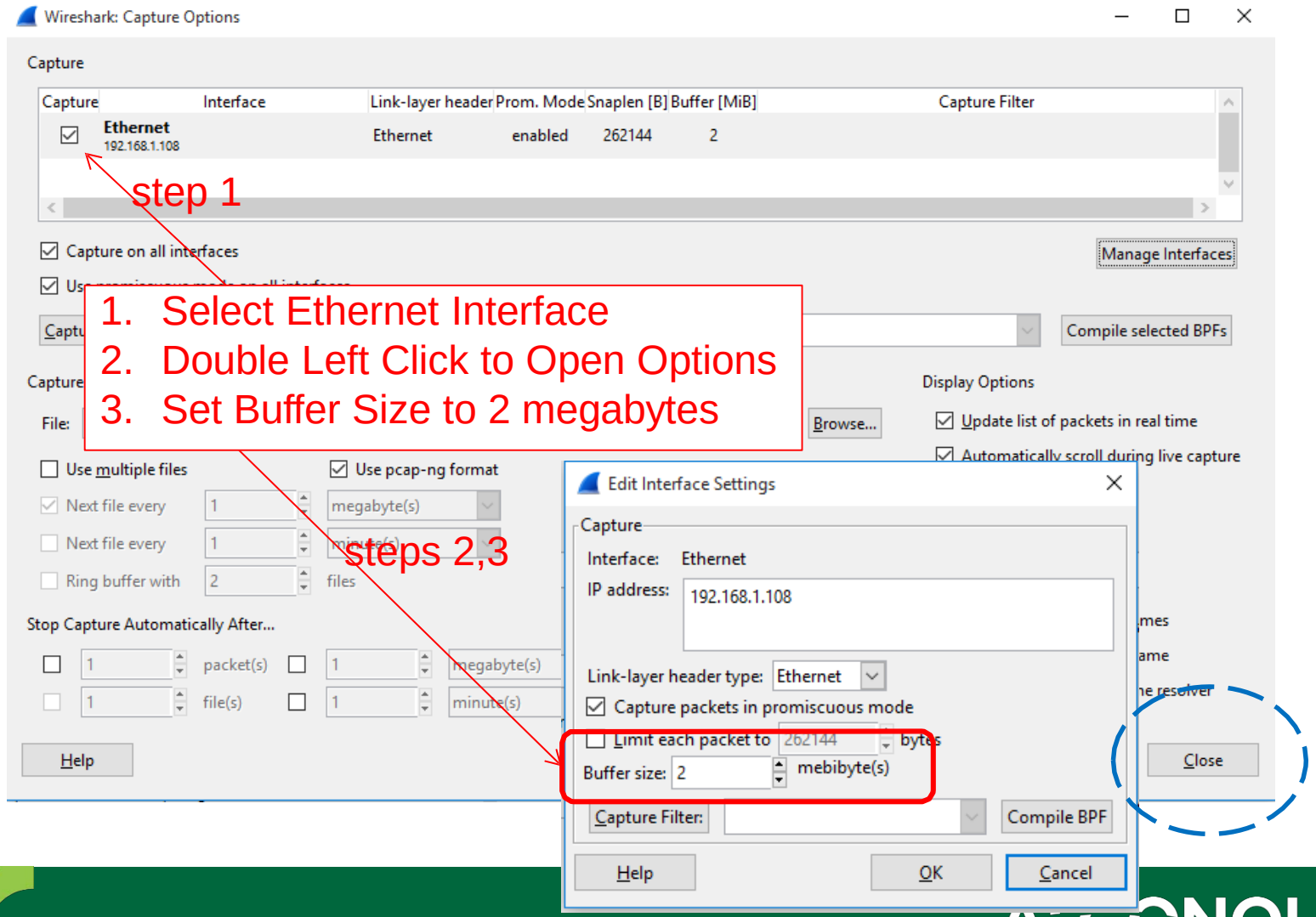
Task 4.2 Wireshark Interface Setup



If you installed Wireshark 2.01, then launch Wireshark Legacy

Task 4.2 Wireshark Interface Setup

Go to "Capture > Options" Tab, Click "Close" at bottom when complete.

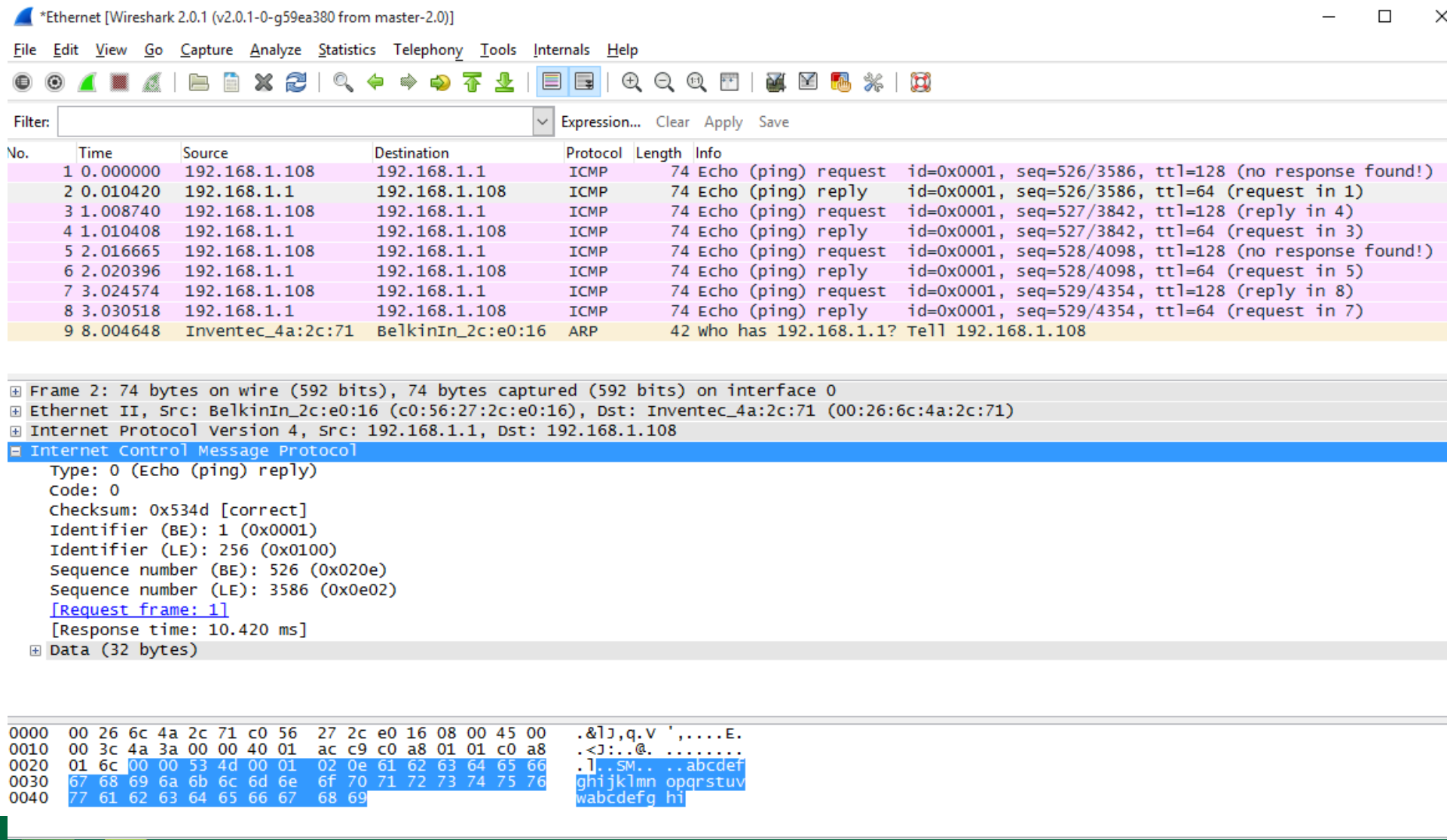


Task 4.3 Packet Capture

Procedure:

1. Open the Command Prompt
2. Start Packet Capture: “Capture > Start” Tab
3. Issue ping command
4. When ping is complete, stop packet capture: Capture > Stop

Task 4.3: Packet Capture



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