



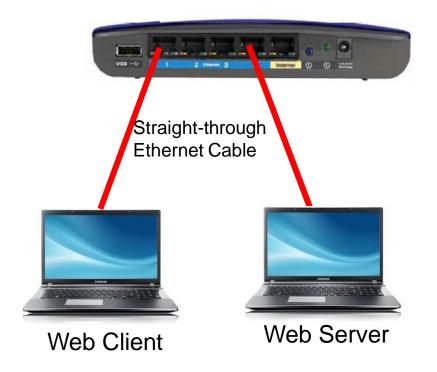
CST8109: LAB 3: REVIEW

Learning Objectives

- Layers of Addressing
- MAC Address
- Determining your MAC address
- ARP Protocol
- Wireshark Packet Capture and Analysis



Physical Topology



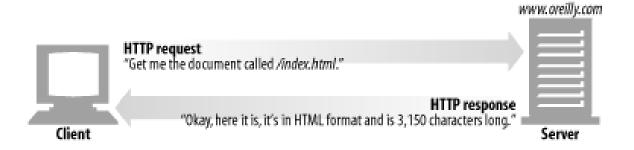
You need to work with a partner for Lab 3

E2500 Router Information

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



Web Server and HTTP Protocol



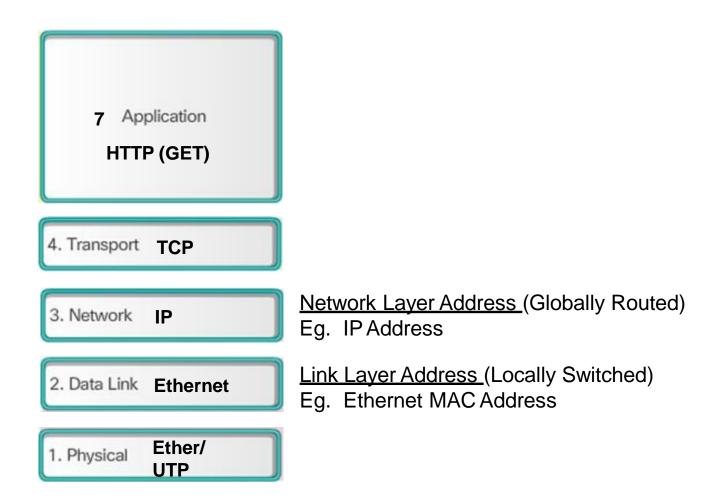
HTTP method	Description
GET	Send named resource from the server to the client.
PUT	Store data from client into a named server resource.
DELETE	Delete the named resource from a server.
POST	Send client data into a server gateway application.
HEAD	Send just the HTTP headers from the response for the named resource.

_	Time Course	Destination	Dontorel	Louish Tofo
٠٠.	Time	Destination		cengar and
	21 4.87392500 192.168.1.134	192.168.1.133	HTTP	400 GET / HTTP/1.1
	23 4.88801900 192.168.1.133	192.168.1.134	HTTP	169 HTTP/1.1 200 OK (text/html)
	20 5 44650000 402 460 4 424	102 160 1 122	HATTO	222 cer /f
	30 3.11030000 132.100.1.134	192.100.1.133	11111	3// GET /Tavicon. Teo HTTP/1.1
	32 5.11833200 192.168.1.133	192.168.1.134	HTTP	215 HTTP/1.1 404 Not Found (text/html)
	50 13.7240690 192.168.1.134	192.168.1.133	HTTP	426 GET / HTTP/1.1
	52 13.7296610 192.168.1.133	192.168.1.134	HTTP	169 HTTP/1.1 200 OK (text/html)



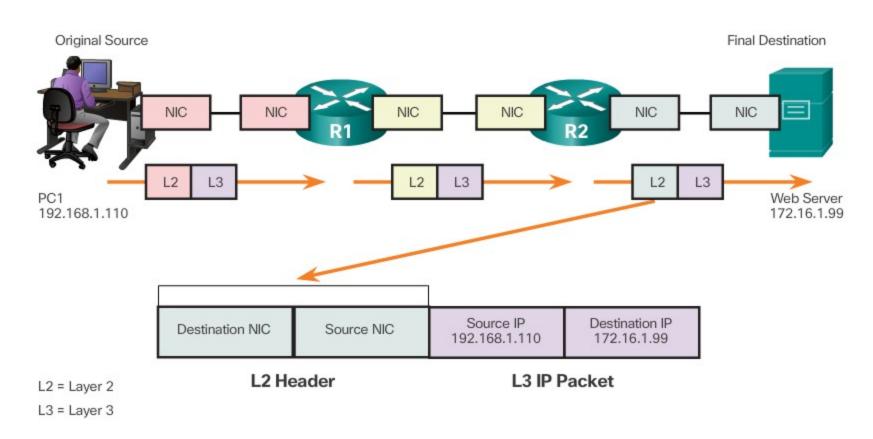
Network Addresses

Network Addresses and Data Link Addresses



Data Link Address (cont.)

Layer 2 Address is Local Link Address Layer 3 Address = Global Network Address





IP Address

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

Network Address Host Address

<u>192</u>.168.1.10

Octet: value between 0-255

This is also called an IP_{V4} Address. This is based on version 4 of the IP protocol.



Hexadecimal

- Also called Hex as a short form
- Base 16 Number System
- Hex uses 16 digits: 0-9 and a,b,c,d,e,f
- Compresses 4 Binary Digits into 1 Hex Digit

Hexadecimal Numbering

Decimal and Binary equivalents of 0 to F Hexadecimal

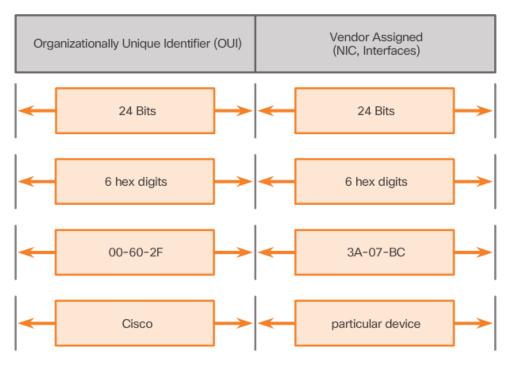
Decimal
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15

Binary	
0000	
0001	
0010	
0011	
0100	
0101	
0110	
0111	8
1000	
1001	
1010	
1011	
1100	
1101	
1110	
1111	

Hexadecimal
0
1
2
3
4
5
6
7
8
9
A
В
С
D
E
F

Ethernet MAC Address

IP Address Length: 48 Binary Digits (bits) Expressed in Hexadecimal Notation



MAC Address Format

00-26-6c-4a-2c-71

My MAC Address



How to Discover your MAC Address

- Use Command: ipconfig /all
- The MAC Address is also called the physical address because it is part of the hardware interface adapter

```
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
DNS Suffix Search List . . . : Cisco

Ethernet adapter Ethernet:

Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :
Description . . . : Qualcomm Atheros at 8152 PCI-E Fast Ethernet Controller
Physical Address . . . : 90-26-6C-4A-2C-71
DMCD Soubled . . . : Yes
```



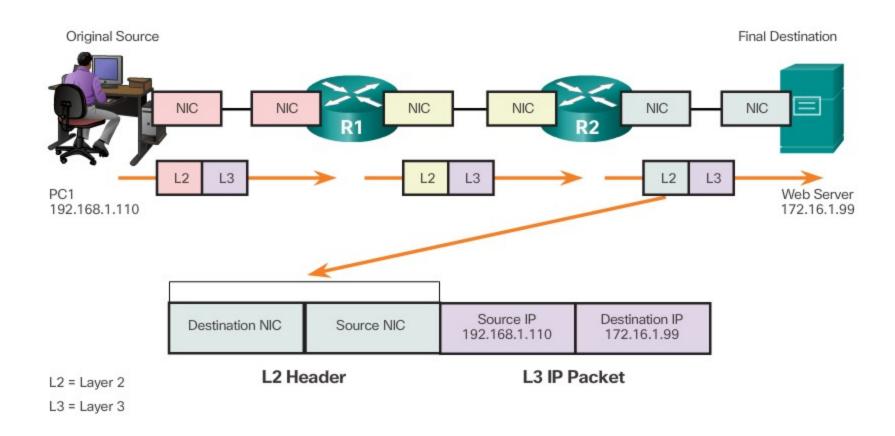
Ethernet Switch

Ethernet, switches frames based on MAC address information Routers, forward packets based on the IP address information

Laptop **Application Layer** peer layer conversation Application HTTP (GET) **Transport Layer** peer layer conversation 4. Transport TCP Router conversations 3. Network IP 3. Network **Ethernet Switch** 2. Data Link Ethernet 2. Data Link 2. Data Link Ethernet **Ethernet** er layer Ether/ Ether/ 1. Physical 1. Physical **UTP I/F0 I/F1**

Data Link Address (cont.)

Layer 2 Address is Local Link Address Layer 3 Address = Global Network Address



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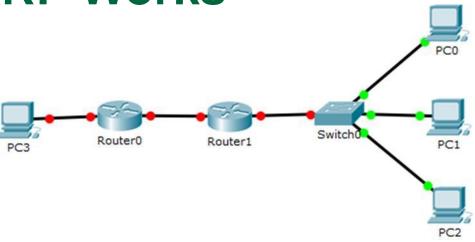
Address Resolution Protocol - ARP

When a packet arrives at Router1 it uses Ethernet to send the packet to PC1 but Router1 has an IP Address but not an Ethernet Address Router0 Router1 PC3 sends a packet to PC1 PC3 uses the IP Address of PC1 and the Ethernet Address of Router0

Ref: ARP basics for the Cisco CCNA



How ARP Works



- 1. Router1 sends an Ethernet Broadcast message: Who Has IP Address
- 2. PC1 responds with its MAC address
- 3. Router1 sends the frame using Ethernet to PC1 using the MAC address learned in step 2

Filter	r: arp		Expression Clear Apply Save		
vo.	Time Source	Destination	Protocol	Length Into	
	13 4.86354100 wistronI_02:b1:8c	Broadcast	ARP	60 who has 192.168.1.133? Tell 192.168.1.134	
	14 4.86358800 Compalin_a8:bb:cd	WistronI_02:b1:8c	ARP	42 192.168.1.133 is at b8:88:e3:a8:bb:cd	
	16 4.86417900 compalin_a8.bb.cd	Br oadcast	ARP	42 Who has 192.168.1.134? Tell 192.168.1.133	
	18 4.86457100 wistronI_02:b1:8c	compalin_a8:bb:cd	ARP	60 192.168.1.134 is at 20:6a:8a:02:b1:8c	
	63 16.0978680 compalIn_a8:bb:cd	Cisco-Li_5a:19:d3	ARP	42 Who has 192.168.1.1? Tell 192.168.1.133	
	64 16.0986110 Cisco-Li_5a:19:d3	CompalIn_a8:bb:cd	ARP	60 192.168.1.1 is at 48:f8:b3:5a:19:d3	



Show the ARP Cache on your PC

From your command prompt: To view the ARP table enter: **arp -g**

To delete the ARP table enter:

arp -d *

```
MAC Address
                             Discovered MAC
Devices connected to the
                                                    Assignment Type
                             Address
same network segment.
    C:\WINDOWS\system32>arp -g
    Interface: 192.168.1.125 --- 0x2
      Internet Address
                            Physical Address
                                                  Type
                                                 dynamic
      192,168,1,1
                            d8-67-d9-c3-2e-ae
                            08-11-96-93-83-1c
                                                 dynamic
      192.168.1.183
                            08-62-66-35-61-bf
                                                 dynamic
      192.168.1.187
      192,168,1,255
                            ff-ff-ff-ff-ff
                                                 static
                                                 static
      224.0.0.22
                            01-00-5e-00-00-16
                            01-00-5e-00-00-fc
                                                 static
      224.0.0.252
                                                 static
      239,255,255,250
                            01-00-5e-7f-ff-fa
                            ff-ff-ff-ff-ff
                                                 static
      255.255.255.255
```



END



