



Sirindhorn International Institute of Technology Thammasat University

Midterm Examination: Semester 2/2006

Course Title : ITS 332 Information Technology II Lab (Networking)

Instructor : Dr Steven Gordon

Date/Time : Wednesday 10 January 2007 9:00 – 12:00

Instructions:

- ③ This examination paper has 14 pages (including this page).
- ③ Condition of Examination
Closed book (No dictionary, No calculator allowed)
- ③ Students are not allowed to be out of the exam room during examination. Going to the restroom may result in score deduction.
- ③ Turn off all communication devices (mobile phone etc.) and leave them under your seat.
- ③ Write your name, student ID, section, and seat number clearly on the answer sheet.
- ③ The space on the back of each page can be used if necessary.

Part A – Multiple Choice [20 marks]

Select the most accurate answer. Only select one answer. Each question is worth 2 marks.

1. Ethernet is a network technology most commonly used for:
 - a) Connecting two routers across wide area networks
 - b) Connecting computers in a local area network
 - c) Connecting web browsers to web servers
 - d) Connecting Ethernet clients to web servers

2. A subnet mask
 - a) Indicates the default router that a computer will send packets to
 - b) Is 48-bits in length
 - c) Can be used to determine which bits in an IP address refer to the host address
 - d) Is always automatically created based on the IP address of your computer
 - e) Is obtained by your computer using DNS

3. Which command is used to view the Internet configuration of your Windows XP computer?
 - a) tracert
 - b) ping
 - c) arp
 - d) ipconfig
 - e) ftp
 - f) cmd

4. Which address is an example of a broadcast address for a Class B network with a default subnet mask?
 - a) 147.1.1.1
 - b) 147.13.0.0
 - c) 147.14.255.0
 - d) 147.14.255.1
 - e) 147.14.255.255

5. How many useable host addresses are available on a Class C network with a default subnet mask?
 - a) 128
 - b) 254
 - c) 255
 - d) 256
 - e) 257

6. A MAC (or hardware or physical) address
 - a) should be unique for each network device
 - b) is set when you set the IP address on your computer
 - c) can be found using DNS
 - d) is assigned to your computer by the network administrator
 - e) can be written in a human readable form as a URL

7. What is the purpose of the TCP three-way handshake?
 - a) To obtain the destination IP address of the server
 - b) To verify the source and destination IP addresses
 - c) To synchronize sequence numbers prior to data transmission
 - d) To determine the number of bytes that will be sent to the server
 - e) To agree upon the speed at which data will be sent between source and destination

8. If you can ping a computer on your local network, but cannot ping a web server (e.g. www.google.com) on the Internet, a possible explanation is:
 - a) Your computer is using a crossover cable to connect to a switch, instead of a straight through cable
 - b) The hardware/physical address used by your network interface card is incorrect
 - c) Your network interface card is disabled
 - d) Your computer does not allow ping messages to be sent
 - e) Your local network router does not allow ping messages to be sent

9. The IP address of your computer
 - a) Is always assigned manually by the network administrator
 - b) Can be converted to a MAC (physical/hardware) address using DNS
 - c) Can be automatically set using DNS
 - d) Should have the same network portion as other computers on your LAN
 - e) Is permanent (for example, never changes)

10. The default gateway for your computer
 - a) Cannot be set using DHCP
 - b) Indicates the host address of your computer
 - c) Will always automatically configure the IP address of your computer
 - d) Cannot be set manually (by you)
 - e) Indicates the router that your packets will be sent to, if no other routes are known

Part B – General Questions [65 marks]

Question 1 [4 marks]

Name two types of addresses used in computer networks. For each type, give an example *or* brief description of the format.

Question 2 [5 marks]

- Match the layers of the OSI model to the appropriate description or function.
- For each of the application, transport and network layers, give an example protocol used at that layer.

Application	Connectivity and path selection
Presentation	Format of data
Session	Establish and manage application conversations
Transport	Binary transmission
Network	Physical addressing
Data Link	Email and file transfer
Physical	Reliable connection and error correction

Question 3 [6 marks]

Selecting from the list of protocols, for each sentence write the protocol name that most accurately completes the sentence. The protocols you can select from are:

1. Address Resolution Protocol (ARP)
2. Carrier Sense Multiple Access (CSMA)
3. Dynamic Host Configuration Protocol (DHCP)
4. Domain Name System (DNS)
5. File Transfer Protocol (FTP)
6. HyperText Transfer Protocol (HTTP)
7. Internet Control Message Protocol (ICMP)
8. Internet Protocol (IP)
9. Transmission Control Protocol (TCP)
10. User Datagram Protocol (UDP)

Complete these sentences with the above protocols (write the acronym, for example “IP”, in the space provided):

- a) _____ is used to automatically assign IP addresses to hosts in a network.
- b) _____ maps human readable URLs to IP addresses.
- c) _____ is used to transfer web pages from server to browser
- d) _____ maps IP addresses to hardware (MAC) addresses.
- e) _____ is used by *ping* to check for network connectivity.
- f) _____ provides reliable data delivery in the Internet

Question 4 [12 marks]

The following page contains output from an Ethereal trace, run on the computer 192.168.1.2. The first section shows the summary of all (9) captured packets. Below that are the details of selected packets. Based on the captured data shown, answer the following questions:

- a) What activity is captured in this trace (in other words, what did the user do while Ethereal was capturing packets)?
- b) What is the purpose of packet No. 1? Why was it sent to the destination 203.113.15.100?
- c) What is the purpose of packets 3, 4 and 5? Your answer should include a description of what the packet types mean (SYN and ACK) and what the parameters Seq and Ack mean.
- d) Do you know the physical (hardware/MAC) address of the computer that Ethereal is run on? If yes, what is it?
- e) Do you know the physical (hardware/MAC) address of the web server? If yes, what is it?
- f) What information does packet 8 carry?
- g) What does the value of the Ack field in packet (frame) 8 indicate?

No.	Time	Source	Destination	Protocol	Info
1	0.000000	192.168.1.2	203.113.15.100	DNS	Standard query A sandilands.info
2	0.392565	203.113.15.100	192.168.1.2	DNS	Standard query response A 125.25.208.135
3	0.393106	192.168.1.2	125.25.208.135	TCP	3750 > http [SYN] Seq=0 Len=0 MSS=1460
4	0.396030	125.25.208.135	192.168.1.2	TCP	http > 3750 [SYN, ACK] Seq=0 Ack=1 Win=5840 Len=0 MSS=1460
5	0.396045	192.168.1.2	125.25.208.135	TCP	3750 > http [ACK] Seq=1 Ack=1 Win=65535 Len=0
6	0.396111	192.168.1.2	125.25.208.135	HTTP	GET /test.html HTTP/1.1
7	0.399716	125.25.208.135	192.168.1.2	TCP	http > 3750 [ACK] Seq=1 Ack=469 Win=6432 Len=0
8	0.400839	125.25.208.135	192.168.1.2	HTTP	HTTP/1.1 200 OK (text/html)
9	0.725801	192.168.1.2	125.25.208.135	TCP	3750 > http [ACK] Seq=469 Ack=1417 Win=64119 Len=0

Frame 6 (522 bytes on wire, 522 bytes captured)

Ethernet II, Src: AsustekC_7e:50:7d (00:17:31:7e:50:7d), Dst: ZyxelCom_6c:e3:b3 (00:13:49:6c:e3:b3)
 Internet Protocol, Src: 192.168.1.2 (192.168.1.2), Dst: 125.25.208.135 (125.25.208.135)
 Transmission Control Protocol, Src Port: 3750 (3750), Dst Port: http (80), Seq: 1, Ack: 1, Len: 468
 Hypertext Transfer Protocol

Frame 8 (1470 bytes on wire, 1470 bytes captured)

Ethernet II, Src: ZyxelCom_6c:e3:b3 (00:13:49:6c:e3:b3), Dst: AsustekC_7e:50:7d (00:17:31:7e:50:7d)
 Internet Protocol, Src: 125.25.208.135 (125.25.208.135), Dst: 192.168.1.2 (192.168.1.2)
 Transmission Control Protocol, Src Port: http (80), Dst Port: 3750 (3750), Seq: 1, Ack: 469, Len: 1416
 Hypertext Transfer Protocol
 Line-based text data: text/html

Question 5 [16 marks]

The following is output from running several applications (commands) on a computer on the Internet. Based on the output, answer the questions below.

```
C:\Documents and Settings\Steve>ipconfig /all
```

```
Windows IP Configuration
```

```
Host Name . . . . . : win06v6
Primary Dns Suffix . . . . . :
Node Type . . . . . : Unknown
IP Routing Enabled. . . . . : No
WINS Proxy Enabled. . . . . : No
```

```
Ethernet adapter Local Area Connection:
```

```
Connection-specific DNS Suffix . :
Description . . . . . : Realtek RTL8168/8111 PCI-E Gigabit
Ethernet NIC
Physical Address. . . . . : 00-17-31-7E-50-7D
Dhcp Enabled. . . . . : No
IP Address. . . . . : 192.168.1.2
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : 192.168.1.1
DNS Servers . . . . . : 203.113.15.99
                        203.113.15.100
```

```
C:\Documents and Settings\Steve>ping www.google.co.th
```

```
Pinging www.l.google.com [66.249.89.99] with 32 bytes of data:
```

```
Reply from 66.249.89.99: bytes=32 time=194ms TTL=237
Reply from 66.249.89.99: bytes=32 time=192ms TTL=237
Reply from 66.249.89.99: bytes=32 time=194ms TTL=237
Reply from 66.249.89.99: bytes=32 time=191ms TTL=237
```

```
Ping statistics for 66.249.89.99:
```

```
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 191ms, Maximum = 194ms, Average = 192ms
```

```
C:\Documents and Settings\Steve>ping www.google.com
```

```
Pinging www.l.google.com [66.249.89.99] with 32 bytes of data:
```

```
Reply from 66.249.89.99: bytes=32 time=190ms TTL=237
Reply from 66.249.89.99: bytes=32 time=194ms TTL=237
Reply from 66.249.89.99: bytes=32 time=193ms TTL=237
Reply from 66.249.89.99: bytes=32 time=192ms TTL=237
```

```
Ping statistics for 66.249.89.99:
```

```
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 190ms, Maximum = 194ms, Average = 192ms
```

```
C:\Documents and Settings\Steve>ping www.siit.tu.ac.th
```

```
Pinging www.siit.tu.ac.th [203.131.209.77] with 32 bytes of data:
```



```
Request timed out.
Request timed out.
Request timed out.
Request timed out.
```

```
Ping statistics for 203.131.209.77:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

```
C:\Documents and Settings\Steve>arp -a
```

```
Interface: 192.168.1.2 --- 0x2
    Internet Address      Physical Address      Type
    192.168.1.1           00-13-49-6c-e3-b3    dynamic
```

```
C:\Documents and Settings\Steve>tracert www.google.co.th
```

```
Tracing route to www.l.google.com [66.249.89.99]
over a maximum of 30 hops:
```

1	2 ms	2 ms	2 ms	lime [192.168.1.1]
2	27 ms	27 ms	23 ms	125-25-208-1.adsl.totbb.net [125.25.208.1]
3	26 ms	24 ms	23 ms	192.168.0.133
4	24 ms	25 ms	27 ms	203.113.13.45
5	26 ms	23 ms	27 ms	ge1-2.gw1-kkm.totisp.net [203.113.13.9]
6	38 ms	26 ms	29 ms	203.190.250.129
7	26 ms	24 ms	24 ms	203.190.250.41
8	846 ms	845 ms	843 ms	203.131.241.129
9	880 ms	877 ms	878 ms	ge-2-2-0.r01.newthk01.hk.bb.gin.ntt.net [203.131.240.209]
10	555 ms	553 ms	556 ms	p16-0-2-3.r21.tokyjp01.jp.bb.gin.ntt.net [129.250.2.233]
11	195 ms	193 ms	193 ms	203.192.129.53
12	191 ms	192 ms	190 ms	gil-0.gw1.nrt4.asianetcom.net [202.147.1.117]
13	193 ms	193 ms	*	gil-0.gw1.nrt4.asianetcom.net [202.147.1.117]
14	193 ms	192 ms	193 ms	GoogleInc.gw1.nrt4.asianetcom.net [203.192.131.70]
15	202 ms	199 ms	197 ms	216.239.47.54
16	192 ms	193 ms	192 ms	66.249.89.99

```
Trace complete.
```

```
C:\Documents and Settings\Steve>
```

- How many network interfaces (e.g. LAN cards) does the computer have?
- What is the IP address of this computer (that is, the computer on which the commands were run)?
- Are there any other computers on the local area network of this computer? If so, what are their IP addresses?
- What is the average time it takes to send a packet to `www.google.co.th`?
- If you executed the command `ping 66.249.89.104`, and compared the results with those from the ping to `www.google.co.th`, what would you expect to see? Explain your answer.
- What does the ping to `www.google.com` indicate (when compared to the ping to `www.google.co.th`)?
- What does the ping to `www.siit.tu.ac.th` indicate? Give a possible reason as to why the results may have been obtained.
- Name two protocols that are used when executing the ping commands.
- How many routers are between this computer and the `www.google.co.th` server?

- j) What is the round trip time between this computer and 203.131.241.129?
- k) How does the round trip time with 203.131.241.129 compare with that of the `www.google.co.th` server? Comment on, and explain the difference.

Question 6 [7 marks]

Assume you want to configure a peer-to-peer network between two computers at home.

- a) If computer A has an IP address of 192.168.1.34 and subnet mask of 255.255.255.0, are the following addresses necessary? If yes, then what should they be set to?
 - i. IP address
 - ii. Subnet mask
 - iii. Default gateway
- b) What type of cable would you use to connect the two computers?
- c) How could you test if you have correctly connected and configured the two computers?

Question 7 [15 marks]

The figure on page 13 shows a computer network with 3 computers, 3 routers and 1 switch. Each device is labelled with a unique letter (A to G), and the network interface (IF) of each device is labelled with a number (e.g. IF1, IF2). E2 refers to interface (IF) 2 on device E (a router). From the figure, answer the following questions.

- a) What type of cable should you use to connect:
 - a. Computer A to Switch D
 - b. Switch D to Router E
 - c. Router E to Router F
 - d. Router G to Computer C
- b) How many different IP networks are used?
- c) Complete the following table showing the interface configurations:

Device	Interface	IP address	Subnet mask	Default gateway
Computer A	IF1	192.168.3.7	255.255.255.0	192.168.3.2
Computer B	IF1			
Computer C	IF1			
Router E	IF1			not applicable
	IF2		255.255.0.0	not applicable
Router F	IF1			not applicable
	IF2			not applicable
Router G	IF1	172.16.12.1	255.255.0.0	not applicable
	IF2	200.1.2.1	255.255.255.0	not applicable

- d) Based on the addresses configured in part (c), complete the routing tables for each router (hint: the “Next Router” for the first entry of Router E will be the IP address of IF1 on Router F):

Router E

Destination Network	Destination Subnet Mask	Next Router
200.1.2.0	255.255.255.0	
172.16.0.0	255.255.0.0	

Router F

Destination Network	Destination Subnet Mask	Next Router
200.1.2.0	255.255.255.0	172.16.12.1
192.168.3.0	255.255.255.0	

Router G

Destination Network	Destination Subnet Mask	Next Router
192.168.3.0	255.255.255.0	

Figure for Question 7



