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**CS513 / ECE506
Spring 2012
Computer Networks
Final Exam
April 30, 2012**

Question	Points	Score
0	1	
1	6	
2	4	
3	4	
4	6	
5	8	
6	6	
7	6	
8	9	
9	8	
10	4	
11	6	
12	5	
13	8	
14	7	
15	8	
16	9	
17	8	
18	7	
19	6	
20	5	
Total	130	

Trivia Question (1 extra credit point)

0a. Name the American General nicknamed "Vinegar Joe" who was assigned by the U.S. government as an advisor to Generalissimo Chiang Kai-Shek to fight the Japanese and Chinese Communists in World War II.

OR

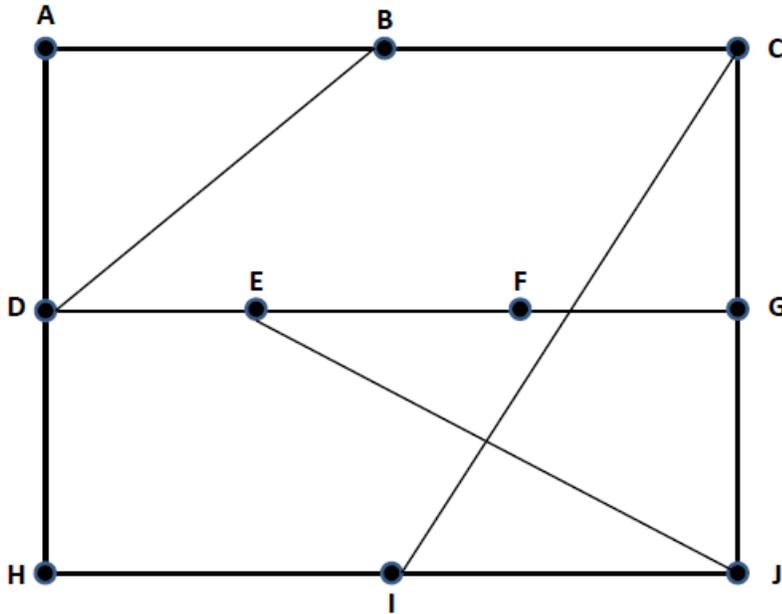
0b. In what city will the 2018 Winter Olympics be held?

- (6 pts) 1. Explain how **Switched Ethernet** has the potential for higher aggregate throughput than an **Ethernet Hub**.
- (4 pts) 2. How do **source routing bridges** work?
- (4 pts) 3. Discuss the physical and MAC layer changes made in going from **802.11g** to **802.11n**.
- (6 pts) 4. Explain the **RTS/CTS** mechanism. How does **RTS/CTS** improve or worsen **DCF** performance?
- (8 pts) 5. Draw a **physical layer 802.11b frame** and use it to explain how an **AP** indicates to an **8011.b client node** that it is lowering its transmission rate due to **dynamic rate adaptation**. What triggers this lowering action and how can this improve wireless throughput?
- (4 pts) 6a. Explain the fundamental architectural difference between a **2.5G** and a **3G cellular wireless networks**.
- (2 pts) 6b. Discuss the differences between how **3G EVDO** provides **FEC** as compared to a **4G LTE cellular network**.
- (6 pts) 7. Draw a diagram that shows the steps (label each step) taken for a **correspondent** to talk with a **mobile wireless client** in a **visited** network via **direct mobile routing**.
- (2 pts) 8a. Define **duty cycle** in a **WSN**.
- (4 pts) 8b. Explain the differences in power concerns between **broadcast** and **convergecast** message patterns sent between a power-connected **sensor base station** and a group of 10 battery-powered **wireless sensors**.
- (3 pts) 8c. Draw a diagram and explain how **LPL** addresses these power concerns.
- (4 pts) 9a. How does the **ATM architecture** deal with the issue of differing **QoS** concerns for the variety of traffic types on the Internet today?
- (4 pts) 9b. Explain the difference between **VPI's** and **VCI's** and how this concept provides for two levels of **ATM switches**?

- (4 pts) 10. How does a sending host attached to a Fast Ethernet LAN which is a **subnet** of a MAN determine whether or not it has to send an IP packet through an **IP router** that is attached to the **subnet**?
- (6 pts) 11. Explain the basic functionality of a **NAT** in handling packets going into and coming out of a local network that sits behind the **NAT router**.
- (5 pts) 12. Explain the concept of **frame bursting** in **Gigabit Ethernet**. How does this concept improve **Gigabit Ethernet** performance?
- (8 pts) 13. Explain the difference between the causes and effects of **MAC layer retries** versus **IP packet losses** on a downstream **TCP** flow where the last hop passes through an AP to a **wireless client node**.
- (4 pts) 14a. List the differences between **FDDI** and **SONET**.
- (3 pts) 14b. How does **SONET** interface with **ATM cells**?
- (5 pts) 15a. Explain **8B/6T** encoding. Why is it used instead of **Manchester encoding** in **100BASE-T4**?
- (3 pts) 15b. Draw a diagram showing the capacities and roles of the **four** input and output wires for **100BASE-T4**.
- (3 pts) 16a. What information is contained in a **Link State Packet**?
- (6 pts) 16b. How is this information used to implement the **Link State Routing protocol**?
- (8 pts) 17. Draw a diagram and use it to explain how **Priority Queueing** in a core router deals with **congestion**. How do the sending hosts participate in this **router-centric** scheme? What problems does this queueing scheme introduce?
- (4 pts) 18a. Explain the adjustments made in the **Karn/Partridge RTO algorithm** with respect to handling **retransmissions**.
- (3 pts) 18b. Discuss how this adjustment influenced the design of **SYN flooding DoS** attacks.
- (6 pts) 19. Explain how **Fast Retransmit** improves **TCP Tahoe** performance.

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(5 pts) 20. Given the network below and the three **distance vectors** received from node **J's neighbors**, fill in **J's new distance vector routing table**. Please show your work!



From E

Node	Delay
A	9
B	22
C	25
D	3
E	0
F	20
G	21
H	14
I	21
J	15

From I

Node	Delay
A	29
B	15
C	4
D	24
E	16
F	6
G	5
H	9
I	0
J	10

From G

Node	Delay
A	25
B	15
C	6
D	12
E	9
F	2
G	0
H	23
I	6
J	9

Node	New Delay	Outgoing Line
A		
B		
C		
D		
E		
F		
G		
H		
I		
J		

JE's Delay is 2

JI's Delay is 5

JG's Delay is 7

Vectors received from J's three neighbors

Node J's Routing Table