



**PRINCE OF SONGKLA UNIVERSITY
FACULTY OF ENGINEERING**

Final Examination: Semester II

Academic Year: 2010

Date: February 25, 2011

Time: (2 hrs)

Subject: 241-553 High Speed and Broadband Integrated Networks

Room: A401

- In this exam paper, there are four questions,
 - All notes and books are not allowed,
 - Answers could be either in Thai or English,
 - ~~All~~ kinds of calculators and electronic devices are allowed,
 - Try to attempt answering all questions.

1. Gigabit Ethernet operates on 2 modes: shared access, and dedicated-access. Answer the following questions:

1.1 Gigabit Ethernet uses CSMA/CD for shared-access with 2 important modifications. What are they? (10 marks)

1.2 In dedicated-access topology enhancement, this mode is used for point-to-point connection and operated in full-duplex. What are the significant features? (10 marks)

2. In Gigabit Ethernet mechanism:

- 2 a) How does "Carrier Extension" work? (5 marks) Please explain with its frame format.
2 b) Why does Gigabit Ethernet need carrier extension? (5 marks)

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3. When Gigabit Ethernet operates in full-duplex mode, CSMA/CD (including the carrier extension and frame bursting) is disable. It introduces link-level flow control, so call "Pause Protocol". Please explain how Pause Protocol works. (10 marks) Please draw a flowchart for this mechanism.

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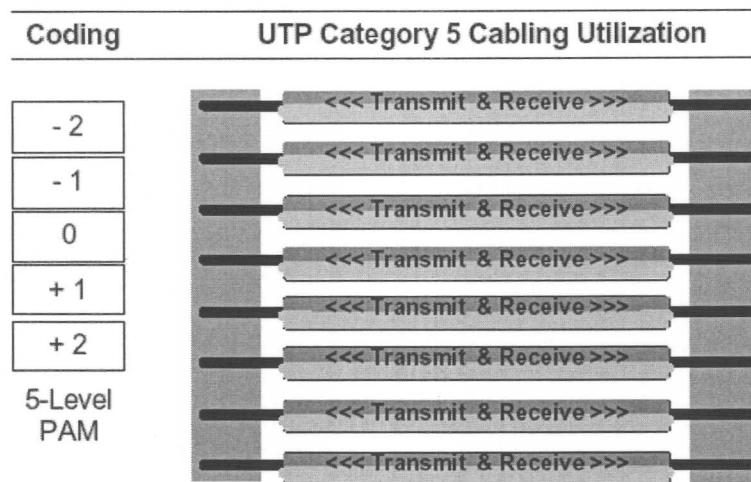
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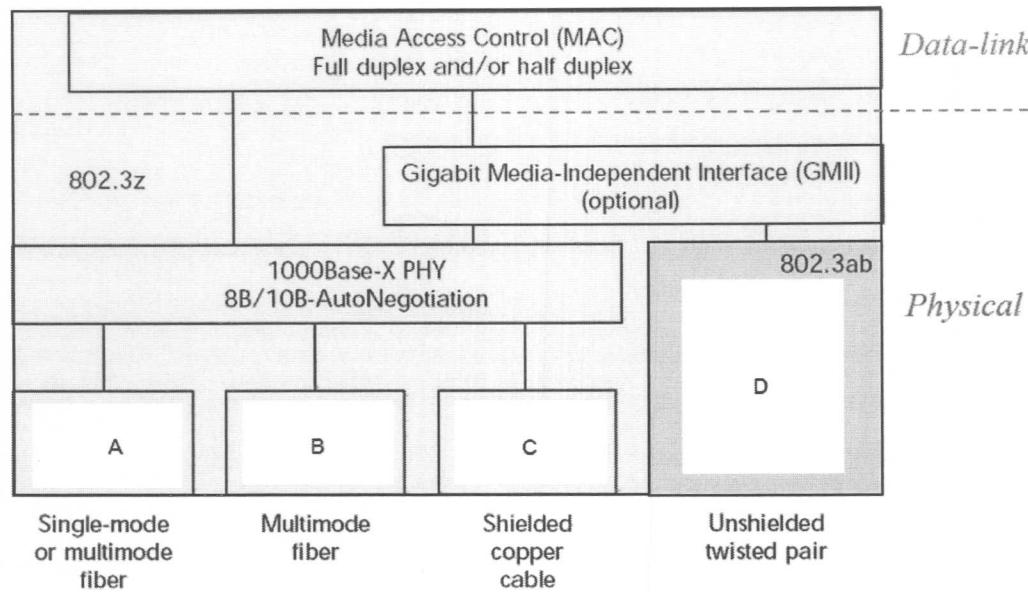
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4. The below picture is 1000BASE-T using UTP Category 5. Please explain how Gigabit Ethernet can work out 1 Gbps speed on this cable. (10 marks)

1000BASE-T

5. Below is Gigabit Ethernet Protocol Architecture. What are A, B,C, and D? (10 marks)



6. The table below is a comparison between 1000Base-T and 10GBase-T. What are A, B, and C? (10 marks)

1000BASE-T	10GBASE-T
5-level coded PAM signaling (2 information bits/symbol)	A
8-state 4D Trellis code across pairs	8-state 4D Trellis code across pairs
Full duplex echo-cancelled transmission	B
125 Mbaud, ~80 MHz used bandwidth	833 Mbaud, ~450 MHz used bandwidth
No FEXT Cancellation	C

7. 10G uses 4 pairs of each cable (same as 1000BASE-T). The encoding uses 3 information bits per symbol (baud) with baud rate: ~ 833 MBaud. Please explain how 10G can achieve 10 Gbps. (10 marks)

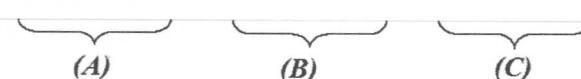
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8. The table below is a comparison between 1000Base-T and 10GBase-T. What are A, B, and C?

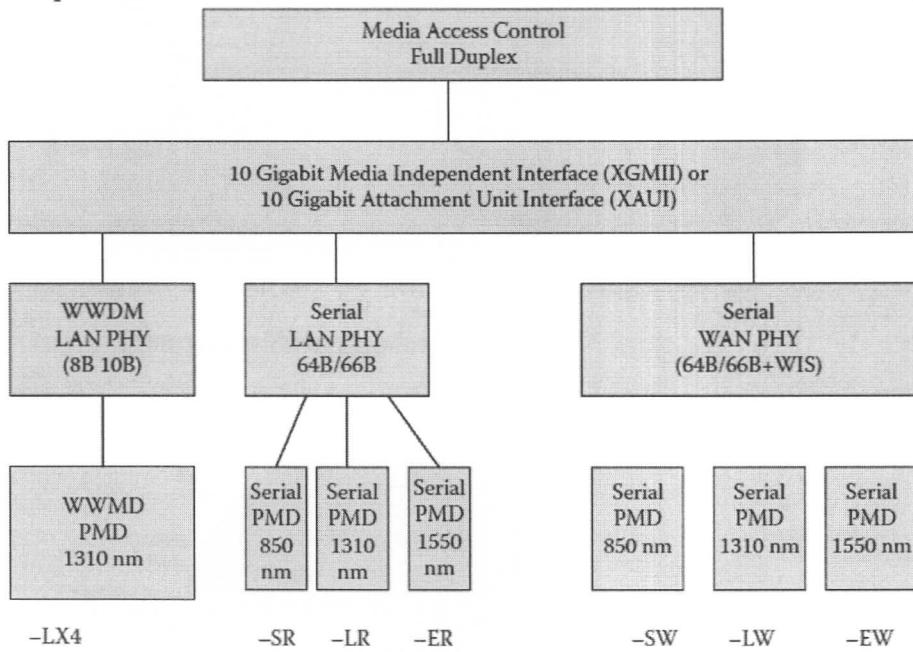
<i>Feature</i>	<i>Gigabit Ethernet</i>	<i>10 Gigabit Ethernet</i>
IEEE standard	802.3z	802.3ae
Media support	Copper and optical fiber	Optical fiber
Mode(s) of operation	Half and full duplex	(A)
Coding scheme	(B)	64B/66B
PMD layer	From fiber channel	New
Transmission range	5 km	40 km
SONET/SDH attachment	(C)	Yes

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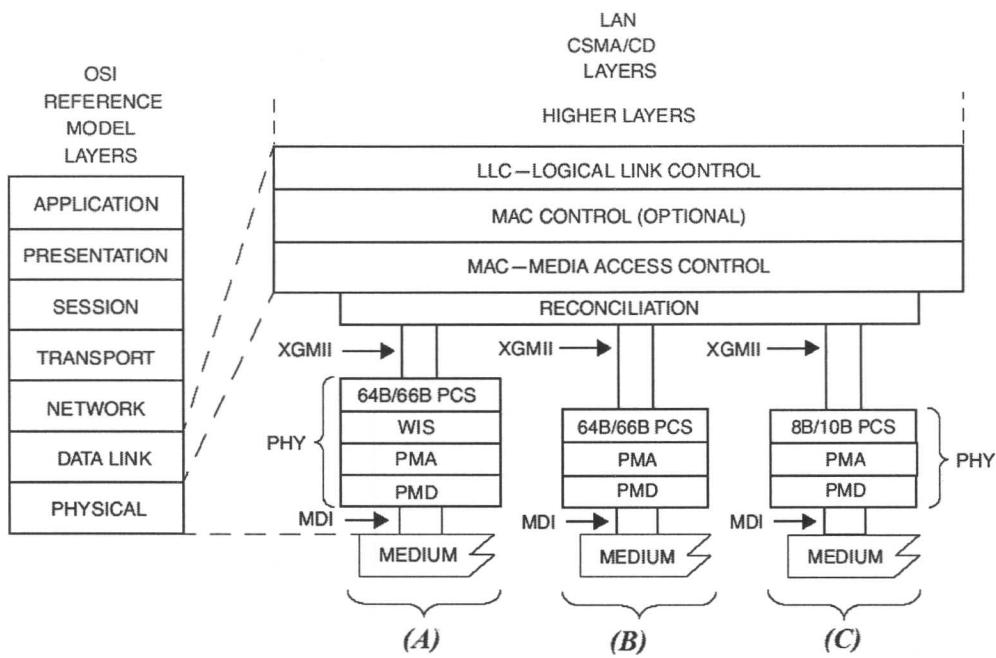
9. Figure below shows 10G Ethernet Protocol Architecture (in IEEE 802.3ae). What are A, B, and C?



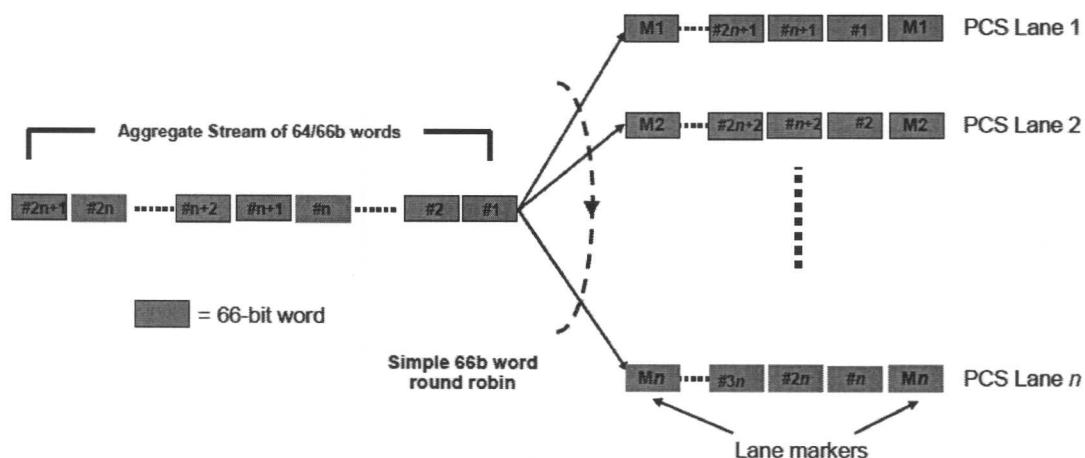
The picture below shows a series of 10G Ethernet. Please describe each physical media use.

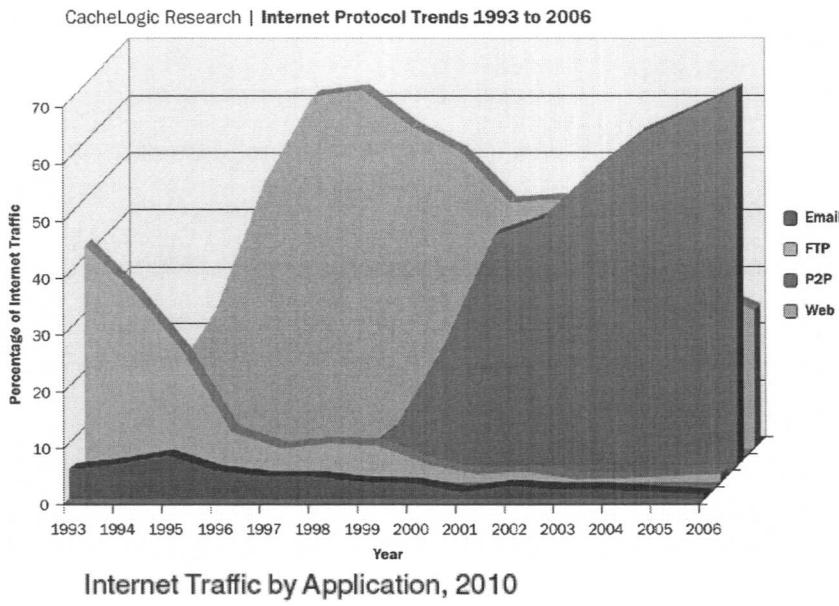


Answer

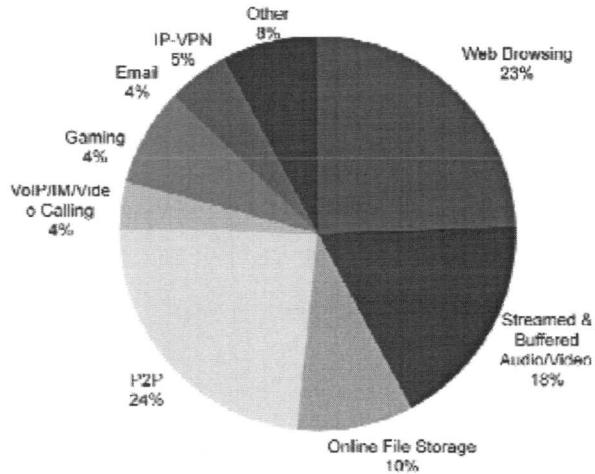


10. In 100 G Ethernet, it provides “Multilane Distribution (MLD). The MLD scheme implemented in the PCS is fundamentally based on a striping of the 66-bit blocks across multiple lanes. Please explain, how 100 G Ethernet can achieve 100 Gbps.





Internet Traffic by Application, 2010



From traffic reports above, the top one shows Internet traffic between 1993 to 2006, while the bottom one show the traffic in 2010. Please describe the traffic trend happening in these figures.