ชื่อ.....รหัส.....

มหาวิทยาลัยสงขลานครินทร์
คณะวิศวกรรมศาสตร์

สอบปลายภาค: ภาคการศึกษาที่ 1 **ปีการศึกษา:** 2557

วันที่สอบ: 17 ธันวาคม 2557 **เวลาสอบ:** 13.30-15.30น.

รหัสวิชา: 241-462 **ห้องสอบ:** A201

ชื่อวิชา: Broadband Integrated Networks **อาจารย์ผู้สอน:** อ.สินชัย กมลภิวงศ์

อ่านรายละเอียดของข้อสอบ และคำสั่งให้เข้าใจก่อนเริ่มทำข้อสอบ

ไม่อนุญาต : - หนังสือและสมุดโน้ต

- เครื่องคิดเลข

อนุญาต : - เครื่องเขียนต่างๆ เช่น ปากกา หรือดินสอ

รายละเอียดของข้อสอบ : ข้อสอบมีทั้งหมด 15 หน้า (รวมปก)

คำสั่ง :

- ข้อสอบมีทั้งหมด 18 ข้อ ให้ทำทุกข้อ
- คำตอบส่วนใดอ่านไม่ออก จะไม่มีการตรวจคำตอบนั้น

-- ทุจริตในการสอบมีโทษขั้นต่ำปรับตกในรายวิชานี้ และพักการเรียน 1 ภาคการศึกษา --

-- โทษสูงสุดคือ ไล่ออก --

ข้อ									รวม
ข้อ									รวม

ชื่อ.....รหัส.....

1. In Gigabit Ethernet, there are 2 important modification, comparing to 10/100 Ethernet.

   Shared-access topology enhancement. Gigabit Ethernet uses CSMA/CD for shared-access with 2 important modifications. What they are and how each one works, use some diagram together with your answers (10 marks)

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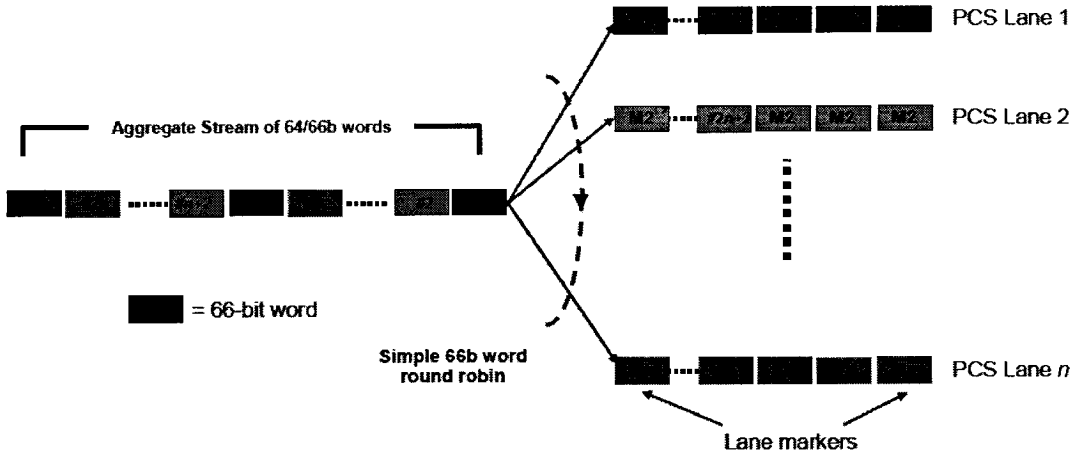
2. Picture below demonstrates how 40G and 100G Ethernet work. The MLD scheme implemented in the PCS is fundamentally based on a striping of the 66-bit blocks across multiple lanes. Please explain how this scheme works. How many lanes are used for 40G and 100G Ethernet? (10 marks)



Answer

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3. Please explain that why CSMA/CD is not suitable for Wireless LAN in the following reasons: (10 marks)
   1. Cost of bandwidth
   2. Hidden terminal problem
   3. Network dimension (or network length)

Answer

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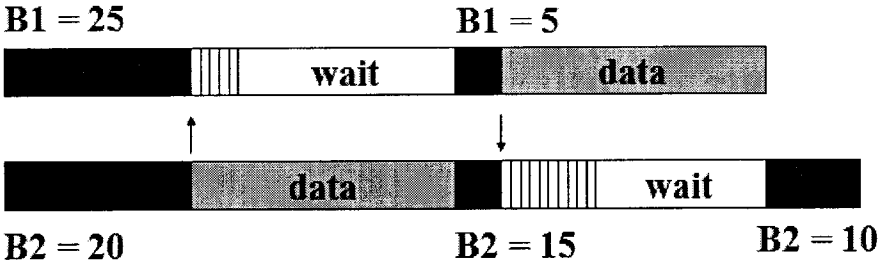
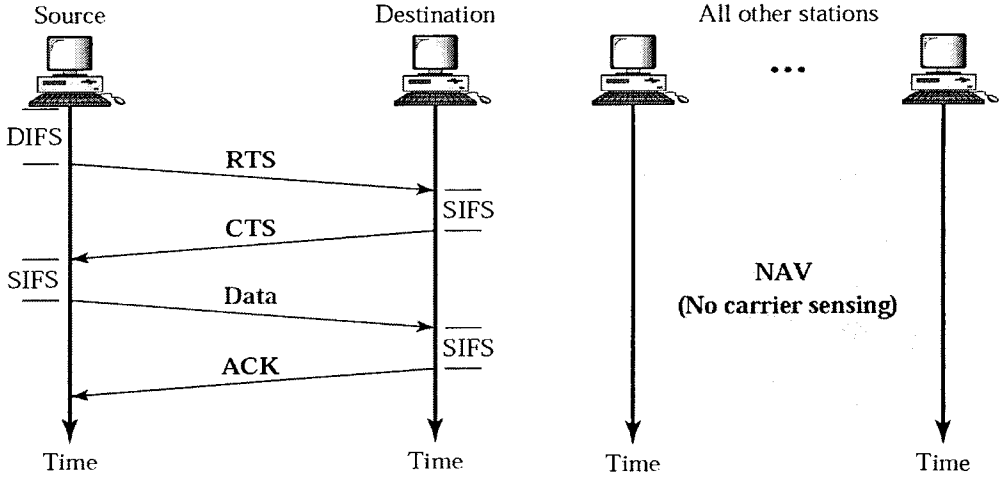
4. 2 Ethernet stations are using CSMA/CA to communicate to each other. Station 1 and Station 2 have backoff interval B1 and B2 respectively, as given in the figure below. Please describe its working sequence, given by the table below. (10 marks)



Answer

Step	Station 1	Station 2
1	B1=25	B2=20
2		
3		
4	Send data	

4. Below figures show signal sequence diagram of how CSMA/CA works. Please describe the following signals: DIFS, RTS, CTS, ACK, SIFS, and NAV. *(10 marks)*



รูปที่ 1 กระบวนการ CSMA/CA และ NAV

Answer

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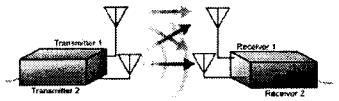
5. (a) What is a main problem of signal padding? Please describe its effects in terms of time-varying, and different signal paths (or multi-path). *(5 marks)*

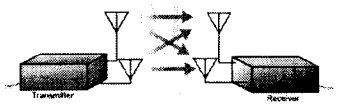
(b) If we encounter signal padding problem, which way is the most easiest way to avoid this problem. (5 marks)

Answer

6. (a) What is the main difference between multi-antenna and MIMO in WLAN? *(5 marks)*

(b) What is the main difference between antenna beamforming and diversity? (5 marks)





Answer

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7. 802.11ac achieves its raw speed increase by pushing on three different factors. Please describe what they are.

Answer

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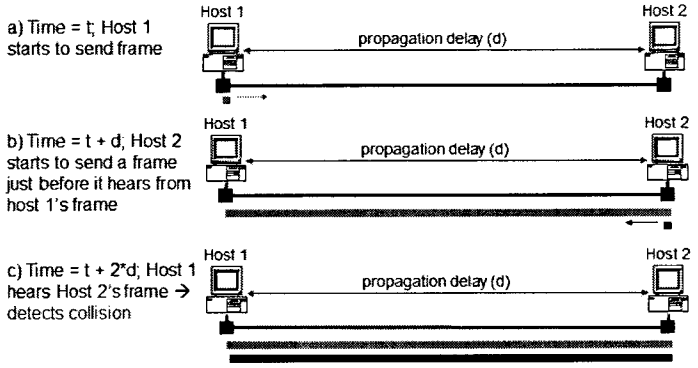
8. Below figure shows collision detection of Ethernet using CSMA/CD.

   Assume that signal speed in a cable = 2.5 x 10^8 meters per second

   Minimum Ethernet frame size is 64 bytes

   Ethernet bandwidth is 100 Mbps



รูปที่ 2 Collision detection in Ethernet

If propagation delay in copper wire is 250,000 km/hr, and Ethernet smallest packet size is 512 bytes. Ethernet transmission rate is up to 1 Gbps. Please calculate the maximum cable length that CSMA/CD is still working properly. (5 marks)

Answer

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9. Please give some 802.11ad Key Features (at least 4 of them) (5 marks)

Answer

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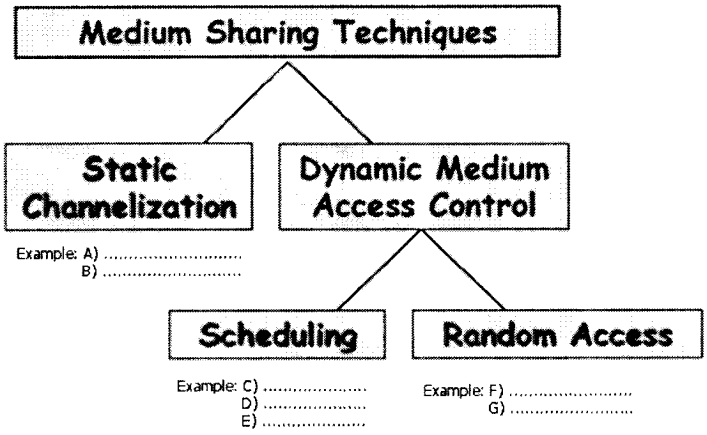
10. Figure below show categories of medium access techniques. Please give examples of each sub-category. (10 marks)



Answer:

A) .....

B) .....

C) .....

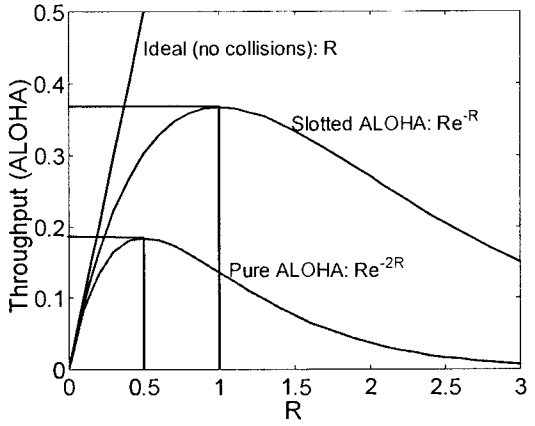
D) .....

E) .....

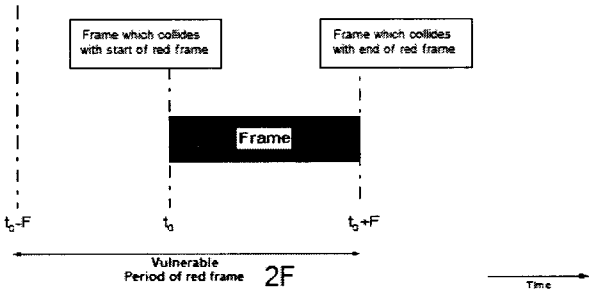
F) .....

G) .....

11. Figure below show system throughput of between pure Aloha and slotted Aloha. From this given throughput result, please explain why slotted Aloha gives 2 times higher (with draw a diagram of each scheme) (10 marks)



รูปที่ 3 Throughput of pure Aloha and slotted Aloha



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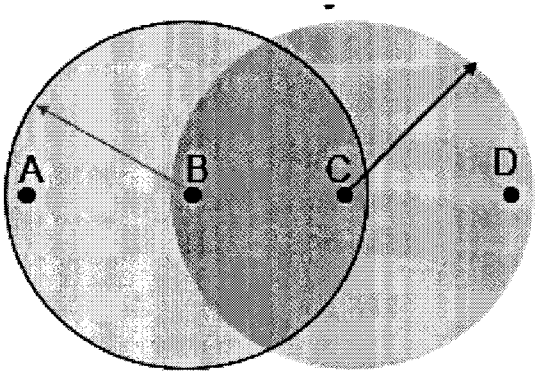
12. In wireless Ethernet, it uses CSMA/CA. Please use the below scenario to explain:
    a) What are the problems of this scenario?
    b) How does CSMA/CA work and eliminate these problem? (Please draw a signal flow diagram)



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13. In IEEE 802.11ac, there are some new features and enhancements. Below is one of them, where wider bandwidth can be achieved by using for wider frequency bandwidth:
    - 80 MHz channel width
    - 160 MHz channel width
    - Non-contiguous 160 MHz (80 MHz + 80 MHz)
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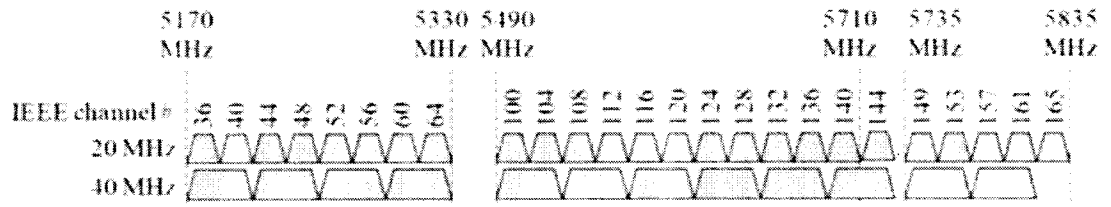

Please explain how each bandwidth each bandwidth combining work. (10 marks)
You need to show that non-contiguous differ from the first two mechanism. Please use the given diagram to draw how each one works.

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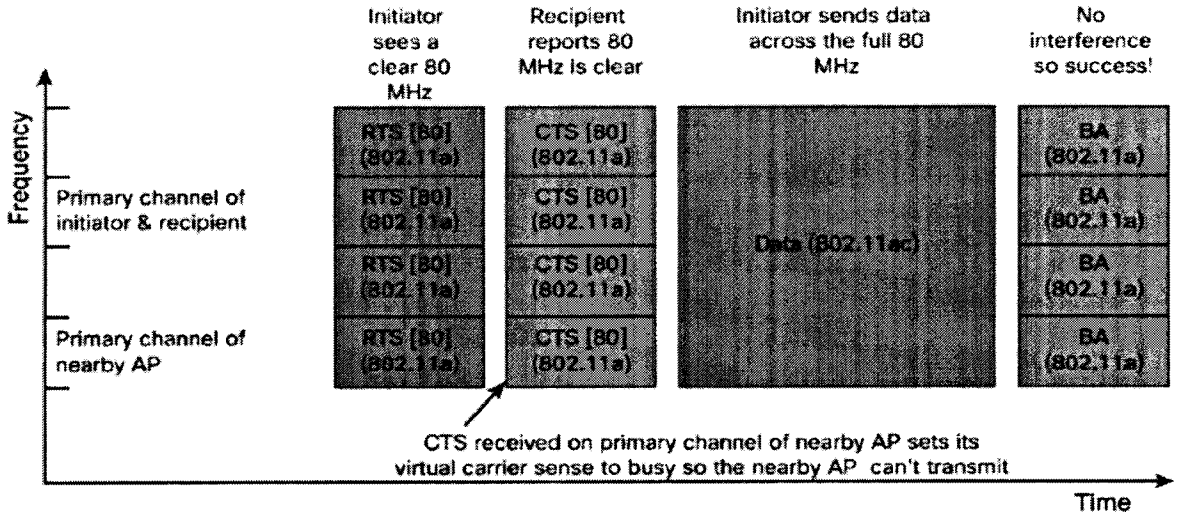
14. In IEEE 802.11ac, there is RTS/CST enhanced with bandwidth signalling. Figure below show no interference case of RTS/CTS signalling. Please explain how it works by using the diagram below. (5 marks)



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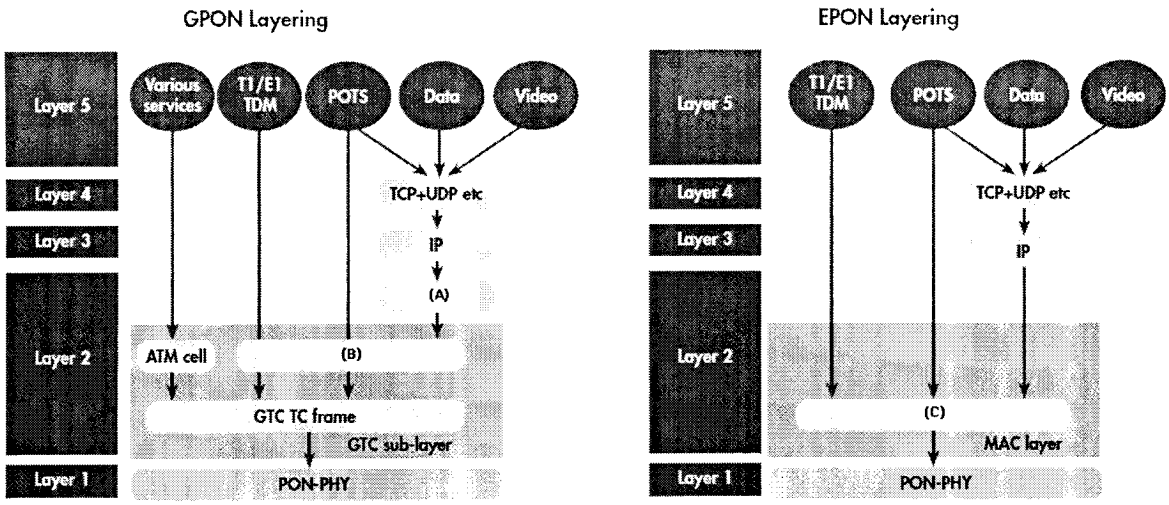
15. Ethernet Passive Optical Network (EPON), Sometimes called GEPON (Gigabit Ethernet Passive Optical Network), and has been defined by IEEE standard. In contrast, Gigabit Passive Optical Network (GPON) has been defined by ITU in ITU Standard G.984.
    (a) below are GPON layering and EPON Layering. Please finish all the missing boxes (A), (B), and (C); what their names are. (5 marks)



Answer:

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(b) Please describe GPON & EPON similarity. (5 marks)

Answer:

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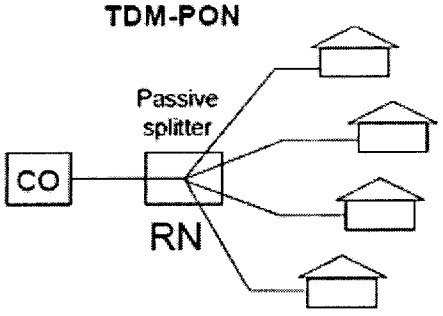
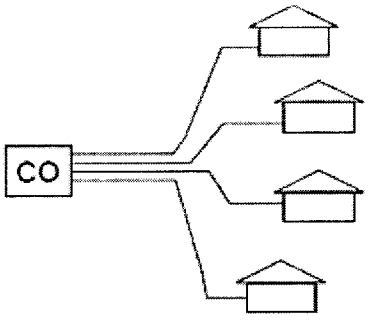
16. Passive FTTH network or passive optical network (PON) is playing an important role on today network service and access technology. TDM-PON (Time Division Multiplexer PON) and Home-

run from CO to end users or point-to-point Home-run are competitors to provide a high speed access network. Please make a comparison between both of them. (5 marks)



Passive power-splitting from CO to end users (PON)



Home-run from CO to end users

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17. What are major LTE radio technologies? (5 marks)

Answer

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18. Please make a comparison between 2G, 3G and 4 G as follows: (10 marks)

Functions	2G	3G	4G
Compatibility			
Data speed			
Voice speed/quality			
Radio technology			
All IP traffic			
Hand over efficiency			