มหาวิทยาลัยสงขลานครินทร์

คณะวิศวกรรมศาสตร์

สอบปลายภาค: ภาคการศึกษาที่ 2 **ปีการศึกษา**: 2557

วันที่สอบ: 14 พฤษภาคม 2558 **เวลาสอบ**: 13.30-15.30

รหัสวิชา: 242-461 **ห้องสอบ**: S201

ชื่อวิชา: BROADBAND AND HIGH SPEED NETWORKS **อาจารย์ผู้สอน**: อ.สินชัย กมลภิวงศ์

อ่านรายละเอียดของข้อสอบ และคำสั่งให้เข้าใจก่อนเริ่มทำข้อสอบ

ไม่อนุญาต : - หนังสือและสมุดโน้ต

- เครื่องคิดเลข

อนุญาต : - เครื่องเขียนต่างๆ เช่น ปากกา หรือดินสอ

รายละเอียดของข้อสอบ : ข้อสอบมีทั้งหมด 12 หน้า (รวมปก)

คำสั่ง :

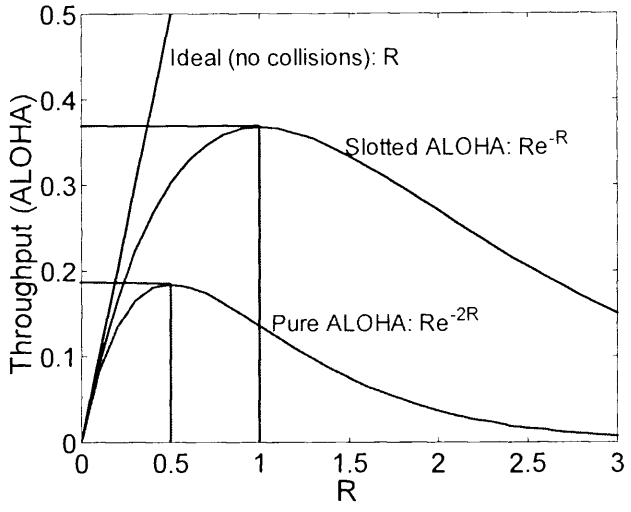
- ข้อสอบมีทั้งหมด 14 ข้อ ให้ทำทุกข้อ
- คำตอบส่วนใดอ่านไม่ออก จะไม่มีการตรวจคำตอบนั้น

-- ทุจริตในการสอบมีโทษขั้นต่ำปรับตกในรายวิชานี้ และพักการเรียน 2 ภาคการศึกษา --

-- โทษสูงสุดคือ ไล่ออก --

ข้อ									รวม
ข้อ									รวม

1. 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 1 Throughput of pure Aloha and slotted Aloha

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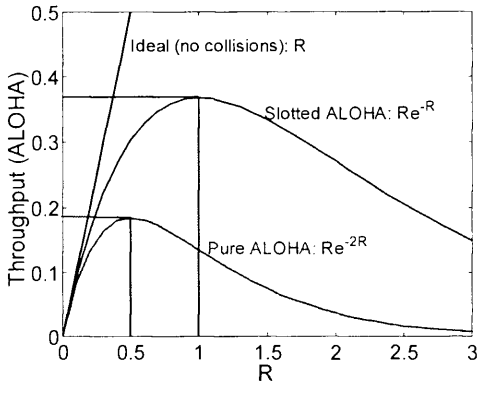
2. Aloha performance (10 marks)

Suppose that a radio system uses a 9600 bps channels for sending call setup request messages to a base station. Suppose that packets are 120 bits long, that the timeout is 20 ms, and that the backoff is uniformly distributed between 1 and 7. What is the maximum throughput possible with ALOHA and with slotted ALOHA? Compare the average delay in ALOHA and slotted ALOHA when the load is 40 percent of the maximum possible throughput of the ALOHA system.



Answer

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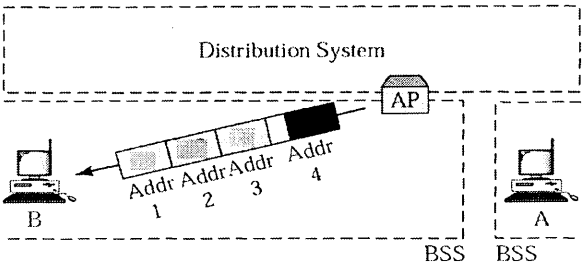
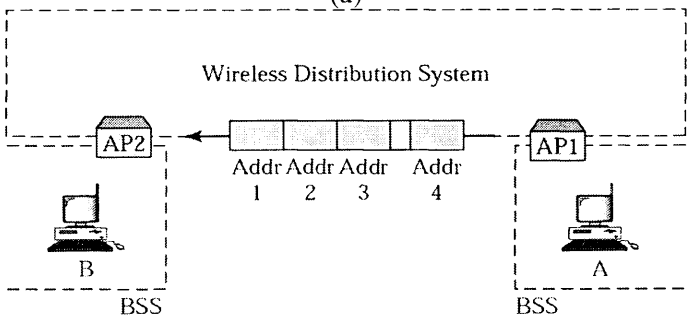
3. Below table show the description of Subfields in FC field used in WLAN. Please fill in what addresses (1, 2, 3 and 4) used in scenarios (a) and (b). *(10 marks)*

To DS	From DS	Address 1	Address 2	Address 3	Address 4
0	0	Destination station	Source station	BSS ID	N/A
0	1	Destination station	Sending AP	Source station	N/A
1	0	Receiving AP	Source station	Destination station	N/A
1	1	Receiving AP	Sending AP	Destination station	Source station



(a)



(b)

Answer

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4. (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)

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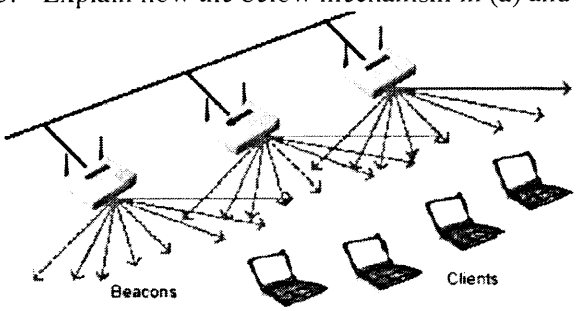
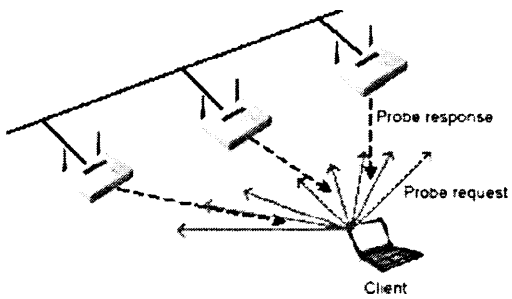
5. Explain how the below mechanism in (a) and (b) work (10 marks)



(a).



(b)

Answer

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6. 802.11ac achieves its raw speed increase by pushing on three different factors:n channel bonding, dense modulation, and MIMO. Please describe what they are.

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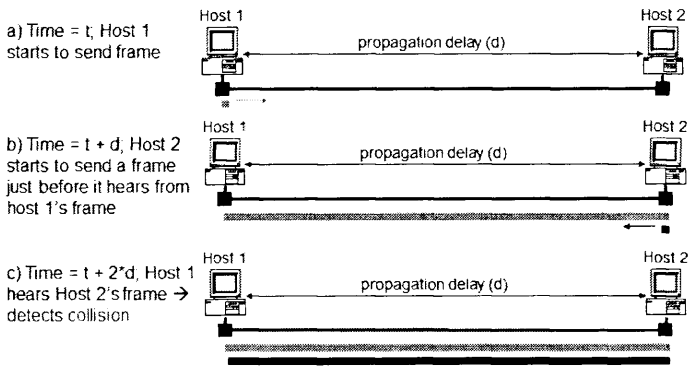
7. Below figure shows collision detection of Ethernet using CSMA/CD.



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)

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

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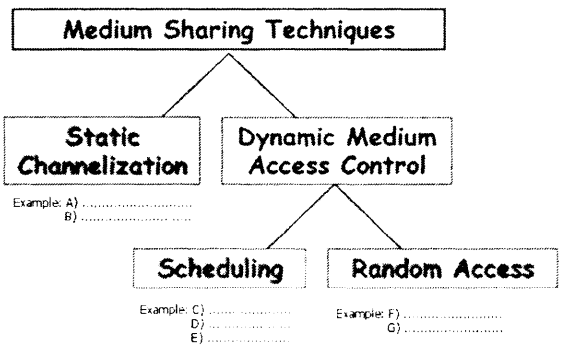
9. Figure below show categories of medium access techniques. Please give examples of each sub-category. (10 marks)



Answer:

A) .....

B) .....

C) .....

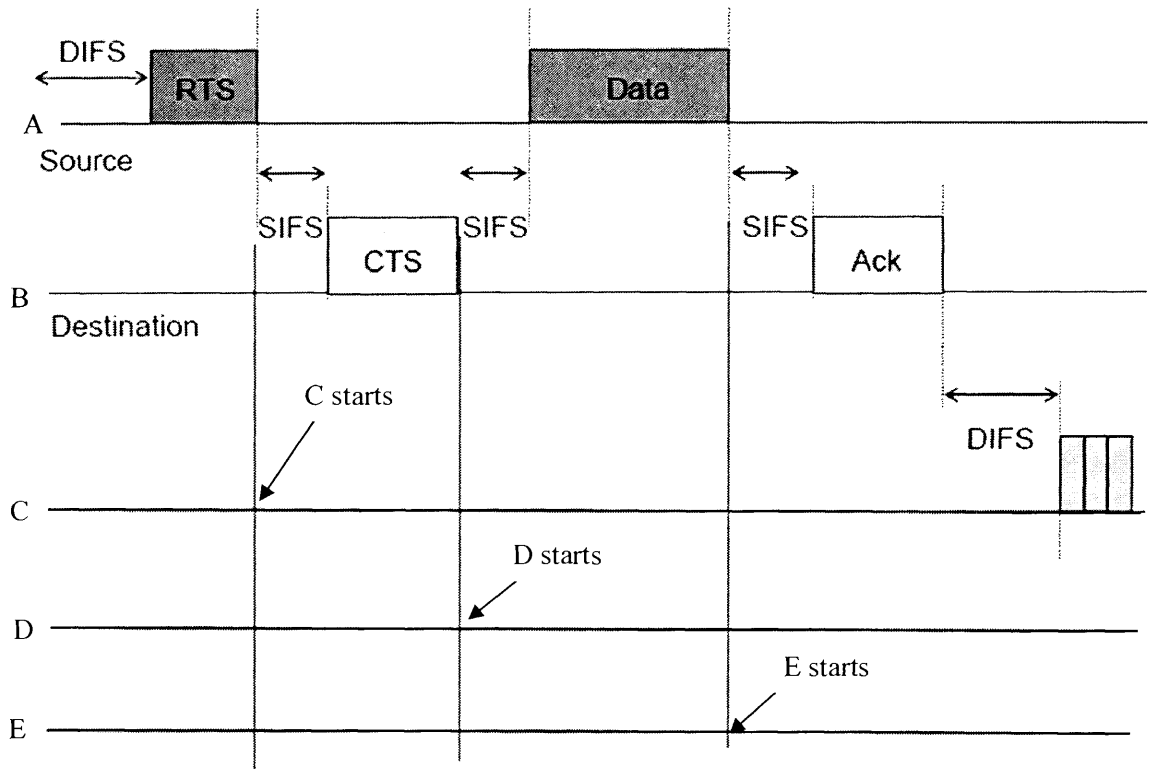
D) .....

E) .....

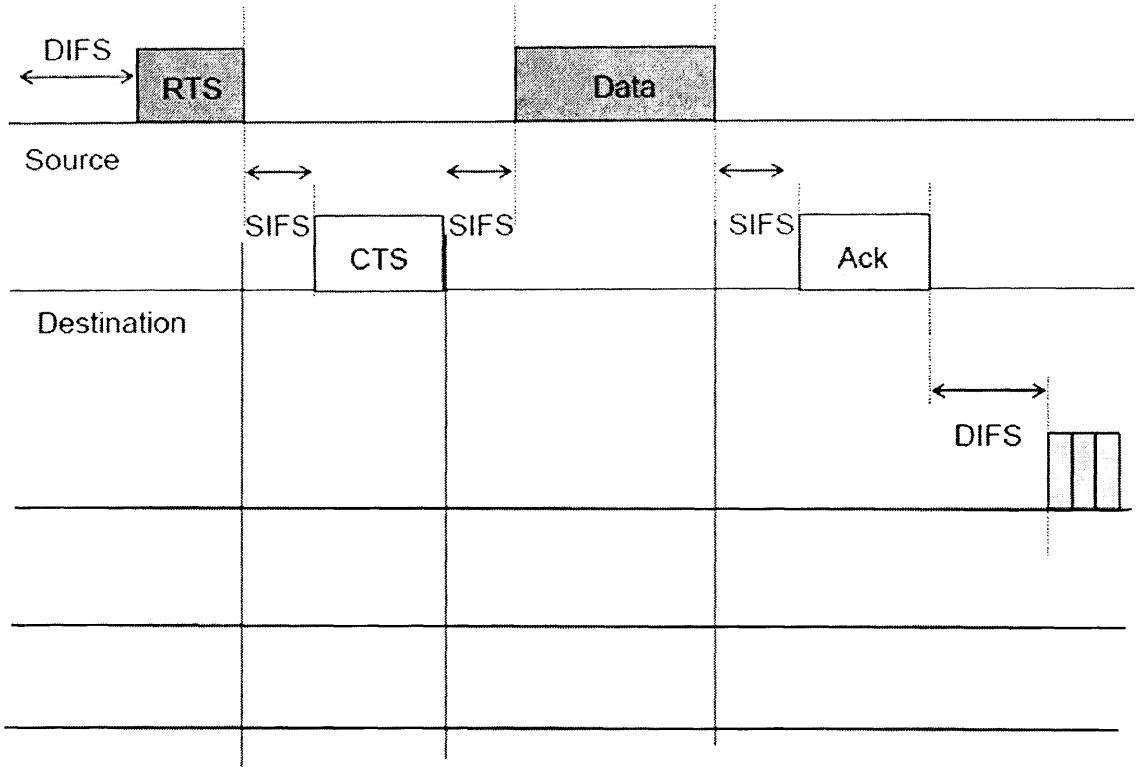
F) .....

G) .....

10. Below is the sequence diagram of how WLAN works. Please complete the diagram of the signaling of node C, D, and E.(10 marks)



Answer



11. 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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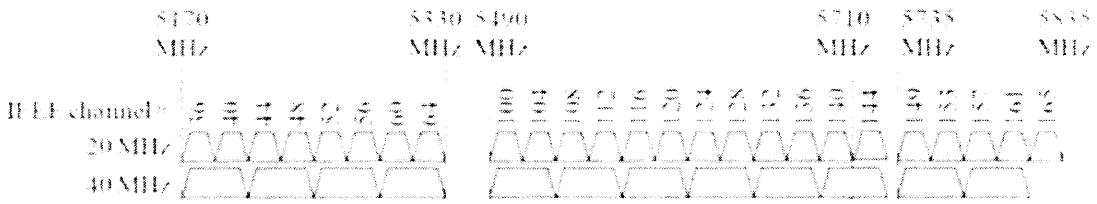

Please explain how each bandwidth each bandwidth combining work. (10 marks)
You need to show that non-contiguous differ from the first two mechanism. Please use the given diagram to draw how each one works.

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12. Wireless LAN Performance:
    a. Please explain how MSDU aggregation and MPDU aggregation work, what they differ to each other, which one can offer better throughput (10 marks)
    b. What are the differences of HT PHY (High Throughput PHY) and MPDU? (5 marks)

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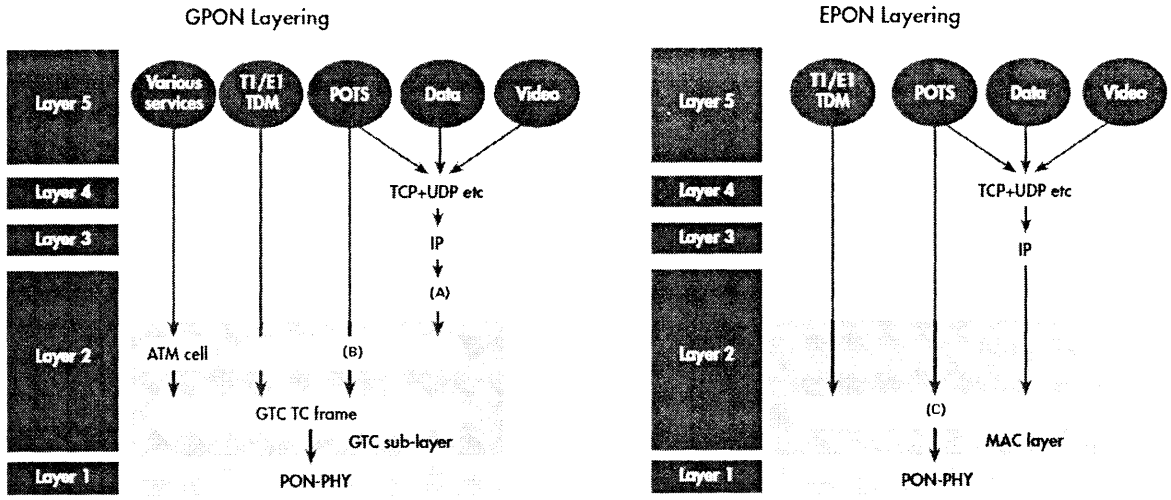
13. Ethernet Passive Optical Network (EPON), Sometimes called GEPON (Gigabit Ethernet Passive Optical Network), and has been defined by IEEE standard. In contrast, Gigabit Passive Optical Network (GPON) has been defined by ITU in ITU Standard G.984.
    (a) below are GPON layering and EPON Layering.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



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

Answer:

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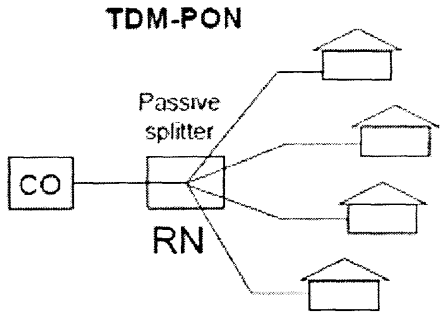
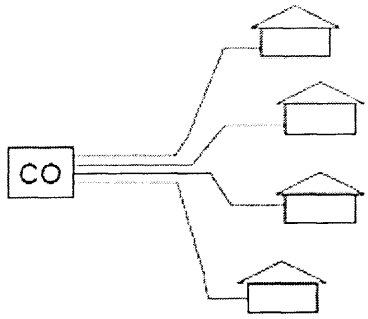
14. Below high speed access network based on optical fiber technology. Please make a comparison between both of them. (5 marks)



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



Home-run from CO to end users

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