

車載通訊技術 期中考 (103/04)

1. (a) List three technologies that are integrated for intelligent transportation systems (ITS) (6%) (b) What is Telematics? (4%) (10% total)
2. (a) What are V-V and V-I communications? (英文全名) (4%)
(b) What is the VANET? (英文全名與說明) (4%)
(c) List two major VANET applications. (4%) (12% total)
3. List four differences are between VANETs and MANETs. (8%)
4. (a) What is the Hidden-Terminal Problem? (4%) How IEEE 802.11 solves it with four periods? (8%)
(b) What is the Exposed-Terminal Problem? (4%) (16% total)
5. Explain compass routing, MFR and GEDIR position-based VANET routing protocols. (operation: 2%, 6% total)
6. What is Geocasting ? (2%) List two categories of Geocast protocols. (4%) Explain how they work. (4%) (10% total)
7. 請說明在 VANET 中以廣播為主的兩個設計重點? (4%) 列出除了 Cluster-based 之外, 三種選擇轉傳節點的廣播策略. (3%) 以群集為基礎的廣播策略為何? (4%) (11% total)

選擇題 (3% each, 27% total)

1. 何謂 Road-Side Unit(RSU)
 - (1) 路側設施, 為 WAVE 中不會移動的通訊單元
 - (2) WAVE 的通訊控制主機
 - (3) WAVE 的訊息發佈單元
 - (4) WAVE 的通訊管理單元
2. 媒體存取控制層的設計上, DSRC/802.11p 和其他 IEEE 802.11 的標準類似, 都是採用下列何種的運作方式:
 - (1) CSMA/CA
 - (2) CSMA/CD
 - (3) TDMA
 - (4) CDMA
3. 在 Vehicular Communication 中, 車輛可以透過何種方式連上網路, 下列何者不是:
 - (1) 3G 網路
 - (2) WLAN
 - (3) 車輛跟車輛之間的車間通訊
 - (4) 藍芽

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4. DSRC 的通訊服務使用了多少的頻帶以便讓一些公用的安全和隱私相關應用？
 - (1) 3.850~3.925GHz
 - (2) 5.850~5.925GHz
 - (3) 6.850~6.925GHz
 - (4) 5.650~5.725GHz

5. DSRC/802.11p 資料的傳輸率範圍為多少至多少？
 - (1) 3Mbps~24Mbps
 - (2) 6Mbps~27Mbps
 - (3) 8Mbps~27Mbps
 - (4) 10Mbps~24Mbps

6. 下列哪一項不是 IEEE802.11p 的特性？
 - (1) 時間性
 - (2) 高速移動性
 - (3) 互通性
 - (4) 以上皆非

7. 何謂 On-Board Unit(OBU)
 - (1) 面板單元
 - (2) 路側設施
 - (3) 通訊控制單元
 - (4) 可移動的 WAVE 通訊單元

8. 請問在 DSRC(Dedicated Short Range Communications)的架構中所規範的 channel，Control channel 與 Service channel 個數分別為何？
 - (1) 2 個 Control channel,5 個 Service channel
 - (2) 3 個 Control channel,4 個 Service channel
 - (3) 1 個 Control channel,6 個 Service channel
 - (4) 6 個 Control channel,1 個 Service channel

9. DSRC/802.11p 和 802.11a 的參數比較，下列何者不是：
 - (1) DSRC/802.11p 把信號的頻寬從 20MHz 降低成 10MHz
 - (2) DSRC/802.11p 資料的傳輸率範圍為 6Mbps 到 27Mbps
 - (3) DSRC/802.11p 傳輸的能源 level 也被修正成能夠在室外通訊，通訊範圍也增加到 1000 公尺
 - (4) DSRC/802.11p 資料的傳輸率範圍為 10Mbps 到 100Mbps

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1. (a) List three technologies that are integrated for intelligent transportation systems (ITS) (6%) (b) What is Telematics? (4%) (10% total)

Ans:

(a) advanced sensor, computer, electronics, and communications technologies and management strategies (2% each)

(b)

Telecommunication (2%) + Informatics (2%)

2. (a) What are V-V and V-I communications? (英文全名) (4%)
(b) What is the VANET? (英文全名與說明) (4%)
(c) List two major VANET applications. (4%) (12% total)

Ans:

(a) Vehicle to vehicle communication (2%)

Vehicle to infrastructure communication (2%)

(b) Vehicular Ad Hoc Network (2%)

The mobile nodes (vehicles) can communicate each other without central access points. (2%)

(c) VANET safety applications (2%)

Non-safety applications (2%)

3. List four differences are between VANETs and MANETs. (8%)

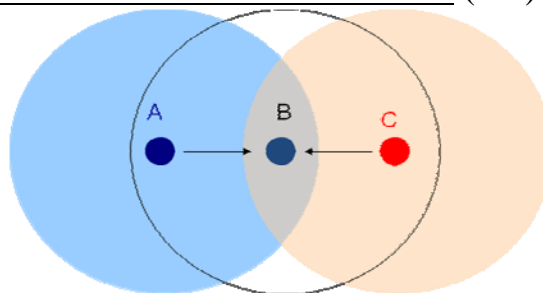
Ans:

- Vehicles mobility (2%)
- Network topology (2%)
- No significant power constraint (2%)
- Localization (2%)

4. (a) What is the Hidden-Terminal Problem? (4%) How IEEE 802.11 solves it with four periods? (8%)
(b) What is the Exposed-Terminal Problem? (4%) (16% total)

Ans:

(a) The hidden-terminal problem occurs (collision at B) when node A and C sends data to node B (2%) where B can hear from A and C but A and C cannot hear from each other (2%)

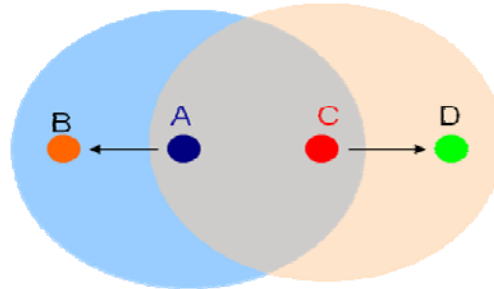


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IEEE 802.11 DCF

- Contention period (2%)
- Handshake period (2%)
- Data period (2%)
- ACK period (2%)

(b) The exposed-terminal problem (collision at C) occurs when node C is exhibited to transmit data to node D at the time A is sending data to B (2%) where A and C can hear from each other (2%)



5. Explain compass routing, MFR and GEDIR position-based VANET routing protocols. (operation: 2%, 6% total)

Ans:

- The compass routing algorithm, forwards packets to the neighbor N that forms the smallest angle $\angle NSD$ with the destination, where S is the forwarding node, N is a potential next hop and D is the destination.
- In the MFR, node S forwards the packet to node A that is the node that minimizes the dot product \overline{DS} and \overline{DA} .
- In GEDIR, packets are sent to neighbor A that is closest to destination D, although the distance of the current node, S, to the destination is less than the distance from node A to node D

6. What is Geocasting ? (2%) List two categories of Geocast protocols. (4%) Explain how they work. (4%) (10% total)

Ans:

- (1) Geocasting distinguishes itself by specifying hosts as group members (1%) within a specified geographical region, i.e., the Geocast region (1%)
- (2) Data-Transmission Oriented protocols: (2%)
 - use flooding or a variant of flooding to forward Geocast packets from the source to the Geocast region. (2%)
- Routing Creation Oriented protocols: (2%)

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create routes from the source to the Geocast region via control packets. (2%)

7. 請說明在 VANET 中以廣播為主的兩個設計重點？(4%) 列出除了 Cluster-based 之外，三種選擇轉傳節點的廣播策略。(3%) 以群集為基礎的廣播策略為何？(4%) (11% total)

Ans：(1)如何有效的將廣播訊息快速且有效的傳送到目標節點。(2%)
在最短的時間內讓有需要知道廣播資訊的車輛接收到這個訊息。(2%)

(2) three different broadcasting strategies to select the forwarding nodes:

- Probability-based (1%)
- Location-based (1%)
- Neighbor-based (1%)

(3)行動節點會被集結成群集的網路拓樸，每一個群集都有一個群集的負責節點(2%)，當有資料要傳輸的時候，則透過這個負責節點傳輸到目的地節點所存在的群集中的負責節點，再轉傳到該目的地節點。(2%)

選擇題 (3% each, 27% total)

Ans: 1, 1, 4, 2, 2, 1, 4, 3, 4

1. 何謂 Road-Side Unit(RSU)
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2. 媒體存取控制層的設計上，DSRC/802.11p 和其他 IEEE 802.11 的標準類似，都是採用下列何種的運作方式：
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 - (2) WLAN
 - (3) 車輛跟車輛之間的車間通訊
 - (4) 藍芽答案：4。
4. 19.DSRC 的通訊服務使用了多少的頻帶以便讓一些公用的安全和隱私相關應用？

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答案：2。

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答案：2。

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答案：1。

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答案：4。

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答案：3。

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答案：4。