

## 車載通訊技術 期中考 (100/11)

1. (a) List three technologies that are integrated for intelligent transportation systems (ITS) (6%)  
(b) What are two purposes of ITS? (4%)  
(c) List three kinds of ITS applications (6%)
2. What is Telematics? (4%)
3. (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) What frequency band and communication standard are used for VANET? (4%)  
(d) List two major VANET applications. (4%)
4. What four differences are between VANETs and MANETs? Explain them. (16%)
5. List values of following DSRC parameters. (a) Physical channels (b) maximum transmission rate (c) modulation scheme (6%)
6. (a) What is the Hidden-Terminal Problem? (5%)  
(b) What is the Exposed-Terminal Problem? (5%)
7. List three types of VANET routing protocols (9%)
8. Explain three kinds of position-based VANET routing protocols. (name: 2%, operation: 2%, 12% total)
9. What is Geocasting ? (3%) Explain Location-Based Multicast (LBM) and list two types of forwarding zone (8%)

## 車載通訊技術 期中考 (100/11)

1. List three technologies that are integrated for intelligent transportation systems (ITS) (6%)
  - (b) What are two purposes of ITS? (4%)
  - (c) List three kinds of ITS applications (6%)

Ans:

- (a) advanced sensor, computer, electronics, and communications technologies and management strategies (2% each)
- (b) Increase the safety (2%) and efficiency (2%) of the surface transportation system
- (c) Global positioning systems (2%)  
Weather information systems (2%)  
Real-time traveler information (2%)

2. What is Telematics? (4%)

Ans:

Telecommunication (2%) + Informatics (2%)

3. (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) What frequency band and communication standard are used for VANET? (4%)
  - (d) List two major VANET applications. (4%)

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) 5.9 GHz band; (2%)  
DSRC (IEEE 802.11p) (2%)
- (d) VANET safety applications (2%)  
Non-safety applications (2%)

4. What four differences are between VANETs and MANETs? Explain them. (16%)

Ans:

- Vehicles mobility (2%)  
Vehicles move at high speed but mobility is regular and predictable (2%)
- Network topology (2%)  
High speed movement makes network topology dynamic (2%)
- No significant power constraint (2%)

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Recharging batteries from vehicle (2%)

➤ Localization (2%)

Vehicles position estimate accurately through GPS systems or on-board sensors (2%)

5. List values of following DSRC parameters. (a) physical channels (b) maximum transmission rate (c) modulation scheme (6%)

Ans:

(a) 6 (2%)

(b) 27Mbps (2%)

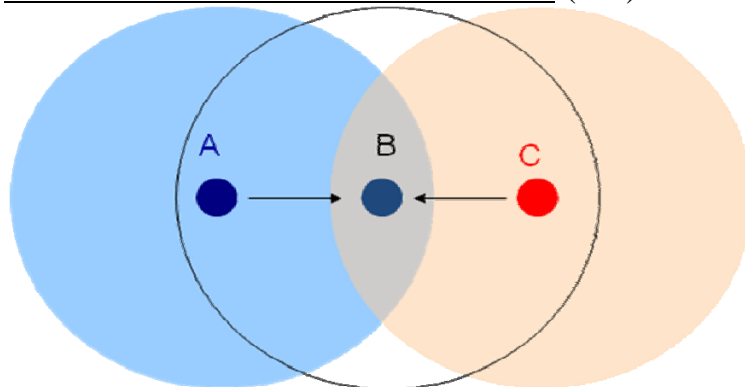
(c) OFDM (2%)

6. (a) What is the Hidden-Terminal Problem? (5%)

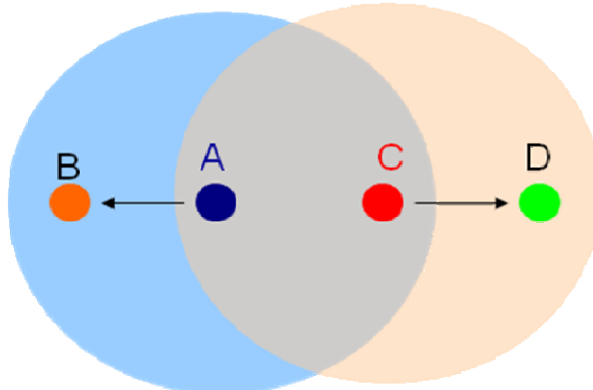
(b) What is the Exposed-Terminal Problem? (5%)

Ans:

- (a) The hidden-terminal problem occurs (collision at B) when node A and C sends data to node B (3%) where B can hear from A and C but A and C cannot hear from each other (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 (3%) where A and C can hear from each other (2%)



7. List three types of VANET routing protocols (9%)

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- Ans: (1) Position-based Routing (3%)  
(2) Geocasting Routing (3%)  
(3) Broadcast Routing (3%)

8. Explain three kinds of position-based VANET routing protocols.  
(name: 2%, operation: 2%, 12% total)

Ans:

- Greedy routing algorithm is a memoryless algorithm. A node selects the node that is closest to the destination (including itself) as the next node in the route.
- 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.
- Randomized Compass routing
  - 1) the neighbor with smallest angle above that line and the neighbor with smallest angle below that line
  - 2) one of those neighbors is randomly chosen to be the next hop
- In the MFR, node S forwards the packet to node A that is the node that minimizes the dot product  $\overrightarrow{DS}$  and  $\overrightarrow{DA}$ .
- 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

9. What is Geocasting ? (3%) Explain Location-Based Multicast (LBM) and list two types of forwarding zone (8%)

Ans:

- (1) Geocasting distinguishes itself by specifying hosts as group members (1%) within a specified geographical region, i.e., the Geocast region (2%)
- (2) LBM is practically identical with flooding data packets, with the modification that a node determines whether to forward a Geocast packet further via one of two schemes (4%)
  - A BOX Forwarding Zone (2%)
  - A CONE Forwarding Zone (2%)