車載通訊技術 期末考 （105/06）

1. In VANETs, which three characteristics affect the design of the routing protocols? (3% each, 9% total)

2. 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. (6%) 以群集為基礎的廣播策略為何？(4%) (14% total)

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

4. (a) Which two factors are the position-based VANET routing decision at each node based on? (4%) (b) Explain five kinds of position-based VANET routing protocols. (name: 2%, operation: 2%, 24% total)

5. (a) What is Geocasting？(2%) (b) List two categories of Geocast protocols. (6%) Explain how they work. (4%) (c) Explain Location-Based Multicast (LBM) and list two types of forwarding zone (8%) (20% total)

6. (a) What is the local optimum a packet with the greedy forwarding may reach? (3%) (b) How to escape from a local optimum? (3%) (c) What is the main difference between GPSR and GPCR routing? (3%, 9% total)

7. Please match each protocol with its correct operation: e.g., 1-a, 2-b,..... (15%)

Protocol	**Operation**
1. VADD	a. “Guards” help to track the current position of a destination
2. Connectivity-Aware Routing (CAR)	b. constructs a route on demand from a source to vehicles that reside in a specified geographic region
3. Receive on Most Stable Group-Path (ROMSGP)	c. minimize the number of packet transmissions required to satisfy packet-specific delay thresholds
4. GVGrid	d. Setting up routes that involve only vehicles from the same group
5. D-Greedy and D-MinCost	e. forward the packet to the best road with the lowest data delivery delay

車載通訊技術 期末考 （105/06）

1. In VANETs, which three characteristics affect the design of the routing protocols? (3% each, 9% total)

Ans:

- High-speed node movement
- Frequent topology change
- Short connection lifetime especially with multi-hop paths

2. 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. (6%) 以群集為基礎的廣播策略為何？(4%) (14% 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 (2%)
- Location-based (2%)
- Neighbor-based (2%)

(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%)

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

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

4. (a) Which two factors are the position-based VANET routing decision at each node based on? (4%) (b) Explain five kinds of position-based VANET routing protocols. (name: 2%, operation: 2%, 24% total)

Ans:

(a)

the destination’s position contained in the packet (2%)
the position of the forwarding node’s neighbors (2%)

(b)

- 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 ∠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

5. (a) What is Geocasting？(2%) (b) List two categories of Geocast protocols. (6%) Explain how they work. (4%) (c) Explain Location-Based Multicast (LBM) and list two types of forwarding zone (8%) (20% total)

Ans:

(a) Geocasting distinguishes itself by specifying hosts as group members (1%) within a specified geographical region, i.e., the Geocast region (1%)

(b) Data-Transmission Oriented protocols: (3%)
use flooding or a variant of flooding to forward Geocast packets from the source to the Geocast region. (2%)
Routing Creation Oriented protocols: (3%)
create routes from the source to the Geocast region via control packets. (2%)

(c) 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%)

6. (a) What is the local optimum a packet with the greedy forwarding may reach? (3%) (b) How to escape from a local optimum? (3%) (c) What is the main difference between GPSR and GPCR routing? (3%, 9% total)

Ans:

(a) no neighbor exists which is closer to the destination than the intermediate node itself

(b) use a repair strategy

(c) packets should always be forwarded to a node on a junction rather than being forwarded across a junction

7. Please match each protocol with its correct operation: e.g., 1-a, 2-b,..... (15%)

Protocol	**Operation**
6. VADD	f. “Guards” help to track the current position of a destination

車載通訊技術 期末考 （105/06）

7. Connectivity-Aware Routing (CAR)	g. constructs a route on demand from a source to vehicles that reside in a specified geographic region
8. Receive on Most Stable Group-Path (ROMSGP)	h. minimize the number of packet transmissions required to satisfy packet-specific delay thresholds
9. GVGrid	i. Setting up routes that involve only vehicles from the same group
10. D-Greedy and D-MinCost	j. forward the packet to the best road with the lowest data delivery delay

Ans:

1-e

2-a

3-d

4-b

5-c