Mobile Computing Final 104/01

1. (a) What procedures are used for map digitization with five steps? (10%) (b) With which three primitives to associate each features in the digital map? (6%) (16% total)

2. (a) List three kinds of Terrestrial Radio-based Location Technology? (2% each, 6% total) (b) What does Navigation mean? (2%)

3. (a) What are two major types of Ad Hoc routing protocols, depending on when they perform routing? List how these two types work. (各四項，8% each, 16% total) (b) Please classify DSR, DSDV, CGSR, AODV, TORA, ABR, SSA into which type they belong (14%) (30%).

4. (a) How CGSR does its three data forwarding steps? (6%) (b) List three control messages of AODV. (名稱 2% each，6%) When are they sent in AODV (說明 2% each，6%) (c) What is the major difference of AODV and DSR? (名稱 2% each，說明 2%, 8%) (d) How ZRP works in ad hoc network? (6%) (32% total)

5. (a) What is MANET? (2%) (b) List three technical characteristics of MANET. (2% each, 6%) (8% total)

6. With which three precise coordinate items do digital (Vector) maps use to represent the map locations? (6%)

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1. (a) What procedures are used for map digitization with five steps? (10%) (b) With which three primitives to associate each features in the digital map? (6%) (16% total)

Ans:

(a) Unit03.ppt pp.13 (10%)

- Prepare the raster file of geographical map or aerial/satellite photographic
- Survey the significant cartographic information
- A Set of Points containing the information about latitude and longitude
- Draw the lines/segments/shapes according to the surveyed points
- Adjust the locations of those components based on the map matching
- Store these components in a digital form

(b) Three primitives (6%)

- Points
- Lines
- Areas

2. (a) List three kinds of Terrestrial Radio-based Location Technology? (2% each, 6% total) (b) What does Navigation mean? (2%)

Ans:

(a)

- Time of Arrival (TOA) (2%)
- Angle of Arrival (AOA)
- Time Difference of Arrival (TDOA)

(b) Navigation provides a route scheme according to the location to find a path (2%)

3. (a) What are two major types of Ad Hoc routing protocols, depending on when they perform routing? List how these two types work. (各四項，8% each, 16% total) (b) Please classify DSR, DSDV, CGSR, AODV, TORA, ABR, SSA into which type they belong (14%) (30%).

Ans:

(a)

Proactive Routing Protocol: (8%)

- continuously evaluate the routes (2%)
- attempt to maintain consistent, up-to-date routing information
- when a route is needed, one may be ready immediately
- when the network topology changes, the protocol responds by propagating updates throughout the network to maintain a consistent view

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Reactive Routing Protocol: (8%)

- on-demand: create routes only when it is desired by the source node
- route discovery: invoke a route-determination procedure
- the procedure is terminated when
  - a route has been found
  - no route is found after all route permutations are examined
- longer delay: sometimes a route may not be ready for use immediately when data packets come

(b) Proactive Routing Protocol: DSDV, CGSR (2%)
Reactive Routing Protocol: DSR, AODV, TORA, ABR, SSA

4. (a) How CGSR does its three data forwarding steps? (6%) (b) List three control messages of AODV. (名稱 2% each，6%) When are they sent in AODV (說明 2% each，6%) (c) What is the major difference of AODV and DSR? (名稱 2% each，說明 2%, 8%) (d) How ZRP works in ad hoc network? (6%) (32% total)

Ans:

(a) Data forwarding steps of CGSR: (6%)

- from cluster head to cluster head in a hierarchical manner
- then from cluster head to cluster members
- between two cluster heads, gateways are used to forward the packets

(b) RREQ, RREP, RERR (2% each)

RREQ: when a node wants to communicate with another node, but does not have a route to that node. Source node broadcasts a route request (RREQ) packet to its neighbors (2% each)

RREP: If a node receives an RREQ packet and it has a current route to the target destination, then it unicasts a route reply packet (RREP) to the neighbor that sent the RREQ packet

RERR: The upstream (toward the source) node detecting a failure propagates a route error (RERR) packet to the source node. The source (or another node on the path) can rebuild a path by sending a RREQ packet

(c) DSR uses Source Routing: (2%)

- ❑ routes are denoted with complete information (each hop is registered)
  - There is a “route record” field in the packet.
  - The source node will add its address to the record.
  - On receipt of the packet, a host will add its address to the “route record”

and rebroadcast the packet (2%)

AODV Uses hop-by-hop routing (2%)

- ❑ Routes are based on dynamic table entries maintained at intermediate nodes (2%)

(d) How ZRP works in ad hoc network? (6%)

- Hybrid of table-driven and on-demand!!
- From each node, there is a concept of "zone".
  Within each zone, the routing is performed in a table-driven manner (proactive).
- For inter-zone routing, on-demand (reacting) routing is used.

5. (a) What is MANET? (2%) (b) List three technical characteristics of MANET. (2% each, 6%) (8% total)

Ans:

(a) MANET = Mobile Ad Hoc Networks (2%)

(b) No centralized entity (2% each, 6%)

Mobile host is no longer just an end system

Acting as an intermediate system

Changing network topology over time

Every node can be mobile

6. With which three precise coordinate items do digital (Vector) maps use to represent the map locations? (6%)

Ans:

Digital (Vector) Maps have precise coordinate system to represent the map locations (6%)

- ■ Longitude
- ■ Latitude
- ■ Altitude