lecture (9)

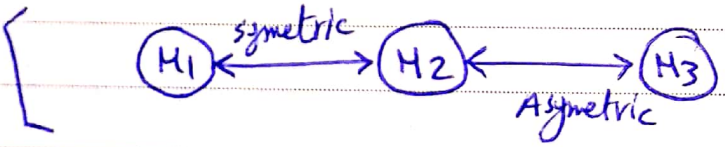
Manet , Vanet ⟶ Ad-hoc Network ⟶ Moving object
Vanet ⟶ special case from ⟶ Manet

Vanet: vechicular adhoc Network - نوع الموبايل و الـ Pattern
Manet: Mobile adhoc Network

⇓	Manet	Vanet
mobility	low	high
Moving pattern	Random	Regular
Range, bw	قليل	كبير
Cost	cheap	expensive
topolgy	Slow	high

Manet → Mobile adhoc Network

Peer-to-peer , Multihop wirless Network in which information pkts are transmitted in a store and forward manner from source to destination via intermediate nodes



link < symetric → download upload same
link < Asymetric → download upload not same

Find Best route for Communication ?

Characterstics of Manet

1. Dynamic topology
2. Bandwidth Constrain , Variable Capacity link
3. energy Constrain
4. limited physical security

Multihop → Direct x → y
↓ → Multihop x → y → z → a

Source, destenation
Direct → one node
Multihop → +1 node, Best route

Routing Challenges for Manet

1- Symetric, Asymetric links
2- heterogeneous Vs homogenous nodes
3- Varying Mobility patterns of different nodes
(Stationary high mobility)
4- efficient routing, Consumeed power, time delay

Routing ⇒ find the optimal path between 2 nodes through intermediate (relays node)
* Intermediate nodes → Multiple potential path

Optimality means → meeting performance requirment
Metrics
① Numbered hops ② distance ③ delay ④ pkt loss rate ⑤ energy Consumptions
Depend on
application, delay, Sensitive, energy
QoS based

Routing Process

① Route discovery
Find route or set of potential routes between Source, destination

② Route selection
Pick optimal path from set of routes that satisfy Given performance Criteria

③ Route Representation, Data Forwarding
⇒ Store route and data transfer

Routing - Manet

[1] Proactive	[2] Reactive	[3] hyprid
⇒ table-driven	⇒ on demand	↓
DSDV	DSR AODV	ZRP

① Proactive (table drivens ⇒ evaluate Continously the route within the network
: when pkt need to be Forward → route is already known

② Reactive (on-demand) ⇒ invoke route determine procedure only on demand
: when route is needed → Global Search is Iniated

تستخدم الشبكة عليه لو الحركة قليلة

Proactive
Exchange routing info between nodes (Periodically or topology Change)
and store in routing table

When node has pkt to send it ① it Consult routing table
② get up data route ③ Forward pkt

* Negligible delay → تأخر بسيط

Ex: DSDV ⇒ Destination, Sequenced Distance vector

every node has routing table
Based on Distance : Distance vector

DSDV
each node meintain routing table
route to every possible destination
number of hops , next node , Sequence number

* Each node Periodically Send its routing table to its direct neighbour
when node recieve Information from neighbour
It updates its routing table

Reactive → on-demand

- Generate route only when a Source demand a route to destination.

Discovery terminates when route is discovered or no route is found

ex DSR → Dynamic Source routing

DSR

each node maintain Cache ↷ Source routes and update if new is found

when node has to send message it Consult Cache

if there is a route to destination, use it

else iniate route discovery

⇒ broadCast → route request packet (Src_address, dst_adress, ID)

each intermediate node that recieve route request pkt.

⇒ Check its Cache

if no route found, intermediate node append its address to route request pkt → Send it to its neighbours

Route request msg → reach destination

ov → node with route to destination.

Route has information about all hops taken to destination

if destination is reciever → send route record in route reply pkt

intermediate is reciever → route record, route to dest

Vanet → novel application of manet
→ Connecting between close vehicles

Components
Smart Cars → onBoard unit

Geographical Area

⇒ V2V Communication
SmartCar —— Smart Car

hops

⇒ V2I Communication
Smart Car —— Road side unit

Vanet Routing Schemes → Reactive
mobility

PositionBased
uniCast
Delay → VADD
non Delay → GSR

GeoCast → IVG

BroadCast → DV-Cast

Reactive location Service
Node ——→ location query pkt
pkt floods network until it reaches destination (or) TTL expires

when destination recieves query pkt
it creates
location reply pkt

with querying node id, location as destination info

deliver pkt as soon as possible
works best in city environment

Position Based (unicast) → Non delaying → GSR
Geographic Source routing

Provide vehicular Connectivity in 2d city environment
use Street map to Compute path to destenation
in terms of junction (intersection)

Sender uses (RLS) to get destenation position

Node Compute path to destination using
Street map and Dijkstra shortest path algorithm

Sender Compute Sequence of junction on path
that pkt has to travel in order to reach
destination

Sequence of junction (is) put into pkt (or)
Computed by each Forwarding node

Trade off between → band width
→ performance (Processing)

Forwarding pkt between 2 successive junctions
done by
Greedy Forwarding