

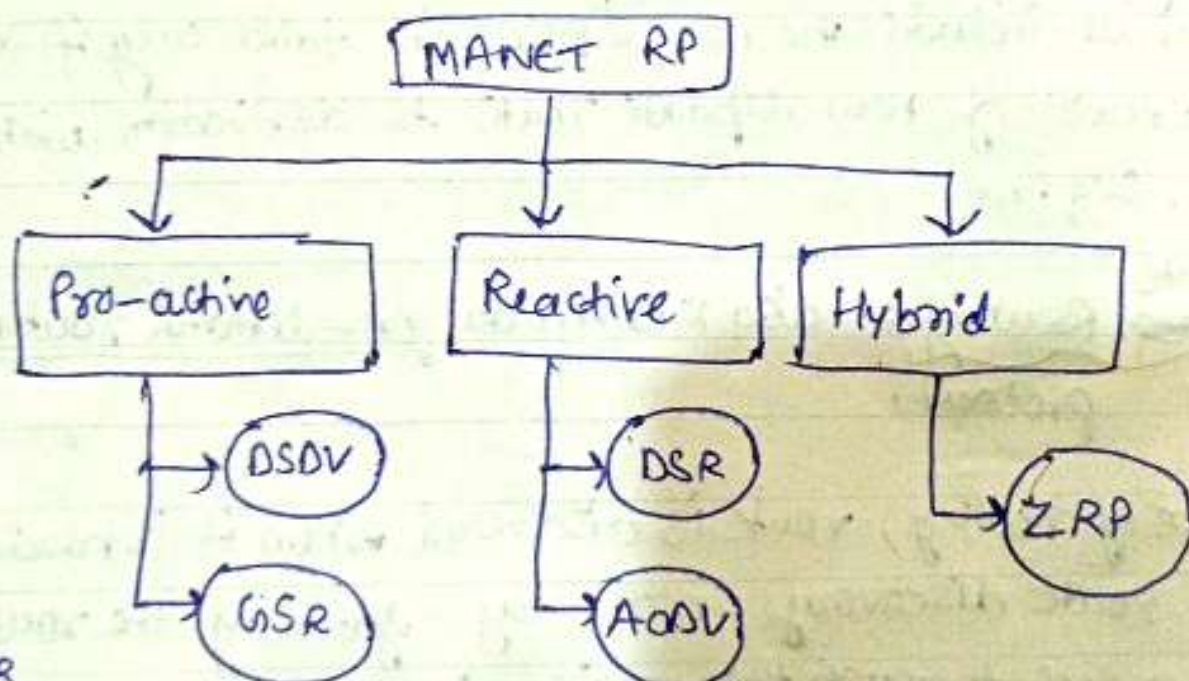
(*)

MANET & In mobile Adhoc Network (MANET), nodes do not know

Topic: the topology of the network, instead they have to discover

Aim/Objective: it by their own as the topology in ad-hoc network is dynamic topology.

The basic rule is that a new node whenever enters into an ad-hoc network, must announce arrival & presence & should also listen should also listen similar announcement broadcast made by other mobile nodes.

TPR

1) Pro-active routing protocols: They are also name as table driven routing, each mobile node maintain a separate routing table which contain the info of the routes to all possible destination mobile nodes.

- Topology in mobile adhoc is dynamic
- routing table updates periodically when network topology changes.
- Limitation: 1) It does n't work on large network.
2) % entries in RT becomes too large since they need to maintain the route info all possible nodes.

1) DSDV (Destination sequenced Distance Vector Routing) is a proactive table driven routing protocol.

- It is based on Bellman-ford routing algo.
- It actually extends the distance vector routing protocol of wired network.
- Distance vector RP is not suited for mobile ad hoc n/w due to count to infinity problem, hence DSDV came into picture to solve it.
- (DS) no: Destination sequence number, is added with every routing entry in the routing table maintained by each node.
- A node will include the new update in table only if some entry consist of new update route to destination with higher seq. no.

2) Global State Routing (GSR) It is pro-active table driven routing protocol.

- It actually extends the link state routing of wired n/w.
- It is based on the Dijkstra's routing algorithm.
- Link state routing protocol is not suited for mobile ad hoc n/w because each node flood the link state RP info directly into whole n/w.
- global flooding leads to congestion of control packets in n/w.
- Here soln is (GSR), it doesn't flood link state RP packet globally into n/w.
- In GSR each mobile node maintain one list & three tables, adjacency list, topology table, next hop table, distance table.

3) Reactive Routing Protocol is also known as on-demand routing protocol.

- In this type route is discovered when it is needed / req.
- process of route discovery occurs by flooding route request packet through the mobile n/w.

Two phases namely & DSR (Dynamic Source RP)

Activity No. 1) Route discovery ! It is a on demand routing protocol. this phase determine most optimal path for the transmission of data b/w source to destination mobile node.

Aim/Objective :

2) Route maintenance; phase perform maintenance work of route as the the topology in mobile adhoc is dynamic in nature.

*) Reactive Routing protocols : done

- (DSR)
 - phase 1
 - phase 2
- (AODV)

1) Dynamic Source Routing Protocol (DSR) : it is on demand routing protocol, route is discovered only when it is required by request
→ phase 1 and phase 2 of DSR

2) Adhoc-on-demand Vector Routing Protocol (AODV) : It is on-demand reactive routing protocol.

→ It is extension of (DSR) & it helps to remove limitations of DSR.

→ DSR stores the path in the data packet's header, hence network size ↑, & the data packet size also ↑ which makes whole n/w slow.

→ BUT AODV stores path in ~~data~~ the routing table. It also operate two phases like DSR: Route discovery, Route maint.

→ AODV is the solution of DSR problems

*) Hybrid Routing Protocol : It is basically combines the adv of both reactive and pro-active routing protocols.

→ These protocols are adaptive in nature and adapts accordingly to zone and position of Source & destination mobile node

*) most popular HRP → Zone routing protocol (ZRP).

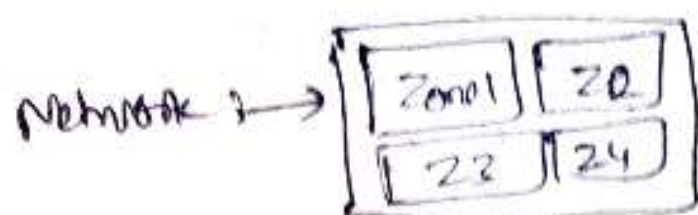
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In ZRP, → whole network is divided into diff-zones

& , then position of source & destination mob node is observed.

→ If source & destination mobile node are present in same zone, then proactive RP is used for transmission of data b/w them.

→ And if source & destination mob node is in diffⁿ zones then reactive RP is used for transmission data b/w them.



* Characteristics of MANET

- 1) It must be localized.
- 2) It should be widely distributed.
- 3) Should able to improve high quality service.
- 4) It must be free of impossible routes.
- 5) The convergence of route must be fast.
- 6) Each node in n/w should be req. to store information abt n/w topology.

* Cluster-Head gateway Switch Routing Protocol (CGSR)

- CGSR is a hierarchical routing protocol & it is a proactive protocol.
- When a source route the data packet to destination, the routing tables are already available at the nodes.
- A cluster higher in hierarchy send the packet to the cluster lower in hierarchy.
- Each cluster have several daughters & forms a tree like structure.
- The nodes aggregate into a cluster use an appropriate algo. The algorithm define a cluster-head, the node used for connection to other.
- also defines gateway node, which provide switching b/w two or more cluster head..

⑦ * CGSR Working : 1) Periodically each node sends a hello message containing its id and monotonically increasing SN.

2) using this message, every cluster head maintain table contain IDs of nodes belonging to it

Activity No.

Date

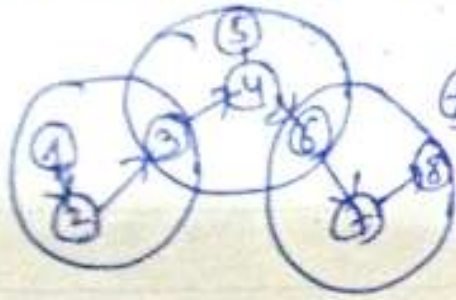
3) Cluster head exchanges these tables with each other through

Topic: gateways.

Aim/Objective:

read

1) Each cluster & each gateway maintain a routing table with an entry for each cluster head that the next gateway on the shortest path to that cluster head.



④ Three types of nodes

Node: Internal node which receive & transmit the data packet.

Cluster head: It control group of adhoc host, monitoring broadcasting within cluster, forward msg to another clus. head.

Gateway node: to carry out transmission of packet & msg b/w cluster head of 2 cluster

⑤ Advantage ~~CCSR~~

1) Better Bandwidth utilization is possible.

2) It enables partial coord. b/w nodes by electing cluster head.

3) It is easy to implement priority scheduling scheme with token scheduling and gateway code scheduling.

Disadvantage

1) Increase in path length & instability in the system at high mobility

2) Rate of change of cluster-head is high.

3) High power consumption; battery draining at cluster head is higher than a normal node.

4) It cause multiple path breaks.

* Power Aware Routing Protocols (PAR) → Power consumption is a crucial design concern in wireless adhoc network since wireless nodes are typically limited battery

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→ (PAR) is a consideration in a way that it minimize the energy consumption while routing traffic.

→ Routers are also power-constrained like nodes.

⊛ Poweraware - routing Metrics & Routing protocol that select paths so as to conserve power must be aware of the status of the batteries.

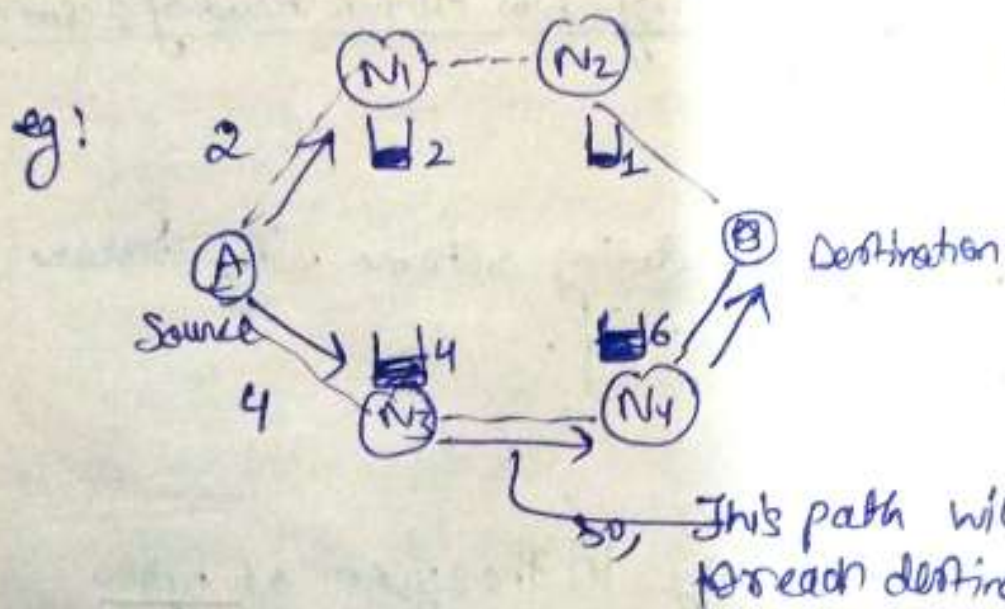
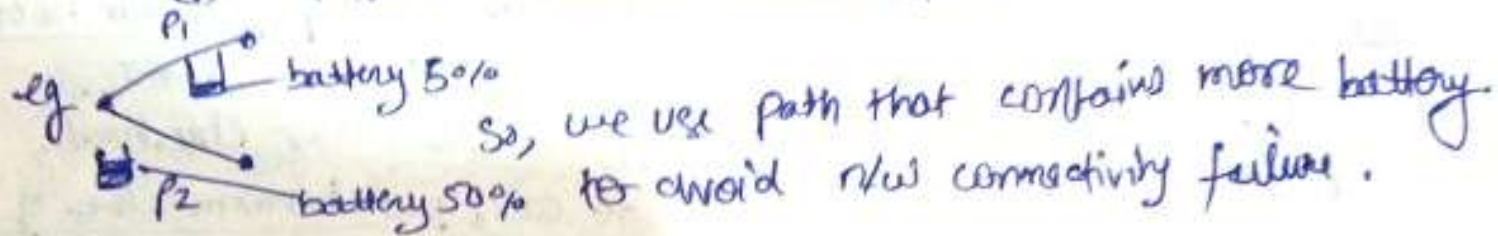
↳ (i) minimal energy consumption per packet

(ii) maximize N/w connectivity,

(iii) minimum variance in node power levels

(iv) minimum cost per packet

(v) Minimize maximum node cost.



So in PAR we select less cost path & high battery path to avoid sys connectivity failure

battery > cost

Various Poweraware Routing Protocol (PAR) :

- 1) minimum total ^{transmission} power routing protocol (MTTR)
- 2) minimum battery cost routing protocol (MBCR)
- 3) min-max battery cost Routing. (MMBCR)

1) MTTR → tries to select a path that has minimum total power. A node that is required to a distant node broadcast RREQ to all its neighbours, the process continues at each & every intermediate node till packet reach destination

Algo 1: 1) Calculate the total transmission power for all route in n/w.

Activity No.

Date:

2) Select the route with min MTTR among all routes.

Topic:

Aim/Objective: MTTR Limitation:

1) It is always select nearest neigh. node, so battery exhaust quickly.

2) more number of nodes are active.

3) Network is congested; packet has to route from mult nodes.

2 (MBCR) : \rightarrow prevent nodes from being overused.

\rightarrow In MBCR battery cost funⁿ $\propto \frac{1}{\text{battery capacity}}$.

\rightarrow as the battery capacity \uparrow , value of cost funⁿ \uparrow .

\rightarrow as a result node which have little battery capacity still may be selected for transmission.

\rightarrow If all nodes have similar battery, it select shorter hop route.

\rightarrow Algo same as MTTR change transmission power to battery cost.

⊗ Limitation: Some nodes may be overused because route containing nodes with little remaining battery capacity may be selected again & again.

3. MMBCR : \rightarrow It overcomes limitation MBCR.

\rightarrow Nodes with smaller battery remaining are avoided. & ones with larger battery capacity are picked up for transmission.

Algo 3 1) for each route, select battery cost funⁿ which having maximum value among all nodes in route.

2) Now select the route with minimum battery cost among all routes.

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73

Limitation: 1) Consume more power to transmit traffic from source to destination, which reduce lifetime of all nodes.

2) No guarantee that minimum total transmission power path will be selected under all circum.

④ PSTN (Public Switched Telephone Network):
PSTN is the world's collection of interconnected voice-oriented public telephone networks. PSTN comprises all the switched telephone network around the world that are operated by local, national or international carriers.
→ These network provides infrastructure & service for public telecomm.
→ helps to telephone comm. each other.

④ PSTN working

when we dial phone number our calls moves through the n/w to reach its destination & two phones are connected.
To fully understand POTS actually work:

Step #1: Your telephone set convert sound wave into electrical signal & these signal are then transmitted to a terminal via cable.

Step #2: The terminal collects the electrical signal & transmit those to central office (CO).

Step #3: The central office route the calls in the form of electrical signal through fiber optic cable. The fiber optic carries these signal in form of light pulses to their final dest.

Step #4: Your calls is routed to a tandem office or CO.

Step #5: When your call reaches the right office, the signal converted back to ES and then is routed to a terminal.

Step #6: The terminal route the calls to the appropriated telephone number. Upon receiving the call, telephone

and convert FS into back to sound waves.

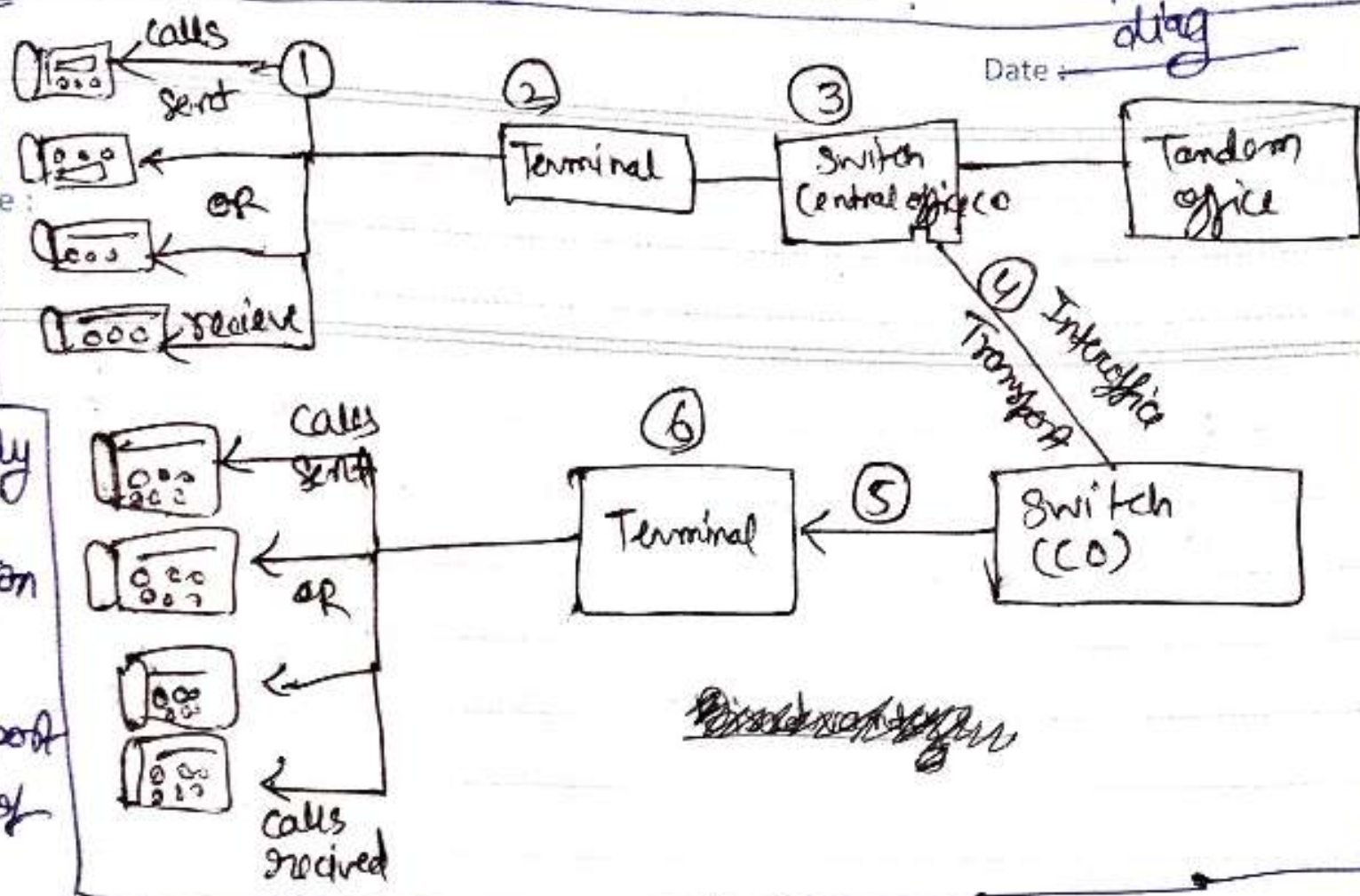
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Advantages

- 1) It provides highly private & secure connection
- 2) ability to scale & support large volume of traffic

- 3) It provides pristine quality nearly 100% uptime.

⊗

Disadvantage

- 1) It is less efficient
- 2) more expensive than a packet switch network
- 3) It requires a dedicated line for making and completing a call.
- 4) Scalability is limited, & cannot use bandwidth optimally