Unit 05

→ temporary networks

- Ad-hoc Network,
- Routing in Ad-hoc Mobile Networks,
- Dynamic State Routing (DSR),
- Route Maintenance and Routing error,
- Fisheye Routing (FSR),
- Ad-hoc on Demand Distance Vector (ADDV).

Distance Vector Routing (DVR)

→ intradomain routing protocol

→ distance vector

① Share distance vector ⇒ only to neighbour routers

$N_1 → N_2$

② At N_1 : $DV(N_2)$ At N_4 : $DV(N_3, N_5)$
   At N_2 : $DV(N_1, N_3, N_5)$ At N_5 : $DV(N_2, N_4)$
   At N_3 : $DV(N_2, N_4)$

③ Update of Routing table

at N_1 : $DV(N_2)$ distance vector of N_2

N_1 New Routing Table

Dest	Dist	Next Hop
N_1	0	N_1
N_2	1+0 = 1	N_2
N_3	1+6 = 7	N_2, N_3
N_4	1+∞ = ∞	$N_2, —$
N_5	1+3 = 4	N_2, N_5

at N_5 : $DV(N_2)$ $DV(N_4)$

New Routing Table : N_5

Dest	Dist	Next Hop
N_1	3+1 = 4	N_2, N_1
N_2	3+0 = 3	N_2
N_3	4+2 = 6	N_4, N_3
N_4	4+0 = 4	N_4
N_5	0	N_5

min (6+3, 4+2)

count to infinity

Link State Routing

① Sharing of Link state table → flooding → More bandwidth → More congestion

② Each node will have global knowledge of network

③ Dijkastra's algorithm → to derive routing table

Source \ destination	R_1	R_2	R_3	R_4	R_5	R_6
$R_1 R_3$		6	3	∞	∞	∞
$R_1 R_3 R_2$		5	3	∞	12	∞
$R_1 R_3 R_2$		5	3	12	12	∞
$R_1 R_3 R_2 R_4$		5	3	12	12	21
$R_1 R_3 R_2 R_4 R_5$		5	3	12	12	18

dest	dist	NextHop
R_1	0	R_1
R_2	5	R_1
R_3	3	R_1
R_4	12	$R_1 R_3 R_2$
R_5	12	$R_1 R_3$
R_6	18	$R_1 R_3 R_5$

Fisheye State Routing (FSR)

→ Originates from GSR (Global State Routing)
→ Based on Linked state routing → No flooding like Link State Routing

Global State Routing

∀ node, 3 tables → Distance, Next Hop, Topology (shared)

① Size of topology table will increase with size of network
② Exchange of large topology table consumes considerable amount of bandwidth

Fisheye Technique

Fisheye Routing divides N/W into many scope

Scope : # nodes reachable within given # hops

Scope 1 : 1 hop
Scope 2 : 2 hop
Scope 3 : 3 hop

Information of nodes with higher scope will be sent less frequently

Only topology table is shared ∀ node A

Topology A		
Node	Neighbour	Distance
A	{B,C}	1 → Scope 1 # more frequent
B	{D,A}	1
C	{A,D}	1
D	{B,C}	2 → Scope 2 # less frequent

Mobile Adhoc Network (MANET)

→ wireless Network
→ No fixed Infrastructure
→ Dynamic Topologies
→ Node in MANET can act as HOST or ROUTER
→ MANET is autonomous collection of mobile nodes that communicate over wireless link

nodes are mobile

characteristics
1) dynamic Topology
2) energy constrained nodes
3) limited security
4) autonomous
5) distributed

properties
1) fast N/w establishment
2) peer 2 peer connectivity
3) independent computation
4) No request for access point
5) less wireless connectivity range

Challenges
1) Topology
2) security
3) Bandwidth
4) energy
5) routing

Applications
1) Battlefield
2) sensor N/W
3) VANET (Vehicular Adhoc N/W)
4) PAN (Personal area N/W)

types:

① Proactive Routing	② Reactive Routing	③ Hybrid Routing
→ route determined in advance (Table driven routing)	→ routes determined when needed	→ Proactive + Reactive
→ more overhead	→ less overhead	Nearby nodes / Far away nodes
→ need periodic update	→ More scalability	zonal routing protocol
→ low route latency	→ high route latency	
→ stale information	→ less route caching	
→ QOS guarantee (Quality of Service)		
→ DSDV, GRS, Fisheye	→ DSR, AODV, Location aided routing	

Dynamic Source Routing (DSR)

Reactive Routing protocol / on demand routing protocol
→ ope" is based on source routing → sender knows the complete path
→ Intermediate nodes don't maintain routing information to route
→ less N/W overhead as → # message exchange b/w nodes is low

Phases of DSR protocol

① Route Discovery ← RREQ packet (Route Request) → Source Node ID / Destination Node ID → Broadcast
② Route Maintenance → RERR message (Route ERROR)   RREP Packet (Route Reply) → Unicast

Route cache → stores path @ source

Adhoc On-Demand Distance Vector

operates in 2 phases → Route Discovery → Route Maintainance
→ source node will not have the complete path
→ each node will have only its previous & next node info
→ each node maintains a route cache

select route with minimum hop count
A → B → E → F → H   ④

Route Discovery

RREP → Source Node ID
→ Destination Node ID
→ Recent Seq. no.
→ Broadcast Id
→ HOP count
→ TTL