



UNIT-IV

Zone Routing Protocol (ZRP)- hybrid Protocol

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AP/CSE



Traditional Routing Schemes

Proactive Routing

- Maintains an up-to-date view of the network
- Example protocols: Distance Vector, Link State

Reactive Routing

- Acquire routes on demand
- Example protocols: TORA, AODV



Motivation

The disadvantages of both traditional routings.

- As seen, the amount of update traffic is quite high in proactive routing.
- In reactive routing, route query is delayed because route information may not be available

ZRP aims to address the problems by combining the best properties of both approaches.



Zone Routing Protocol

Hybrid protocol= Proactive+ reactive

Intra-zone routing : Proactive Protocol (Table Driven)

Inter –zone routing: Reactive Protocol (On-Demand)

The Zone Routing Protocol

Based on the concept of zones

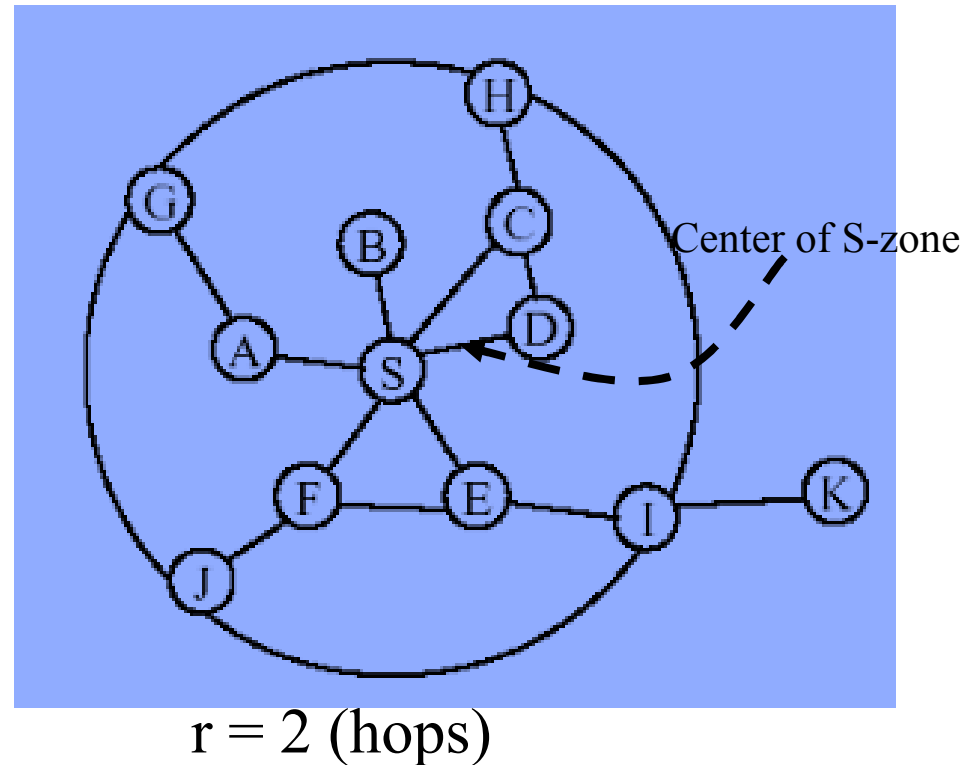
- A zone is defined for each node separately
- Zone radius r given as number of hops
- The zones overlap

- Peripheral nodes

G, H, J, and I

- Neighbor nodes

B, C,



We depict zones as circles, but they are not.

The Zone Routing Protocol

Based on the concept of zones

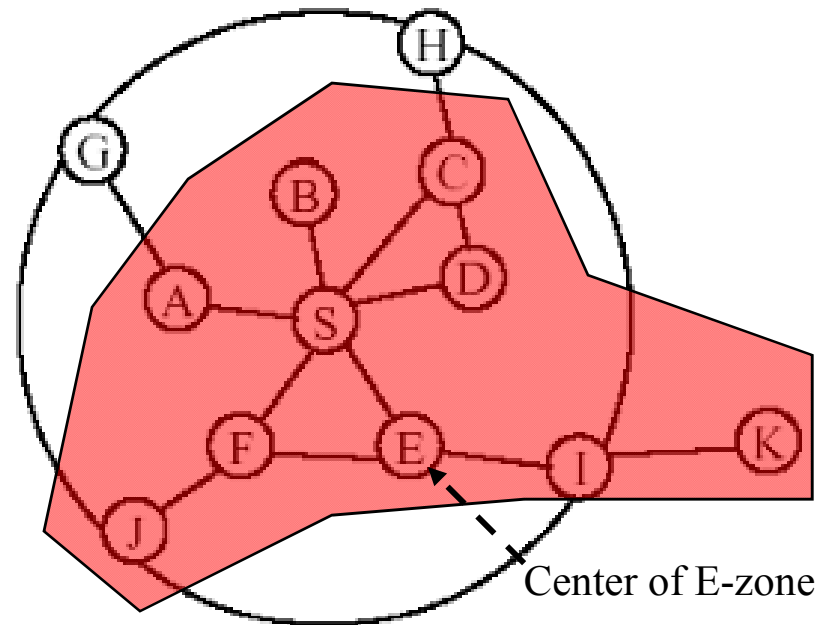
- A zone is defined for each node separately
- Zone radius r given as number of hops
- The zones overlap

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G, H, J, and I

- Neighbor nodes

B, C,



$r = 2$ (hops)

We depict zones as circles, but they are not.

Proactive Intra-zone Routing

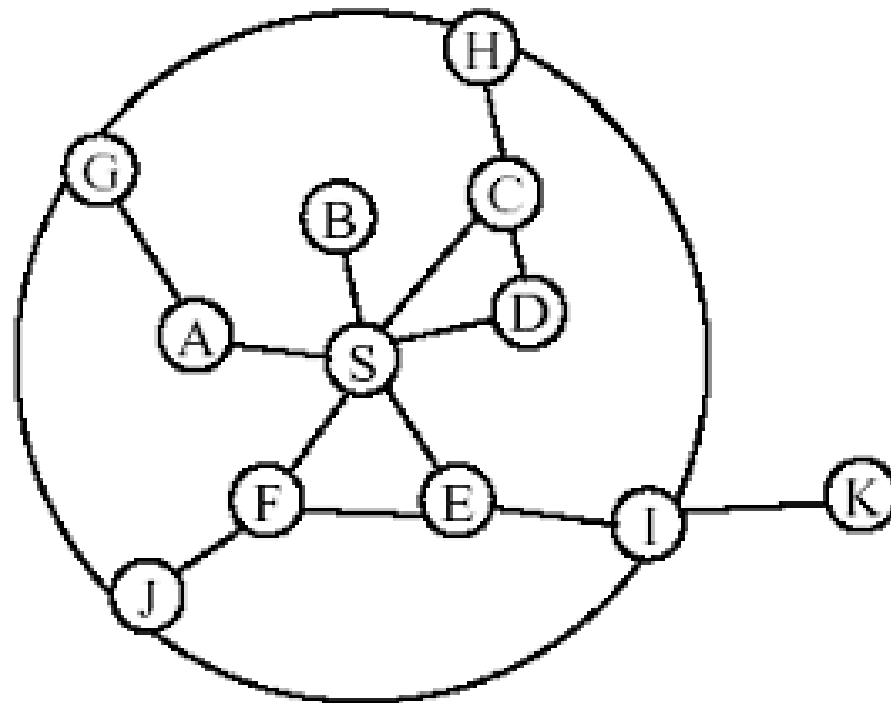
ZRP refers to the locally proactive routing component as **IARP**

IARP is not a specific routing protocols. Instead, IARP is a family of proactive routing protocols

Each node maintains the routing info to all nodes in its zone

The updates are only local in the zone.

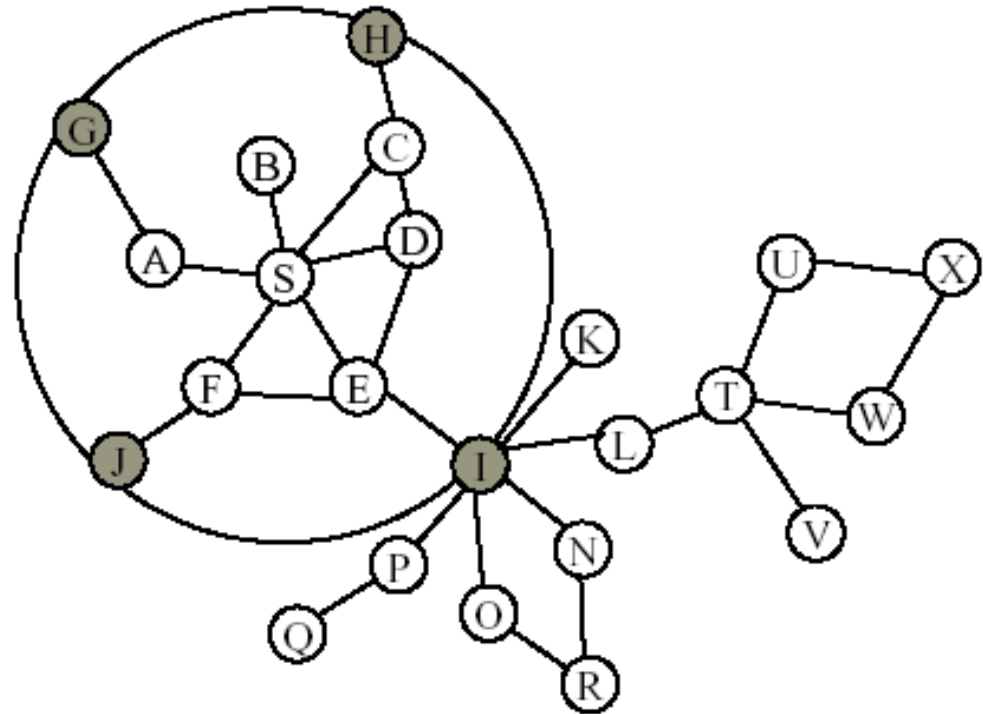
Reduces the maintenance costs to a limited zone



The globally reactive routing component is named **IERP**. **IERP** is responsible for **discovering routes to destinations** beyond a node's routing zone.

For example, when S has a packet to send to x, IERP is responsible for discovering this route.

How does IERP work? I will explain in the next few slices.





Interzone Routing (cont.)

IERP has two phases for route discovery:

- Route request
- Route reply

IERP don't use standard flooding search.

IERP **border-casts** a route request.

Border-casting is a packet delivery service that allows a node to efficiently send a message to its peripheral nodes.

Route query packet is uniquely identified by a combination of the source node's ID and request number.

Upon receipt of a route query packet, a node adds its ID to the query.

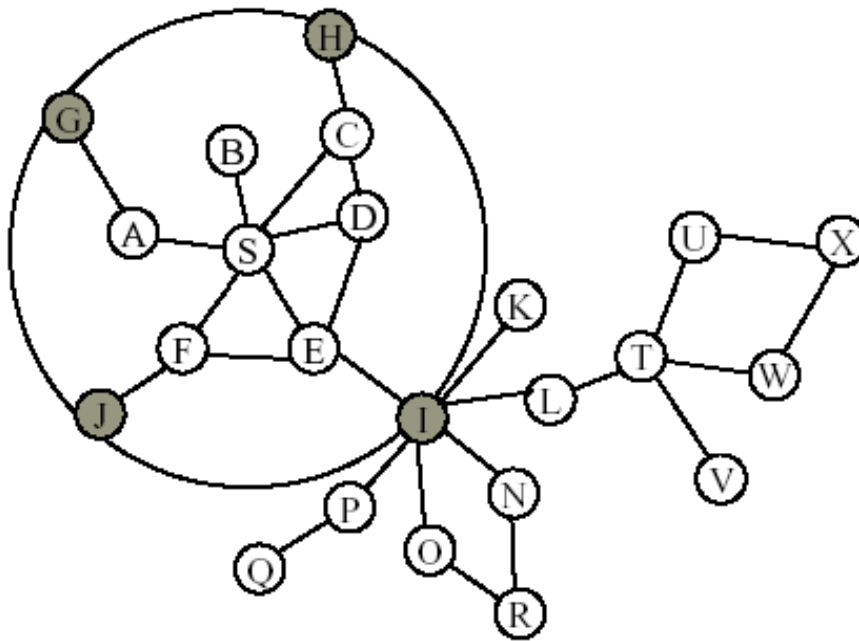


Interzone Routing (cont.)

If peripheral nodes don't find the destination, they continue the border-casting process.

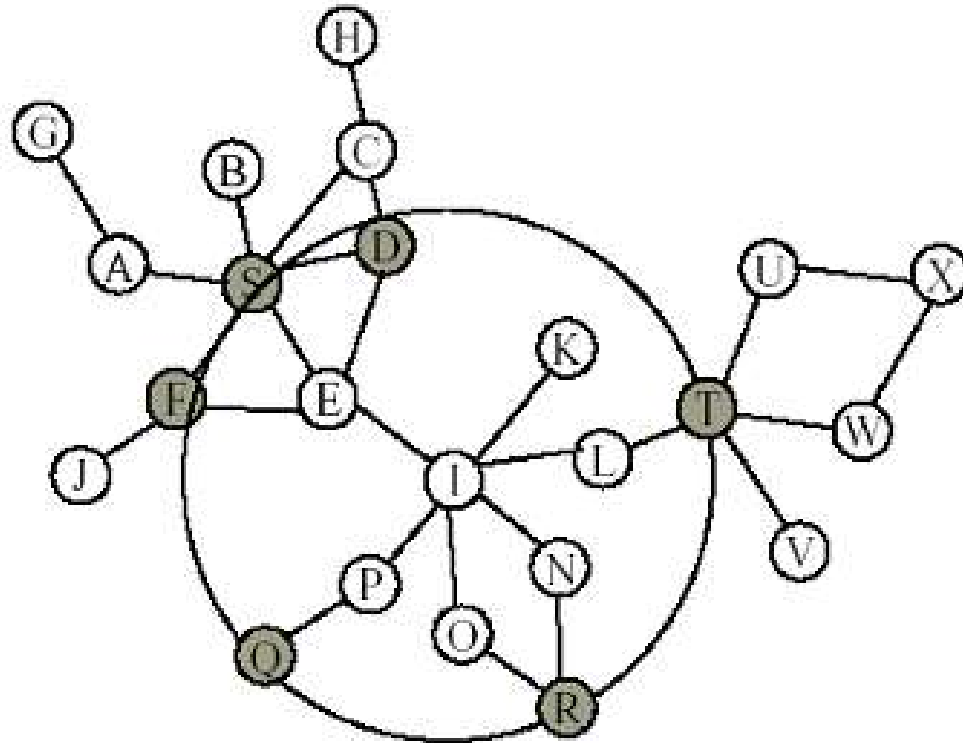
If the destination is found, a route reply is sent back to the source by reversing the accumulated route.

S has a packet to send to x



X is not in S's routing zone. S issues a route request using IERP. The request is bordercasted to the peripheral nodes (the gray ones). These gray nodes search their routing table for the destination. They don't see the destination. So the border-casting process continues (at node I, J, G, and H).

An Example (cont.)



Node I bordercasts the request to its peripheral nodes (gray ones). Due to query control mechanisms, the request is not passed back to nodes D, F, and S. I will discuss query control later.

Finally, the route request is received by node T, which can find the destination in its routing zone. A route reply is sent back to node S.



Advantages

1. ZRP provides a flexible solution to challenge of discovering and maintaining routes. It combines two different methods of routing in one protocol.
2. ZRP reduces the traffic amount compared to pure proactive or reactive routing. The amount of intra-zone control traffic increases with the zone's size. However, using the knowledge of the routing zone to reduce the amount of inter-zone control traffic through border-casting.
3. QD, ET and LT provide significant improvements compared with purely reactive ($\rho = 1$) and purely proactive schemes ($\rho \rightarrow \infty$)
4. Zone routing is targeted for large networks. The amount of control traffic does not depend on network size because proactive updates are only local.



References

Prasant Kumar Pattnaik, Rajib Mall, “Fundamental of mobile computing”
, second edition.