COMP9332 Network Routing and Switching

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Geocasting

Lecture overview

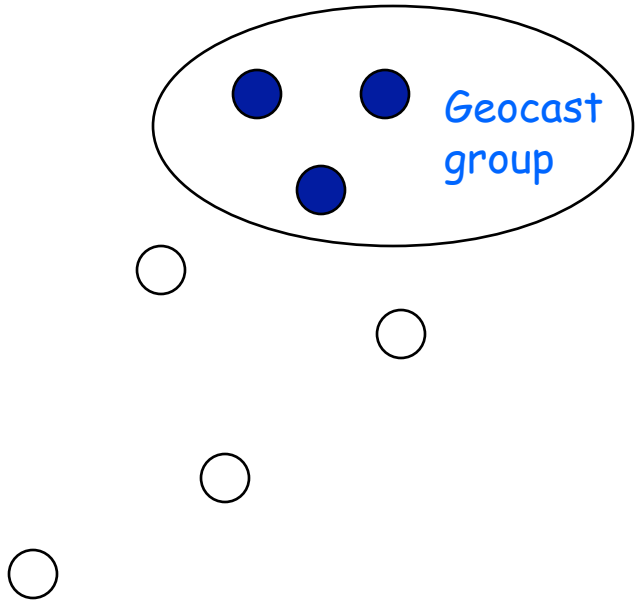
This lecture examines the concept geocasting in a mobile ad-hoc network, i.e., routing a packet to all nodes within a specified geographic area.

Topics to be covered

- Concept and applications of geocasting
- Routing for geocasting
  - Geocast flooding
  - Forwarding zone
    - » Static forwarding zone
    - » Adaptive forwarding zone

Concept of Geocasting

- Sending a message to everyone in a specified geographic area
- Similar to multicast, but group is defined by geography
- A node automatically joins a geocast group by entering the area and leaves the group upon leaving the area (unlike IGMP, no group membership management protocol)
- Each node knows its own position (e.g. using GPS)



Geocast Group Address
Geocast Region

- Specified geographic area (geocast region) is the geocast group address
- Every message must have the geocast region specified in the header
- Geocast region can be defined as a circle, rectangle, polygon, etc.

Applications of Geocasting

- Sensor networks (name a few)
- Vehicular ad hoc networks (name a few)
- Any other?

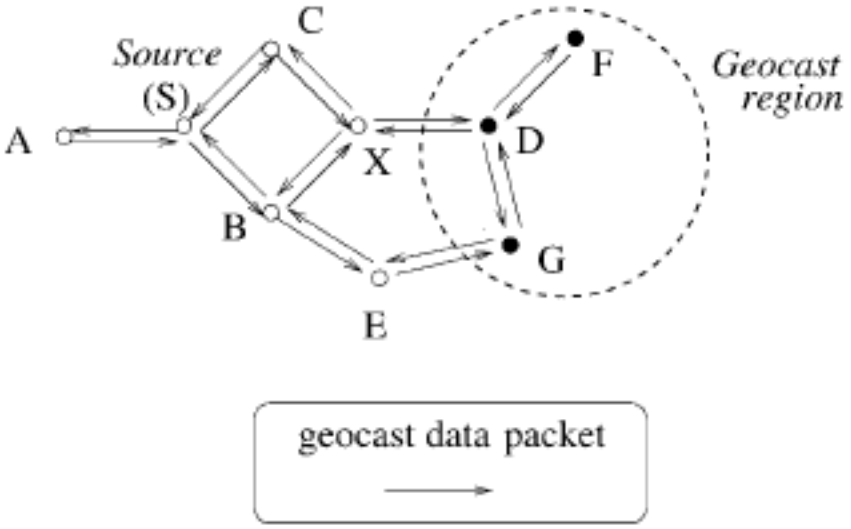
Routing for Geocasting

- Objectives
  - all nodes within specified area must receive the message (accuracy)
  - nodes outside the area must not accept the message
  - Forwarding overhead should be minimized without sacrificing accuracy of delivery

Geocast Flooding

The simplest way of routing

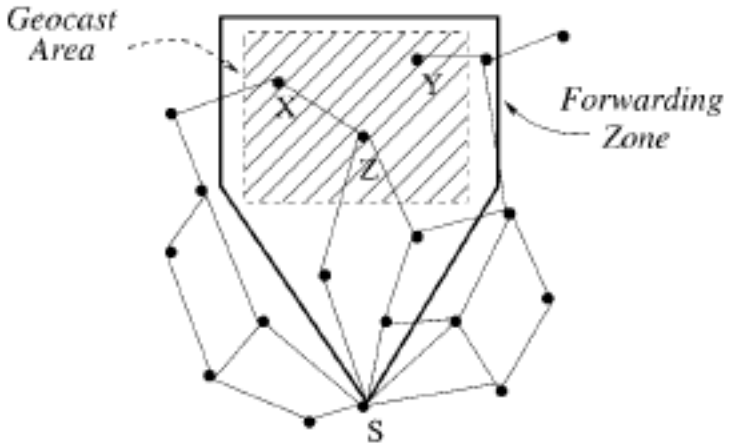
- A node will re-broadcast (retransmit) if it did not receive before
- Will reach all nodes in the network
- Message contains geocast region
- A node receiving a message accepts it if it is within the geocast region
- High accuracy, but high forwarding overhead as well



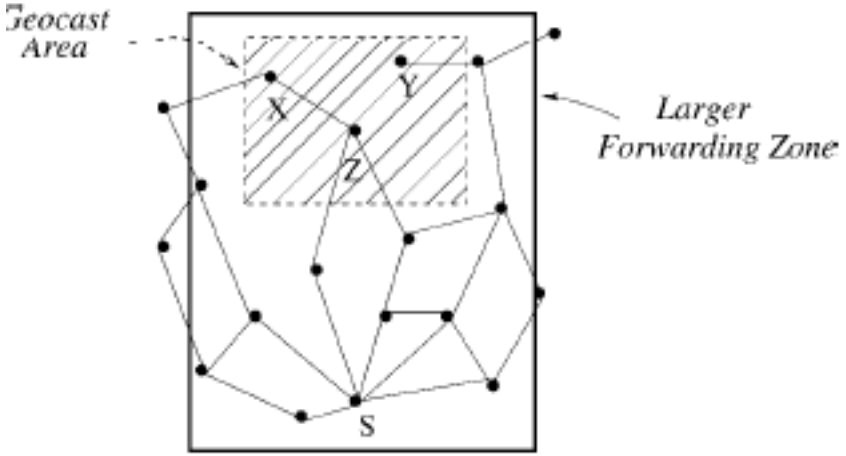
From KO and VAIDYA 2002

Concept of forwarding zone

- Can we reduce overhead without sacrificing accuracy?
- Same as flooding except, a node should forward (rebroadcast or retransmit) a message only if it is within the forwarding zone
- The source can define the forwarding zone and include this definition in header
- Smaller forwarding zone may reduce accuracy!



(a) Y cannot receive

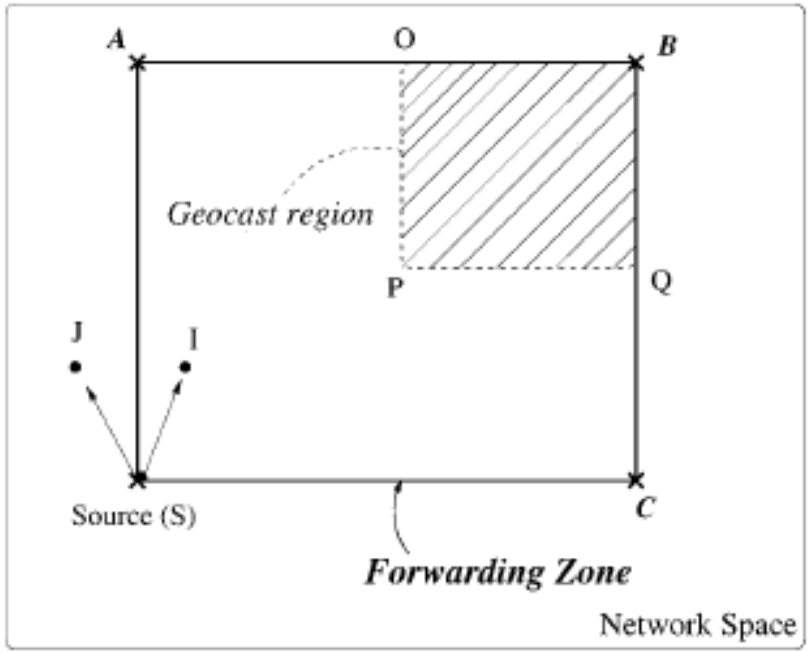


(b) Y can receive

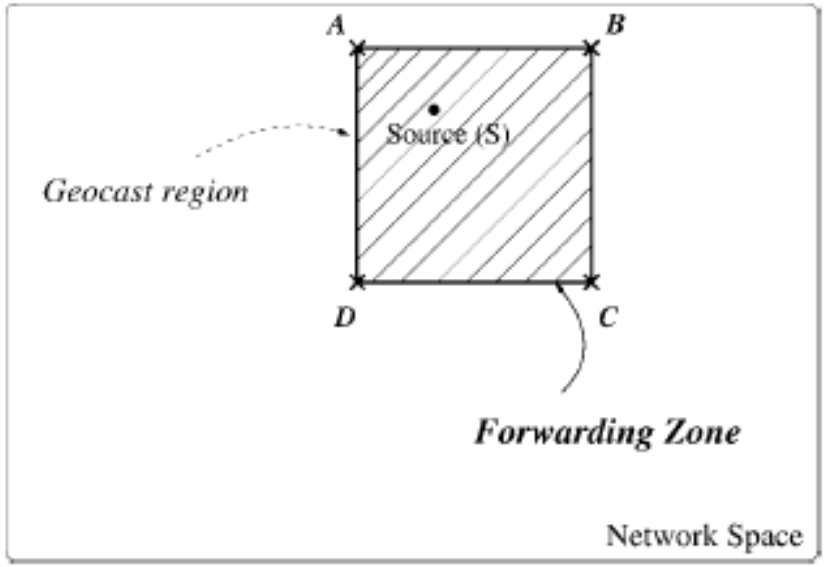
From KO and VAIDYA 2002

Static Forwarding Zone

- Forwarding Zone is defined by source and never changed by a forwarding node
- Simple to implement, but has high overhead



(a)



(b)

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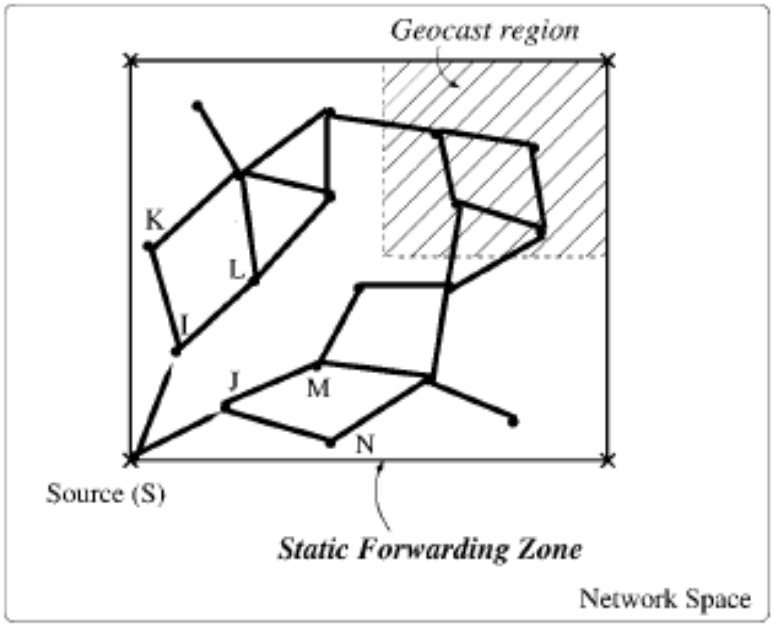
Adaptive Forwarding Zone

- Forwarding Zone is redefined by a forwarding node
- Reduces forwarding overhead



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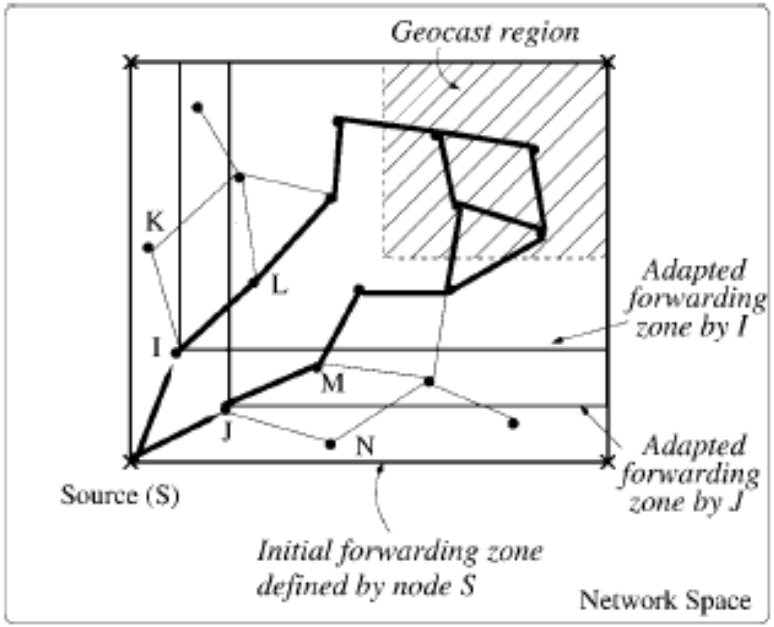

(b)

From KO and VAIDYA 2002

References

- KO and VAIDYA, "Flooding-based geocasting protocols for mobile ad hoc networks," Mobile Networks and Applications, 7, 471-480, 2002 (available from course website)