JYOTHISHMATHI INSTITUTE OF TECHNOLOGY & SCIENCE

(Approved by AICTE, New Delhi & Affiliated to JNTUH)

DEPARTMENT OF CSE

SUBJECT: Mobile Computing

NAME OF THE FACULTY: R. Satya Teja YEAR / SEMESTER: III-II

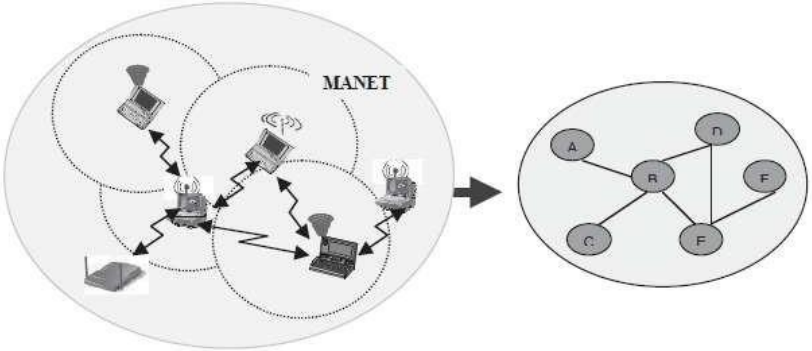
Outline

- Mobile Ad hoc networks.
- Applications of ad hoc networks.
- Challenges in Ad hoc network.
- Media Access Control
- Routing algorithms for MANETs.
- Conclusion.

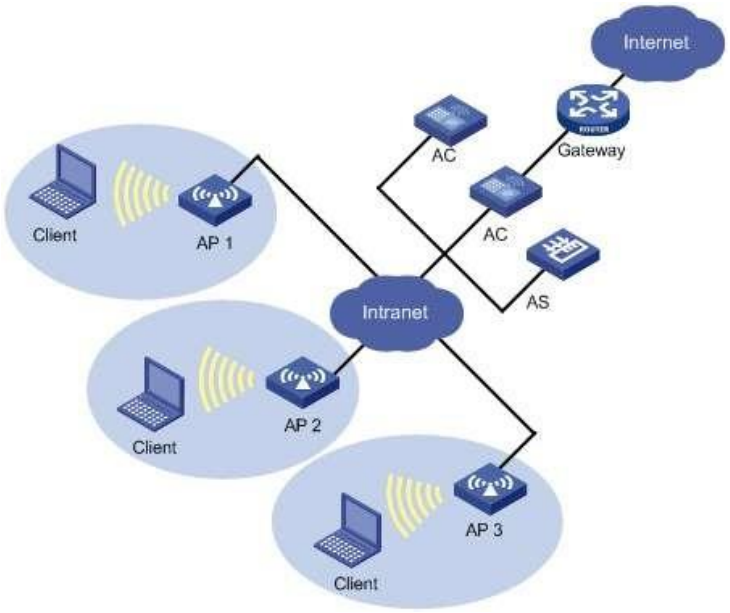
Mobile Ad hoc networks (MANETs)

- Mobile ad hoc networks are formed dynamically by an autonomous system of mobile nodes that are connected via wireless links.
- No existing fixed infrastructure or centralized administration – No base station.
- Mobile nodes are free to move randomly.
  - Network topology changes frequently.
- May Operate as standalone fashion or also can be connected to the larger internet.
- Each node work as router.

MANETs



MANETs



WLAN

Applications

- Tactical networks
  - Military communication, automated battlefields
- Emergency Services
  - Search and rescue operations
  - Disaster recovery – Earthquakes, hurricanes .
- Educational
  - Virtual classrooms or conference rooms.
  - Set up ad hoc communication during conferences, meeting, or lectures
- Home and Entertainment
  - Home/office wireless networking.
  - Personal Area network
  - Multiuser games
  - Outdoor internet access.

Challenges

- Infrastructure less
  - Brings new network designing challenges.
- Dynamically changing topologies
  - Cause route changes, frequent network partitions and packet loss.
- Physical layer limitations
  - Limited Wireless range.
  - Packet loss during transmission.
  - Broadcast nature of the communication.
- Limitations of Mobile Nodes
  - Short battery life
  - Limited capacities.
- Network security.

Effects on the protocol stack

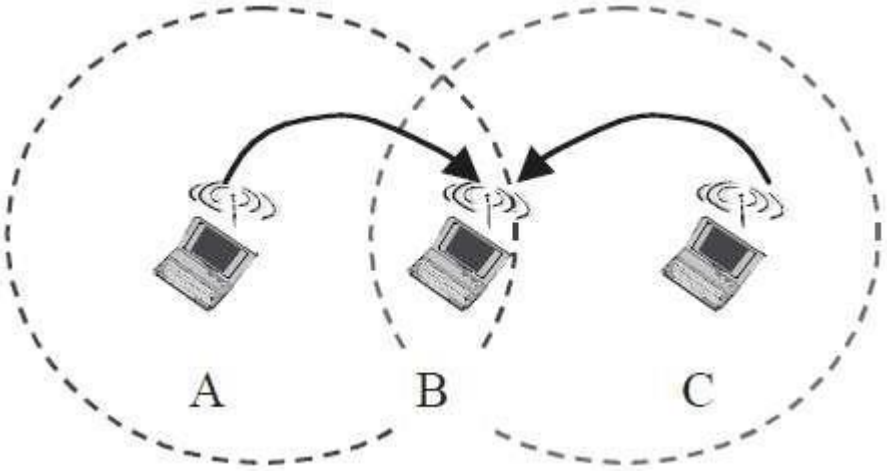
- Application Layer
  - New applications, Authentication, Encryption.
- Transport Layer
  - Congestion Control, Flow control.
- Network
  - Host addressing, Routing, Multicasting.
- Data Link Layer
  - Media Access
- Physical
  - Spectrum usage/allocation

Media Access Control

- Since MANETs, use broadcasting and shared transmission media, introduces a probability of packet collisions and media contention.
- Since collision detection is not possible with half-duplex radio. This brings new challenges to conventional CSMA/CD-based and MAC based protocols.
- Among the top issues are the hidden-terminal and exposed-terminal problems.

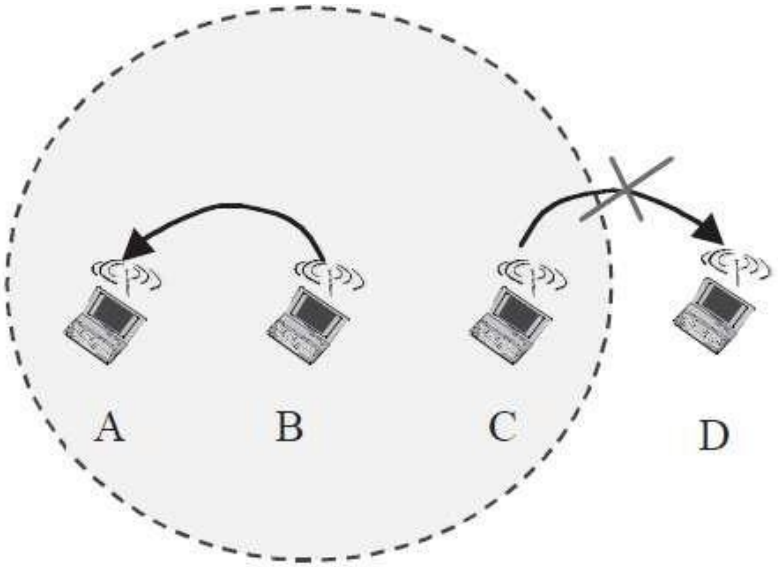
Hidden-terminal problem

- When two terminals can not detect each other's transmission due to being outside of each others range. The collision can occur.



Exposed-terminal problems.

- Occur when a permissible transmission from a node to another node has to be delayed due to the irrelevant transmission between two other nodes.



Solution

- A new protocol **MACA** (multiple access with collision avoidance protocol) is used to avoid the Hidden-terminal and Exposed-terminal problems.
- Use signalling packets to avoid collision.
  - RTS (Request to send)
    - Sender request the right to send from a receiver with a short RTS packet before it sends a data packet.
  - CTS (Clear to send)
    - Receiver grants the right to send as soon as it is ready to receive