SNS COLLEGE OF ENGINEERING
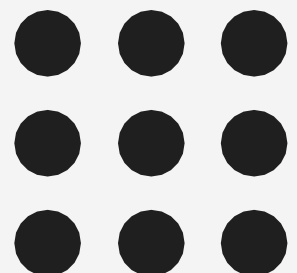
Kurumbapalayam(Po), Coimbatore – 641 107

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19EC701 - ADHOC NETWORKS

# Unit -2 – DATALINK LAYER – CONTENTION BASED PROTOCOLS WITHOUT RESERVATION

Contention-based protocols

MACAW: A Media Access Protocol for Wireless LANs is based on MACA (Multiple Access Collision Avoidance) Protocol
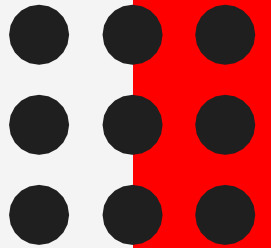
MACA

- When a node wants to transmit a data packet, it first transmit a **RTS (Request To Send)** frame.
- The receiver node, on receiving the RTS packet, if it is ready to receive the data packet, transmits a **CTS (Clear to Send)** packet.
- Once the sender receives the CTS packet without any error, it starts transmitting the data packet.
- If a packet transmitted by a node is lost, the node uses the binary exponential back-off (BEB) algorithm to back off a random interval of time before retrying. The binary exponential back-off mechanism used in MACA might starves flows sometimes. The problem is solved by MACAW.

MACA Protocol
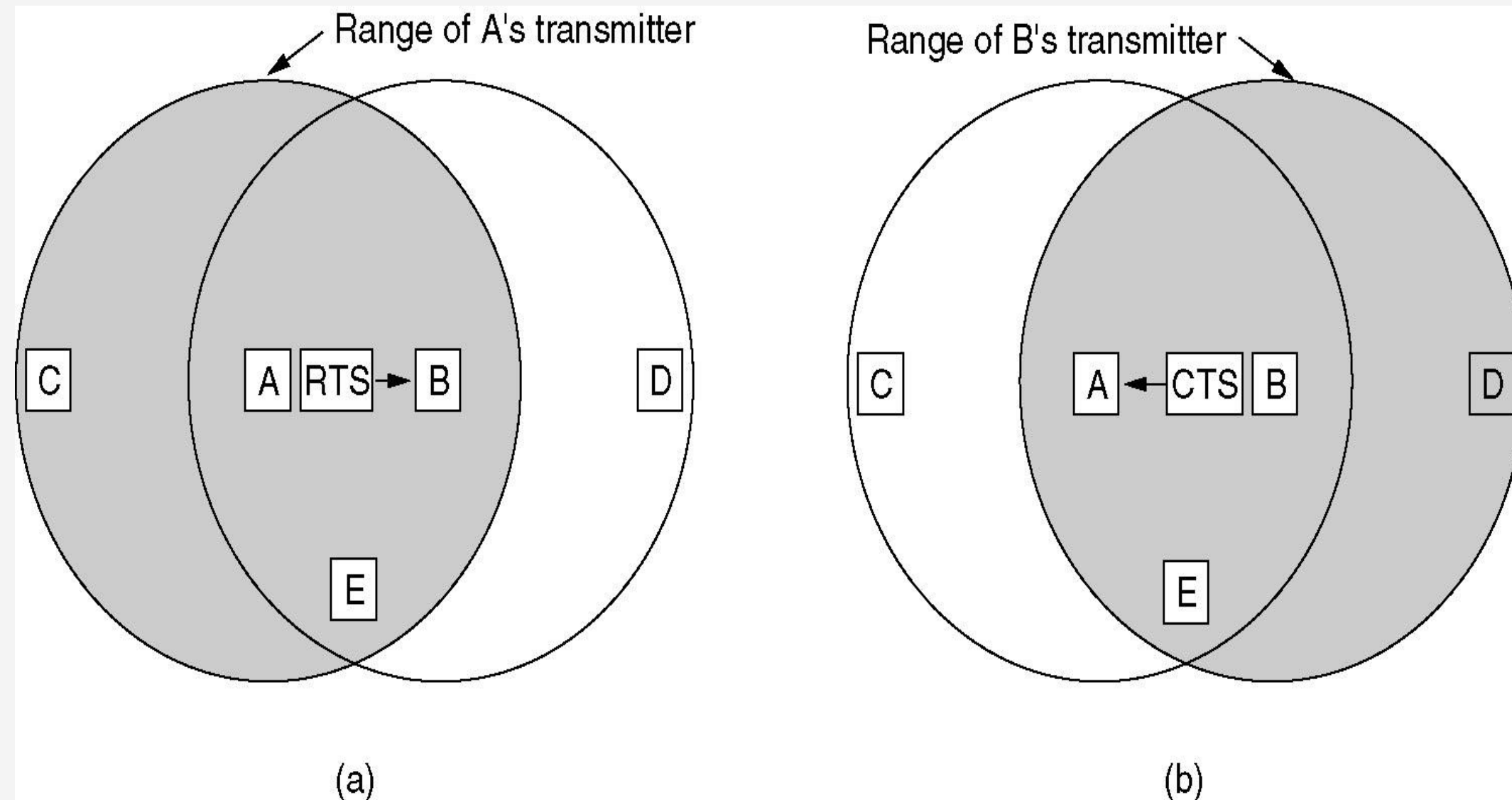
The MACA protocol. (a) A sending an RTS to B.
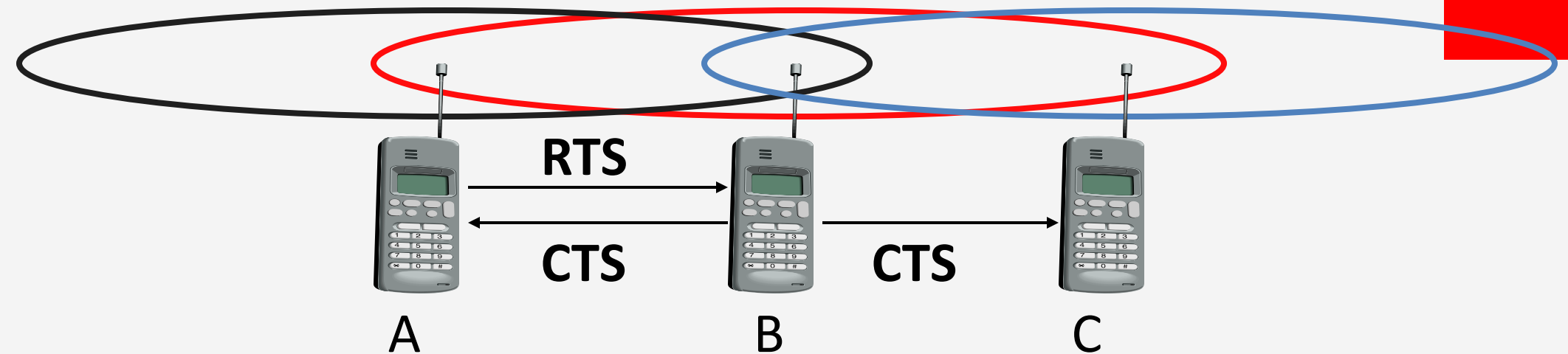(b) B responding with a CTS to A.

MACA examples

MACA avoids the problem of hidden terminals
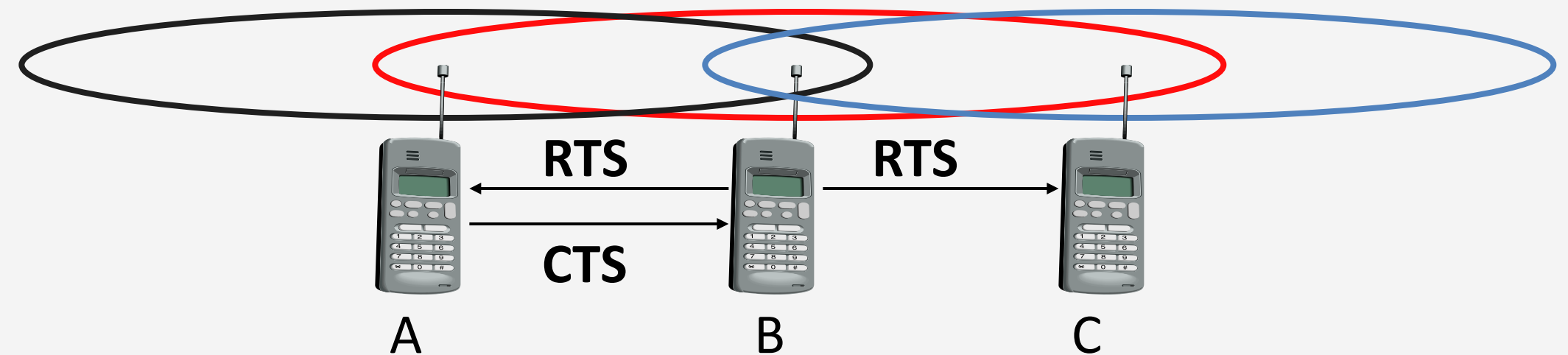- A and C want to send to B
- A sends RTS first
- C waits after receiving CTS from B

MACA avoids the problem of exposed terminals
- B wants to send to A, C to another terminal
- now C does not have to wait for it cannot receive CTS from A

MACAW

Variants of this method can be found in IEEE 802.11 as DFWMAC (Distributed Foundation Wireless MAC),

MACAW (MACA for Wireless) is a revision of MACA.

- The sender senses the carrier to see and transmits a **RTS** (**Request To Send)** frame if no nearby station transmits a RTS.
- The receiver replies with a **CTS** (**Clear To Send**) frame.
- Neighbors
  - see CTS, then keep quiet.
  - see RTS but not CTS, then keep quiet until the CTS is back to the sender.
- The receiver sends an ACK when receiving an frame.
  - Neighbors keep silent until see ACK.
- Collisions
  - There is no collision detection.
  - The senders know collision when they don't receive CTS.
  - They each wait for the exponential backoff time.

Contention-based protocols

Floor acquisition Multiple Access Protocols (FAMA)

- Based on a channel access discipline which consists of a carrier-sensing operation and a collision-avoidance dialog between the sender and the intended receiver of a packet.
- Floor acquisition refers to the process of gaining control of the channel. At any time only one node is assigned to use the channel.
- Carrier-sensing by the sender, followed by the RTS-CTS control packet exchange, enables the protocol to perform as efficiently as MACA.
- Two variations of FAMA
  - RTS-CTS exchange with no carrier-sensing uses the ALOHA protocol for transmitting RTS packets.
  - RTS-CTS exchange with non-persistent carrier-sensing uses non-persistent CSMA for the same purpose.
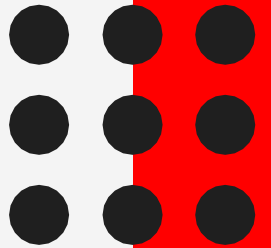
Contention-based protocols

Busy Tone Multiple Access Protocols (BTMA)

The transmission channel is split into two:
- a data channel for data packet transmissions
- a control channel used to transmit the busy tone signal

When a node is ready for transmission, it senses the channel to check whether the busy tone is active.

If not, it turns on the busy tone signal and starts data transmissions

Otherwise, it reschedules the packet for transmission after some random rescheduling delay.

Any other node which senses the carrier on the incoming data channel also transmits the busy tone signal on the control channel, thus, prevent two neighboring nodes from transmitting at the same time.

Dual Busy Tone Multiple Access Protocol (DBTMAP) is an extension of the BTMA scheme.

a data channel for data packet transmissions

a control channel used for control packet transmissions (RTS and CTS packets) and also for transmitting the busy tones.
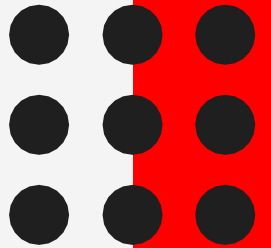
Contention-based protocols

Receiver-Initiated Busy Tone Multiple Access Protocol (RI-BTMA)

The transmission channel is split into two:

a data channel for data packet transmissions

a control channel used for transmitting the busy tone signal

A node can transmit on the data channel only if it finds the busy tone to be absent on the control channel.

The data packet is divided into two portions: a preamble and the actual data packet.

MACA-By Invitation (MACA-BI) is a receiver-initiated MAC protocol.

By eliminating the need for the RTS packet it reduces the number of control packets used in the MACA protocol which uses the three-way handshake mechanism.

Media Access with Reduced Handshake (MARCH) is a receiver-initiated protocol.

Assessment

List out classification of Contention based protocols

THANK YOU