



SNS COLLEGE OF TECHNOLOGY

**Coimbatore-35
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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

19EC402- WIRELESS ADHOC AND SENSOR NETWORKS

IV ECE / VII SEMESTER

UNIT 2 – MEDIA ACCESS CONTROL (MAC) PROTOCOLS

**TOPIC 4 –Contention based with reservation mechanisms-Distributed
priority-scheduling.**

Classifications of MAC Protocols:

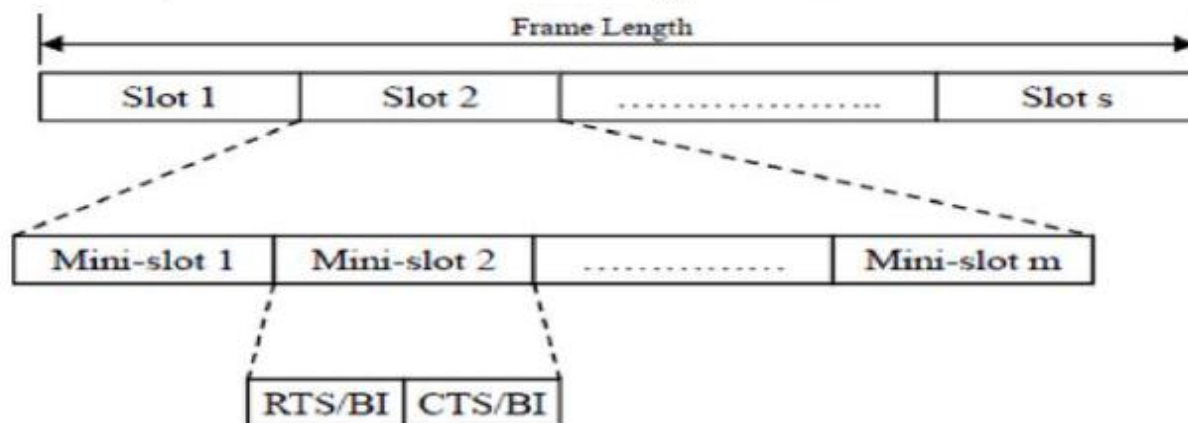
➤ Contention-based Protocols with Reservation Mechanism:

- ✓ Contention occurs during the resource (bandwidth) reservation phase.
- ✓ Once the bandwidth is reserved, the node gets exclusive access to the reserved bandwidth.
- ✓ QoS support can be provided for real-time traffic.

❖ Synchronous protocols:

□ **Distributed Packet Reservation Multiple Access Protocol(D-PRMA)**

- It extends the centralized packet reservation multiple access (PRMA) scheme into a distributed scheme that can be used in ad hoc wireless networks.
- PRMA was designed in a wireless LAN with a base station.
- D-PRMA is a TDMA-based scheme. The channel is divided into fixed- and equal-sized frames along the time axis.



Classifications of MAC Protocols:

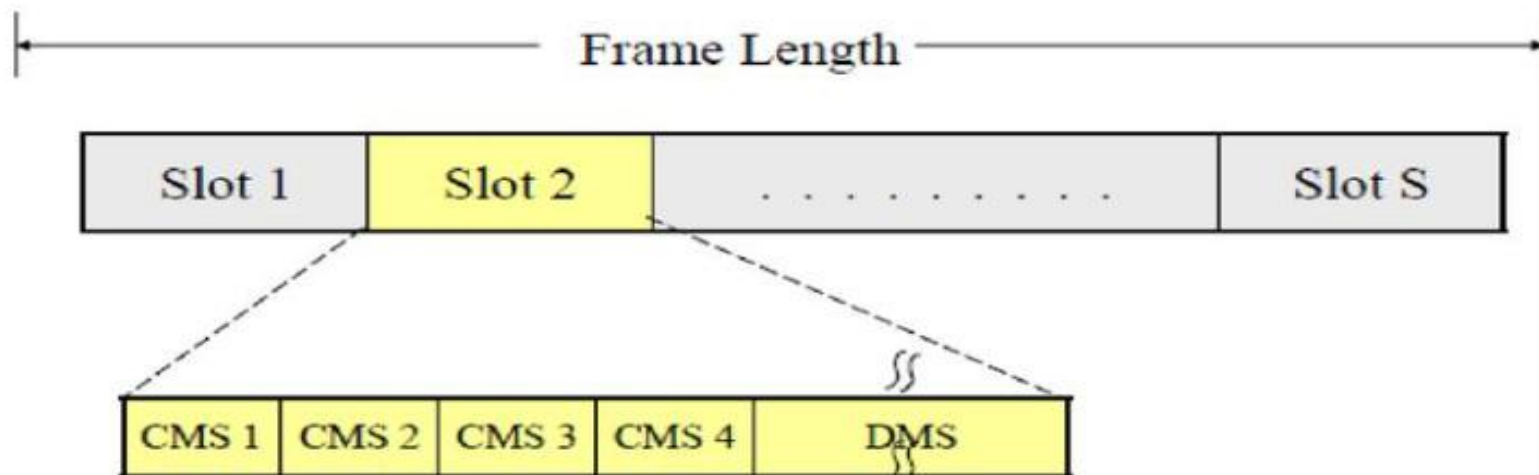
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➤ Contention-based Protocols with Reservation Mechanism:

❖ Synchronous protocols:

❑ **Collision Avoidance Time Allocation Protocol(CATA):**

- ✓ Support broadcast, unicast, and multicast transmissions simultaneously.
- ✓ Each frame consists of S slots and each slot is further divided into five Control Mini-Slots
 - CMS1: Slot Reservation (SR)
 - CMS2: RTS
 - CMS3: CTS
 - CMS4: Not To Send (NTS)
 - DMS: Data transmission



➤ Contention-based Protocols with Reservation Mechanism:

❖ Synchronous protocols:

❑ **Soft Reservation Multiple Access with Priority Assignment (SRMA/PA):**

- ✓ Developed with the main objective of supporting integrated services of real-time and non-real-time application in Ad-hoc networks.
- ✓ Nodes use a collision-avoidance handshake mechanism and a soft reservation mechanism.

❑ **Five-Phase Reservation Protocol (FPRP)**

- ✓ A single-channel TDMA based broadcast scheduling protocol.
- ✓ Nodes uses a contention mechanism in order to acquire time slots.
- ✓ The protocol assumes the availability of global time at all nodes.
- ✓ The reservation takes five phases:
 - Reservation,
 - Collision Report,
 - Reservation Confirmation,
 - Reservation Acknowledgement,
 - Packing And Elimination Phase.

Classifications of MAC Protocols:

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➤ Contention-based Protocols with Reservation Mechanism:

❖ Synchronous protocols:

❑ **Five-Phase Reservation Protocol (FPRP)**

Five-phase protocol:

- **Reservation request:** send reservation request (RR) packet to dest.
- **Collision report:** if a collision is detected by any node, that node broadcasts a CR packet
- **Reservation confirmation:** a source node won the contention will send a RC packet to destination node if it does not receive any CR message in the previous phase
- **Reservation acknowledgment:** destination node acknowledge reception of RC by sending back RA message to source
- **Packing and elimination:** use packing packet and elimination packet.

Classifications of MAC Protocols:

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➤ Contention-based Protocols with Reservation Mechanism:

❖ Asynchronous protocols:

❑ **MACA with Piggy-Backed Reservation (MACA/PR):**

- ✓ Provide real-time traffic support in multi-hop wireless networks
- ✓ Based on the MACAW protocol with non-persistent CSMA
- ✓ The main components of MACA/PR are:
 - A MAC protocol
 - A reservation protocol
 - A QoS routing protocol

❑ **Real-Time Medium Access Control Protocol (RTMAC)**

- ✓ Provides a bandwidth reservation mechanism for supporting real-time traffic in ad-hoc wireless networks
- ✓ RTMAC has two components
 - A MAC layer protocol is a real-time extension of the IEEE 802.11 DCF.
 - A medium-access protocol for best-effort traffic
 - A reservation protocol for real-time traffic
 - A QoS routing protocol is responsible for end-to-end reservation and release of bandwidth resources.

Classifications of MAC Protocols:

➤ Contention-based protocols with Scheduling Mechanism:

- ✓ Protocols in this category focus on packet scheduling at the nodes and transmission scheduling of the nodes.
- ✓ The factors that affects scheduling decisions
 - Delay targets of packets
 - Traffic load at nodes
 - Battery power
- ✓ Distributed priority scheduling and medium access in Ad Hoc Networks present two mechanisms for providing quality of service (QoS)
 - **Distributed priority scheduling (DPS)** – Piggy-backs the priority tag of a node's current and head-of-line packets to the control and data packets
 - **Multi-hop coordination** – Extends the DPS scheme to carry out scheduling over multi-hop paths.