CODIAC Protocol

Centralized or Distributed Integrated Access Control

Slides for document IEEE P802.11-93/54

Carolyn Heide/Spectrix

Goals

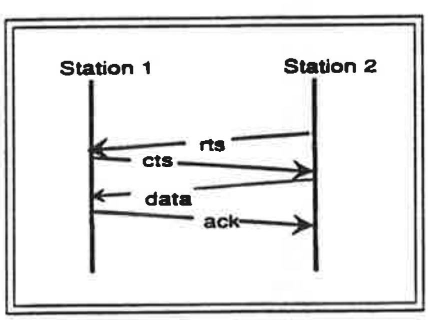
- Take advantage of the contention avoidance, power efficiency and time-bounded support characteristics of a point coordination function;
- Operate efficiently and with fairness in the absence of a point coordination function;
- Provide maximum flexibility, allowing the protocol to be tailored to varying implementations without losing compatibility across those implementations.

Concept

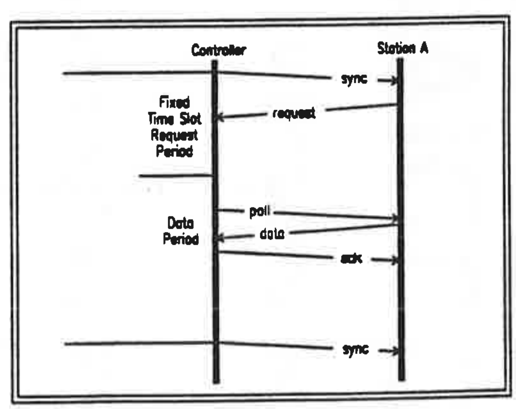
Combination of two protocols:

Xircom's Wireless Hybrid Asynchronous Time-bounded (WHAT) Protocol

Spectrix' Reservation/Polling Protocol (RPP)



WHAT



RPP

Theory of Operation

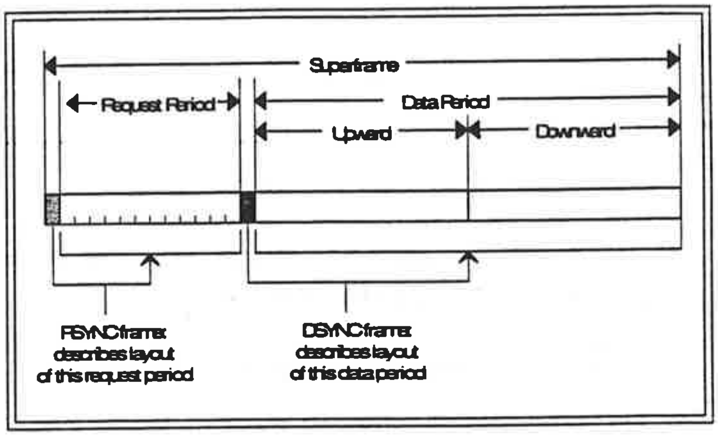
- Two modes of operation: centralized and distributed.
- Centralized: point coordination function managed by a controller.
- Distributed: enhanced listen-before-talk.
- Data transfer performed point-to-point by exchange of four frames: RTS, CTS, DATA and ACK.
- Station startup procedure: listen.

Distributed Mode

- WHAT

Centralized Mode

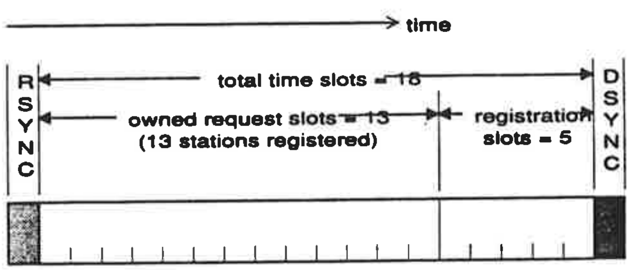
Superframe



IEEE 802.11-93/54a

Centralized Mode

Example Request Period



RSYNC specifies 18 total slots, 5 registration slots.

13 stations have already registered and been assigned ID's 1 to 13, which are specifies the request time slot they own.

Registering stations generate random numbers from 1 to 5 and contend for the five registration slots.

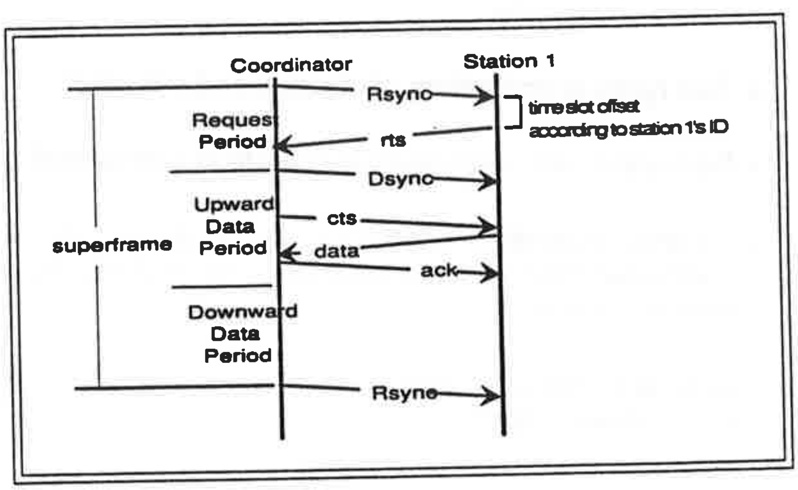
Centralized Mode

Registration

- Stations must be registered to use the medium (for anything but registration).
- Controller allocates any number of registration slots.
- Registration slots can overlap owned slots if the implementation choose to do so.
- Controller assigns registering station an owned slot number, which becomes the station's ID, used when in frames sent to/from that station for the duration of its registration.

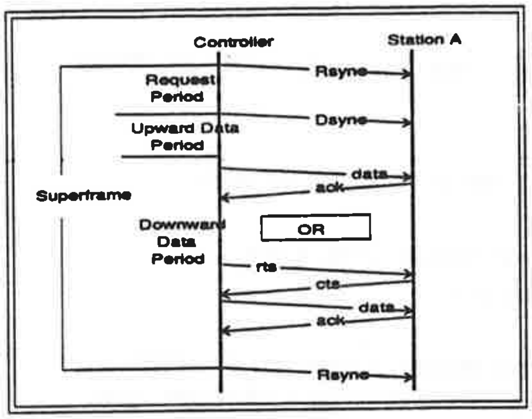
Centralized Mode

Upward Data Period

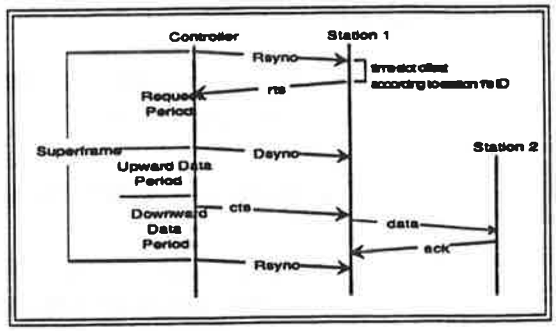


Centralized Mode

Downward Data Period



Controller to Station



Station to Station

Changing Modes

- Stations change modes according to whether or not they hear the controller.
- Two types of controllers, dedicated and potential.
- Dedicated controllers always operate in centralized mode.
- Potential controllers can operate as regular stations in distributed mode or as controllers in centralized mode at their discretion.
- Criteria for potential controller changing modes is choice of the implementation.

ACK & Duplicate Detection

Goals

- ♦ minimize retransmission of data frames
- ♦ filter out most duplicates
- ♦ NOT to guarantee no duplicates

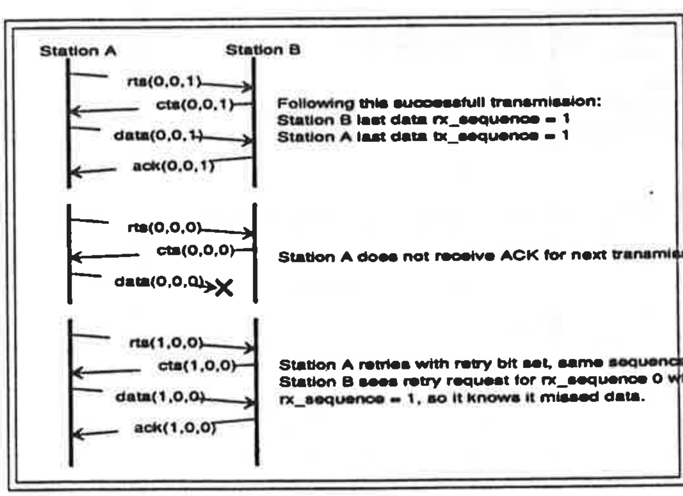
Mechanism

- ♦ Retry Bit
- ♦ Sequence Bit
- ♦ Out-of-sequence Bit

ACK & Duplicate Detection

Example 1

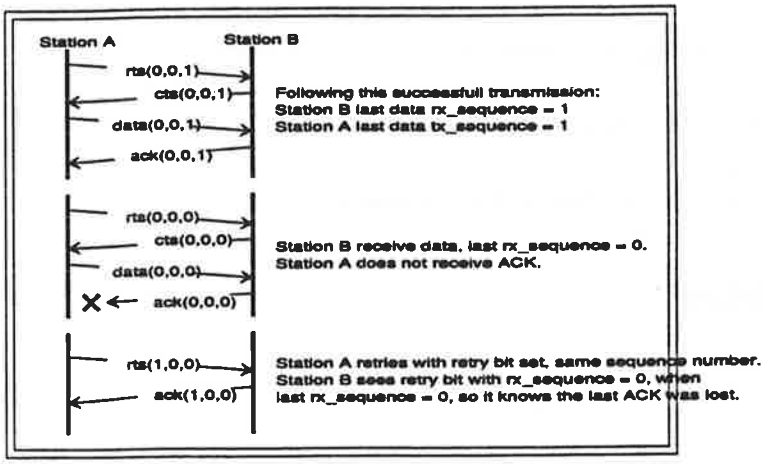
flags ⇒ (retry, out-of-sequence, sequence)



ACK & Duplicate Detection

Example 2

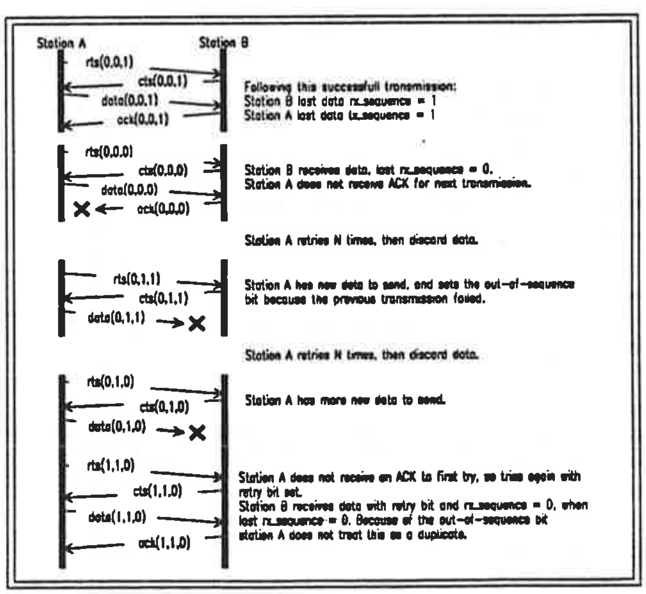
flags ⇒ (retry, out-of-sequence, sequence)



IEEE 802.11-93/54a

ACK & Duplicate Detection

Example 3 flags ⇒ (retry, out-of-sequence, sequence)



Overlapping Modes

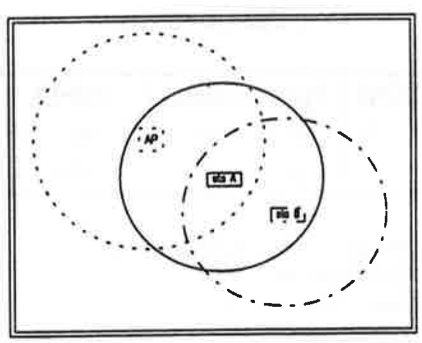
Distributed/Distributed

- null case

Overlapping Modes

Distributed/Centralized

The AP and Station A are centralized, station B is distributed

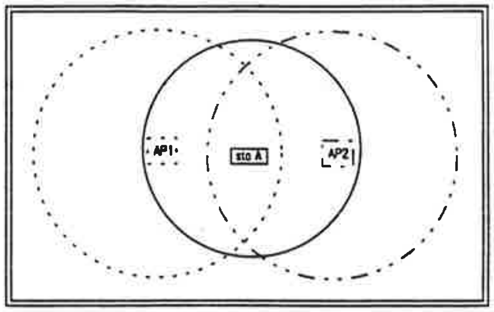


Performance of both centralized and distributed stations in the overlap is degraded.

Overlapping Modes

Centralized/Centralized

AP1, AP2 and station A all centralized.



Station A powers up this way - it cannot communicate, but could try to register to inform an AP of the problem.

Station A moves into this position, ?

Frame Format

Minimum Frame Length (10 + n) octets								
		FCS Coverage						
Preamble 8n	SD 8	DID 16	Type 8	Control 8	INFO (optional) 8m	FCS 32	ED 8	⇐ field name ⇐ field length (bits)

Preamble	=	Preamble (n to be determined)
SD	=	Start Delimiter
DID	=	Destination Identifier
Type	=	Frame Type
Control	=	Control Flags: AP, sequence, out-of-sequence, retry, hierarchical
INFO	=	Information (0 <= m <= to be determined)
FCS	=	Frame Check Sequence, CRC-32
ED	=	End Delimiter

Destination identifier values: FFFFh = broadcast

8000 - FFFEh = controller stations
0 - 7FFFh = non-controller station.

Possible Enhancements

Pages 21 & 22 of document 93/54.

802.11 Issues

Pages 29 to 36 of document 93/54