Issue Identification: 1.2 (Topic: 'Standard' Process).

- Do we want to develop a weighted list of criteria (i.e.; delays, efficiency, etc.) ?
- What do we mean by efficiency?

Alternatives:
1). Obsolete Issue

Arguments:
Pro:

Con:

Related Issue Identification:

Issue Originator:

Issue History:
May 1992: First opened
January 1994: Alternative #1 and closing the Issue by endorsing the alternative - MAC: unanimous

Issue Status: CLOSE January 1994

Issue Identification: 1.3 (Topic: 'Standard' Process).

- What are our priorities when we have to make engineering trade offs?

Alternatives:
1). Obsolete Issue

Arguments:
Pro:

Con:

Related Issue Identification:

Issue Originator:

Issue History:
May 1992: First opened
January 1994: Alternative #1 and closing the Issue by endorsing the alternative - MAC: unanimous

Issue Status: CLOSED January 1994

Issue Identification: 2.1 (Topic: Environment).

- What physical environment the standard will support, including station speed ?

Alternatives:

Arguments:
Pro:

Con:

Related Issue Identification:
1) - 16.5 (Topic: Mobility)

Issue Originator:

Issue History:
May 1993: Date first open
January 1994: Attempt to close the Issue as 'obsolete' failed. Plan to address this Issue in March 1994.

Issue Status: Open

Issue Identification: 3.1 (Topic: Marketing).

What is the impact of the MAC implementation complexity in regard of 'time-to-market ?

Alternatives:

1) - See the CODIAC protocol proposal - Reference #1
2) - Obsolete Issue by adoption of the MAC protocol foundation (Reference #3).

References:

1) - The CODIAC Protocol - Centralized or Distributed Integrated Access Control (CODIAC), A Wireless MAC Protocol
2) - P802.11-93/204 - An Improved Reference Model for IEEE 802.11.
3) - P802.11-93/190 - Distributed Foundation Wireless Medium Access Control

Arguments:

General:

1): - (Reference #2) - An increase in complexity cannot help, and can hurt, "time-to-market." In a similar manner, an increase in complexity of the specification of the mechanisms needed to support a variety of diverse PHYs under a single MAC protocol cannot help, and can hurt, implementation complexity. While the standard does not define implementation, the simpler the descriptive model and the resulting specifications are , the greater the potential for simplified implementation.

Pro:

1.1) - The CODIAC protocol can be implemented in many levels of complexity. Where time-to-market is of primary concern; a simple implementation could be chosen to accomplish this.

Con:

Related Issue Identification:

Issue Originator:

Issue History:

May 1992: Date first opened.
May 1993: Alternative #1, Reference #1 and Argument_pro #1.1
November 1993: Reference #2 and Argument_general #1.
January 1994: Alternative #2, Reference #3 and closing the Issue by endorsing the alternative - MAC: unanimous

Issue Status: CLOSED January 1994

Issue Identification: 7.1 (Topic: Cost).

- How does cost of goods influence our designs?
- Is cost proportional to functionality?
- Can it be measured?

Alternatives:

1) - Obsolete Issue

Arguments:

Pro:

Con:

Related Issue Identification:

Issue Originator:

Issue History:

May 1992: Date first opened

January 1994: Alternative #1 and closing the Issue by endorsing the alternative - MAC: unanimous

Issue Status: CLOSED January 1994

Issue Identification: 7.2 (Topic: Cost).

- How interoperability of 'low cost' and 'reliable MAC' is to be addressed?

Alternatives:
1) - Obsolete Issue

Arguments:

Pro:

Con:

Related Issue Identification:

Issue Originator:

Issue History:
May 1992: Date first opened
January 1994: Alternative #1 and closing the Issue by endorsing the alternative - MAC: unanimous

Issue Status: CLOSED January 1994

Issue Identification: 8.1 (Topic: Safety).

- How does safety concerns impact our decisions?
- Do we let our decision making be driven by time constraints?

Alternatives:

Arguments:

General:

1.0) - Splitting the Issue into 2 related Issues:

8.1A) - How does safety concerns impact our decisions?

8.1B) - Do we let our decision making be driven by time constraint?

Pro:

Con:

Related Issue Identification:

Issue Originator:

Issue History:

May 1992: first open

January 1994: - Argument-General #1.0 and closing the Issue 8.1

Issue Status: CLOSE January 1994

Issue Identification: 8.1A (Topic: Safety).

How does safety concerns impact our decisions?

Alternatives:

Arguments:

General:

Pro:

Con:

Related Issue Identification:

1) - 8.1 (Safety)

Issue Originator: MAC Group

Issue History:

January 1994: - Date first open

Issue Status: Open

Issue Identification: 8.1B (Topic: Safety).

Do we let our decision making be driven by time constraint?

Alternatives:
1) - Obsolete issue

Arguments:
General:

Pro:

Con:

Related Issue Identification:
1) - 8.1 (Safety)

Issue Originator: - MAC Group

Issue History:
January 1994: Date first open and closed by endorsing the Alternative. MAC: unanimous

Issue Status: CLOSED January 1994

Issue Identification: 9.1 (Topic: Performance).

- How will the standard address:
  a) - MAC throughput?
  b) - throughput probability?

Alternatives:

1) - The throughput performance may be addressed via a an optional Data Compression function.
2) - Obsolete Issue

References:

1)- P802.11-92/123 - "Mathematica" Based Integrated MAC/PHY Performance Simulation Framework Including Capture Effect.
2) - P802.11-93/1 - Application of "Mathematica" Based Simulation Template to Demand Assigned MAC Described in IEEE P802.11-92/39 ("The IBM MAC Proposal").
3) - P802.11-93/29 - Wireless LAN MAC Protocol: Data Compression as a MAC Option to Improve Effective Throughput.

Arguments:

Pro:

1.1) - The function (compression) would be optional, at the MAC Layer, because it may be performed by higher layers.
1.2) - Any compression function will increase the [MAC] performance.

Con:

1.1) - Compression on a packet basis may not provide a very useful compression ratio.

Related Issue Identification:

1) - 29.1 (Simulation)
2) - 9.1 (Performance)

Issue Originator:

Issue History:

May 1992: First opened
November 1992: Reference and Related Issue.
January 1993: Reference #2
March 1993: Alternative #1 - Reference #3 - Argument_pro #1.1 and 1.2 - Argument_con #1.1.
January 1994: Alternative #2 - Attempt to close the Issue as 'obsolete' failed.

Issue Status: Open

Issue Identification: 9.2 (Topic: Performance).

What are the area coverage implications of MAC timing constraints?

Alternatives:

1) - No timing constraints are imposed by this protocol that would limit coverage area of LAN dimensions.
2) - Obsolete Issue

References:

1) - The CODIAC Protocol - Centralized or Distributed Integrated Access Control (CODIAC), A Wireless MAC Protocol

Arguments:

Pro:

1.1) - On the assumption that this issue arose from the Ethernet maximum cable length specification which is driven by the timing constraints of CSMA/CD.

Con:

Related Issue Identification:

1) - 10.4 (Topic: Coordination)

Issue Originator:

Issue History:

May 1992: First opened
May 1993: Alternative #1 - Reference #1 - Argument_pro #1.1.
January 1994: Alternative #2 and closing the Issue by endorsing Alternative #2 - MAC: unanimous

Issue Status: CLOSED January 1994

Issue Identification: 9.3 (Topic: Performance).

Is the same MAC must work in a minimum system and maximum system (network size independence)?

Alternatives:

1) - Yes

References:

1) - The CODIAC Protocol - Centralized or Distributed Integrated Access Control (CODIAC), A Wireless MAC Protocol
2) - P802.11-93/115 - Protocol Layering Alternatives for Practical Implementation
3) - P802.11-93/140 - MAC/PHY Functional Partitioning

Arguments:

Pro:

1.1) - Not just to work in minimum and maximum system, but to work efficiently in both is the goal of the CODIAC protocol (Reference #1).

1.2) - The same MAC must support minimum and maximum system configurations.

Con:

Related Issue Identification:

1) - 5.5 (Topic: Distribution Systems)

Issue Originator:

Issue History:

May 1992: Date first open
May 1993: Alternative #1 - Reference #1 - Argument_pro #1.1.
September 1993: Reference #2 & #3 and Argument_pro #1.2
January 1994: - Close the Issue by endorsing Alternative #1. - MAC: Unanimous

Issue Status: CLOSE January 1994

Issue Identification: 9.4 (Topic: Performance).

- How will the standard address attenuation ?

Alternatives:

References:
1) - P802.11-92/123 - "Mathematica" Based Integrated MAC/PHY Performance Simulation Framework Including Capture Effect.

Arguments:

Pro:

Con:

Related Issue Identification:
1) - 29.1 (Simulation)

Issue Originator:

Issue History:

May 1992: First opened
November 1992: Reference and Related Issue.
January 1994: - Attempt to close the Issue failed.

Issue Status: Open

Issue Identification: 9.6 (Topic: Performance).

- How does 'interference' impact MAC throughput?

Alternatives:
1) - Refer to Issue 9.1

References:

Arguments:
General:

Pro:
1.1) - This Issue is already addressed in Issue 9.1

Con:

Related Issue Identification:
1) - 9.1 (Performance)

Issue Originator: MAC Group

Issue History:
March 1993: Date first opened
January 1994: Close the Issue by endorsing Alternative #1. - MAC: unanimous

Issue Status: CLOSED January 1994

Issue Identification: 10.1 (Topic: Coordination).

~~What is a Coordination Function (CF) ?~~
What Coordination Function (CF) will be specified in the standard?

Alternatives:

1) - A Distributed Coordination Function (DCF).
2) - Point Coordination Function (PCF)
3) - Both, DCF and PCF (same alternatives as specified in Issue 10.2B).

References:

1) - P802.11-93/40 - The Wireless Hybrid Asynchronous Time Bounded MAC Protocol.
2) - P802.11-93/70 - A Distributed Access Protocol Proposal Supporting Time Bounded Services.
3) - P802.11-93/10a1 - Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications (Draft)
4) - P802.11-93/3 - What are Adhoc Wireless LANs? - A Viewpoint.
5) - P802.11-93/70 - A distributed Access Protocol Proposal Supporting Time-bounded Services.
6) - P802.11-93/54 - The CODIAC Protocol - Centralized or Distributed Integrated Access Control (CODIAC), A Wireless MAC Protocol.
7) - P802.11-94/16 - Review of MAC Issues List
8) - P802.11-93/190 - Distributed Foundation Wireless Medium Access Control

Arguments:

General:

1.0) - Selection is dependent on the selected MAC protocol or the protocol selection is dependent on the coordination alternative selected.

2.0) - Proposed to change the CF definition (see Reference #3). CF should include protocol flow control of all contention resolutions (Slotted aloha / CSMA) and also data packet delivery for local network management and interface to the access point.

3.0) - The current definition of CF should be retained (see Reference #3).

4.0) The issue of coordination appears to be at the heart of the difference between the 802.11 MAC proposals. From this point was derived the decision to select one MAC proposal for the foundation to the 802.11 MAC standard.

5.0) Attempt to distinguish between PCF and Point/Centralized-Control functions (e.g. Power Management, Store/forward functions, Distribution System access, channel option, network planning) - Counter argument: This has nothing to do with coordination function.

Pro:

1.1) - A DCF should be specified as the default mode of operation. A DCF is simple to implement, sufficient for asynchronous service, and well suited to ad-hoc networks. A PCF should be added as an optional extension when Time-bounded service is required. The WHAT protocol (Reference #1) is an example of this approach.

1.2) - A DCF should be specified as the primary mode of operation. A DCF based on CSMA/CA + Ack as proposed in this document (Reference #2) has good medium sharing characteristics without added control overhead. The throughput efficiency is high and stable for high loads. It is well suited for Ad-Hoc operation, and allows overlap of infrastructure and Ad-Hoc, even on the same channel. It does fully support single channel PHY's.

1.3) - DCF facilitates ad-hoc networks better because it does not require a controller (From Alternative 2b of Issue 10.3 (Reference #2)).

1.4) - DCF is lower overhead and possibly lower access delay (in small population BSAs) (From Alternative 2e of Issue 10.3 (Reference #2)).

1.5) - Distributed Coordination function is better to deal with other transmitter in a Basic Service Area.

2.1) - A PCF can be built on top of the proposed CSMA/CA access method (Reference #2), allowing full coexistence and efficient sharing between Asynchronous and Time Bounded Services. Reserved but unused Isochronous bandwidth is fully available for the Asynchronous service, without any control overhead. The proposed Time Bounded Service (Reference #2) implementation using the CSMA/CA access method with priority does not burden the implementation of an Asynchronous Service only MAC.

2.2) - It is easy to manage the assignment of PCF in ad-hoc networks (see Reference #4).

2.3) - PCF lends itself to network planning topology.

2.4) - Having PCF access to the media can be tailored to the traffic nature of channel utilization optimization.

2.5) - PCF lends itself to power management.

2.6) - The quality of Time-bounded service is higher with PCF than the one provided by DCF.

2.7) - PCF is required for Time-bounded services (TBS) support (From Alternative 2a of Issue 10.3 (Reference #2)).

2.8) - PCF is better for high population networks, deterministic media access to avoid collisions (From Alternative 2d of Issue 10.3 (Reference #2)).

3.1) - By using DCF as the basic CF, with a PCF on top of it for Time Bounded service, there is no issue related to overlap of Ad-Hoc and infrastructure networks. For the same reason there is no issue for the MAC to operate on a single channel PHY, because of the medium sharing characteristics of the DCF (From Argument-pro 1.1 of Issue 10.3 (Reference #2)).

3.2) - Both types of coordination function are defined in the MAC Foundation (reference #8).

Con:

2.1) - There are difficulty to manage the assignment of PCF in ad-hoc network

2.2) - It is very difficult to manage assignment of PCF in a mobile station in a high mobility situation.

2.3) - Ad-hoc network require special function to become the PCF, opposed to the DCF which does not require any special function.

2.4) - PCF does not work without single channel PHY in overlapping BSAs

Related Issue Identification:

1) - 10.2B (Coordination)
2) - 10.3 (Coordination)

Issue Originator: Larry Van Der Jagt

Issue History:

May 1992: First opened
July 1992: Rephrase the Issue
March 1993: Alternative #1 - Reference #1 - Argument_pro # 1.1
May 1993: Alternative #2 - Reference #2 - Argument_pro #1.2 and #2.1
July 1993: Alternative #3, Argument-general #1.0 to #3.0, Argument-pro #2.2 to #2.8 and #3.1, Argument-con #2.1 to #2.3 and References #3 to #6.
September 1993 - Argument_General #4.0 & #5.0, Argument_pro #1.5 and Argument_con #2.4.
January 1994: Reference #7 & #8, Argument-pro #3.2 and closing the Issue by endorsing Alternative #3. MAC: Yes-37, no-0, Abstain-3.

Issue Status: CLOSED January 1994

Issue Identification: 10.2B (Topic: Coordination).

Do multiple Coordination Functions (CF) need to be specified?

Alternatives:

1) - Yes
2) - See Alternative #2 of Issue 10.2A
3) - Both Distributed Coordination Function DCF) and Point Coordination Function (PCF)

References:

1) - P802.11-92/126 - The Use of Terms for Expressing the Concepts of "Roaming", "Hand-off", "Registration" and "Identification" in WLAN Systems.
2) - P802.11-93/70 - A Distributed Access Protocol Proposal Supporting Time Bounded Services.
3) - P802.11-93/54 - The CODIAC Protocol - Centralized or Distributed Integrated Access Control (CODIAC), A Wireless MAC Protocol
4) - P802.11-94/16 - Review of MAC Issues List
5) - P802.11-93/190 - Distributed Foundation Wireless Medium Access Control

Arguments:

General:

1.0) - It is proposed to close this Issue because the Issue is addressed as an Alternative of Issue 10.1 (Both PCF and DCF should be specified in the standard) (see Related Issue #2).

Pro:

2.1) - See Alternative_pro #2 of Issue 10.2A

3.1) - Both Distributed Coordination Function (DCF) and Point Coordination Function (PCF) are required to support efficient operation with network size independence for asynchronous service. PCF is required for TBS, but this should not be forced on small population and ad-hoc networks.

3.2) - Both types of coordination function are defined in the MAC Foundation (reference #5).

Con:

Related Issue Identification:

1) - 10.2A (Coordination)
2) - 10.1 (Coordination)

Issue Originator:

Issue History:

May 1992: First opened
November 1992: Alternative #1 and Reference #1
May 1993: Alternatives #2 and #3 - Reference #2 and #3 - Argument_pro #2.1 and #3.1
July 1993: Argument_general #1.0 proposing to close the Issue at the September 1993 meeting.
January 1994: Reference #4 & #5, Argument-pro #3.2 and closing the Issue by endorsing Alternative #3. MAC: Yes-36, no-0, Abstain-5.

Issue Status: CLOSED January 1994

Issue Identification: 10.3 (Topic: Coordination).

What are the issues surrounding the Point Coordination Function (PCF) and Distributed Coordination Function (DCF) arguments ?

Alternatives::

1) - No issue related to overlapped ad-hoc and infrastructure network.

2) - The following is a list of issue addressing the overlapped of ad-hoc and infrastructure network:
   a) - PCF is required for Time-bounded services (TBS) support.
   b) - DCF facilitates ad-hoc networks better because it does not require a controller.
   c) - PCF is better than DCF for minimizing power consumption of portable stations.
   d) - PCF is better for high population networks, deterministic media access to avoid collisions.
   e) - DCF is lower overhead and possibly lower access delay (in small population BSAs).

References:

1) - P802.11-93/70 - A Distributed Access Protocol Proposal Supporting Time Bounded Services.
2) - P802.11-93/54 - The CODIAC Protocol - Centralized or Distributed Integrated Access Control (CODIAC), A Wireless MAC Protocol
3) - P802.11-94/16 - Review of MAC Issues List

Arguments:

General:

1.0) - The alternatives and arguments of this are directly related to Issue 10.1. Therefore, the Alternatives and Arguments of this Issue are transferred to Issue 10.1 and closure of this Issue is recommended.

2.0) - This issue was used to keep track of the various arguments in support of PCF and DCF. Given that the standard should support both, this particular issue should be closed.

Pro:

1.1) - By using DCF as the basic CF, with a PCF on top of it for Time Bounded service, there is no issue related to overlap of Ad-Hoc and infrastructure networks. For the same reason there is no issue for the MAC to operate on a single channel PHY, because of the medium sharing characteristics of the DCF.

Con:

Related Issue Identification:

Issue Originator:

Issue History:

May 1992: Date first opened
May 1993: Alternative #1 and #2 - References #1 and #2 - Argument_pro #1.1.
July 1993: Argument_general #1.0 proposing to close this Issue at the September 1993 meeting.
January 1994: Reference #3 Argument-general #2.0 and closing the Issue by endorsing the Argument_general #2.0. MAC: Yes-37, no-1, Abstain-1.

Issue Status: CLOSED January 1994

Issue Identification: 10.4 (Topic: Coordination).

- What are the requirements concerning service area ?

Alternatives:
1) - Obsolete Issue

Arguments:
General:
1.0) - As no special requirement for service area, which are not already specified for Basic Service Set (BSS), can be identified, closure of this Issue is recommended.

Pro:

Con:

Related Issue Identification:
1) - 10.2A (Coordination)

Issue Originator:

Issue History:
May 1992: Date first opened
July 1993: Argument_general #1.0 proposing to close the Issue at the September 1993 meeting.
January 1994: Alternative #1 and closing the Issue by endorsing the alternative - MAC: unanimous

Issue Status: CLOSED January 1994

Issue Identification: 10.6 (Topic: Coordination).

Should the standard specify means by which a Distributed Coordination Function (DCF) can cooperate with a Point Coordination Function (PCF) when a PCF is detected?

Alternatives:

1) - Yes

References

1) - P802.11-94/16 - Review of MAC Issues List
2) - P802.11-93/190 - Distributed Foundation Wireless Medium Access Control

Arguments:

General:

Pro:

1.1) - The MAC Foundation (Reference #2) describes specific ways in which this can be done. Even if the specifics in this regard undergo modifications in the final standard, the answer to this question should still be "yes'.

Con:

Related Issue Identification:

1) - 10.1 (Coordination)
2) - 10.2 (Coordination)
3) - 10.2A (Coordination)
4) - 10.2B (coordination)
5) - 10.3 (Coordination)

Issue Originator: K. Lynn

Issue History:

September 1993: Date first opened.
January 1994: Reference #1 & #2, Argument-pro #1.1 and closing the Issue by endorsing Alternative #1 MAC: Yes-38, no-0, Abstain-0.

Issue Status: CLOSED January 1994

Issue Identification: 11.3 (Topic: Access Point).

Is there a need for multiple Access Points (APs) per Basic Service Set (BSS) ?

Alternatives:
1) - No

References:
1) - P802.11-93/54 - The CODIAC Protocol - Centralized or Distributed Integrated Access Control (CODIAC), A Wireless MAC Protocol
2) - P802.11-94/16 - Review of MAC Issues List
3) - P802.11-93/190 - Distributed Foundation Wireless Medium Access Control

Arguments:

Pro:

1.1) - Although no need is envisioned, no reason for preclusion is seen. With the CODIAC protocol (Reference #1) only one controller per centralized mode BSS is required, but any number of stations could be APs.

1.2) - The MAC Foundation (Reference #3) requires a single AP per BSS in infrastructure configurations. This ensures that all stations within a given BSS can be properly coordinated and synchronized.

Con:

Related Issue Identification:

Issue Originator:

Issue History:
May 1992: Date first opened
May 1993: Alternative #1 - Reference #1 - Argument_pro #1.1
January 1994: Reference #2 & #3, Argument-pro #1.2 and closing the Issue by endorsing Alternative #1 MAC: Yes-28, no-2, Abstain-11.

Issue Status: CLOSED January 1994

Issue Identification: 11.4 (Topic: Access Point).

Can it be stated that in the case of the presence of a station acting as an Access Point (AP), it always contains the Point Coordination Function (PCF) if a PCF is present?

Alternatives:
1) - No

References:
1) - P802.11-94/16 - Review of MAC Issues List

Arguments:

Pro:

1.1) - Although it is unlikely that a real implementation will place the PCF elsewhere, strictly speaking it is not required that the PCF always be collocated with the AP.

Con:

Related Issue Identification:

Issue Originator: D. Bagby

Issue History:
May 1993: Date first opened
January 1994: Alternative #1, Reference #1, Argument-pro #1.1 and closing the Issue by endorsing Alternative #1 MAC: Yes-32, no-2, Abstain-3.

Issue Status: CLOSED January 1994

Issue Identification: 11.5 (Topic: Access Point).

Will AP provides relay of packets to other device within a BSS?

Alternatives:

References:
1) - P802.11-93/208 - A Complete Description of Frame Prioritization in a CSMA/CA MAC Protocol.

Arguments:
Pro:

Con:

Related Issue Identification:

Issue Originator: MAC Group

Issue History:
January 1994: Date first open and Reference #1.

Issue Status: Open

Issue Identification: 11.6 (Topic: Access Point).

Will the MAC support the functionality of more than one AP per BSS?

Alternatives:

References:

Arguments:
Pro:

Con:

Related Issue Identification:

Issue Originator: MAC Group

Issue History:
January 1994: Date first open

Issue Status: Open

Issue Identification: 13.3 (Topic: Management).

What support will the standard provide for power management:
- Direct Current (DC) power ?
- Radio Frequency (RF) power ?

Alternatives:
1) - Sign-on at turn-on.
2) - Coordinate turn-on with Access Point (AP).

Arguments:

General:

1.0) There is a need split the Issue into 2 related issues:
- 13.3A) - What support will the standard provide for DC power management?
- 13.3B - What support will the standard provide for RF power management?

Pro:

1.1) - Registration function has to exist anyhow.

2.1) - Station (STN) behaves predictably - Access Point (AP) can hold store and forward MAC Service Data Units (MSDUs)

Con:

1.1) - Access Point (AP) doesn't know if the station has gone - i.e.; when to free buffers.

1.2) - Must have fast registration to avoid power waste.

2.1) - MAC is more complex.

Related Issue Identification:
1) - 13.3A (Management)
2) - 13.3B (Management)

Issue Originator:

Issue History:

May 1992: First opened
July 1992: Alternatives, Pro, and Con provided by John Deane.
May 1993: Argument_general #1.0 - splitting of the Issue into two related issues 13.3A and 13.3B
January 1994: Decision to close this Issue as it is splitted into 2 related Issues - 13.3A and 13.3B.
MAC: Unanimous

Issue Status: CLOSE January 1994

Issue Identification: 13.3A (Topic: Management).

What support will the standard provide for DC power management?

Alternatives:

1) - Implementation dependent
2) - The MAC should provide specific Power Management Functionality such as:
   a) - Temporary buffering functions
   b) - Transmitter and receiver synchronization

References:

1) - P802.11-93/54 - The CODIAC Protocol - Centralized or Distributed Integrated Access Control (CODIAC), A Wireless MAC Protocol.
2) - P802.11-93/94 - The Importance of Power Management Provisions in the MAC.
3) - P802.11-94/16 - Review of MAC Issues List
4) - P802.11-93/190 - Distributed Foundation Wireless Medium Access Control

Arguments:

Pro:

1.1) - Some implementations are more concerned with power consumption than others. The CODIAC protocol (Reference #1) allows implementations to trade off power consumption requirements with overhead and access delay. These features are described in the main text of this document.

2.1) - The MAC should provide specific Power Management functionality like temporary buffering and transmitter and receiver synchronization, to allow stations to go into sleep without loss of service.

2.2) - Buffering and synchronization functions are key to the power management mechanism in the MAC Foundation (Reference #4), allowing application independent power management.

Con:

1.1) - See Argument-pro #2.1

Related Issue Identification:

1) - 13.3 (Management)
2) - 13.6 (Management)

Issue Originator: C. Heide

Issue History:

May 1993: Date first opened - Alternative #1 - Reference #1 - Argument_pro #1.1.
July 1993: Alternative #2, Reference #2, Argument_pro #2.1 and Argument_con 1.1.
January 1994: Reference #3 & #4, Argument_pro #2.2 and closing the Issue by endorsing Alternative #2 MAC: Yes-32, no-0, Abstain-5.

Issue Status: CLOSED January 1994

Issue Identification: 13.6 (Topic: Management).

How will the MAC standard address Power Consumption ?

Alternatives:

1) - See Alternative #1 of Issue 13.3A

2) - The MAC protocol should allow stations to have their transceivers off most of the time when there is no traffic addressed to them. Also, the MAC protocol should provide a way for suspending an association (without de-associating), allowing for immediate reassociation when the station resumes operation.

3): See Reference #4 - MAC Foundation specification

References:

1) - P802.11-93/54 - The CODIAC Protocol - Centralized or Distributed Integrated Access Control (CODIAC), A Wireless MAC Protocol
2) - P802.11-93/136 - Opinions on Issues 13.6 and 17.3 and New Issues
3) - P802.11-94/16 - Review of MAC Issues List
4) - P802.11-93/190 - Distributed Foundation Wireless Medium Access Control

Arguments:

Pro:

1.1) See Argument #1.1 of Issue 13.3A
2.1) See Reference #2
3.1) - See Reference #4

Con:

Related Issue Identification:

1) - 13.3 (Management)
2) - 13.3A (Management)

Issue Originator:

Issue History:

May 1992: Date first opened
May 1993: Alternative #1 - Reference #1 - Argument_pro #1.1
September 1993: Alternative #2, Reference #2 and Argument_pro #2.1.
January 1994: Reference #3 & #4, Argument_pro #3.1 and closing the Issue by endorsing Alternative #3 MAC: Yes-29, no-1, Abstain-7.

Issue Status: CLOSED January 1994

Issue Identification: 14.2 (Topic: Connection Types).

- What are the trade-off in efficiency between a connection oriented protocol versus running Time-bounded data over connectionless protocol ?

Alternatives:

1) - Not Relevant

References:

1) - P802.11-94/16 - Review of MAC Issues List
2) - P802.11-93/190 - Distributed Foundation Wireless Medium Access Control

Arguments:

Pro:

1.1) - Time bounded services are only provided via a connection-oriented service as described in the adopted MAC Foundation (Reference #2).

Con:

Related Issue Identification:

1) - 15.1 (Topic: Services)

Issue Originator:

Issue History:

May 1992: First opened
January 1994: Reference #1 & #2, Argument_pro #1.1 and closing the Issue by endorsing Alternative #1 MAC: Yes-26, no-3, Abstain-7.

Issue Status: CLOSED January 1994

Issue Identification: 14.3 (Topic: Connection Types).

- Where shall the connection oriented and connectionless services be integrated:,
- the MAC, or
- the LLC, or
- somewhere else ?

Alternatives:

1) - MAC

References:

1) - P802.11-94/16 - Review of MAC Issues List
2) - P802.11-93/190 - Distributed Foundation Wireless Medium Access Control

Arguments:

Pro:

1.1) - Taking 'connection-oriented' here to mean 'Time-bounded', the MAC protocol must distinguish between frame types and provides a different access method for the different service types. Consequently, as specified in the MAC Foundation (Reference #2) the MAC must be aware of both types and provide integration.

Con:

Related Issue Identification:

Issue Originator: Chandos Rypinsky

Issue History:

May 1992: First opened
January 1994: Alternative #1, Reference #1 & #2, Argument_pro #1.1. Attempt to close this issue failed - MAC: Yes-4, No-29, Abstain-3.

Issue Status: Open

Issue Identification: 14.4 (Topic: Connection Types).

Ability to establish peer-to-peer connectivity without prior connection (eg. without "knowledge of the presence of your peers").

Alternate Issue text: - can a station initiate communications with another station without knowing that it is present, and what its wireless address is?

Alternatives:

1) - Yes

References:

1) - P802.11-93/54 - The CODIAC Protocol - Centralized or Distributed Integrated Access Control (CODIAC), A Wireless MAC Protocol

2) - P802.11-94/16 - Review of MAC Issues List

Arguments:

Pro:

1.1) - (Reference #1) In the RTS frame contains the 48-bit address of the intended destination station. In distributed mode this frame is broadcast, so the destination station can respond if it is there. In centralized mode the RTS is sent to the controller, and it can use its knowledge of registered stations to determine the wireless address of the destination. Also, use of the AP bit and the Hierarchical bit allow stations to identify APs without any prior knowledge.

1.2) - In particular, this is possible for ad hoc communication between stations.

Con:

Related Issue Identification:

Issue Originator:

Issue History:

May 1992: Date first opened

May 1993: Alternate Issue text - Alternative #1 - Reference #1 - Argument_pro #1.1.

January 1994: Reference #2 Argument_pro #1.2 and closing of the Issue by endorsing the Alternative - MAC: Yes-35, No-1, Abstain-2

Issue Status: CLOSE January 1994.

Issue Identification: 15.1 (Topic: Services).

- Part 1 - What does Time-bounded means ?
- Part 2 - What are the bounds

15.1-A - What does Time-bounded means ?

Alternatives:

1) It means a time-bounded service
2) The term time bounded itself
3) The service transfers data from a natural process and thus certain time constrained performance criteria must be met for the service to be useful.

References:

- P802.11/92-109 - Communications Requirements of Multimedia Applications: A Preliminary Study.
- P802.11/92-110 - Wireless Networking Requirements of Multimedia Applications
- P802.11/92--129 & 101 - Time Based Services - Quality of Service on Wireless LANs

Arguments:

This is what everyone means and is concerned over (see P802.11/92-109 and -110).
3) This is not a self-referencing definition and it is useful in defining requirements of the MAC

Tentative Definitions:

1) Time-bounded service: A service class for which the data being carried is subjected to requirements with respect to the absolute delay and/or delay variance.

2) A time-bounded service, as supported by 802.11, is insensitive to a defined amount of transfer delay. However, when this value is exceeded the value of the message becomes zero.
A non-time-bounded service, as supported by 802.11, is transferred as promptly as possible but the value of the message is only slightly diminished by peak delays exceeding average delay many times.

3) The time-bounded service provides a mechanism for the transport of data between two service access points with controlled absolute delay and delay variance.

4) The time-bounded service provides a mechanism for the transport of data between two service access points with controlled worst case delay.

5) The time-bounded service provides a mechanism for guaranteed bandwidth availability over a predetermined time interval.

6) The time-bounded service is designed to meet the special demands of applications that require data transmission with controlled absolute delay and delay variance.

7) Time-bounded service: A service class for which bandwidth is reserved and the data being carried is subjected to requirements with respect to bandwidth, the absolute delay and/or delay variance.

Related Issue Identification:

Issue Originator:

Issue History:

May 1992: Date first opened
September 1992 - Discussion - Alternatives 1 & 2 and Arguments, including tentative definitions: 1 to 6
Nov 1992 - Discussion - Alternative 3 & Definition 7 added
January 1994: - Decision to let this Issue open.

Issue Status: Open

Issue Identification: 15.1 (Cont'd)

15.1-B - What are the bounds ?

Alternatives:

1) - The following is extracted from P802.11-92/107.
In attempting to determine the bounds tor "time-bounded" services, it is helpful to consider a list of potential applications which will have time-bounded characteristics:

* telephony/teleconferencing
* audio recording/playback
* telephone answering machine/voicemail
* shared still pictures with telephony
* shared still pictures allowing mouse and/or keyboard alteration with telephony
* Motion video with audio record/playback
* motion videoconferencing
* motion videoconferencing with lip synchronized audio
* medical telemetry

industrial automation and control

Each of these applications has different user requirements with respect to the value of the bounds for END-TO-END delay and/or PERMISSIBLE VARIATION in END-TO-END delay and/or PERMISSIBLE VARIATION between END-TO-END delay for different components of the data (e.g. between video and audio). Hence it will be helpful if different applications have the capability to request different **Quality of Service** attributes when establishing a connection on the network. [For example, to the user, this may involve a decision on cost versus resolution or color/black and white pictures. This would impact the 802.11 standard by imposing a requirement for a mechanism of reserving multiple Time-bounded channels.]

Once the END-TO-END bounds are known for a particular application, there remains the problem of determining the budget that is allocated to the wireless LAN versus the budget that is to be allocated to the connection to the Wide Area Network (WAN) and to the WAN itself and versus the budget that is consumed by the end users station (by delays imposed by system software and hardware). These network and system budgets are outside scope of 802.11 but have been examined in order to allocate appropriate budgets for time-bounded services over the 802.11 wireless network.

The process of this work (see P802.11-92/107) has included:

1. An examination of the human factors characteristics for the set of applications listed for which we expect the use time-bounded services and development of the END-TO-END bounds. Much of this work has been done, especially for telephony applications and is codified in existing telephony standards.

2. An examination of budgets for existing networks delays (again, this information already exists) and a reasonable estimation of internal system budgets for presentation of "time-bounded" data to the end user. (Existing systems are not always reasonable.)

3. An INFORMED allocation of budgets for bounds in "time-bounded" networks has been made with the knowledge of what application types can be supported with which choice of bounds.

2) - The following is derived from P802.11-92/129.
1. The Data Rate TBS QOS requirement is:

Q1 SP = 64 Kbs
Q1 VD Broadcast <= 5 Mbs
This service (un-compressed, Broadcast quality video) is obviously outside the scope of WLAN. It is provided by dedicated bandwidth on Broadband LANs along with 802.3 & and 802.4 in separate frequency bands.
Q1 VD Slow Scan >= 160 Kbs
Q1 IA Mechanical <= 160 Kbs
Q1 IA Tank Level >= 0.160 Kbs

2. The second TBS QOS requirement is:
Q2. Regular (Cyclic) Media Access for timely reconstruction of or control actions on the variable.
Q2a. The samples of the variable must be conveyed at regular, cyclic periods that allow "faithful, timely reconstruction.
Q2 SP = Transmit opportunities every ~125 us
Q2 VD Slow Scan = Transmit opportunities <= every 2*N sec to allow for limited data frame size & complete video frames each 2 secs. N= data frames per video frame
Q2 IA Mechanical = Transmit opportunities >= every 10 ms
Q2 IA TankLevel = Transmit opportunities <= every 10 sec

3. The third TBS QOS requirement, which applies only to "real time data" is:
Q3. Acceptable levels of Jitter between transmission opportunities to allow "faithful" reconstruction or control action.
This requirement only applies when the reconstructed variable will be used in "real time", eg. feedback is present.
Jitter allowed is proportional to the user's sense of time.
Q3a. Normally jitter can be about 20% of specified time between Transmit opportunities.
Q3 SP for further study
Q3 VD Slow Scan - video frame jitter <= 0.2 sec
Q3 IA Mechanical >= 2 ms
Q3 IA Tank Level <= 1 sec
Q3 IA ?? = ??

4. The fourth TBS QOS requirement, which applies only to "real time data" is:
Q4. Discard of "Late Data" None of the reconstruction or control algorithms for TBS are designed to cope with data that arrive out of order or significantly beyond the designed time window (the transmission interval).
Q4a This data may be discarded by the MAC

The sixth TBS QOS requirement is:
Q6. Call Duration
Q6 SP 5 sec to M hrs - M = "longest "reasonable call duration
Q6 VD 10 min to infinite (security monitor)
Q6 IA 4 hrs to infinite

References:

1) - P802.11-92/109 - Communications Requirements of Multimedia Applications: A Preliminary Study.
2) - P802.11-92/110 - Wireless Networking Requirements of Multimedia Applications
3) - P802.11-92/107 - Alternatives to issues Related to Time Bounded Services.
4) - P802.11-92/129 & 101 - Time Based Services - Quality of Service on Wireless LANs
5) -)802.11-92/129 - Time Based Services QOS Requirements on Wireless LAN

Arguments:

Related Issue Identification:

Issue Originator:

Issue History:

September 1992: Alternative #1 and References 1 to 4
November 1992: Alternatives #2 and Reference 5

Issue Status: Open - pending work on 15.1-A

Issue Identification: 15.3 (Topic: Services).

~~- What protocols above the MAC would drive the Time-bounded services ?~~

- What is the MAC service interface to Time Bounded Services (TBS)? and is it different from the Link Layer Connection (LLC) interface?

Alternatives:

1) - (See 802.11-92/107 - Alternatives to Issues Related to Time-bounded Services). Two protocols are needed above the MAC:
   a) - Data or in-band protocol
   b) - Call control or out-of-band

2) - 802.2 LLC Type 2.

References:

1) - P802.11/92-107 - Alternatives to Issues Related to Time-bounded Services.

Arguments:

Pro:

Con:

Related Issue Identification:

1) - 15.8 (Topic: Services)
2) - 12.7 (Interfaces)

Issue Originator:

Issue History:

May 1992: First opened
September 1992: Alternatives 1 & 2.
January 1994: New Issue statement

Issue Status: Open

Issue Identification: 15.4 (Topic: Services).

What are the services or functions unique to wireless networks ?

Alternatives:

1) - The "mobile Connectivity" requirement is unique to wireless networks. The requirement refers to the ability to transparently handle intermittent connectivity as a unit transitions cells.

2) - "Hidden Station" characteristic is also a unique problem to wireless LANs.

3) - The 802.11 standard must provide a level of security equivalent to wired network physical security to avoid compromising security assumptions of existing LANs.

4) - Overlapping networks.

5) - (Reference #2) - MAC-visible, time-variant medium usage.

6) - Obsolete Issue

References:

1) - P802.11-92/128 - IEEE 802.11 Distribution System Services Functionality
2) - P802.11-93/204 - An Improved Reference Model for IEEE 802.11.
3) - P802.11-93/190 - Distributed Foundation Wireless Medium Access Control

Arguments:

Pro:

3.1) - The Alternative (#3) is expected to be low cost.

3.2) - The Alternative (#3) is acceptable as long as the feature is optional. Making the Alternative mandatory may prevent exportation of 802.11 compliant systems.

5.1 - (Reference #2) - In the addition of the items already listed for this Issue (Alternatives #1 to #4), the existence of MAC-visible, time-variant medium usage as a characteristic of a PHY is unique to wireless networking (and unique to Frequency Hopping PHYs among those currently under consideration by 802.11).

6.1) - The MAC Foundation decision makes this Issue obsolete

Con:

3.1) - The implementation of the Alternative (#3) may be costly at higher PHY rates.

Related Issue Identification:

Issue Originator:

Issue History:

May 1992: First opened
November 1992: Alternatives #1 and 2 and Reference.
January 1993: Alternative #3 - Arguments-pro #3.1 and 3.2 - Arguments-con #3.1 - Taken a 'straw poll' regarding Alternative #3:

- How many would like Alternative #3 as a mandatory minimum requirement?: result - 5
- How many would like Alternative #3 as an optional minimum requirement?: result - 12
- How many do not want Alternative #3?: result - 1

May 1993: Alternative #4.
November 1993: Alternative #5, Reference #2 and Argument_pro #5.1.
January 1994: Alternative #6, Reference #3, Argument_pro #6.1 and closing the Issue by endorsing the Alternative #6 - MAC: Yes-24, No-2, Abstain-11

Issue Status: CLOSED January 1994

Issue Identification: 15.5 (Topic: Services).

- Are there any services outside the MAC/PHY that need to be specified in order to operate ?

Alternatives:
1) - Yes

References:
1) - P802.11-93/190 - Distributed Foundation Wireless Medium Access Control

Arguments:

Pro:
1.1) - The MAC Foundation (Reference #1) specifies the services needed that outside of the MAC/PHY.

Con:

Related Issue Identification:

Issue Originator:

Issue History:
May 1992: First opened
January 1994: Alternative #1, Reference #1, Argument_pro #1.1 and closing the Issue by endorsing the Alternative #1 - MAC: Unanimous

Issue Status: CLOSED January 1994

Issue Identification: 15.6 (Topic: Services).

What is the algorithm for managing the partitioning of capacity between Time-bounded and Asynchronous services ?

Alternatives:

1) - Implementation dependent.

2) - The AP should partition the capacity mix.

References:

1) - P802.11-93/54 - The CODIAC Protocol - Centralized or Distributed Integrated Access Control (CODIAC), A Wireless MAC Protocol.

2) - P802.11-93/70 - A Distributed Access Protocol Proposal Supporting Time Bounded Services.

Arguments:

Pro:

1.1) - That should be left to the discretion of the implementation. The CODIAC protocol (Reference #1) allows different implementations to tailor servicing of stations to their needs while still remaining compatible.

2.1) - Given an Isochronous framing Period (IFP) the bandwidth per Isochronous connection is defined by a maximum frame size. This is the maximum that a station can occupy per IFP, but a variable length up to the reserved maximum is possible. An AP should limit the maximum assigned total Isochronous bandwidth such that at least one maximum size Asynchronous frame does still fit in the IFP period.

In addition an AP should reserve some spare capacity to allow stations with existing connections to re-associate with the AP, so that the connection can be maintained.
New connection setups can be refused when the system is already using the reserved (for re-association) capacity.

Con:

Related Issue Identification:

Issue Originator: Chandos Rypinski

Issue History:

May 1992: First opened
May 1993: Alternatives #1 and #2 - References #1 and #2 - Argument_pro #1.1 and #2.1.

Issue Status: Open

Issue Identification: 15.7 (Topic: Services).

- What is the common service:
  - Asynchronous, or
  - Time-bounded ?

Alternatives:

Arguments:

Pro:

Con:

Related Issue Identification:

Issue Originator:

Issue History:

May 1992: First opened

July 1992: The Functional Requirement document (IEEE P802.11-92/57), section Data Service Types specifies that 'All 802.11 implementations will support the Asynchronous class service.' It was agreed by the committee that the statement can be interpreted as Asynchronous service is the common service.

Issue Status: Closed - 07/1992

Issue Identification: 15.8 (Topic: Services).

Do all stations and all infrastructures support the Time-bounded service ?

Alternatives:

1) - Alternatives are dependent of the definition of 'support'
2) - Yes
3) - no

References:

1) - P802.11/92-107 - Alternatives to Issues Related to Time-bounded Services.

2) - P802.11-93/54 - The CODIAC Protocol - Centralized or Distributed Integrated Access Control (CODIAC), A Wireless MAC Protocol.

3) - P802.11-93/70 - A Distributed Access Protocol Proposal Supporting Time Bounded Services.

Arguments:

General:

1.0) - All support (802.11 MAC proposals) Time-bonded (TB) services. - To simplify task, could the TB services be left for further study by the committee at this time? - (providing that hooks are provided in the MAC proposals on the table).

The group (Issue work group) agrees that hooks for time bounded services shall be included in the first release of the MAC and when fully specified, TB services are an option. These hooks are a mechanism whereby the MAC can cause the transfer of isochronous MSDUs in a manner which has an acceptable low probability of collision or deferral. This results in bounded absolute delay and delay variance. The "hook" also includes a MAC field that specifies TB or Asynchronous data type.

Pro:

1.1) - The issue is inter-related to how the Time-bounded interface is defined (see Issue 15.3 - What protocols above the MAC would drive the Time-bounded Services?).

1.2) - Possible related new issue: 'Do we define the MAC to service existing 'clients' of the MAC or do we define a MAC that is independent ?'.

1.3) - Sub-issue: 'Where is the Asynchronous / Time-bounded multiplexer resides (below or above the MAC)?' - See picture from Document P802.11-91/21.

1.4) -

a) - Stations:

The CODIAC protocol (Reference #2) requires that all non-controller stations be well behaved in both operating modes. This means a station must be:

i) - capable of communicating in both modes;
ii) - capable of communicating by the distributed mode rules only, but it must be quiet in the presence of a controller; or
iii) - capable of communicating by the centralized mode rules only, but it knows it must be quiet when it does not hear a controller.

This means that for non-controller stations "supporting" (where "supporting" means not precluding other stations from using TBS) TBS with the CODIAC protocol is a given, because TBS is provided by centralized mode operation .

For controller stations, whether they can operate in both modes should be an implementation decision. However if a station requests TBS, there should be a specific negative response to that request if the service cannot be provided (not yet defined).

b) Infrastructures:
Yes, where the definition of support is to handle in a well behaved manner - i.e. where a station requests TBS there should be a negative response to that request if the service is not provided.
If support = provide, then No.

Summary - in agreement with Pro arguments 3.1 and 3.5

2.1) - All stations support it - as all MACs are the same but the functions above the MAC are out of 802.11 scope.

2.2) - Responding 'no' to the question imply that the creation of an option is required (see Issue 1.4 - related to options).

3.1) - The lack of time-bounded service support should not preclude offering of time-bounded by other stations.

3.2) - The station implementation cost may be an issue.

3.3) - Constraints to fit, at the minimum, the existing 802.2 pieces. Additional capability may be provided as well.

3.4) - Distribution System implementation based on existing 802.x LANs (which do not have inherent support for Time-bounded services) must not be excluded.

3.5) - If a station ask for an optional service, it is preferable to receive an explicit response indicating that the service is not supported rather than ignore the request.

3.6) - Responding 'yes' to the question imply the use of infrastructure that does not exist today.

3.7 - Time Bounded Services are only supported in Infrastructure networks, and will need an AP. Not all stations within an ESA with infrastructure need to support Time Bounded Services. Its service is optional, and dependent on the PHY isolation.

When Time Bounded service is supported within an ESA, then all AP's covering the area of operation need to support Time Bounded Services to assure continuous operation, but there can be a mix of stations that do and do not support Time Bounded Services.

3.8) - we already decided that Time bounded (TB) is an option conformant station, not implementing TB will not cause interoperability problems with stations that do implement TB.

Con:

2.1) - See Arguments-pro #3.1
2.2) - See Arguments-pro #3.2
2.3) - See Arguments-pro #3.3
2.4) - See Arguments-pro #3.4
2.5) - See Arguments-pro #3.5
2.6) - See Arguments-pro #3.6
3.1) - See Arguments-pro #2.1
3.2) - See Arguments-pro #2.2

Related Issue Identification:

1) - 15.3 - Service
2) - 1.4 - 'Standard' Process

Issue Originator: Simon Black

Issue History:

May 1992: First opened
September 1992: Arguments 1 to 9
January 1993: - Alternatives #2 and 3 - Arguments-pro #2.2, 3.5 and 3.6 - Arguments-con #2.5, 2.6 and 3.2.
May 1993: References #2 and #3 - Argument_pro #1.4 and #3.7
September 1993: Argument_general #1.0.
January 1994: Argument_pro #3.8 and closing the Issue by endorsing the Alternative #3 - MAC: Yes-31, No-3, Abstain-6.

Issue Status: CLOSED January 1994

Issue Identification: 15.9 (Topic: Services).

How will the standard address the MAC ability to service various traffic:
- Data,
- Voice, and
- Video ?

Alternatives:

1) - See the CODIAC Protocol proposal - Reference #1
2) - Data service is always available

References:

1) - P802.11-93/54 - The CODIAC Protocol - Centralized or Distributed Integrated Access Control (CODIAC), A Wireless MAC Protocol.

2) - P802.11-93/70 - A Distributed Access Protocol Proposal Supporting Time Bounded Services.

Arguments:

Pro:

1.1) - The CODIAC protocol (Reference #1) supports asynchronous and time-bounded services. The centralized mode can be implemented to support the requirements of various TBS time constraints.

2.1) - The MAC can support different Time bounded service levels, depending on the PHY speed and characteristics. The MAC should support a range of PHY speeds. The Time Bounded Service levels can distinguish between Voice and Video, or any lower multiple of the primary Time Bounded Service (as a integer multiple of the IFP)

Con:

Related Issue Identification:

Issue Originator:

Issue History:

May 1992: First opened
May 1993: Alternatives #1 and #2 - References #1 and #2 - Argument_pro #1.1 and #2.1
January 1994: Decision to leave the Issue open - more work required.

Issue Status: Open

Issue Identification: 15.10 (Topic: Services).

- Between what service points is the Time-bounded service provided ?

Alternatives:

1) MAC/LLC boundary to MAC/LLC boundary (MAC_SAP to MAC_SAP).
2) MAC/PHY boundary to MAC/PHY boundary (PHY_SAP to PHY_SAP).

Arguments:

Pro:

1) The only one that make sense. It is the natural interface point. It is also the limits of the 802.11 scope.

2) Isolates performance implication from MAC layer.

Con:

1) Implies performance requirements on all 802.11 MAC and implementations (assuming Time-bounded service provided).

2) Not useful in providing Time-bounded service.

Related Issue Identification: Issue 15.1 - Topic: Services

Issue Originator: Simon Black

Issue History:

September 1992 - First opened - Alternative 1 & 2 - arguments and Straw-poll:
- For alternative #1 - 8
- For alternative #2 - 0
- Abstain - 1

To be forwarded to 802.11 Plenary with recommendation for alternative #1

November 1992: - Motion to close the issue by accepting Alternative #1. Result: yes-21, no-0, abstention-1. Issue closed

Issue Status: Close

Issue Identification: 15.11 (Topic: Services).

What are the classes of Time-bounded service will the 802.11 standard specifies in addition to the required Asynchronous service ?

Alternatives:

1) - Class 1: Best effort delivery, connectionless (i.e File transfer or Email) (the asynchronous service).

2) - Class 2: Time based reservation class (i.e. Video Conference).

3) - Class 3: Non-time-based reservation class, connection oriented (i.e Image browsing)

4) - Basic Voice Service class would be the default when supported

References:

1) - P802.11/92-109 - Communications Requirements of Multimedia Applications: A Preliminary Study.

2) - P802.11/92-110 - Wireless Networking Requirements of Multimedia Applications

3) - P802.11-93/70 - A Distributed Access Protocol Proposal Supporting Time Bounded Services.

Arguments:

Pro:

4.1) - Due to the variable frame size flexibility of the methodology described in this paper (Reference #3), this will automatically serve all lower ranges, although they can be specified as separate levels (using a longer IFP, being an integer multiple of the basic IFP).

A separate Video class may be needed.

Con:

Related Issue Identification:

1) - Issue 15.1 - (Services)

Issue Originator: Tim Kwok

Issue History:

September 1992: First opened - Alternatives #1 to #3
May 1993: Alternative #4 - Reference #3 - Argument_pro #4.1
January 1994: Decision to leave the Issue open as more work is needed to close it.

Issue Status: Open

Issue Identification: 16.1 (Topic: Mobility).

- Will the standard support roaming for both:
- Asynchronous, and
- Time-bounded services ?

Alternatives:

1) - Yes on both

References:

1) - P802.11-94/16 - Review of MAC Issues List
2) - P802.11 PAR

Arguments:

Pro:

1.1) - Specific mechanism to provide roaming support for time bounded services (TBS) has not been much discussed within the committee, but it should be a requirement.

Con:

Related Issue Identification:

- 17.7 (Topic: Services)

Issue Originator:

Issue History:

May 1992: First opened
January 1994: Alternative #1, Reference #1 & #2 Argument_pro #1.1, and closing the Issue by endorsing Alternative #1. MAC: Yes 39, No-0, Abstain-0

Issue Status: CLOSE January 1994

Issue Identification: 16.4 (Topic: Mobility).

What does graceful degradation mean ?

Alternatives:

1) - As a station moves out of range of a PCF its performance may degrade, but in doing so it should not interfere with the operation of other stations still in the PCF.

2) - As traffic increases in a BSA performance of each individual station should degrade gradually, the BSA should not just hit a point where it ceases to function.

Arguments:

Pro:

Con:

Related Issue Identification:

Issue Originator:

Issue History:

May 1992: First opened
May 1993: Alternatives #1 and # 2.
January 1994: Decision to leave the Issue open as more work is needed to close it.

Issue Status: Open

Issue Identification: 16.5 (Topic: Mobility).

- What are the parameters of mobile stations ?
- What values do we support ? (speed etc.)

Alternatives:

References:
1)- P802.11-94/16 - Review of MAC Issues List

Arguments:

General:

1.0) - The standard should not distinguish between mobile and stationary stations - all stations are potentially mobile.

Pro:

Con:

Related Issue Identification:

Issue Originator:

Issue History:

May 1992: First opened

January 1994: Reference #1, Argument_general #1.0. Attempt to close this Issue failed MAC: Yes-6, No-15, Abstain-10

Issue Status: Open

Issue Identification: 17.1 (Topic: Addressing).

- What level of reliability for Group Addressing is required ?

Alternatives:

Arguments:

General:

1.0) - This Issue is addressed by the following Issues: 17.3, 17.5, 19.2A and 19.2B - No need to keep this Issue open.

Pro:

Con:

Related Issue Identification:

1) - 19.2 (Reliability)
2) - 17.3 (Addressing)
3) - 17.5 (Addressing)
4) - 19.2A (Reliability)
5) - 19.2B (Reliability)

Issue Originator:

Issue History:

May 1992: First opened
January 1994: Argument_general #1.0. Issue closed as obsolete MAC: Unanimous

Issue Status: CLOSED January 1994.

Issue Identification: 17.2 (Topic: Addressing).

What level of reliability for Broadcast (Multicast) Addressing is required ?

Alternatives:

1) - These are not inherently reliable delivery mechanisms.
2) - Multichannel system negative acknowledgement could use a spare channel for error correction.

References:

1) - P802.11-93/54 - The CODIAC Protocol - Centralized or Distributed Integrated Access Control (CODIAC), A Wireless MAC Protocol.

Arguments:

General:

1) - Refer to Issue 17.1

Pro:

1.1) - Multicast and broadcast reliability is directly tied to the MSDU error rate, as they cannot be acknowledged. This is the case for all LANs, wired and wireless.

1.2) - Higher level protocol above MAC or application should handle missing packets and errors in transmission.

Con:

Related Issue Identification:

1) 17.1 (Addressing)

Issue Originator:

Issue History:

May 1992: First opened
May 1993: Alternative #1 - Reference #1 - Argument_pro #1.1
September 1993: Alternative #2 and Argument_pro #1.2.
January 1994: Argument_general #1.0. Issue closed as obsolete MAC: Unanimous

Issue Status: CLOSED January 1994.

Issue Identification: 17.3 (Topic: Addressing).

What is the extent of Multicast ? ~~(Basic Service Set (BSS), Extended Service Set (ESS)).~~

Alternatives:

1) - Basic Service Set (BSS)
2) - Extended Service Set (ESS)
3) - Both BSS and ESS

References:

1) - P802.11-93/40 - The Wireless Hybrid Asynchronous Time-bounded MAC Protocol
2) - P802.11-93/54 - The CODIAC Protocol - Centralized or Distributed Integrated Access Control (CODIAC), A Wireless MAC Protocol.
3) - P802.11-93/136 - Opinions on Issues 13.6 and 17.3, and New Issues.
4) - P802.11-94/16 - Review of MAC Issues List

Arguments:

Pro:

3.1) - A Station should be explicitly control the scope of multicasts. The WHAT protocol (Reference #1) provides this capability with the 'hierarchical' bit.

3.2) - Both ESS and BSS multicast should be supported, a station should be able to explicitly control the scope of multicast (this supports the position of document 93/40 on the WHAT protocol-Reference #2). The hierarchical bit provides this capability.

3.3) - Data PDUs and MAC PDUs should be differentiated. Data PDUs are regular data, so their extent is independent of the actual location (current BSS0, hence Multicast Messages should be forwarded to the whole ESS (unless an implementation dependent filtering function is used in the Access Point.

MAC Control PDUs may (and probably should, depending on the PDU's content) be limited to the BSS.

3.4) - The standard should support a Distribution System consisting of standard 802 LANs connected by 802 compatible bridges, and in such configuration the scope of a multicast must include the Extended Service Set (ESS).

Con:

Related Issue Identification:

Issue Originator:

Issue History:

May 1992: First opened
March 1993: Alternative #2 - Reference #1 - Argument_pro #3.1.
May 1993: Reference #2 - Argument_pro #3.2
September 1993: Reference #3, and Argument_pro #3.3.
January 1994: Reference #4 Argument_pro #3.4, and closing the Issue by endorsing Alternative #3.
MAC: Yes-36, No-0, Abstain-0

Issue Status: CLOSE January 1994

Issue Identification: 17.4 (Topic: Addressing).

- Will the standard support Source Routing ?

Alternatives:

Arguments:

Pro:

Con:

Related Issue Identification:

Issue Originator:

Issue History:
May 1992: First opened
January 1994: Decision to leave this Issue open.

Issue Status: Open

Issue Identification: 17.5 (Topic: Addressing).

What is meant by addressing?

Alternatives:

1) - Size
2) - IEEE 802
3) - Media Link Framing (MLF) address (Reference #4)

References:

1) - P802.11-93/40 - The Wireless Hybrid Asynchronous Time-bounded MAC Protocol
2) - P802.11-93/22 - Further Exploration of Transactions and Name Spaces
3) - P802.11-93/54 - The CODIAC Protocol - Centralized or Distributed Integrated Access Control (CODIAC), A Wireless MAC Protocol.
4) - P802.11-93/61 - Wireless LAN MAC Protocol: MAC-to-MAC Interface.
5) - P802.11-94/16 - Review of MAC Issues List
6) - P802.11-93/190 - Distributed Foundation Wireless Medium Access Control

Arguments:

Pro:

2.1) - Wireless Stations should be identified by 48 bit unique IDs that are compatible with other IEEE 802 standards. All asynchronous service MPDUs carry the full 48 bit address in the WHAT protocol (see Reference #1). Time-bounded MPDUs use a short local identifier. However, the Call Setup message for Time-bounded connections contains the full 48 bit addresses of the source and destination.

2.2) - IEEE 802 addressing is required (supports the position of document 93/40 on the WHAT protocol - Reference #1). Wireless stations should be identified by 48 bit unique IDs that are compatible with other IEEE 802 standards. The 48 bit addresses of source and destination stations are contained in the four step transaction of the CODIAC protocol (Reference #3).

2.3) - In the MAC Foundation (Reference #6), all nodes are assumed to have a unique 48 bit IEEE address, and all (asynchronous) data transfers include such addresses. The MAC Foundation includes other identifiers besides IEEE 802 addresses (such as Basic Service Set identification (BSS-ID and Extended Service Seyt Identifier (ESS-ID) but these are used for specialized purposes separate from the addressing function or uniquely identify a station.

3.1) - With a one byte coding, there exist 255 different MLF addresses. This set is divided into several subsets according to table 2 of paper P802.11-93/61 (see Reference #4). The justification of defining some addresses ranges for Access Point(AP), for mobile stations and ad-hoc network are:

a) - it speeds up the connection establishment time: indeed a Mobile Station willing to 'get in touch' with an AP can take into account only the MPDU packets originating from an AP.

b) - In the same time, if an ad-hoc network is co-located with other wireless networks, it helps to discriminate between both; a mobile station pertaining to an ad-hoc network can easily discard any information that does not originate from a station of the same ad-hoc network.

Con:

Related Issue Identification:

Issue Originator:

Issue History:

May 1992: First opened
March 1993: Reference #1 and 2 - Argument_pro #2.1
May 1993: Reference #3 - Argument_pro #2.2
July 1993: Alternative #3, Reference #4 and Argument_pro #3.1
September 1993: Recommend Alternative #2 (IEEE 802 - 48 bit address).
January 1994: Reference #6, Argument_pro #2.3.
Closing of the Issue by endorsing #2 Alternative - MAC: Yes-34, No-0, Abstain-3.

Issue Status: CLOSE January 1994

Issue Identification: 18.1 (Topic: Data Rates).

Should the MAC work equally well at all PHY data rates ?

Alternatives:

1) - Yes
2) - No

References:

1) - P802.11-94/16 - Review of MAC Issues List
2) - P802.11-93/190 - Distributed Foundation Wireless Medium Access Control

Arguments:

Pro:

1.1) - It is known now that all the PHY data rates are going to be about 1 Mbps as opposed to the original PAR range of 1-20 Mbps. Therefore this question isn't relevant until the state of the art of the PHY layers advances.

1.2) - The MAC Foundation (Reference #2) includes provisions allowing the support of various data rates. Although the MAC will obviously have higher performance with higher data rates, there should be no significant data-rate dependencies within the MAC.

Con:

Related Issue Identification:

1) - 18.2 (Data Rates)

Issue Originator:

Issue History:

May 1992: Date first opened
July 1993: Alternatives #1 and #2, Argument_pro #1.1 and Proposal to close the Issue at the September meeting by adopting Alternative #1.
January 1994: Reference #1 & 2, Argument_pro #1.2 and closing of the Issue by endorsing Alternative #1 - MAC Yes-37, No-0, Abstain-0.

Issue Status: CLOSE January 1994

Issue Identification: 18.2 (Topic: Data Rates).

Will the standard support one MAC driving multiple PHYs of different rates ?

Alternatives:

1) - Yes
2) - No

References:

1) - P802.11-93/115 - Protocol Layering Alternatives for Practical Implementation.
2) - P802.11-93/140 - MAC/PHY Functional Partitioning
3) - P802.11-94/16 - Review of MAC Issues List
4) - P802.11-93/190 - Distributed Foundation Wireless Medium Access Control

Arguments:

Pro:

1.1) - If one accepts the PAR demand for one MAC and one accepts that the different MAC's may decide on different data rates then the answer is yes. Since we know that the range of data rates is small this should not present implementation problems.

1.2) - The use of a PHY adaptation layer at the bottom of the MAC (see Reference #1) allows such multiple-PHY support, provided that the necessary parameters regarding the PHY capabilities can be requested by this PHY adaptation layer via the MAC/PHY interface.

1.3) - A single MAC should support multiple PHYs with different rates. Preamble length and other parameters reported by the PHY.

1.4) - The MAC Foundation (Reference #2) includes provisions to accommodate different rates.

Con:

Related Issue Identification:

1) - 18.1 (Data Rates)

Issue Originator:

Issue History:

May 1992: Date first opened
July 1993: Alternatives #1 and #2, Argument_pro #1.1 and proposal to close the Issue at the September meeting by endorsing Alternative #1.
September 1993: - Reference #1 & #2 and Argument_pro #1.2 & #1.3.
January 1994: Reference #3 & #4, Argument_pro #1.4 and closing of the Issue by endorsing Alternative #1 - MAC Yes-35, No-0, Abstain-1.

Issue Status: CLOSE January 1994

Issue Identification: 19.1 (Topic: Reliability).

Shall the 802.11 standard depend on the layers above the MAC for recovery from failed transmits ? If so to what extent ?

Alternatives:

1) - Partially

References:

1) - P802.11-93/54 - The CODIAC Protocol - Centralized or Distributed Integrated Access Control (CODIAC), A Wireless MAC Protocol.
2) - P802.11-94/16 - Review of MAC Issues List

Arguments:

Pro:

1.1) - A retry mechanism should be implemented in the MAC as required to bring the MSDU loss rate up to the equivalent of wired LANs. (See Issue 19.5)

1.2) - "partially" through the use of a MAC-Level ACK on directed transmissions. However, this mechanism only improves the delivery reliability and does not guarantee delivery.

Con:

Related Issue Identification:

1) - 19.5 - Reliability

Issue Originator:

Issue History:

May 1992: First opened
May 1993: Alternative #1 - Reference #1 - Argument_pro #1.1
January 1994: Reference #2, Argument_pro #1.2 and closing of the Issue by endorsing the Alternative - MAC Yes-36, No-1, Abstain-0.

Issue Status: CLOSE January 1994

Issue Identification: 19.2A (Topic: Reliability).

Will the IEEE 802.11 MAC look like all other IEEE 802 MACs regarding delivery reliability?

Alternatives:
1) - Yes
2) - No

References:
1) - P802.11-93/40 - The Wireless Hybrid Asynchronous Time-bounded MAC Protocol
2) - P802.11-93/54 - The CODIAC Protocol - Centralized or Distributed Integrated Access Control (CODIAC), A Wireless MAC Protocol.
3) - P802.11-94/16 - Review of MAC Issues List

Arguments:

General:

19.2A:

1.0) - Bit Error Rate (BER) explicitly defined in the PAR.

2.0) - BER is not delivery reliability.

3.0) - Undetected BER must be low; detected BER could be higher that other 802 MACs.

Pro:

19.2A:

1.1) - It must provide comparable level of service to client software.

1.2) - Related to 1.1 above - must be good enough to not 'upset' the upper layer clients.

1.3) - See Argument_pro #1.2 in Issue 19.5

2.1) - Multicasts may be less reliable than directed transmissions.

Con:

Related Issue Identification:
1) - 19.2A - Reliability
2) - 19.5 - Reliability

Issue Originator:

Issue History:
March 1993: Date first opened - Alternative # 1 and #2 - Reference #1 - Argument_general #1.0 to #3.0 - Argument_pro #1.1 and #1.2.
May 1993: Reference #2 - Argument_pro #1.3
January 1994: Reference #3, Argument_pro #2.1 and closing of the Issue by endorsing Alternative #2 - MAC Yes-20, No-0, Abstain-7.

Issue Status: CLOSE January 1994

Issue Identification: 19.2B (Topic: Reliability).

How does Multicast affect the decision made in Issue 19.2A?

Alternatives:

1) - Broadcast and Multicast will not be as reliable

References:

1) - P802.11-93/54 - The CODIAC Protocol - Centralized or Distributed Integrated Access Control (CODIAC), A Wireless MAC Protocol.
2) - P802.11-94/16 - Review of MAC Issues List

Arguments:

General:

Pro:

1.1) - See Argument_pro #1.1 in Issue 17.2

Con:

Related Issue Identification:

1) - 19.2A - Reliability
2) - 17.2 - Addressing

Issue Originator:

Issue History:

March 1993: Date first opened
May 1993: Alternative #1 - Reference #1 - Argument_pro #1.1
January 1994: Reference #2, and closing of the Issue by endorsing the Alternative - MAC: Yes-29, No-0, Abstain-5.

Issue Status: CLOSE January 1994

Issue Identification: 19.3 (Topic: Reliability).

- How much overhead is acceptable to get reliable frames (error checking and correction) ?

Alternatives:

Arguments:

Pro:

Con:

Related Issue Identification:
1) - 20.3 (Data Unit Structure)

Issue Originator:

Issue History:

May 1992: Date first open
January 1994: Decision to leave this Issue open at this time.

Issue Status: Open

Issue Identification: 19.7 (Topic: Reliability).

Is a maximum number of stations to be specified ? if so how many ?

Alternatives:

1) - No - the number should not be specified.

References:

1) - P802.11-93/54 - The CODIAC Protocol - Centralized or Distributed Integrated Access Control (CODIAC), A Wireless MAC Protocol.

Arguments:

Pro:

1.1) - That should be up to the implementation. In distributed mode the protocol will begin to break down at a certain number of stations, and the implementer should decide what action to take about that - whether to switch operating modes, or to make the degradation limit a parameter of the network.
In centralized mode, it is a function of the intended application. An application with huge numbers of stations with small payload and/or tolerance for large transfer delays can be supported, as can an application with smaller population with need of shorter transfer delays. The CODIAC protocol (Reference #1) can be set up to accommodate either, without loosing compatibility.

1.2) - The number should be left open.

Con:

Related Issue Identification:

Issue Originator:

Issue History:

May 1992: Date first opened
May 1993: Alternative #1 - Reference #1 - Argument_pro #1.1.
January 1994: Argument_pro #1.2.

Issue Status: Open

Issue Identification: 19.8 (Topic: Reliability).

How will the standard address the MAC robustness in the presence of co-site dissimilar networks ?

Alternatives:

1) - Nothing different from handling any other kind of interference.

References:

1) - P802.11-93/54 - The CODIAC Protocol - Centralized or Distributed Integrated Access Control (CODIAC), A Wireless MAC Protocol.

Arguments:

Pro:

1.1) - On the assumption that "dissimilar" means not so different that they don't see each other (e.g. IR and SS), and not so similar as to be able to recognize each other's MSDUs - Co-site dissimilar networks interfere with each other. There is nothing the MAC can do about this that is different from handling interference of any other kind.

Con:

Related Issue Identification:

Issue Originator:

Issue History:

May 1992: Date first opened
May 1993: Alternative #1 - Reference #1 - Argument_pro #1.1.
January 1994: Decision to close this Issue by endorsing the Alternative - MAC: Yes-28, No-1, Abstain-5.

Issue Status: CLOSE January 1994

Issue Identification: 19.10 (Topic: Reliability).

How will stability under heavy load be addressed ?

Alternatives:

1) - See the CODIAC Protocol proposal (Reference #1)
2) - See the CSMA/CA Protocol proposal (Reference # and #3)

References:

1) - P802.11-93/54 - The CODIAC Protocol - Centralized or Distributed Integrated Access Control (CODIAC), A Wireless MAC Protocol.
2) - P802.11-93/70 - A distributed Access Protocol Proposal Supporting Time Bounded Services.
3) P802.11-92/51 - A Wireless MAC Protocol Comparison.
4) - P802.11-9X/YY - Performance of the CODIAC protocol
5) - P802.11-93/190 - Distributed Foundation Wireless Medium Access Control

Arguments:

General:

1.0) - This Issue is made obsolete by the MAC Foundation decision (Reference #5).

Pro:

1.1) - The centralized mode of the CODIAC protocol (Reference #1) remains stable under heavy load by increasing transfer delay. This is further explored in document "Performance of the CODIAC protocol" (Reference #4).

2.1) - The CSMA/CA protocol (Reference #2) is demonstrated to be stable under high load. Reference to document IEEE P802.11-92/51 (Reference #3) for simulation results.

Con:

Related Issue Identification:

Issue Originator:

Issue History:

May 1992: Date first opened
May 1993: Alternative #1 and #2 - References #1 to #4 - Argument_pro #1.1 and #2.1.
January 1994: Argument_general #1.0. Issue closed as obsolete MAC: Unanimous

Issue Status: CLOSED January 1994.

Issue Identification: 19.11 (Topic: Reliability).

How will the transmission lost be addressed ?

Alternatives:

1) - Positive ACK and Retransmission (see Related Issues #1 and #2).

References:

1) - P802.11-93/54 - The CODIAC Protocol - Centralized or Distributed Integrated Access Control (CODIAC), A Wireless MAC Protocol.
2) - P802.11-94/16 - Review of MAC Issues List

Arguments:

Pro:

1.1) - Issues 19.1 and 19.5 cover this issue. - The CODIAC protocol (reference #1) proposes positive ACK and retransmission to bring the transmission loss rate to approximately the same level of MSDU delivery reliability as other IEEE 802 protocols.

1.2) - Propose to accept the Alternative for Directed Asynchronous transmission - Multicast or Time-bounded transmissions do not incorporate positive acknowledgments.

Con:

Related Issue Identification:

1) - 19.1 - Reliability
2) - 19.5 - Reliability

Issue Originator:

Issue History:

May 1992: Date first opened
May 1993: Alternative #1 - Reference #1 - Argument_pro #1.1
January 1994: Reference #2, Argument_pro #1.2 and closing of the Issue by endorsing the Alternative - MAC Yes-28, No-0, Abstain-3.

Issue Status: CLOSE January 1994

Issue Identification: 20.2 (Topic: Data Unit Structure).

Can the MAC handle different preamble lengths from different PHYs ?

Alternatives:

1) - No
2) - Yes

References:

1) - P802.11-93/54 - The CODIAC Protocol - Centralized or Distributed Integrated Access Control (CODIAC), A Wireless MAC Protocol.
2) - P802.11-93/146 - The Need for MAC Data Delimiters in the PHY.
3) - P802.11-94/16 - Review of MAC Issues List
4) - P802.11-93/190 - Distributed Foundation Wireless Medium Access Control

Arguments:

Pro:

1.1) - If different PHYs must generate different preamble lengths then preamble should be handled by the Medium Independent Layer, which is on the PHY side of the MAC/PHY interface. The preamble would be stripped off by the time the frame is seen by the MAC.
To facilitate MAC independence from preamble length, perhaps the preamble should not be considered part of the MAC frame.

2.1) - (Reference #2) - The PHY should be responsible for generating the preamble, upon a MAC command. The PHY should indicate the end of the preamble to the MAC, so that the MAC can start generating the MSDU data.

2.2) - The MAC Foundation (Reference #4) does not need a specific preamble length.

Con:

Related Issue Identification:

Issue Originator:

Issue History:

May 1992: Date first opened
May 1993: Alternative #1 - Reference #1 - Argument_pro #1.1.
September 1993: Alternative #2, Reference #2 and Argument_pro #2.1
January 1994: Reference #3 & 4, Argument_pro #2.2 and closing of the Issue by endorsing Alternative #2 - MAC Yes-28, No-0, Abstain-3.

Issue Status: CLOSE January 1994

Issue Identification: 20.4 (Topic: Data Unit Structure).

How is the MAC time preservation ordering of SDU to end systems (LLC requirement) will be addressed by the standard ?

Alternatives:

1) - No change in the order of MSDUs - See CODIAC Protocol proposal (Reference #1).

References:

1) - P802.11-93/54 - The CODIAC Protocol - Centralized or Distributed Integrated Access Control (CODIAC), A Wireless MAC Protocol.
2) - P802.11-94/16 - Review of MAC Issues List
3) - P802.11-93/190 - Distributed Foundation Wireless Medium Access Control

Arguments:

Pro:

1.1) - The CODIAC protocol (Reference #1) is a stop-and-wait ARQ, it does not change the order of MSDUs.

1.2) - The standard should ensures that duplicates are not generated and that ordering is preserved (e.g. via a duplicate detection scheme as in the MAC Foundation (Reference #3).

Con:

Related Issue Identification:

Issue Originator:

Issue History:

May 1992: Date first opened
May 1993: Alternative #1 - Reference #1 - Argument_pro #1.1.
January 1994: Reference #2 & 3, Argument_pro #1.2 and closing of the Issue by endorsing the Alternative - MAC Yes-32, No-0, Abstain-0.

Issue Status: CLOSE January 1994

Issue Identification: 20.6 (Topic: Data Unit Structure).

- Is there a need for fragmentation/re-assembly function at the MAC layer?

Alternatives:

References:
1) - P802.11-93/208 - A Complete Description of Frame Prioritization in a CSMA/CA MAC Protocol.

Arguments:
Pro:

Con:

Related Issue Identification:

Issue Originator: MAC Group

Issue History:
January 1994: Date first open and Reference #1.

Issue Status: Open

Issue Identification: 20.7 (Topic: Data Unit Structure).

- Will the MAC support windowing (allowing multi-packets with single acknowledge (ACK)?

Alternatives:

References:
1) - P802.11-93/208 - A Complete Description of Frame Prioritization in a CSMA/CA MAC Protocol.

Arguments:
Pro:

Con:

Related Issue Identification:
1) - 20.6 (Data Structure)

Issue Originator: MAC Group

Issue History:
January 1994: Date first open and Reference #1.

Issue Status: Open

Issue Identification: 21.2 (Topic: Media).

How does the MAC robustness in the presence of non-reciprocal wireless medium will be addressed by the standard ?

Alternatives:

References:

1) - P802.11-93/54 - The CODIAC Protocol - Centralized or Distributed Integrated Access Control (CODIAC), A Wireless MAC Protocol.

Arguments:

General:

1.0) - If this means stations may have different receive and transmit coverage area:
In CODIAC protocol centralized mode (Reference #1) , if the relationship between the controller and a station is asymmetric the station will not be able to register. Minimal bandwidth will be lost as it repeatedly tries to do so. In distributed mode the RTS/CTS exchange will fail, avoiding the wasted bandwidth of attempting to send the data itself.
If this means non-reciprocal traffic load:
The CODIAC protocol is flexible in the assignment and duration of the data periods in centralized mode, both at run-time and per implementation, creating no problems handling non-reciprocal traffic loads. This is a moot point for distributed mode as it has no directionality.

2.0) - Refer to Issue 19.8.

Pro:

Con:

Related Issue Identification:

1) - 19.8 (Reliability)

Issue Originator:

Issue History:

May 1992: Date first opened
May 1993: Reference #1 - Argument_general #1.0.
January 1994: Argument_general #2.0 and closing of the Issue - MAC: unanimous

Issue Status: CLOSE January 1994

Issue Identification: 21.3 (Topic: Media).

- What does the statement 'Resolve media use conflict' mean ?

Alternatives:
1) - Obsolete

Arguments:

Pro:

Con:

Related Issue Identification:

Issue Originator:

Issue History:
May 1992: First opened
January 1994: Alternative #1 and closing of the Issue by endorsing the Alternative - MAC: unanimous

Issue Status: CLOSE January 1994

Issue Identification: 24.1 (Topic: PHY Types).

- Will the standard support different PHY classes ?

Alternatives:
1) - YES

References:
1) - P802.11-94/16 - Review of MAC Issues List

Arguments:

Pro:

Con:

Related Issue Identification:

Issue Originator:

Issue History:
May 1992: First opened
January 1994: Alternative #1, Reference #1 and closing of the Issue by endorsing the Alternative - MAC: Yes-31, No-0, Abstain-1

Issue Status: CLOSE January 1994

Issue Identification: 24.2 (Topic: PHY Types).

- What type of PHYs need to be specified ?

Alternatives:
1) - Not relevant

Arguments:

Pro:

Con:

Related Issue Identification:

Issue Originator:

Issue History:
May 1992: First opened
January 1994: Alternative #1 and closing of the Issue by endorsing the Alternative - MAC: Unanimous

Issue Status: CLOSE January 1994

Issue Identification: 24.6 (Topic: PHY Types).

Does the PHY layer provide the PHY type to the MAC layer ?

Alternatives:

1) - Yes

References:

1) - P802.11-93/115 - Protocol Layering Alternatives for Practical Implementation.
2) - P802.11-93/140 - MAC/PHY Functional Partitioning
3) - P802.11-94/16 - Review of MAC Issues List

Arguments:

Pro:

1.1) - The MAC must be able to identify the type of PHY being used.

1.2) - The MAC needs to know what type of PHY it is using.

Con:

Related Issue Identification:

- 12.1 (Topic: Interfaces)

Issue Originator:

Issue History:

May 1992: First opened
September 1993: - Alternative #1, Reference #1 & #2 and Argument-pro #2.1.
January 1994: Reference #3, Argument_pro #1.2 and attempt to close the Issue by endorsing the Alternative - MAC Yes-18, No-11, Abstain-0. Full committee: Yes-19, No-20, Abstain-7; the Issue remains open.

Issue Status: Open

Issue Identification: 24.7 (Topic: PHY Types).

Will the MAC standard specify the support of multiple PHYs transparently ?

Alternatives:

1) - Yes
2) - No

References:

1) - P802.11-93/30 - Wireless LAN MAC Protocol: PHY Layer Transparency.
2) - P802.11-93/115 - Protocol Layering Alternatives for Practical Implementation.
3) - P802.11-93/140 - MAC/PHY Functional Partitioning
4) - P802.11-94/16 - Review of MAC Issues List

Arguments:

Pro:

1.1) - P802.11-93/30 describes how the MAC Protocol (described in P802.11-92/39) can be adapted in a straight forward manner to address several PHY layer types:

- Infra-red
- Spread Spectrum Direct Sequence
- Spread Spectrum Frequency Hopping
- Multi-channel Spectrum

1.2) - See Reference #2

1.3) - See Reference #3

2.1) - For the most part the MAC will support various PHYs in a PHY-independent fashion (i.e. transparently). However, there are certain PHY-specific functions which the MAC will handle in a PHY-dependent manner.

Con:

Related Issue Identification:

1) - 24.3 (Topic PHY Types)

Issue Originator:

Issue History:

May 1992: First opened
March 1993: Alternatives #1 and 2 - Reference #1 - Argument_pro #1.1.
September 1993: Reference #2 & #3 and Argument_pro #1.2 & #1.3.
January 1994: Reference #4, Argument_pro 2.1. Attempt to close this Issue by endorsing Alternative #2 fails - MAC Yes-3, No-24, Abstain-4.

Issue Status: Open

Issue Identification: 25.1 (Topic: Channel).

Will the standard provide a procedure to reserve medium channel capacity ?

Alternatives:

1) - Yes
2) - No

References:

1) - P802.11-93/40 - The Wireless Hybrid Asynchronous Time-bounded MAC Protocol.
2) - P802.11-93/54 - The CODIAC Protocol - Centralized or Distributed Integrated Access Control (CODIAC), A Wireless MAC Protocol.
3) - P802.11-94/16 - Review of MAC Issues List
4) - P802.11-93/190 - Distributed Foundation Wireless Medium Access Control

Arguments:

Pro:

1.1) - The standard should provide the ability to reserve the medium. The WHAT protocol (see reference #1) uses this technique to allow Time-bounded MPDUs to have higher priority media access than asynchronous MPDUs.

1.2) - Not a lot of work has been done so far in this area, however this facility can easily be incorporated into the CODIAC protocol (Reference #2) by adding information to the request frame specifying a reservation of a particular length, or even making a "connection request" for a certain amount of bandwidth which could stand as a reservation of channel capacity until the connection is torn down, rather than having to issue a request every superframe.

1.3) - The time-bounded support in the MAC Foundation (Reference #4), in essence, reserves medium capacity so as to ensure that all time-bounded users receive guaranteed access to the medium.

Con:

Related Issue Identification:

Issue Originator:

Issue History:

May 1992: First opened
March 1993: Alternatives #1 and 2 - Reference #1 - Argument_pro #1.1.
May 1993: Reference #2 - Argument_pro #2.1.
January 1994: Reference #3 & 4, Argument_pro #1.3 and closing of the Issue by endorsing Alternative #1 - MAC Yes-21, No-1, Abstain-11.

Issue Status: CLOSE January 1994

Issue Identification: 25.2 (Topic: Channel).

Must the MAC work on a single channel PHY ?
Will the standard support multiple channel PHYs ?

Alternatives:
1) Yes on Both

References:
1) - P802.11-94/16 - Review of MAC Issues List
2) - P802.11-93/190 - Distributed Foundation Wireless Medium Access Control

Arguments:

General:

1.0) - The Issue needs to be splitted into 2 related Issues:
- 25.2A - Must the MAC work on a single channel PHY ?
- 25.2B - Will the standard support multiple channel PHYs ?

Pro:

1.1) - The MAC Foundation (Reference #2) supports both single and multiple channel PHYs.

Con:

Related Issue Identification:
1) - 25.2A - Channel
2) - 25.2B - Channel

Issue Originator:

Issue History:
May 1992: Date first opened
May 1993: Argument_general #1.0: Splitting of the Issue into 2 related Issues: 25.2A and 25.2B.
January 1994: Reference #1 & 2, Argument_pro #1.1 and closing of the Issue by endorsing the Alternative - MAC Yes-27, No-1, Abstain-5.

Issue Status: CLOSE January 1994

Issue Identification: 25.2A (Topic: Channel).

Must the MAC work on a single channel PHY ?

Alternatives:
1) - Yes

References:
1) - P802.11-93/140 - MAC/PHY Functional Partitioning
2) - P802.11-94/16 - Review of MAC Issues List
3) - P802.11-93/190 - Distributed Foundation Wireless Medium Access Control

Arguments:
General:

Pro:
1.1) - See Reference #1
1.2) - See Issue 25.2
Con:

Related Issue Identification:
1) - 25.2 - Channel

Issue Originator: C. Heide

Issue History:
May 1993: Date first opened - Alternative #1
September 1993: Reference #1 and Argument_pro #1.1.
January 1994: Reference #2 & 3, Argument_pro #1.2 and closing of the Issue by endorsing the Alternative - MAC Yes-27, No-1, Abstain-5.

Issue Status: CLOSE January 1994

Issue Identification: 25.2B (Topic: Channel).

Will the standard support multiple channel PHYs ?

Alternatives:
1) - Yes

References:
1) - P802.11-93/140 - MAC/PHY Functional Partitioning
2) - P802.11-94/16 - Review of MAC Issues List

Arguments:
General:

Pro:
1.1) - See reference #1.

Con:

Related Issue Identification:
1) - 25.2 - Channel

Issue Originator: C. Heide

Issue History:
May 1993: Date first opened - Alternative #1
September 1993: Reference #1 and Argument_pro #1.1.
January 1994: Reference #2 (editor note: I have not the result of the vote on this Issue).

Issue Status: SEE editor's note ??????

Issue Identification: 25.9 (Topic: Channel).

- What Clear Channel Assesment do we put in the MAC foundation?

Alternatives:

References:

Arguments:
Pro:

Related Issue Identification:

Issue Originator: MAC group

Issue History:
January 1994: Date first open.

Issue Status: Open

Issue Identification: 26.1A (Topic: Priority).

Does the concept of priority need to be addressed in the MAC?

Alternatives:

1) - See CODIAC Protocol proposal - Reference #1
2) - Yes

References:

1) - P802.11-93/54 - The CODIAC Protocol - Centralized or Distributed Integrated Access Control (CODIAC), A Wireless MAC Protocol.
2) - P802.11-94/16 - Review of MAC Issues List
3) - P802.11-93/190 - Distributed Foundation Wireless Medium Access Control

Arguments:

General:

Pro:

1.1) - If the concept of priority is addressed in the MAC: The CODIAC protocol (Reference #1) lends itself very well to the implementation of priority in centralized mode. If priority is added to the RTS frame then the controller can service requests in prioritized sequence in the data period. The controller can also assign quantity of bandwidth to requesting stations in a prioritized fashion. Priority is not a concept which can be applied to the CODIAC protocol distributed mode.

2.1 - In the MAC Foundation (Reference #3), point-coordinated transmissions have access priority over distributed transmissions.

Con:

Related Issue Identification:

1) - 26.1 - Priority

Issue Originator: C. Heide

Issue History:

May 1993: Date first opened - Alternative #1 - Reference #1 - Argument_pro #1.1
January 1994: Reference #2 & 3, Argument_pro #2.1 and closing of the Issue by endorsing Alternative #2 - MAC Yes-33, No-0, Abstain-0.

Issue Status: CLOSE January 1994

Issue Identification: 27.1 (Topic: Code Size)

- Are there code size limits to be specified ?

Alternatives:
1) - No

References:
2) - P802.11-94/16 - Review of MAC Issues List

Arguments:
Pro:
1.1) - No 802 Standard specifies code size limits.

Con:

Related Issue Identification:

Issue Originator:

Issue History:
May 1992: First opened
January 1994: Reference #2, Argument_pro #1.1 and closing of the Issue by endorsing the Alternative - MAC Yes-37, No-0, Abstain-0.

Issue Status: CLOSE January 1994

Issue Identification: 28.1 (Topic: Physical Size).

How important is the physical size ?

Alternatives:

1) - The physical size should not be considered as an 802.11 functional requirement.

Arguments:

Pro:

1.1) - Although extremely important to some implementations, should not be considered as any kind of functional requirement for 802.11.

Con:

Related Issue Identification:

Issue Originator:

Issue History:

May 1992: Date first opened
May 1993: Alternative #1 - Argument_pro #1.1
January 1994: Closing of the Issue by endorsing the Alternative - MAC Yes-33, No-0, Abstain-4.

Issue Status: CLOSE January 1994

Issue Identification: 29.1 (Topic: Simulation).

- How does 802.11 addresses simulation:
  - Common simulator ?
  - MAC simulator ?
  - PHY simulator ?
  - How do we simulate ?
  - What do we simulate ?
  - What are the traffic models we drive simulations from?

Alternatives:

1) This issue is addressed by Document P802.11-92/123.
'A detail computational framework is established for the execution of performance simulations of MAC state machines operated over PHY entities'. 'This framework is to provide a common methodology for analyzing MAC/PHY performance that can be executed on a variety pf platforms'. 'This framework allows the experimenter to locate stations geographically and to assign attributes to those stations. Some of the attributes that can be defined are:
- Station location
- Transmit power
- State
- Message probability'

'The use of "Mathematica" as a software tool accomplishes this goal'.

2) This issue is also addressed in Document P802.11-92/26. The document describes a 'simulator that has been designed to analyze the CSMA/CA protocol used by Waveland product, and is being used to evaluate MAC protocols alternatives.
The simulator uses as input the actual locations of stations in two networks. The model uses individual signal path attenuation values between all stations, to evaluate interference conditions and capture effects at the receiver locations'.

3) - This Issue is addressed by Document P802.11-94/20 Reference #4). The RF MAC Simulator was developed to help wireless LAN designers evaluate the strenghts and weakness of four MAC protocols.

References:

1) - P802.11-92/123 - "Mathematica" Based Integrated MAC/PHY Performance Simulation Framework Including Capture Effect.
2) - P802.11-92/26 - Wireless Network Performance Modeling Approach
3) - P802.11-93/1 - Application of "Mathematica" Based Simulation Template to Demand Assigned MAC Described in IEEE P802.11-92/39 ("The IBM MAC Protocol")
4) - P802.11-94/20 - RF MAC Simulation

Arguments:

Pro:

1.1) 'The framework described (92/123) is flexible enough to handle many differing simulation needs and scenarios (Capture effects, Throughput efficiency)'.
1-B) 'This simulation method (92/123) can be 'executed on a variety of platforms and be within the budget of all IEEE 802.11 participants'.

2.1) The simulation tool described (92/26) as 'a powerful tool for MAC protocol evaluation in a radio environment'. 'The main characteristics of the PHY have been successfully modeled:
- Signal path attenuation as function of distance
- Effect of attenuation boundaries like walls and ceilings
- Fading / shadowing

- Capture effects
- Co-channel interference
- Adjacent channel interference
- Microwave oven interference (jammer)'

2.2) 'The model provides simulation at a high traffic load in a realistic Client-server, and in a peer-to-peer environment'.

2.3) 'The model allows efficient analysis of the causes of packet loss at individual stations'

3.1) - See Reference #4.

Con:

Related Issue Identification:

Issue Originator:

Issue History:
May 1992: First opened
November 1992: Alternative #1 and 2, References #1 and 2, Arguments #1 and 2.
January 1993: Reference #3
January 1994: Alternative #3, Reference #4 and Argument_pro #3.1.

Issue Status: Open