IEEE 802.11
Wireless Access Method and Physical Specification

Review of MAC Issues List

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Abstract

This document reviews the current set of open issues in the 802.11 MAC Issues List [1]. There are many issues which the author believes can be readily closed, particularly in light of the decision at the November meeting to select a foundation upon which to base the forthcoming standard [2]. This paper makes recommendations on the resolution of various such issues. Issues which cannot be easily closed are not addressed here and it is recommended that these issues should remain open.

References:

[1] IEEE P802.11-92/64, 802.11 Issues Document, F. Simon (ed.)
[2] IEEE P802.11-93/190, Distributed Foundation Wireless Medium Access Control

Issue Identification: 10.1   (Topic: Coordination).

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).

Recommendation: Both

Discussion: Both types of coordination function are defined in [2].

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)

Recommendation: Close with Alternative 3

Discussion: Both types of coordination function are defined in [2].

Issue Identification: 10.3   (Topic: Coordination).

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

Recommendation: Close (just lists issues)

Discussion: 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.

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?

Recommendation: Yes

Discussion: [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".

Issue Identification: 11.3   (Topic: Access Point).

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

Recommendation: Close with answer "No"

Discussion: [2] requires a single AP per BSS in infrastructure configurations. This ensures that all stations within a given BSS can be properly coordinated and synchronized.

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?

> **Recommendation: Close with answer "No"**

> **Discussion:** Although it is unlikely that a real implementation will place the PCF elsewhere, strictly speaking it is not required that the PCF always be co-located with the AP.

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).

> **Recommendation: Close since it has been split into 13.3A and 13.3B**

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

> **Recommendation: Close with answer "2"**

> **Discussion:** Buffering and synchronization functions are key to the power management mechanism in [2], allowing application-independent power management.

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 ?

> **Recommendation: Close (issue is no longer relevant).**

> **Discussion:** Time bounded services are only provided via a connection-oriented service (described in [2]).

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 ?

> **Recommendation: Close with answer "in MAC"**

> **Discussion:** 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 in [2]) the MAC must be aware of both types and provide the integration.

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

Recommendation: Close with answer "yes"

Discussion: In particular, this is possible for ad hoc communication between stations.

Issue Identification: 16.1   (Topic: Mobility).

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

Recommendation: Yes on both.

Discussion: Specific mechanisms to provide roaming support for time bounded services has not been much discussed within the committee, but it should be a requirement.

Issue Identification: 16.5   (Topic: Mobility).

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

Issue Status: Open

> **Recommendation: The standard should not distinguish between mobile and stationary stations - all stations are potentially mobile.**

Issue Identification: 17.3   (Topic: Addressing).

What is the extent of Multicast ?

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

> **Recommendation: Alternative 3 (BSS and ESS)**

> **Discussion:** The standard should support a Distribution System consisting of standard 802 LANs connected by 802-compatible Bridges, and in such a configuration the scope of a multicast must include the ESS.

Issue Identification: 17.5   (Topic: Addressing).

<div align="center">What is meant by addressing?</div>

Alternatives:
   1) - Size
   2) - IEEE 802
   3) - Media Link Framing (MLF) address

Recommendation: IEEE 802

Discussion: In [2], all nodes are assumed to have a unique 48 bit IEEE address, and all (asynchronous) data transfers include such addresses. [2] includes other identifiers besides IEEE 802 addresses (such as BSS-ID and ESS-ID) but these are used for specialized purposes separate from the addressing function of uniquely identify a station.

Issue Identification: 18.1   (Topic: Data Rates).

<div align="center">Should the MAC work equally well at all PHY data rates ?</div>

Alternatives:
   1) - Yes
   2) - No

Recommendation: Yes

Discussion: [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 signficant data-rate dependencies within the MAC.

Issue Identification: 18.2   (Topic: Data Rates).

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

Alternatives:
1) - Yes
2) - No

Recommendation: Yes

Discussion: [2] includes provisions to accomodate different rates.

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

Recommendation: Alternative 1

Discussion: "Partially" through use of a MAC-level ACK on directed transmissions. However, this mechanism only improves the delivery reliability and does not guarantee delivery.

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

> **Recommendation: No**

> **Discussion:** Multicasts may be less reliable than directed transmissions..

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

> **Recommendation: Accept Alternative 1**

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).

> **Recommendation: Accept Alternative 1 (for directed asynchronous transmissions)**

> **Discussion:** Multicast or time-bounded transmissions don't incorporate positive acknowledgments.

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

Can the MAC handle different preamble lengths from different PHYs ?

Alternatives:
1) - No
2) - Yes

Recommendation: Yes

Discussion: [2] does not need a specific preamble length. .

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.

Recommendation: No change in SDU ordering.

Discussion: The standard should ensures that duplicates are not generated and that ordering is preserved (for example, via a duplicate detection scheme as in [2]).

Issue Identification: 24.1   (Topic: PHY Types).

- Will the standard support different PHY classes ?

Recommendation: Yes

Issue Identification: 24.6   (Topic: PHY Types).

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

Alternatives:
1) - Yes

Recommendation: Yes

Discussion: The MAC needs to know what type of PHY it is using.

Issue Identification: 24.7   (Topic: PHY Types).

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

Alternatives:
1) - Yes
2) - No

Recommendation: No

Discussion: For the most part the MAC will support the 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.

Issue Identification: 25.1 (Topic: Channel).

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

Alternatives:
1) - Yes
2) - No

Recommendation: Yes

Discussion: The time-bounded support in [2] in essence reserves medium capacity so as to ensure that all time-bounded users receive guaranteed access to the medium..

Issue Identification: 25.2 (Topic: Channel).

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

Recommendation: Yes on both

Discussion: [2] supports both single and multiple channel PHYs.

Issue Identification: 25.2A (Topic: Channel).

Must the MAC work on a single channel PHY ?

Alternatives:
1) - Yes

Recommendation: Yes

Issue Identification: 25.2B   (Topic: Channel).

Will the standard support multiple channel PHYs ?

Alternatives:
1) - Yes

Recommendation: Yes

Issue Identification: 26.1A   (Topic: Priority).

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

Recommendation: Yes

Discussion: In [2], point-coordinated transmissions have access priority over distributed transmissions.

Issue Identification: 27.1   (Topic: Code Size)

- Are there code size limits to be specified ?

Recommendation: No

Discussion: No 802 standard specifies code size limits.