
**IEEE P802.11
Wireless LANs**

**Remaining Technical "NO" Comments on LMSC
Ballot on IEEE P802.11D5.0**

Summary

The IEEE P802.11 working group has completed processing all comments received during the Sponsor Ballot review cycle. This review has resulted in a revised version of the 802.11 draft (version 5.3) which is now available.

P802.11 would like to take this opportunity to thank everyone for their inputs during the review cycle. Practically all the comments were resolved and incorporated into the revised draft.

The working group has contacted all sponsor ballot voters and received written confirmation that their comments have been adequately addressed with one exception. There remain a few comments for which a voter is unsatisfied with the working group's response. All of the comments are from a single voter, hence there remains one outstanding no vote from the Sponsor ballot.

Additionally, the same voter has requested that several additional comments be carried as open comments for the recirculation ballot. For all of these comments, the voter has indicated either orally or in writing to the working group that he will be satisfied with the proposed responses to those specific comments, however, he wishes to review the revised draft wording before they are officially closed.

This document contains a summary of the technical issues as well as the actual text of the comments which comprise the remaining no vote.

Summary of the primary issues involved within the outstanding declined comments and the working group's position:

- 1) The request for a strict 1:1 correspondence between PICs entries and the use of the word "shall";

The working group has done significant restructuring of the document as the result of processing the review comments. However, the group has declined to strictly enforce a 1:1 correspondence as it believes that the revised PICs structure as presented in draft 5.3 is more useful than the strict mapping which was requested.

- 2) The request for the elimination of the concepts of mobility, DS and ESS from the draft;

The working group has declined to eliminate these concepts as they are an integral portion of the work that P802.11 was chartered to do as specified in the P802.11 PAR document.

- 3) The request to make English prose "informative" rather than "normative".

The working group has declined to make the prose informative. The group prefers to have both the prose and formal descriptions normative, as each portion has different strengths. The working group knows of no conflicts between the prose and formal descriptions of the MAC. If any should be discovered in the future, rather than decide a priori that one clause takes precedence over another, the group prefers that discrepancies be brought to their attention for case by case resolution.

The remainder of this document consists of the actual comment text and the official response of P802.11 for those comments.

Comments which were not resolved to the satisfaction of the reviewer:

Declined Comment #1

Clauses: 1.2, 5.1.1.4, 5.2, 5.4.2.1, etc.

Voter Rich Siefert

Type of comment: Technical

Part of the No-vote: Y

Comment/ rational

The fact that high-layer applications may desire the ability to move within or among wireless LANs does NOT imply the requirement, as stated in 5.1.1.4, that this mobility must be provided within the MAC sublayer. In fact, 802.11 does not currently provide this mobility service (see discussion of DS and ESS below). Mobility is best relegated to higher-layer protocols (such as Network). 802.11 should provide the appropriate service interfaces (e.g., allowing a MAC client or management entity to determine the current associations of an AP) that allow higher-layer protocols to implement mobility, but not to attempt to implement it within the MAC. There is no need to “reinvent” the entire ISO protocol stack within the MAC, just because it’s wireless.

Recommended change

Eliminate mobility as a requirement of, and function provided by 802.11. Include a paragraph in the Scope section identifying mobility as a higher-layer function that can be provided among 802.11 LANs.

Working Group resolution

Request was respectfully declined.

Mobility is inherently a part of the functionality provided by 802.11. A primary purpose of 802.11 is to provide the support necessary for system implementations which may include additional mobility functionality at higher layers. The functions of association, reassociation etc. accomplish this, as well as enable mobility within the 802.11 coverage space.

The degree of mobility functionality included in 802.11 is consistent with the 802.11 PAR. To remove all mobility functionality from the 802.11 draft would mean that the working group would not accomplish the task it was chartered for.

Therefore, the working group must respectfully decline this request.

Declined Comment #2**Clauses:** 5.4.2.2, 5.3, etc.**Voter Rich Siefert****Type of comment:** Technical**Part of the No-vote:** Y**Comment/ rational**

There is no specification provided for the DS; neither a specific implementation nor a set of service interfaces and invariants that ensure proper MAC operation across the ESS. Since 802.11 depends on the DS to provide mobility and ESS coverage, it is clear that this standard currently does not provide sufficient information to build an interoperable, conformant ESS. Without conformance requirements, DS's and ESS's become proprietary entities.

In addition, the inclusion of an "unspecified" DS makes the delay as seen at the LLC service interface unbounded and uncontrolled. LAN MAC clients expect a low delay; the inclusion of an arbitrary internetwork (including possible WAN links) invalidates any assumptions about delay that are typically made by LAN clients. IEEE 802.1G allows WAN links for Remote Bridges, but it puts an upper bound on their number and delay, and makes this information available to a management entity.

Recommended change

Eliminate the concept of DS and ESS from the standard at this time, and note that this is "under study" or "work-in-progress". When specifications are available that allow interoperable, conformant implementations to be built, revise the standard to include these new specifications. Eliminate all discussion of mobility as an 802.11-provided service.

Working Group resolution

Request was respectfully declined.

The 802.11 draft specifies what is required for a MAC layer, (i.e. media access to the Wireless Media).

Additionally, since Mobile stations using a WM involve unique problems which 802.11 was required to solve, 802.11 also describes the context within which the 802.11 MAC and PHYs are intended to operate.

The information which explains the architectural context is believed by the working group to be crucial to understanding 802.11 functionality. This approach dates from the earliest days of the working group and is reflected by the fact that the use of the DS and ESS concepts are specifically provided for within the 802.11 PAR.

The conceptual interaction between 802.11 and a DS is important from the 802.11 viewpoint. That interaction is what 802.11 specifies.

As a DS instantiation may (probably will) involve additional non-layer 2 functionality, specific DS internal details are outside the scope of 802.11.

The working group asks the reviewer to consider that the draft is a MAC/PHY std and not necessarily a complete reference for everything required to create an arbitrary network which supports mobility.

The request to eliminate the concept of DS and ESS from the standard was respectfully declined by the working group.

Declined Comment #3**Clauses: various****Voter Rich Siefert****Type of comment: Technical****Part of the No-vote: Y****Comment/ rational**

Use of "shall" and PICS: The use of the word "shall" is critically important in IEEE standards. A "shall" mandates a conformance requirement. Therefore, the word should be used SPARINGLY, in precisely those clauses that absolutely require conformance for interoperability or correctness. In addition, EACH AND EVERY "shall" must have an associated entry in the PICS proforma. This has not been done in this standard. The PICS refers generally to sections that contain many shall statements. This is incorrect. There should be a 1:1 correspondence between the number of "shalls" in the document and the number of conformance requirements in the PICS..

Rather than have a lot of "shalls", it is common practice to have a complete detailed description of some desired behavior, either in prose or a formal language/state-machine, then have *ONE* statement, such as: "The MAC shall implement the requirements of the Transmit State Machine as specified in clause x.x.". This allows one PICS entry for a complex entity.

Recommended change

Eliminate and restructure the use of the term "shall" as indicated, or correct the PICS such that there is a 1:1 correspondence between "shalls" and PICS requirements entries.

Working Group resolution

Comment mostly accepted.

As noted in comment 3, the use of "shall" has been removed from the clauses defining the service interfaces and frame formats. The corresponding entries in the PICS have also been removed.

Regarding the request for a strict 1:1 correspondence between "shalls" and PICS entries;

After consulting with other reviewers, 802 members, and other working group members, the 802.11 working group reached the conclusion that a strict 1:1 correspondence is not required. Additionally, the working group thinks that the PICS is more useful in its current form, as it provides significant useful information to a potential user about the implementation. The working group thinks that the PICS contains enough detail when referencing a sub-clause (even though

that sub-clause may, in some cases, contain more than one "shall") for implementers to be given sufficient guidance to build confirming implementations.

After giving the matter serious consideration, the working group decided to decline the request to have a strict 1:1 correspondence between PICs entries and "shalls".

Declined Comment #4**Clauses: 9****Voter Rich Siefert****Type of comment: Technical****Part of the No-vote: Y****Comment/ rational**

802.11 specifies an extremely complex MAC in English prose. This is a deviation from all other 802 standards, and unacceptable for a number of reasons:

(1) This standard must be implemented by people unfamiliar with many of the slang terms used by the writers and left undefined, e.g., "transmit again immediately" (How soon is immediately?), or "shall be implemented on top of the DCF" (What does this mean for conformance?), or "shall wake-up" (undefined slang).

(2) This standard must be implementable by non-native English speakers. Having the normative requirements in English prose makes this virtually impossible.

(3) English prose (or any human language, for that matter) is ambiguous. There is not a 1:1 correspondence between *words* and *meaning*; the same words can mean different things depending on the listener's background. (This is a major reason why we have wars and courts of law; if language were unambiguous, we would have no arguments over the meaning of what was said!)

(4) In particular, the 802.11 MAC is extremely complex, perhaps the most complex MAC yet devised within 802. No other 802 MAC standard allows the use of prose for normative specification.

Recommended change

(1) Make the English prose description of the MAC (and MAC Management) *informative*, rather than normative. Remove all "shall" statements from the descriptions.

(2) Provide a normative, formalized presentation of the MAC (and MAC Management). This formalization can use state-machine notation, Pascal, C, Verilog or other code, or any method that is truly unambiguous.

Working Group resolution

Comment mostly accepted.

As a result of this comment as well as several others from the Sponsor ballot review, the 802.11 working group updated and significantly expanded the formal description of the MAC. The formal description of the MAC was rewritten using SDL, an ITU-T standardized language (Rec. Z100

series) and is now included in Annex C which is a normative portion of the document. The working group believes that this satisfies recommended change (1).

Regarding the request to demote the English prose from normative to informative:

The 802.11 working group has done its best to insure that Annex C and the prose are not in conflict in any way.

However, the act of making the prose informative would have the effect of arbitrarily deciding any conflicts within the draft in the favor of the Annex. After due consideration, the working group decided not to adopt an unknown set of default decisions.

Rather, the working group recognizes that since the work behind both the prose and the formal description was done by humans, it is conceivable that either could possibly contain an error which is currently undetected. In case this possibility should come to be fact, the working group strongly prefers that all such issues, if/when they are found, be brought to the working group's attention. This will enable the working group to track issues and resolve them in a revision of the standard, should that become necessary.

Therefore, the working group respectfully decided to decline the request to make the prose informative.

Declined Comment #5

Clauses: 10.1

Voter Rich Siefert

Type of comment: Technical

Part of the No-vote: Y

Comment/ rational

Since the operation of the MAC depends on the MAC Management being present, and MAC Management requires a SM entity, the statement that "a SM entity is assumed to exist" should be replaced by a "shall" requirement.

Recommended change

Add a requirement that a SM entity be present, either here or in Clause 11.

Working Group resolution

Request was respectfully declined.

The working group feels that while it may be splitting semantic hairs, that it could not require that a SM entity exist as the SM entity is not formally part of 802.11. It is true that 802.11 does expect that some entity may invoke the SM interface to exert control on the MAC, and it is hoped that the entity exerting control is a SM entity... but the 802.11 working group did not feel that it had the ability to mandate the type of entity which invokes the interface. All 802.11 can do is

perform the actions specified by the invocation of the interface - that action is independent of who invoked the interface.

Comments for which the reviewer is satisfied with the proposed action pending review of the actual draft text:

Tentatively Resolved Comment #1

Clauses: 5.4.1.2

Voter Rich Siefert

Type of comment: Technical

Part of the No-vote: Y

Comment/ rational

There is no specification of the functions or even the service requirements of the Integration Service. Without any specification, there is no way to ensure correctness, conformance, or interoperability of an Integration Service implementation. Without these three elements, the service is meaningless and useless.

Recommended change

Specify (at a minimum) sufficient detail of the requirements of an Integration Service implementations to ensure correctness, conformance and interoperability, or alternatively, eliminate the Integration Service from 802.11.

Working Group resolution

Comment resolved with reviewer.

No technical change was required. The details of the integration service are dependant on the implementation of a specific DS. As the service in question is an interface to the DS, it is not appropriate for 802.11 to specify it.

The reviewer and working group agreed that stating that the IS is outside the scope of the standard as well as completely optional is satisfactory.

Tentatively Resolved Comment #2

Clauses: 5.4.3.1, 5.7.6

Voter Rich Siefert

Type of comment: Technical

Part of the No-vote: Y

Comment/ rational

Since 802.11 does not mandate the use of any particular Authentication scheme, there is no way to ensure conformance or interoperability. This is a requirement of any standard.

Recommended change

Specify the Authentication scheme sufficiently to provide for conformance and interoperability, or eliminate Authentication from 802.11.

Working Group resolution

Comment accepted.

802.11 does specify the authentication scheme(s), in fact two authentication schemes are specified; open system and shared key. The use of one of the two alternative schemes is mandated. Both schemes are sufficiently specified to ensure conformance and interoperability. Additionally, since draft 5.0, clause A.4.4.1 in the PICs has been updated to clearly state that the Authentication schemes are mandatory.

Tentatively Resolved Comment #3

Clauses: 5.4.3.3, 8.1.2, 8.2.1

Voter Rich Siefert

Type of comment: Technical

Part of the No-vote: Y

Comment/ rational

802.11 defines a WEP algorithm for privacy. There is already an established standard for secure data exchange (802.10/SILS). There is no need to define new standards where we have existing ones. In addition, a privacy algorithm that requires a known key must specify a means for key distribution, or it is not usable in an Interoperable manner. There is already a standard for key distribution in 802.10, which should be used by 802.11.

Recommended change

Eliminate the WEP algorithm and use 802.10 for secure data exchange, along with the 802.10 key distribution mechanisms.

Working Group resolution

Comment resolved with reviewer.

The purposes of 802.10 and WEP are not the same. WEP's purpose is to compensate for the physical attributes of wired media which wireless media do not have. WEP is applied only to the 802.11 link (while 802.10 provides end to end security) and a substitute for the "closed physical nature of wire". The working group believes that it is not commercially acceptable to field WLANs which do not compensate for this link difference.

After discussion of the issue in January '97 the reviewer agreed to drop the objection.

Tentatively Resolved Comment #4**Clauses:** 5.5, etc.**Voter** Rich Siefert**Type of comment:** Technical**Part of the No-vote:** Y**Comment/ rational**

There are many places in this clause (and others) where what are essentially MAC and MAC management specifications are buried in the service descriptions. These have associated “shall” statements, which require PICS entries. (For example, on p. 24, bottom: “If STA A receives a class 2 frame . . .”) All conformance requirements should be in the same section (MAC and/or MAC management) and not strewn through service descriptions and other clauses. All “shall” statements shall be grouped and easy to find and recognize (sic!).

Recommended change

Put all conformance requirement statements in the clause appropriate to that requirement. There should be no “conformance” requirements in a clause on service specifications, since these are not required to be exposed interfaces.

Working Group resolution

Comment accepted.

The draft has been updated to remove the objections re conformance statements and service specifications.

The working group asks that the reviewer please review the latest draft to see if he agrees that this specific comment has been sufficiently satisfied (There remain a few “shalls” within clause 5).

Tentatively Resolved Comment #5**Clauses:** 5.6**Voter** Rich Siefert**Type of comment:** Technical**Part of the No-vote:** Y**Comment/ rational**

There is no need to require a device in an IBSS to be able to associate.

Recommended change

Eliminate the requirement.

Working Group resolution

Comment accepted, reviewer satisfied.

No draft change was needed. There is no requirement that ALL class 1 and class 2 frames be used by a station in an IBSS. Clause 5.6 does not contain any reference to association, hence it already read as the reviewer requested.

Tentatively Resolved Comment #6**Clauses: 6.1.3****Voter Rich Siefert****Type of comment: Technical****Part of the No-vote: Y****Comment/ rational**

This section states that the DS may reorder MSDUs (even within a unicast stream). This is unacceptable as the MAC service interface, and is a prime example of why (1) The DS, if allowed, must have requirements specified, and (2) IP is unsuitable as a DS mechanism for an IEEE 802 MAC. This section essentially violates ISO 15802 / 10039, as it states that 802.11 does not guarantee even unicast ordering invariant at the MAC service interface of a conformant implementation. If you are providing a IEEE MAC-layer service, you must specify whatever is necessary to provide such a service at the LLC interface. This section allows an 802.11 conformant interface that violates IEEE 802 Functional Requirements.

Recommended change

Either specify the DS in sufficient detail to ensure correctness, conformance, and interoperability, or eliminate the DS concept and all references to it in 802.11

Working Group resolution

Comment Accepted and resolved with reviewer.

802.11 now specifies that the DS shall meet the requirements for ordering of 15802. This has been added to clause 6.1.3.

Tentatively Resolved Comment #7**Clauses: 7.1.3.3****Voter Rich Siefert****Type of comment: Technical****Part of the No-vote: Y****Comment/ rational**

These clauses contain redundant "shall" statements. A "shall" requirement should only be stated once. This occurs in many other places within the standard; this is one example.

Recommended change

Eliminate all redundant "shalls".

Working Group resolution

Resolved with reviewer.

The working group believes that the two sections cited are not internally redundant. The reviewer agreed to re-read the clauses in the revised draft.

Tentatively Resolved Comment #8

Clauses: 7.2.2

Voter Rich Siefert

Type of comment: Technical

Part of the No-vote: Y

Comment/ rational

There are numerous “shall” statements in this section on Frame Formats, e.g. “Data+DF-Ack, Data+CF-Ack+CF-Poll, CF-Poll, and CF-Ack+CF-Poll shall only be sent by a Point Coordinator”. This is not a requirement of the *Frame Format*, but a requirement of the MAC entity. There should be no “shall” statements in the section on Frame Formats.

Recommended change

Move all conformance requirements (“shall” statements) from the Frame Format clause to the MAC or MAC Management clauses, or eliminate if redundant.

Working Group resolution

Comment accepted and resolved with reviewer.

Text was moved from frame format clauses to clauses 9.2 and 9.3 and checked for redundancy.

Tentatively Resolved Comment #9

Clauses: 11.1.2.1

Voter Rich Siefert

Type of comment: Technical

Part of the No-vote: Y

Comment/ rational

The note states that Beacons may be delayed. In fact, since CSMA delay is unbounded (especially without fixing the Capture Effect!) Beacons may not be sent at all.

Recommended change

The standard needs to deal with the possibility that frames, including Beacons and ATIMs, etc. may be delayed indefinitely. The standard must specify the behaviour of the STAs under these conditions.

Working Group resolution

Resolved with reviewer - no change required.

The working group believed that the behaviour in the cases cited is specified and that no further specification was necessary w/o further examples of problems of which the group is not aware. The state machines also cover the cited cases.

Tentatively Resolved Comment #10

Clauses: 11.2.2.1

Voter Rich Siefert

Type of comment: Technical

Part of the No-vote: Y

Comment/ rational

The mechanism specified for operation of power-save mode in an IBSS does not appear to ensure correct operation, since the time for successful transmission of a ATIM (using CSMA/CA) is unbounded. Worse than this, the use of power-save effectively forces all traffic into the ATIM window (until the devices actually come out of doze state). This further reduces the available bandwidth and increases contention during the window, increasing the probability that the ATIMs will not be delivered. This appears to fail in the worst-case of all stations dozing under heavy load. There is no assurance that any station will ever be able to transmit ATIMs (much less data frames) under worst-case conditions.

Recommended change

Eliminate the use of power-save mode in ad-hoc networks.

Working Group resolution

The request to remove ad-hoc power management was declined. Instead, the group went through a list of all concerns that have been brought to / thought of by the group (including those offered by the reviewer). Each was examined and in several cases the draft was enhanced and/or clarified to remove problems. The working group now believes that there are no problems with power save mode in ad-hoc networks. The reviewer has agreed to re-read the revised draft.