

## Single Outstanding NO Vote

Voter: Rich Seifert

**Vic: I have inserted my thoughts on this latest document right into the text. Please consider and/or include in the ballot at your discretion—Rich**

### Introduction

As the basis for resolution of the remaining no-vote, here is a summary of the outstanding comments of the single remaining NO-vote on the LMSC Ballot on IEEE P802.11/D5.0. On behalf of the group, the Chair would like to thank the voter for his elaborate review and comment back on the disposition by 802.11.

Please be aware that you will find traces of responses from voter to an obsolete set of resolutions. You will also find comments to the updated set of resolutions as if they were responses to a tele-conference. To maintain the authenticity of the file, the writer of this paper did not make any changes to the voter's text, although they may be confusing to third parties.

Voter submitted 9 remaining comments supporting his no-vote.

After analysis, the writer found that 2 were already changed in the spirit of voter's comments and according to the referenced tele-conference (comment 8 and 9) and 2 were not technical (comment 6 and 7).

So 5 technical comments remain.

### Five Technical comments

Of those 5 remaining technical comments, 2 address mobility and 3 address the issue of normative and the use of "shall".

### Comment on Mobility

#### *Comment 1*

Comment 1 recommends 802.11 to remove mobility from the MAC sublayer because voter views mobility as a higher layer function. 802.11 agrees that mobility can also be supported by the Network Layer and for certain types of mobility, may be best supported there. However, just as the MAC provides both global addressing (network layer function) as well as a routing function in bridges (network layer function as well), 802.11 contends that the air interface needs to contain mobility supporting functionality.

**Vic: The fact that 802 addresses are globally-unique has NOTHING to do with network-wide connectivity! The reason for global-uniqueness is to eliminate the need for address administration (i.e., assignment of individual addresses by an end-user network administrator). The expansion of LANs from computer-rooms to desktops made local address**

**assignment unmanageable. Strictly speaking, local uniqueness is all that is required for Data Link addresses, even with LANs. Globally-unique addresses are also locally-unique, and relieve administrators of the address assignment problem. While global addressing is a necessary capability of the Network Layer, the fact that it is also provided (independently) at Data Link Layer does not mean that the Data Link should now perform Network Layer functions. (When I said that mobility should be performed at a higher layer, I actually was referring to Session Layer, not Network. In my opinion, this is the "architecturally correct" place to do this. It is also possible to do it at Network Layer, as proposed by Mobile IP.) In no case does it make sense to put this function in the Data Link.**

**While Bridges do provide a form of connectivity among LANs, they do not "terminate the Data Link", as routers do. I think that 802.11 has looked at MAC addressing and Bridges incorrectly, and improperly assumed**

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**that Network Layer functionality has been moved into the Data Link, thereby justifying 802.11's decision to move mobility into the Data Link as well. As one of the developers of the original 48-bit global addressing scheme AND the 802.1D Bridge standard, I can say that both the assumption and the conclusion are incorrect.**

#### **Comment 2**

Comment 2 recommends 802.11 to eliminate the concept of a Distribution System (DS) and of Extended Service Set (ESS). The 802.11 PAR addresses the possibility of Basic Service Areas and Extended Service Areas, thus for an ESS and inherently for a DS. Because 802.11 specifically limits its scope to the air-interface and addresses the service sets and DS only conceptually, the chair does not see a problem to maintain the architecture and its description in this standard to more fully inform the reader.

**Vic: My problem here is that 802.11 DEPENDS on the DS and ESS, yet does not really specify them in any useful way. You cannot build a conformat, interoperable ESA network from the 802.11 standard.**

**Without this, the standard does not provide value in this area. Since the only thing that 802.11 really attempts to specify in an interoperable manner is the air interface for a single link, I think that this is the only thing that 802.11 should CLAIM to be standardizing. (This is a hard enough job as it is!) Currently, it claims (or appears to claim) to be standardizing a system of multiple, interconnected BSAs, providing mobility across an ESA. In fact, it does NOT do this in an interoperable manner, and is misleading in this regard.**

#### **Comment on Shalls and Normative**

##### **Comment 3 and 4**

Although the group agreed to remove all shalls from the service definitions in clauses 6, 10 and 12 and have the PICS match with shalls, the editor did not dare to make changes on his own judgement in other clauses.

##### **Comment 5**

The voter recommends to make the definition of the MAC and MAC management in the body of the standard Informative. The 802.11 Chair has

difficulty declaring the body of the standard as Informative.

**Vic: It is not the "body" of the standard that I want to be informative, it is the TEXTUAL description of the MAC, as opposed to the formalization. Why does the chair have a problem with this? It is the method used by EVERY OTHER 802 STANDARD for specifying MAC behavior. You are entering new territory here. If the method of presentation used by 802.11 were SUPERIOR to a formalization, then I would have no problem with it. I fail to see how an English-text description can be more unambiguous and complete than a formalization.**

The voter also recommends to provide normative material for the MAC and MAC management in the shape of State Diagrams. 802.11 responded by adding the state diagrams.

As 802.11 has invested a great deal of effort in the complete specification of the MAC and MAC Management. The committee feels that the formal and prose definitions in the current draft are complementary and serve to provide a more complete understanding of the operation of the MAC and MAC Management.

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**Mobility**

1.2, 5.1.1.4, 5.2, 5.4.2.1, etc.	<b>R</b> <b>S</b>  <b><u>1</u></b>	<b>T</b>	<b>Y</b>	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.	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.	<b>Request is respectfully declined. We believe the commenter misunderstood the architecture. As data flows from higher layers into the top of the MAC, this data must be delivered as a Stations moves. Hence, mobility is inherently a primary aspect of the functionality provided by 802.11. Note that it is the mobile STA that decides when to reassociate. While layers higher than layer 2 may well be involved in the implementation of mobility as provided by the MAC (via invocation of a DS service), mobility is not a service which can be removed from the 802.11 MAC layer. Primary purpose of 802.11 is to provide the mobility services requested - this is what the functions of association, reassociation etc accomplish.</b>	<b>✗</b> <b>The comment stands. The fact that mobility is needed by applications does not make it a MAC functional requirement. Especially since the DS is unspecified in 802.11, mobility is very much a higher-layer protocol (or application) concern, not MAC. Mobility within the MAC that spans internetworks violates ISO layering principles as well, as it is the Network Layer that is responsible for packet delivery across internetworks, and not the MAC/Data Link.</b>  <b>The fact that a station (rather than the network) makes the reassociation decision also does not make this a MAC concern. It should be a higher-layer entity within the station performing this function.</b>  <b>Mobility is a service which *can* easily be removed from 802.11, and should be. The primary purpose of 802.11 is NOT mobility services, it is wireless MAC. By definition, a MAC is a single Data Link, not an internetwork.</b>  The written response to this comment does not provide any rationale for its rejection, and it was not discussed during the conference call. It is still an outstanding issue.
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5.3, 5.4.2.2, etc.	<b>R</b> <b>S</b> <b>2</b>	<b>T</b>	<b>Y</b>	<p>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.</p> <p>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.</p>	<p>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.</p>	<p><b>Request is respectfully declined. We believe the commenter misunderstood the architecture. As data flows from higher layers into the top of the MAC, this data must be delivered as a Stations moves. Hence, mobility is inherently a primary aspect of the functionality provided by 802.11. Note that it is the mobile STA that decides when to reassociate. While layers higher than layer 2 may well be involved in the implementation of mobility as provided by the MAC (via invocation of a DS service), mobility is not a service which can be removed from the 802.11 MAC layer. primary purpose of 802.11 is to provide the mobility services requested - this is what the functions of association, reassociation etc accomplish.</b></p> <p>Declined. 802.11 has gone to a lot of effort to handle the problems unique to mobile stations using a WM. In order to do this it had to explain the architectural context within which the 802.11 MAC and PHYs operate. This information is crucial to understanding 802.11. Also refer to resolution of comment 3 in this clause. The 802.11 draft does what is required and appropriate for a MAC layer, i.e., media access to the Wireless Media. DS internals are outside the scope of 802 (not just 802.11). The reviewer is asked to consider that the draft is a MAC/PHY standard and not a complete reference to everything required to create any type of network which includes 802.11 links.</p>	<p><b>✘</b></p> <p><b>No change in position.</b></p> <p>I agree with the statement that "the draft is a MAC/PHY standard and not a complete reference to everything required...". I also agree that the purpose of 802.11 is (and should be) to specify only "what is required and appropriate for a MAC layer, i.e., media access to the Wireless Media". This is PRECISELY why we should eliminate discussion of the DS and ESS, because it falls outside the scope of 802.11.</p>
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**Comment on SHALLs and NORMATIVE**

5.5, etc.	<b>R S <u>3</u></b>	<b>T</b>	<b>Y</b>	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!).	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.	<b>Action taken: Decline. The working group adopted the current structure of the document and feels that it does not preclude the generation of an accurate and meaningful PICS .</b>  No action taken: The reviewer apparently would like the document to have a different structure. However, the group was unable to determine from the comment supplied, what structure would satisfy the reviewer. Therefore the request is declined.	<b>✘ This is not what was agreed to in our telephone conference. The PICS must not only be “meaningful”, it must conform the the requirements of an International Standard! Conformance requirements in Service Specifications are not acceptable.</b>  <b>Vic: My understanding from the telephone conference was exactly what I state below (under the check mark). Your latest response indicates that these changes were NOT made. This is the reason for my change to a NO on this issue.</b>  ✓ Per our telephone conference, all conformance requirements (shalls) shall be removed from the Service Specifications. MAC functionality will be moved from this clause to the MAC clause.
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9	<b>R S <u>5</u></b>	<b>T</b>	<b>Y</b>	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,	(1) Make the English prose description of the MAC (and MAC Management) *informative*, rather than normative. Remove all “shall” statements from the descriptions.	802.11 decided to make a normative formal description using SDL, an ITU-T standardized language (Rec. Z100 series). Vic	<b>✘ If the text is also normative, the comment stands. It is not acceptable to have two, potentially conflicting, normative specifications of the same behavior.</b>  <b>Vic: In my opinion, this is the big issue. I think it is a very bad precedent to allow an 802 standard to specify</b>
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				<p>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).</p> <p>(2) This standard must be implementable by non-native English speakers. Having the normative requirements in English prose makes this virtually impossible.</p> <p>(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!)</p> <p>(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.</p>	<p>(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.</p>		<p><b>MAC behavior in textual, descriptive form. Worse, having TWO normative specifications of the same behavior guarantees ambiguity.</b></p> <p>Per our telephone conference, the draft now contains TWO normative specifications of the same behavior, with no indication of which one prevails in the event of a conflict. We also agreed that the probability of conflict between these specifications is extremely high. This leaves 802.11 in a precarious state.</p> <p>For all of the reasons stated in the original comment, I believe that it is imperative that an International Standard specify complex behaviors in a single, unambiguous manner. If there are errors in the normative specification (which can reasonably be expected in a MAC this complex), they can be fixed through the normal maintenance process (that’s what it is for!).</p> <p>EVERY 802 MAC (and some other 802 standards, such as bridging) is specified in a normative formalization, with informative (not normative) text description. The reasons for this procedure are those stated in the comment. The 802.11 MAC is the most complex conceived by 802 to date, and make this need even more compelling. The history of 802 standards shows that normative formalizations work, and work well.</p> <p>I cannot see how an English text description can be more clear and unambiguous (especially to non-native English speakers) than a formalization; I can see less how TWO independent normative specifications make the standard clearer. I believe that 802.11 is doing a serious disservice to both the user and vendor community by taking this position, and I urge you to</p>
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various	<b>R</b> <b>S</b> <b>4</b>	<b>T</b>	<b>Y</b>	<p>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..</p> <p>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.</p>	<p>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.</p>	<p><b>Comment respectfully declined. It is accepted that there are places in the draft where rather than have a prose description covered by a single 'shall' the text uses 'shall' statements for each of the elements that make up the required function. This is a style issue that does not change the specified functionality. The editing burden of changing the style of the draft at this stage is quite frankly too great to accept this comment at this late stage.</b></p> <p>Comment respectfully declined. The group does not know how the reviewer would change the draft: remove all "shalls" and simply say "it shall operate as specified in clauses 1 thru 14"? How many shalls are too many? The author is requested to inform 802.11 which Shalls he views as superfluous.</p>	<p><b>✘ The response is not accepted. This is NOT a style issue. You simply cannot have conformance requirements in a Service Specification. Service Specifications are *abstractions*, and do not indicate observable behaviors. There is no reasonable means of having conformance requirements on an unobservable abstraction.</b></p> <p><b>The attitude presented that, "It is too late to fix things, even if they are wrong" seems inappropriate in an International Standard.</b></p> <p><b>Vic: I still fail to see how you can have a conformance requirement for something that is not even implemented, much less observable, such as a Service Specification.</b></p> <p>✓ Per our telephone conference, you have agreed to remove "shalls" (conformance requirements) from the clauses on Service Specifications and Frame Formats, and other places if obvious. Redundant shalls shall (sic) be checked for consistency.</p> <p>In addition, it is a requirement (of IEEE/ISO standards) that there be a 1:1 correspondence between the word "shall" and entries in the PICS proforma. It is NOT permissible to have a single PICS entry cover a number of shalls. Specifically, it is not possible to have a single PICS entry cover a sub-clause containing multiple shall</p>
Submission						page 8	statement. Has. Chair IFFF P802.11



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**Editorial comments**

5.2.4.1	<b>R</b> <b>S</b>  <b>6</b>	<b>E</b>	<b>Y</b>	<p>The statement, "Bridges were originally designed to provide range extension between like-type MAC layers." is false. Bridges were first designed to provide traffic segmentation between LANs, regardless of MAC type. Refer to the 802.1D introduction.</p> <p>In the next paragraph, there is a reference to "bridge-like devices", with no definition of what these are. IEEE 802 only defines bridges, not "bridge-like devices".</p>	<p>Eliminate these statements.</p>	<p><b>Action Taken: Accepted. Replace section 5.2.4.1 as follows: "The 802.11 architecture contains more than one distinct logical medium., the DSM and the WM..Bridges provide repeater functionality, traffic segmentation, and integration of different MAC subnetworks. Repeater functionally extends the range of the LAN beyond the limits imposed by the PHY. In 802.11, the ESS architecture (APs and the Distribution System) provides traffic segmentation and range extension.. Logical connections between 802.11 and other LANs are via the Portal.. Portals connect between the DSM and the LAN medium that is to be integrated."</b></p> <p>Partially accepted. The reference to "bridge-like devices" remains as 802.11 recognizes that 802.11 links will operate in environments that are not restricted to 802 specified components.</p>	<p><b>✘</b></p> <p><b>Response is inadequate. The committee says that they accepted the response when in fact they did not. The comment requested a definition of a "bridge-like device".</b></p> <p><b>As to the actual response, subnetworks are not defined in IEEE 802; there is no such concept, and therefore bridges do not provide for integration of different MAC subnetworks, as stated. Second, the statement that the ESS architecture provides traffic segmentation and range extension is false. An architecture does not provide anything, it is simply a framework for implementations, which provide various functions.</b></p> <p>I am willing to accept the group's response IF a definition of a "bridge-like device" is added to the definitions.</p>
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5.6	<b>R</b> <b>S</b> <u>7</u>	<b>E</b>	<b>Y</b>	In Fig 10, it is not obvious that a STA *may* be an 802.1D bridge, or a router. Both of these devices appears as regular STAs to 802.11.	Add a note to Figure 10: One or more STAs may be providing 802.1D bridging or Network Layer routing functionality, even in an IBSS.	<p><b>Action taken: Declined. These comments are superfluous. While the stations in the diagram may NOT be APs, there is no restriction on the functions above the MAC layer that may be running on the machines that embody the stations.</b></p> <p>Declined. Please refer to the definition of Station in clause 3. A Station is not defined as the physical box within which there may be components in addition to an 802.11 implementation. Specifically, the Station in figure 10 are ONLY Stations, there are no Bridges or routers possible in an IBSS as neither bridges or routers can be a member of the IBSS. If an 802.11 Station happens to be contained within a physical box, which does further processing on data acquired via the 802.11 Station, what that processing is is not relevant - this hypothetical box may be doing something similar to a bridge, or it may be doing word processing.</p>	<p><b>✘</b></p> <p><b>The comment stands. (We have a “disconnect” here. My only request was to *clarify* the figure by indicating that there could be a bridge among those devices. This is definitely a true statement, as 802.11 does not place any restrictions on the nature of the devices. I fail to understand the reason why the requested note is objectionable.)</b></p> <p>The response is inconsistent. First it says that there are no bridges or routers possible in an IBSS, then it states that a station may be performing bridge functions (or functions similar to a bridge, which is ambiguous). Clearly, since 802.11 cannot specify the higher-layer functions performed in a device, then it is possible to build 802.1D bridges or Network Layer routers with 802.11 interfaces. My original comment stands.</p>
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**Resolved comments**

Comment 8 has been resolved by stating that the Station Management Entity shall be implemented. Just as 802.5, the PICS does not address this.

10.1	R S  <b>8</b>	t	Y	Since the operation of the MAC depends on 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.	Add a requirement that a SM entity be present, either here or in Clause 11.	Declined - it may be splitting hairs but - 802.11 can not require that an SM entity exist, as the SM entity is outside the scope of 802.11. However, 802.11 does assume that some entity invokes our interface to let the MAC know what to do, we hope it is a station mgt entity, but we can't “require it”. Neither can we require that we be asked to do anything else...	✗ <b>This is not what was agreed to in our telephone conference. I fail to see why 802.11 cannot require that a Station Management entity exist, and that it have certain required functionality. This is true in many other LAN standards, including 802.5 and FDDI. Since you require an entity to perform certain operations, (or the MAC doesn't work), you should make Station Management implementation a conformance requirement.</b> ✓ Per our telephone conference, it was agreed that a Station Management entity is indeed required. SM will be made mandatory, and all references to optional SM functionality will be eliminated.
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Comment 9 has indeed been resolved as voter desired: the open system authentication is mandatory, the WEP is optional.

5.4.3.1, 5.7.6	R S  <b>9</b>	T	Y	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.	Specify the Authentication scheme sufficiently to provide for conformance and interoperability , or eliminate Authentication from 802.11.	<b>Action taken: Declined. 802.11 specifies 2 authentication schemes in clause 8.</b>  Declined. The comment is incorrect. While 802.11 does not specify a <b>single</b> specific authentication scheme, it does specify 2 authentication schemes and could be extended to others. The ones specified are sufficiently detailed to ensure conformance and interoperability.	✗ <b>This was not the agreement from our telephone conference. The standard must mandate some interoperability for Authentication. A second method may be optional, but it cannot allow conformant, non-interoperable implementations, which would be the case of one station exclusively used Authentication method A, and another exclusively used Method B.</b>  ✓ The specification will require all devices to implement one Authentication scheme. The second one is optional, in addition to (as opposed to “instead of”) the first.
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