Seq. #	Section number	your ini-tials	Cmnt type E, e, T, t	Part of NO vote	Comment/Rationale	Corrected Text	Disposition/Rebuttal

Results of Recirculation Ballot on Draft Standard D4.1

Comments (with Dave's comment)

1	A.4.7	vh	E		The item identification column is inconsistent with the majority of other MIB item identifications. The change in the next column will make it will make consistent	Change in the Item column all occurences of "16." into "IR". Change in the status column all occurences of 16. into IR	
2	A.4.7	vh	E		Non conventional use in row IR23	Change C: in the status column into IR5a	
3	A.4.7	vh	e		The first item is included as part of the header	Remove the attribute header from this row	
4	A.4.5	vh	E		The item identification column is inconsistent with the majority of other MIB item identifications. The change in the next column will make it will make consistent	Change in the Item column all occurences of "14." into "FH". Change in the status column all occurences of 14.2 into FH2	
5	A.4.5	vh	E		The definitionof the option of 2 Mbit/s is not specified according to what I understand as the rule. The next column will bring correction	Replace FH2 (prior called 14.2) into the following 2 rows: FH2.1//TXVECTOR parameter:PLCPBITRATE= 1//14.2.2.2//M//yes * FH2.2//TXVECTOR parameter:PLCPBITRATE=2//14.2. 2.2//O//yes no Change in the status column all occurences of FH2 (prior called 14.2) into FH2.2	
6	5.5	db	T	n	The following sentences were inserted into clause 5.5 at the July meeting: "An AP shall always be in State 3. " This requirement is simply incorrect. With this the MAC	Delete the following text from clause 5.5 which was added during the July 1996 meeting:	

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					as specified can not work. Consider that the effect of this sentence is to place an AP permanently in state 3. The impact is tantamount to not having a state distinction for APs. As a result the system can not operate and may end up in deadlock. Consider: Since an AP would always be in state 3 from it's point of view, it will send any frame it wants to any other station. Now consider the "other" station - if it is not an AP it may be in state 1 or 2, if it receives a class x frame where X > it's believed state, it is required by the draft to respond with either a de-authentication or disassociation frame - both of which are intended to resolve a state mismatch between communicating stations. However since the AP is locked into state 3, the mismatch can not be resolved as the AP CAN NOT change out of state 3. Clearly the protocol is broken by the added sentence. I consider this to be such a serious problem that I first intended to vote NO on this confirmation ballot. It is only the serious nature of the problem that resulted in a "yes with comment" vote. Frankly I consider that this is so broken that the protocol can not be implemented in an operating manner with the AP in state 3 requirement. Therefore, I decided to have some faith that it will be fixed by the group ASAP and I decided to try to avoid the delay involved with processing a NO during the confirmation ballot. However, I can guarantee that this will be the subject of a NO technical vote as part of the Sponsor ballot. I am not sure what motivated the addition of the above change to clause 5.5 during the July meeting. After discussing the change with Mike Fischer, I believe it was an attempt to correct a perceived problem with the class	"An AP shall always be in State 3. It provides the logical connection to the DS and as a Point Coordinator (PC), it may provide a Contention Free Period (CFP)."	

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					of some CF frames - however, the language added (in my opinion) breaks more than it repairs and must be removed. If some CF frames must be class 1 instead of 3, then let's move them from one category to another to solve the original problem - but clearly, an AP can not be permanently locked into state 3.		
7	5.5	mif	E	(na)	**One of the editorial changes made during the July, 1996 meeting reduced clarity, and could be interpreted in a manner that renders the access and confidentiality control services useless. Therefore, this commenter strongly urges that these changes either be removed (restoring the text from D4.0, which is better than the "improved" text in D5.0); or making the corrections shown to the right, which appear to do a much better job of capturing the intent of the clarification issues discussed in July, 1996, without breaking anything else in the process.** **The 1st of the 3 changes shown to the right is the paragraph which introduced the fundamental problem because of the unqualified assertion that "an AP shall always be in State 3." Since these states are applied pairwise between stations able to communicate via the WM, one could interpret the text in D5.0 to allow situations that break the state machine shown in Figure 8, and/or that render several mandatory management frame transfer activities optional or unnecessary. As a participant in those discussions in July, 1996, I can assert that this was definitely NOT the intent of the change.** **What does appear to benefit from clarification, relative to the original D4.0 text, is that APs do not authenticate nor associate with other APs in order to form an ESS. The procedures for establishing and maintaining an ESS and the DSM connections**	**The following is the third (unindented) paragraph in clause 5.5:** An AP shall always be in State 3 with respect to other APs in the same ESS. An AP shall utilize station state for communication with other stations via the WM, but not for communication via the DS.~~It provides the logical connection to the DS and as a Point Coordinator (PC), it may provide a Contention Free Period (CFP).~~ **The following is the first portion of the second paragraph below Figure 8 in clause 5.5:** Class 1 frames (permitted from within States 1, 2 and 3): Control Frames: • RTS • CTS • ACK • CF-End • CF-End+Ack	

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					necessary within that ESS are defined to be outside the scope of this standard. **The 2nd and 3rd of the changes shown to the right pertain to the sole instance identified in a D4.0 letter ballot comment where frame types were assigned to the wrong class. If CF-End and CF-End+Ack are Class 3 frames, a point coordinator operating at an AP with no associated stations cannot send the CF-End which informs stations hearing that AP's Beacons that the CFP has ended. The result is to cause potentially sizeable periods during which the WM is unused because the stations receiving the Beacon have set their NAVs based on the CFDurationRemaining value in the CF parameter set element, and there is no CF-End to reset those NAVs. Because the CF-End and CF-End+Ack are informative control frames, they can be assigned to Class 1 without any compromise to the integrity or privacy of ESS communication. In addition, this reassignment is the simplest way, and only non-technical way, to resolve what is otherwise a coflict between Clause 5.5 and the PCF rules in Clause 9.3**	**The following is the third sub-paragraph under the unindented line beginning "Class 3 frames ..." near the end of clause 5.5:** ~~e)~~ Control frames: • ~~CF-END+ACK~~ • PS-Poll • ~~CF-End~~	
8	**5.5**	**db**	**T**	**n**	The following sentences were inserted into clause 5.5 at the July meeting: "An AP shall always be in State 3. " This requirement is simply incorrect. With this the MAC as specified can not work. Consider that the effect of this sentence is to place an AP permanently in state 3. The impact is tantamount to not having a state distinction for APs. As a result the system can not operate and may end up in deadlock. Consider: Since an AP would always be in state 3 from it's point of view, it will send any frame it wants to any other station. Now consider the "other" station - if it is	Delete the following text from clause 5.5 which was added during the July 1996 meeting: "An AP shall always be in State 3. It provides the logical connection to the DS and as a Point Coordinator (PC), it may provide a Contention Free Period (CFP)."	

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					not an AP it may be in state 1 or 2, if it receives a class x frame where X > it's believed state, it is required by the draft to respond with either a de-authentication or disassociation frame - both of which are intended to resolve a state mismatch between communicating stations. However since the AP is locked into state 3, the mismatch can not be resolved as the AP CAN NOT change out of state 3. Clearly the protocol is broken by the added sentence. I consider this to be such a serious problem that I first intended to vote NO on this confirmation ballot. It is only the serious nature of the problem that resulted in a "yes with comment" vote. Frankly I consider that this is so broken that the protocol can not be implemented in an operating manner with the AP in state 3 requirement. Therefore, I decided to have some faith that it will be fixed by the group ASAP and I decided to try to avoid the delay involved with processing a NO during the confirmation ballot. However, I can guarantee that this will be the subject of a NO technical vote as part of the Sponsor ballot. I am not sure what motivated the addition of the above change to clause 5.5 during the July meeting. After discussing the change with Mike Fischer, I believe it was an attempt to correct a perceived problem with the class of some CF frames - however, the language added (in my opinion) breaks more than it repairs and must be removed. If some CF frames must be class 1 instead of 3, then let's move them from one category to another to solve the original problem - but clearly, an AP can not be permanently locked into state 3.		
9	**7.1.1**	**mif**	**E**	**(na)**	**The technical intent of this paragraph on bit and octet**	Fields that are longer than a single octet	

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	(also see related issue with 8.2.5)				**ordering is correct: All fields other than CRC fields are to be depicted in the standard, and sent across the MAC/PLCP boundary in conformant implementations, least significant bit first; while CRC fields are sent most significant bit first. This ordering of CRC fields is consistent with CRC-32 in other 802 protocols (and is simpler to implement in most cases). However, the existing text is confusing (at best) because there is not an "FCS field" defined in Clause 7.** **The corrected text in the next column does not just replace "FCS field" with "CRC field" for 2 reasons:** **(1) While there is a CRC field defined in 7.1.3.6, there are other CRCs referenced in the standard, so this change might still be ambiguous.** **(2) The same issue exists with the ICV field defined in Clause 8.2.5, which is also a 4-octet field containing a CRC-32 polynomial remainder.** **By correcting the text as shown to the right, all of the CRC-related ordering issues are covered, without requiring enumeration of field names in a "conventions" sub-clause.** **(Note: This sub-clause pertains to MAC conventions, but the wording to the right is also correct when applied to all CRCs in the standard, because the PLCP CRC fields in all PHYs are transferred with the highest order coefficient first.)**	are depicted with the least significant octet on the left. The least significant bit of each octet is defined as bit 0 for that octet and is the leftmost bit of the octet. The sole ~~(~~exceptions~~-~~are fields containing Cyclic Redundancy Check (CRC) codes, which are transmitted starting with the coefficient of the highest order term~~the FCS field)~~. Fields that are less than one octet in length are ordered with the least significant bit to the left.	
10	**7.1.3.1.8**	**mif**	**E**	**(na)**	**There is an inconsistency between the blanket statement in 7.1.3.1.8 that "The More Data field shall be set to 0 in all other directed frames." and the allowable (may, not shall) use of the More Data bit in CF-Poll responses (explicitly in clause 9.3.3.5, indirectly in other PCF operation text). This inconsistency seems to have grown progressively since about D2.0, as independent, comment resolution work proceeded in parrallel for clauses 7, 9, and 11.**	The More Data field shall be one bit in length and shall be used to indicate to a STA in Power Save mode that more MSDUs are buffered for that STA at the AP. The More Data field shall be valid in directed Data Type frames transmitted by an AP to an STA in Power Save Mode. A value of 1 shall indicate that at least one buffered MSDU is present. The More Data field	

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					The principle that the More Data (then called just "More" because fragmentation had not yet been adopted) was useful for to-AP transfers during the contention free period has been around since the adoption of the proposals in submission 94-283 ("Liberating the More Function") in November, 1994. The text at that time, as well as at the time of the PCF cleanup adopted from submissions 95-140 and 95-150 in July, 1995, did not deal directly with clause 7 (then 4), because the exclusion of other instances of frames with More Data =1 did not yet appear there. The simplification of power save modes was occuring parallel during May and July, 1995, which had a side effect of removing some of the (implicit) supporting text in clause 11 (then 8). **At this point, the simplest, and most direct, way to fix this inconsistency is the text change shown to the right. This correction does not impact fundamental interoperability, because the additional allowed use is not mandatory ("may be set ..."), so a CF-Pollable STA that always transmitted More Data =0 would be able to communicate with an AP that interpreted and used More Data =1 in CF-Poll responses. The same situation pertains in the reverse case of an STA which sets More Data =1 and a point coordinator which does not behave differently when a CF-Poll respone includes More Data =1.**	may be set to a value of 1 in directed Data type frames transmitted by a CF-Pollable STA to the Point Coordinator (AP) in response to a CF-Poll to indicate that the STA has at least one additional buffered MSDU available for transmission in response to a subsequent CF-Poll. The More Data field shall be set to 0 in all other directed frames.	
11	**8.2.5** (also see related issue with 7.1.1)	**mif**	**E**	**(na)**	**Text was added to the 2nd paragraph of Clause 8.2.5 at the July 1996 meeting to clarify IV field bit ordering by referring explicitly to the ordering conventions in Clause 7.1.1. However, the added text did not address the ICV field ordering. This is a potentially major oversight, because the sole specification of the ICV field contents is the sentence "The WEP Integrity Check algorithm is CRC-32." (in clause 8.2.3, just above Figure 34).**	The WEP ICV = 32 bits. The ICV field shall contain a CRC-32 value, calculated and transferred in an identical manner as is described for the MAC CRC field in Clause 7.1.3.6, except that the ICV field value shall be calculated using only the contents of the Data field, as shown in Figure 35. The expanded MPDU shall include a 32 bit IV field immediately preceding the	

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					While the polynomial for "CRC-32" is well-known, there is a risk that different implementers will transfer the resulting check value in opposite order; as some think that the global bit ordering convention (LSb first) applies to the ICV field, while others think that the CRC bit ordering exception (coefficient of the highest order term first) applies to the ICV field. The stated rationale for using CRC-32 as the ICV algorithm, at the time of its adoption (at the August, 1995 meeting in Schamberg, Illinois) was that CRC-32 was a check code of adequate (if not excessive) quality that already had to be implemented at all stations for the MAC frame check CRC. If the specifics of ICV calculation (other than the range of octets of the MPDU which are included in the calculation) or transfer bit order are not identical to that used for the CRC field, this advantage of reusing CRC-32 is lost, for no apparent benefit. The corrected text makes this consistency explicit, referring to the relevant portions of Clause 7.	MPDU. This field shall contain three sub-fields: A three octet field that contains the initialization vector, a 2 bit key ID field and a 6 bit pad field. The ordering conventions defined in clause 7.1.1 apply to the IV fields and its sub-fields. The key ID field contents select one of four possible secret key values for use decrypting this MPDU. Interpretation of these bits is discussed further in section 8.3.2. The contents of the pad field shall be zero. The key ID occupies the two least significant bits of the last octet of the IV field, while the pad occupies the six most significant bits of this octet.	
12	**8.2.5 (figure 35)**	**mif**	**E**	**(na)**	**Text was added to the 2nd paragraph of Clause 8.2.5 at the July 1996 meeting to clarify IV field bit ordering by referring explicitly to the ordering conventions in Clause 7.1.1. However, Figure 35 was not updated to show the key ID bits at the left side of their octet, which is needed for consistency with the order stated in the text: "The key ID occupies the two least significant bits of the last octet of the IV field, while the pad occupies the six most significant bits of this octet."** **(I had to convert the drawing from its original format to "Word 6.0 Picture Object" before Word 6 for the Macintosh would let me edit the drawing. It may be perferable to make equivalnet changes in the original drawing rather than inserting the picture object to the right in place of the existing Figure 35.)**	Replacement for Figure 35 drawing: Figure is reproduced at the end of this document.	
13	**14.2.2.2**	**vh**	**e**		**The FHSS MIB variable BSSBaicRate and the MIB**	**Remove the last two sentences of the**	

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					variable CurrentHighSRate are mentioned here but are not defined in the respective clauses	clause and insert: BASIC rate is 1. HIGHSPEED is either 0 if not supported or 2 if the optional 2 Mbit/s PMD is implemented.	
14	15, annex	mt	E		submitted additional text changes: to add frequency specifications for France and Spain regulatory domains, to add text clarifying all references to regulatory domains, corrected table and figure references, replaced figure 90 eye diagram with original figure from D4 to fix print error, to update the direct sequence Pics proforma with regulatory domain additions.	Supplied as separate file	
15	11.3.1, 11.3.2, 11.3.3, 11.3.4, and 11.1.3.2 .1, also 8.1.1.2, 8.1.2.2, 8.1.2.3, 8.1.2.4	mif	t	(na)	There is nothing specified, either procedurally or in the MAC MIB to define an upper bound on the response time for Management frames other than Probes. There is a risk that conformant implementations might not be interoperable in the absence of of such a bound on the time before the responding station attempts to send Association Response frames, Reassociation Response frames, and Authentication frames (for the 2nd through last frames of any defined authentication sequence). The problem could occur in a case where an AP (or other responder STA in the case of Authentication sequences) is implemented in such a manner that it will never respond to one or more of these request types within the time that some STA implementation considers a reasonable maximum waiting time for such a response. For power-managed stations, waiting "forever" is a poor alternative. I strongly recommend that we apply the time limits already in the MIB for aMinProbeResponseTime and aMaxProbeResponseTime to the request/response exchanges for Association, Reassociation, and Authentication (for each step in the authentication	**Clause 11.3.1:** A station shall associate with an Access Point via the following procedure: a) The station shall transmit an Association Request to an Access Point with which that station is authenticated. b) If an Association Response frame is received with status value of "successful", the station is now associated with the Access Point. If the Association Request fails for any reason, the station may scan for a different Access Point with which to attempt association. The station may treat a period of at least aMaxProbeResponseTime duration following the transmission of an	

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					sequence), as well as for Probe (already specified in 11.1.3.2.2). There also needs to be a constraint that the AP (or responder in the case of Probes and Authentication sequences in an IBSS) shall make its first attempt to transmit the response within aMinProbeResponse of receipt of a valid request. The requirement for conformance & interoperability is to have an upper bound on the response time between successful receipt of the request and the first attempt to obtain control of the medium to transmit the response. With this time interval known, there is a basis for interoperability that allows local decisions at the stations as to how much longer (if any) to wait due to medium access delays, and whether to retry, look elsewhere, etc. **A similar comment on D4.0 was declined (with commenter's agreement) at the July, 1996 meeting because the solution proposed therein was found to be incomplete; not because there was a finding that the cited problem did not exist. While the risk of non-interoperability among "sane" STA and AP implementations is small, sooner or later this type of incompatibility will occur if a time bound is not defined in the standard.** **There are two approaches to fixing this problem. One is to add new MIB attributes with minimum response time limits for each various management frame exchanges. The other is to re-use an existing response time MIB attribute, such as aMaxProbeResponseTime. The proposed text changes to the right use the later approach, since to this commenter there does not seem to be any compelling reason to need different response time bounds for different of the exchanges. Note that all of the referenced responses pertain to the establishment of communication (Association, Reassociation,**	Association Request frame without receipt of any Association Response frames as a failure of the Association Request. **Clause 11.3.2:** An Access Point shall operate as follows in order to support the association of stations. a) Whenever an Association Request frame is received from a station and the station is authenticated, the Access Point shall transmit an Association Response with a status value as defined in clause 7.3.1.9~~7.3.1.8~~. The Access Point shall make its initial attempt to transmit the Association Response frame soon enough after receipt of the Association Request frame that a successful transmission attempt will be complete within aMaxProbeResponeTime of the receipt of the request. If the status value is "successful", the assigned Station ID to the station is included in the response. If the station is not	

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					Authentication), so the time bound selected does not impact the performance for MSDU delivery after communication is established.	authenticated, the Access Point shall transmit a Deauthentication frame to the station. b) When the Association Response with a status value of "successful" frame is acknowledged by the station, the station is considered to be associated with this Access Point. c) The AP shall inform the Distribution System of the association. **Clause 11.3.3:** A station shall reassociate with an Access Point via the following procedure: a) The station shall transmit a Reassociation Request frame to an Access Point. b) If a Reassociation Response frame is received with status value of "successful", the station is now associated with the Access Point. If the Reassociation Request fails for any reason, the station may scan for a different Access Point with which to attempt reassociation. The station may treat a period of at least	

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						aMaxProbeResponseTime duration following the transmission of a Reassociation Request frame without receipt of any Reassociation Response frames as a failure of the Reassociation Request. **Clause 11.3.4:** An Access Point shall operate as follows in order to support the reassociation of stations. a) Whenever a Reassociation Request frame is received from a station and the station is authenticated, the Access Point shall transmit a Reassociation Response with a status value as defined in clause 7.3.1.97.3.1.8. The Access Point shall make its initial attempt to transmit the Ressociation Response frame soon enough after receipt of the Ressociation Request frame that a successful transmission attempt will be complete within aMaxProbeResponeTime of the receipt of the request. -If the status value is "successful", the assigned Station ID to the station is included in	

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						the response. If the station is not authenticated, the Access Point shall transmit a Deauthentication frame to the station. b) When the Reassociation Response with a status value of "successful" frame is acknowledged by the station, the station is considered to be associated with this Access Point. c) The AP shall inform the Distribution System of the reassociation. **Clause 11.1.3.2.1:** Stations, subject to criteria below, receiving Probe Request frames shall respond with a Probe Response only if: (1) the SSID is the broadcast SSID or matches the specific SSID of the station, and (2) the Capability Information field of the Probe indicates a match on the current BSS type. Probe Responses shall be sent as directed frames to the address of the station that generated the Probe. The Probe Response shall be sent using normal frame transmission rules. The responding station shall make its initial attempt to transmit the Probe Response frame within aMinProbeResponeTime of the receipt of the Probe Request	

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						frame. An Access Point shall respond to all Probes meeting the criteria above. In an IBSS, the station that generated the last Beacon shall respond to a Probe. In each BSS there shall be at least one node that is awake at any given time to respond to Probes. The station that sent the most recent Beacon shall remain in the Awake state and shall be the only station to respond to Probes until a Beacon frame is received. If the station is an Access Point, it shall always remain in the Awake state and always respond to Probes. **In each of Clauses 8.1.1.2, 8.1.2.2, 8.1.2.3, and 8.1.2.4 add the following two paragraphs after the current text:** The station sending this frame shall make its initial transmission attempt soon enough after receipt of the preceding Authentication frame of this authentication sequence that a successful transmission attempt will be complete within aMaxProbeResponeTime of the receipt of the preceding frame. The station waiting to receive this frame may treat a period of at least aMaxProbeResponseTime duration following its transmission of the Authentication frame to which this is a response, without receipt of any	

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						Authentication frames as an unsuccessful authentication attempt.	

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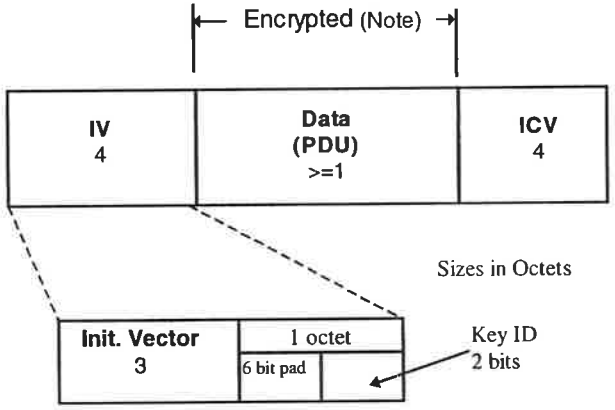

Note: The encipherment process has expanded the original MPDU by 8 Octets, 4 for the Initialization Vector (IV) field and 4 for the Integrity Check Value (ICV). The ICV is calculated on the Data field only.