Comment on 802.11/D5.0 **Name: _____** **Date: _____**

Seq. #	Clause number	your voter's ID code	Cmnt type E, e, T, t	Part of NO vote	Comment/Rationale	Recommended change	Disposition/Rebuttal
	6.1.2 5.4.3.3 8.x.x.x	MT	t		ref: MT_8 Clarification should be added to state what happens in the case of an access point which supports both 'clear mode' and WEP mode. Specifically: Can both modes be simultaneously supported? How are multicasts handled - sent twice once in the clear and again encrypted with WEP?	Both methods must be able to be simultaneously supported since WEP is optional and compliance criteria is in the clear. Therefore, in order to reduce overhead, the standard ought to state that all multicasts will be sent in the clear and that WEP stations must also receive and not reject these broadcasts based on WEP bit.	
	6.1.2 5.4.3.3 8.x.x.x	MT	T		ref: MT_9 A potential security problem exists in the case where a station can support both/several authentication methods. Consider the 'obvious' case of a wireless access point operating as a repeater. In this situation, the repeater associates to an access point connected to the distribution system using the WEP authentication method. A mobile station associates to the repeater using the 'clear' method. If the repeater forwards the packets from the mobile station using the WEP encryption, then a possible network infringement exists. A similar scenario is two stations associated to the same ESS. One station uses 'clear' and the other uses WEP. If both associated to the same AP, the AP must perform the clear-WEP or WEP-clear translation providing a potential breach. The same situation exists when they are associated to different	It seems there should be a strong line formed which allows only a single authentication method allowed by the standard. -or- At the very least (referring back to the previous comment) the user ought to be informed whether the standard allows for authentication method translation and the standard should provide the hooks for enabling or disabling this translation via a MIB variable. -or- remove authentication from the standard.	

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					APs.		
	6.1.3 9.8 Annex A.4.4.1 PC8.2	**GMG**	**T**	**Y**	**The MSDU ordering provisions have been included in this standard to provide an optional alternative for those applications that do require strictly ordering service, for those cases where the type of frame reordering introduced by the Power Management buffering provisions will cause a problem.** **The intent of this provision was to have an alternative available, but it would be an option that would not affect the normal implementation. However the PICS does not list this provision as optional.** **Therefore these sections should be deleted, or it should be made clear in the text that this is optional and not mandatory functionality.**	**Delete sections 6.1.3, 9.8 and PC8.2 in Annex. A.** **OR** **Mark this functionality as optional.**	
	6.1.3 9.8 Annex A.4.4.1	**MAF**	**T**	**Y**	**The strictly ordered service class was included in this standard to provide an alternative method to handle those cases where the type of frame reordering possible when using Power Management buffering might cause a problem for a higher layer protocol** **The intent of this provision was to provide a strictly ordered alternative for the applications which may require one, but not to make this facility mandatory for all implementations. Unfortunately, the cited sections and the PICS do not list this facility as optional.**	**Change PC8.2 from status "M" to status "O". Add a sentence to 6.1.3 and 9.8 to indicate the strictly ordered service is optional.** **Note that, in 6.2.1.3, the transmission status of "unavailable service class" is already specified to be returned if strictly ordered service is requested but is not available.**	
	6.1.3	**JMZ**	**t**		It is not at all clear to me that StrictlyOrdered service class precludes simultaneous use of power management. Since multidestination frames are buffered until the next DTIM, one implementation may push them ahead of directed MSDUs for a particular station, but it seems that multidestination traffic could always be deferred until after directed traffic has been delivered. Further, there is no way (in principle) for a STA to	Unless the group feels that having to buffer multidestination traffic longer is too onerous a burden to place on an AP, delete the restriction that forbids Power Management in stations receiving Strictly Ordered service data.	

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					know whether it is going to***receive*** StrictlyOrdered traffic so it can avoid the problem. Transmitting StrictlyOrdered frames is not troublesome.		
	6.1.3 7.1.3.1. 10 9.8	**MT**	**T**		**ref: MT_14** **The strictly order service class does not accomplish the necessary goals. The current definition allows for a STA only to order its transmitted packets. The requirement is that the received packets maintain order. What is needed is a method for a station to identify to all other stations of this requirement.** **See also MT_15**	**During the AUTHENTICATION process (since authentication is common among infrastructure and IBSS networks, and association is not), additional information such as capability and requirements should be exchanged. At this time, a STA requiring that its incoming frames be in order, would identify this requirement. In this way, all frames from each communicating station will be in order.**	
	6.1.3 7.1.3.1. 10	**MT**	**T**		**ref: MT_14** **The strictly order service class does not accomplish the necessary goals. The current definition allows for a STA only to order its transmitted packets. The requirement is that the received packets maintain order. What is needed is a method for a station to identify to all other stations of this requirement.** **See also MT_15**	**During the AUTHENTICATION process (since authentication is common among infrastructure and IBSS networks, and association is not), additional information such as capability and requirements should be exchanged. At this time, a STA requiring that its incoming frames be in order, would identify this requirement. In this way, all frames from each communicating station will be in order.**	
	6.1.3 9.8 Annex A.4.4.1 PC8.2	**WD**	**T**	**Y**	**The MSDU ordering provisions were included in this standard to provide an optional alternative method for those cases where the type of frame reordering introduced by the Power Management buffering provisions would yield a problem.** **Partly this statement was meant to end discussions on the question whether the re-ordering characteristics would comply to 802 frame reordering requirements.** **The intend of this provision was to have an alternative available, but it would be an option that**	**Delete sections 6.1.3, 9.8 and PC8.2 in Annex. A.** **OR** **Mark this functionality as optional.**	

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					would not affect the normal implementation. However the subject sections and the PICS does not list this provision as optional. Last thing I heard was that 802 is changing its requirement in this respect. Therefore these sections should be deleted, or at least it should be made clear in the text that this is optional and not mandatory functionality.		
	6.1.3 9.8 Annex A.4.4.1	**MAF**	**T**	**Y**	**The strictly ordered service class was included in this standard to provide an alternative method to handle those cases where the type of frame reordering possible when using Power Management buffering might cause a problem for a higher layer protocol.** **The intent of this provision was to provide a strictly ordered alternative for the applications which may require one, but not to make this facility mandatory for all implementations. Unfortunately, the cited sections and the PICS do not list this facility as optional.**	**Change PC8.2 from status "M" to status "O". Add a sentence to 6.1.3 and 9.8 to indicate the strictly ordered service is optional.** **Note that, in 6.2.1.3, the transmission status of "unavailable service class" is already specified to be returned if strictly ordered service is requested but is not available.**	
	6.2.1	**TLP**	e		There is no 6.2.2, so the tri-level 6.2.1 is unnecessary and misleading.	Remove the ".1" from the third level of each 6.2.1xxx reference.	
	6.2.1.2	**DLP**	**t**		**The reception status parameter indicates success or failure of the incoming frame(s). However, according to the "When Generated" section, frames are reported only when successful. What does failure mean?**	**Clarify the meaning of failure for the reception status parameter.**	
	6.2.1.2	**TLP**	e		"incoming" refers to an active process, not an historic event. More to the point, it does not refer to an "already incomed" frame (to carry the English mis-use to its logical conclusion).	Change "incoming" to "received".	
	6.2.1.3	**DLP**	**e**		**The standard 802 nomenclature of MAUNITDATA.confirm is replaced by MAUNITDATASTATUS.indication. Was this intentional?**	**As I do not know the rationale for this choice, no change may be required.**	

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	6.2.1.3	**DLP**	**e**		**The last paragraph of this section is repeated twice.**	**Delete the repeated paragraph.**	
	6.2.1.3	**JMZ**	**e**		Editing error	Delete extra copy of last paragraph	
	6.2.1.3	**TLP**	t		The error occurs when the specified limit would otherwise be exceeded.	Change "is reached" to "would otherwise be exceeded".	
	6.2.1.all	**TLP**	e		A uniform syntax should be adopted for enumeration constant values. In some places this standard uses concatenated words, each starting with a capital letter. In other places, sometimes in the same sentence, space-separated or hyphen-separated words without initial capitals are used. The same symbolic constant is sometimes referenced both ways.	Adopt a uniform representation for such symbolic enumeration constants. Concatenated words with an initial capital letter on each word and acronyms all in capital letters seems to be the dominant usage in this draft. Be consistent.	
	7.1.1	SB	E	N	Paragraph three of this clause refers to an FCS field whereas elsewhere in this clause this field is referred to as a CRC field. There is also a necessity to define a transmission order for the WEP ICV which is also a CRC-32.	Change to clause 7.1.1 either as follows, or to capture this intent: Fields that are longer than a single octet 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~~(except the FCS field)~~ Any field containing a Cyclic Redundancy Code (CRC) shall be an exception to this convention and shall be transmitted commencing with the coefficient of this highest order term. Fields that are less than one octet in length are ordered with the least significant bit to the left.	
	7.1.1 (also see related issue	**MAF**	**E**	**(na)**	**The technical intent of this paragraph on bit and octet ordering is correct: All fields other than CRC fields are to be depicted in the standard, and sent across the MAC/PLCP boundary in nonformant implementations, least significant bit first; while**	Fields that are longer than a single octet 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	

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	with 8.2.5)				**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.)**	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.	
	7.1.1, 7.3.1	SB	t	N	Clause 7.1.1 relies on the depiction of fields in diagrams to define the ordering convention: ~~~~~~~~~~ The protocol data units (PDUs) in the MAC sublayer are described as a sequence of fields in specific order. *Each figure in clause 7 depicts the fields as they appear in the MAC frame and in the order in which they are transferred, leftmost field first.* The sequence of octets in the fields of the MAC frame forms an octet stream at the MAC/PLCP sublayer boundary. *The leftmost octet in each field of the MAC*	Add figures for each of these fields (preferred) or define an ordering convention that does not depend on the depiction of fields in figures. Figures will not fit in this column, but I would be happy to provide them if this comment is accepted.	

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					frame is passed across the MAC/PLCP boundary first. *Fields that are longer than a single octet 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 (except the FCS field). Fields that are less than one octet in length are ordered with the least significant bit to the left.* ~~~~~~~~~ Problem is there are no pictures for any of the fixed fields in clause 7.3.1. Therefore the transmission order of the following is undefined: Authentication Algorithm Number Authentication Transaction Sequence Number Beacon Interval Capability Information Current AP Address Listen Interval Reason Code Station ID (SID) Status Code Timestamp		
	7.1.3.1. **6.1.3** **10** **9.8**	**MT**	**T**		**ref: MT_14** **The strictly order service class does not accomplish the necessary goals. The current definition allows for a STA only to order its transmitted packets. The requirement is that the received packets maintain order. What is needed is a method for a station to identify to all other stations of this requirement.** **See also MT_15**	**During the AUTHENTICATION process (since authentication is common among infrastructure and IBSS networks, and association is not), additional information such as capability and requirements should be exchanged. At this time, a STA requiring that its incoming frames be in order, would identify this requirement. In this way, all frames from each communicating station will be in order.**	

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	7.1.3.1.1	**MT**	**t**		**ref: MT_16** **In the case of a frame having been received with a revision level higher than is supportable, an acknowledgment will not be generated to the sending station (this is not stated but is assumed that no ACK will be sent since the frame is discarded and no indication given to LLC layer). In this case, the sending station will consume unnecessary bandwidth with retries.** **The standard should allow for a more graceful method.** **In the case of a future access point which must simultaneously support multiple versions a cleaner method is required**	**One method with minimal impact to add a Reason Code to clause 7.3.1.7 which states Unrecognized Version or Version Too High and issue a DISASSOCIATION.request to the sending station.** **Another method is to require that all stations negotiate (via the above reason code) the highest common supported version level during association. Then a table must be maintained for each association and assurance that all data is sent at this level.** **For the case of the access point, especially wheremulticasts and control and management frames are concerned, the access point must insure that these packets are sent at the lowest common revision level of all associated stations.** **A further refinement (and probably necessary) is to guarantee that ALL FUTURE control and management frames are sent at the current revision level, otherwise old equipment will notinteroperate with the newer. (if an RTS/CTS exchange is sent at a higher version level, and they are dropped, so much for virtual CCA, etc.)**	
	7.1.3.1.1	**TLP**	e		The existing wording is inadequate to handle the relationships among revisions of this standard.	Change "between a new revision and this revision" to "between a new revision and a prior revision".	

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	7.1.3.1.3 7.1.3.1.4 8.x.x.x	MT	T		ref: MT_17 The TO_DS and FROM_DS bits should be allowed to be used in control packets. In particular, these bits could identify a wireless access point which is operating in a repeater function. The repeater upon association to another access point could identify itself as part of the (wireless) distribution system. In this fashion, a Network administrator can establish a security level for the distribution system (such as requiring all data to be WEP encrypted) but stations can be allowed to associate to individual APs using the 'clear mode'. In this case, the AP could filter those 'clear mode' packet requests from the distribution system. Therefore, two stations can communicate in the clear to each other (using the services of the access point and/or distribution system) without having access to any other data from the distribution system.	AUTHENTICATION.request, ASSOCIATION.request frames from a repeater (or Wireless AP) should set the FROM_DS bit to identify themselves as such. Appropriate authentication methods (those as established for the distribution system by a system administrator) can be used. TO FM meaning 0 0 normal STA operation 0 1 repeater associations Appropriate hooks should be provided to allow various levels of security or the standard could simply adopt a single authentication method.	
	7.1.3.1.3 7.1.3.1.4 8.x.x.x	MT	t		ref: MT_18 The use of these bits during the association process (ref MT_17) would enable automatic distribution systems functions. By not defining these bits this way, the standard cannot support interoperability among vendors supplying repeaters. Each vendor will have to resort to proprietary packet exchanges to establish the station as part of the distribution system. I point out the situation of a repeater which has associated one or more power save stations associated to it. The packets must be sent to the repeater for queuing and delivery. Without the standard specifying a way to identify a wireless distribution system component, all this becomes proprietary or	define the bits to be allowed in AUTHENTICATION and ASSOCIATION request frames. Further refinements could be the addition of a required authentication method (as establish via MIB variables of a system administrator, for instance) and automatic conveyance of station capability information.	

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					left to another consortium such as the IAPP		
	7.1.3.1.4 7.1.3.1.3 8.x.x.x	MT	T		ref: MT_17 The TO_DS and FROM_DS bits should be allowed to be used in control packets. In particular, these bits could identify a wireless access point which is operating in a repeater function. The repeater upon association to another access point could identify itself as part of the (wireless) distribution system. In this fashion, a Network administrator can establish a security level for the distribution system (such as requiring all data to be WEP encrypted) but stations can be allowed to associate to individual APs using the 'clear mode'. In this case, the AP could filter those 'clear mode' packet requests from the distribution system. Therefore, two stations can communicate in the clear to each other (using the services of the access point and/or distribution system) without having access to any other data from the distribution system.	AUTHENTICATION.request, ASSOCIATION.request frames from a repeater (or Wireless AP) should set the FROM_DS bit to identify themselves as such. Appropriate authentication methods (those as established for the distribution system by a system administrator) can be used. TO FM meaning 0 0 normal STA operation 0 1 repeater associations Appropriate hooks should be provided to allow various levels of security or the standard could simply adopt a single authentication method.	
	7.1.3.1.4 7.1.3.1.3 8.x.x.x	MT	t		ref: MT_18 The use of these bits during the association process (ref MT_17) would enable automatic distribution systems functions. By not defining these bits this way, the standard cannot support interoperability among vendors supplying repeaters. Each vendor will have to resort to proprietary packet exchanges to establish the station as part of the distribution system. I point out the situation of a repeater which has associated one or more power save stations associated to it. The packets must be sent to the repeater for queuing and delivery. Without the standard specifying a way to identify a wireless distribution	define the bits to be allowed in AUTHENTICATION and ASSOCIATION request frames. Further refinements could be the addition of a required authentication method (as establish via MIB variables of a system administrator, for instance) and automatic conveyance of station capability information.	

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					system component, all this becomes proprietary or left to another consortium such as the IAPP		
	7.1.3.1.6	**SD**	**t**		**Nothing is said about the Control Type frame.**	**Add « Control Type frame Retry field is always set to zero.»**	
	7.1.3.1.7	**TLP**	e		The second occurrence of the word "shall" in each of these sentences is incorrect. "Shall" is legislative; "will" is predictive. This sentence and the following sentence make predictions. Therefore "will" is correct in each second occurrence (which is a rare instance in a standard).	Change "shall" to "will" when describing the state in which the station is anticipated to be at some future time. (three occurrences)	
	7.1.3.1.8	**AS**	**e**	**y**	**This clause implies that the more data field is only set for directed frames when more MSDUs are present.**	**Change the third sentence in the second paragraph to: "A value of 1 shall indicate that at least one additional buffered MSDU or MMPDU is present for the same STA."**	
	7.1.3.1.8	**MAF**	**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 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**	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 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.	

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					appear there. The simplification of power save modes wasoccuring 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.**		
	7.1.3.1.8 2nd ¶	**TLP**	e		The same wording is needed in both sentences — either buffered broadcast/multicast, or simply broadcast/multicast. I can't tell which was originally intended. However, the use of the word "buffered" may require prefatory explanation, so deletion seems to be the preferred choice.	Change the two paragraphs to use consistent wording.	
	7.1.3.2	**KC**	**t**	**Y**	**In Table 3. "(in microseconds from end of this frame)" the "end of this frame" is not defined and gives no actual physical event from which to start counting time.**	**specify the event that is the timing marker**	
	7.1.3.3	**JMZ**	**e**		The wording is unclear in the last sentence	Change "in the RTS frame" to "in the corresponding RTS frame"	
	7.1.3.3.3	**TLP**	e		You cannot "ensure a high probability".	Change "ensure" to "provide".	
	7.1.3.3.7	**TLP**	e		This sentence should end similarly to Source Address above.	Either the text "in the transmitter address" should be added at the end of the paragraph, or the text "in the source address" should be deleted from the end of the prior paragraph.	
	7.1.3.4	**JMZ**	**e**		Figure 14 is incorrect	"B1" should be "B15"	

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	7.2.1.4 7.2.1.5 7.2.1.6	**TLP**	e		Figures 20 through 22	This picture and the following should be rescaled to 80% x 80%, as are the previous ones.	
	7.2.2	SB	e	N	Poor use of the Queen's English!	Data frames sent during the contention period shall use the Data Subtypes: Data, or Null Function. Data frames sent by, or in response to polling by, the Point Coordinator during the contention free period shall use the appropriate ~~ones of the~~ Data Subtypes based upon the usage rules	
	7.2.2	**TLP**	e		The acronym IFF is unacceptable.	Change "IFF" to "when".	
	7.2.2	**TLP**	e		first bullet, first item is incorrect	Change "Data+CF-Ack" to "Data+CF-Poll".	
	7.2.3 7.2.3.9 7.3.2 7.3.2.3	**WD**	**T**	**Y**	Comment: For Direct Sequence, additional channel number information is needed in BEACON and PROBE-Response frames. Rationale; The defined channels are very overlapping, with a frequency spacing of only 5 MHz. Under normal conditions a receiver listening on channel x will receive a frame transmitted on channel (x +/- 1) (5 MHz apart) or even (x +/- 2) (10 MHz apart) without an error (for short messages). This is a problem in association procedures (roaming, start up). The receiver can not determine what frequency the received frame was transmitted, which may subsequently result in wrong channel settings. To solve this the transmitter channel must be made known to the receiver in one way or the other. The most straight forward is to define a DS Parameter Set with channel # information in BEACON and PROBE-Response frames, which is in line with the distribution of the channel information in FH implementations. In this Parameter set also the channels that are actually used in an ESS can be defined, this gives a roaming station the possibility to scan a smaller set of channels.	7.2.3.1. Change table 5 6: DS/FH Parameter Set Change note-1: Notes: 1. The DS/FH Parameter Set information element shall only be present within Beacon Frames generated by STAs using Direct Sequence or Frequency Hopping Physical Layers respectively. Section 7.2.3.9, Change Table 12 Entry 6: DS/FH Parameter Set 1. The DS/FH Parameter Set information shall only be present within Probe Response Frames generated by STAs using Direct Sequence or Frequency Hopping Physical Layers respectively.	

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						Section 7.3.2 Add DS Parameter set and give it element ID code 3, and move the subsequent numbers as applicable. Add new section behind 7.3.2.3a 7.3.2.3.a DS Parameter Set The DS Parameter Set element shall contain the set of parameters necessary for channel number information. The information field shall contain Current Channel number and the numbers of the channels used in an ESS. Element ID | Length | Current Channel | ESS Ch Number | octets 1 1 1 0 - 12 Figure 27a, DS Parameter Set Element Format The Current Channel field shall be 1 octets. The ESS Ch Number identifies the Channel numbers that are used in a ESS. The field shall be between 0 and 12 octets. If no ESSCh Number is specified then all Channels are used. If the value of the first octet of the ESS Ch Number field is 0 then only the Current channel is used.	
	7.2.3.10 **7.3.1.1** **8.1.2**	**GMG**	**T**	**Y**	**Given that Authentication is considered useless in an environment which does not provide confidentiality, because without confidentiality, a station can always pretend to be an other station by using its address as a false identity source address.**	**Delete the Shared Key Authentication method from the standard, or make it optional also for stations supporting WEP . Change 8.1 as follows:**	

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					The "Shared Key Authentication" method should be deleted from the standard, because it does not provide any additional authentication level above the "Open System Authentication" with WEP enabled for data transfers. **Frames that do not have the proper WEP key (ICV is wrong) are not forwarded to the DS.** **The fact that the stations have the proper WEP key that has been distributed (supposedly in a secure way, which is outside the scope of this standard) is an implicit form of authentication.** **Shared Key Authentication depends on both sides having the same WEP key. This is exactly equivalent to the implicit authentication that is achieved with the "Open Authentication", combined with WEP on, for all data traffic.** **This does also rely on both sides having the same correct key.** **Therefore there is no justification for the additional complexity, and or the considerable additional delay during reassociation, or the complexity of the pre-authentication.**	802.11 currently defines only one ~~defines two~~ subtype~~s~~ of authentication service; "Open System" ~~and "Shared Key"~~. The subtype invoked is indicated in the body of authentication management frames. Thus authentication frames are self identifying with respect to authentication algorithm. **Therefore delete section 8.1.2 entirely, or make it explicitly optional in section 8.1.2.** **Change Table 14 by deleting all Shared Key entries.** **Change section 7.3.1.1 as follows:** Authentication Algorithm Number = 0: Open System ~~Authentication Algorithm Number = 1: Shared Key~~ All other values of Authentication Number shall be reserved.	
	7.2.3.2	**TLP**	e		This subclause needs to have wording parallel to the following clauses, as indicated.	Change to read "The Frame Body of a Management Frame of Subtype ATIM shall be null."	
	7.2.3.9 **7.2.3** **7.3.2** **7.3.2.3**	**WD**	**T**	**Y**	Comment: For Direct Sequence, additional channel number information is needed in BEACON and PROBE-Response frames. Rationale;	7.2.3.1. Change table 5 6: DS/FH Parameter Set Change note-1:	

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					The defined channels are very overlapping, with a frequency spacing of only 5 MHz. Under normal conditions a receiver listening on channel x will receive a frame transmitted on channel (x +/- 1) (5 MHz apart) or even (x +/- 2) (10 MHz apart) without an error (for short messages). This is a problem in association procedures (roaming, start up). The receiver can not determine what frequency the received frame was transmitted, which may subsequently result in wrong channel settings. To solve this the transmitter channel must be made known to the receiver in one way or the other. The most straight forward is to define a DS Parameter Set with channel # information in BEACON and PROBE-Response frames, which is in line with the distribution of the channel information in FH implementations. In this Parameter set also the channels that are actually used in an ESS can be defined, this gives a roaming station the possibility to scan a smaller set of channels.	Notes: 1. The DS/FH Parameter Set information element shall only be present within Beacon Frames generated by STAs using Direct Sequence or Frequency Hopping Physical Layers respectively. Section 7.2.3.9, Change Table 12 Entry 6: DS/FH Parameter Set 1. The DS/FH Parameter Set information shall only be present within Probe Response Frames generated by STAs using Direct Sequence or Frequency Hopping Physical Layers respectively. Section 7.3.2 Add DS Parameter set and give it element ID code 3, and move the subsequent numbers as applicable. Add new section behind 7.3.2.3a 7.3.2.3.a DS Parameter Set The DS Parameter Set element shall contain the set of parameters necessary for channel number information. The information field shall contain Current Channel number and the numbers of the channels used in an ESS. Element ID | Length | Current Channel | ESS Ch Number | octets 1 1 1 0 - 12	

Seq. #	Clause number	your voter's ID code	Cmnt type E, e, T, t	Part of NO vote	Comment/Rationale	Recommended change	Disposition/Rebuttal
	7.3.2 7.3.2.3				number information is needed in BEACON and PROBE-Response frames. Rationale; The defined channels are very overlapping, with a frequency spacing of only 5 MHz. Under normal ~~conditions a receiver listening on channel x will receive~~ a frame transmitted on channel (x +/- 1) (5 MHz apart) or even (x +/- 2) (10 MHz apart) without an error (for short messages). This is a problem in association procedures (roaming, start up). The receiver can not determine what frequency the received frame was transmitted, which may subsequently result in wrong channel settings. To solve this the transmitter channel must be made known to the receiver in one way or the other. The most straight forward is to define a DS Parameter Set with channel # information in BEACON and PROBE-Response frames, which is in line with the distribution of the channel information in FH implementations. In this Parameter set also the channels that are actually used in an ESS can be defined, this gives a roaming station the possibility to scan a smaller set of channels.	6. DS/FH Parameter Set Notes: 1. The DS/FH Parameter Set information element shall only be present within Beacon Frames generated by STAs using Direct Sequence or Frequency Hopping Physical Layers respectively. Section 7.2.3.9, Change Table 12 Entry 6: DS/FH Parameter Set 1. The DS/FH Parameter Set information shall only be present within Probe Response Frames generated by STAs using Direct Sequence or Frequency Hopping Physical Layers respectively. Section 7.3.2 Add DS Parameter set and give it element ID code 3, and move the subsequent numbers as applicable. Add new section behind 7.3.2.3a 7.3.2.3.a DS Parameter Set The DS Parameter Set element shall contain the set of parameters necessary for channel number information. The information field shall contain Current Channel number and the numbers of the channels used in an ESS. Element ID | Length | Current Channel | ESS Ch Number | octets 1 1 1 0 - 12 Figure 27a, DS Parameter Set Element Format The Current Channel field shall be 1 octets. The ESS Ch Number identifies the Channel numbers that are used ina ESS. The field shall be between 0 and 12 octets. If no ESSCh Number is	

Comment on 802.11/D5.0 **Name: _____** **Date: _____**

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	7.3.1	SB	t	N	Clause 7.1.1 relies on the depiction of fields in diagrams to define the ordering convention	Add figures for each of these fields (preferred) or define an ordering convention that does not depend on the depiction of fields in figures.	
	7.3.1.1 8.1.2 7.2.3.10	**GMG**	**T**	**Y**	**Given that Authentication is considered useless in an environment which does not provide confidentiality, because without confidentiality, a station can always pretend to be an other station by using its address as a false identity source address.** **The "Shared Key Authentication" method should be deleted from the standard, because it does not provide any additional authentication level above the "Open System Authentication" with WEP enabled for data transfers.** **Frames that do not have the proper WEP key (ICV is wrong) are not forwarded to the DS.** **The fact that the stations have the proper WEP key that has been distributed (supposedly in a secure way, which is outside the scope of this standard) is an implicit form of authentication.** **Shared Key Authentication depends on both sides having the same WEP key. This is exactly equivalent to the implicit authentication that is achieved with the "Open Authentication", combined with WEP on, for all data traffic.** **This does also rely on both sides having the same correct key.** **Therefore there is no justification for the additional complexity, and or the considerable additional delay during reassociation, or the complexity of the pre-authentication.**	**Delete the Shared Key Authentication method from the standard, or make it optional also for stations supporting WEP .** **Change 8.1 as follows:** 802.11 currently defines only ~~one~~ defines two subtypes ~~-~~ of authentication service; "Open System" ~~and "Shared Key~~". The subtype invoked is indicated in the body of authentication management frames. Thus authentication frames are self identifying with respect to authentication algorithm. **Therefore delete section 8.1.2 entirely, or make it explicitly optional in section 8.1.2.** **Change Table 14 by deleting all Shared Key entries.** **Change section 7.3.1.1 as follows:** Authentication Algorithm Number = 0: Open System ~~Authentication Algorithm Number = 1: Shared Key~~ All other values of Authentication Number shall be reserved.	
	7.3.2	**WD**	**T**	**Y**	Comment: For Direct Sequence, additional channel	7.2.3.1. Change table 5	

The protocol data units (PDUs) in the MAC sublayer are described as a sequence of fields in specific order. *Each figure in clause 7 depicts the fields as they appear in the MAC frame, and in the order in which they are transferred, leftmost field first.*

The sequence of octets in the fields of the MAC frame forms an octet stream at the MAC/PLCP sublayer boundary. *The leftmost octet in each field of the MAC frame is passed across the MAC/PLCP boundary first.*

Fields that are longer than a single octet 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 (except the FCS field). Fields that are bytes that are one octet in length are ordered with the least significant bit to the left.

Problem is there are no pictures for any of the fixed fields in clause 7.3.1. Therefore the transmission order of the following is undefined.

Authentication Algorithm Number
Authentication Transaction Sequence Number
Beacon Interval
Capability Information
Current AP Address
Listen Interval
Reason Code
Station ID (SID)
Status Code
Timestamp

Seq. #	Clause number	your voter's ID code	Cmnt type E, e, T, t	Part of NO vote	Comment/Rationale	Recommended change	Disposition/Rebuttal
	7.2.3 **7.2.3.9** **7.3.2.3**				number information is needed in BEACON and PROBE-Response frames. Rationale; The defined channels are very overlapping, with a frequency spacing of only 5 MHz. Under normal conditions a receiver listening on channel x will receive a frame transmitted on channel (x +/- 1) (5 MHz apart) or even (x +/- 2) (10 MHz apart) without an error (for short messages). This is a problem in association procedures (roaming, start up). The receiver can not determine what frequency the received frame was transmitted, which may subsequently result in wrong channel settings. To solve this the transmitter channel must be made known to the receiver in one way or the other. The most straight forward is to define a DS Parameter Set with channel # information in BEACON and PROBE-Response frames, which is in line with the distribution of the channel information in FH implementations. In this Parameter set also the channels that are actually used in an ESS can be defined, this gives a roaming station the possibility to scan a smaller set of channels.	6: DS/FH Parameter Set Change note-1: Notes: 1. The DS/FH Parameter Set information element shall only be present within Beacon Frames generated by STAs using Direct Sequence or Frequency Hopping Physical Layers respectively. Section 7.2.3.9, Change Table 12 Entry 6: DS/FH Parameter Set 1. The DS/FH Parameter Set information shall only be present within Probe Response Frames generated by STAs using Direct Sequence or Frequency Hopping Physical Layers respectively. Section 7.3.2 Add DS Parameter set and give it element ID code 3, and move the subsequent numbers as applicable. Add new section behind 7.3.2.3a 7.3.2.3.a DS Parameter Set The DS Parameter Set element shall contain the set of parameters necessary for channel number information. The information field shall contain Current Channel number and the numbers of the channels used in an ESS. Element ID | Length | Current Channel	

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	7.2.3.9 7.3.2.3				number information is needed in BEACON and PROBE-Response frames. Rationale; The defined channels are very overlapping, with a frequency spacing of only 5 MHz. Under normal ~~conditions a receiver listening on channel x will receive~~ a frame transmitted on channel (x +/- 1) (5 MHz apart) or even (x +/- 2) (10 MHz apart) without an error (for short messages). This is a problem in association procedures (roaming, start up). The receiver can not determine what frequency the received frame was transmitted, which may subsequently result in wrong channel settings. To solve this the transmitter channel must be made known to the receiver in one way or the other. The most straight forward is to define a DS Parameter Set with channel # information in BEACON and PROBE-Response frames, which is in line with the distribution of the channel information in FH implementations. In this Parameter set also the channels that are actually used in an ESS can be defined, this gives a roaming station the possibility to scan a smaller set of channels.	6. DS/FH Parameter Set Notes: 1. The DS/FH Parameter Set information element shall only be present within Beacon Frames generated by STAs using Direct Sequence or Frequency Hopping Physical Layers respectively. Section 7.2.3.9, Change Table 12 Entry 6: DS/FH Parameter Set 1. The DS/FH Parameter Set information shall only be present within Probe Response Frames generated by STAs using Direct Sequence or Frequency Hopping Physical Layers respectively. Section 7.3.2 Add DS Parameter set and give it element ID code 3, and move the subsequent numbers as applicable. Add new section behind 7.3.2.3a 7.3.2.3.a DS Parameter Set The DS Parameter Set element shall contain the set of parameters necessary for channel number information. The information field shall contain Current Channel number and the numbers of the channels used in an ESS. Element ID | Length | Current Channel | ESS Ch Number | octets 1 1 1 0 - 12 Figure 27a, DS Parameter Set Element Format The Current Channel field shall be 1 octets. The ESS Ch Number identifies the Channel numbers that are used in a ESS. The field shall be between 0 and 12 octets. If no ESSCh Number is	

Comment on 802.11/D5.0 **Name: _____** **Date: _____**

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	7.3.2.1	**AS**	**t**	**y**	**There appears to be no good technical reason to pad TIM elements so that they are an even number of bytes.**	**Remove the restriction on N1 and N2 being even.**	
	7.3.2.1	**TLP**	e		It would be useful to have a table or figure illustrating the Bitmap Control octetsubformat.	Add such a table or figure.	
	7.3.2.3	**WD**	**T**	**Y**	Comment: For Direct Sequence, additional channel number information is needed in BEACON and PROBE-Response frames. Rationale; The defined channels are very overlapping, with a frequency spacing of only 5 MHz. Under normal conditions a receiver listening on channel x will receive a frame transmitted on channel (x +/- 1) (5 MHz apart) or even (x +/- 2) (10 MHz apart) without an error (for short messages). This is a problem in association procedures (roaming, start up). The receiver can not determine what frequency the received frame was transmitted, which may subsequently result in wrong channel settings. To solve this the transmitter channel must be made known to the receiver in one way or the other. The most straight forward is to define a DS Parameter Set with channel # information in BEACON and PROBE-Response frames, which is in line with the distribution of the channel information in FH implementations. In this Parameter set also the channels that are actually used in an ESS can be defined, this gives a roaming station the possibility to scan a smaller set of channels. **In addition to the association process being standardized, a wireless access point must have a means to share its 'association table' with access point higher on the network tree. Without the sharing of associated station information up the tree, it is not possible for packets to be efficiently routed.**	7.2.3.1. Change table 5 6: DS/FH Parameter Set Change note-1: Notes: 1. The DS/FH Parameter Set information element shall only be present within Beacon Frames generated bySTAs using Direct Sequence or Frequency Hopping Physical Layersrespectively. So: Section 7.2.3.9, Change Table 12 Entry 6: DS/FH Parameter Set 1. The DS/FH Parameter Set information shall only be present within Probe Response Frames generated bySTAs using Direct Sequence orFrequency Hopping Physical Layersrespectively. Section 7.3.2 Add DS Parameter set and give it element ID code 3, and move the subsequent numbers as applicable. Add new section behind 7.3.2.3a 7.3.2.3.a DS Parameter Set The DS Parameter Setelement shall contain the set of parameters necessary for channel number information. The information field shall contain Current Channel number and the numbers of the channels used in an ESS.	
	7.3.2.3, 7.3.2.9, 13.1.4.4, 13.1.4.4.4, 13.1.4.4.5, 14.8.2	SB	t	N	Dwell time related MIB attributes are a complete mess in terms of units. 13.1.4.4 definesaMaxDwellTime and aCurrentDwellTime in nanoseconds (!), the default values in 14.8.2 are in milliseconds and the comparison to a TSF timer value in 11.1.5 is to a time in microseconds. Lastly the value for the dwell time in the FH Parameter set element (7.3.2.9) is in microseconds.	Please can we have some order here. It would be nice if theaMaxDwellTime and aCurrentDwellTime were inKus since this is what a number of other MAC attributes such asaBeaconPeriod is in. It also ties up with the FH parameter set. It also makes the TSF time comparison easy (hence the beacon stuff). So: Section 7.2.3.9, Change Table 12 aMAXDwellTime should be inKus and be a default value of 390 (399.360ms) aCurrentDwellTime should be inKus an be a default value of 20.	
	7.x.x.x	**MT**	**T**		**referencing MT_17 and MT_18, it is noted that support of a wireless distribution must be considered proprietary unless appropriate steps are taken here.**		
	8.1	**JMZ**	**t**		It is conceivable that a STA may wish to require Shared Key Authentication from certain stations, but be willing to accept Open System Authentication from others. Or	Clarify this point in 8.1, 8.1.1, 8.1.2, and 11.4.1.11 (change aAuthenticationType to	

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					that (for some compatibility reason) it might wish to allow either. I think the standard should not restrict whether both can be in operation at the same time.	aAuthenticationTypes).	
	8.1.1	**JMZ**	**e**		Typo	Need a period after "Authentication"	
	8.1.1	**JD**	**e**		**typo**	Open system authentication is the simplest of the available authentication algorithms. Essentially it is a null authentication algorithm. Any station that requests authentication with this algorithm becomes authenticated if aAuthenticationAlgorithm at the recipient station is set to allow Open System Authentication Open system authentication is the default authentication algorithm.	
	8.1.1.2, 8.1.2.2, 8.1.2.3, 8.1.2.41 1.3.1, 11.3.2, 11.3.3, 11.3.4, and 11.1.3.2 .1, **also**	**MAF**	**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**	**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.	

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					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 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**	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 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	

Seq. #	Clause number	your voter's ID code	Cmnt type E, e, T, t	Part of NO vote	Comment/Rationale	Recommended change	Disposition/Rebuttal
					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, Authentication), so the time bound selected does not impact the performance for MSDU delivery after communication is established.	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 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.	

Seq. #	Clause number	your voter's ID code	Cmnt type E, e, T, t	Part of NO vote	Comment/Rationale	Recommended change	Disposition/Rebuttal
						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 aMaxProbeResponseTimeduration following the transmission of a ReassociationRequest frame without receipt of anyReassociationResponse 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	

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						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 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:**	

Seq. #	Clause number	your voter's ID code	Cmnt type E, e, T, t	Part of NO vote	Comment/Rationale	Recommended change	Disposition/Rebuttal
						Stations, subject to criteria below, receiving ProbeRequest 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 aMinProbeResponeTimeof the receipt of the Probe Request 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**	

Seq. #	Clause number	your voter's ID code	Cmnt type E, e, T, t	Part of NO vote	Comment/Rationale	Recommended change	Disposition/Rebuttal
						after the current text: The station sending this frameshall make its initial transmission attempt soon enough after receipt of the preceding Authenticationframe of this authentication sequence that a successful transmission attempt will be complete within aMaxProbeResponeTimeof the receipt of the preceding frame. The station waiting to receive this frame may treat a period of at least aMaxProbeResponseTimeduration followingits transmission of the Authentication frame to which this is a response, without receipt of any Authentication frames as an unsuccessful authentication attempt.	
	8.1.2 **7.2.3.10** **7.3.1.1**	**GMG**	**T**	**Y**	**Given that Authentication is considered useless in an environment which does not provide confidentiality, because without confidentiality, a station can always pretend to be an other station by using its address as a false identity source address.** **The "Shared Key Authentication" method should be deleted from the standard, because it does not provide any additional authentication level above the "Open System Authentication" with WEP enabled for data transfers.** **Frames that do not have the proper WEP key (ICV is**	**Delete the Shared Key Authentication method from the standard, or make it optional also for stations supporting WEP .** **Change 8.1 as follows:** 802.11 currently defines only one~~defines two~~ subtype~~s~~ of authentication service; "Open System" ~~and "Shared Key"~~. The subtype invoked is indicated in the body of authentication management frames.	

Seq. #	Clause number	your voter's ID code	Cmnt type E, e, T, t	Part of NO vote	Comment/Rationale	Recommended change	Disposition/Rebuttal
					wrong) are not forwarded to the DS. **The fact that the stations have the proper WEP key that has been distributed (supposedly in a secure way, which is outside the scope of this standard) is an implicit form of authentication.** **Shared Key Authentication depends on both sides having the same WEP key. This is exactly equivalent to the implicit authentication that is achieved with the "Open Authentication", combined with WEP on, for all data traffic.** **This does also rely on both sides having the same correct key.** **Therefore there is no justification for the additional complexity, and or the considerable additional delay during reassociation, or the complexity of the pre-authentication.**	Thus authentication frames are self identifying with respect to authentication algorithm. **Therefore delete section 8.1.2 entirely, or make it explicitly optional in section 8.1.2.** **Change Table 14 by deleting all Shared Key entries.** **Change section 7.3.1.1 as follows:** Authentication Algorithm Number = 0: Open System ~~Authentication Algorithm Number = 1: Shared Key~~ All other values of Authentication Number shall be reserved.	
	8.1.2.3	**TLP**	E		What is encrypted? Which fields? DA? CRC/FCS? As currently stated any implementation decision is supportable, but implementations will not be interoperable unless all implementors accidentally make the same choices. <not likely>	Specify the extent of encryption — the first through last fields encrypted.	
	8.2.1	**TLP**	e		Disambiguate the references to 802.11.	Change to read " The 802.11 standards committee specifically recommends against running an 802.11 LAN with privacy but without authentication."	
	8.2.2	**TLP**	e		Get the name of the U.S.gevernment agency correct and the English language clear.	Change to read "the chances of approval, by the U.S. Department of Commerce, of export from the U.S. of products containing a WEP implementation".	
	8.2.3	**DSM**	**E**		**You should describe this algorithn using the term**	**Add a sentence indicating this is a**	

Seq. #	Clause number	your voter's ID code	Cmnt type E, e, T, t	Part of NO vote	Comment/Rationale	Recommended change	Disposition/Rebuttal
					given in a text such as Schneier's Applied Cryptography	**"Stream" cipher.**	
	8.2.3 fig 33	**SD**	**e**		**The label «(MAX_MSG_SZ)» is useless.**	**Remove it from figure.**	
	8.2.3	**SD**	**t**		**The IV has to be transmitted in the clear to allow self-synchronization in case some MPDUs are lost.**	**Modify the sentence: «The IV may be transmitted in the clear since it does not provide an attacker with any information about the secret key.» in : «The IV is transmitted in the clear since it does not provide an attacker with any information about the secret key and allows self-synchronization.»**	
	8.2.3 fig 34	**SD**	**e**		**Figure has to be improved.**	**Move the arrow head to the end of the lines, recenter the label « Integrity Algorithm», add the label « Seed » as in figure 33.**	
	8.2.3	**TLP**	t		The statement would be true only for symmetric-key systems. But the concept and need for symmetric keys has not yet been specified as necessary or even relevant. The easiest way to fix this problem is the change the text as shown.	Change to read "note that if the same key is an be used for encryption and decryption then $D_k(E_k(P)) = P$"	
	8.2.4	**rdh**	**T**	**y**	This section requires the use of RC4. RC4 requires a license from RSA Data Security, Inc. I believe that stream ciphers withoutlicesne requirements are available. Also, the RC4 algorithm specification is not public.	I suggest that the IEEE 802.11 working group select a public, license free algorithm. Some alternatives inlcude A5 and ORYX, but there are other alternatives. • A5. The A5 algorithm is the stream cipher used for encryption in Group Special Mobile (GSM) telephones. IEEE must enter into an agreement with the GSM standards developers to use the algorithm, but once this	

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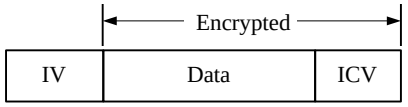
						agreement is reached. The A5 algorithm is fully described in BruceSchneier's book, *Applied Cryptography* (second edition). ORYX. AT&T has developed the ORYX algorithm, and a representative from AT&T told me that they are willing to make this algorithm avaliable.	
	8.2.4	**TLP**	E		A means of locating the company called "RSA Data Security, Inc", which presumably is located somewhere on the planet, needs to be specified.	Add "If necessary, contact the IEEE Standards Office for details on how to communicate with RSA." at the end of the last paragraph.	
	8.2.5	**MT**	**e**		**remove page break just before figure 35**		
	8.2.5	**rdh**	**t**	**y**	Encryption must cover the Integrity Check Value (ICV) as well as the data	. The top of Figure 35 should be redrawn as follows: 	
	8.2.5	**RM**	**T**	**Y**	**Section 8.25 and Figure 35 are contradictory:** **From Section 8.2.5** 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. **From Section 7.1.1 Conventions** ..... The least significant bit of each octet is defined as bit 0 for that octet and is the **leftmost** bit of the octet (except the FCS field). Figure 35 shows the key ID as the rightmost 2 bits.	**Revise Section 8.2.5** The key ID occupies the two ~~least~~ **most** significant bits of the last octet of the IV field, while the pad occupies the six ~~most~~ **least** significant bits of this octet [alternatively, correction of the figure is acceptable]	
	8.2.5	SB	E	N	The type of CRC for the ICV and the transmission order are undefined	Amend 8.2.5 as follows, or to capture this intent:	

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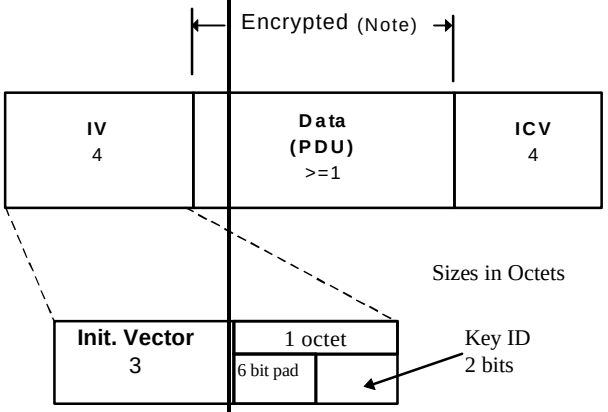
						The WEP ICV ~~= 32 bits~~ shall be a 32-bit field containing the 32-bit Cyclic Redundancy Check (CRC) defined in clause 7.1.3.6 calculated over the Data (PDU) field as depicted in figure 35. The expanded MPDU shall include a 32 bit IV field immediately preceding the MPDU. This field shall contain three 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 field~~s~~ and its sub-fields and to the ICV field~~.~~	
	8.2.5	SB	E	N	There would seem to be an error in figure 35 since the figure does not match the statement: *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.*	Edit figure 35 to show the KeyID and pad as follows Key ID | 6-bit pad	
	8.2.5	**TLP**	e		Equal signs should not occur in text.	Change to read "The WEP ICV is 32 bits in length."	
	8.2.5	**TLP**	e		Within figures, field names should be within their drawn boundaries where possible. Single-digit numbers should be written out when they occur in text, unless there are multi-digit numbers in the same text.	Redraw figure 35 and change the immediately-following text as follows. Put the "Key ID 2 bits" text inside the lower octet subfield drawing. Use spelled-out numerals when all numerals in the sentence are single digit.	
	8.2.5 (also see related issue with	**MAF**	**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**	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	

Seq. #	Clause number	your voter's ID code	Cmnt type E, e, T, t	Part of NO vote	Comment/Rationale	Recommended change	Disposition/Rebuttal
	7.1.1)				**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).** **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.**	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 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.	
	8.2.5 (figure 35)	**MAF**	**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**	Replacement for Figure 35 drawing:	

Seq. #	Clause number	your voter's ID code	Cmnt type E, e, T, t	Part of NO vote	Comment/Rationale	Recommended change	Disposition/Rebuttal
					Macintosh would let me edit the drawing. It may be perferable to makeequivalnet changes in the original drawing rather than inserting the picture object to the right in place of the existing Figure 35.)	 Note: The encipherment process has expanded the original MPDU by 8 Octets, 4 for the Init field and 4 for the Integrity Check Value (ICV). The ICV is calculated on the Data field only	
	8.3.2	**TLP**	E		The second sentence needs to constrain STA construction, not ultimate users. The indicated change accomplishes this shift in focus.	Change sentence to end "shall not be readable via MAC managementSAPs."	
	8.3.2	**TLP**	E		The last two sentences of the third paragraph are redundant (the material presented is covered better in the following paragraph), premature (it presumes knowledge of concepts not yet explicated) and unneeded.	Delete the last two sentences of the third paragraph.	

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	8.3.2	**TLP**	T	Yes	If the array aWEPKeyMapping is "indexed by MAC address", then the array is 2^{47} entries long. Clearly, and from the following text, this is not the case. The array is really an array of three-element records, where one element is a MAC address, which is searched using a content-addressable search.	Please reformulate this description so that it is conceptually correct and matches the MIB attributes which specify the maximum and currently-used number of elements in the array.	
	8.3.2	**TLP**	e		There are a number of English language restructurings needed which are indicated in the submitted edited file.	Correct as indicated in the submitted revision-marked files.	
	8.3.2	**TLP**	E		The statement "The values in this attribute shall take precedence over the aWEPDefault and aDefaultWEPKey variables." is sloppy description. The value False in WEPOn can take precedence over the aWEPDefault and aDefaultWEPKey variables only if the text states that the default value of WEPOn does not apply when the RA or TA address does not have an entry in the aWEPKeyMapping array.	Please clean up this description, either to indicate that the WEPOn default does not apply when no corresponding array entry exists, or to indicate that it is only WEPOn True that takes precedence, and not WEPOn False.	
	8.x.x.x 5.4.3	**MT**	**E/t**		**ref: MT_6** **In the case of an access point with two associated stations. The access point is aware of (at least) two authentication methods. STA A associates using method A and STA B associates using method B. STA A and STA B cannot associate directly and can therefore, not transfer data. The AP is not aware (unless internal rules are established) that it may not be allowable for it transfer data between these two stations.** **According to the PICS, open authentication must be supported, and WEP is optional. Therefore, clarity ought to be provided such in the case that WEP is enabled. Should a station authenticating using the open method be allowed to join a BSS which has WEP enabled? According to the current wording, it seems that the answer is yes or the system is in danger of non-compliance. However, this opens a can of security worms. (MT_8,9,10,11)**	**Distribution system services can only be invoked in the case that similar authentication methods (or by established management rules in the AP).** **In the case that the final destination is not within the current BSS, the frame should be forwarded with appended information identifying the authentication method used by the initiating station. The responsibility of checking is placed on the AP providing service to the final destination STA.** **-or-** **Recommend a *mandatory* authentication method within 802.11 so that this breach of security and accompanying overhead as described above can be averted.**	

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						-or- Remove all references to authentication from the standard and allow a user to chose a vendor which supplies appropriate security vs. overhead/protection tradeoff	
	8.x.x.x 5.4.3.3 6.1.2	MT	t		ref: MT_8 Clarification should be added to state what happens in the case of an access point which supports both 'clear mode' and WEP mode. Specifically: Can both modes be simultaneously supported? How are multicasts handled - sent twice once in the clear and again encrypted with WEP?	Both methods must be able to be simultaneously supported since WEP is optional and compliance criteria is in the clear. Therefore, in order to reduce overhead, the standard ought to state that all multicasts will be sent in the clear and that WEP stations must also receive and not reject these broadcasts based on WEP bit.	
	8.x.x.x 5.4.3.3 6.1.2	MT	T		ref: MT_9 A potential security problem exists in the case where a station can support both/several authentication methods. Consider the 'obvious' case of a wireless access point operating as a repeater. In this situation, the repeater associates to an access point connected to the distribution system using the WEP authentication method. A mobile station associates to the repeater using the 'clear' method. If the repeater forwards the packets from the mobile station using the WEP encryption, then a possible network infringement exists. A similar scenario is two stations associated to the same ESS. One station uses 'clear' and the other uses WEP. If both associated to the same AP, the AP must perform the clear-WEP or WEP-clear	It seems there should be a strong line formed which allows only a single authentication method allowed by the standard. -or- At the very least (referring back to the previous comment) the user ought to be informed whether the standard allows for authentication method translation and the standard should provide the hooks for enabling or disabling this translation via a MIB variable. -or- remove authentication from the standard.	

Seq. #	Clause number	your voter's ID code	Cmnt type E, e, T, t	Part of NO vote	Comment/Rationale	Recommended change	Disposition/Rebuttal
					translation providing a potential breach. The same situation exists when they are associated to different APs.		
	8.x.x.x 7.1.3.1.3 7.1.3.1.4	MT	T		ref: MT_17 The TO_DS and FROM_DS bits should be allowed to be used in control packets. In particular, these bits could identify a wireless access point which is operating in a repeater function. The repeater upon association to another access point could identify itself as part of the (wireless) distribution system. In this fashion, a Network administrator can establish a security level for the distribution system (such as requiring all data to be WEP encrypted) but stations can be allowed to associate to individual APs using the 'clear mode'. In this case, the AP could filter those 'clear mode' packet requests from the distribution system. Therefore, two stations can communicate in the clear to each other (using the services of the access point and/or distribution system) without having access to any other data from the distribution system.	AUTHENTICATION.request, ASSOCIATION.request frames from a repeater (or Wireless AP) should set the FROM_DS bit to identify themselves as such. Appropriate authentication methods (those as established for the distribution system by a system administrator) can be used. TO FM meaning 0 0 normal STA operation 0 1 repeater associations Appropriate hooks should be provided to allow various levels of security or the standard could simply adopt a single authentication method.	
	8.x.x.x 7.1.3.1.3 7.1.3.1.4	MT	t		ref: MT_18 The use of these bits during the association process (ref MT_17) would enable automatic distribution systems functions. By not defining these bits this way, the standard cannot support interoperability among vendors supplying repeaters. Each vendor will have to resort to proprietary packet exchanges to establish the station as part of the distribution system. I point out the situation of a repeater which has associated one or more power save stations associated to it. The packets must be sent to the repeater for	define the bits to be allowed in AUTHENTICATION and ASSOCIATION request frames. Further refinements could be the addition of a required authentication method (as establish via MIB variables of a system administrator, for instance) and automatic conveyance of station capability information.	

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					queuing and delivery. Without the standard specifying a way to identify a wireless distribution system component, all this becomes proprietary or left to another consortium such as the IAPP		
	9.1.1	**TLP**	T		When two alternatives are supposed to cover the span of possibilities, they must be logical complements.	Change 9.1.1 to read "If the medium is not sensed busy, the transmission may proceed. "	
	9.1.1 **9.1.2**	**TLP**	e		Parallel headings should have parallel structure and should assist the reader.	Add "(DCF)" to first heading. Add "(PCF)" to second heading.	
	9.1.2	**AS**	**t**	**y**	**The third sentence in the second paragraph states that "all frame transmissions under the point coordination function shall use an IFS that is smaller than the IFS for frames transmitted via the distributed coordination function.** **This contradicts the description in clause 9.3.3.1 which states that "the PC may send its next pending transmission as soon as a PIFS after the end of its last transmission."**	**Delete the third sentence in the second paragraph.**	
	9.1.2	**AS**	**t**	**y**	**The resolution of comment 1017 (**the members of a point-coordinated BSS won't even attempt to gain access to the medium out of turn (their NAVs are set), so using PIFS to give the AP priority is wacky. It really is only to allow the AP to grab the medium away from *another* overlapping BSS.**jz) for the ballot on D4.0, was** **Editorial / Clarification** **Text change in section 9.1.2 without changing the meaning.** **ACCEPTED** **However, the current text still implies that a shorter IFS is used to give the PC priority access to the medium.**	**Delete the fourth sentence in the second paragraph.**	
	9.1.2	**DLP**	**e**		**The last paragraph of this section contains the following typo: "controlsthe"**	**Change the text to read: "controls the"**	
	9.1.2	**JMZ**	**e**		Typo	Need space between "controls" and	

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						"the" in last sentence.	
	9.1.2	**TLP**	e		Second paragraph has an undefined forward referent. Use "a", not "the", when referring to a not-yet-defined concept.	Change to read "through the use of a virtual carrier sense mechanism".	
	9.1.4	**AS**	**E**	**y**	**This section only describes fragmentation of MSDUs.**	**Change references to MSDU to MSDU or MMPDU.**	
	9.1.4	**AS**	**t**	**y**	**The last sentence in the last paragraph indicates that all fragments of a single MSDU are sent as a burst using a single invocation of the PCF medium access procedure. This is not true according to the allowed frame exchange sequences in clause 9.7. An STA other the PC can only transfer one MPDU per poll from the PC.**	**Remove the words "or PCF" from the sentence in question.**	
	9.1.4 fig 37	**SD**	**e**		**Figure has to be improved.**	**Realign lines andrecenter « CRC » labels.**	
	9.1.4	**TLP**	t		Transmission is virtually 100% reliable; reception is not. The text incorrectly associates a reception-related problem with transmission.	Change to read "channel characteristics limit ~~transmission~~ reception".	

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	9.1.5	**KC**	**T**	**Y**	**"The translations are given in the MAC Data Service State Machine defined in the annex."** **<u>There are no such state diagrams in the annex.</u>** **This standard is very complex. It is not going to be easy for most implementers to understand all the interactions of the parts presented.<u>It is vital to supply the state diagrams and make them normative</u> It is some indication of ponderous nature of this draft that although these diagrams have been promised, they have not been delivered. A good look at clause 14 will show that the production of state diagrams for that PHY layer added needed clarity. The specification of the MAC layer must match this clarity.** **Furthermore, I suspect that the framers of clause 14 found a few inconsistencies when they produced these diagrams, and that the same thing will happen in the MAC case.**	**Put in the MAC state machine diagrams, and make them normative.**	
	9.2	**DLP**	**e**		**The fifth paragraph of this section contains the following typo: frame<newline>s.**	**Change the text to read: "frames."**	
	9.2	**JMZ**	**e**		Typo	Change "frame s" to "frames"	
	9.2	**KC**	**t**	**Y**	**"For this reason the RTS and CTS frames shall be transmitted at one of these mandatory rates."** **Which one? Does this mean the same rate shall be picked for both RTS and CTS? Is it not the case that CTS is always set by the RTS? What does this mean?**	**Clarify statement.**	

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	9.2	**JD**	**e**		**typo**	Another means of distributing the medium reservation information is the duration field in directed frames. This field gives the time that the medium is reserved, either to the end of the immediately following ACK, or in the case of a fragment sequence, to the end of the ACK following the next fragment.	
	9.2 2nd ¶	**TLP**	e		The English of this paragraph is very poor — it is colloquial, judgmental, contains forward referents to as-yet-unspecified concepts, and contains ambiguous pronoun back-referents.	Rewrite as "The CSMA/CA protocol is designed to reduce the collision probability between multiple stations accessing a medium, at the point where collisions would most likely occur. Just after the medium becomes idle following a busy medium (as indicated by the CS function) is when the highest probability of a collision exists. This is because multiple stations could have been waiting for the medium to become available again. This is the situation which necessitates a randombackoff procedure to resolve medium contention conflicts."	
	9.2 4th ¶	**TLP**	E, t		The last sentence describes the inverse of the real relationship. It is the transmitting station that is "hidden" to the non-receiving station, not vice versa. Hiding is not symmetric, and no information is known about the inverse relationship.	Change to read "Thus a station can be unable to receive the originating station yet still know ..."	
	9.2 5th ¶	**TLP**	e, T		In general, collisions (that is, concurrent interfering transmissions) on the wireless medium are not detectable, as they are in IEEE 802.3 LANs, but their side-effects may be observed. The procedure described make a collision inference.	Change "fast collision detection" to read "fast collision inference".	

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	9.2 5th ¶	**TLP**	e		Poor English	Change "start the process over" to read "repeat the process".	
	9.2 6th ¶	**TLP**	e		Poor English — "hearing" is a process of living beings, not inanimate objects.	Change "can hear the AP, but not all other STAs " to read "can receive the AP, but cannot receive all otherSTAs".	
	9.2 7th ¶	**TLP**	e		Inadequate rationale and poor English.	Change first sentence and beginning of second sentence to read "The RTS/CTS mechanism cannot be used for broadcast and multicast frames because there are multiple destinations for the RTS, and thus potentially multiple concurrent senders of the CTS. The RTS/CTS mechanism".	
	9.2 8th ¶	**TLP**	e		The normative text does not specify which processors of RTS and CTS frames are to perform the specified action	Change paragraph to read "... duration information contained in a received RTS or CTS frame ..."	
	9.2 last ¶ 9.2.4	**TLP**	e		Other portions of this standard refer to the MIB variable name. This portion should be consistent and also do so, rather than use the circumlocutory way of reference which was presented.	Change "Basic Rate Set" to "aBasicRateSet" in 9.2. Change "SlotTime" to "aSlotTime" in 9.2.4.	
	9.2.1	**TLP**	e		Specify both aspects of the determination that is to be made.	Change sentence to read "When the counter is zero, the virtual carrier sense indication is that the medium is idle; when non-zero, that it is busy.".	
	9.2.1 5.1.1.2 (c) 5.2.4.1 5.4 12.all 14.all 15.some 16.all	**TLP**	e	Yes	The wireless medium is definitely singular (unless there is an alternate universe with multiple "ethers"), or unless P802.11 is extending its charter to acoustic modes of transmission.	change "edia" to "edium" everywhere except when referring to wired media.	

Seq. #	Clause number	your voter's ID code	Cmnt type E, e, T, t	Part of NO vote	Comment/Rationale	Recommended change	Disposition/Rebuttal
	9.2.2 last ¶	**TLP**	e		The error did not occur in the frame, but in the reception process. Correct the language to reflect the reality.	Change second sentence to end "received the frame correctly, and that the error occurred in the reception of the ACK frame."	
	9.2.3 1st ¶	**TLP**	e		The paragraph omits references and descriptive information which would be useful to the reader.	Change to read "Four different IFSs are defined to provide priority levels for access to the wireless media; they are listed in order, from the shortest to the longest. Figure 38 shows some of these relationships."	
	9.2.3	**TLP**	e		Change Figure 38's title to be correct.	Change to read "Figure 38, Some IFS Relationships".	
	9.2.3.1	**KC**	**t**	**Y**	**"The SIFS shall be the time from the end of the last symbol of the previous frame to the beginning of the first symbol of the preamble of the subsequent frame as seen at the air interface"** **Symbol times are not defined. No test is specified for finding the beginning or end of a symbol in the air. How will this checked?**	**Define the physical events that can be tested to know when a symbol begins and ends, or find a physical event on which to base SIFS.**	

Comment on 802.11/D5.0 **Name: _____** **Date: _____**

Seq. #	Clause number	your voter's ID code	Cmnt type E, e, T, t	Part of NO vote	Comment/Rationale	Recommended change	Disposition/Rebuttal
	9.2.3.2 **9.2.3.3** **9.2.5.1** **9.2.5.2**	**TLP**	E	Yes	The medium is both time-varying and asymmetric. "Detection" that the medium is "free" is not possible. Inference that the medium in not in use (i.e., idle) can be made based on lack of detection that the medium is in use. But such inference of being not-in-use is much less reliable than the detection of being in-use. The language chosen must reflect this lack of reliability in the carrier non-sensing process. Also, the medium is "free" only if there are no usage fees. That aspect has nothing to do with whether the medium is currently in use. Words with the proper connotations, such as "idle" and "busy", should be used.	Change the second sentence of 9.2.3.2 to read "A STA using the PCF shall be allowed to transmit contention-free traffic after it senses the medium idle at the TxPIFS slot boundary ..." Change the second and third sentences of 9.2.3.3 to read "A STA using the DCF shall be allowed to transmit if it senses the medium to be idle at the TxDIFS slot boundary as defined in 9.2.9 after a correctly-received frame, and its backoff time has expired. A STA using the DCF shall not transmit within an EIFS after it senses the medium to be idle following reception of a frame..." Change the second paragraph of 9.2.5.1 to read "when the STA senses the medium to be idle for greater ". Change first paragraph to read "when a transmitting STA infers a failed transmission". Change second paragraph to read "a DIFS period during which the medium is sensed inactive for the duration of the DIFS period, or following an EIFS period during which the medium is sensed inactive for the duration of the EIFS period".	

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	9.2.3.3 **9.2.3.2** **9.2.5.1** **9.2.5.2**	**TLP**	E	Yes	The medium is both time-varying and asymmetric. "Detection" that the medium is "free" is not possible. Inference that the medium in not in use (i.e., idle) can be made based on lack of detection that the medium is in use. But such inference of being not-in-use is much less reliable than the detection of being in-use. The language chosen must reflect this lack of reliability in the carrier non-sensing process. Also, the medium is "free" only if there are no usage fees. That aspect has nothing to do with whether the medium is currently in use. Words with the proper connotations, such as "idle" and "busy", should be used.	Change the second sentence of 9.2.3.2 to read "A STA using the PCF shall be allowed to transmit contention-free traffic after it senses the medium idle at the TxPIFS slot boundary ..." Change the second and third sentences of 9.2.3.3 to read "A STA using the DCF shall be allowed to transmit if it senses the medium to be idle at the TxDIFS slot boundary as defined in 9.2.9 after a correctly-received frame, and its backoff time has expired. A STA using the DCF shall not transmit within an EIFS after it senses the medium to be idle following reception of a frame..." Change the second paragraph of 9.2.5.1 to read "when the STA senses the medium to be idle for greater ". Change first paragraph to read "when a transmitting STA infers a failed transmission". Change second paragraph to read "a DIFS period during which the medium is sensed inactive for the duration of the DIFS period, or following an EIFS period during which the medium is sensed inactive for the duration of the EIFS period".	
	9.2.4	**JMZ**	**t**		The paragraph beginning "The Contention Window" is poorly worded with respect to remaining at aCWmax.	Insert "Once it reaches aCWmax," before "the CW shall remain at the..."	

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	9.2.4	**KC**	**T**	**Y**	**Given the definition of EIFS in 9.2.3.4, one would expect that all STAs that try to receive any frames that are transmitted at a data rate that is not one of those supported by the STA will generate CRC errors and then use EIFS instead of DIFS for backoff, and therefore be at a disadvantage resulting in unfair access.**	**Change to only one delay time for both cases, or think of something else that is fair.**	
	9.2.4	**RM**	**t**	**N**	Definition of CW = An integer between the values of MIB attributes aCWmin and aCWmax, For consistency across implementations, the endpoints should be explicitly included or excluded.	CW = An integer within the range of ~~between the~~ values of MIB attributes aCWmin and aCWmax, CWmin<CW<CWmax	
	9.2.4	**TLP**	e		Specify both aspects of the determination that is to be made.	Change to read "after a DIFS is detected with the medium idle when the last frame detected on the medium was received correctly, or an EIFS is detected with the medium idle when the last frame detected on the medium was not received correctly"	
	9.2.4 3rd ¶	**TLP**	E	Yes	"The CW shall take the next value in the series (or a higher value) every time an unsuccessful attempt to transmit an MPDU causes either Station Retry Counter to increment." This portion of the sentence is very unclear. What series? Which series, since there are apparently two? Does "next value" imply pre-incrementation as it seems to, or post-incrementation as described in the prior two sentences?	Please rewrite to be unambiguous.	

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	9.2.5.1 **9.2.3.2** **9.2.3.3** **9.2.5.2**	**TLP**	E	Yes	The medium is both time-varying and asymmetric. "Detection" that the medium is "free" is not possible. Inference that the medium in not in use (i.e., idle) can be made based on lack of detection that the medium is in use. But such inference of being not-in-use is much less reliable than the detection of being in-use. The language chosen must reflect this lack of reliability in the carrier non-sensing process. Also, the medium is "free" only if there are no usage fees. That aspect has nothing to do with whether the medium is currently in use. Words with the proper connotations, such as "idle" and "busy", should be used.	Change the second sentence of 9.2.3.2 to read "A STA using the PCF shall be allowed to transmit contention-free traffic after it senses the medium idle at the TxPIFS slot boundary ..." Change the second and third sentences of 9.2.3.3 to read "A STA using the DCF shall be allowed to transmit if it senses the medium to be idle at the TxDIFS slot boundary as defined in 9.2.9 after a correctly-received frame, and its backoff time has expired. A STA using the DCF shall not transmit within an EIFS after it senses the medium to be idle following reception of a frame..." Change the second paragraph of 9.2.5.1 to read "when the STA senses the medium to be idle for greater ". Change first paragraph to read "when a transmitting STA infers a failed transmission". Change second paragraph to read "a DIFS period during which the medium is sensed inactive for the duration of the DIFS period, or following an EIFS period during which the medium is sensed inactive for the duration of the EIFS period".	
	9.2.5.2	**DLP**	**e**		**The last paragraph of this section contains the following typo: "e xpiration"**	**Change the text to read: "expiration"**	
	9.2.5.2	SB	t	N	The following statement in 9.2.5.2: *In an IBSS, the backoff time shall not decrement in the period from TBTT until the expiration of the ATIM window. Beacon and ATIM frames may be transmitted*	Remove two sentences from 9.2.5.2 ~~In an IBSS, the backoff time shall not decrement in the period from TBTT until the expiration of the ATIM~~	

Seq. #	Clause number	your voter's ID code	Cmnt type E, e, T, t	Part of NO vote	Comment/Rationale	Recommended change	Disposition/Rebuttal
					during this same period. Seems to be in conflict with 11.2.2.4 which says: *All STAs shall use the backoff procedure defined in clause 9.2.5.2 for transmission of the first ATIM following the Beacon. All remaining ATIMs shall be transmitted using the conventional DCF access procedure.* If STAs are using the back-off procedure within the ATIM window as in 11.2.2.4, then the back-off time must decrement else nothing would ever be transmitted. I think that the attempt here is to try and define what happens to a data/management frames that is in back-off and had not been sent by the start of the next ATIM window at the TBTT. This seems to be undefined in the standard - it is not clear whether a frame that has been announced and is not sent due to a busy medium (and hence back-off) should: a) be re-announced and retried in the next beacon interval with the original back-off time held over the ATIM window, or b) it should be retried afresh (given that the first frame transmitted will have back-off applied anyway). I seem to remember that we previously discussed and settled on the latter as the proper case - ie the frame (or partial frame if fragmented) is re-announced afresh.	~~window. Beacon and ATIM frames may be transmitted during this same period.~~ One might conclude that some text is required about MSDUs in back-off at the start of the ATIM window in 11.2.2.4 as well for clarity.	
	9.2.5.2 fig 41	**SD**	**E**		**This figure should be made more readible.**	**Redraw it.**	

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Seq. #	Clause number	your voter's ID code	Cmnt type E, e, T, t	Part of NO vote	Comment/Rationale	Recommended change	Disposition/Rebuttal
	9.2.5.2 **9.2.3.2** **9.2.3.3** **9.2.5.1**	**TLP**	E	Yes	The medium is both time-varying and asymmetric. "Detection" that the medium is "free" is not possible. Inference that the medium in not in use (i.e., idle) can be made based on lack of detection that the medium is in use. But such inference of being not-in-use is much less reliable than the detection of being in-use. The language chosen must reflect this lack of reliability in the carrier non-sensing process. Also, the medium is "free" only if there are no usage fees. That aspect has nothing to do with whether the medium is currently in use. Words with the proper connotations, such as "idle" and "busy", should be used.	Change the second sentence of 9.2.3.2 to read "A STA using the PCF shall be allowed to transmit contention-free traffic after it senses the medium idle at the TxPIFS slot boundary ..." Change the second and third sentences of 9.2.3.3 to read "A STA using the DCF shall be allowed to transmit if it senses the medium to be idle at the TxDIFS slot boundary as defined in 9.2.9 after a correctly-received frame, and its backoff time has expired. A STA using the DCF shall not transmit within an EIFS after it senses the medium to be idle following reception of a frame..." Change the second paragraph of 9.2.5.1 to read "when the STA senses the medium to be idle for greater ". Change first paragraph to read "when a transmitting STA infers a failed transmission". Change second paragraph to read "a DIFS period during which the medium is sensed inactive for the duration of the DIFS period, or following an EIFS period during which the medium is sensed inactive for the duration of the EIFS period".	
	9.2.5.2	**WD**	**t**		**The last paragraph of this section explains that normal backoff decrements should be defered during an ATIM window. However the same procedure is used prior to transmissions of the Beacon or ATIM frames. So the rule as stated should only apply to a pending frame that is pending to be transmitted outside the ATIM window.**	In an IBSS, the backoff time for a pending non-Beacon or non-ATIM transmission shall not decrement in the period from TBTT until the expiration of the ATIM window. Beacon and ATIM frames may be	

Seq. #	Clause number	your voter's ID code	Cmnt type E, e, T, t	Part of NO vote	Comment/Rationale	Recommended change	Disposition/Rebuttal
						transmitted during this same period.	
	9.2.5.2 last ¶	**TLP**	E	Yes	TBTT is an acronym not used until this point; it deserves to be spelled out so that the reader stands a chance of understanding the concepts being exposed here. It is not clear that TBTT is an explicit moment in time; most such acronyms stand for intervals. A good deal more work on explaining this concept is needed.	Rewrite to clarify.	
	9.2.5.3	**DLP**	**e**		**The second paragraph of this section contains the following typo: "indepen dently"**	**Change the text to read: "independently"**	
	9.2.5.3	**TLP**	e		Interference occurs "in" the logical channel; "on" would require a physical channel (such as a wire), but the electromagnetic wireless channel has no physical essence — the "ether" does not really exist.	Change "interference on" to 'interference in".	
	9.2.5.3	**TLP**	e		Humans "believe". Possibly animals "believe". Computer programs do not "believe".	Change to read "which the initiating station infers have failed."	
	9.2.5.3 6th ¶	**TLP**	e		The station doing the filtering is not identified. The type of filtering is not identified by its proper name.	Change fourth sentence to read "This duplicate MSDUshall be filtered at the receiving station using the normal duplicate frame filtering mechanism."	
	9.2.5.4	**KC**	**t**	**Y**	**1 microsecond of what?**	**State what it is and how it is measured.**	
	9.2.5.4 fig 42	**SD**	**T**		**The period of duration (2xSIFSTime) + (CTS_Time) + (2x aSlotTime) during which a STA has to wait until it sets its NAV should be represented.**	**Modify the figure**	
	9.2.5.4 2nd ¶	**TLP**	e		An "estimate" is being discussed, not "state" information. Single-digit numerals should be written out. The condition is anticipated, not known. The inverse of busy is "idle", nor "free".	Change to "Maintenance of the NAV shall consist of an internal estimate accurate to one microsecond, of the anticipated busy/idle condition of the medium.".	
	9.2.5.4 last ¶	**TLP**	t		The receiver can only infer the data rate of transmission, but it can directly detect the data rate of reception. So referencing the receiving process eliminates the need to go into the inferential aspects that would otherwise arise.	Change end of paragraph to read "most recent NAV update wasreceived."	

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	9.2.5.5	**DLP**	**e**		**The third to last bullet point of this section contains the following typo: "than a n initial"**	**Change the text to read: "than an initial"**	
	9.2.5.5 fig 43	**SD**	**E**		**This figure should be made more readible.**	**Redraw it.**	
	9.2.5.6	**DLP**	**e**		**The last sentence of the last paragraph of this section refers to Frame 1, when it should be Fragment 1.**	**Change the text to read: " from Fragment 1 has expired."**	
	9.2.5.6	**DLP**	**t**		**Should Figure 45 use Fragment 0 or is this an example of a retransmission? If so, should the text clarify this example?**	**No change may be necessary.**	
	9.2.5.6	SB	E	N	This clause seems to be somewhat misleading. Also may's and shall's got a bit misleading in this clause. In some cases *will* is the correct term since the action arises as default - not out of choice ~~e~~g frame simply wasn't received. Also some clarification required as to when STAs only able to hear the destination will be access the channel. Since the second part of the clause does not really relate to figure 45 delete the references to CTS and frame 1 and make them more general.	Suggested text: In the case where an acknowledgment is sent but not received by the source station, stations that heard the Fragment, or ACK will mark the channel as busy for the next frame exchange due to the NAV having been updated from these frames~~the NAV shall be marked busy for the next frame exchange~~. This is the worst case situation and~~. This~~ is shown in Figure 45. If an~~the~~ acknowledgment is not sent by the destination station, stations that can~~may~~ only hear the destination station will~~shall~~ not update their NAV and may attempt~~will be free~~ to access the channel when their NAV updated from the previously received frame reaches zero. All stations that hear the source will be free to access the channel after their NAV updated from the transmitted fragment~~Frame 1~~ has expired.	
	9.2.5.6 fig 44	**SD**	**E**		**This figure should be made more readible.**	**Redraw it.**	
	9.2.5.6	**SD**	**e**		**NAV (Fragment 1) should not overlap NAV (RTS)**	**Shrink and move it.**	

Seq. #	Clause number	your voter's ID code	Cmnt type E, e, T, t	Part of NO vote	Comment/Rationale	Recommended change	Disposition/Rebuttal
	fig 45				**and should be on the line.**		
	9.2.5.6 3rd ¶	**TLP**	e		As before, use "will" in predictive statements, "shall" in legislative ones.	Change to "... stations that may only hear the destination station will not update their NAV ..."	
	9.2.5.7	**KC**	**e**		**The heading "Directed MPDU Transfer Procedure" has no subsection marking.**	**"9.2.5.7.1 Directed MPDU Transfer Procedure"**	
	9.2.5.7 last two ¶s	**TLP**	e	Yes	These paragraphs contain inappropriate language, including references to "payload" frames and other concepts not employed elsewhere in this draft.	Change these two paragraphs to read "When an RTS/CTS exchange is used, the asynchronous Data frame shall be transmitted after the end of the CTS frame and a SIFS period. No regard shall be given to the busy or free status of the medium when transmitting this Data frame. When an RTS/CTS exchange is not used, the asynchronous Data frame shall be transmitted following the success of the basic access procedure. With or without the use of the RTS/CTS exchange procedure, the STA which is the destination of an asynchronous Data frame shall follow the ACK procedure.'	
	9.2.5.8	SB	e	N	Heading 'Directed MPDU Transfer Procedure' in normal text style	Change to heading for clause 9.2.5.8	
	9.2.6 1st ¶	**TLP**	e		Incorrect language used.	Change "mechanism" to "procedure" twice.	
	9.2.6 2nd ¶	**TLP**	t	Yes	The time-varying property of the channel, which may be the most important problem for implementors, is omitted.	Change to read "due to the increased probability of lost frames from interference or collisions or time-varying channel properties."	
	9.2.7	**DLP**	**e**		**The last paragraph of this section contains the following typo: "PHYRXEND.indicateand"**	**Change the text to read: "PHYRXEND.indicate and"**	
	9.2.7	**JMZ**	**e**		Typo	Change "PHYRXEND.indicateand" to "PHYREXEND.indicate and"	

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	9.2.7 2nd ¶	**TLP**	e		"Always" applies to every use of "shall", and thus is always redundant.	Delete the word "always".	
	9.2.8 6th ¶	**TLP**	e	Yes	If you are going to reference a specific LAN protocol, at least reference an IEEE standard, which Ethernet is not.	Change to read "(similar to an FCS error in other LAN protocols)."	
	9.2.9	**KC**	**t**	**Y**	**See 9.2.3.2 and 9.2.3.3 above. Given that symbol time is not defined one might assume that it is the sampling point in the center of the symbol for GFSK, or in a DSP system, it is the point when enough samples have been processed so as to be 90% sure of the symbol value. Neither of these is "in the air."**	**State what it is and how it is measured.**	
	9.2.9 1st ¶	**TLP**	e		The use of the word "per" in this context is inappropriate; inverse units are not implied.	Change to read "... are provided by the specific PHY."	
	9.2.9 2nd ¶ last ¶	**TLP**	t		Since symbols have duration, the measurement must specify which point in the symbol timing is being used. Later text in this area indicates that it is the end of the symbol that is intended.	Change 2nd ¶ to read "All timings that are referenced from the end of the transmission are referenced from the end of the last symbol of a frame on the medium." Change last ¶ to read "The starting reference of these slot boundaries is again .."	
	9.3	**AS**	**t**	**y**	**A CF-Pollable station can only transmit one MPDU when polled by the PC (the frame exchange table in 9.7), in contrast to what it says in the eighth sentence of the first paragraph.**	**Change MSDU to MPDU.**	
	9.3	**AS**	**t**	**y**	**The second last sentence in the second paragraph says that the PC retains control of the medium by using PIFS. This is untrue. The PC retains control of the medium because everyone's NAV is set.**	**Remove the last part of the sentence, "by waiting the PIFS duration before resuming CF transfers".**	

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	9.3	**AS**	**t**	**y**	**The first sentence in the second paragraph states that the PC shall not perform a backoff on retransmission of an unacknowledged frame during the CFP.** **My understanding from clause 9.3.3.1 is that the PC may resume transmission after a PIFS but is not required to. In 9.3.3.3 the PC is specifically allowed to use a backoff prior to retransmission.**	**Change the shall to a may.**	
	9.3.1 fig 48	**SD**	**E**		**This figure should be made more readible.**	**Redraw it.**	
	9.3.1 fig 50	**SD**	**E**		**This figure should be made more readible.**	**Redraw it.**	
	9.3.2.1	**TLP**	E		The first sentence makes little sense. The meaning of the words "as is used" is extremely unclear. Also, does this apply to the last fragment/segment as well? Does it apply whether an ACK is required or not?	Rewrite this sentence.	
	9.3.2.1	**TLP**	e		The term "free" is inappropriate; use "idle".	Change to read "When the medium is sensed to be idle for one PIFS period,".	
	9.3.2.2	**JMZ**	**e**		Typo	Change "of any" to "of any"	
	9.3.2.2	**TLP**	e		An unnecessary constraint should be removed, since it is redundant 100% of the time.	Delete "containing such an element that"	
	9.3.2.3	**TLP**	e		The term "free" is inappropriate; use "idle".	Change to read "medium be sensed as being idle".	
	9.3.3	**AS**	**t**	**y**	**The second last sentence is inconsistent with the frame exchange table in clause 9.7. The only valid responses for a CFPollable station in this scenario are CF-ACK(no data) or Null(no data)**	**Change ACK or CF-ACK to CF-ACK or Null.**	
	9.3.3	**AS**	**t**	**y**	**The last paragraph allows and ACK to be a valid response to a CF-Poll. This is not allowed in the frame exchange table in 9.7.**	**Change ACK or CF-ACK to CF-ACK or Null.**	
	9.3.3 fig 51	**SD**	**E**		**This figure should be made more readible.**	**Redraw it.**	
	9.3.3.1	**AS**	**t**	**y**	**The second last sentence in the first paragraph says that the PC retains control of the medium by using PIFS. This is untrue. The PC retains control of the medium because everyone's NAV is set.**	**Delete sentence.**	

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	9.3.3.1	**AS**	**t**	**y**	**In the paragraph starting with "For frames that …", the fifth sentence states that only the last fragment of a burst from an STA may be acknowledged with a CF-ACK.** **This is not true since CFP operation as defined in the frame sequences in 9.7 does not require a PC to transfer all fragments of a MSDU or MMPDU before polling the next station.**	**Delete the sentence "This shall only occur if the …"**	
	9.3.3.1	**JMZ**	**t**		The fact that the new sentence starting "Non-CF-Pollable stations" only applies during the CFP needs to be made explicit (otherwise is breaks NAV totally)	Change "frame shall" to "frame during the Contention-Free Period shall"	
	9.3.3.2 fig 52	**SD**	**E**		**This figure should be made more readible.**	**Redraw it.**	
	9.3.3.2 fig 52	**SD**	**t**		**The StS frame does not represent anything.**	**Remove the StS frame and the following Ack frame by a unique U1-ack frame.**	
	9.3.3.3	SB	E	N	Clarify use of optional protocol function by stronger language than simply the use of may. The PC may also use this backoff during the CFP prior to retransmitting an unacknowledged, directed data or management frame.	Suggested text: The PC may optionally ~~also~~ use this backoff during the CFP prior to retransmitting an unacknowledged, directed data or management frame.	
	9.3.3.4 last paragraph	**SD**	**T**		**A figure should represent the aCFPMaxDuration.**	**Draw the figure.**	

Seq. #	Clause number	your voter's ID code	Cmnt type E, e, T, t	Part of NO vote	Comment/Rationale	Recommended change	Disposition/Rebuttal
	9.3.3.5	AS	t	y	The second sentence in the first paragraph states "… and shall acknowledge the receipt of all other Data and Management frames using ACK control frames …" According to the frame sequences in 9.7 table 20, a CF-Pollable station may only respond with an ACK control frame if it is sent a directed data frame without a CF-Poll.	Replace the last part of the sentence ", sent after a SIFS period…" with "sent after a SIFS period. During the CFP, CF-Pollable stations shall acknowledge the receipt of a Data frame (without the CFAck or CF-Poll bits) or a management frame using an ACK control frame sent after a SIFS period."	
	9.3.4.1	AS	t	y	The last sentence in paragraph 1 indicates that polling of power saving stations is done before polling of non-power saving stations. This seems to introduce an unfairness in the polling mechanism in that if the power saving stations have sufficient traffic they could indefinitely delay the traffic to non-power save stations.	Remove the last sentence, or put in a polling mechanism that is fair.	
	9.4	AS	e	y	The last sentence in the third paragraph states that the contents of a fragment shall be fixed after its initial transmission until it is successfully delivered. This does not take into account the retry bit.	Change "shall be fixed" to "shall be fixed, with the exception of the retry bit,"	
	9.4	AS	t	y	This section only describes fragmentation of MSDUs. I believe the intent of the standard is to allow fragmentation of MMPDUs.	Change occurrences "MSDU" to "MSDU or MMPDU".	
	9.4	KC	t	Y	"The timer starts on the attempt to transmit the first fragment ..." When does it start? Is it at the "attempt" to transmit (delayed because of backoff or medium busy etc.) or the first Tx energy above the background noise, or what?	State what it is and how it is measured.	
	9.5	AS	t	y	This section only describes reassembly of MSDUs. I believe the intent of the standard is to allow fragmentation of MMPDUs.	Change occurrences "MSDU" to "MSDU or MMPDU".	
	9.5	DLP	e		The xx.xx place marker needs to be removed.	Replace xx.xx with the section in	

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						parentheses.	
	9.5	**JMZ**	**e**		Editing	Fill in reference marked "xx.xx"	
	9.5	**KC**	**E**		**"All stations shall support the simultaneous reception of a minimum of 3 MSDUs."** **I know that it means that the fragments of at least 3 MSDU are to be supported for reconstruction at any given time, but what it says is impossible.**	**The fragments of at least 3 MSDU shall be able to be supported for reconstruction at any given time.**	
	9.5	**KC**	**E**		**"... to receive additional simultaneous MSDUs."**	**... to receive additional contemporaneous MSDUs.**	
	9.5	**KC**	**e**		**"described in xx.xx"**	**replace "xx.xx" with reference**	
	9.5 last paragraph	**SD**	**e**		**typo**	**« xx.xx (9.2.8 duplicate » should be changed in «9.2.8 (duplicate»**	
	9.5 3rd & 4th un-indented ¶s **9.8 1st two ¶s**	**TLP**	E		The word "simultaneous" means exactly contemporaneous. It is highly unlikely that any STA commences transmission or reception of two MPDUs or two MSDUs simultaneously on the single instance of a wireless LAN being described by this standard. Even at the internal software level, the CPU is servicing only one MSDU on any given machine cycle. The word "concurrent" means overlapping in time, which is the sense intended here. At the lowest level, the servicing of the MSDUs is interleaved by the STA's CPU. Even at this level the correct description is "concurrent", not "simultaneous". In contrast, multiple wireless LANs can be operating simultaneously, and not just concurrently, on non-overlapping channels. In summary, "simultaneous" is a much stronger term, implying much more than temporal overlap. "Concurrent" is the proper term for this situation.	Change "simultaneous" to "concurrent" at each occurrence in each paragraph.	

Seq. #	Clause number	your voter's ID code	Cmnt type E, e, T, t	Part of NO vote	Comment/Rationale	Recommended change	Disposition/Rebuttal
	9.6	**AS**	**t**	**y**	**The last paragraph refers to PHY mandatory rates. I believe this is a remnant which was supposed to have been fixed due to previous comment resolutions.**	**Change "PHY mandatory rates" to "rates in the aBSSBasicRateSet".**	
	9.7	**AS**	**t**	**y**	**Frame sequences 2 and 3 in table 20 imply that to transmit a management frame during a CFP, the PC must transmit a CFAck a SIFS period before starting to transmit the Mgmt frame. This doesn't make sense.** **Frame sequences 2 and 3 in table 20 are also the only sequences where both frames are initiated by the PC.**	**The Frame sequences should be:** **Mgmt(bc)** **Mgmt(dir) - ACK** **Data(bc/mc)** **Data(dir)+CF-Poll{+CFAck) - Data(dir)+CF-Ack {- CF-Ack(no data)}** **Data(dir)+CF-Poll{+CFAck) - CF-Ack(no data)** **Data(dir)+CF-Poll{+CFAck) - Data(dir)+CF-Ack - ACK** **CF-Poll(no data){+CFAck) - Data(dir) {- CF-Ack(no data)}** **.** **.** **.**	
	9.7	**JMZ**	**t**		The revised CF sequences no longer make it clear that some kind of CF-End ***must*** be transmitted to mark the end of the CFP. I understand that it can be broken up for various reasons, but we should clarify that there must be exactly one (square-brackets was wrong, since you cannot send more than one) CF-End per CFP.	Add a sentence clarifying this requirement.	
	9.7	**WD**	**E**		**The Table 19 does not show the relevant ATIM related sequences.**	**Add to the table:** **ATIM - Ack 2**	
	9.7	**MAF**	**E**	**{na}**	**Table 19 does not show the ATIM sequence.**	**Add to Table 19:** **ATIM - Ack 2**	

Seq. #	Clause number	your voter's ID code	Cmnt type E, e, T, t	Part of NO vote	Comment/Rationale	Recommended change	Disposition/Rebuttal
	9.7 table 19	**TLP**	e		A multicast is listed as permitted in a management frame where it cannot occur	Delete "or multicast" from the second non-heading row of the table.	
	9.8 6.1.3 Annex A.4.4.1 PC8.2	**GMG**	**T**	**Y**	**The MSDU ordering provisions have been included in this standard to provide an optional alternative for those applications that do require strictly ordering service, for those cases where the type of frame reordering introduced by the Power Management buffering provisions will cause a problem.** **The intent of this provision was to have an alternative available, but it would be an option that would not affect the normal implementation. However the PICS does not list this provision as optional.** **Therefore these sections should be deleted, or it should be made clear in the text that this is optional and not mandatory functionality.**	**Delete sections 6.1.3, 9.8 and PC8.2 in Annex. A.** **OR** **Mark this functionality as optional.**	
	9.8 6.1.3 Annex A.4.4.1	**MAF**	**T**	**Y**	**The strictly ordered service class was included in this standard to provide an alternative method to handle those cases where the type of frame reordering possible when using Power Management buffering might cause a problem for a higher layer protocol.** **The intent of this provision was to provide a strictly ordered alternative for the applications which may require one, but not to make this facility mandatory for all implementations. Unfortunately, the cited sections and the PICS do not list this facility as optional.**	**Change PC8.2 from status "M" to status "O". Add a sentence to 6.1.3 and 9.8 to indicate the strictly ordered service is optional.** **Note that, in 6.2.1.3, the transmission status of "unavailable service class" is already specified to be returned if strictly ordered service is requested but is not available.**	
	9.8	**AS**	**e**	**y**	**The first sentence in the third paragraph is a hard read.**	**Replace "sent using" to "of".**	
	9.8	**JMZ**	**e**		Editing	Delete spurious copy of "Individual frames..." sentence at the end.	
	9.8 6.1.3 7.1.3.1.	**MT**	**T**		**ref: MT_15** **strictly order frames can be supported by having the**		

Seq. #	Clause number	your voter's ID code	Cmnt type E, e, T, t	Part of NO vote	Comment/Rationale	Recommended change	Disposition/Rebuttal
	10 9.8				**AP send multicast packets twice – once with the strictly order bit set and once without the strictly ordered multicasts would be sent when the multicast was received. The non-strictly ordered multicast would be sent during the DTIM for power save nodes. The power save nodes would take the non-strictly ordered multicast and non-power save nodes would take the strictly ordered multicast (regardless of whether the station is configured for strictly ordered) rationale: without this modification, latency will increase because packets will have to defer in order to maintain transmission order (a multicast has to be delayed until the DTIM requiring that all subsequent directed packets will be deferred in order to maintain order**		
	9.8	SB	e	N	Spurious text: 'Individual frames within each of these sequences are separated by a SIFS'	Delete sentence	
	9.8 6.1.3 Annex A.4.4.1	**MAF**	**T**	**Y**	**The strictly ordered service class was included in this standard to provide an alternative method to handle those cases where the type of frame reordering possible when using Power Management buffering might cause a problem for a higher layer protocol. The intent of this provision was to provide a strictly ordered alternative for the applications which may require one, but not to make this facility mandatory for all implementations. Unfortunately, the cited sections and the PICS do not list this facility as optional.**	**Change PC8.2 from status "M" to status "O". Add a sentence to 6.1.3 and 9.8 to indicate the strictly ordered service is optional. Note that, in 6.2.1.3, the transmission status of "unavailable service class" is already specified to be returned if strictly ordered service is requested but is not available.**	

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	9.8 1st two ¶9.5 3rd & 4th un-indented ¶s s	**TLP**	E		The word "simultaneous" means exactly contemporaneous. It is highly unlikely that any STA commences transmission or reception of two MPDUs or two MSDUs simultaneously on the single instance of a wireless LAN being described by this standard. Even at the internal software level, the CPU is servicing only one MSDU on any given machine cycle. The word "concurrent" means overlapping in time, which is the sense intended here. At the lowest level, the servicing of the MSDUs is interleaved by the STA's CPU. Even at this level the correct description is "concurrent", not "simultaneous". In contrast, multiple wireless LANs can be operating simultaneously, and not just concurrently, on non-overlapping channels. In summary, "simultaneous" is a much stronger term, implying much more than temporal overlap. "Concurrent" is the proper term for this situation.	Change "simultaneous" to "concurrent" at each occurrence in each paragraph.	
	A4.5	**JMZ**	**t**		The FH PHY PICS Proforma does not make it clear that support for any given regulatory domain is optional. The implication is that all N of them must be implemented in any conformant device. This is a ridiculous requirement.	Correct the PICS to indicate that support for any given regulatory domain is optional.	