IEEE P802.11
Wireless LANs
Comments received on 802.11b in Letter Ballot 16

Date: January 9, 1999

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1. Res #	Seq. #	Clause number	your voter's id code	Cmnt type E, e, T, t	Part of NO vote	Comment/Rationale	Recommended change	Disposition/Rebuttal
2.	1.	1.0 General	BO	E		If you are going to abbreviate things, don't mix abbreviations and complete words in the same "word", i.e. kilogram and kg are acceptable, kgram and kilog are not acceptable.	Replace all "Mbit/s" with Mb/s".	REJECTED, this abbreviation is consistent with the current standard (802.11 1997) and changing it here would create confusion.
3.	2.	1.0 General	BO	T	Y	The PHY has no concept of a "frame". Yet this word is used throughout the clause. The PHY only knows PSDU, PPDU, baud, symbol, bit, and octet.	Eliminate the word "frame" and replace it with "PSDU" or "PPDU", as appropriate.	ACCEPTED: Editor to search entire document and replace "frame" with "PSDU" or "PPDU" as appropriate.
4.	1	1.0 Title	Vh	E		The title should read: "Draft Supplement to Standard ……". I noted that this needs to be updated in the PAR. To better describe the document, it would be better to change the title now and start a PAR revision in March.	Change the title and make the font size consistent over the whole of the title. Start the PAR revision process and at the same time request a change from "higher speed" to "higher rate"	ACCEPTED. Editor to change the title to add "Draft", make entire title the same font, and chage "Higher Speed" to "Higher Rate".

5.		2	1.0	Vh	E		The scope given here is the scope of the PHY. However, it spells "describes", where "specifies" may be better. It may be better to make an additional scope for the document first, which may have to be equal to the scope specified in the PAR. The Chair of 802.11 needs to verify the need.	Propose to make a new scope belonging to the supplement book that could look like the following: This supplement specifies the Physical Layer Entity for the Higher Rate Direct Sequence Spread Spectrum (DSSS) extension and the changes that have to be made to the base standard to accommodate the PHY.	ACCEPTED. Para. 1.1, first sentence: Change "describes" to "specifies". Para. 1.1.1: Replace first sentence with: " This supplement specifies the Physical Layer Entity for the Higher Rate Direct Sequence Spread Spectrum (DSSS) extension and the changes that have to be made to the base standard to accommodate the PHY."
6.		1	1.1	ap	E		Spelling error “Sporead	change to Spread	ACCEPTED, Fix spelling.
7.		3.	1.1	BO	T	Y	The overview is not the place to describe required features of the standard.	Remove all usage of the word “shall”.	

8.	4.	1.1 and multiple comment resolutions dealing with FH compatibility and Page 511 lines 5-7	BO	T	Y	The comment resolutions that state "a consensus can not be reached…" are not a proper technical response to the well thought out comments on the draft standard. Throwing everything into a standard because a consensus can not be reached is not the path to a successful standard. In Table 2, it is obvious that the HR/DSSS/FH PHY is the death of wireless LANs in the 2.4 GHz band. This PHY is inimical to HR LAN life in the band as it does not cooperate with anything other than itself and legacy FH PHYs. Because this PHY is required to hop among all HR/DSSS channels to maintain compatibility with legacy FH PHYs, it is an active interferer with all other PHYs, making coordination with HR LANs and legacy DSSS LANs impossible. This PHY is a cancer that will require all 802.11 HR LANs it contacts to adopt the HR/DSSS/FH PHY in order to operate. It will kill any legacy DSSS LANs it contacts. This PHY does not provide a "migration path", as has been claimed. In any legacy installation where the addition of HR PHY is desirable, new access points will need to be installed with the HR PHY capability. "Interoperability" between the legacy FH and new HR WLANs can be handled through the access points. There is no need for direct communication between stations with legacy FH PHYs and the new HR PHY. Should a manufacturer desire to collapse the two access points into one, a dual mode PHY can be built for this purpose. Similarly, a dual mode PHY can be built to accomplish the "downshifting" described on page 511 without the need to create an option in this HR PHY.	Eliminate the HR/DSSS/FH PHY.	

9.	5.	1.1 and multiple comment resolutions dealing with PBCC	BO	T	Y	PBCC has been shown to provide only a modest benefit, compared to CCK, in simulations on a stationary channel. There is no data to indicate that this result will obtain in the real world. Because of the additional complexity involved in the implementation and specification of this mode, as well as, the lack of any specification as to how and when this mode should be used instead of CCK, interoperability problems are guaranteed. Hiding behind the shield of "It's only an option and doesn't have to be implemented" is not acceptable.	Eliminate PBCC.	
10.	6.	1.1 and Multiple comment resolutions dealing with short preamble	BO	T	Y	The current state of description of the short preamble option describes no mechanism to determine whether selecting this option is useful at any given point in time. The current mode of use for this option requires that significant external intelligence be used to control this option, up to and including human intervention to control the admission of particular 802.11 compliant equipment to particular networks. This is not acceptable for a standard that purports to describe an interoperable WLAN system. In addition, the fact that short preamble is optional is (along with the laundry list of other options in this "standard") a recipe for interoperability hell.	Either: a) Make short preamble mandatory and describe completely when it is to be used and when it is not to be used; or b) Eliminate one of the preamble modes.	

11.	7.	1.1 and Multiple comment resolutions dealing with short preamble	BO	T	Y	The current state of description of the short preamble option describes no mechanism to determine whether selecting this option is useful at any given point in time. The current mode of use for this option requires that significant external intelligence be used to control this option, up to and including human intervention to control the admission of particular 802.11 compliant equipment to particular networks. This is not acceptable for a standard that purports to describe an interoperable WLAN system. In addition, the fact that short preamble is optional is (along with the laundry list of other options in this "standard") a recipe for interoperability hell.	Either: a) Make short preamble mandatory and describe completely when it is to be used and when it is not to be used; or b) Eliminate one of the preamble modes.	
12.	1	1.1	BT	T	Y	The FH option is not (or partly) coexistent and not interoperable with the basic HR/DSSS specification. Using the option creates a separate standard. This is not acceptable	Add provisions to guarantee interoperability. If this is not possible the option should be removed	
13.	2	1.1	BT	T	Y	There is a coexistence problem between the short and long preamble, which can be solved. For the resolution I refer to the comments of Jan Boer		
14.	1	1.1	ch	e	YES	The sentence "Note that inclusion in this standard of both CCK and PBCC is not meant as an assurance that regulatory considerations can be met on either one in any given country" has nothing to do with setting the standard.	This sentence should be removed.	ACCEPTED: The sentence adds nothing to the standard and should be removed.
15.	2	1.1	ch	e	YES	Table 2 is a Co-existence Matrix, thus the ability to decode the PSDU/MPDU should have no bearing on this table. There should be no deference between OK and C in this co-existence table.	Change all cells marked with C to OK and remove the C category.	ACCEPTED: Editor to correct.

16.	1	1.1	DB	T	yes	Reasons: The PHY specification contains options. 802.11 has voted that options shall be minimised and included only when absolutely necessary (see previous meeting minutes). The presence of following options mandate a No vote: Short PLCP frame format FH PLCP frame format DSSS/PBCC Data Modulation and Modulation rate Additionally, the 2.4 GHz high speed PHY effort was chartered with a specific purpose and was restricted by 802.11 to the definition of a *SINGLE* 2.4Ghz higher speed PHY. The inclusion of these options specifically violates the letter as well as the spirit of that charter and is in direct contradiction of the decision under which the group was chartered. Until the draft specifies a single 24GHz PHY the group has not met it's goal or charter. (Note: This is a serious issue that I feel strongly enough about to push all the way to exec com if necessary.) To resolve the issue I suggest that the group adopt the following w.r.t. to each option: Short PLCP frame format: First choice = Remove the long PCLP header and mandate use of only the short header. This would create a high-speed PHY which would actually provide some of the thruput performance promised by the increased bit rate. This would also remove the antenna to antenna backward PHY compatibility that the current draft contains. I personally do not think that is important (from a business standpoint as the installed base of low speed DSSS units is negligible). However if the		

17.	1	1.1	Dk	TE	N	Table 1 has some errors in the column labelled HR/DSSS/FH. When the HR/DSSS/FH transmits, the data portion which uses the HR/DSSS/short frame formatting will have the same effect as a HR/DSSS/short transmitter on a receiver configured for DSSS, HR/DSSS, HR/DSSS/short, or HR/DSSS/PBCC. For example, during the transmission of the data portion using the HR/DSSS/short format, a HR/DSSS receiver will be able to CCA the packet as long as the signal is at the same frequency. All of the other DSSS matrix entries assume the transmitter and receiver is at the same frequency also. Thus, in this table, all of the entries for the HR/DSSS/FH column should be marked either a (1) or (2) or (OK).	The column marked HR/DSSS/FH (TX) should contain the following entries: DSSS 2 FH 1 HR/DSSS 1 HR/DS/short OK HR/DS/FH OK HR/DS/PBCC OK Where 2 is CCA sensing during the secondary HR/DSSS/short preamble, not during the FH preamble, and none of the PPDU can be received.	REFERRED TO FH TECHNICAL GROUP.
18.	2	1.1	Dk	TE	N	Table 2 has an error in the column labelled HR/DSSS/FH and the row marked HR/DSSS/short. A HR/DSSS/FH transmitter should cause CCA in a HR/DSSS/short receiver during the data portion which uses the HR/DSSS/short format. All of the other DSSS matrix entries assume the transmitter and receiver is at the same frequency also.	The matrix item should be marked OK'.	REFERRED TO FH TECHNICAL GROUP.
19.	3	1.1	JBo	T	Y	The coexistence matrix should reflect changes after adoption of my comment 2: coexistence between short and long preamble. PBCC should in this matrix also be split into long and short preamble (same as CCK). The X in HR/DS/short at TX and DSSS at RX is very pessimistic. Coexistence is dependent on the CCA method used in DSSS. DSSS as part of the high rate system will coexist.	Change column HR/DS/short DSSS: OK'' FH: HR/DSSS: C Where: OK'' = Coexists with possible interference, depending on the CCA mode used. Split HR/S/PBCC in column for long and short (this should also be done in the interoperability matrix)	

20.	1	1.1	JC	T	Y	The FH option contained in the draft violates the PAR restriction to a single PHY. Anyone can build a dual-mode transceiver if desired, but specifying how to do this violates our PAR. Separate from the fact that our PAR restricts the high-rate solution to a single PHY, it is important to realise that the FH PHY is limited by regulatory agencies (at least in the US) to low data rates, while DS signalling can effect much higher rates for reasonable E_B/N_0 values. It makes no sense to constrain any aspect of the future technology.	Remove FH material from HR DSSS PHY standard	
21.	1	1.1	lw	T	Y	There are too many modes of operation for the HR/DSS S PHY. This is confusing to the customer and not in the spirit of the PAR. We are to develop a single, high speed PHY and the HR/DSS with short preamble fits that description.	There should be a primary high speed, mandatory mode of operation for the HR/DSSS PHY. I recommend that the HR/DSSS with short preamble become mandatory. I also recommend that PBCC either replace CCK or we drop it out of the standard completely. This is the only way to ensure 802.11 HR/DSSS interoperability.	
22.	2	1.1	lw	T	Y	Backward compatibility is not part of the PAR but a good idea. We have written the PHY spec as backward compatibility to DSS as being mandatory and forward compatibility to the true HR/DSSS with short preamble as not mandatory.	In conjunction with what I wrote in 1, I also suggest that the long preamble be optional the same as the optional FH compatibility mode.	
23.	3	1.1	lw	t	n	Table 1.1 is so confusing that it shows the need to eliminate options.	Eliminate the options as suggested in 1.	
24.		1.1	mt	T		It is my opinion that the DSSS-FH option of the 2.4GHz high speed option should be deleted. The use of this option will not offer a robust solution to any migration issues that a current user of 802.11 FH will encounter. This option was part of compromises resulting from attempts to pass the standard and is not a strong technical solution.	Delete all references to DSSS-FH option	

25.	1	1.1	mw	E		The acronym HR/DSSS is not unambiguously defined. Does it mean HR/DSSS long preamble at 5.5 and 11 Mbps, exclusive of short preamble? Does it mean HR/DSSS long or short at 5.5 and 11 Mbps? Is it inclusive of CCK but exclusive of PBCC? Is HR/DSSS a four rate system: 1, 2, 5.5 and 11 Mbps? Or, is HR/DSSS a two rate system: 5.5 and 11 Mbps? Is HR/DSSS/long inclusive of PBCC?	Consider unambiguously defining terms (HR/DSSS, HR/DSSS/long, etc.) and acronyms and use consistently throughout text. Make a definition table. My preference is to use HR/DSSS to denote an implementation containing 4-rates: 1, 2, 5.5 and 11 Mbps. Short or long preamble. BARKER, CCK or PBCC. FH option or not. This is the most inclusive definition. Submodes would be individually identified/defined. For example, HR/DSSS/PBCC would mean 5.5 or 11 Mbps PBCC, short or long preamble. HR/DSSS/PBCC/short would denote 5.5 or 11 Mbps with the short preamble. HR/DSSS/short would denote BARKER, CCK or PBCC at 2, 5.5 or 11 Mbps, all with short preamble.	REJECTED: Para.2 of Section 1.1 defines the HR/DSSS as being the high rate CCK extension to the current standard using the long preamble. Proposed Resolution: Replace paragraphs 3 and 4 of Section 1.1 with the following text: "Optional mode as are also described. An optional mode replacing the CCK modulation with Packet Binary Convolutional Coding (HR/DSSS/PBCC) is also provided. To optimize data throughput at the higher rates an optional short PLCP preamble is provided. This mode is called HR/DSSS/short or HR/DSSS/PBCC/short. This short preamble mode cannot co-exist with DSSS, HR/DSSS/PBCC or HR/DSSS." .Propose Resolution: Add the column and row for HR/DSSS/PBCC/short to Tables 1 and 2. Table 1: HR/DSSS/PBCC/short column 1 x 1

26.	2	1.1	mw	t		Some of the entries of Table 1 are debatable depending upon viewpoint. For example, CCA mode 2 (carrier sense) fails on CCK or PBCC. However, the virtual CCA mode succeeds on CCK or PBCC if the header is correctly received.	Consider making a itemised list of failure mechanisms. Make a itemised list of necessary success mechanisms. Denote type in entries. An improved CCA scheme would simplify Table 1.	
27.	3	1.1	mw	t		What is the intent of Table 1? Is it an attempt to inform system administrators what modes can be intermingled? OK and X are understandable. The 1's are a bit ambiguous. How does one interpet: an OK for an HR/DSSS/short system receiving HR/DSSS, but the reciprocal HR/DSSS system receiving HR/DSSS/short is only a 1?	Consider clearly stating the intent and interpretations. Maybe redefine Table 1 to mean the receiver can successfully receive the PPDU and ignore the interference issue. An improved CCA scheme would simplify Table 1.	
28.	4	1.1	mw	t		Some of the entries of Table 2 are debatable depending upon viewpoint. For example, CCA mode 2 (carrier sense) fails on CCK or PBCC. However, the virtual CCA mode succeeds on CCK or PBCC if the header is correctly received. The typical reader may be confused. The standard is very confusing in its present form. The casual reader will probably develop the opinion that only a couple modes work together (i.e., the diagonal elements in the table).	Consider clarify intent and definitions. Quantify performance if possible. An improved CCA scheme may simplify Table 2.	

29.	5	1.1	mw	t		Table 1 and Table 2 may create a lot of confusion. They tend to make the standard appear user unfriendly.	If an improved CCA scheme is adopted, the rules may become simple (if FH is ignored): RULE: (1) If legacy 1-and-2 Mbps only DSSS systems are included in a cell along with the new high-rate stations, always use long preambles. 1, 2, 5.5 and 11 Mbps is supported. The virtual CCA provides clean functioning. (2) If only new high-rate-extension compliant stations are used in a cell, long or short preambles can be used but short can only be received by another station supporting short. 1, 2, 5.5 and 11 Mbps is supported. The new CCA provides clean functioning. Mobility is support only with long preambles. (3) If only new high-rate-extension compliant stations containing the short preamble option are used in a cell, long or short preambles can be used concurrently and successfully received by all. 1, 2, 5.5 and 11 Mbps is supported. The new CCA provides clean functioning. Mobility is support only with short or long preambles.	
30.	1	1.1	RvN	T	yes	The FH option is not interoperable nor coexistent with the basic CCK standard. This violates the intent of creating one basic high rate standard and it will create a lot of confusion in the market.	Change the FH option in order to guarantee interoperability with basic CCK, or delete the entire option.	

31.	1	1.1	sb	TE		In the third para it says 'The short preamble mode cannot co-exist with DSSS and HR/DSSS'. There are levels of co-existence, e.g. they may co-exit in the same band on different channels. Table 1 even suggests that an HR/DS/SHORT transmission will cause CCA at a DSSS receiver – this is also some level of coexistence.	Make the definition of will not co-exist clearer	Technical. Passed to FH group.
32.	4	1.1	sb	e		Reference is incorrect in 6th para	Should be 1.4.6.8 not 1.4.6.9	Resolution: Replace 1.4.6.8 with 1.4.6.7.
33.	6	1.1	sb	t	N	Use of the 4.0Mbps signal field value for HR/DSSS/FH probably means that this rate now needs to be revised to be reserved in the FH section of the standard. Should this be added as a modification to the existing standard?	Suggestion	
34.	10	1.1	sb	E		I think you can cut some of the detail about the FH interoperable mode from this. It is just cut and paste from elsewhere. Suggest an introduction here and definition in 1.2.3.15 …	Simplify text	Editor to simplify overview description of FH interoperable mode if deemed appropriate; otherwise, commentor should provide detailed text instead of general statement.

35.	1	1.1	TG	T	N	Table 1, Interoperability Matrix, and Table 2, Co-Existence Matrix are incomplete. According to the additions to Appendix A (A4.7), Short Preamble and PBCC are orthogonal, independent options. Thus all option combinations must be specified.	The tables should include four rows and columns for the four HR/DSSS options: Long CCK, Short CCK, Long PBCC, and Short PBCC. Alternatively, if the intention is that PBCC may only use Short Preamble, then the PICS supplement (A4.7) should be changed so that HRDS10 (PBCC) requires HRDS3 (Short Preamble). This would also require eliminating the PBCC option in the Long PLCP service field definitions in 1.2.3.4, and moving the existing diagram (table 3) with PBCC to 1.2.3.11. An edited table in Framemaker format is available from the commenter.	

36.	2	1.1	TG	t	N	The legends of Table 1, Interoperability Matrix, and Table 2, Co-Existence Matrix do not completely specify the different levels of interoperability and co-existence. The option "1" (in table 1) and Option "C" (in table 2) need to be subdivided to indicate the difference between using only an energy-based CCA, and the limited virtual carrier sensing possible by being able to receive the PLCP header with its length field, even though the PSDU would not be received.	For the Interoperability Matrix, an additional mode should be added: "2 = There is sensing (CCA) that another BSS is functioning, and reception of the preamble, SFD, and PLCP header allow deferral for the duration of the Length field." For the Co-Existence Matrix, the "C" option should be split into "C1" and "C2". C1 = Co-exist by deferring on CCA without reception of PLCP header or PSDU. No virtual carrier sense. C2 = Co-exist by deferring on CCA and partial virtual carrier sense based on reception of the Length Field of the PLCP Header. Additional text for the "OK" option: OK = Co-exist w/o interference (defer with full physical and virtual carrier sense) An edited table in Framemaker format is available from the commenter.	

37.	1	1.1	TT	t	N	Table 1 – Interoperability Matrix has a couple of errors in the following elements. Tx> HR/DSSS/short - Rx> DSSS - value = 1 Tx> HR/DSSS/short - Rx> HR/DSSS - value = 1 In these two cases a receiver that does not have the Short Preamble implemented cannot detect the SFD and PLCP Header and therefore cannot defer to this frame.	Change these two table elements to X.	
38.	2	1.1	TT	t	N	It is not clear from this table that the assumption being made is that the receiver with the PBCC option also has the Short preamble implemented. Since this combination is not mandatory, but an election on the part of the manufacturer, it should be stated here.	Add Sentence: Tables 1 and 2 assume that the receiver which has the PBCC option implemented has also implemented the Short Preamble option.	
39.	3	1.1	TT	e		Titles in Tx> headings of Table 1 are not correct.	Change: HR/DS/short to HR/DSSS/short HR/DS/PBCC to HR/DSSS/PBCC	ACCEPTED, change titles.~~ACCEPTED, change titles~~
40.	4	1.1	TT	t	N	The description in the legend for entries marked as 1 is not quite correct. "1 =There is sensing (CCA) that another BSS is functioning, but no detection of the PPDU." The term PPDU is not correct here.	Change PPDU to PSDU.	ACCEPTED, change PPDU to PSDU
41.	3	1.1	WDI	T	Y	The Short preamble generates a coexistence problem. This problem should be resolved.	This problem can be resolved, by the proposal of Jan Boer. I refer to that solution.	
42.	1	1.2.2 1.4.6.8 0/1/2	JBo	T	Y	The FH option is not (or partly) coexistent and not interoperable with the basic HR/DSSS specification. The option is in this sense a separate standard within the standard. It will be confusing for the market and is bad for the credibility and acceptance of the standard .	Add provisions to guarantee interoperability. If this is technically nor feasible the option should be removed	

43.	4	1.5	AS	T	Y	Fix Basic rate set definition	Make changes as per clause 3.8 in paper 99/xxx	
44.	5	1.5	AS	E	N	Copy the whole subclauses and make the required changes instead of copying only the relevant portions. This will allow someone referencing the document to look in one place for the description of a subclause instead of 2.		ACCEPTED: Editor to copy entire subclauses and reflect required changes.
45.	6	1.5	AS	E	N	Add Short preamble and PBCC subfields to figure 27		ACCEPTED: Editor to add.
46.	7	1.5	AS	E	N	Fix description of Supported rates element with respect to the definition of the BSS basic rate set.	Make changes as per clause 7.3.2.2 in paper 99/xxx	Defer. Haven't seen the paper.
47.	8	1.5	AS	T	Y	Fix description of DCF in 9.2 with respect to the definition of the BSS basic rate set.	Make changes as per clause 9.2 in paper 99/xxx	Defer. Haven't seen the paper.
48.	9	1.5	AS	T	Y	Remove reference to PHY mandatory rates in clause 9.6.	Make changes as per clause 9.6 in paper 99/xxx	Defer. Haven't seen the paper.
49.	10	1.5	AS	E	N	Fix description of OperationalRateSet with respect to the definition of the BSS basic rate set.	Make changes as per clause 10.3.3.1.2 in paper 99/xxx	Defer. Haven't seen the paper.
50.	11	1.5	AS	E	N	Fix description of OperationalRateSet with respect to the definition of the BSS basic rate set.	Make changes as per clause 10.3.10.1.2 in paper 99/xxx	Defer. Haven't seen the paper.
51.	12	1.5	AS	E	N	There are no existing clauses 10.4.6 or 10.4.7. It would probably be better to format each of these clauses and subclauses as they appear in the current standard and make a comment to add these subclauses.		ACCEPTED: Editor to include existing standard sections and reflect required additions and modifications.
52.	8.	1.2.3 and its sub-clauses	BO	T	Y	Where the definition of a PLCP field is the same as in clause 15 of IEEE 802.11-1997, the proper text is to reference that earlier definition.	Eliminate duplication of text in field descriptions that are already present in clause 15. Replace with a reference to the correct subclause in clause 15. Where additions are being made to values defined for a field, reference the earlier clause and add something like: "the following additional values are defined: …"	This was discussed previously and it was decided that this should be a stand alone section.
53.	9.	1.3.2	BO	T	Y	The HR/DSSS MIB is NOT described in IEEE 802.11-1997 anywhere. A complete ASN.1 description of the MIB for HR/DSSS is required.	Provide a complete ASN.1 description for the HR/DSSS MIB.	
54.	10.	1.5	BO	T	Y	Figure 27 does not show the new subfields.	Add the subfields in the correct locations.	

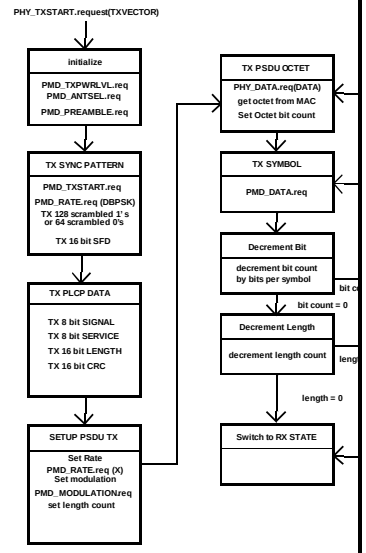
55.	11.	1.5	BO	T	Y	Because of comments made earlier which have lead to the elimination of PBCC and either the elimination of two different preamble modes or that short preamble was made mandatory, the extensions to the capability information element and status codes are no longer necessary.	Eliminate all text changing the capability information element and the status codes.	
56.	2	1.3.2	HMO	E	N	dot11RegDomainsSupported is not part of the dot11PhyOperationTable .	Define this as separate dot11RegDomainsSupportedTable.	ACCEPTED: See revised Table 6 in Word document
57.	3	1.3.2	HMO	E	N	Reference to items dot11SupportedDataRatesTx and dot11SupportedDataRatesRx is incorrect.	Refer to dot11SupportedDataRatesTxTable and dot11SupportedDataRatesRxTable.	ACCEPTED: See revised Table 6 in Word document

58.	1	1.5 for existing para. 9.6	MIF	T	no	The equation given for calculating the time required to transmit the frame is incorrect. The factor of 32768 in the divisor term causes a result that is far shorter than the actual frame transmission time. For example, if MPDU length is 32 octets and the data rate is 11Mbit/s, the time period added to the PreambleLength plus the PLCPHeaderLength is (8 * 32 * 1) / (11 * 32768) = 256 / 360488 = 0.00071, which is clearly the wrong value. It would appear that the 32768 is an attempt to compensate for an unspecified encoding of the MPDUDurationFactor, but this is (a) not specified, (b) inconsistent with the value given for the MPDUDurationFactor in clause 1.3.3, Table 7, and (c) inconsistent with the definition of MPDUDurationFactor in 802.11rev. Note that scaling the MPDUDurationFactor by 32768 is NOT sufficient for the general needs of the 802.11 MAC. This provides 15 bits of fractional precision, which is less than 4.5 significant (decimal) digits, which is barely sufficient for the existing FH PHY, but is insufficient to provide microsecond resolution across the range of allowable frame lengths and the allowable range of data rates. Just changing the FH PHY's 33/32 expansion to 65/64 would require 6 significant digits of fractional precision, and the range of sensible values could need at least 8 digits. The coding of aMPDUDurationFactor used in Annex C of 802.11-1997 provides 9 significant digits.	Correct this equation to yield the correct value and to be consistent with the encoding of aMPDUDurationFactor adopted for 802.11rev. This also requires a change in Table 7 in Clause 1.3.3 to aMPUDDurationFactor value =0. To be consistent with the encoding of aMPDUDurationFactor from 802.11rev, (which is the one already present in Annex C of 802.11-1997), the proper equation is: "aPreambleLength + aPLCPHeaderLength + (((aMPDUDurationFactor x 8 x PSDUoctets) / 10^9) + (8 x PSDUoctets)) / data rate where data rate is in Mbit/s"	
59.	4	1.5	MIF	T	no	The modifications to existing paragraphs in the standard is supposed to include a new "Supported Options" element with two fields, a byte for supported codes and a byte for supported PLCP headers. This was accepted in the Letter Ballot resolutions of comment sequence #276, but does not appear in the D2.0 draft.	Include the Supported Options element, as stated in the acceptance text of the disposition column for comment sequence #276 of 98/405.	

60.	6	1.2.2.1	mw	e		Should the payload portion of the packet be identified as MPDU or PSDU? IEEE802.11-1997 shows MPDU.	Consider choosing MPDU or PSDU. Explain in text why different from IEEE802.11-1997, so the reader does not become confused.	~~ACCEPTED, change MPDU to PSDU as done elsewhere.~~Rejected: Leave as PSDU. Note, MPDU and PSDU are really the same thing.
61.	3	1.2.2.1	sb	E		Figure 3 is duplicate and does not match text	Delete figure 3	Simon seems to have duplicates that don't show on my copy. Actually, the real Figure 3 was inadvertently deleted and needs to be added back in.~~Simon seems to have duplicates that don't show on my copy. Actually, the real Figure 3 was inadvertently deleted and needs to be added back in.~~
62.	8	1.2.3	sb	e		All transmitted bits except in the case of FH … tighten English … e.g. does this mean just the PLCP FH fields, or the short PLCP/MPDU too …	Be precise about the fields referred to	ACCEPTED: Delete the first sentence in clause 1.2.3 and change the first sentence in clause 1.2.4 to read"… scramble all bits transmitted except for the FH preamble and header.

63.	17	1.5	sb	T	N	It is not clear to me in this standard if Short Preamble mode and PBCC mode are operational modes for a BSS (what I expected given the introductory text about co-existence and interoperability), or per-PPDU attributes (what I suspect has been envisaged given the changes here). If they are operational modes for a BSS – and that seems the more sensible option, then the additions to capability information are probably not the most elegant way of proceeding. The capabilities information was designed to signal MAC capabilities, not PHY. I would suggest defining a new PHY parameter set for the HR PHY (consistent) this would then go in beacons and probe responses and indicate the operating mode in that BSS (e.g. PBCC or short preamble). If per-MPDU changes are envisaged then the other stations in the BSS need to be absolutely capable of sensing the optional exchange accurately … as with muli-rate. This seems not to be the case. I also note that while the multi-rate text has been extended (again assuming a per-PPDU selection of mode). The rules concerning management frames like beacons have not. This would be clear if the options were modes per BSS. I note FH mode is not signalled here or elsewhere – though that could be inferred from the combination of DS and FH parameter sets both being present in beacons. If so make clear.	Clarify whether PBCC, FH, SHORT are operational modes in a BSS (preferred given the co-existence/interoperability), or per-PPDU. If per-BSS consider changes suggested. Make PHY primitive parameters consistent with given approach – if a mode then use PLME, if per-PDU append to PHY-TXSTART.	
64.	3	1.5	TG	E	N	In Table 27, the Short Preamble and the PBCC subfields are not shown in the drawing.	Add the new subfields to the drawing: B5 = Short Preamble B6 = PBCC Modulation	ACCEPTED: See item 45.
65.	2	1.3.3	AS	E	N	The description of aPreambleLength should only contain cases for the modal options.	Remove “or 72 us” and “short,” from the Value field for aPreableLength.	TECHNICAL: Being modified by the other technical group.

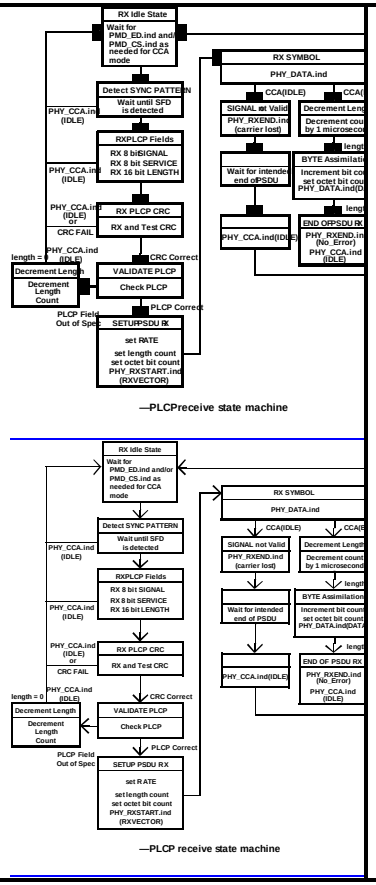
66.	12.	1.2.2.2	BO	T	Y	Both Figures 2 and 3 seem to depict PLCP frame formats. Yet neither is referenced nor described in the text.	Either delete these figures or describe their meaning and use in the text.	
67.	13.	1.4.2	BO	T	Y	Functional requirements don't belong in the overview.	Eliminate "shall" statements.	
68.	1	1.2.4	ko	T		In order to realise accurate and quick initial acquisition, it is important to use phase information of preamble sequences by defining initial state of a scrambler also for a long preamble.	Define initial state of scrambler for long preamble	
69.	7	1.2.2.2	mw	e		Figure 2 for the short preamble shows only 5.5 and 11 Mbps for the PSDU. 2 Mbps should be included also.	Add 2 Mbps to the PSDU in Figure 2.	ACCEPTED: Editor to change figure to add 2 Mbps to the PSDU. Add to end of clause 1.2.2.2: "…moduation and the PSDU shall be transmitted at 2Mbps, 5.5 Mbps or 11 Mbps."
70.	11	1.2.4	sb	t	N	It says that the polynomial … shall be used to scramble *all* bits transmitted by the HR/DSSS PHY. Elsewhere the FH interoperable preamble/header are excluded. So there is a conflict here.	Remove conflict.	ACCEPTED, change to "all except FH header"
71.	5	1.2.2.2	TT	E		In figure 2, heading for PLCP header is incorrect.	PLCP HEADER 48 BITS @ 2 Mbit/s should be short PLCP HEADER 48 BITS @ 2 Mbit/s	ACCEPTED, add "short" to the label. Editor to fix figure.~~ACCEPTED, add "short" to the label~~
72.	6	1.2.2.2	TT	E		Need to add the word PLCP to be unambiguous about which preamble and header we are talking about.	The short PLCP preamble uses the 1 Mbit/s Barker code spreading with DBPSK modulation. The short PLCP header uses the 2 Mbit/s Barker code spreading with DQPSK modulation.	ACCEPTED, add "PLCP" to indicate what header is being referred to. ~~ACCEPTED, add "PLCP" to indicate what header is being referred to.~~

73.	14.	1.2.3.15	BO	T	Y	Table 8 does not describe all of the possible bit combinations. Neither is the table referenced in the text.	Complete the table with the missing bit combinations.	
74.	3	1.3.4	AS	T	Y	No description of the extended characteristics has been provided.	Make changes as per clause 1.3.4 in paper 99/xxx	
75.	15.	1.2.2.3	BO	E		This clause references figure 7 incorrectly.		ACCEPTED: See item 80.
76.	16.	1.2.2.3	BO	T	Y	This clause incorrectly places requirements on the MAC. The content of the PSDU is unknown to the PHY and can not be described here.	Remove all references to contents of PSDUs.	
77.	17.	1.2.2.3	BO	T	Y	This clause incorrectly places requirements on MAC management. The PHY is solely a mechanism to carry bits from one place to another. The PHY is incapable of knowing and interpreting the meaning of those bits.	Remove all references to MAC management functionality.	
78.	18.	1.4.3	BO	T	Y	Figure 19 incorrectly show MAC Management above the convergence layer. This is incorrect.	Extend the MAC block to the right, pushing the MAC Management block further to the right until it is no longer above the convergence layer.	
79.	1	1.2.5	ca	E	N	The figure 8 needs to be modified for the LONG/SHORT PREAMBLE		ACCEPTED: Change "64 scrambled zeros" to "56 scrambled zeros"
80.	3	1.2.2.3	Dk	E	N	Figure 3 is missing.	Add figure 3 back in.	Accepted, editor to add in figure 3.~~Accepted, add in figure 3~~

81.	4	1.2.5	Dk	T	N	The HR/DSSS/FH mode should include some form of cross CCA such that a compliant unit will defer to a HR/DSSS signal that is already on transmitting on the air. There is no such requirement currently in the draft, partly because it was assumed that the unit would be searching for the FH preamble in the 1 MHz bandwidth. This is not necessarily true – it is possible to provide single RF string with dual digital processing. Use of RSSI at 10 – 20 dB above sensitivity is also possible. Since the HR/DSSS/FH option mixes the FH and DS format, some degree of cross CCA should be included in the requirements.	Add the requirement to perform CCA with one of the two following methods: Energy detect >-70 dBm in the 1 MHz it is tuned to. A timeout feature is allowed to protect against CW interference. Or Be capable of detecting HR/DSSS or DSSS signals and setting CCA to busy for the extent of the frame.	
82.	1	1.2.5 1.2.6	HMO	T	Y	The impact of PBCC is not defined in the transmit and receive procedures.	Define the impact of PBCC on the transmit and receive procedures.	
83.	6	1.2.2.3	HMO	E	Y	Incorrect reference to Figure 3.	Include new Figure 3 (and renumber following figures)	ACCEPTED: See item 80.
84.	7	1.2.2.3	HMO	T	Y	The optional FH PLCP frame format causes a station that uses it to be not interoperable with stations that do not support this option. It does not even properly share the medium.	Change this option to make it interoperable.	
85.	1	1.2.2.3	nc	E	N	The figure describing FH preamble is missing. It appears in file p80211b-draft1.last.pdf as figure 5 on page 8.	Insert the figure	ACCEPTED: See item 80.
86.	2	1.2.2.3	nc	T	Y	The format of the preamble, as shown in figure 5 of file p80211b-draft1.last.pdf shows that the duration of the high-rate short preamble is 81 microseconds, while in the figure describing the short preamble it id 96 microseconds. Apparently, the preamble is using 5.5 Mbit/s, as opposed to 2 Mbit/s in regular short preamble mode. This deserves to be mentioned in the text.	See next comment	

87.	3	1.2.2.3, 1.2.3.15	nc	T	Y	The text is not aligned with the change made to 1.2.3.15 according to the resolution of comment 160 in 84057b: Comment accepted. The FH PLCP modification in 18.2.3.15 will be changed to use the existing FH PLCP PSF field using an indication of a 4 Mbps data rate (0110) which is currently unused and a length indication sufficient to cover greater than or equal to the duration of the full HR/DSSS packet. For example, if a FH/HR station takes the duration of the full HR/DSSS packet including guard time in microsec and divide by 2 and rounds up to calculate the length to insert in the FH PLCP header, a legacy FH station will defer for a period greater than or equal to the length of the packet whether it calculates the equivalent length with or without the 33/32 stuff expansion factor used in the 1 and 2 Mbps FH mode. This was approved at the plenary.	Change at page 13, line 34, from: The FH interoperability mode uses the FH preamble and header to establish the channel the signal will be radiated on and the rate it will use. The length contained in the FH PLCP header shall indicate the length in octets of the MPDU contained in the following HR/DSSS frame. To: The FH interoperability mode uses the FH preamble and header to establish the channel the signal will be radiated on. When transmitting an FH/HR PPDU, the rate in the FH PSF shall indicate a 4 Mbps data rate and the length shall indicate a number of octets, which, when sent at 4 Mbps, would be sufficient to cover greater than or equal to the duration of the full HR/DSSS PPDU. The data rate of the HR/DSSS PPDU may be either 5.5 or 11 Mbit/s, and it is signalled in the PLCP HEADER part of it. The PLCP HEADER part of HR/DSSS PPDU in the FH/HR mode shall be transmitted at 5.5 Mbit/s CCK modulation.	1.2.3.15 details the procedure.

88.	5	1.2.2.3	sb	t	N	The need to have both DS and FH parameter sets in beacon/probe response frames for HR/DSSS/FH will need modification of Tables 5 and 12 in clause 7 of the current standard. Text in these tables defines when these information elements should be used.	Revise definitions in existing tables and add to MAC modification section.	
89.	7	1.2.2.3	sb	e		In figure 5 the duration values are wrong for re-defined short header rate	correct duration values	ACCEPTED: Editor to correct duration of PLCP header in Figure 3.
90.	1	1.2.5	Sr	T	No	In the long term, interoperability of the HR/DSSS PHY with low-rate FH modes is not going to accelerate acceptance of the 802.11b standard nor help expand the market for wireless LAN products nor have an overall positive influence on the acceptance of wireless LAN technology or products.	Eliminate the option for low-rate FH interoperability.	
91.	1	1.2.5 1.2.6	WDI	T	Y	The impact of PBCC is not defined in the transmit and receive procedures.	Define the impact of PBCC on the transmit and receive procedures.	
92.	2	1.2.2.3	WDI	T	Y	The FH PLCP option is not interoperable with stations that do not support this option. In fact it does not even coexist. This means that the standard is seriously broken. An option in the standard is only acceptable when it is at least interoperable with the basic standard. Interoperability should mean interoperability at the high rates.	This option is only acceptable when interoperability can be achieved at the higher rates.	
93.	2	1.4.4	ap	E		Figure 11	Fix drawing lines	REJECTED: Needmore detail from commentor.
94.	1	1.2.6	AS	E	N	Replace figure 10 with the correct version of figure 94 from Tgrev.		ACCEPTED: Editor to correct.

95.		2	1.2.6	ca	E	N	The Receive state machine needs to have the set RATE mechanism modified		ACCEPTED: Editor to correct and need to add a "Set Modulation" in the "SETUP PSDU RX" block.

96.	3	1.2.6	MIF	T	no	The 6th paragraph of 1.2.6 states that the "receive parameters" (presumably the RXVECTOR) includes several items, but not the PLCP format detected on the incoming frame. It is of critical importance that the MAC be informed of which PLCP format was used so that the same format can be specified for the response frame (if a response is needed). NOTE: The lack of this exact mechanism was part of this voters "NO" vote on Letter Ballot 15, and would have been the basis of a NO vote on this ballot except that Document 98-405 (Letter Ballot 15 comment resolutions) states that comments sequence #187 and #276 are accepted, so I assume that the PLCPFormat parameter is already a part of 802.11B RXVECTOR, and its omission from the D2.0 draft is an oversight.	Add (in an appropriate clause) a full description of the PHY-RXSTART.indicate(RXVECTOR) primitive, comparable to the descriptions thereof in the other PHY definitions. Include therein a PLCPFormat parameter that can take values "LongPLCP," "ShortPLCP," or "FHPLCP."	ACCEPTED, see comments resolution by ca
97.	10	1.2.6	mw	e		The statement "A receiver conformant to this high rate extension shall be capable of receiving 5.5 and 11 Mbps in addition to 1 and 2 Mbps" states that this is a four-rate standard. One cannot build an odd mix of rates: 5.5 and 11 Mbps only, etc.	Just a point of clarification. Duplicate this comment on first page of extension.	ACCEPTED: Add " in addition to the 1 and 2 Mbps rates" to the first sentence of the second paragraph of clause 18.1.
98.	11	1.2.6	mw	t		Since this a four-rate standard it seems possible to autodetect the short preamble when in the long preamble mode.	Consider changing the wording to state that all implementations which are short-preamble-receive-option capable, must auto-detect short-preambles when configured in the long-preamble mode.	

99.	14	1.2.6	sb	T	N	In figure 12 the PMD primitives are illustrated as being at the PLCP-MAC service interface. These are PMD primitives so that cannot be so. Maybe the information for rate and antenna select is in the PHY_TX_START since it is synchronized to a PSDU transmit. Indeed that is what the first paragraph following figure 12 suggests … but 1.4.4.3 point to PMD primitives which are between PMD and PLCP not PHY primitives. Maybe modulation and header are PLME primitives since these are operating modes.	Sort out the logical layering and primitives.	
100.	7	1.2.6	TT	e		Wrong word used. When using Long PLCP will have both a long Preamble and a long Header.	The receiver configured to receive a short PLCP shall also be capable of receiving a PPDU with a long PLCP preamble ~~or~~ and header.	ACCEPTED
101.	19.	1.2.3.4	BO	E		The SERVICE field is no longer reserved. There are functional bits described here.	Eliminate references to the field being reserved.	ACCEPTED
102.	20.	1.2.7	BO	T	Y	Conformance specifications are not proper in this clause. They belong in the PICS.	Remove reference to conformance.	
103.	21.	1.4.5 and its subclauses	BO	E		Having the parameters for the primitives in a table that is well separated from the description of the primitives, themselves, is very annoying and makes this section difficult to comprehend and retain.	Describe the parameters used by each primitive in the description of the primitive.	Good Idea. The editor should consult with the commentor for a better format.

104.	5	1.4.5	ca	T	N	detailed service specifications need an entry for PREAMBLE	PMD_PREAMBLE.request Function This primitive, which is generated by the PHY PLCP sublayer, selects the preamble mode that shall be used by the HR/DSSS PHY for transmission. Semantics of the service primitive The primitive shall provide the following parameters: PMD_PREAMBLE.request(PREAMBLE) PREAMBLE selects which of the HR/DSSS PHY preamble types shall be used for PLCP transmission. Subclause 18.2.2 provides further information on the HR/DSSS PHY preamble modes. The PREAMBLE parameter takes on the value of zero(0) for long preamble or one(1) for short preamble When generated This primitive shall be generated by the PLCP sublayer to change or set the current HR/DSSS PHY pream-ble mode used for the PLCP portion of a PPDU. Effect of receipt The receipt of	

105.	8	1.2.3.4	mw	e		(page 513, line 31) 18.2.3.3 should be 18.2.3.5.	Consider making paragraph number change.	ACCEPTED, fix references.~~ACCEPTED, fix references~~
106.	4	1.2.7	nc	T	N	On line 52 there appears: … with short PLCP frame format as specified in clause 1.2.2. However, there is a difference in that the PLCP header is transmitted at 5.5 Mbit/s, not at 2 Mbit/s. This needs to be addressed.	Text depends on corrections to 1.2.2.3 and 1.2.3.15	
107.	9	1.2.3.4	sb	E		The SERVICE field is *not* reserved for further use except for two bits. The field is used for a purpose … but only two bits are used all others are reserved for future use. Also IEEE802.11 device compliance is *not* signified by the unused bits being zero … if only this were so life would be easy! These bits re reserved and shall be set to zero on transmission is I think what you mean!	Re-write paragraph in standard-ese … sorry!	ACCEPTED: See item 101.
108.	22.	1.2.8	BO	T	Y	This clause does not adequately describe the operation of the PLCP for the FH compatibility operation. There is insufficient information to build compliant implementations. In particular, the timing, order and content of the PHY SAP primitives are not described.	Eliminate FH compatibility.	
109.	3	1.4.4.2	ca	T	N	Table 9 needs an entry for PMD_Preamble.req to select the long or short preamble	Add to table	
110.	4	2.0 App.C	HMO	E	Y	State Machines need to be updated.	Provide revision of Annex C.	ACCEPTED: Editor to update state machines.
111.	5	2.0 App.D	HMO	E	N	The new MIB attributes need definition of a new group, and appropriate identification number. Also compliance statements have not been specified yet.	Define a new group (e.g. dot11PhyHRDSSSTable) as dot11phy 11, that includes a new structure (e.g. dot11PhyHRDSSSEntry) that contains the new attributes as items 1 and 2. This new group also has to be included in the compliance statements.	Rejected: See revised Table 6 in Word document.

112.	3	2.0 Appendix	Vh	T	Y	Before A.4.7 the PICS should specify what the extension is in the context of the whole standard. Is it an option that can be selected by itself, is it required to have the DSSS PHY operational?	Add the A4.3 part from the base standard and show what is to be added.	
113.	8	1.4.5.17	TT	T	N	This clause is a sort of a duplicate of one in clause 12. It was copied from the DS clause 15 which was also wrong to have included it. The PHY-CCA.indicate primitive is one between the MAC and the PLCP, not between the PLCP and PMD, therefore has no business being described in this section. I think this is was missed when an attempt was made to clean up this section.	Delete clause 1.4.5.17.	
114.	4	1.4.4.3	ca	T	N	Table 10 needs an entry for PREAMBLE	Add to table	
115.	6	1.1, Table 1	Vh	T	Y	The cell in column FH, row HR/DSSS/FH erroniously speifies that the extension can receive an FH frame.	Remove OK, fill in X. Or may be a qualified 1. The qualification being that in the edges of the HR, there is no sensing.	
116.	7	1.1, Table 1	Vh	T	Y	The cells with an OK for the DSSS column or not correct except for the first row.	Replace the other Oks by a 1.	
117.	16	1.4.5.3	sb	T	N	There is no information in the 'when generated' which suggests when this primitive is actually generated (initialisation I suspect).	Suggest this information is added. It is usual … see PMD_TXSTART request for instance.	
118.	12	1.4.5.13.2	mw	E		What does PN code correlation quality mean for CCK and PBCC? Does this mean only on the waveform portions where BARKER codes exist? Must implementers devise a creative technique for qualifying non-coherently CCK and PBCC?	Consider clarifying. My preference is to state that this means BARKER code detection. Not CCK or PBCC.	ACCEPTED: See modifications to 18.4.5.15.1, 18.4.5.15.2 and 18.4.5.15.3.
119.	13	1.4.5.14.2	mw	t		Are 3 thresholds required. One for each: BARKER, CCK and PBCC?	Consider clarifying.	

120.	9	1.2.3.8	mw	t		I like the idea of using a fixed scrambler seed, since the receiver can now detect the preamble without full scrambler synching. The short preamble scrambler seed specification may be too ambiguous. For example, what is the LSB and orientation of X'6C' in the scrambler? Also, does the specified seed create a bit pattern that looks like SFD near the true SFD? If so, this can cause a problem with false SFD detection.	List the scramble output for the first few bits to avoid implementation confusion. Maybe list all 56 bits of the short sync. Make sure a scrambler seed is chosen which does not create a near-facsimile of SFD near the true SFD at the BARKER level.	
121.	13	1.4.4.5	sb	e		Tables 14/15 and 16/17 are duplicate with 14 and 16 being modified but incorrect.	Editorial fix	Fixed in Draft 2.0
122.	3	1.4.6.4	ch	e	YES	The description of CCK is confusing. The CCK block takes bits and input and outputs QPSK phases. The description currently changes the bits to phases and then operates on the phases to determine the QPSK outputs. It would be more clear it the bits were operated on, and then there were a mapping from the encoded bits to phases.	Change the CCK encoder description so that it consists of a mathematical model that encodes the input bits and then maps the bits onto QPSK chips.	**REFERRED TO MAIN GROUP FOR RESOLUTION.**
123.	14	1.4.6.4	mw	e		(page 540, line 54) The word *terms* should probably be *time*.	Consider changing.	ACCEPTED, Change "terms" to "time"~~ACCEPTED, Change "terms" to "time"~~
124.	5	1.4.6.5	nc	e	N	Last line on page, change "in terms" to "in time".		ACCEPTED, Change "terms" to "time"~~ACCEPTED, Change "terms" to "time"~~
125.	2	1.4.8.3	Sr	T	No	Comment resolution effort adequately defined adjacent channel rejection as per my comments in response to Letter Ballot 15.	No need for further changes.	
126.	1	1.4.6.6	mbs	t	YES	Figure 13 should not include the scrambler.	Remove the scrambler from Figure 13.	
127.	2	1.4.6.6	mbs	t	YES	The input and output of Figure 13 are not labelled.	Label the input x. Label the outputs y_0 and y_1, respectively, from top to bottom.	
128.	3	1.4.6.6	mbs	t	YES	In Figure 14, the order of the bits from Figure 13 is not shown.	Label the pairs in Figure 15 (y_1 y_0)	

129.	4	1.4.6.6	mbs	t	YES	The phase change from the last chip of the PLCP hear to the first chip of the PBCC codeword must be specified.	Add the following paragraph: The phase of the first complex chip of the MPDU shall be defined with respect to the phase of the last chip of the PCLP header, i.e. the last chip of the CRC check. The bits (y_1 y_0) = (0,0) shall indicate the same phase as the last chip of the CRC check. The other three combinations of (y_1 y_0) shall be defined with respect to this reference phase as shown in Figure 15.	

130	15	1.4.8.4	mw	E		(page 553, line 40) HR/DSSS is ambiguous. Is it only 5.5 and 11 Mbps with long preamble?	Consider clarifying.	ACCEPTED: Change 18.4.8.4.to: 18.4.8.4 CCA The High Rate PHY shall provide the capability to perform CCA according to at least one of the following three methods: a) CCA Mode 1: Energy above threshold. CCA shall report a busy medium upon detecting any energy above the ED threshold. b) CCA Mode 2: Carrier sense only. CCA shall report a busy medium only upon the detection of a valid BARKER sequence. This signal may be above or below the ED threshold. CCA Mode 3: Carrier sense with energy above threshold. CCA shall report a busy medium upon the detection of a valid BARKER sequencewith energy above the ED threshold. … a) If a valid High Rate signal is detected during its preamble within the CCA assessment window, the energy detection threshold shall be less than or equal to –76 dBm for TX power > 100 mW, –70 dBm for 50 mW < TX power < 100 mW, and –64 dBm for TX power < 50 mW. b) With a valid signal (according to

131.	16	1.4.8.4	mw	t		CCA mode 2 and 3 currently fails on CCK and PBCC.	Consider resolving.	
132.	17	1.4.8.4	mw	t		The CCA modes do not solve all potential interoperability/coexistence problems.	Consider adding a new CCA mode which has two-state channel-busy tripping: (1) either CS occurs with energy below a threshold or (2) CS occurs with energy above a threshold. (1) VERY-WEAK SIGNAL STATE: Used to detect long range 1 and 2 Mbps systems. If CS occurs and the signal is below an ED threshold, declare the channel busy until the CS ends. (2) NOT-WEAK SIGNAL STATE: Used to detect CCK and PBCC which needs higher SNR's. Stronger 1 and 2 Mbps DSSS is detected also. If CS and energy above a threshold occurs, declare channel busy until ED drops. The MAC could disable the VERY-WEAK SIGNAL STATE if desired to mask out adjacent cells.	
133.	18	1.4.8.4	mw	t		(page 554, line 5) The TGa draft does not impose power levels CCA versus threshold levels. Why does TGb?	Consider clarifying motivation for keying thresholds off transmit power level of unknown transmitter?	
134.	19	1.4.8.4	mw	E		(page 554, line 11) The acronym HR/DSSS is not unambiguously defined. Does this mean 1, 2, 5.5 and 11 Mbps? Short or long preamble? CCK or PBCC?	Consider clarifying.	ACCEPTED: See item 130.

135.	7	1.4.6.6	nc	T	N	The PBCC is an absolute, rather than differential, modulation. This requires an unambiguous statement of an initial phase. One example might be the phase of the last symbol of the preamble.	State that the reference phase for the mappings described in figure 14 shall be derived from the phase of the last symbol of the PLCP header	
136.	8	1.4.6.6	nc	T	N	In figure 14 it is not specified which component is I and which is Q, or which is real and which is the imaginary part in complex representation.	Specify Re near the horizontal axis and Im near vertical axis	
137.	9	1.4.6.6	nc	T	N	If the initial carrier phase used as a reference for the PBCC waveform is derived from the last symbol of the PLCP header, then using the constellations as depicted in figure 14 causes that before the transition phases of 0,90,180,270 are used, while after the transition the phases 45,135,225,315 are used. This results in a need to implement a modulator which may support 8 possible phases rather than 4. This in turn causes the I and Q components to become multilevel rather than two levels, which complicates implementation.	Rotate all the constellations in figure 14 by 45 degrees clockwise	
138.	23.	1.4.5.5.3	BO	T	Y	This clause seems to be requiring some action from the MAC, which is improper in this location.	This is probably just described awkwardly. Rewrite the subclause so that PMD_TXSTART.request is seen as a result of the PLCP receiving PHY-DATA.request from the MAC.	
139	24.	1.4.6.7	BO	E		Drop shadows on the boxes in the figures are unnecessary.	Remove drop shadows.	Editor's discretion.
140.	25.	1.4.6.7	BO	T	Y	References to “frame are again made in this clause. At the PMD level where this is described, all that is know are symbols.	Eliminate references to “frame”. Better yet, eliminate PBCC entirely.	

141.	1	1.4.6.7	JF	T	Y	The PBCC mode should not be optional. The CCK modulation is inherently very weak by today's communications standards. If the PBCC is not used then the only way to make this waveform useful is with a severe measure of equalization. Therefore the only way to make this standard a useful one depends on a companies implementation, not on the standard waveform itself. By making the PBCC a requirement then the standard waveform itself will have inherent utility.	Make this mode required for a standard implementation.	
142.	4	2.0 A4.7	Vh	E		The list is just a list now. It should be preceded by a question.	Add" What functions and features are provided in what way?	ACCEPTED: Add the question: "Are the following PHY Functions supported?" at the beginning of Table A4.7.
143.	26.	1.4.6.8	BO	E		Reference the current 802.11 standard properly.		ACCEPTED: See revised text in Word Document.
144.	27.	1.4.6.8	BO	T	Y	If the reason for FH compatibility in the HR/DSSS PHY is backward compatibility with legacy FH systems, why is an incompatible hopping set defined? Hopping set 1 does not provide compatibility with legacy FH systems.	Eliminate the incompatible hopping set.	
145.	28.	1.4.6.8	BO	T	Y	As described, the FH compatibility mode interferes with all other HR/DSSS modes of operation to the point of preventing any other operations in the vicinity of an HR/DSSS/FH system. This is entirely counter to the need for coexistence with the other HR/DSSS systems.	Eliminate HR/DSSS/FH.	
146.	4	1.4.7.9	JBo	T	N	Some formula mistakes that are also in the current standard. The summation is over 1000 samples, which makes sum from 0 to 999 (4 times). Verr formula: result is 1 if there is no distortion (can not be the intention) As far as I know this comment was not addressed in my November Ballot.	Change sums. Replace in the Verr formula the division by minus sign.	

147.	2	1.1 , 1.2.7	sb	t	N	The co-existence matrix is not clear. The interoperability matrix I read as transmitter with capability x can talk to receiver with capability y. The concept of transmitter and receiver as they appear in the axes of table 2 is somewhat strange. It says that coexistence means to tolerate on another's presence – but a transmitter and receiver can always do this. Does coexistence not involve two pairs of interactions on the same channel – in which case if CCA is possible in a DSSS system from a HR/DS/SHORT system as in table 1 why do they not co-exist at least using CCA? Also there is no mention here of them being on the same physical channel. I also note that 1.2.7 suggests there is limited co-existence.	Check definitions and axes labelling in coexistence table. Be consistent about CCA interoperability between tables 1 and 2 particularly with respect to DSSS and DS/HR/SHORT	
148.	8	1.1 Table 2	Vh	T	Y	The cell at column FH and at row HR/DSSS/FH should not say OK. In a number of cases at the band edge, there is interference	Replace the OK by OK'.	
149.	9	1.1 Table 2	Vh	T	Y	The cell at column DSSS and at row HR/DSSS/FH should not say x. In a number of cases the FH receiver is in another "channel".	Replace the x by OK'.	

150.	2	1.2.5 and/or 1.4.4.2	MIF	T	no	The 5th paragraph of 1.2.5 states that the PHY-TXSTART.request(TXVECTOR) primitive is described in 1.4.4.2, but no such description appears there (or anywhere else in this document). Of critical importance is that there appears to be no mechanism defined by which the MAC can instruct the PHY whether to use the long PLCP format or the short PLCP format. This should be a parameter in the TXVECTOR NOTE: The lack of this exact mechanism was part of this voters "NO" vote on Letter Ballot 15, and would have been the basis of a NO vote on this ballot except that Document 98-405 (Letter Ballot 15 comment resolutions) states that comments sequence #187 and #276 are accepted, so I assume that the PLCPFormat parameter is already a part of 802.11B TXVECTOR, and its omission from the D2.0 draft is an oversight.	Add (in an appropriate clause) a full description of the PHY-TXSTART.request(TXVECTOR) primitive, comparable to the descriptions thereof in the other PHY definitions. Include therein a PLCPFormat parameter that can take values "LongPLCP," "ShortPLCP," or "FHPLCP."	ACCEPTED, see comments by ca.
151.	15	1.2.6 , 1.4.4.1	sb	T	N	I cannot find any definition of the modifications in terms of additional parameters required for the PHY primitives in clause 12 of the existing standard. For example some of the additional parameters to PHY-TX_START are mentioned in 1.2.6 but not defined elsewhere.	Add PHY parameter definitions that extend clause 12 of the existing standard as appropriate.	
152.	29.	1.4.5.10 and 1.4.5.11	BO	E		Modulation and rate have been separated in this version of the draft, yet they are still entwined here.	Delete "modulation" in several locations.	ACCEPTED: Search entire document for "modulation rate" and delete "modulation". Editor: Search entire document for "HR/DSSS PHY" and replace with "High Rate PHY" where appropriate.

153.	5	1.1 Table 1 and 2	Vh	T	Y	From table 1 and 2, it can be seen that the FH option is only interoperable with itself and interferes with all other PHYs, features and options. As such, the FH option is to be seen as a separate PHY. It is confusing to the market to have that option. The standard ought to specify why the option is included and how it relates to the other options and features. Technically, the option is fatal when started in a building with a LAN that is deployed using the DSSS PHY with a carefully made frequency plan to have the highest efficiency for the user. The reason being that the FH option hops with its 11 MHz throughout the 2400 to 2480 MHz band, interfering with the cells around it. Maturity wise, the feature is far behind the DSSS specification. The latter already having chips implemented and under testing. Continuation of the option will cause major delays in the approval speed of the standard.	Remove the option from the draft to enable the group to make its schedule, to prevent the group being ridiculed in the press of having presented a bad standard because of its many options and its incompatibility among its own components.	
154.	10	1.1 Table 1 and 2	Vh	E		The naming is not consistent, like DSSS but FH.	Make consistent with FHSS and DSSS consistently done.	Rejected: The tables are being deleted.

155.	2	1.2.6 and 1.4.8.4	JBo	T	Y	There is a coexistence problem between the short and long preamble. I prepared a submission together with Harris (99/01) which describes the problem and gives a resolution. The main problem is in the case where a PPDU with a short preamble is being transmitted, while a station configured to receive a long preamble only, wants to transmit. Suppose the station is also configured in CCA mode 2 or 3 (carrier or carrier above energy level). The receiver will sense the carrier of the short preamble, set CCA busy and waits for the longSFD. The SFD will not be detected. After the short preamble a CCK modulated signal is in the air. The receiver returns to the idle state (no SDF or drop of carrier) and senses the medium before transmitting the waiting frame. There is no carrier sense because of the CCK modulated signal (CCA idle). A transmission will start resulting in a collision. The chance on a collision in this scenario is 100%! The basic of resolution is to change the CCA approach. In the legacy standard is not prescribed under what conditions CCA returns from busy state to the idle state. I the new proposal this is added. The resolution is such that CCA will remain active during the whole transmission of the frame, independent on the modulation of the MPDU (Barker, CCK, PBCC)	Changes in 1.2.6 PLCP receive procedure: Page 523, line 3: Delete: If the CCITT CRC-16 FCS check fails…….in Figure 10. Page 523, line 25: Add: If the length count is expired (length=0) the HR/DSSS Phy will force the PHY_CCA.ind to go to the IDLE state (independent of the CCA mode used). Page 524, figure 10: Delete at arrow out of block RX PLCP CRC: Or CRC FAIL Changes in section 1.4.8.4 CCA can be found in document 99/10 In the overview section 1.1 it should be reflected that in a system conformant to the HR/DSSS also the 1 and 2 Mbit/s rates in that system should be conformant to this HS/DSSS standard (4-rate system).	
156.	6	1.4.6.5.2 , 1.4.6.5.3	nc	t	N	I don't see the rationale of changing the phase increment by 180 degrees on each odd symbol. Given that the modulation is DQPSK, it does not produce any new waveforms on the medium, but rather it changes the mapping between data bits and waveforms. As the data is scrambled anyway, the 180-degree flipping of odd symbols is a redundant operation.	Withdraw the 180 degree flipping text and appropriate columns of the tables.	

157.	30.	1.2.6 (page 524 lines 7-9 and 37-40)	BO	T	Y	This clause describes operation of the MAC and MAC management. The PHY has no idea of what the MAC or MAC management is doing, only the result of its operation, i.e., the issuance of PHY-TX.start. The PHY may not make new requirements on the operation of the MAC and MAC management.	Eliminate the text describing MAC and MAC management operation.	
158.	31.	1.2.3.15 and 1.2.6 (page 523 line 5)	BO	T	Y	The table in 1.2.3.15 and the text in 1.2.6 seem to indicate that more than one rate must be indicated in the single FH PSF. 1.2.3.15 implies that the values for 5.5 or 11 Mb/s should be in this field. 1.2.6 states that the value for 4 Mbps should be in this field.		
159.	32.	1.3.1 Page 531 line 11 and line 13	BO	E		Improper word choice	Replace “of” with “or” and “802.11-197” with “802.11-1997”.	ACCEPTED: See revised text in Word document.
160.	33.	1.3.3 Table 11, page 534 line 14	BO	T	Y	Three values are listed for this parameter without any indicatio of how to choose one.	Clarify this entry in the table.	
161.	34.	1.4.6.8 page 555 line 34	BO	T	Y	The standard does not define IF bandwidth.	Eliminate the statement referring to IF bandwidth.	
162.	35.	1.4.7.9 page 565 lines 11 and 16	BO	T	Y	Equation is not correct.	Replace “n=0” with “n=1” in both locations.	
163.	36.	1.4.7.9 page 563 line 51	BO	T	Y	Equation is not correct.	Replace “n=0” with “n=1” and use absolute value of I(n).	
164.	37.	1.4.7.9 page 564 line 51	BO	T	Y	Equation is not correct.	Replace “n=0” with “n=1” and use absolute value of Q(n).	

The following persons submitted comments on the draft standard 802.11bD2.0

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Godfrey	Tim	tg
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Kawaguchi	Dean M.	dk
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