IEEE P802.11
Wireless LANs

TGa Letter Ballot 16 Comment Resolution Report

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Abstract

Comment resolutions are described. The comments with dispositions are attached. In order to preserve the comment order, the table should remain sorted by clause number and then by voter i.d.

BRAN: 52 subcarriers with 4 non-puncturing pilots – comment 2 – Accepted. Involves text changes to be approved editorially
BRAN: Preamble with 32 pt periodicity of short preamble – comment 1 – Rejected, ask BRAN to consider 802.11a preamble
BRAN and MMAC: Supported rates (4 Mb/s (R=1/3), 27 Mb/s (R=9/16), 42 Mbit/s (MMAC, R=7/8)) – comments 3, 4 – decided not to change now
MW, BRAN: Deriving Carrier and clock from same ref – comments 5, 121, 122, 183, 193, – rejected by TGa.
Many: Mandatory rates, coding rates, modulation – comments 16, xxxxxxx – rates 6,12 and 24 Mbit/s accepted as mandatory
MIF: Encoding the whole PLCP header at slow rate - comment 52– accepted encoding RATE and LENGTH at 6 Mbit/s in a single OFDM symbol
MIF: Change SIGNAL to increase Hamming distance – comment – resolved by previous
RVN: The SIFS duration – comment 101,185 – accepted changing SIFS to 14 usec, slot time to 9 usec and some other
Many: RSSI Should we specify absolute accuracy? align two subclauses – comments xx – removed absolute accuracy specs
RW: exclude time windowing from description. – comment 34 – wording changed to imply that a rectangular window is the normative description
Harris: Enhance CCA to account both for ED and for Carrier Sense. – comments 103-105 - rejected
MOA: Adjust sensitivity reqmts – comment 131, 195 – accepted
MOA: Adjust spectral mask – comment 115 – resolved by changing the spectral mask (including 52 subcarrier effects)
CT,HW,: Wording on regulatory domains, channelization, powers, finalized vs unclear yet regulations – resolved (text by CT, approved)
DK: Reconsider Channelization (16 MHz spacing) – comment 120 - rejected
Many: Define ACI and (non-A)CI requirements. – comments xx– done. resolved by TEG, approved by TGa. Based on neighbour with worst case mask-passing sidelobes.
DK: Alternating LSBs and MSBs in the interleaver – comment 70 – rejected.
TT: aMPDUDuratinFactor correction – comment 186 - accepted
Many: Define Maximum received level. – comments 133-140 - done
MW: cancel scrambler seed randomization. – comment 101 - rejected
CCA threshold – resolved – see comment 105

BO: MPDU to PSDU – comments xx,xx,xx, xx - accepted
HM: atribute naming – comments 174-181 - accepted

SIGNAL is not included in CRC16 calculation. - affected by decision on SIGNAL encoding.
"Preamble" notation: is SIGNAL part of it? – comment 33 etc. - affected by decision on SIGNAL encoding.
Many: 1.3.1.1 (Mathematical conventions) clarity – comments 27-32, - resolved by improved wording and exchanging 1.3.1.1 with 1.3.2
Bit order notation in header fields and in data – comments xx - resolved
Interleaver: forwd and bckwd definition – comments xx, xx – resolved. added both fwd and bckwd equations
Double index conversion in OFDM modulation description – comment xx - corrected
Rx and Tx State machine and figures - revised

Scope statement. resolved
Fonts in figures (BO, VZ, CA) – comments xx - corrected
"shall", "specifies" vs. "describes" etc. - addressed

Issues arising fron the changes:
Decision on mandatory rates: Wording, PICS Proforma changes
52 subcarrier related issues: preamble, wording of subcarrier placement.
SIGNAL field encoding as an OFDM symbol: wording, figures.

Document 99/016, sorted, with resolutions

The following persons have sent comments on draft standard 802.11aD1.6.
Note that the yellow highlighted voter ID indicates that the person is not a voter.

Petrick	Al	Ap	2
Sanwalka	Anil K.	as	2
O'Hara	Bob	bo	62
BRAN		bran	6
Andren	Carl F.	ca	17
Heegard	Chris	ch	2
Tom	Cherry	ct	17
Kawaguchi	Dean M.	dk	2
Ennis	Greg	ge	5
Moelard	Henri	hm	7
Worstell	Harry	Hw	21
Heiskala	Juha	jh	9
Okanoue	Kazuhiro	ko	5
Wilz	Leo	Lw	5
Shoemake	Matthew B.	mbs	1
Fischer	Michael	mif	7
Morikura	Masahiro	moa	2
Webster	Mark	mw	22
Chayat	Naftali	nc	7
Nee	Richard van	rvn	2
Ward Jr.	Robert M.	rw	6
Tsoulogiannis	Tom	tt	3
Hayes	Victor	vh	7
Zelenty (IEEE editor)	Valerie	vz	13
TOTAL			232

Seq. #	Clause number	your voter's id code	Cmnt type E, e, T, t	Part of NO vote	Comment/Rationale	Recommended change	Disposition/Rebuttal
1.		bran			Comments by Ericsson & Nokia: The short sequence part of the 802.11a, with 0.8 microsecond periodicity is too short for reliable detection	Change to preamble with short preambles of 1.6 microsecond duration. See document 802.11-99/002	**Issue for discussion** **Discussed, decided in TGa not to make any changes.**
2.		bran			Instead of using 3 pilots which are inserted instead of data subcarriers, use 4 pilots which are in addition to the 48 subcarriers.		**Issue for discussion** **Accepted. A lot of text changed.**
3.		bran			Add a 4 Mbit/s data rate based on BPSK and coding rate 1/3, derived from R=1/2 by repetition		**Issue for discussion** **decided to be internal BRAN issue**
4.		bran			Add a 27 Mbit/s data rate based on 16QAM and coding rate 9/16, derived from R=1/2 by puncturing		**Issue for discussion** **decided to be internal BRAN issue, not affecting current decisions**
5.		bran			Prefer to have timing and carrier frequency derived from same referrence.		**Issue for discussion.** **Discussed and voted. Did not reach 75%. Remains to be a de facto implementation consideration.**
6.		bran			Ken Paterson (HP) would like to present a peak to average reduction technique		**Paper presented, no action taken.**
7.	**1.1**	**ct**	**e**		**should provide correct reference**	This clause describes the physical layer for the Orthogonal Frequency Division Multiplexing (OFDM) sys-tem. The Radio Frequency LAN system is initially aimed for the 5.15-5.25, 5.25-5.35 and 5.725-5.825 GHz	**Accept:** **DONE** **The first paragraph is replaced with Vic's suggestion.**

						U-NII bands as provided in the USA according to Code of Federal Regulations, Title 47, Section 15.407.	
8.	**1.1**	**mw**	**e**		**(page 2, line 9) Should Figure 11 really be Figure 10?**	**Consider changing figure number.**	**This is Figure 11.** **DONE**
9.	**1.1**	**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 an Orthogonal Frequency Division Multiplexing (OFDM) system and the changes that have to be made to the base standard to accommodate the OFDM PHY.	**Accept:** **Changed to:** This supplement specifies the Physical Layer Entity for an Orthogonal Frequency Division Multiplexing (OFDM) system and the **additions** that have to be made to the base standard to accommodate the OFDM PHY. **DONE**
10.	1.1.1 a)	Bo	T		The scope clause is not the place for conformance statements (those include the word "shall"). This clause is a general description of the area to be described in the standard.	Replace "shall" with wording more appropriate.	Proposed resolution: This function **is** supported by the Accepted by CRG Accepted by TGa DONE
11.	1.1.1 a)	Bo	T	Y	The PHY knows nothing of MPDUs, only PSDUs.	Replace MPDU with PSDU.	Propose to accept DONE
12.	1.1.2 line 14	Bo	T		Clause 1.1 and its subclauses are all part of the introduction. This is not the place for conformance statements.	Replace "shall" with wording more appropriate.	proposed wording: The OFDM Physical Layer service **is** provided to the accepted by CRG accepted by TGa DONE
13.	1.1.2 line 9	Bo	E			Replace "(current standard)" with the correct document reference.	**Accept** **DONE**
14.	1.1.2.4	Bo	E		This clause does not describe the service primitive notation.	Either remove "and notation" from the clause header or add a description of the notation used.	Removed **DONE**

15.	**1.2.2**	**ge**	**T**	**y**	**65535 is way larger than the maximum allowed by the 802.11 MAC as currently specified (2312 data octets)**	**For the high data rates, we should change the MAC spec**	**proposed resolution: Reject. MAC will not submit such large numbers anyway.** **This was used in DS as well. Why change, unless packing is critical?** **accepted by CRG** accepted by TGa DONE Readdressed due to preamble change. Chenged to 1-4095
16.	**1.2.2 Table 1**	**hw**	**T**	**X**	**No "best effort" or standard data rate**	Table 1 shows multiple data rates with no suggested standard rate, would like to see one "Best Effort" standard rate at 24MB/s with the other rates optional.	to be resolved in Mandatory Rates discussion, then becomes editorial approved by TGa Mandatory rates are mentioned. DONE
17.	1.2.2.1 and 1.2.3.1	Bo	T		This parameter may have only a single value at any given time. It may take a value from the range 1-65535.	Correct the statement.	AS proposed: The **allowed values for the** LENGTH parameter are in the range from 1 to 4095. accepted by CRG accepted by TGa DONE
18.	**1.2.2.2 line 36 pp3**	**hw**	**T**		**All of the data rates should be supported by the OFDM PHY**	Strike and supported by the OFDM PHY"	Three of rates are supported. "and supported by the OFDM PHY" is struck out.
19.	1.2.2.3	Bo	E		"should be" does not belong in this standard.	Replace with "is".	NC accepted DONE
20.	**1.2.2.3**	**MIF**	**e**	**no**	**"should be reserved" is poor standardese.**	**change "should be" to "are"**	**NC accepted "is"** DONE
21.	1.2.2.4	Bo	T		This parameter does not describe the number of power levels in the MIB, it describes the power level to be used for this transmission.	Correct the statement.	AS+NC The **allowed values for the** TXPWR_LEVEL parameter **are in the range** from 1 to 8. This parameter is used to indicate**, which of the available** TxPowerLevel attributes defined in the

							MIB **shall be used** for the current transmission. accepted by CRG accepted by TGa DONE
22.	**1.2.3.2**	**ca**	**t**	**Y**	**Text states that absolute accuracy of RSSI is not specified, but clause 1.3.8.5 specifies +/-6 dB and monotonic over levels of -89 to -30 dBm.**	**Change text to: "Accuracy of the RSSI is specified in clause 1.3.8.5."**	**Delete 1.3.8.5; modify 1.2.3.2 to say** The **allowed values for the** Receive Signal Strength Indicator (RSSI) parameter **are in the range** from 0 through RSSI Max. … RSSI is intended to be used in a relative manner **and it shall be a monotonically increasing function of received power**. accepted by CRG accepted by TGa DONE
23.	**1.3**	**mbs**	**T**	**YES**	**This section is written in an incomprehensible fashion. There are variables that are not defined, e.g. rDATA, wTSUBFRAME, etc. The output of Figure 2 is no labeled, much less explained. It is extremely important for this section to describe the encoder in a standard format that is easily understood, otherwise we will have compatibility problems down the road.**	**The authors/proposers of this modulation should write this section in a standard format that is easily understood, well defined and not ambiguous.**	**?? Does it address mathematical notations or the whole 1.3??** **will be dealt with through addressing numerous comments** **Most done, correct fig. 2 DONE**
24.	1.3.1	Bo	T	Y	The PHY knows nothing of MPDUs, only PSDUs.	Replace MPDU with PSDU.	Propose to accept DONE
25.	1.3.1.1	Bo	E		Describe the quoted term "complex baseband" or use terminology that does not need to be read "in quotes".		will be described in a **complex baseband signal** notation. DONE
26.	1.3.1.1	Bo	e		Insert "the" into "achieve same goal" on line 33.		accepted DONE
27.	1.3.1.1	Bo	T	Y	There seem to be several terms used in equations 1 through 4 that are not defined:	Define these terms.	add after (1): where Re(.) stands for the

					Re, rpreamble, rsignalling, rdata,k, tdata,Ts, rsubframe, wtsubframe, Ck.		real part of a complex variable, fc denotes the center carrier frequency modify LHS of (2) by adding subscript PACKET the parts of the signal mentioned in equation (2) should be called by same names when defined. in eq(2), replace summation over data OFDM frames with a single r_{DATA}. The subframes of which the equation (2) is composed are described in subclauses xxx.The **subframes** of the signal are all constructed as an inverse Fourier transform of a set of coefficients C_k, after eq (3) add in front of the paragraph: The parameters delta(f) and N_s are described in table 4. DONE accepted by TGa
28.	1.3.1.1	Bo	T	Y	Wt is used in equation 4. Is this the same as wt on line 11?	Correct capitalization or define Wt.	NC Accepted:.small w will be used in (4) accepted by TGa DONE
29.	**1.3.1.1**	**ch**	**T**	**YES**	**There are undefined variables in this section. This section leaves ambiguity in the description of the modulation. The main data variable rDATA is not even defined.**	**The author of this section needs to go back through it and work to make it bulletproof.**	**accepted, to be done** **see comment 13** **DONE**
30.	**1.3.1.1**	**ge**	**e**	**n**	**r_{RF} should be written as a function of t**	**change r_{RF} to $r_{RF}(t)$**	**accepted** DONE

31.	**1.3.1.1**	**mw**	**e**		**Components are presented in the equations which are not defined. See Eqs. 1,2,3.**	**Add a verbal description and/or figure to explain the meaning of various equation components.**	**accepted, to be done** **Done due to cmmt 27 DONE**
32.	**1.3.1.1**	**mw**	**E**		**In Figure 1, why is T = Tguard + 2Tfft? Why is it not T = Tguard + Tfft? T is not defined in Table 4.**	**Explain meaning of T formulation. Add to Table 4?**	change text The boundaries of subsections of duration *T* are defined by a multiplication by a time-windowing function *w T (t)*, which may extend over more than one period *T FFT* , **as illustrated in figure 1. In particular, window functions which extend over multiple periods of the FFT are utilized in the definition of the preamble.** **Split fig. 1 into two cases, single repetition and multiple repetition of the FFT interval.** DONE accepted by CRG accepted by TGa
33.	**1.3.1.1**	**rw**	**E**	**N**	Equation 2 includes both the preamble and signaling separately. Since, signaling is included in the preamble per Table4 , duplication results.	**Change equation 2 rather than table 4, as**	**Equation is changed.**
34.	**1.3.1.1**	**rw**	**t**	**Y**	It can be shown that the time domain windowing included in the definitions introduces error at an ideal demodulator. This can potentially cause biased frequency and timing estimates and additionally result in degraded modulation error measurements (clause 1.3.7.6). Since the windowing is intended only to be informational, and to be more in alignment with BRAN which has no windowing, it is recommended that the artificial	**Change definition to indicate rectangular windows by either suitable change to equation 4 or by including with defining equation the time interval over which the equation is valid**	**In the case of vanishing T_{TR} the windowing function degenerates into a rectangulat pulse of duration T. The normative specifications of generating the transmitted waveforms shall utilize the rectangular pulse shape. In implementation, higher**

					windowing suggested be removed. In conjunction with this, equation 5 must be changed.		**T_{TR} is typically implemented in order to smooth the transitions between the consecutive subsections. This creates a small overlap, of duration *T TR* , between them as shown in Figure 1. The transition time *T TR* is about 100 nsec. Smoothing the transition is required in order to reduce the spectral sidelobes of the transmitted waveform.** However, the binding requirements are the spectral mask and modulation accuracy requirements, as detailed in clauses 1.3.7.2 and 1.3.7.5. Time domain windowing, as described here, is just one way to achieve those objectives. The implementor may use other methods to achieve same goal, such as frequency domain filter-ing. Therefore, the transition shape and duration of the transition are informative parameters. DONE accepted by TGa motion
35.	**1.3.10**	**AS**	**E**	**N**	**Replace figure 17 with the correct version of figure 94 from Tgrev.**		**Accept: Amended by following the latest Figure 94. DONE**
36.	1.3.10	Bo	T	Y	The PHY knows nothing of MPDUs, only PSDUs.	Replace MPDU with PSDU. Eliminate reference to the MAC and replace it with SAP primitve references.	Propose to accept DONE

37.	1.3.10	Bo	T	Y	There is no indication in this state machine as to what state is entered first.	Include a transition to the idle state on reset.	Accept accepted by TGa The figure is updated. DONE
38.	**1.3.10**	**ca**	**e**	**Y**	**The last sentence (29-33) is awkward.**	**Change to: "Any data received after the indicated data length are considered Stuff Bits (to fill out an OFDM symbol) and should be discarded. "**	Modified. DONE
39.	**1.3.10**	**ca**	**e**	**Y**	**There are extraneous lines on Figure 16 and the font strays outside the boxes. Tail bits are again shown as scrambled whereas they may not be.**	**Fix extra lines and oversize font. Indicate proper state of Tail Bits**	The lines are removed. DONE
40.	**1.3.10**	**ca**	**e**	**Y**	**The text strays outside the boxes on Figure 17**	**Fix the font**	DONE
41.	**1.3.10**	**ct**	**t**		**How does the service field get out of OFDM spec? It appears to zeros except for reserved fields**	clarify	remove SERVICE field is out of 802.11 OFDM specification, Insert CRC of the PLCP header is not valid, DONE accepted by CRG accepted by TGa
42.	1.3.10 Figure 16	Bo	e		There appears to be an extraneous grey line rising from the trailing edge of "Header CRC" at the bottom of the PHY PLCP to the leading edge of "Header CRC" at the top of PHY PLCP.	Explain this line or remove it.	DONE
43.	1.3.10 Figure 16	Bo	T	Y	It appears that the PHY-CCA.indicate occurs before the PMD_RSSI.indicate in the figure, while the text indicates that the opposite should be true.	Correct the figure to show the proper relationship between these primitives.	NC Accept. Delegate to the Editor DONE accepted by CRG accepted by TGa
44.	1.3.10 Figure 16	Bo	T	Y	The PHY knows nothing of MPDUs, only PSDUs.	Below the line between MAC and PHY, rename all MPDUs to PSDUs.	NC Accept. Delegate to the Editor DONE
45.	1.3.10	Bo	T	Y	The PHY knows nothing of MPDUs, only	Replace MPDU with PSDU.	NC Accept. Delegate to the

	Figure 17				PSDUs.		Editor DONE
46.	1.3.2	Bo	T	Y	The PHY knows nothing of MPDUs, only PSDUs.	Replace MPDU with PSDU.	NC Accept. Delegate to the Editor DONE
47.	1.3.2	Bo	T	Y	The PHY knows nothing of MPDUs, only PSDUs. It also seems that adding two blocks to the right of the block currently labelled MSDU is not unduly difficult, as the text seems to imply.	Replace MPDU with PSDU in Figure 3. Add the Stuff and Tail bits blocks to the figure.	NC Accept. Delegate to the Editor DONE accepted by CRG accepted by TGa
48.	**1.3.2**	**ca**	**t**	**Y**	**Figure 3 should show the PPDU tail field and the PLCP preamble is shown as 11 symbols but it is 12 symbols (9 short, 2 long and 1 short)**	**Add PPDU tail field to the figure and change PLCP preamble length to 12 symbols**	**NC passed to the Editor a suggested figure to handle the comment** DONE **handled, see prev comment**
49.	**1.3.2 figure 3**	**ct**	**e**		**count of symbols for SYNC and PLCP preamble fields are incorrect based on text in 1.3.2.1**	should be 12 symbols in SYNC (9 short, 2 long, 1 short) and PLCP preamble	**See comment 48** DONE
50.	1.3.2.1	Bo	T	Y	The PHY knows nothing of MPDUs, only PSDUs.	Replace MPDU with PSDU.	NC Accept. Delegate to the Editor DONE
51.	**1.3.2.1**	**MIF**	**e**	**no**	**Sub-clause (3) refers to "CRC16" which is the wrong polynomial. The correct polynomial, as is stated in 1.3.3.5, is "CCITT CRC-16."**	**Correct this to "CCITT CRC-16"**	**NC Accept** DONE
52.	**1.3.2.1**	**MIF**	**T**	**YES**	**Starting the OFDM coded data immediately after the Signal field is incompatible with the multirate mechanism of the 802.11 MAC UNLESS the coding and data rate used to transmit the remainder of the PLCP Header is a rate supported by all stations. It is not mandatory that the coding and data rate used for the MPDU be available at stations not addressed by a particular frame, but it is assumed that all stations can receive and decode the PLCP header, thereby knowing the expected end time of the frame transmission. Furthermore, there must be at least one coding and data rate that is mandatory for all stations, because control frames and multicast MPDUs and MMPDUs must be sent in a manner that can be received by all stations in the BSS, as well as by other**	**The simplest solution is to make the 6Mbit/s data rate mandatory and to require the PLCP header to be transmitted at 6Mbit/s. In this approach, as with the existing PHYs and the 802.11B proposed PHY, the data rate indicated in the Signal field commences with the first bit following the PLCP header. Because the Service, Length, and CRC fields of the PLCP header occupy 48 bits, which exactly fill 2 OFDM symbols at the 6Mbit/s rate, there would be no need to pad the PLCP**	**Reject because CCA based on ED will be a sufficient replacement for the knowledge of packet's duration from decoding the header.** accepted by TGa **DONE(Nothing is changed)**

					stations attempting to locate and (re)associate with the BSS.	**header in order to change coding at the start of the MPDU in cases where a higher rate was desired.** **A disadvantage to this approach is that the efficiency of a BSS able to use the higher data rates is reduced by having to send the PLCP header of every frame, as well as control frames and multicast frames, at 6Mbit/s. An alternative is to make more than one rate mandatory, and to allow the use of higher rates that are supported by all stations for the PLCP header, control frames and multicasts. The 12Mbit/s rate looks like a good candidate, because the entire PLCP header would fit in a single symbol without padding.**	
53.	**1.3.2.1 1) and 2)**	**ct**	**e**		**Assuming name in previous diagram is correct, text should refer to SYNC field not SYNC SYMBOL**	change SYNC SYMBOL to SYNC	**NC Change SYNC SYMBOL to "PLCP Preamble field"** DONE **Accepted by CRG**
54.	**1.3.2.1 12**	**hw**	**e**		**Sequel should be sequence**	change sequel to sequence	**NC The word "sequel" was meant. As it causes ambiguity, replace "in the sequel" by "later"** **superseded by Naf's text** **DONE**
55.	**1.3.2.1 12)**	**ct**	**e**		**typo**	change "sequel to" "sequence to"	**Ditto**
56.	**1.3.2.1 13)**	**ct**	**e**		**typo**	minus sign should be in front of 22	**NC minus is there, it just remained on previous line.**

							correct into "non-breaking minus?" will change due to pilot change **DONE**
57.	1.3.3.1	Bo	T	Y	This clause seems like it should be specifying conformance criteria. Yet, there are no "shall" statements.	If this clause is supposed to be the specification of the PLCP SYNC field, insert "shall" in a bunch of places.	On pp 10, row 43 change "can be written as" to "shall be generated according to the following equation" pp 11 row 6: change : "can now be described by inverse Fourier transform" into "shall be generated according to the following equation" pp 11, row 21, add "which shall be generated according to the equation" row 30: change "are concatenated" into "shall be concatenated" DONE accepted by CRG accepted by TGa
58.	**1.3.3.1**	**ca**	**e**	**Y**	**Line 29 indicates t_{11} whereas all other text and figure 4 indicates only 10 short symbols.**	**Change t_{11} to t_{10}**	**NC OK** DONE change to t_9 to reflect the SIGNAL change
59.	**1.3.3.1**	**jh**	**e**		**Line 29: t_{11}**	**t_{10}**	**NC OK Changed to t9** DONE
60.	**1.3.3.1**	**mw**	**e**		**(page 10, line 29) t1 to t11 is mentioned, but Figure 4 shows only t1 to t10.**	**Fix discrepancy.**	**NC OK** DONE ditto
61.	1.3.3.1	nc	E		On the line preceding equation (10), change "three repetitions" with "single repetition"		DONE ditto
62.	**1.3.3.1**	**rw**	**T**	**Y**	The Bran meeting Dec 11, 1998 in Helsinki expressed concern that a short preamble of 16 points was insufficient in length for acquisition in several of their multipath channels. No correlation peaks were discernable.	**Resolve issue in Jan 99 meeting and in concert with Bran concerns**	**NC to be discussed with BRAN** **No change, DONE**

63.	**1.3.3.1**	**TT**	**E**		**Reference to t11 is not correct.**	**On line 29 change t11 to t10.**	**NC OK DONE ditto 61**
64.	1.3.3.1 Figure 4	Bo	e		Labelling the SERVICE field "DATA" seems a bit misleading, particularly when the SERVICE field is referenced in the clause immediately above (1.3.3)	Replace "DATA" with "SERVICE".	**DONE Redone. DATA denotes a combination of SERVICE PSDU, tail bits and pad bits.**
65.	**1.3.3.1 line 29**	**ct**	**e**		**typo**	t11 should be t10	**NC OK DONE see 61**
66.	**1.3.3.1 line 29 pp10**	**hw**	**e**		**Training structure consists of t1 to t10**	change t11 to t10	**NC OK DONE see 61**
67.	**1.3.3.1 line 31-32**	**ct**	**e**		**there are many dashed boundaries in figure 4**	clarify or perhaps change some of the dashes to lines	**NC Accept, change measure lines to thin solid lines. Wait with implementation until after preamble discussion. (not) DONE. The whole figure shall be revised to reflect preamble changes**
68.	1.3.3.10	Bo	e		Need an ellipsis (…) in equation 17. Replace "floor( )" with "⌊ ⌋"		NC accept ellipsis, reject Replace "floor( )" with "⌊ ⌋", added explanation of floor(.)
69.	**1.3.3.10**	**ca**	**t**	**Y**	**The equation appears to be backwards. It specifies the deinterleaving equation rather than the interleaving equation.**	**Change to i=F(k) instead of k=F(i)**	NC proposal: have both directions of convertion. $k=16i-(N_{CBPS}-1)\text{floor}(16i/N_{CBPS})$ i,k =0,1, … , $N_{CBPS}-1$ $i=(N_{CBPS}/16)(k \bmod 16)+\text{floor}(k/16)$ DONE accepted CRG accepted by TGa
70.	**1.3.3.10**	**Dk**	**T**	**Y**	**The interleaving/deinterleaving scheme puts consecutive bits with the same symbol to bit**	**Change the interleaving to circularly rotate the rows by**	**NC Difficult technical issue. Subcmission by**

					map location of the gray coded 16QAM or 64QAM symbols into the FEC decoder. For example, using 16QAM, a sequence of 16 consecutive bits will be in the MSB position which has better BEP, and the next sequence of 16 consecutive bits will be in the LSB position which has worse BEP in the receiver. This is worse for the FEC decoder than if the MSB's and LSB's were consistently interlaced in the data stream going to the FEC decoder.	**an alternating pattern of (0,1) for 16QAM and (0, 1, 2 bits) for 64QAM. None is required for BPSK or QPSK. This ensures that the input to the FEC decoder is always evenly distributed with MSB, midSB, and LSB. This also minimizes the reduction of interleaving separation that is intended by using the algorithm in the draft.**	**BreezeCOM** **Reject. Simulations by two independent groups have shown very little difference.** **Accepted by TGa.** **DONE**
71.	**1.3.3.10 pp17 line 9//10**	**hw**	**T**		**Is definition of I and k reversed (is the input a function of the out put**		**See comment 69** DONE
72.	**1.3.3.10**	**mw**	**e**		**(page 17, line 7) Equation 17 may be ambiguous.**	**Consider adding an input/output table.**	**See comment 69** DONE
73.	**1.3.3.10 pp17 line 4**	**hw**	**e**		**spelling**	Change symbols to symbol	DONE
74.	**1.3.3.11**	**ch**	**t**	**YES**	**There is no reason to carry around all of the square roots in tables 6 through 9. Normalization is not necessary and thus is confusing.**	**Remove square roots.**	**NC decline. The normalization is important in order to have all the portions of the message, such as preamble, signaling and data OFDM symbols, and also pilot vs. data subcarriers, scaled properly relative to each other.** **Accepted (to reject) by CRG** accepted by TGa DONE
75.	**1.3.3.13**	**mw**	**E (T)**		**Are the indices in Equation 18 correct? Should the index on the right be Ns x K + n, instead of k + Ns x n?**	**Consider changing. Consider giving example input/output values.**	NC initially (18) read: $d_{k,n} = d_{k+Ns*n}, \qquad k =$

							restore this. in eq 19, change the subscript of w to TSYM. Also, change (21) to read $r_{DATA}(t) = \sum_{n=0}^{N_{SYM}-1} r_{DATA,n}($ accept CRG accepted by TGa **DONE**
76.	1.3.3.2	Bo	T	Y	The description of the content of the two SIGNAL symbols is not adequate to unambiguously determine the complex values S1 and S2.	Describe in more detail or include a figure that unambiguously determines the values for S1 and S2.	change on line 52 "where T_{SIG} =0.8 µsec" into "where T_{SIG} =0.8 µsec and the coefficients S_k are taken from equation (6)". accepted by CRG accepted by TGa **DONE** **reopen.** **the SIGNAL field changes**
77.	**1.3.3.2**	**jh**	**e**		**Line 39: subscribers**	**subcarriers**	**DONE**
78.	**1.3.3.2**	**MIF**	**t**	**no**	**The Signal field has 4 bits, which can represent any of 16 states, and only 8 values to be represented (BPSK 1/2, BPSK 3/4, QPSK 1/2, QPSK 3/4, 16QAM 1/2, 16QAM 3/4, 64QAM 2/3, and 64QAM 3/4). This 1:2 sparseness in the code space permits the reliability of the Signal field to be improved by assigning a set of codes with a minimum Hamming distance of 2.**	**Modify the Signal field code assignments so that all 8 of the assigned values are separated by a minimum Hamming distance of 2.**	**Reject due to need to accommodate additional optional rates or coding schemes in the future.** **Rejected in motion 5 by TGa** **DONE (nothing has been changed)**
79.	**1.3.3.2**	**mw**	**e**		**Wording is confusing in first paragraph. Bit encoding is obscure.**	**Consider adding a sentence after the first sentence which states that 2 bits of data are sent on the first OFDM training symbol and 2 bits of data are sent on the second OFDM training symbol for a total of 4 bits. For robustness, on a particular**	**SIGNAL changed, revise** **DONE**

						OFDM training symbol the 2 bits are encoded as an identical QPSK phase (1-of-4 phases) on all the carriers.	
80.	**1.3.3.2 line 39**	**ct**	**e**		**typo**	subscribers should be subcarriers	**NC accept DONE**
81.	**1.3.3.2 line 39 pp11**	**hw**	**e**		**Change subscribers should be subcarriers**	Change subscribers should be subcarriers	**NC accept DONE**
82.	1.3.3.2 Table 5	Bo	e		Increase the width of the first column so that "Constellation" appears all on one line.		NC accept **DONE**
83.	1.3.3.3	Bo	T	Y	This clause refers to transmitted bit order. There is no reference to where this is defined. The "first 7 bits" is ambiguous.	Define bit order of transmission. Define bit numbering within fields.	Change text to: The SERVICE field has 16 bits, which shall be denoted as MSB to LSB. The LSB shall be transmitted first in time.The 7 least significant bits of the service field, which are transmitted first, are set to zeros and are used to synchronize the descrambler. The remaining 9 bits of the 802.11 service field shall be reserved for future use. All reserved bits shall be set to zero. This field shall be protected by the CCITT CRC-16 frame check sequence described in clause 1.3.3.5. accepted by CRG accepted by TGa **DONE**
84.	**1.3.3.3**	**ca**	**t**	**Y**	**The first 7 transmitted bits are set to zero here (12-27) whereas in 1.3.3.7 (14-9) the first byte is set to zeros.**	**Decide which it is and make both agree.**	**7 bits is the correct version. Correct 1.3.3.7** **On pp 14 row 9 replace to "The seven least significant bits of …"**

							accepted by CRG accepted by TGa **DONE**
85.	**1.3.3.3 line 28**	**ct**	**E**		**all zeros can't refer to reserved 9 bits or they can't be used in the future for something else in the 802.11 standard**	clarify which bits with zero signify 802.11 device compliance or rephrase statement	**DONE** **Service field is removed.**
86.	1.3.3.4	Bo	T	Y	The PHY knows nothing of MPDUs, only PSDUs.	Replace MPDU with PSDU.	Accept all BO comments to change MPDU to PSDU (Thanks, Harry). DONE accepted by TGa
87.	1.3.3.4	Bo	T	Y	This clause refers to transmitted bit order. There is no reference to where this is defined.	Define bit order of transmission. Define bit numbering within fields.	Reject. The order is defined on rows 38-39 DONE accepted by CRG accepted by TGa
88.	**1.3.3.4**	**mw**	**e**		**(page 12, line 38) Is the correct clause number used? 12.3.5.4?**	**Consider changing clause number.**	Correct DONE
89.	1.3.3.5	Bo	e		Step 3 of figure 5: delete "of" or complete the phrase/		DONE
90.	1.3.3.5	Bo	T	Y	This clause refers to transmitted bit order. There is no reference to where this is defined.	Define bit order of transmission.	Reject. The bit oredering of the protected bits is addressed in the text, while the bit ordering of the FCS bits is addressed in text in figure 5. DONE accepted by CRG. accepted by TGa
91.	**1.3.3.5**	**mw**	**e**		**Figure 5 has a problem with the direction of the arrowheads. One or more must be pointing in the wrong direction.**	**Fix CRC feedback connections in Figure 5.**	**NC accepted, remove arrowhead exiting from XOR upwards.** DONE
92.	**1.3.3.5 line 20 pp11**	**hw**	**e**		**Figure 5 wrong?**	Arrows wrong	**NC ditto** DONE
93.	1.3.3.6	Bo	T	Y	The PHY knows nothing of MPDUs, only PSDUs.	Replace MPDU with PSDU.	NC Accept. Delegate to the Editor DONE
94.	1.3.3.6	Bo	T	Y	The PHY knows nothing of messages, only PSDUs. This also sounds like it is placing a requirement upon the MAC (that it deliver	Replace message with PSDU. Rephrase the clause to make it clear that the PLCP is	Accept change MPDU to PSDU.

					MPDUs of particular lengths). This is not permitted.	extending arbitrary length PSDUs to be a multiple of NCBPS. Also is this supposed to be NCBPS or NDBPS?	Rest of the comment was checked and found no errors. DONE accepted by TGa
95.	**1.3.3.6**	**MIF**	**E**	**no**	**The term "bit stuffing" is generally used to refer to the insertion of bits (often in a selective or data-pattern-dependent manner) within an SDU as part of the processess of creating a PDU. A typical example is the run-length based bit stuffing used in HDLC.** **This clause discusses addition of trailing zero bits to make the total PPDU length occupy an integral number of symbols. This process is generally called "padding" not "bit stuffing."**	**Change the title of this clause to "Padding" and update all instances of "bit stuffing" to "padding" and instances of "stuffed bits" to "pad bits."**	**NC recomment to accept and to use "pad bits" intead of "stuffing bits" everywhere.** DONE
96.	**1.3.3.6**	**mw**	**e**		**Should values in Equation 14 and 15 be added to Table 4?**	**Consider adding parameters to the table.**	**NC No. Those are temporary variables, even though N_{SYM} is used in ODFM definition option.** DONE
97.	**1.3.3.6**	**TT**	**t**	**N**	**Since bit stuffing is being done by the PHY, does this not affect the duration calculation of the MAC?** **The MAC will calculate and round up to the nearest microsecond. However with this PHY it sounds like it has to round up to the nearest 4 usec. in order to be accurate.** **Since an error in the duration field less than DIFS will not affect the performance or behaviour of the MAC it is probably not necessary to provide a mechanism for the MAC to calculate a number accurately. However a note should be made in this section indicating that an error of up to 9 usec. may be present in duration calculations made by the MAC. (9 comes from duration calcualtions in a fragment burst case where the duration covers three separate frames of**	**Add statement that MAC duration can be up to 9 usec. less than actual duration of transmissions.**	**NC** **Produce a duration calculation equation and suggest where should it be inserted.** **1.5.1** **DONE**

					maximum error of 3 usec each.		
98.	**1.3.3.7**	**ap**	**e**		**Figure 6**	**Insert Z^N taps in figure**	**Accept. Put Z in each box.** DONE(X instead of Z)
99.	1.3.3.7	Bo	E		The format of figure 5 and figure 6 are different, though they both describe an LFSR.	Make the figures consistent in style.	DONE
100.	1.3.3.7	Bo	T	Y	Data octets are simply bit strings. Bit strings have no inherent significance and therefore can not have an MSB or an LSB.	Define bit order of transmission in a way that does not depend on bit significance.	Fixed. DONE
101.	**1.3.3.7**	**mw**	**t**		**Should the scrambler be put in a known, specified state?**	**If the scrambler is put in a known state in the transmitter and known descrambler state in the receiver, one of two improvements arise. Receiver descrambler synchronization is not required.** **(1) The preamble could be shortened, since overhead is not required for scrambler synchronizing.** **Or,** **(2) Preamble detection is much more robust because the transmitter pattern is certain. The detection can be made without using the descrambler.**	**NC decline.** **The effect on robustness and sensitivity is negligible, since the requirement to decode correctly the first 7 bits is implied in the requirement to decode correctly he whole message.** **The randomization is there for a reason – avoid perpetuation of bad PAR in retransmissions.** **Withdrawn (thanks)** **DONE**
102.	**1.3.3.8**	**ca**	**e**	**Y**	**Paragraph heading calls this a PLCP tail, but it is a PPDU tail.**	**Change title to "PPDU Tail Bit Field"**	**DONE**
103.	**1.3.4**	**ap**	**T**	**N**	**Clear Channel Assessment using only RSSI**	**Implement a more robust ED detection scheme if carrier sensing is not practical.**	**CCA is based upon RSSI energy detection (ED). This is a simple mechanism for deferral.** **DONE**
104.	**1.3.4**	**ca**	**T**	**Y**	**The CCA mechanism based on RSSI is not robust. The accuracy of the RSSI is too lose**	**Add a requirement that the equipment establish the noise**	**NC Recommend to reject. During the data portion of**

					to establish a proper threshold. The setting of the threshold is not adequately specified, nor is the criterion for setting it. Further, the response of the system to CCA not passing threshold is not specified sufficiently.	**floor via measurement and use this to calibrate the threshold.** **Add text similar to the DS PHY:** The OFDM PHY shall provide the capability to perform CCA according to at least one of the following three methods: *CCA Mode 1:* Energy above threshold. CCA shall report a busy medium upon detecting any energy above the ED threshold (aTIThreshold). *CCA Mode 2:* Carrier sense only. CCA shall report a busy medium only upon the detection of a valid OFDM signal. This signal may be above or below the ED threshold. *CCA Mode 3:* Carrier sense and energy above threshold. CCA shall report a busy medium upon the detection of an OFDM signal and energy above the ED threshold. The energy detection status shall be given by the PMD primitive, PMD_ED. The carrier sense status shall be given by PMD_CS. The status of PMD_ED and PMD_CS is	**the message the signal has no specific signature which enables "significantly better than ED" Carrier Sense. Therefore, do not complicate the CCA procedure further.** **Accept the part which says that a specification of CCA threshold is required.** **DONE(Reject)**

						used in the PLCP convergence procedure to indicate activity to the MAC through the PHY interface primitive PHY-CCA.indicate. A busy channel shall be indicated by PHY-CCA.indicate of class BUSY. Clear channel shall be indicated by PHY-CCA.indicate of class IDLE. The PHY MIB attribute dot11CCAModeSupported shall indicate the appropriate operation modes. The PHY shall be configured through the PHY MIB attribute dot11CurrentCCAMode. The CCA shall be TRUE if there is no energy detect or carrier sense. The CCA parameters are subject to the following criteria: If a valid OFDM signal is detected during its preamble within the CCA assessment window, the energy detection threshold shall be less than or equal to –76 dBm. With a valid signal (according to the CCA mode of operation) present at the receiver antenna within 2 ? s of	

						the start of a MAC slot boundary, the CCA indicator shall report channel busy before the end of the slot time. This implies that the CCA signal is available as an exposed test point. Refer to IEEE 802.11-1997 Figure 47 for a slot time boundary definition. In the event that a correct PLCP Header is received, the OFDM PHY shall hold the CCA signal inactive (channel busy) for the full duration as indicated by the PLCP LENGTH field. Should a loss of carrier sense occur in the middle of reception, the CCA shall indicate a busy medium for the intended duration of the transmitted frame. Conformance to OFDM PHY CCA shall be demonstrated by applying a OFDM compliant signal, above the appropriate ED threshold (a), such that all conditions described in b) and c) above are demonstrated.	
105.	**1.3.4**	**mw**	**t**	**Y**	**If 802.11 DSSS 1 and 2 Mbps uses a threshold specification on the ED method of CCA, why does not the 5 GHz OFDM? There are different power levels specified in Table 11. How does this impact CCA? Could**	**Justify CCA scheme and contrast to 2.4 GHz DSSS 1 and 2 Mbps spec.**	**Ditto** **A motion passed to include text:**

					interference be a problem? How is the threshold governed?		A start of a valid OFDM transmission at receive level equal or greater than minimum 6 Mbit/s sensitivity (-82 dBm) shall cause CCA to indicate Busy with probability >90% within 5 microseconds. If the preamble portion was missed, the receiver shall hold the CS signal Busy for any signal 20 dB above minimum 6 Mbit/s sensitivity (-62 dBm).
106.	**1.3.6.1**	**ca**	**e**	**Y**	**The font in figure 10 needs to be fixed to stay within the boxes.**	**Fix figure text.**	**DONE**
107.	**1.3.6.3**	**ct**	**T**	**Y**	**Although the current text indicates it shall be revised, this section needs to be reworked before it is approved as standard to indicate which sections are normative and which if any are informative.**	If the normative text for each country/region can be determined, use specific entries for country as in current standard section 15 table 63 for DSSS PHY or section 14 separate tables for FH PHY, and there are still issues to be determined, use informative text for those.	Change in the first paragraph: The centers of the outermost channels **shall be** at a distance of … to stress the normative nature of it. Change "Note" into Informational note" in the next two paragraphs, to stress the informational nature of those paragraphs. **DONE**
108.	**1.3.6.3**	**ge**	**t**	**y**	**This section must be finalized before submission to sponsor ballot. The channelization defined by the standard should not depend upon "HPA characteristics".**	**In the first sentence, change "a channelization scheme" to "the channelization scheme". Remove the last two sentences of the first paragraph. Remove Note 1 and Note 2.**	**Changed.** **DONE**

109.	**1.3.6.3**	**ko**	**T**		**It seems that channelization has not been fixed yet.**	**Fix channelization.**	**DONE**
110.	1.3.6.3	nc	e		On line 7, change "may have to amplified" to "may have to be amplified"		**DONE**
111.	**1.3.6.6**	**mw**	**t**	**Y**	**What implementation constraints are required by the 6 usec slot time?**	**Justify the slot time duration.**	**DONE**
112.	**1.3.6.7**	**ct**	**t**		**The transmit power levels described are for the US and should be indicated as such, and if other countries will be using this standard, additional text should be added**	add additional text for other countries if known or a general disclaimer indicating there are different regulatory environments etc.	**Regulatory text introduction improved** **Approved by TGa motion DONE** **Correct title and powers**
113.	**1.3.6.7.2**	**ko**	**T**		**It seems that some parameters have not been fixed yet.**	**Fix the parameters.**	**Fixed**
114.	1.3.7.2	Bo	T		It is not clear what the two differently colored lines represent in figure 12. Is the spectrum supposed to be between these lines or simply under the black line?	Clarify what this figure means.	NC Clarify that the spectrum should lie below the mask, and thet the Blue line is an illustration of signal spectrum. For typographic reasons, change spectrum to thin black line and the mask to thick black line. **DONE**
115.	**1.3.7.2**	**moa**	**T**	**Y**	**Allowed transmit spectrum mask (Figure 12) are tight for class AB amplifier. For instance, class AB amplifier modeled by ETSI-BRAN creates –18.5 dBr sidelobe at 9 MHz frequency offset when the amplifier operates at 5dB output back off. It seems better that the frequency offset specified for –20 dBr define at 10 MHz which is almost at adjacent channel signal edge.**	**Change frequency offset specified for –20 dBr to 10 MHz instead of 9 MHz in Figure 12.**	**Discussion issue** Spectrum mask resolved by motion: DONE
116.	**1.3.7.2**	**mw**	**e**		**Two curves are shown in Fig. 12. What are they?**	**Label curves.**	**as 114**
117.	**1.3.7.2 line 53 pp22**	**hw**	**T**	**X**	**dB relative to the power spectral density at the carrier frequency – looks like carrier bin has no power in it?**	By definition the carrier bin is 0 power density so how can you reference this to –20dBr	**NC Change to** (dB relative to the maximal spectral density of the signal) **DONE**
118.	**1.3.7.3**	**ca**	**e**	**Y**	**"geographic" does not belong in this**	**Replace the word**	**NC**

					sentence.	**"geographic" with "political".**	**DONE**
119.	**1.3.7.3**	**ct**	**e**		**typo**	should be Spurious Transmissions, and text could be read something like "spurious transmissions from compliant devices shall conform to national regulations"	**DONE**
120.	**1.3.7.4**	**Dk**	**T**	**N**	**It would appear that the 20 MHz spacing is not sufficient to allow use of two consecutive channels in the same geographic area. The spectral mask at the center of the next channel is only down about –30 dBc which does not provide much margin for near-far effects. You would have to use every other channel within a common geographic area or power control to get reasonable near-far margins. Using every other channel would only allow for 4 channels in the low and mid band. Using power control works OK with connections but not as well with asynchronous data.** **If you separated the channels by 32 MHz, you would get <-40 dBc but more importantly the edge of the band is outside the third order intermod lobe of the other channel. This would provide 5 channels in the lower and mid-band with about 15 dB better isolation at the edges. Adding 5 more channels interlaced in the other 5 would provide for two sets of frequencies for a total of 10 channels. Bringing the channels down from 20 MHz to 16 MHz spacing between sets degraded the bleedover by only 4 dB at the edges. You could still use adjacent channels for cellular style system installation. The distance to the band edge would have to be reduced to 28 MHz from 30 MHz.**	**Consider this.**	**NC Recommend to reject. In any case splitting installetions into odd and even channels is bad, but it can be done as part of cell planning.** **Also, a lot of effort went into agreement on this parameter with other regulatory bodies from different regulatory domain.** **Rejected by TGa motion** **DONE**
121.	**1.3.7.4**	**mw**	**t**		**Should the timing and carrier reference have**	**Consider using same clock**	**discussion item with**

					the same source, so synchronizing on one provides synchronization on the second?	**source.**	**BRAN DONE Discussed. see cmmt 5**
122.	**1.3.7.5**	**mw**	**t**		**Should the timing and carrier reference have the same source, so synchronizing on one provides synchronization on the second?**	**Consider using same clock source.**	**discussion item with BRAN DONE Discussed. see cmmt 5**
123.	**1.3.7.6**	**jh**	**e**		**Line 9: latter "*I(I, j, k)*"**	***I_0(I, j, k)***	**NC accept DONE**
124.	**1.3.7.6**	**mw**	**e**		**Wording of this section needs improvement. Currently the test method is given before the specification values.**	**Present the specification values up front. Put the test method in a separate following paragraph.**	**ditto**
125.	**1.3.7.6**	**rw**	**e**	**N**	Equation 22, definition of "P_0" is required		**NC detail P_0 as an average of I_0 and Q_0 valuesDONE**
126.	**1.3.7.6.1**	**jh**	**t**	**Y**	**Line 4&5: TBD**	**Define TBD**	**NC remove TBD. Probably 1.3.7.6.2 meantDONE**
127.	**1.3.7.6.2**	**mw**	**t**	**Y**	**TBD used.**	**Remove TBD.**	**NC remove TBD DONE**
128.	**1.3.7.6.2**	**rw**	**t**	**N**	TBDs need to be removed. Has relaxed requirement on outer carriers been factored into modulation error measurement requirements?	**Technical discussion during Jan 99 meeting should suggest values**	**Ditto This values were suggested during Sep 97 mtg with a rationale of outer lines being more distorted by filters DONE**
129.	**1.3.7.6.3**	**RvN**	**T**	**yes**	**Allowed relative constellation errors (Table 12) are too stringent. For instance, at 24 Mbps, an SNR of about 10 dB is required at the FFT output for a 10% packet error. The constellation errors should be small relative to the noise, but in Table 12, it is required that the constellation errors are –24 db, i.e., 14 dB smaller than the expected noise level. This puts a large constraint on quantization, filtering and power amplifier effects in the transmitter. To me, a more reasonable value seems 6 dB below the noise level, so a relative error of –16 dB instead of –24.**	**Add 8 dB to all values in Table 12.**	**Discussion Item, also with BRAN. Values relaxed by 8 dB, per TGa motion. DONE**
130.	1.3.8.1	Bo	T	Y	The PHY knows nothing of MPDUs, only	Replace MPDU with PSDU.	NC Accept. Delegate to the

					PSDUs.		Editor DONE
131.	**1.3.8.1**	**moa**	**T**	**Y**	**The numbers for receiver sensitivity are small. These numbers are derived by adding 5dB margin to the computer simulation results with no degradation factor. The required received power Pr for 10% packet error rate of 1000 byte MPDU length derived by computer simulation for latest parameters are :** **Pr = –87.4 dBm for 6 Mbit/s** **Pr = –86.4 dBm for 9 Mbit/s** **Pr = –84.6 dBm for 12 Mbit/s** **Pr = –82.2 dBm for 18 Mbit/s** **Pr = –79.5 dBm for 24 Mbit/s** **Pr = –75.9 dBm for 36 Mbit/s** **Pr = –71.7 dBm for 48 Mbit/s** **Pr = –70.1 dBm for 54 Mbit/s** **(These results are with NF = 10 dB)**	**Change numbers to following values:** **–82 dBm for 6 Mbit/s** **–81 dBm for 9 Mbit/s** **–79 dBm for 12 Mbit/s** **–77 dBm for 18 Mbit/s** **–74 dBm for 24 Mbit/s** **–70 dBm for 36 Mbit/s** **–66 dBm for 48 Mbit/s** **–65 dBm for 54 Mbit/s**	**NC discussion item, even though the differences are of order of 1-2 dB. Don't waste much time.** **Values Accepted.** **DONE**
132.	1.3.8.2	Bo	T	Y	The PHY knows nothing of MPDUs, only PSDUs.	Replace MPDU with PSDU.	NC Accept. Delegate to the Editor Changed. DONE
133.	1.3.8.2	Bo	T	Y	No undefined values may be left in the standard.	Define the value for "X".	NC specify –20 dBm? Assumptions- 50 mW, 1 meter, 6 dBi Tx, 2 dBi Rx. change to –30 dBm Accepted by TGa DONE
134.	**1.3.8.2**	**ct**	**T**	**Y**	**missing maximum input level**	put in appropriate value or delete	**Ditto**
135.	**1.3.8.2**	**jh**	**t**	**Y**	**Line 50: -X**	**Define X**	**Ditto**
136.	**1.3.8.2**	**ko**	**T or E**		**A value of maximum input level seems not be fixed.**	**Fix the value.**	**Ditto**
137.	**1.3.8.2**	**lw**	**t**	**n**	**Maximum input power needs to be specified.**	**I don't know what the value should be but we should have a place holder for the specification.**	**Dittto**

138.	**1.3.8.2**	**mw**	**t**	**Y**	**TBD used.**	**Remove TBD.**	**Ditto**
139.	1.3.8.2	nc	t		No maximum receiver input level specified	Specify –20 dBm.	**Ditto**
140.	**1.3.8.2, 1.3.8.3, 1.3.8.4**	**ca**	**e**	**Y**	**specifications are TBD**	**Replace -Xs with numbers**	**Resolved by TEG and approved by motion DONE**
141.	1.3.8.3	Bo	T	Y	No undefined values may be left in the standard.	Define the values for each "XX".	**Resolved by TEG and approved by motionDONE**
142.	**1.3.8.3**	**ct**	**T**	**Y**	**missing adjacent channel rejection values**	put in appropriate values or delete	**Resolved by TEG and approved by motionDONE**
143.	**1.3.8.3**	**jh**	**t**	**Y**	**All the XXs**	**Define the XXs**	**Resolved by TEG and approved by motionDONE**
144.	**1.3.8.3**	**ko**	**T or E**		**Adjacent channel rejection levels seem not be fixed.**	**Fix the levels.**	**Resolved by TEG and DONEapproved by motion**
145.	**1.3.8.3**	**lw**	**T**	**Y**	**We can not approve a PHY specification without having the values for adjacent channel rejection specified**	**I don't know what the values should be but we should not be going to letter ballot until they are specified.**	**Resolved by TEG and approved by motion DONE**
146.	**1.3.8.3**	**mw**	**t**	**Y**	**TBD used.**	**Remove TBD.**	**Resolved by TEG and approved by motionDONE**
147.	1.3.8.3	nc	t		No Receiver Adjacent Channel Rejection specified		**Resolved by TEG and approved by motionDONE**
148.	**1.3.8.3 and 1.3.8.4 line 3-14 pp26**	**hw**	**t**		**Adjacent channel rejection is expressed in dB at times and dBm at others**	The reference to db and dbm should all be dB.	**NC Accept DONE**
149.	**1.3.8.3 line 3 pp26**	**hw**	**e**		**typo**	Insert the word are between that and located	**DONE**
150.	1.3.8.4	Bo	T	Y	No undefined values may be left in the standard.	Define the values for each "XX".	**Resolved by TEG and approved by motion. DONE**
151.	**1.3.8.4**	**ct**	**T**	**Y**	**missing non-adjacent channel rejection values**	put in appropriate values or delete	**Resolved by TEG and approved by motion DONE**
152.	**1.3.8.4**	**jh**	**t**	**Y**	**All the XXs**	**Define the XXs**	**Resolved by TEG and approved by motion DONE**
153.	**1.3.8.4**	**ko**	**T or**		**Non adjacent channel rejection levels seem**	**Fix the levels.**	**Resolved by TEG and**

			E		**not be fixed.**		**approved by motion DONE**
154.	**1.3.8.4**	**lw**	**T**	**Y**	**We can not approve a PHY specification without having the values for non adjacent channel rejection specified**	**Again, I don't know what the values should be but we should not be going to letter ballot until they are specified.**	**Resolved by TEG and approved by motion DONE**
155.	**1.3.8.4**	**mw**	**t**	**Y**	**TBD used.**	**Remove TBD.**	**Resolved by TEG and approved by motion DONE**
156.	1.3.8.4	nc	t		No Receiver Non-adjacent Channel Rejection specified		**Resolved by TEG and approved by motion DONE**
157.	1.3.8.5	Bo	T		This clause seems to be stating a requirement for minimum signal detection level. Or is it specifying that the receiver must identify and quantify the level of the received signal. Obviously, this is not clear from the text.	Rewrite this clause so that it is clear what it is specifying.	REMOVED
158.	**1.3.8.5**	**ca**	**e**	**Y**	**Reception Level Detection is not called RSSI here, but what else could it be?**	**Clarify what is meant in this paragraph. Call it RSSI if that is what it is. Indicate how it relates to RSSI if it is not. Indicate the mechanism by which the information is passed to the MAC and what the MAC should do with it.**	**Refer to cmmt 22 REMOVED**
159.	**1.3.8.5**	**mw**	**t**	**Y**	**What is the purpose of the absolute accuracy? What is the impact of the 12 dB uncertainty? Should the threshold be set relative to the noise floor?**	**Describe motivation for the specification.**	**NC Remove the 1.3.8.5. Refer to comment 22. REMOVED**
160.	**1.3.8.5 line 19 pp26**	**hw**	**e**		**Add word**	-30 dBm **SHALL** have monotonically	**REMOVED**
161.	**1.3.8.5 line 20 pp26**	**hw**	**e**		**Add words**	and **AN** absolute accuracy **OF**(strike is)+/- 6 dB.	**REMOVED**
162.	1.3.9	Bo	T	Y	This clause needs to be rewritten to eliminate mention of the MAC. It should contain a description of the transmit procedure wholly bounded by the PHY SAP and PMD SAP	Eliminate mention of the MAC.	Mention of MAC was removed. DONE

					primitives.		
163.	1.3.9	Bo	T	Y	The PHY knows nothing of MPDUs, only PSDUs.	Replace MPDU with PSDU.	NC Accept. Delegate to the Editor. DONE
164.	1.3.9	Bo	T	Y	Other than the PLCP fields, the PHY does not know the semantics of the information passed across the PHY SAP. It simply knows that it has been asked to send an octet. Octets are simply bit strings. Bit strings have no inherent significance and therefore can not have an MSB or an LSB.	Define bit order of transmission in a way that does not depend on bit significance.	NC consult Bob, at which NOT NEEDED, the mention of LSB-MSB is OK DONE This clause was re-written
165.	**1.3.9**	**ca**	**e**	**Y**	**Figure 14 appears to show the Tail Bit(s) as encoded+scrambled whereas 1.3.3.8 says they are replaced by unscrambled bits before encoding. Which is it? Also, the font needs fixing to keep the text within the boxes.**	**Show tail bits properly handled and fix font.**	**DONE**
166.	**1.3.9**	**ca**	**e**	**Y**	**The text in figure 15 falls outside the boxes**	**Fix font**	**DONE**
167.	**1.3.9**	**ca**	**e**	**Y**	**The transmit state machine does not show the appending of the Tail**	**Add a block to show the Tail appending**	**DONE**
168.	**1.3.9**	**ct**	**T**	**Y**	**Service field not defined to indicate modulation rate change in this way, Signal meant?**	change to SIGNAL or clarify how SERVICE field does it	**Change on line 43 SERVICE to SIGNAL DONE**
169.	1.3.9 Figure 14	Bo	T	Y	The PHY knows nothing of MPDUs, only PSDUs.	Below the line between MAC and PHY, rename all MPDUs to PSDUs.	NC Accept. Delegate to the Editor DONE
170.	1.3.9 Figure 15	Bo	E		The notation used in the state diagram needs to be explained. In particular, what does it mean to have PMD_TXSTART.request and other SAP primitives inside one of the state boxes?		DONE
171.	1.3.9 Figure 15	Bo	T	Y	The PHY knows nothing of MPDUs, only PSDUs.	Remove reference to MAC and MSDU. Replace with PHY SAP primitive references.	NC Accept. Delegate to the Editor DONE
172.	1.3.9 Figure 15	Bo	T	Y	The state machine does not show where PHY-DATA.confirm is issued.	Add this primitive to the state machine.	Ask Bob DONE
173.	1.3.9 Figure 15	Bo	T	Y	The state machine shows PHY-DATA.req (*sic*) inside a state, rather than causing a transition to a state, as is done with PHY-TXSTART.request.	Place the primitive on the appropriate transition(s).	Ask Bob DONE
174.	**1.4.1; 1.4.2;**	**vz**	**E**		Refer to the "base standard" or "IEEE Std 802.11-1997" rather than the		**DONE**

	elsewhere				"current standard" in 1.4.1, 1.4.2, and elsewhere.		
175.	**1.4.2**	**HM**	**E**		**Reference to dot11PhyOperationComplianceGroup is incorrect.**	**Refer to dot11PhyOperationTable.**	**DONE**
176.	**1.4.2**	**HM**	**E**		**Reference to dot11PhyRateGroup with items dot11SupportedDataRatesTx and dot11SupportedDataRatesRx is incorrect.**	**Refer to separate dot11SupportedDataRatesTx Table and dot11SupportedDataRatesRx Table.**	**“**
177.	**1.4.2**	**HM**	**E**		**Reference to dot11PhyTxPowerComplianceGroup is incorrect.**	**Refer to dot11PhyTxPowerTable.**	**“**
178.	**1.4.2**	**HM**	**E**		**Reference to dot11PhyRegDomainsSupportGroup is incorrect.**	**Refer to dot11RegDomainsSupported Table.**	**“**
179.	**1.4.2**	**HM**	**E**		**Reference to dot11AntennasListGroup is incorrect.**	**Refer to dot11AntennasListTable.**	**“**
180.	**1.4.2**	**HM**	**E**		**Reference to dot11PhyRateGroup is incorrect.**	**Refer to dot11SupportedDataRatesTx Table and dot11SupportedDataRatesRx Table.**	**“**
181.	**1.4.2**	**HM**	**E**		**Reference to dot11PhyOFDMComplianceGroup is incorrect.**	**Refer to dot11PhyOFDMTable.**	**“**
182.	1.4.2 Table 13	Bo	T	Y	There may be no TBD values in the standard.	Replace TBD with valid values or eliminate “TBD”.	to be resolved in Mandatory Rates discussion, then becomes editorial DONE
183.	**1.4.2 table 13 & A.4.8 OF1.2, OF2.11, OF2.13 OF9.3**	**MIF**	**T**	**YES**	**dot11SupportedDataRatesTxValue and dot11SupportedDataRatesRxValue are both listed with “optional rates TBD”, whereas in the PICS (A.4.8, OF1.2) ALL of the data rates are optional. Similarly, in A.4.8, OF2.11 ALL of the coding rates are optional, and in A.4.8, OF2.13 ALL of the modulation mappings are optional.**	**Define the mandatory and optional data rates. Make the MIB and the PICS consistent on these rates. At least one data rate, coding rate, and subcarrier modulation mapping set must be mandatory, presumably {6Mbit/s, R=1/2, BPSK}.**	to be resolved in Mandatory Rates discussion, then becomes editorial DONE

184.	1.5.1	AS	T	Y	The characteristics described in Table 14 are defined as static integer values in Clause 10.4.3.2 in the standard. The MAC does not expect them to change during operation. TGb had a similar problem and it was resolved by adding a new pair of primitives to clause 10 to retrieve extended PHY characteristics. The parameters for the confirm are PHY dependent, so a set of static parameters could be defined for this PHY to accommodate the different values of aPreambleLength and aPLCPHeaderLength.		NOT YET Preamble length is fixed. DONE
185.	1.5.1	RvN	T	yes	The numbers for slot time and SIFS are too small. These numbers are mainly dependent on processing delays in transmitter and receiver. Practical delays for the receiver are: Serial-to-parallel conversion: 4 ms FFT: 4 ms Channel correction, phase tracking, QAM to binary and deinterleaving: 5 ms Decoding: 1 ms This gives a SIFS=Rx delay + RxTxTurnaround + MACdelay = 14+3+2 = 19 ms SlotTime = CCATime+RxTxTurnaround+MACdelay = 4+3+2 = 9 ms RxTxTurnaroundTime = 9 ms in current draft text, probably under the assumption that an IFFT has to be performed in the transmitter. However, the transmitter can start sending the fixed preamble without almost any processing delay, so RxTxTurnaround is mainly determined by ramp-up time. Preamble length does not take into account the Signal field, which should be included according to the definition of the preamble on page 9-11.	Change parameters to following values: aSlotTime = 9 ms aSIFSTime = 19 ms aRxTxTurnaroundTime < 3 ms aTxPLCPDelay : implementation dependent aRxPLCPDelay : implementation dependent aTxRampOnTime : implementation dependent aTxRampOffTime : implementation dependent aTxRFDelay : implementation dependent aRxRFDelay : implementation dependent aPreambleLength : 17.6 ms	Serial-to-parallel conversion: 4 ms should not be counted, aRxTxTurnaroundTime < 2 ms bringing SIFS down to 14 microseconds SlotTime = CCATime+RxTxTurnaround+MACdelay +Jitter= 4+2+2+1 = 9 ms Accepted by motion DONE
186.	1.5.1	TT	t	Y	Table 14 – aMPDUDuratinFactor is not	Change	Accept the comment

					correct. **The way this is defined assumes duration factor is used to convert from the PHY coding rate, e.g. at 12 Mbit/s coding rate using a ½ code you would need to multiply your duration by 2.** **However duration factor is used by the MAC, which takes the number of bytes multiplies it by the rate and then by the duration factor.** **Since the MAC is using the 6,9,12... rates which are actual data rates then the duration factor should be just 1.** **Part 2**	**aMPDUDurationFactor to be 1 for all data rates.**	accepted by TGa **DONE**
187.	1.5.2	Bo	T	Y	The Overview is not the place for conformance requirements.	Replace "shall" statements.	NC replace "shall be" with "is" **DONE**
188.	**1.5.5.1. 2 line 6 Pp37**	**hw**	**e**		**Typo**	"0" bits are added to FORM (strike be) an OFDM symbol.	**DONE**
189.	**1.5.5.1. 2 line 7 pp37**	**hw**	**e**		**typo**	PHY to be encoded into **AN** OFDM	**DONE**
190.	**1.5.5.7. 4 line 4 Pp40**	**hw**	**e**		**typo**	Add period at end of the line…	**DONE**
191.	**A.4.3**	**vh**	**E**		Coordinate the item number of the 5 GHz option and the clause number with TGb.	It is more elegant if the sequence of item numbers match the sequence of clauses	**NOT DONE** **DONE** **Ask Carl to change item numbers**
192.	**A.4.5 line 20 pp42**	**hw**	**e**		**spelling**	Change Hpooing to hopping	**DONE**
193.	**A.4.8**	**ge**	**T**	**y**	**OF1.2.1 through 1.2.8 seems to imply that all**	**Specify which rates are**	to be resolved in Mandatory

					data rates are options.	**optional and which are mandatory**	Rates discussion, then becomes editorial DONE
194.	**A.4.8**	**ge**	**t**	**y**	**"Most of Europe" is unclear and the cited sections do not clarify any further**	**Specify geographic regions more precisely with specific channelizations**	**NOT RESOLVED Specific regional items are removed. DONE**
195.	**A.4.8**	**jh**	**t**	**Y**	**Line 53: -X**	**Define the X**	**Resolve comment 131, then editorial DONE**
196.	**A.4.8 1.3.7.7**	**lw**	**e**	**n**	**There is no section 1.3.7.7 in the spec but it does exist in the table A.4.8 OFDM PHY functions as "symbol clock frequency tolerance"**	**Put it in or remove it**	**NC remove OF4.7 and OF4.8** **Removed**
197.	**A.4.8 1.3.7.8**	**lw**	**e**	**n**	**There is no section 1.3.7.8 in the spec but it does exist in the table A.4.8 OFDM PHY functions as "carrier frequency tolerance"**	**I believe it is the same as center frequency tolerance. Remove it**	**OF4.8 is removed.**
198.	**A.4.8 CF6**	**vh**	**E**		The question: "Which requirements and options does the PHY support?" does not make sense.	Replace "requirements" by "functions".	**DONE**
199.	**A.4.8 line 12 Pp44**	**hw**	**T**	**X**	**OF3.10.1 is a subset of the other 2 and should be manditory**	Change the O to M	**NC accept DONE**
200.	A.4.8 OF1.2	Bo	T	Y	It seems that it is possible to build a compliant OFDM PHY that does not implement any data rate, at all. The PICS indicates that all rates are optional.	Change the PICS to indicate that at least one rate must be chosen.	to be resolved in Mandatory Rates discussion, then becomes editorial DONE
201.	**A.4.8 OF1.2**	**vh**	**T**	**Y**	Can a vendor make a compliant implementation if he picks neither of the optional data rate? What if one picks one and another picks a differing rate?	Make sure one is to be selected and make sure one or more are manadatory so interoperability can be warranted.	to be resolved in Mandatory Rates discussion, then becomes editorial DONE
202.	**A.4.8 OF2.1.3**	**vh**	**T**	**Y**	Is not the modulation related to the data rate?	Specify in a way so that interdependency is made clear.	**DONE**
203.	A.4.8 OF2.11	Bo	T	Y	It seems that it is possible to build a compliant OFDM PHY that does not implement any of the convolutional encoders. The PICS indicates that all encoders are optional.	Change the PICS to indicate that at least one encoder must be chosen. Since this choice is tied to the choices of rates, that must be indicated, as well.	to be resolved in Mandatory Rates discussion, then becomes editorial DONE
204.	**A.4.8 OF2.11**	**vh**	**T**	**Y**	Item OF2.11 is a mandatory encoding, but the following options are all optional. If there are other encoding, not mentioned in the list, it is OK, because that encoding would be the interoperable encoding. If it is not, we have an	Specify a mandatory encoding for interoperability, or make the options so that the vendor is obliged to select one and make a mechanism to resolve	to be resolved in Mandatory Rates discussion, then becomes editorial DONE

					interoperability problem.	interoperability.	
205.	A.4.8 OF2.13	Bo	T	Y	It seems to be possible to build a compliant OFDM PHY tha does not implement any modulation. The PICS indicates that all modulations are optional.	Change the PICS to indicate that at least one modulation must be chosen. Since this choice is tied to the choice of rates and encoders, that must be indicated, as well.	to be resolved in Mandatory Rates discussion, then becomes editorial DONE
206.	A.4.8 OF3.10	Bo	T	Y	You know the drill by now.	Change to PICS to indicate that one of the temperature options must be chosen.	See comment 199. DONE
207.	A.4.8 OF3.3	Bo	T	Y	The PICS indicates that an OFDM PHY that supports more than one UNII band is not compliant. Is this really the intention?	Change the PICS to indicate that one or more bands may be supported.	DONE
208.	A.4.8 OF4.1	Bo	T	Y	The PICS indicates that an OFDM PHY that supports more than one UNII band is not compliant. Is this really the intention?	Change the PICS to indicate that one or more bands and their associated power levels may be supported.	to be resolved in Mandatory Rates discussion, then becomes editorial DONE
209.	A.4.8 OF5.1.4	Bo	T	Y	The PICS may not have any undefined values.	Replace "X" with a valid value.	to be resolved by comment 131. DONE
210.	A.4.8 OF5.3	Bo	T	Y	Again the PICS indicates that no rates need to be implemented.	Fix the PICS to show that at least one rate must be chosen.	DONE
211.	**A.4.8 OF3.3**	**MIF**	**E**	**no**	**The reference, status, and support columns are blank after OF3.3. Because all of the subitems OF3.3.1 through OF 3.3.3 are optional, but some channelization is required, the top-level entry OF3.3 itself should be mandatory, just as is done for the top-level entries OF2.10, OF2.13, etc.**	**Add "1.3.6.3" in the References column, add "M" in the Status column, and add "Yes / No" with checkboxes in the Support column.** **Also, delete or clarify the ".3" following each of the "O" entries under Status for OF3.3.1 through OF 3.3.3.**	**NC Accept DONE**
212.	A.4.8, 1.1, 1.4.2,	nc	T	Y	No Mandatory data rates are stated in the standard. Such rates are required to form a "Basic Rate Set" to ensure interoperability.	Specify 12 Mbit/s and 24 Mbit/s as the Mandatory data rates.	**NC Proposed resolution: specify R=1/2 as mandatory supported coding rate, QPSK and 16QAM as mandatory modulation formats and 12 Mbit/s and 24 Mbit/s as mandatory rates.**

							TGa accepted ny motion rates 6, 12 and 24 Mbit/s as mandatory. **DONE**
213.	**Abstract**	**vz**	**E**		The abstract is unclear.	Please rework. Also, keywords should be listed in alphabetical order	**DONE**
214.	**end**	**hw**	**T**	**X**	**Needs definitions of terms in document**	Put glossary at end of document – symbols are used for several meanings – OFDMsymbols – modulation symbols- short and long training symbols……..	**All wordings with "symbol" are commonly used (technical words).**
215.	**Figure 14 and 16**	**vz**	**E**		Can callouts be switched so they are right-reading in Figures 14 and 16?		**NC difficult, in view of the density. Precedence in 802.11-1997 Reject**
216.	**Figure 8 and 18**	**vz**	**E**		Use hatching rather than grey-scale for figures when possible (e.g., Figure 8 and Figure 18).		**DONE**
217.	**Figures**	**vz**	**E**		All figures should use a minimum 8 pt type and Helvetica (medium, not bold) is the preferred font. The callouts in Figure 4 are much too small. Try to use fonts and sizes consistently in all figures (e.g., Figure 10).		**Changed to bigger font. (smallest is 8pt)**
218.	**Font**	**Vz**	**E**		Ensure that Annex B type size is at least 8 pt		**All letters are at 9 pt.** **DONE**
219.	General	Bo	E		The top level paragraphs are not included in the table of contents, only those paragraph headings of level 4 and below.	Include the top level paragraphs on the TOC.	Not yet. Trying to find do that on the frame maker.
220.	**General**	**vh**	**T and E**	**Y**	I suspect that the supplement should also add to the clauses about references, definitions, clause 12 and 13.	Review and add where needed	**All related info. is in clause 17. No additional text is needed to clause 12 and 13.** **DONE**
221.	**general**	**vz**	**E**			Please include editor's notes to show how this supplement will be folded into the base standard in the	**DONE**

						future. Also, renumber clause 1 (OFDM Physical Layer Specification for the 5 GHz Band) to the proper clause number corresponding to the base standard. Should this be Clause 17	
222.	**General**	**vz**	**E**		Refer to clauses and subclauses. Examples: See Clause 4, see 2.3.1. Also, refer to annexes rather than appendixes.		**DONE**
223.	**General**	**Vz**	**E**		Lowercase clause and subclause headings wherever possible. Only the first letter of the first word should be capitalized (e.g., 1.5.5.4.4 Effect of receipt).		**DONE**
224.	**General**	**Vz**	**E**		The material in Annex C belongs in the front of the supplement. Label it as Clause 4 and add an editor's note to add the following abbreviations and acronyms to the base standard		**DONE**
225.	**pp10**	**hw**	**T**	**X**	**Loose definition**	Preamble is not defined in document but used inconsistently – does it include the signal field --- pp11 line 21 and line 30 and line 52 and inconsistent	**DONE**
226.	**Pp25**	**hw**	**e**		**Table as a stand-alone has no meaning**	Should reference the table to 1.3.7.6	**DONE**
227.	**Table 4**	**jh**	**e**		**Line 41: PLCP pleamble**	**PLCP preamble**	**DONE**
228.	**Tables**	**vz**	**E**		Please insert an em-dash in all empty table cells to show that they are intentionally blank and that data is not missing (e.g., Table 5, Table 15).		**DONE Only those which need**
229.	**Title**	**vz**	**E**		Ensure that the title matches the PAR		**Checked by Vic: This is OK DONE**
230.	**Title page and footers**	**vz**	**E**		**Copyright statements have to give the year correctly**	In the Draft Copyright Statement on the title page and on the bottom of each page, change 1998 to	**DONE**

						1999.	
231.	TOC	nc	e		Add Table of Contents. Set the number of levels listed in the Table of Content to 4 or 5. Many important items will be difficult to locate unless this is done.		**Default style includes no 4 level. Trying to change the style file.**