
IEEE P802.11

Wireless Access Method and Physical Layer Specification

**Section 4 Response
to Draft D1 Letter Ballot
Processed at March 1995 Meeting**

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Abstract: This Document P802.11-95/66 represents the output of the sub-working group of the MAC group that is resolving the comments on section 4 of 802.11/D1. The comment numbers in the *TAG* column cross reference to the numbers in the technical/editorial column in document P802.11-95/65. Responses in **bold** are not definitive because either the issue is too large for a small working group, or because we need input from a group that is working on another section. The comments reviewed are largely those that the author marked as *technical*, though here we noted an editorial comment that addressed the same issue we bundled that in as well. These are marked with an (E) following the authors name in the table below.

Action: Adopt the changes in P802.11-95/66 to replace the relevant portions of Section 4 of P802.11/D1, as shown in the companion document P802.11-95/58.

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| 1 | 4.1 | Chris Zeglin Tom T J Renfro A Bolea | Bit/Byte ordering | make clear - 1.6 does not contain octet ordering - eg for duration field. |
| 2 | 4.1.1 | J Rosdahl A Bolea B Dobyns C Heide T Baumgartner M Fischer S Black (E) M Okada (E) Rackowitz (E) Tom T R White (T/E) B O'Hara (E) E Geiger (E) S Vesuna J Renfro (E) G Sherwood J Kubler Fischerma D Bagby | Frame format should be: Frame control 2 octets Duration/ConnID 2 octets Address 1 6 octets Address 2 6 octets Address 3 6 octets Sequence control 2 octets Address 4 0/6 octets Frame body 0-2304 CRC 4 octets | Recommend yes |
| 3 | 4.1.1 | A Bolea J Renfro | Move Duration field | Recommend no, duration field must stay in fixed position (to allow easy hardware implementations). Only other possible place is after address 1, but this is messy since it ends up between address 1 and address 2. |
| 4 | 4.1.1 | M Fischer | 2304 -2312 octets with ICV/IV - where does 2304 come from | 2304 = 2048 (application data size) + 125 (worst case protocol overhead) + 5 (802.2 SNAP header) + 30 (source routing). Optional field in data frames for IV (16 bits before MSDU) and ICV (32 bits after MSDU). |
| 5 | 4.1.1 | M Demange | Protected MAC header to shorten turnaround - big change | Recommend no, big change with little support in the working group. |
| 6 | 4.1.1 | T Phipps | Delete section. | Recommend no, generally felt diagram useful - comment editorial, perhaps make diagram clearer to show fields that are not in all frame types (grey?) |

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| 7 | 4.1.2.1 | Jim Panian | Generally felt useful. Note M fischers comment on WEP bit in comment 12 and paper 95/06. Compression not in standard so no need for compressed bit, but note no reserved bits left. | Recommend yes |
| 8 | 4.1.2.1 | C Heide | Clarification of which frames field in frame control field are valid | Editorial |
| 9 | 4.1.2.1 | Joe Kubler | More bit in frame control field removed to power management field (sections 7.2.1.6, 7.2.1.7 inconsistent) | Recommend no |
| 10 | 4.1.2.1 | McDonald J Panian (E) | More bits for version number. | Recommend no, larger control field, protocol extensions fundamentally incompatible at frame level will be rare. |
| 11 | 4.1.2.1 | Wim Diepraten | Agree with intent - that is to specify how to set FC bits in various frame types, disagree with two of Wims comments - Power management (should be allowed in all)and EP (elements in management only). | Recommend no, but note to check definition of when bits used and what values they take in each section. |
| 12 | 4.1.2.1 | M Fischer | Rsvd bit in frame control field becomes 'frame body encrypted bit' | Recommend yes, but note no reserved space in frame control |
| 13 | 4.1.2.1.1 | Rick White | Define initial protocol version as 00 | Recommend yes |
| 14 | 4.1.2.1.1 | M Fischer | ... without indication to LLC | Recommend yes |
| 15 | 4.1.2.1.1 | S Vesuna | Shall discard frame with higher protocol version becomes may discard | Recommend no, since discard only way to ensure defined behaviour |
| 16 | 4.1.2.1.2 | B Dobyms A Bolea D Bagby | Complete re-organisation of types Remove (no data) data frames since Data can have length =0 ? Move Null to control | Flag |
| 17 | 4.1.2.1.2 | C Heide T Baumgartner | Drop asynch from asynch data | Recommend yes |
| 18 | 4.1.2.1.2 | M Demange | Merge association and reassociation - suggestion is that practically these could be the same. Re-association is practically deassociate plus associate. | Flag, but note that may be better to keep seperate from standards view point - to keep the two things logically seperate. |
| 19 | 4.1.2.1.2 | T Phipps | Add CF END + ACK since no way to ACK last CF-DOWN (would usually be in CF-UP) | Recommend no, user CF-ACK (zero data) then CF-END |
| 20 | 4.1.2.1.2 | Wim Diepraten | Suggestion that CF-TBS added. | Recommend no, since if CF then ConnID instead of duration |
| 21 | 4.1.2.1.2 | M Fischer | Have PS-Poll replace Poll to avoid confusion with CF-Poll | Recommend yes |
| 22 | 4.1.2.1.2 | P Prenner | Merge certain high level management frames, create more reserved. Some are time critical - probe-probe response, some are higher level functions. | Flag, but could split into lower and upper management functions - use the 00 type for one and the reserved 11 type for the other. Alternatively for non-time critical could use an element for sub-type. |

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| 23 | 4.1.2.1.3 | B Dobyns D Bagby | Problem with toDS - can generate out-of-sequence packets | Flag, can't stop re-ordering ? LLC should fix in an ideal world. |
| 24 | 4.1.2.1.3 | C Heide T Baumgartner M Demange | STA uses ToDS field whenever going via an AP - DS Services include relaying within a BSS | Recommend that when associated the ToDS bit should <i>default</i> to true. <i>Default</i> does not mean <i>must</i> |
| 25 | 4.1.2.1.3 | R White | Any frame to another STA must have DS bit set | Recommend no |
| 26 | 4.1.2.1.4 | R White | This one bit field shall indicate that the frame is being distributed from the distribution system in an infrastructure network. | Recommend yes |
| 27 | 4.1.2.1.4 | M Fischer | Add text to To/FromDS both 0: A frame direct from one station to another station in the same BSS | Recommend yes |
| 28 | 4.1.2.1.5 | Tom Baumgartner | Only data frames fragmented | Recommend no |
| 29 | 4.1.2.1.5 | M Demange A Bolea (E/T) R White S Vesuna | Define sense of Last Fragment Bit (1 is last frag, 0 is more following) | Recommend yes |
| 30 | 4.1.2.1.6 | J Kubler | Retry bit A station may shall use this indication to aid in the process of eliminating duplicate frames | Recommend yes |
| 31 | 4.1.2.1.6 | M Demange R White | Define sense of Retry Bit (1 is retry, 0 is first transmission) | Recommend yes |
| 32 | 4.1.2.1.7 | B O'Hara R White (E) M Demange (E) J Rackowitz (E) A Bolea (E) S Vesuna (E) E Geiger (E) G Sherwood (E) | Power management bits. 'These bits shall remain constant for each frame sequence described in section 4.3' | Recommend yes |
| 33 | 4.1.2.1.8 | C Heide J Rosdahl | Reword 'elements present': This one bit field shall be set to one if there are one or more elements present in the frame body. This field shall be used for management type frames only. This field is reserved for all other frame types and shall be set to 0. | Recommend Jon Rosdahl's reworded |

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| 34 | 4.1.2.1.8 | C Heide T Baumgartner A Bolea B O'Hara D Bagby | Remove EP bit as redundant since elements only ever present in management frames | Recommend yes |
| 35 | 4.1.2.2 | B O'Hara M Fischer J McDonald R White Miceli D Bagby | Change duration time to bit times and no microseconds. Also referce to calculation in section 5. | Flag |
| 36 | 4.1.2.2 | C Heide T Baumgartner M Fischer S Vesuna (E) A Bolea (E) | Last sentence; remove parenthesis and reword: Only contention Free Time Bound service frames use a connection ID; asynchronous data frame do not use connection ID | Recommend yes |
| 37 | 4.1.2.2 | J Kubler | Always use ConnID rather than Duration in CF. ConnID only used for TBS therefore use reserved value of ConnID (all 0's) for sync data. Add to above sentence: This field is reserved for CF Asynchronous Data Frames and shall be set to 0. | Answered comment |
| 38 | 4.1.2.2 | W Diepstraten | ConnID necessary for time bounded - exists at the MAC service boundary to identify connection. | Perhaps need to carify use of ConnID |
| 39 | 4.1.2.3.2 | M Fischer E Geiger | Delete final sentence of 4.1.2.3.2 It is not necessary that a station be capable of generating the broadcast address | Recommend no (leave) |
| 40 | 4.1.2.3.3 | E Geiger G Sherwood T Phipps | Measures shall be taken in the selection of the value of this field to differentiate it from other ad hoc networks in the vicinity. | Flag - how do you choose initial BSSID in Ad-hoc network. Choose MAC address of initiating station. Much discussion! |
| 41 | 4.1.2.3.3 | R White | BSSID clarifiaction - address of STA in AP | Recommend yes |
| 42 | 4.1.2.3.4 | M Fischer C Heide | Improved wording of destination address definition | Recommend yes |
| 43 | 4.1.2.3.5 | M Fischer | Improved wording of Source address definition | Recommend yes |

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| 44 | 4.1.2.3.6 | M Fischer R White C Heide J Rosdahl | Improved wording of receiver address definition | Recommend yes |
| 45 | 4.1.2.3.7 | C Heide P Brenner | Allow broadcast TA/RA | Recommend no, not logical. |
| 46 | 4.1.2.3.7 | M Fischer J Rosdahl R White | Improved wording of transmitter address definition | Recommend yes |
| 47 | 4.1.2.4 | C Zegelin | Change fragment numbering to count down from initial number of fragments | Recommend no, since can't change fragmentation on fly |
| 48 | 4.1.2.4 | B Dobyns | Sequence control field not long enough - but no suggestion of suitable length Assumption: Check sequence number and source address at destination | Recommend no, keep overheads to minimum |
| 49 | 4.1.2.4 | R White | Change Dialogue Token to Sequence Number | Recommend yes |
| 50 | 4.1.2.4.1 | A Bolea J Renfro | Change Dialogue Token to be random instead of incrementing, or starts at random value and increments. Assumption: Check sequence number and source address at destination. | Recommend no to both, random gains you nothing based on assumption. Specify sequence numbers for all stations start at 0. |
| 51 | 4.1.2.4.1 | B Dobyns | Sequence number same for all DAs or unique on a per DA basis. Assumption: Check sequence number and source address at destination. | Standard does permit both. |
| 52 | 4.1.2.4.1 | M Fischer | add ... with the retry frame control bit set to 1 | Recommend yes |
| 53 | 4.1.2.4.2 | M Fischer | frag number text | Recommend yes |
| 54 | 4.1.2.4.1 | J Rackowitz T Phipps J Renfro R White S Vesuna | Increase fragment number to 5-6 bits | Recommend no since this adds an extra octet and there is no clear justification of increased performance due to small fragments. |
| 55 | 4.1.2.5 | M Fischer | Frame body is variable length up to 2312 not 2304 Figure 4.1 should include the optional fields for the WEP information (IV, ICV) | Recommend no, add separate optional fields in data frame format for IV, ICV |
| 56 | 4.1.2.5 | B Dobyns | Where did 2304 come from ? | Recommend no, this is the year that an IR PHY will be a practical WLAN solution. |

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| 57 | 4.1.2.6 | S Vesuna A Bolea M Fischer E Geiger G Smith Tom T | CRC | Flag, section needs further work, consult references. |
| 58 | 4.2 | J Renfro | Move duration field | Recommend no, duration field must stay in fixed position (to allow easy hardware implementations). Only other possible place is after address 1, but this is messy since it ends up between address 1 and address 2. |
| 59 | 4.2.1.1 | A Bolea J Kubler P Brenner (E) | RTS always sent to AP in an infrastructure network, what about peer-peer ? | Recommend no, since RTS/CTS handshake is always carried out with the AP since this is the optimum way to communicate the NAV to all stations in the BSS |
| 60 | 4.2.1.1 | M Fisher | Rename DA/SA in RTS RA/TA, then add clarification text | Replace terms, but text is less clear and needs more work |
| 61 | 4.2.1.1 | R White Fischerma | Define frame control field for all control frames in 4.2.1 | Recommend yes, despite maintenance issue |
| 62 | 4.2.1.2 | G Smith | CTS should contain source, | Recommend no, probability of error is extremely small (not worth six bytes of overhead) |
| 63 | 4.2.1.2 | M Fischer Fischerma R White (E) | Change DA to RA in CTS. Also clarification text on RA from TA in previous RTS | Recommend yes |
| 64 | 4.2.1.2 | J Rosdahl | SA in CTS for Network Management | Recommend no, additional 6 octets overhead per exchange, could keep track of RTS/CTS pairs, only useful in ad-hoc cases (where you don't hear the RTS). |
| 65 | 4.2.1.2 + | D Johnson | Power Control | Flag |
| 66 | 4.2.1.3 | G Smith J Rosdahl | Add SA to ACK | Recommend no, since ACK can't arrive out of sequence. |
| 67 | 4.2.1.3 | M Fischer Fischerma | Change DA to RA and add clarification text | Recommend yes |

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| 68 | 4.2.1.4 | C Zegelin R White T Phipps (E) M Demange (E) G Sherwood (E) A Bolea (E) W Diepstraten (E) T Baumgartner S Vesuna J Rosdahl Miceli (E) J Kubler J Renfro | SID missing from Poll | Replace Duration with SID in Poll make changes throughout section 4 to diagrams to show additional use of this field |
| 69 | 4.2.1.4 | T Baumgartner | CF-Poll bit - where is it | Became CF-Poll sub-type (data type) |
| 70 | 4.2.1.4 | M Fischer Fischerma | Suggest name to PS-Poll Change address SA to TA to bring in line with above changes to control frames Add SID | Recommend yes |
| 71 | 4.2.1.4 | Tom T J Rackowitz (E) | Need to define CF-END control Frame control Reserved Duration RA TA CRC TA would be BSSID, RA would be broadcast | Recommend this frame format |
| 72 | 4.2.2 | R White (E) | Change data frames to asynchronous data frames | Recommend no, comment 17 already removed asynch from asynch data (since data type frames can also carry tbs data) |

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| 73 | 4.2.2.1 | C Heide J Rosdahl Fischerma S Vesuna E Geiger J Kubler B O'Hara (E) G Sherwood (E) J Rackowitz (E) J Renfro (E) Tom T (E) D Bagby | Sequence control field instead of sequence number and fragment number | Recommend yes, consistency |
| 74 | 4.2.2.1 | C Heide | Remove BSS ID from address 3 in To/FromDS=0 | Recommend no, need to verify that frame is from your BSS - consider broadcast |
| 75 | 4.2.2.1 | T Baumgartner | Dialogue Token now sequence number, move address 4 | Recommend no, since address4 only in one case (to/fromDS =1) keeps sequence Control field in a fixed place |
| 76 | 4.2.2.1 | M Fischer R White P Brenner | Sequence control First part is good clarification - yes to all sentences, but replace initiating with originating in last sentence (even clearer) Frame body - should not include IV/ICV. These are seperate optional fields in the data frame. Frame body contents not zero if subtype 00xx (positive logic) add text ... for CF control purposes, but... - yes NAV vector update sentence - yes | Recommend yes, with minor rewording. |
| 77 | 4.2.2.1 | J Renfro | Allow Null messages to be sent at any time (not just during CF period), useful for power saving | Good idea, but all tied up with the reorganisation of frame types - could get this by sending a data frame with zero length data. Usage also needs to be tied up with section 5 - this is only the frame type definition section, not usage |
| 78 | 4.2.2.1 | R White | Seperate sections for data subtypes | Recommend no, Data frame format constant for sub-type. Usage rules should be defined in section 5. |
| 79 | 4.2.2.1 | R White | Pointer to frame control definitions | Recommend no, all applicable so just add section pointer |
| 80 | 4.2.2.1 | R White | Frame usage paragraph | Not in this section, needs pointer to section 5. |
| 81 | 4.2.3 | J Rackowitz (E) | Define element type codes | Recommend add pointer to Section 4.4 (editorial) |

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| 82 | 4.2.3 | A Bolea J Rosdahl R White E Geiger M Fischer B O'Hara (E) J Renfro (E) P Brenner (E) W Diepstraten (E) | Swap BSSID and DA in management frames to make consistent with data frames. | Recommend yes |
| 83 | 4.2.3 | A Bolea | Three issues: Fixed fields rather than elements. Keep elements and make short timestamp 0 so that it comes out in the same place - effectively yes from above. Weight field has gone, channel sync information should use correct element names | Recommend yes to first comment: Represent mandatory information (both fixed length and variable length) as fixed fields in management frame formats. Use elements for optional information. Recommend delete weight (no longer used), and define channel sync information |
| 84 | 4.2.3 | C Heide Tom T J Rackowitz (E) | Add management frame descriptions for Connection request Grant connection End connection | Recommend yes: Need defining. |
| 85 | 4.2.3 | L Hamilton P Brenner (E) W Diepstraten (E) J Rackowitz (E) | Draw out each management frame | Recommend yes - required. |
| 86 | 4.2.3 | J Renfro D Bagby | Fixed frame for each management type rather than elements | Recommend yes Represent mandatory information (both fixed length and variable length) as fixed fields in management frame formats. Use elements for optional information an protocol extensions. Such elements can appear in any order. |
| 87 | 4.2.3 | R White | Subsection for management frame type | Recommend yes, needs completing |
| 88 | 4.2.3 | R White | Define frame control field in all management frames | Recommend yes, do this globally for management frame type since frame control field same for all management sub-types |

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| 89 | 4.2.3 | T Phipps | Management frames not fragmented | Recommend no, cannot guarantee length of management frame will be shorted than fragmentation threshold. |
| 90 | 4.2.3 | P Brenner J Panian (E) | Add broadcast BSS ID for management frames. | Recommend yes Add bullet c) In probe management frames, the BSS ID shall either be a specific BSS ID or the broadcast BSS ID as defined in the procedures specified in section 7. |
| 91 | 4.2.3.1 | Joe Kubler J Hayes T Phipps W Diepstraten D Bagby A Bolea J Kubler J Hayes S Black | Delete weight Channel sync information replaced by hop parameters which is an ordered set {pattern, dwell time} (set, index not required). | Recommend yes, no longer required Recommend yes, but Hop time replaced by dwell time (since hop time also contains time stamp which is redundant since it also appears in the frame elsewhere. Set and index not required since pattern and the frequency you are listening to give you all the information you need to get in sync. |
| 92 | 4.2.3.1 | J Hayes D Bagby J Hayes | Which timestamp in beacon - long or short | Recommend that long timestamp be removed, therefore beacon contains only short timestamp. |
| 93 | 4.2.3.1 | J Renfro | Distinguish between ad-hoc and infrastructure beacons | Recommend no, Beacons are the same since differences are optional elements (TIMs). NB weight element that is mentioned is now obsolete |
| 94 | 4.2.3.1 | S Black | Contents of beacon | Recommend revisited in the light of the fixed management frame formats decision, contents a usfull list though |
| 95 | 4.2.3.11 | S Vesuna | Reference to privacy algorithm list | Defer for section 2 input |
| 96 | 4.2.3.12 | John Hayes | Reference to authentication - identity assertion | Defer for section 2 input |
| 97 | 4.2.3.3 | P Brenner | Add new element to give disassociation reason | Recommend no, can't enumerate all the reasons for disassociation |
| 98 | 4.2.3.4 | C Heide | Association request must contain CF-awareness indicator | Flag, check with section 7 folks |
| 99 | 4.2.3.4 | C Heide | Association request must contain info to negotaita max age of AP buffer data. | Flag, check with section 7 folks |
| 100 | 4.2.3.4 | J Kubler | Sequence element | Recommend no, insufficient detail in comment |
| 101 | 4.2.3.4-7 | W Diepstraten | Required information in association and reassociation | Flag, check with section 7 folks |
| 102 | 4.2.3.5 | C Heide | Remove status from association response | Flag, awaiting section 7 input |

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| 103 | 4.2.3.6 | A Bolea | Remove reassociation - always use association | Flag, awaiting section 7 input |
| 104 | 4.2.3.7 | S Vesuna | Reassociation contains new SID | Flag, awaiting section 7 input, but likely |
| 105 | 4.2.3.8 | Tom T | Probe request contains ESS ID | Recommend yes |
| 106 | 4.3.2.9 | J Renfo | Distinguish between probe in infrastructure and ad-hoc | Recommend no, not necessary since all differences are optional elements |
| 107 | 4.2.3.9 | Tom T | Short timestamp in probe, not timestamp | Recommend yes, but wait for section 7 input. |
| | | | | |
| a1 | 4.3 | J Hayes T Phipps J Panian (E) | Allow Data-Data exchange Allow individual ATIM | Recommend yes for both |
| a2 | | | | |