

**IEEE P802.11
Wireless LANs**

Draft Text for High Speed Extension of 802.11 at 2.4 GHz

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Abstract

Draft text is provided for the proposed high speed extension of the Direct Sequence standard for 2.4 GHz. The text specifies optional data rates of 1.83, 3.67, 5.50, 7.33, 9.17, 11.00, 12.83, 14.67, 16.50, 18.33, 20.17, and 22.00 Mb/s. The specified modulation method is Advanced Multirate Barker Code, or AMBC.

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1. Extension of the Direct Sequence Spread Spectrum Physical Layer Specification for the 2.4 GHz ISM Band

1.1 Introduction

This clause describes the high speed extension of the physical layer for the Direct Sequence Spread Spectrum (DSSS) system (section 15 in the Low Speed standard). The Radio Frequency LAN system is intended for the 2.4 GHz ISM band as provided in the USA according to Document FCC 15.247, in Europe by ETS 300-328 and for other countries with channelization as defined in clause 15.4.6.2 of the Low Speed standard.

In addition to the 1 Mb/s data rate described in section 15 of the Low Speed standard, the extension of the DSSS system provides for optional MPDU rates of 1.83, 3.67, 5.50, 7.33, 9.17, 11.00, 12.83, 14.67, 16.50, 18.33, 20.17, and 22.00 Mb/s. FCC regulations require a processing gain of at least 10 dB. This shall be accomplished by chipping the baseband signal at 11 Mc/s, with an 12 chip PN code. The DSSS system uses baseband modulations of Differential Binary Phase Shift Keying (DBPSK) to provide the 1 Mb/s data rate., and QPSK to provide the higher data rates.

Preambles: Long, Short, or Both ? At time of writing, 802.11 TGb has not reached a consensus on whether:

(1) The High Speed extension will have full interoperability and coexistence with Low Speed 802.11 compliant devices, by using the same 128 μ s preamble as the existing standard.

or

(2) The High Speed extension will provide for a choice, on a packet by packet basis, between the 128 μ s Long Preamble of the existing standard, and a Short Preamble of 48 μ s duration, as defined in clause 1.2.3.1-B, below. The Short Preamble achieves higher throughput rates at the expense of perfect coexistence. The Long Preamble preserves coexistence as an option. With either choice, the PLCP header is unchanged in the High Speed extension.

Unless explicitly defined otherwise in this Draft Text, all sections and clauses of the Low Speed 802.11 standard apply for the High Speed standard. Note that this includes detailed clauses of section 15.

1.1.1 Scope

This section describes the extension of the the physical layer services provided to the 802.11 wireless LAN MAC by the 2.4 GHz Direct Sequence Spread Spectrum system. The clauses describe differences from the existing 802.11 spec for DSSS at 2.4 GHz, referred to in this document as the Low Speed standard.

To conform to the 802.11 High Speed standard, equipment must support the existing 1 Mb/s data rate, and all the Advanced Barker data rates up to 9.17 Mb/s. Support for the existing 2.0 Mb/s standard is optional, as are the Advanced Barker data rates from 11 to 22 Mb/s. This requires equipment to be interoperable with 802.11 Low Speed, and meets minimal requirements for the more recent High Speed standard.

1.2 DSSS Physical Layer Convergence Procedure Sublayer

1.2.1 Introduction

This section provides a convergence procedure for the data rate specifications, in which MPDU's are converted to and from PPDU's. During transmission, the MPDU shall be pre-pended with a PLCP preamble and header to create the PPDU. At the receiver, the PLCP preamble and header are processed to aid in demodulation and delivery of the MPDU.

1.2.2 Physical Layer Convergence Procedure Frame Format

The format for the PPDU, including the DSSS PLCP preamble, the DSSS PLCP header and the MPDU are identical to the Low Speed standard.

1.2.3 PLCP Field Definitions

As in the Low Speed DSS standard, the entire PLCP Preamble and Header shall be transmitted with 1 Mb/s DBPSK modulation. All transmitted bits shall use the scrambling polynomial described in clause 15.2.4 of the Low Speed standard.

Unless specifically noted otherwise, the High Speed extension uses the same definitions as the Low Speed standard.

NOTE: Either clause **1.2.3.1-A** or clause **1.2.3.1-B** will be selected for the Final Draft, and re-numbered to **1.2.3.1**. Either **Figure 1-A** or **Figure 1-B** would then be inserted after Clause 1.2.2 of the High Speed extension.

1.2.3.1-A PLCP Synchronization (SYNC)

Clause 15.2.3.1 of the Low Speed standard also defines the High Speed extension.

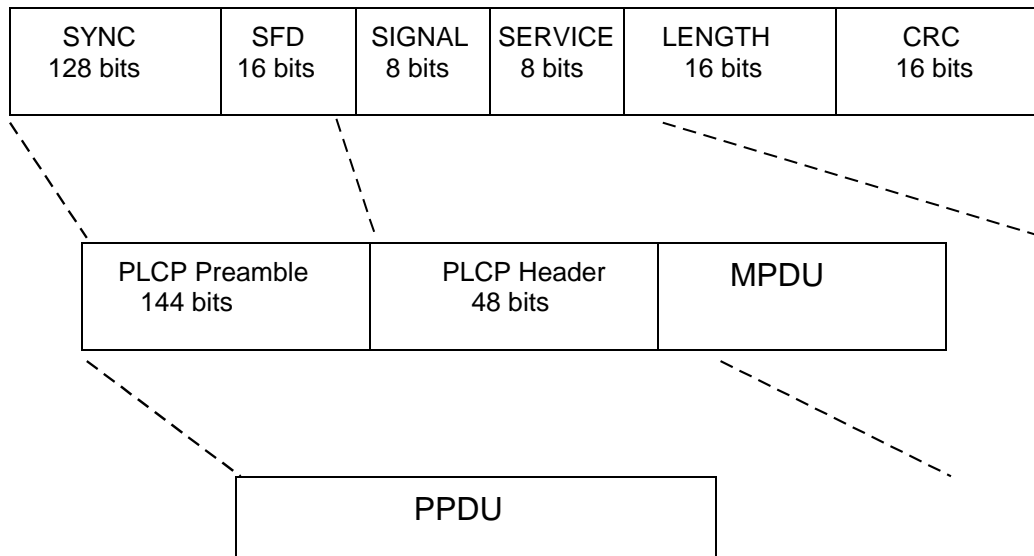


Figure 1-A, PLCP Frame Format

1.2.3.1-B PLCP Synchronization (SYNC)

Devices compliant with the High Speed extension must transmit either:

- a) a synchronization field consisting of 128 bits of scrambled 1 bits, or
- b) a synchronization field consisting of 48 bits of scrambled 1 bits.

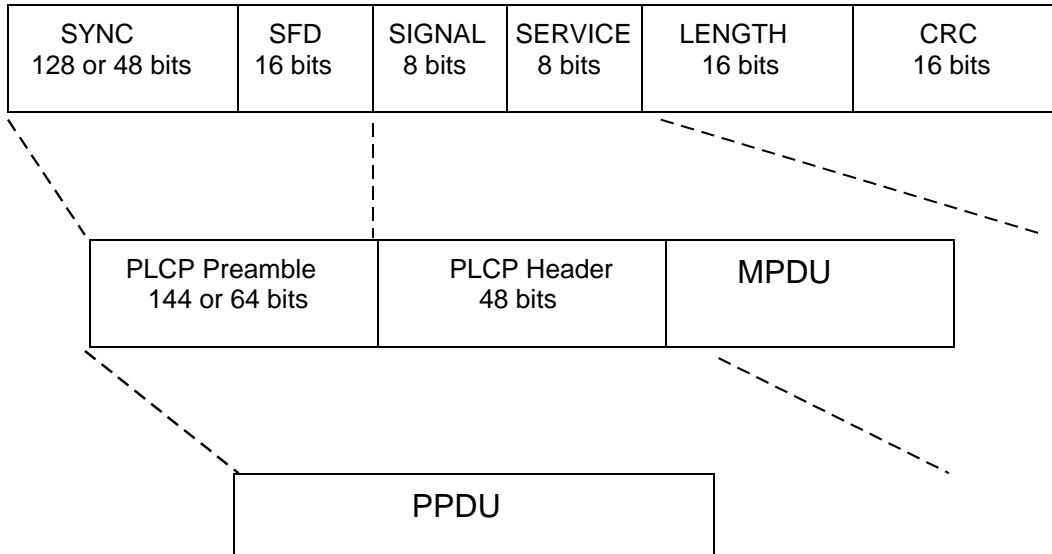


Figure 1-B, PLCP Frame Format

1.2.3.2 PLCP Start Frame Delimiter (SFD)

Clause 15.2.3.2 of the Low Speed standard defines the Start Frame Delimiter.

1.2.3.3 PLCP Signal Field (SIGNAL)

The 8 bit 802.11 Signal Field indicates to the PHY the modulation which shall be used for transmission (and reception) of the MPDU. The data rate shall be equal to or greater than the Signal Field value multiplied by 100kbit/s, and rounded up to the next Signal Field value, when the data rate is a non-integer. The extended DSSS PHY supports modulation rates given by the following 8 bit words, where the LSB shall be transmitted first in time:

- | | | | |
|----|------|--------------|------------------------|
| a) | 0A h | (MSB to LSB) | for 1.000 Mb/s DBPSK |
| b) | 14 h | " " | for 2.000 Mb/s DQPSK * |
| c) | 14 h | " " | for 1.833 Mb/s AMBC * |
| d) | 28 h | " " | for 3.667 Mb/s AMBC |
| e) | 3C h | " " | for 5.500 Mb/s AMBC |
| f) | 50 h | " " | for 7.333 Mb/s AMBC |
| g) | 64 h | " " | for 9.167 Mb/s AMBC |
| h) | 78 h | " " | for 11.000 Mb/s AMBC |
| i) | 8C h | " " | for 12.833 Mb/s AMBC |
| j) | A0 h | " " | for 14.667 Mb/s AMBC |
| k) | B4 h | " " | for 16.500 Mb/s AMBC |
| l) | C8 h | " " | for 18.333 Mb/s AMBC |
| m) | DC h | " " | for 20.167 Mb/s AMBC |
| n) | F0 h | " " | for 22.000 Mb/s AMBC |

- * The LSB in the Service field distinguishes which Data Rate is in use.
For 2 Mb/s DQPSK, the LSB is 0 h. For 1.833 Mb/s AMBC, the LSB is F h.

The DSSS PHY rate change capability is described in the Low Speed standard, sections 9.5 and 15.2.5. This field shall be protected by the CCITT CRC-16 frame check sequence, as described in clause 15.2.3.6 of the Low Speed standard.

1.2.3.4 PLCP Service Field (SERVICE)

The 8 bit 802.11 Service Field indicates to the PHY whether a modulation system belonging to the Low Speed standard, or to the High Speed extension, is used for transmission (and reception) of the MPDU.

As defined in clause 15.2.3.4 of the Low Speed standard, any value other than 00 h in the Service Field shall indicate non-compliance with the Low Speed standard. Devices compliant to the High Speed extension shall use the values provided in this clause to determine the High Speed modulation method and data rate.

Packets which are transmitted by a High Speed modulation, shall contain the value of F h in the LSB of the Service Field.

In addition, The Service Field shall indicate use of a Forward Error Correction Code on a packet by packet basis. The MSB of the Service Field shall be:

- 0 h no FEC in use for the MPDU of this PPDU.
- F h Block FEC, as defined in section 1.5, in use for the MPDU.
- D h Convolutional FEC, as defined in section 1.5, in use for the MPDU.

The LSB shall be transmitted first in time. This field shall be protected by the CCITT CRC-16 FCS described in clause 15.2.3.6 of the Low Speed standard.

All other Service Field values remain reserved for future uses.

1.2.3.5 PLCP Length Field (LENGTH)

The PLCP length field shall be an unsigned 16 bit integer which indicates the number of microseconds (16 to $2^{16}-1$ as defined by aMPDUMaxLngth) required to transmit the MPDU. The transmitted value shall be determined from the LENGTH parameter in the TXVECTOR issued with the PHY-TXSTART.request primitive described in clause 12.3.5.4 of the Low Speed standard. The length field provided in the TXVECTOR is in bytes and is converted to microseconds for inclusion in the PLCP LENGTH field. The Length field is calculated as follows:

- | | | | |
|----|------------------|----------|---|
| a) | 1.000 Mb/s DBPSK | Length = | number of bytes * 8 |
| b) | 2.000 Mb/s DQPSK | Length = | number of bytes * 4 |
| c) | 1.833 Mb/s AMBC | Length = | Round Up [(number of bytes * 8) / (1 * $11/6$)] |
| d) | 3.667 Mb/s AMBC | Length = | Round Up [(number of bytes * 8) / (2 * $11/6$)] |
| e) | 5.500 Mb/s AMBC | Length = | Round Up [(number of bytes * 8) / (3 * $11/6$)] |
| f) | 7.333 Mb/s AMBC | Length = | Round Up [(number of bytes * 8) / (4 * $11/6$)] |
| g) | 9.167 Mb/s AMBC | Length = | Round Up [(number of bytes * 8) / (5 * $11/6$)] |
| h) | 11.000 Mb/s AMBC | Length = | Round Up [(number of bytes * 8) / 11] |
| i) | 12.833 Mb/s AMBC | Length = | Round Up [(number of bytes * 8) / (7 * $11/6$)] |
| j) | 14.667 Mb/s AMBC | Length = | Round Up [(number of bytes * 8) / (8 * $11/6$)] |
| k) | 16.500 Mb/s AMBC | Length = | Round Up [(number of bytes * 8) / (9 * $11/6$)] |
| l) | 18.333 Mb/s AMBC | Length = | Round Up [(number of bytes * 8) / (10 * $11/6$)] |
| m) | 20.167 Mb/s AMBC | Length = | Round Up [(number of bytes * 8) / (11 * $11/6$)] |
| n) | 22.000 Mb/s AMBC | Length = | Round Up [(number of bytes * 8) / 22] |

At the receiver, the LENGTH field is used to calculate the number of bytes in the MPDU, as follows:

- | | | | |
|----|------------------|-------------------|--|
| a) | 1.000 Mb/s DBPSK | number of bytes = | Length / 8 |
| b) | 2.000 Mb/s DQPSK | number of bytes = | Length / 4 |
| c) | 1.833 Mb/s AMBC | number of bytes = | Round Down [(Length / 8) * (1 * $11/6$)] |
| d) | 3.667 Mb/s AMBC | number of bytes = | Round Down [(Length / 8) * (2 * $11/6$)] |
| e) | 5.500 Mb/s AMBC | number of bytes = | Round Down [(Length / 8) * (3 * $11/6$)] |
| f) | 7.333 Mb/s AMBC | number of bytes = | Round Down [(Length / 8) * (4 * $11/6$)] |
| g) | 9.167 Mb/s AMBC | number of bytes = | Round Down [(Length / 8) * (5 * $11/6$)] |
| h) | 11.000 Mb/s AMBC | number of bytes = | Round Down [(Length / 8) * (11)] |
| i) | 12.833 Mb/s AMBC | number of bytes = | Round Down [(Length / 8) * (7 * $11/6$)] |
| j) | 14.667 Mb/s AMBC | number of bytes = | Round Down [(Length / 8) * (8 * $11/6$)] |
| k) | 16.500 Mb/s AMBC | number of bytes = | Round Down [(Length / 8) * (9 * $11/6$)] |
| l) | 18.333 Mb/s AMBC | number of bytes = | Round Down [(Length / 8) * (10 * $11/6$)] |
| m) | 20.167 Mb/s AMBC | number of bytes = | Round Down [(Length / 8) * (11 * $11/6$)] |
| n) | 22.000 Mb/s AMBC | number of bytes = | Round Down [(Length / 8) * (22)] |

For purposes of calculating deferral delays, the receiver shall calculate MPDU duration with an accuracy of one microsecond.

The LSB (least significant bit) shall be transmitted first in time. This field shall be protected by the CCITT CRC-16 FCS described in clause 15.2.3.6 of the Low Speed standard.

1.2.3.6 PLCP CRC Field (CCITT CRC-16)

Clause 15.2.3.6 of the Low Speed standard defines the PLCP CRC Field.

1.2.4 PLCP Data Modulation and Modulation Rate Change

The PLCP preamble shall be transmitted using 1 Mb/s DBPSK modulation. The 802.11 SIGNAL field shall indicate the modulation which shall be used to transmit the MPDU. The transmitter and receiver shall initiate the modulation indicated by the 802.11 SIGNAL field starting with the first symbol (not necessarily the first bit) of the MPDU. The MPDU transmission rate shall be set by the DATARATE parameter in the TXVECTOR issued with the PHY-TXSTART.request primitive described in clause 15.4.4.1 of the Low Speed standard.

1.2.5 PLCP Transmit and Receive Procedure

The transmit and receive procedures are as described in sections 15.2.7. and 15.2.8 of the Low Speed standard

1.3 DSSS Physical Layer Management Entity (PLME)

1.3.1 PLME_SAP Sublayer Management primitives

Table 1 is an extension to Table 58, of clause 15.3.2 of the Low Speed standard. This extension lists the MIB attributes which may be accessed by the PHY sublayer entities and intra layer of higher Layer Management Entities (LME). Values for agPhyRateGroup are added for all the possible High Speed data rates. It is to be understood that most of these hexadecimal values represent the nearest approximations, rather than exact data rates. The values in the table represent data rates of 1, 2, 1.833, 3.667, 5.500, 7.333, 9.167, 11.000, 12.833, 14.667, 16.500, 18.333, 20.167, and 22.000 Mb/s, and appear in the table in this order.

The primitives for the FECs are new for the proposed High Speed standard.

agPhyRateGroup		
aSupportedDataRatesTx	02h, 04h, 03h, 07h, 0Bh, 0Fh, 12h, 16h, 1Ah, 1Dh, 21h, 25h, 28h, 2Ch	Static
aSupportedDataRatesRx	02h, 04h, 03h, 07h, 0Bh, 0Fh, 12h, 16h, 1Ah, 1Dh, 21h, 25h, 28h, 2Ch	Static
aSupportedFECsTx	00h, FDh, FFh	Static
aSupportedFECsRx	00h, FDh, FFh	Static

Table 1, Extension to MIB Attribute Default Values / Ranges

1.4 DSSS Physical Medium Dependent Sublayer

1.4.1 General

The PLCP Preamble and the PLCP Header are transmitted with the 1 Mb/s DBPSK method of the Low Speed standard. For the MPDU, the modulation system is Advanced Multirate Barker Code. The differences between the High Speed and Low Speed standards are generally restricted to details of the modulation system. Some parameters pass information regarding data rate, packet duration and optional use of an FEC. This high speed standard allows more states to describe these parameters, in order to accommodate a greater range of possible data rates and greater resistance to propagation channel impairments.

The RF power spectrum, including channelization, is the same as for the low speed 802.11 standard. Phy Medium Dependent specifications are the same as for the low speed standard, except where noted otherwise. The low speed standard and the Advanced Multirate Barker Code, or AMBC, uses the same spectrum mask, operating channels, TX power levels, turnaround times, slot times and CCA mechanisms.

All of the categories for service primitives are the same as described in section 15.4.4 of the Low Speed standard. The High Speed standard extends the range of possible values for the PMD_SAP Service Primitive Parameters in Table 62 of clause 15.4.4.4, as found in the Low Speed standard.

1.4.1.1 Extension of PMD_SAP Service Primitive Parameters

The PMD_SAP Service Primiives, TXD_UNIT and RXD_UNIT, as listed in Table 62, clause 15.4.4.4 of the Low Speed standard, are amended in Table 2, below:

Parameter	Associate Primitive	Value
TXD_UNIT	PMD_DATA.request	One (1), Zero (0): DBPSK di bit combinations 00,01,11,10: DQPSK 05 h - FF h : AMBC, all rates
RXD_UNIT	PMD_DATA.indicate	One (1), Zero (0): DBPSK di bit combinations 00,01,11,10: DQPSK 05 h - FF h : AMBC, all rates
RATE	PMD_RATE.indicate PMD_RATE.request	0A h for 1.000 Mb/s DBPSK 14 h for 2.000 Mb/s DQPSK 14 h for 1.833 Mb/s AMBC 28 h for 3.667 Mb/s AMBC 3C h for 5.500 Mb/s AMBC 50 h for 7.333 Mb/s AMBC 64 h for 9.167 Mb/s AMBC 78 h for 11.000 Mb/s AMBC 8C h for 12.833 Mb/s AMBC A0 h for 14.667 Mb/s AMBC B4 h for 16.500 Mb/s AMBC C8 h for 18.333 Mb/s AMBC DC h for 20.167 Mb/s AMBC F0 h for 22.000 Mb/s AMBC

Table 2, Extension to the List of Parameters for the PMD Primitives

1.4.1.2 Radio Channel Issues

As noted in section 1.1 of the High Speed standard, all clauses of the Low Speed standard apply unless noted otherwise. In particular, the following Low Speed clauses are valid for the High Speed standard:

- 15.4.6.1 Operating Frequency Range
- 15.4.6.2 Number of Operating Channels
- 15.4.6.5 Transmit and Receive In Band and Out of Band Spurious Emissions

1.4.2 Slot Time

The slot time is unchanged from the Low Speed standard, both in its functionality and in the value of 5 microseconds. Reference is made to clauses 15.4.6.8 "Slot Time" and 15.4.8.4 "Clear Channel Assessment".

1.4.2.1 Transmit to Receive Turnaround Time

Clause 15.4.6.6 of the Low Speed standard applies, without change.

1.4.2.2 Receive to Transmit Turnaround Time

Clause 15.4.6.7 of the Low Speed standard applies, without change.

1.4.3 Modulation Method

The high speed Direct Sequence specification defines a set of data rates which are based upon rotations of the Advanced Barker Code, as shown below:

The left-most bits are transmitted first. The Low Speed 802.11 DSSS spreading code is the 11 bit Barker Code shown below:

				+1	-1	+1	+1	-1	+1	+1
+1	-1	-1	-1							

The Advanced Barker Code set uses all phases of the original Barker Code and appends a "-1" chip to the end:

Code 1:	+1	-1	+1	+1	-1	+1	+1	+1	+1
	-1	-1	-1	-1					
Code 2:	-1	+1	+1	-1	+1	+1	+1	+1	-1
	-1	-1	+1	-1					
Code 3:	+1	+1	-1	+1	+1	+1	+1	-1	-1
	-1	+1	-1	-1					
Code 4:	+1	-1	+1	+1	+1	-1	-1	-1	-1
	+1	-1	+1	-1					
Code 5:	-1	+1	+1	+1	-1	-1	-1	-1	+1
	-1	+1	+1	-1					
Code 6:	+1	+1	+1	-1	-1	-1	-1	+1	-1
	+1	+1	-1	-1					
Code 7:	+1	+1	-1	-1	-1	+1	-1	-1	+1
	+1	-1	+1	-1					
Code 8:	+1	-1	-1	-1	+1	-1	+1	+1	+1
	-1	+1	+1	-1					
Code 9:	-1	-1	-1	+1	-1	+1	+1	+1	-1
	+1	+1	+1	-1					
Code 10:		-1	-1	+1	-1	+1	+1	+1	-1
	+1	+1	+1	-1	-1				
Code 11:		-1	+1	-1	+1	+1	-1	-1	+1
	+1	+1	-1	-1	-1				

The above code set is orthogonal, and is also orthogonal to the "all ones" code, below:

Code 12:		+1	+1	+1	+1	+1	+1	+1	+1
	+1	+1	+1	+1	+1				

The chip rate is 11 Mc/s, unchanged from the Low Speed standard. Depending on the desired data rate, 1 to 12 of the above codes are generated, as "I" (in phase) and "Q" (quadrature) channels. Using interleaving

to de-MUX the MPDU data bits, one MPDU data bit is XOR'ed with each stream. Each stream is subsequently XOR'ed with a cover code of 4095 bits length. This cover code uses the same clock as the Advanced Barker Code generators. For each of the "I" and "Q" channels, the data streams are summed. The number of amplitude levels varies with the number of codes in use. The "I" and "Q" channels are then processed through Digital to Analog Converters, or DAC's, then summed and transmitted at the appropriate RF carrier frequency.

1.4.3.1 Data Byte Interleaving with Symbols

The serial bit stream coming from the MAC to the transmitted MPDU shall be transmitted alternately on the "I" and "Q" channels. Bit 0 shall be sent on the "Q" channel, bit 1 on the "I" channel, bit 3 on the "Q" channel, etc. Each AMBC symbol will carry from 2 to 22 bits.

Bytes are normally split between symbols for transmission. Bit stuffing shall be used as needed. The exception is that the first bit of the CRC-32 FCS shall begin on a new symbol.

A patent will be filed for GBT's technique to determine the first bit of the CRC-32 FCS in the received MPDU.

A FUTURE UPDATE OF THIS DRAFT WILL DESCRIBE BIT STUFFING IN DETAIL.

1.4.3.2 Cover Code

This is a long PN sequence. DESCRIPTION WILL BE PROVIDED IN A FUTURE REVISION.

1.4.3.3 Transmit Amplitude Modulation

The number of amplitude levels varies with the data rate. Higher data rates mean a greater number of AMBC codes to sum, and a greater number of possible amplitude levels, as follows:

	Data Rate	Possible Number of Levels	Number of AMBC's
a)	1.000 Mb/s DBPSK	2	N/A
b)	2.000 Mb/s DQPSK	2	N/A
c)	1.833 Mb/s AMBC	2	1
d)	3.667 Mb/s AMBC	3	2
e)	5.500 Mb/s AMBC	4	3
f)	7.333 Mb/s AMBC	5	4
g)	9.167 Mb/s AMBC	6	5
h)	11.000 Mb/s AMBC	7	6
i)	12.833 Mb/s AMBC	8	7
j)	14.667 Mb/s AMBC	9	8
k)	16.500 Mb/s AMBC	10	9
l)	18.333 Mb/s AMBC	11	10
m)	20.167 Mb/s AMBC	12	11
n)	22.000 Mb/s AMBC	13	12

This High Speed standard permits omission of higher amplitude sums because these sums occur relatively infrequently. This allows for more economical implementations without objectionable impairment of performance. Because the high amplitude levels can be removed before being sent to the DAC for transmission, this clause refers to omission of levels, and not amplifier Backoff.

1.4.4 PMD Transmit Specifications

The following Low Speed standard clauses all apply for the High Speed standard:

- 15.4.7.1 "Transmit Power Levels"
- 15.4.7.2 "Minimum Transmitted Power Level"
- 15.4.7.3 "Transmit Power Level Control"
- 15.4.7.4 "Transmit Spectrum Mask"
- 15.4.7.5 *Transmit Center Frequency Tolerance"
- 15.4.7.6 "Chip Clock Frequency Tolerance"
- 15.4.7.7 "Transmit Power On and Power Down Ramp"

1.4.4.1 RF Carrier Suppression

DESCRIPTION WILL BE PROVIDED IN A FUTURE REVISION.

1.4.4.2 Transmit Phase Accuracy

Clause 15.4.7.9 of the Low Speed standard defines the transmit modulation phase accuracy for High Speed devices, as well.

1.4.5 PMD Receiver Specifications

The following clauses describe the receive functions and parameters associated with the Physical Medium Dependent sublayer.

1.4.5.1 Receiver Minimum Input Level Sensitivity

The Frame Error Rate (FER) shall be less than 10^{-5} at an MPDU length of 1024 bytes for an input level of -77 dBm, measured at the antenna connector. This FER shall be specified for 9.17 Mb/s modulation. The test for the minimum input level sensitivity shall be conducted with the Energy Detection threshold set less than or equal to -77 dBm.

1.4.5.2 Receiver Maximum Input Level

The receiver shall provide a maximum FER of 8×10^{-2} at an MPDU length of 1024 bytes for a maximum input level of -4 dBm, measured at the antenna. This FER shall be specified for 2 Mb/s DQPSK modulation.

1.4.5.3 Receiver Adjacent Channel Rejection

Adjacent channel rejection is defined between any two channels with greater than or equal to 30 MHz separation in each channel group defined in clause 15.4.6.2 of the Low Speed channel.

DESCRIPTION WILL BE PROVIDED IN A FUTURE REVISION.

1.4.5.4 Clear Channel Assessment

Clause 15.4.8.4, of the Low Speed standard, also applies to the High Speed standard.

1.4.5.5 Change of AGC at boundary of MPDU

This technique is patented and licensable under policies which meet applicable IEEE guidelines.

1.5 Forward Error Correction Code

1.5.1 General

The implementation of an FEC is optional. When propagation is good, data throughput is higher without the FEC. For propagation channels with adverse conditions, the use of an FEC can provide significantly higher throughput rate and fewer packet errors. Therefore, those devices which provide for an FEC, will do so on a packet by packet basis. The Block code has a more economical implementation than the Convolutional code, so this standard provides a choice.

The FEC protects the entire MPDU. The FEC does not replace the CRC-32 FCS described in clause 7.1.3.6 of the Low Speed standard. There are three states which describe the optional use of the FEC, as described in clause 1.2.3.2 of the proposed High Speed standard.

1.5.1.1 Block Code

DESCRIPTION WILL BE PROVIDED IN A FUTURE REVISION.

At the time of writing, it is intended that this clause will provide for a Block Code of about one half rate. GBT has simulated performance results with a number of BCH codes, and has done extensive simulations for BCH(63, 36, 5) and for BCH (127, 64, 10) code.

1.5.1.2 Convolutional Code

DESCRIPTION WILL BE PROVIDED IN A FUTURE REVISION. At the time of writing, it is intended that this clause will provide for a code of constraint length $K = 7$.