DRAFT AMENDMENT ISO/IEC 8802-11:1999/DAM 2

Attributed to ISO/IEC JTC 1 by the Central Secretariat (see page ii)

Voting begins on	Voting terminates on
2000-02-24	**2000-08-24**

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION
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FAST-TRACK PROCEDURE

Information technology — Telecommunications and information exchange between systems — Local and metropolitan area networks — Specific requirements —

Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications

AMENDMENT 2: Higher-speed physical layer extension in the 2.4 GHz band

Technologies de l'information — Télécommunications et échange d'information entre systèmes — Réseaux locaux et métropolitains — Exigences spécifiques —

Partie 11: Spécifications pour le contrôle d'accès au support et la couche physique

AMENDEMENT 2: Extension de la couche physique à grande vitesse dans la bande 2,4 GHz

ICS 35.110

In accordance with the provisions of Council Resolution 21/1986 this DIS is circulated in the English language only.

Conformément aux dispositions de la Résolution du Conseil 21/1986, ce DIS est distribué en version anglaise seulement.

NOTE FROM ITTF

This draft International Standard is submitted for JTC 1 national body vote under the Fast-Track Procedure.

In accordance with Resolution 30 of the JTC 1 Berlin Plenary 1993, the proposer of this document recommends assignment of ISO/IEC 8802-11/DAM 2 to JTC 1/SC 6.

"FAST-TRACK" PROCEDURE

1 Any P-member and any Category A liaison organization of ISO/IEC JTC 1 may propose that an existing standard from any source be submitted directly for vote as a DIS. The criteria for proposing an existing standard for the fast-track procedure are a matter for each proposer to decide.

2 The proposal shall be received by the ITTF which will take the following actions.

2.1 To settle the copyright and/or trade mark situation with the proposer, so that the proposed text can be freely copied and distributed within JTC 1 without restriction.

2.2 To assess in consultation with the JTC 1 secretariat which SC is competent for the subject covered by the proposed standard and to ascertain that there is no evident contradiction with other International Standards.

2.3 To distribute the text of the proposed standard as a DIS. In case of particularly bulky documents the ITTF may demand the necessary number of copies from the proposer.

3 The period for combined DIS voting shall be six months. In order to be accepted the DIS must be supported by 75 % of the votes cast (abstention is not counted as a vote) and by two-thirds of the P-members voting of JTC 1.

4 At the end of the voting period, the comments received, whether editorial only or technical, will be dealt with by a working group appointed by the secretariat of the relevant SC.

5 If, after the deliberations of this WG, the requirements of 3 above are met, the amended text shall be sent to the ITTF by the secretariat of the relevant SC for publication as an International Standard.

If it is impossible to agree to a text meeting the above requirements, the proposal has failed and the procedure is terminated.

In either case the WG shall prepare a full report which will be circulated by the ITTF.

6 If the proposed standard is accepted and published, its maintenance will be handled by JTC 1.

IEEE Std 802.11b-1999
(Supplement to
ANSI/IEEE Std 802.11, 1999 Edition)

Supplement to IEEE Standard for Information technology—Telecommunications and information exchange between systems—Local and metropolitan area networks—Specific requirements—

Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications:

Higher-Speed Physical Layer Extension in the 2.4 GHz Band

Sponsor

LAN/MAN Standards Committee
of the
IEEE Computer Society

Approved 16 September 1999

IEEE-SA Standards Board

Abstract: Changes and additions to IEEE Std 802.11, 1999 Edition are provided to support the higher rate physical layer (PHY) for operation in the 2.4 GHz band.
Keywords: 2.4 GHz, high speed, local area network (LAN), radio frequency (RF), wireless

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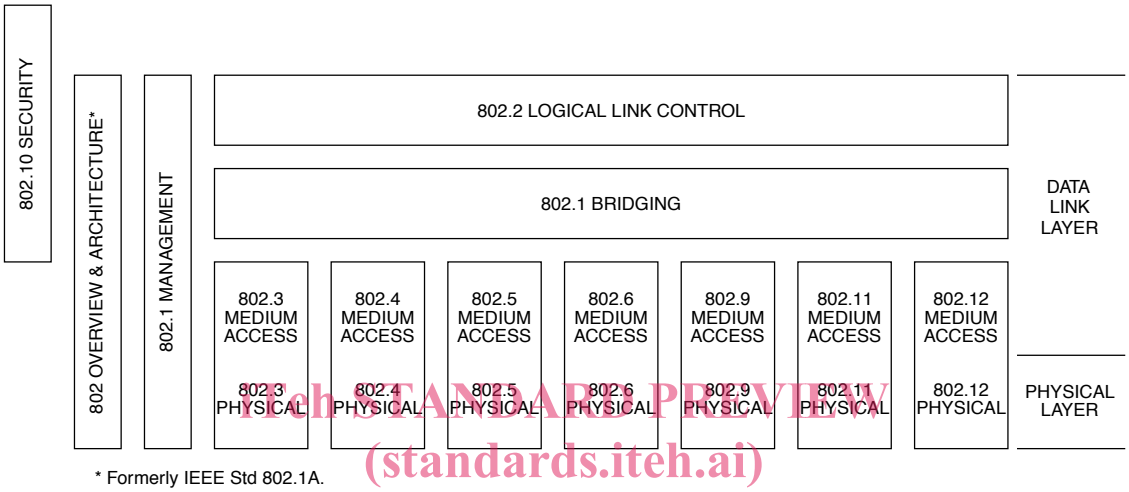
Introduction

[This introduction is not part of IEEE Std 802.11b-1999, Supplement to IEEE Standard for Information technology—Telecommunications and information exchange between systems—Local and metropolitan area networks—Specific requirements—Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications: Higher-Speed Physical Layer Extension in the 2.4 GHz Band.]

This standard is part of a family of standards for local and metropolitan area networks. The relationship between the standard and other members of the family is shown below. (The numbers in the figure refer to IEEE standard numbers.)



This family of standards deals with the Physical and Data Link layers as defined by the International Organization for Standardization (ISO) Open Systems Interconnection (OSI) Basic Reference Model (ISO/IEC 7498-1:1994). The access standards define seven types of medium access technologies and associated physical media, each appropriate for particular applications or system objectives. Other types are under investigation.

The standards defining the access technologies are as follows:

- IEEE Std 802 — *Overview and Architecture*. This standard provides an overview to the family of IEEE 802 Standards.
- ANSI/IEEE Std 802.1B and 802.1k [ISO/IEC 15802-2] — *LAN/MAN Management*. Defines an OSI management-compatible architecture, and services and protocol elements for use in a LAN/MAN environment for performing remote management.
- ANSI/IEEE Std 802.1D [ISO/IEC 15802-3] — *Media Access Control (MAC) Bridges*. Specifies an architecture and protocol for the interconnection of IEEE 802 LANs below the MAC service boundary.
- ANSI/IEEE Std 802.1E [ISO/IEC 15802-4] — *System Load Protocol*. Specifies a set of services and protocol for those aspects of management concerned with the loading of systems on IEEE 802 LANs.
- IEEE Std 802.1F — *Common Definitions and Procedures for IEEE 802 Management Information*
- ANSI/IEEE Std 802.1G [ISO/IEC 15802-5] — *Remote Media Access Control Bridging*. Specifies extensions for the interconnection, using non-LAN communication technologies, of geographically separated IEEE 802 LANs below the level of the logical link control protocol.

- ANSI/IEEE Std 802.2 [ISO/IEC 8802-2] *Logical Link Control*
- ANSI/IEEE Std 802.3 [ISO/IEC 8802-3] *CSMA/CD Access Method and Physical Layer Specifications*
- ANSI/IEEE Std 802.4 [ISO/IEC 8802-4] *Token Passing Bus Access Method and Physical Layer Specifications*
- ANSI/IEEE Std 802.5 [ISO/IEC 8802-5] *Token Ring Access Method and Physical Layer Specifications*
- ANSI/IEEE Std 802.6 [ISO/IEC 8802-6] *Distributed Queue Dual Bus Access Method and Physical Layer Specifications*
- ANSI/IEEE Std 802.9 [ISO/IEC 8802-9] *Integrated Services (IS) LAN Interface at the Medium Access Control and Physical Layers*
- ANSI/IEEE Std 802.10 *Interoperable LAN/MAN Security*
- IEEE Std 802.11 [ISO/IEC DIS 8802-11] *Wireless LAN Medium Access Control and Physical Layer Specifications*
- ANSI/IEEE Std 802.12 [ISO/IEC DIS 8802-12] *Demand Priority Access Method, Physical Layer and Repeater Specifications*

In addition to the family of standards, the following is a recommended practice for a common Physical Layer technology:

- IEEE Std 802.7 *IEEE Recommended Practice for Broadband Local Area Networks*

The following additional working groups have authorized standards projects under development:

- IEEE 802.14 *Standard Protocol for Cable-TV Based Broadband Communication Network*
- IEEE 802.15 *Wireless Personal Area Networks Access Method and Physical Layer Specifications*
- IEEE 802.16 *Broadband Wireless Access Method and Physical Layer Specifications*

Participants

At the time this standard was balloted, the 802.11 Working Group had the following membership:

Vic Hayes, *Chair*
Stuart J. Kerry, *Vice Chair*
Al Petrick, *Co-Vice Chair*
George Fishel, *Secretary*

Robert O'Hara, *Chair and editor, 802.11-rev*
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IEEE Standards Project Editor

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Telecommunications and information exchange between systems—

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Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications:

Higher-Speed Physical Layer Extension in the 2.4 GHz Band

[This supplement is based on IEEE Std 802.11, 1999 Edition.]

EDITORIAL NOTE—The editing instructions contained in this supplement define how to merge the material contained herein into the existing base standard to form the new comprehensive standard, as created by the addition of IEEE Std 802.11b-1999.

The editing instructions are shown in ***bold italic***. Three editing instructions are used: change, delete, and insert. ***Change*** is used to make small corrections in existing text or tables. This editing instruction specifies the location of the change and describes what is being changed either by using ~~strikethrough~~ (to remove old material) or underscore (to add new material). ***Delete*** removes existing material. ***Insert*** adds new material without disturbing the existing material. Insertions may require renumbering. If so, renumbering instructions are given in the editing instructions. Editorial notes will not be carried over into future editions.

3.8 Basic service set (BSS) basic rate set

Change the text in this subclause as shown:

The set of data transfer rates that all the stations in a BSS will be capable of using to receive and transmit frames to/from the wireless medium (WM). The BSS basic rate set data rates are preset for all stations in the BSS.

4. Abbreviations and acronyms

Insert the following abbreviations alphabetically in the list in Clause 4:

CCK	complementary code keying
HR/DSSS	High Rate direct sequence spread spectrum using the Long Preamble and header
HR/DSSS/short	High Rate direct sequence spread spectrum using the optional Short Preamble and header mode
HR/DSSS/PBCC	High Rate direct sequence spread spectrum using the optional packet binary convolutional coding mode and the Long Preamble and header
HR/DSSS/PBCC/short	High Rate direct sequence spread spectrum using the optional packet binary convolutional coding mode and the optional Short Preamble and header

7.2.3.1 Beacon frame format

Change Notes 1 and 2 of Table 5 as shown:

Table 5—Beacon frame body

Order	Information	Note
1	Timestamp	—
2	Beacon interval	—
3	Capability Information	—
4	SSID	—
5	Supported Rates	—
6	FH Parameter Set	1
7	DS Parameter Set	2
8	CF Parameter Set	3
9	IBSS Parameter Set	4
10	TIM	5

NOTES:

1—The FH Parameter Set information element is ~~only~~ present within Beacon frames generated by STAs using frequency-hopping PHYs.

2—The DS Parameter Set information element is ~~only~~ present within Beacon frames generated by STAs using direct sequence PHYs.

3—The CF Parameter Set information element is only present within Beacon frames generated by APs supporting a PCF.

4—The IBSS Parameter Set information element is only present within Beacon frames generated by STAs in an IBSS.

5—The TIM information element is only present within Beacon frames generated by APs.

7.2.3.9 Probe Response frame format

Change Notes 1 and 2 of Table 12 as shown:

Table 12—Probe Response frame body

Order	Information	Note
1	Timestamp	—
2	Beacon interval	—
3	Capability Information	—
4	SSID	—
5	Supported Rates	—
6	FH Parameter Set	1
7	DS Parameter Set	2
8	CF Parameter Set	3
9	IBSS Parameter Set	4

NOTES:

1—The FH Parameter Set information element is ~~only~~ present within Probe Response frames generated by STAs using frequency-hopping PHYs.

2—The DS Parameter Set information element is ~~only~~ present within Probe Response frames generated by STAs using direct sequence PHYs.

3—The CF Parameter Set information element is only present within Probe Response frames generated by APs supporting a PCF.

4—The IBSS Parameter Set information element is only present within Probe Response frames generated by STAs in an IBSS.

7.3.1.4 Capability Information field

Change the text in 7.3.1.4 and Figure 27 as shown:

The Capability Information field contains a number of subfields that are used to indicate requested or advertised capabilities.

The length of the Capability Information field is 2 octets. The Capability Information field consists of the following subfields: ESS, IBSS, CF-Pollable, CF-Poll Request, ~~and~~ Privacy, Short Preamble, PBCC, and Channel Agility. The format of the Capability Information field is ~~as~~ illustrated in Figure 27.

B0	B1	B2	B3	B4	B5	B6	B7	B8 … B15
ESS	IBSS	CF Pollable	CF-Poll Request	Privacy	Short Preamble	PBCC	Channel Agility	Reserved

Octets: 2

Figure 27—Capability Information fixed field

Insert the following text at the end of 7.3.1.4:

APs (as well as STAs in IBSSs) shall set the Short Preamble subfield to 1 in transmitted Beacon, Probe Response, Association Response, and Reassociation Response management MMPDUs to indicate that the use of the Short Preamble option, as described in 18.2.2.2, is allowed within this BSS. To indicate that the use of the Short Preamble option is not allowed, the Short Preamble subfield shall be set to 0 in Beacon, Probe Response, Association Response, and Reassociation Response management MMPDUs transmitted within the BSS.

STAs shall set the Short Preamble subfield to 1 in transmitted Association Request and Reassociation Request MMPDUs when the MIB attribute dot11ShortPreambleOptionImplemented is true. Otherwise, STAs shall set the Short Preamble subfield to 0 in transmitted Association Request and Reassociation Request MMPDUs.

APs (as well as STAs in IBSSs) shall set the PBCC subfield to 1 in transmitted Beacon, Probe Response, Association Response, and Reassociation Response management MMPDUs to indicate that the use of the PBCC Modulation option, as described in 18.4.6.6, is allowed within this BSS. To indicate that the use of the PBCC Modulation option is not allowed, the PBCC subfield shall be set to 0 in Beacon, Probe Response, Association Response, and Reassociation Response management MMPDUs transmitted within the BSS.

STAs shall set the PBCC subfield to 1 in transmitted Association Request and Reassociation Request MMPDUs when the MIB attribute dot11PBCCOptionImplemented is true. Otherwise, STAs shall set the PBCC subfield to 0 in transmitted Association Request and Reassociation Request MMPDUs.

Bit 7 of the Capabilities Information field shall be used to indicate the usage of Channel Agility by the HR/DSSS PHY. STAs shall set the Channel Agility bit to 1 when Channel Agility is in use, and shall set it to 0 otherwise.

Bits 8–15 of the Capability Information field are reserved.

7.3.1.9 Status Code field

Add three Status Codes to Table 19 as shown:

Table 19—Status Codes

Status Code	Meaning
19	Association denied due to requesting station not supporting the Short Preamble option.
20	Association denied due to requesting station not supporting the PBCC Modulation option.
21	Association denied due to requesting station not supporting the Channel Agility option.

7.3.2.2 Supported Rates element

Change the text in 7.3.2.2 as shown.

The Supported Rates element specifies ~~all the values rates that this station is capable of receiving~~ in the Operational-Rate-Set parameter, as described in the MLME_Join.request and MLME_Start.request primitives. The information field is encoded as 1–8 octets, where each octet describes a single Supported Rate ~~in units of 500 kbit/s~~.

Within Beacon, Probe Response, Association Response, and Reassociation Response management frames, each Supported Rate belonging to the ~~BSSBasic Rate Set~~ BSS basic rate set is encoded as an octet with the msb (bit 7) set to 1 (e.g., a 1 Mbit/s rate belonging to the ~~BSSBasicRateSet~~ BSS basic rate set is encoded as X'82'). Rates not belonging to the ~~BSSBasicRateSet~~ BSS basic rate set are encoded with the msb set to 0 (e.g., a 2 Mbit/s rate not belonging to the ~~BSSBasicRateSet~~ BSS basic rate set is encoded as X'04'). The msb of each Supported Rate octet in other management frame types is ignored by receiving STAs.

~~BSSBasicRateSet~~ The BSS basic rate set information in Beacon and Probe Response management frames is delivered to the management entity in an STA via the BSSBasicRateSet parameter in the MLME_Scan.confirm primitive. It is used by the management entity in an STAs ~~in order~~ to avoid associating with a BSS if the STA cannot receive and transmit all the data rates in the ~~BSSBasicRateSet~~ BSS basic rate set (see Figure 36).

9.2 DCF

Change the eleventh paragraph in 9.2 as shown.

The medium access protocol allows for stations to support different sets of data rates. All STAs shall be able to receive and transmit at all the data rates in the aBasicRateSet specified parameter of the MLME_Join.request and MLME_Start.request primitives ~~and transmit at one or more of the aBasicRateSet~~

~~data rates.~~ To support the proper operation of the RTS/CTS and the Virtual Carrier Sense mechanism, all STAs shall be able to detect the RTS and CTS frames. For this reason, the RTS and CTS frames shall be transmitted at one of the rates in the BSS basic rate set ~~aBasicRateSet rates~~. (See 9.6 for a description of multirate operation.)

9.6 Multirate support

Change the existing text as shown:

Some PHYs have multiple data transfer rate capabilities that allow implementations to perform dynamic rate switching with the objective of improving performance. The algorithm for performing rate switching is beyond the scope of this standard, but in order to ensure coexistence and interoperability on multirate-capable PHYs, this standard defines a set of rules that shall be followed by all STAs.

All Control frames shall be transmitted at one of the rates in the ~~BSSBasicRateSet~~ BSS basic rate set ~~(see 10.3.10.1), or at one of the rates in the PHY mandatory rate set~~ so that they will be understood by all STAs in the BSS.

All frames with multicast and broadcast RA shall be transmitted at one of the rates included in the ~~BSSBasicRateSet~~ BSS basic rate set, regardless of their type or subtype.

Data and/or management MPDUs with a unicast ~~immediate address~~ RA shall be sent on any supported data rate selected by the rate switching mechanism (whose output is an internal MAC variable called MACCurrentRate, ~~defined in units of 500 kbit/s,~~ which is used for calculating the Duration/ID field of each frame). An STA shall not transmit at a rate that is known not to be supported by the destination STA, as reported in the Supported Rates element in the management frames. For frames of type Data + CF – ACK, Data + CF – Poll + CF – ACK, and CF – Poll + CF – ACK, the rate chosen to transmit the frame must be supported by both the addressed recipient STA and the STA to which the ACK is intended.

~~In order to~~ To allow the transmitting STA to calculate the contents of the Duration/ID field, the responding STA shall transmit its Control Response and Management Response frames (either CTS or ACK) at the highest rate in the BSS basic rate set that is less than or equal to the rate of ~~at the same rate as~~ the immediately previous frame in the frame exchange sequence (as defined in 9.7). ~~if this rate belongs to the PHY mandatory rates, or else at the highest possible rate belonging to the PHY rates in the BSSBasicRateSet.~~ In addition, the Control Response frame shall be sent using the same PHY options as the received frame.

For the HR/DSSS PHY, the time required to transmit a frame for use in the Duration/ID field is determined using the PLME-TXTIME.request primitive and the PLME-TXTIME.confirm primitive, both defined in 1.3.4.

10.3.2.2 MLME_scan.confirm

Change "set" to "sets" in the Name and Description columns for the PHY Parameter Set.

