IEEE P802.11
Wireless LANs

Project Authorization Request (PAR)
Higher Rate IEEE 802.11b Study Group (HRbSG)

Date: May 2000

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IEEE-SA Standards Board Project Authorization Request (PAR) Form (2000-Rev 1)

1. Sponsor Date of Request	2. Assigned Project Number	3. PAR Approval Date
[2000 July]	[_____]	_____

Copyright release must be submitted with appropriate signatures by FAX (1-732-562-1571)}

[...] PAR Signature Page on File {IEEE Staff to check box}

4. Project Title, Recorder and Working Group/Sponsor for this Project

Document type and title: {Place an X in only one option below}

- [X] **Standard for**{document stressing the verb "shall"}
- [..] **Recommended Practice for**{document stressing the verb "should"}
- [..] **Guide for** {document in which good practices are suggested}

Title: [**Supplement to STANDARD [FOR] Information Technology-Telecommuniactions and information exchange between systems-Local and Metropolitan networks-Specific requirements-Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications: Further Higher data rate extension in the 2.4GHz band**]

Name of Working Group (WG): [**IEEE P802.11, Working Group for Wireless LANs**]

Name of Official Reporter (usually the WG Chair) who must be an SA member as well as an IEEE/Affiliate Member:	Stuart Kerry
IEEE-Standards Staff has verified that the Official Reporter (or Working Group Chair) is an IEEE and an IEEE-SA member:	[...] (Staff to check box)

Contact Information:

Telephone	+1-408-991-4854	FAX:	[+1-408-991-5758]
E-mail:	stuart.kerry@philips.com		

Name of Working Group Chair (if different than Reporter):	[...]
IEEE-Standards Staff has verified that the Working Group Chair is an IEEE and an IEEE-SA member:	[...] (Staff to check box)

Contact Information:

Telephone	[...]	FAX:	[...]
E-mail:	[...]		

Name of Sponsoring Society and Committee:	Computer Society/LMSC
Name of Committee Sponsor Chair:	Jim Carlo
IEEE-Standards Staff has verified that the Sponsor is an IEEE and an IEEE-SA member:	[...] (Staff to check box)

Contact Information:

Telephone	+1-214-693-1776	FAX:	+1-214-853-5274
E-mail:	jcarlo@ti.com		

5. Type of Project

a. Is this an update to an existing PAR? No

b. Choose one from the following:

[…] New Standard
[...] Revision of existing Standard {number and year} [...]
[X] Amendment (Supplement) to an existing standard {number and year}
[**IEEE Std 802.11b-1999**]
[...] Corrigenda to an existing standard {number and year} [...]

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6. Life Cycle

[X] Full Use (5-year life cycle)
[...] Trial Use (2-year life cycle)

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7. Balloting Information

Choose one from the following:

[X] Individual Sponsor Balloting
[...] Entity Sponsor Balloting
[...] Mixed Balloting (combination of Individual and Entity Sponsor Balloting)

Expected Date of Submission for Initial Sponsor Ballot: March 2001

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8. Fill in Projected Completion Date for Submittal to RevCom: November 2001

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9. Scope of Proposed Project:

[To develop a higher speed(s) PHY extension to 802.11b. Refer to Section 16 for the complete scope.]

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10. Purpose of Proposed Project:

[To develop a new PHY extension to enhance the performance and the possible applications of the 802.11b compatible networks by increasing the data rate achievable by such devices. This technology will be beneficial for improved access to fixed network LAN and inter-network infrastructure (including access to other wireless LANs) via a network of access points, as well as creation of higher performance ad hoc networks.]

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11. Intellectual Property {Answer each of the questions below}

Are you aware of any patents relevant to this project?

[No] {Yes, with detailed explanation below / No}
[...] {Explanation}

Are you aware of any copyrights relevant to this project?

[No] {Yes, with detailed explanation below / No}
[...] {Explanation}

Are you aware of any trademarks relevant to this project?

[No] {Yes, with detailed explanation below / No}
[...] {Explanation}

Are you aware of any registration of objects or numbers relevant to this project?

[No] {Yes, with detailed explanation below / No}
[...] {Explanation}

12. Are you aware of any other standards or projects with a similar scope?

[Yes] {Yes, with detailed explanation below / No}
{Explanation}

IEEE 802.15.3

The 802.15 WG has an approved 99165r7P802-15_HRSG-PAR to develop a standard for high rate Wireless Personal Area Networks (WPAN). This PAR is targeted at data rates greater than 20Mbps. This PAR is targeted at short range networking with a radius up to 10m. The 802.15 PAR does not mandate use of the 802.11 MAC protocol.

By contrast, the 802.11 extension to be developed under the requested 802.11 PAR shall be compliant with the 802.11 MAC and shall be a Wireless Local Area Network (WLAN) standard.

IEEE 802.11a

The 802.11a standard defines a PHY for Wireless Local Area Networks (WLAN) that operates at data rates up to 54Mbps. The 802.11a standard is for the 5GHz U-NII bands. The new proposed 802.11b extension shall be interoperable with the existing 802.11b standard that operates in the 2.4GHz band.

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13. International Harmonization

Is this standard planned for adoption by another international organization?
[Yes] {Yes/No/?? if you don't know at this time}
If Yes: Which International Organization [ISO]
If Yes: Include coordination in question 15 below
If No: Explanation [...]

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14. Is this project intended to focus on health, safety or environmental issues?

[No] {Yes/No/?? if you don't know at this time}
If Yes: Explanation [...]

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15. Proposed Coordination/Recommended Method of Coordination

Mandatory Coordination

SCC 10 (IEEE Dictionary)	by **DR** {Circulation of **DR**afts}
IEEE Staff Editorial Review by	by **DR**
SCC 14 (Quantities, Units and Letter symbols)	by **DR**

Coordination requested by Sponsor:

[ISO]	by [DR]	{circulation of **DR**afts/**LI**aison memb/**CO**mmon memb}
[.....]	by [...]	{circulation of **DR**afts/**LI**aison memb/**CO**mmon memb}
[.....]	by [...]	{circulation of **DR**afts/**LI**aison memb/**CO**mmon memb}
[.....]	by [...]	{circulation of **DR**afts/**LI**aison memb/**CO**mmon memb}

Coordination Requested by Others:

[...] {added by staff}

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16. Additional Explanation Notes: {Item Number and Explanation}

Scope of the Project

The scope of this project is to develop a higher speed(s) PHY extension to the 802.11b standard.

The new standard shall be compatible with the IEEE 802.11 MAC.

The maximum PHY data rate targeted by this project shall be at least 20 Mbit/s.

The new extension shall implement all mandatory portions of the IEEE 802.11b PHY standard.

The project will take advantage of the provisions for rate expansion that are in place on the current standard PHY.

The 802.11 MAC defines a mechanism for operation of stations supporting different data rates in the same area. The current 802.11b standard already defines the basic rates of 1, 2, 5.5 and 11 Mbit/s.

The proposed project targets further developing the provisions for enhanced data rate capability of 802.11b networks.

The 802.11 MAC currently incorporates the interpretation of data rate information and the computation of expected packet duration even if the specific station does not support the rate at which the packet was sent.

Regulatory Bodies

IEEE P802.11 will correspond with regulatory bodies worldwide in order to try to assure that the proposed extension will be applicable geographically as widely as possible.

Patents

The Working Group will adhere to the IEEE patent policy.

The PAR Copyright Release and Signature Page must be submitted by FAX to 732-562-1571 before this PAR will be sent on for NesCom and Standards Board approval.

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5 Criteria for Higher Rate IEEE 802.11b Study Group (HRbSG)

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IEEE 802 Five Criteria

1. BROAD MARKET POTENTIAL

a) Broad sets of applicability.

The broad sets of applicability include a number of applications presently supported with Ethernet speeds on wired networks. Some example applications that can be addressed with the higher rate capability include mpeg video, video teleconferencing and applications requiring larger data sets, as well as larger number of users.

The increasing and widespread adoption of today's computing and communications applications (email, Internet browsing, etc.) are placing increased demands on network services and bandwidth.

This is evidenced by the rapid transition from 100 Mbps to 1 Gbps wired Ethernet and shared to switched mediums. Additionally, applications under development such as voice and video over Internet Protocol will further accelerate the demand for higher bandwidth communications services.

The higher rate capability can potentially be used to improve network throughput beyond the capability of the existing 1, 2, 5.5 and 11 Mbps IEEE 802.11 networks in the 2.4GHz band. The 2.4 GHz band is presently available worldwide for such applications.

b) Multiple vendors, numerous users.

The higher rate extension will be supported by the same vendor base and by end users of the existing IEEE 802.11 standard. An indicator of such participation is the active IEEE 802.11 membership itself. The higher rate standard will also attract new vendors that have historically targeted higher speed markets.

The IEEE 802.11 membership supporting this PAR includes a broad range of international wireless industry leaders, ranging from semiconductor manufacturers to system integrators. There are over 63 companies represented at IEEE 802.11 in preparation of this PAR.

c) Balanced costs (LAN versus attached stations).

The cost to achieve the higher rates is projected to be within the range of the existing IEEE 802.11 systems. The changes are anticipated to impact the baseband processing, while the RF/IF front as well as the MAC protocol are expected to remain equivalent to the existing standard. The baseband signal processing will change but the cost of the new processing hardware is projected to be within the cost targets of the existing standard.

2. COMPATIBILITY

The compatibility with IEEE 802 requirements will result from the use of the IEEE 802.11 MAC which itself was developed and has been approved as being compatible with those requirements. Since the proposed extension will be compatible with the existing IEEE 802.11 MAC, all LLC and MAC standards shall be compatible and in conformance with IEEE 802.1 Architecture, Management and Internetworking. The MAC/PHY Layer interface shall remain common to the existing IEEE 802.11 definitions.

3. DISTINCT IDENTITY

a) Substantially different from other 802 Projects

The speeds proposed are significantly higher than the existing IEEE 802.11b products at the 2.4 GHz band. It is the only proposed solution to expand the rate capability of the existing IEEE 802.11b standard in an interoperable fashion.

IEEE 802.15.3 is not mandated to be compliant with the IEEE 802.11 MAC, nor is it required to be interoperable with existing IEEE 802.11 modulations in the 2.4GHz band. IEEE 802.15.3 is intended for use as a Wireless Personal Area Network (WPAN), while the proposed IEEE 802.11 extension is intended for use as a Wireless Local Area Network (WLAN).

b) One unique solution per problem (not two solutions to a problem).

The PAR will define only one additional 2.4 GHz PHY high rate extension in addition to the current IEEE 802.11b PHY.

c) Easy for document reader to select the relevant specification.

A separate PHY section, or integration into the current high rate section, will be developed as an addition to the current standard. The resulting document will address the requirements, specifications and any other relevant information in regard to the high rate extension PHY.

4. TECHNICAL FEASIBILITY

a) Demonstrated system feasibility.

There are several modulation methods that have been presented as feasible solutions to the rate extension question.

Preliminary proposals from 3Com, Intersil, Supergold, Sharp Labs, and Alantro have been reviewed that indicate the technical feasibility of higher rate extensions to IEEE 802.11b.

Alantro has announced that its proposal has been integrated into a chip demonstrating the technical feasibility to extend the IEEE 802.11b standard to 22Mbps.

b) Proven technology, reasonable testing.

The main components of technology of the PHY to be developed have precedents proving their feasibility.

Radio Technology: The existing IEEE 802.11b products already prove the technical feasibility of the 2.4 GHz radio part.

Modulation Methods: There are several modulation methods that are sound candidates for the higher speed PHY.

Modem Technology: The increased processing requirements of the digital modem part are in line with the progress in ASIC technology.

c) Confidence in reliability.

The analysis of the existing products and proposals representing the candidates' approaches provides confidence in the reliability of the proposed solutions. This data has been partially presented within the Higher Rate 802.11b Study Group (HRbSG) and the papers are available for review.

5. ECONOMIC FEASIBILITY

a) Known cost factors, reliable data.

The fundamental radio architecture and baseband architecture of the candidate approaches are similar to that of the current IEEE 802.11b solutions. The known cost baseline of the current IEEE 802.11b systems has been used to project the cost baseline for the higher rate PHY.

b) Reasonable cost for performance.

The primary cost trade-offs are cost vs. rate vs. range vs. multipath resistance of the high rate solution in contrast to the current IEEE 802.11b PHY capability. These trade-offs appear reasonable based on information presented to the HRbSG. The costs of the stations remain approximately the same.

c) Consideration of installation costs.

The installation cost of higher rate devices is the same as that of the current IEEE 802.11b devices. Upgrading an existing network to a higher speed can be performed selectively in areas with a demand for higher instantaneous rate.