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26 May 2006

Paul Nikolich
18 Bishops Lane
Lynnfield, MA 01940
p.nikolich@ieee.org

Re: P802.11n - 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

Dear Paul:

I am pleased to inform you that on 25 May 2006 the IEEE-SA Standards Board approved the above referenced project until 31 December 2007. A copy of the file can be found on our website at <http://standards.ieee.org/board/nes/projects/802-11n.pdf>.

Now that your project has been approved, please forward a roster of participants involved in the development of this project. This request is in accordance with the IEEE-SA Operations Manual, Clause 5.1.2i under Duties of the Sponsor which states:

"Submit annually to the IEEE Standards Department an electronic roster of individuals participating on standards projects"

For your convenience, an Excel spreadsheet for your use has been posted on our website at <http://standards.ieee.org/guides/par/roster.xls>. Please forward this list to me via e-mail at j.haasz@ieee.org no later than 23 August 2006.

Please visit our website, IEEE Standards Development Online (<http://standards.ieee.org/resources/development/index.html>), for tools, forms and training to assist you in the standards development process. Also, we strongly recommend that a copy of your draft be sent to this office for review prior to the final vote by the working group to allow for a quick review by editorial staff before sponsor balloting begins.

If you should have any further questions, please contact me at 732-562-6367 or by email at j.haasz@ieee.org.

Sincerely,

Jodi Haasz
Program Manager
International Stds Programs and Governance
Standards Activities
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FAX +1 732 875 0695
Email: j.haasz@ieee.org

CC: stuart@ok-brit.com

PAR Request Date: 09 March 2006**PAR Approval Date:** 25 May 2006**PAR Signature Page on File:** Yes**Type of Project:** Modification to Approved PAR**Status:** Modification to a Previously Approved Amendment PAR P802.11n, 2003-09-11**Root Project/PAR:** Modification to Approved PAR P802.11-REVma, 2003-03-20**1.1 Project No.:** **P802.11n****1.2 Type of Document:** Standard**1.3 Life Cycle:** Full-Use**1.4 Is this document in ballot now?** No**2.1 Title**

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

Old Title

Amendment to STANDARD [FOR] Information Technology-Telecommunications and information exchange between systems-Local and Metropolitan networks-Specific requirements-Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications: Enhancements for Higher Throughput

2.1 Amendment/Corrigenda Title

Amendment : Enhancements for Higher Throughput

3.1 Working Group Name[Wireless LAN Working Group](#)**Working Group Chair**[Kerry Stuart J](#)Phone: 408-348-3171
Email: stuart@ok-brit.com**Working Group Vice Chair****3.2 Sponsor**[IEEE Computer Society Local and Metropolitan Area Networks \(C/LM\)](#)**Sponsor Chair**[Nikolich Paul](#)Phone: 857-205-0050
Email: p.nikolich@ieee.org**3.3 Joint Sponsor****4.1 Type of Ballot:** Individual**4.2 Expected Date of Submission for Initial Sponsor Ballot:** 2007-01-00**4.3 Projected Completion Date for Submittal to RevCom:** 2007-09-00**5.1 Approximate number of people expected to work on this project:** 425**5.2 Scope:** The scope of this project is to define an amendment that shall define standardized modifications to both the 802.11 physical layers (PHY) and the 802.11 Medium Access Control Layer (MAC) so that modes of operation can be enabled that are capable of much higher throughputs, with a maximum throughput of at least 100Mbps, as measured at the MAC data service access point (SAP).**Old Scope:** The scope of this project is to define an amendment that shall define standardized modifications to both the 802.11 physical layers (PHY) and the 802.11 Medium Access Control Layer (MAC) so that modes of operation can be enabled that are capable of much higher throughputs, with a maximum throughput of at least 100Mbps, as measured at the MAC data service access point (SAP).**5.3 Is the completion of this document contingent upon the completion of another document?** No

5.4 Purpose: The purpose of the project is to improve the 802.11 wireless local area network (LAN) user experience by providing significantly higher throughput for current applications and to enable new applications and market segments.

Old Purpose: The purpose of the project is to improve the 802.11 wireless local area network (LAN) user experience by providing significantly higher throughput for current applications and to enable new applications and market segments.

5.5 Need for the Project: 802.11 based WLANs have been widely accepted as a valuable communications option with more than 100 million units per year now shipping. Demand is growing for higher throughput WLANs to support higher data rate requirements for both traditional file transfers and demanding new multi-media applications.

5.6 Stakeholders for the Standard: The stakeholders are the telecommunications industry.

6.1.a. Has the IEEE-SA policy on intellectual property been presented to those responsible for preparing/submitting this PAR prior to the PAR submittal to the IEEE-SA Standards Board? Yes Presented Date: 2006-03-20

If no, please explain:

6.1.b. Is the Sponsor aware of any copyright permissions needed for this project? No

If yes, please explain:

6.1.c. Is the Sponsor aware of possible registration activity related to this project? No

If yes, please explain:

7.1 Are there other standards or projects with a similar scope? No

If yes, please explain:

Sponsor Organization:

Project/Standard Number:

Project/Standard Date: 0000-00-00

Project/Standard Title:

7.2 Is there potential for this standard (in part or in whole) to be adopted by another national, regional, or international organization? ? Do not know at this time

Technical Committee Name and Number:

Contact person:

Contact person Phone Number:

Contact person Email Address:

7.3 Will this project result in any health, safety, security, or environmental guidance that affects or applies to human health or safety? No

7.4 Additional Explanatory Notes:

This PAR modification is to revise the "Type of Project" section only, to change the document being amended to "IEEE P802.11-REVma". This amendment cannot be approved until after the approval of IEEE P802.11-REVma.

8.1 Sponsor Information:

Is the Scope of this project within the approved scope/definition of the Sponsor's Charter? Yes

If no, please explain:

PAR FORM

PAR Status: Amendment of Standard
PAR Approval Date: 2003-09-11
PAR Signature Page on File: Yes
Review of Standards Development Process: No

1. Assigned Project Number: 802.11n

2. Sponsor Date of Request: 2003-03-14

3. Type of Document: Standard for

4. Title of Document:

Draft: Amendment to STANDARD [FOR] Information Technology-Telecommunications and information exchange between systems-Local and Metropolitan networks-Specific requirements-Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications: Enhancements for Higher Throughput

5. Life Cycle: Full Use

6. Type of Project:

6a. Is this an update to an existing PAR? No

6b. The Project is a: Amendment to Std 802.11-1999 (2003 edition)

7. Contact Information of Working Group:

Name of Working Group: IEEE P802.11, Working Group for Wireless LANs

Name of Working Group Chair: Stuart J Kerry

Telephone: 408-348-3171 **FAX:** 408-474-5343

Email: stuart@ok-brit.com or stuart.kerry@philips.com

8. Contact Information of Official Reporter (If different than Working Group Chair)

Name of Official Reporter: (if different than WG contact)

Telephone: **FAX:**

Email:

9. Contact Information of Sponsoring Society or Standards Coordinating Committee:

Name of Sponsoring Society and Committee: Computer Society Local and Metropolitan Area Networks

Name of Sponsoring Committee Chair: Paul Nikolich

Telephone: 857-205-0050 **FAX:** 781-334-2255

Email: paul.nikolich@att.net

Name of Liaison Rep. (If different than Sponsor Chair):

Telephone: **FAX:**

Email:

10. The Type of ballot is: Individual Sponsor Ballot

Expected Date of Submission for Initial Sponsor Ballot: 2005-11-25

11. Fill in Projected Completion Date for Submittal to RevCom: 2006-06-16

Explanation for Revised PAR that Completion date is being extended past the original four-year life of the PAR:

12. Scope of Proposed Project:

The scope of this project is to define an amendment that shall define standardized modifications to both the 802.11 physical layers (PHY) and the 802.11 Medium Access Control Layer (MAC) so that modes of operation can be enabled that are capable of much higher throughputs, with a maximum throughput of at least 100Mbps, as measured at the MAC data service access point (SAP).

13. Purpose of Proposed Project:

The purpose of the project is to improve the 802.11 wireless local area network (LAN) user experience by providing significantly higher throughput for current applications and to enable new applications and market segments.

14. Intellectual Property:

Sponsor has reviewed the IEEE patent policy with the working group? Yes

Sponsor is aware of copyrights relevant to this project? No

Sponsor is aware of trademarks relevant to this project? No

Sponsor is aware of possible registration of objects or numbers due to this project? No

15. Are there other documents or projects with a similar scope? No

Similar Scope Project Information:

16. Is there potential for this document (in part or in whole) to be submitted to an international organization for review/adoption? Do not Know

If yes, please answer the following questions:

Which International Organization/Committee?

**International Contact
Information?**

17. If the project will result in any health, safety, or environmental guidance that affects or applies to human health or safety, please explain, in five sentences or less. No

18. Additional Explanatory Notes: (Item Number and Explanation)

See attached.

18. Additional Explanatory Notes:

Item 12.

The scope of the MAC and PHY enhancements assume a baseline specification defined by 802.11 and its amendments and anticipated amendments a, b, d, e, g, h, i and j. The enhancements shall be to support higher throughput. The amendment shall not redefine mechanisms in the baseline that do not pertain to higher throughput.

Some of the modes of operation defined in the HT amendment shall be backwards compatible and interoperable with 802.11a and/or 802.11g.

Existing 802.11 standards are typically designated by their peak physical data rates. For example, 802.11a has a peak data rate of 54Mbps. This amendment has chosen to use a performance metric of throughput measured at the MAC data SAP. This amendment seeks to improve the peak throughput to at least 100Mbps, measured at the MAC data SAP. Depending on the scenario, this represents an improvement of at least 4 times the throughput obtainable using existing 802.11 systems.

In order to make efficient use of scarce spectral resources in unlicensed bands, the highest throughput mode defined by the HT amendment shall achieve a spectral efficiency of at least 3 bits per second per Hertz for the PSDU.

In the process of formulating this PAR, it was found that there are multiple user scenarios. Accordingly, the task group will undertake the following steps:

1. Identify and define usage models, channel models and related MAC and application assumptions. Initial usage models envisioned include hot-spot, enterprise and residential; others may be included.
2. Identify and define evaluation metrics that characterize the important aspects of a particular usage model. The evaluation metrics may include but are not limited to the items listed in Table 1, provided as an illustration of the format.

Table 1: Evaluation Metrics

Evaluation Parameter	Usage Model 1	Usage Model 2	Usage Model 3
Throughput at the MAC data SAP, Mbps [#]			
Range, meters			
Aggregate Network Capacity [?]			
Power Consumption (peak and average), mW			
Spectral Flexibility ^{??}			
Cost / Complexity Flexibility			
Backward Compatibility ^{**}			
Coexistence [*]			

Notes:

[?] Definition includes a measure of spectral efficiency.

^{??} That is, agnostic to a particular frequency allocation and perhaps able to implement spectral agility.

^{*} The ability of one system to perform a task in a given shared environment in which other systems have an ability to perform their tasks and may or may not be using the same set of rules.

^{**} Backward compatibility with non-HT 802.11 device is desirable to the extent practicable.

[#] It is intended that throughput will be a primary comparison metric, and at least 100Mbps is the mandatory minimum throughput for the highest throughput mode. It is anticipated that the amended standard will contain a family of related modes, with different throughputs. It is anticipated that some of these modes will have throughputs that are substantially below 100Mbps, but that are still substantially higher, given similar operating conditions, than any modes in the existing 802.11 standard.

3. Develop a technical requirement specification.

4. Define a process for evaluations.

The impact of an HT device on the operation of a legacy network shall be comparable to that of any other legacy device identified in the baseline defined above.

21. Additional Explanatory Notes:

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