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23 August 2007

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

Re: P802.11 - 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 Amendment: Mesh Networking

Dear Paul:

I am pleased to inform you that on 22 August 2007 the IEEE-SA Standards Board approved the above referenced project until 31 December 2008. A copy of the file can be found on our website at <http://standards.ieee.org/board/nes/projects/802-11s.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 s.hampton@ieee.org no later than 20 November 2007.

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 +1 732 562 6003 or by email at s.hampton@ieee.org.

Sincerely,

Sherry Hampton
Administrator, Governance
Standards Activities
Phone +1 732 562 6003
FAX +1 732 875 0695
Email: s.hampton@ieee.org

CC: stuart@ok-brit.com BCC: s.hampton@ieee.org, t.t.lee@ieee.org

PAR Request Date: 11 April 2007	
PAR Approval Date: 22 August 2007	
PAR Signature Page on File: Yes	
Type of PAR: Modification to Approved PAR	
Status: Modification to a Previously Approved PAR for an Amendment - P802.11, 25 May 2006	
Root Project: IEEE Std 802.11-2007	
1.1 Project No.: 802.11s	
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 Amendment: Mesh Networking	
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
Name of Standards Liaison Representative (if applicable)	
3.3 Joint Sponsor	
4.1 Type of Ballot: Individual	
4.2 Expected Date of Submission for Initial Sponsor Ballot: January 2008	
4.3 Projected Completion Date for Submittal to RevCom: January 2009	
5.1 Approximate number of people expected to work on this project: 400	
5.2 Scope: This amendment describes an IEEE 802.11 Mesh network with an IEEE 802.11 Wireless Distribution System (WDS) using the IEEE 802.11 MAC/PHY layers that supports both broadcast/multicast and unicast delivery over self-configuring multi-hop topologies.	Old Scope: The scope of this project is to develop an IEEE 802.11 Extended Service Set (ESS) Mesh with an IEEE 802.11 Wireless Distribution System (WDS) using the IEEE 802.11 MAC/PHY layers that supports both broadcast/multicast and unicast delivery over self-configuring multi-hop topologies.
5.3 Is the completion of this document contingent upon the completion of another document? No	

5.4 Purpose: The IEEE 802.11 standard provides a four-address frame format for exchanging data packets between stations for the purpose of creating a Wireless Distribution System (WDS), but does not define how to configure or use a WDS. The purpose of this amendment is to provide a protocol for auto-configuring paths between stations over self-configuring multi-hop topologies in a WDS to support both broadcast/multicast and unicast traffic in a Mesh using the four-address frame format or an extension.

Old Purpose: The IEEE 802.11-1999 (2003 edition) standard provides a four-address frame format for exchanging data packets between Access Points (APs) for the purpose of creating a Wireless Distribution System (WDS), but does not define how to configure or use a WDS. The purpose of the project is to provide a protocol for auto-configuring paths between APs over self-configuring multi-hop topologies in a WDS to support both broadcast/multicast and unicast traffic in an ESS Mesh using the four-address frame format or an extension.

5.5 Need for the Project: At present, standard Wireless Local Area Network (WLAN) infrastructure is interconnected using Ethernet Local Area Networks (LANs) and is, therefore, fixed. One trend is toward increased information bandwidth, accompanied by a commensurate reduction in communication range, but with no lesser requirement for communication coverage. The other is the trend toward mobile computing applications that will require mobile infrastructure in addition to mobility for end users. In both instances, Mesh provides a solution via multi-hop wireless delivery among WLAN stations. Using Mesh, coverage within a house, a hospital, a hotel, an airport, a neighborhood, a campus, etc., may be extended wirelessly and without manual configuration other than setting the SSID (Service Set Identifier) and/or AP introduction. Mesh also supports a new class of IEEE 802.11 applications that require untethered/unlicensed infrastructure.

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: 2006-03-07

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? ? Yes

Technical Committee Name and Number: ISO/IEC JTC1 SC6

Contact person: [Robin Tasker](#)

Contact person Phone Number: +44-1925-603758

Contact person Email Address: r.tasker@dl.ac.uk

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 multiple sections so that P802.11s (Mesh Networking) will be applicable to 802.11 stations, rather than being restricted to Access Points and Extended Service Sets. In addition, document references and the expected Sponsor Ballot and Completion dates are updated to reflect the current estimated schedule for P802.11s. Item 5.2, Scope of the Project: An IEEE 802.11 Mesh is a collection of stations interconnected with wireless links that enable automatic topology learning and dynamic path configuration. The proposed amendment shall be an extension to the IEEE 802.11 MAC (Medium Access Control). The amendment will define an architecture and protocol for providing an IEEE 802.11 Mesh using the IEEE 802.11 MAC to create an IEEE 802.11 Wireless Distribution System that supports both broadcast/multicast and unicast delivery at the MAC layer using radio-aware metrics over self-configuring multi-hop topologies. A Mesh is functionally equivalent to a wired ESS, with respect to the non-Mesh Stations (STAs) relationship with the Basic Service Set (BSS) and ESS. The amendment shall enable interoperable formation and operation of a Mesh, but shall be extensible to allow for alternative path selection metrics and/or protocols based on application requirements. A target configuration is up to 32 devices participating as forwarders in the Mesh. However, larger configurations may also be contemplated by the standard. It is intended that the architecture defined by the amendment shall allow a Mesh to interface with higher layers and to connect with other networks using higher layer protocols. The amendment shall utilize existing IEEE 802.11 security mechanisms, or an extension thereof, for the purpose of securing a Mesh in which all of the stations are controlled by a single logical administrative entity for security. The amendment shall allow the use of one or more IEEE 802.11 radios on each station in the Mesh.

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:

[Email This Letter](#)

26 May 2006

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

Re: P802.11s - 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 2008. A copy of the file can be found on our website at <http://standards.ieee.org/board/nes/projects/802-11s.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
Phone +1 732 562 6367
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 P802.11s, 2004-05-13**Root Project/PAR:** Modification to Approved PAR P802.11-REVma, 2003-03-20**1.1 Project No.:** **P802.11s****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: IEEE 802.11 ESS Mesh Networking

2.1 Amendment/Corrigenda Title

Amendment: ESS Mesh Networking

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:** 2006-01-00**4.3 Projected Completion Date for Submittal to RevCom:** 2007-01-00**5.1 Approximate number of people expected to work on this project:** 500**5.2 Scope:** The scope of this project is to develop an IEEE 802.11 Extended Service Set (ESS) Mesh with an IEEE 802.11 Wireless Distribution System (WDS) using the IEEE 802.11 MAC/PHY layers that supports both broadcast/multicast and unicast delivery over self-configuring multi-hop topologies.**Old Scope:** The scope of this project is to develop an IEEE 802.11 Extended Service Set (ESS) Mesh* with an IEEE 802.11 Wireless Distribution System (WDS) using the IEEE 802.11 MAC/PHY layers that supports both broadcast/multicast and unicast delivery over self-configuring multi-hop topologies.**5.3 Is the completion of this document contingent upon the completion of another document?** No

5.4 Purpose: The IEEE 802.11-1999 (2003 edition) standard provides a four-address frame format for exchanging data packets between Access Points (APs) for the purpose of creating a Wireless Distribution System (WDS), but does not define how to configure or use a WDS. The purpose of the project is to provide a protocol for auto-configuring paths between APs over self-configuring multi-hop topologies in a WDS to support both broadcast/multicast and unicast traffic in an ESS Mesh using the four-address frame format or an extension.

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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:** 2006-03-07

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? ? Yes

Technical Committee Name and Number: ISO/IEC JTC1 SC6

Contact person: [Robin Tasker](#)

Contact person Phone Number: +44-1925-603758

Contact person Email Address: R.Tasker@dl.ac.uk

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. Item 5.2, Scope of the Project: An IEEE 802.11 Extended Service Set (ESS) Mesh is a collection of Access Points (APs) interconnected with wireless links that enable automatic topology learning and dynamic path configuration. The proposed amendment shall be an extension to the IEEE 802.11 MAC (Medium Access Control). The amendment will define an architecture and protocol for providing an IEEE 802.11 ESS Mesh using the IEEE 802.11 MAC to create an IEEE 802.11 Wireless Distribution System that supports both broadcast/multicast and unicast delivery at the MAC layer using radio-aware metrics over self-configuring multi-hop topologies. An ESS Mesh is functionally equivalent to a wired ESS, with respect to the Stations (STAs) relationship with the Basic Service Set (BSS) and ESS. The amendment shall enable interoperable formation and operation of an ESS Mesh, but shall be extensible to allow for alternative path selection metrics and/or protocols based on application requirements. A target configuration is up to 32 devices participating as Access Point (AP) forwarders in the ESS Mesh. However, larger configurations may also be contemplated by the standard. It is intended that the architecture defined by the amendment shall allow an ESS Mesh to interface with higher layers and to connect with other networks using higher layer protocols. The amendment shall utilize IEEE 802.11i security mechanisms, or an extension thereof, for the purpose of securing an ESS Mesh in which all of the APs are controlled by a single logical administrative entity for security. The amendment shall allow the use of one or more IEEE 802.11 radios on each AP in the ESS Mesh.

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: