To the Wireless Groups-

Attached is a zip file containing the PAR and 5C for the proposed Low Rate WPAN.
This PAR request is on the 802 agenda for action at the upcoming meeting in Tampa.
There will be a tutorial on Monday evening to acquaint everyone with the application
requirements and unique need. Please review and address any comments or questions
to Pat Kinney (Pat.Kinney@intermec.com) with a copy to me (bheile@bbn.com).

See you Tampa

Regards

Bob

Bob Heile
Verizon Technology Organization
Chair IEEE 802.15
40 Sylvan Road, Waltham, MA 02451

IEEE P802.15
Wireless Personal Area Networks

Project	IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs)
Title	**IEEE P802.15 WPAN Low Rate Study Group PAR**
Date Submitted	[8 November, 2000]
Source	[Sean Middleton] [Philips Semiconductors] [1251 McKay Dr. San Jose, CA 95131 USA] Voice: [+1 408 474 4726] Fax: [+1 408 474 7247] E-mail:[sean.middleton@philips.com]
Re:	[IEEE P802.15 Wireless Personal Area Network Low Rate Project Authorization Request.]
Abstract	[During the July 2000 IEEE802 Plenary the IEEE P802.15 Wireless Personal Area Network Low Rate Study Group was formed, their goal is to study and then submit a Project Authorization Request, if deemed necessary.]
Purpose	[Submit the PAR to the P802.15 Working Group]
Notice	This document has been prepared to assist the IEEE P802.15. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve(s) the right to add, amend or withdraw material contained herein.
Release	The contributor acknowledges and accepts that this contribution becomes the property of IEEE and may be made publicly available by P802.15.

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

1.   Sponsor Date of Request   [**2000 November 8**]

2.   Assigned Project Number   [**P802.15.4   TBD**]

3.   PAR Approval DATE   [   ] {IEEE-Standards Staff to fill in box}
{Copyright release must be received with appropriate signatures
by FAX (1-732-562-1571)}
[ ] PAR Signature Page on File {IEEE Staff to check Box}

4.   Project Title 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 {Documents in which good practices are suggested}

TITLE: [**STANDARD FOR Telecommunications and Information Exchange Between
Systems – LAN/MAN Specific Requirements – Part 15: Wireless Medium Access
Control (MAC) and Physical Layer (PHY) Specifications for Low Rate Wireless
Personal Area Networks (WPAN)**]

Name of Working Group(WG) : [**802.15**]

Name of Official Reporter (usually the WG Chair) who MUST be an SA member as
well as an IEEE/Affiliate Member: [**Robert F. Heile**]
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}
Telephone: [**+1 781 466 2057**]   FAX: [**+1 781 466 2575**]
EMAIL: [**bheile@bbn.com**]

Name of WG 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}
Telephone: [   ]   FAX: [   ]
EMAIL: [   ]

Name of Sponsoring Society and Committee: [**Computer Society/LMSC**]
Name of Sponsoring Committee Chair: [**Jim Carlo**]
IEEE-Standards Staff has verified that the Sponsor is an IEEE and an IEEE-SA
Member: [ ] (Staff to check box}
Telephone: [**+1 214 853 5274**]   FAX: [**+1 214 853 5274**]
EMAIL: [**jcarlo@ti.com**]

5. Type of Project:

5a.   Is this an update to an existing PAR? {Yes/No} [**No**]
If YES: Indicated PAR number/approval date [   ]
If YES: Is this project in ballot now? [   ] {Yes/No}
[Indicate changes/rationale for revised PAR in Item #16. This should be no
more than 5 lines.]

5b. Choose from one of the following:
[**X**] New Standard

```
[  ] Revision of existing standard {number and year} [   ]
[  ] Amendment (Supplement) to existing standard {number and year} [   ]
[  ] Corrigenda to 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 of the following:
[ X ] Individual Sponsor Ballot Process
[   ] Entity (not Individual) Sponsor Ballot Process
[   ] Mixed Balloting (combination of Individual and Entity Sponsor
      Balloting)
```

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Expected Date of Submission for Initial Sponsor Ballot: [ July 2002]
```

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8.  Fill in Projected Completion Date for Submittal to RevCom [   ]
```

```
9.  Scope of Proposed Project
```
[This project will define the PHY and MAC specifications for low data rate wireless connectivity with fixed, portable and moving devices with no battery or very limited battery consumption requirements typically operating in the Personal Operating Space (POS) of 10 meters (See 16a). It is foreseen that depending on the application that a longer range at a lower data rate may be an acceptable trade-off (See 16b).

It is the intent of this project to work toward a level of coexistence with other wireless devices in conjunction with Coexistence Task Groups, such as 802.15.2.]

```
10. Purpose of Proposed Project:
```
[To provide a standard for ultra low complexity, ultra low cost, ultra low power consumption and low data rate wireless connectivity among inexpensive devices. The raw data rate will be high enough (maximum of 200kbs) to satisfy a set of simple needs such as interactive toys, but scaleable down to the needs of sensor and automation needs for wireless communications.

The project may also address the location tracking capabilities required to support uses of smart tags and badges.]

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11. Intellectual Property {Answer each of the questions below}
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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 explanation below/ No}
[   ] {Explanation}
```

Are you aware of any registration of objects or numbers relevant to this
project?
[**No**] {Yes, with explanation below/ No}

12. Are you aware of other standards or projects with a similar scope?
[**Yes**] {Yes, with explanation below/ No}

[Firefly Group

**This group (formerly 'HomeRF Lite') is not a standards organization but an
Industry consortium that has a similar charter. The Working Group has
established a liaison with this group with respect to technical, marketing,
and coexistence aspects for other projects, and plans to maintain this
liaison, as appropriate, for this project. As Industry Consortia, formal
coordination in Item 12 may be inappropriate.]**

13. International Harmonization
Is this standard planned for adoption by another international organization?
[**??**] {Yes/No/?? if you don't know at this time}
If Yes: Which International Organization [   ]
If Yes: Include coordination in question 13 below
If No: Explanation [   ]

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? [   ]

15. Proposed Coordination/Recommended Method of Coordination

Mandatory Coordination
SCC 10 (IEEE Dictionary)   by DR
IEEE Staff Editorial Review   by DR
SCC 14 (Quantities, Units and Letter symbols) by DR

Coordination requested by Sponsor and Method:
[   ] by [   ] {circulation of DRafts Liaison memb/COmmon memb}
[   ] by [   ] {circulation of DRafts/LIaison memb/COmmon memb}
[   ] by [   ] {circulation of DRafts/LIaison memb/COmmon memb}
[   ] by [   ] {circulation of DRafts/LIaison memb/COmmon memb}
{Choose DR or LI or CO for each coordination request}

Coordination Requested by Others:
[   ] {added by staff}

16.   Additional Explanation Notes: {Item Number and Explanation}
**[16a
There remains a significant group of applications that could not be addressed
by current projects in 802.15 and or by current standards and projects in
802.11. The very long battery life needed for applications such as sensors,
meter reading, smart tags/badges, and home automation necessitate low enough
power consumption to allow batteries typical to such applications to last
multiple months to multiple years. Additionally, the intended applications**

are envisioned to be very inexpensive, requiring low complexity wireless links
that are low cost relative to the intended applications.

16b
These applications would also benefit from the ability to trade-off the data
rate and range while preserving the requirements for very long battery life.
For example, the three following scenarios:
a.) Long range (50m) at a reduced data rate (20kbs)
b.) Typical range (~10m) at a full data rate (up to 200kbs)
c.) Shortened range with reduced data rate (20kbs) to achieve even longer
battery life

IEEE P802.15
Wireless Personal Area Networks

Project	IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs)
Title	**IEEE P802.15 WPAN Low Rate Study Group 5 Criteria**
Date Submitted	[8 November, 2000]
Source	[Sean Middleton] Voice: [+1 408 474 4726] [Philips Semiconductors] Fax: [+1 408 474 7247] [1251 McKay Dr. E-mail:[sean.middleton@philips.com] San Jose, CA 95131 USA]
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IEEE P802.15 Low Rate Wireless Personal Area Networks Study Group Functional Requirements Standards Development Criteria

The IEEE P802.15 Low Rate Study Group for Wireless Personal Area Networks (WPANs) reviewed and completed the required IEEE Project 802 Functional Requirements, Standards Development Criteria (a.k.a. the Five Criteria). The IEEE P802.15 WPAN Five Criteria response is in Italics below.

1. BROAD MARKET POTENTIAL

a) Broad sets of applicability

There is increasing interest in offering wireless networking to even the most inexpensive devices, that up to now these devices have utilized unique, proprietary wireless interfaces and protocols which are different from vendor to vendor. Since these devices will need to operate on batteries lasting multiple months to multiple years, this form of wireless networking connectivity will require substantially lower power consumption than is currently available or addressed in current standards or task groups activities.

Examples of applications include Home Automation, Meter Reading, Medical Monitoring, Precision Agriculture and Environmental Networks, Industrial Controls, and Access/Authorization. Examples of devices include Smart Tags & Badges, Auto Location ID's, Stick-on and Security Sensors, Interactive Toys, Human Interface Devices (HIDs), Portable bar code readers, and Remote controls. With an effective wireless standard, geared to this class of applications, the market potential is huge.

The wireless capability will make these devices easier to use and provide additional functionality and efficiency.

b) Multiple vendors and numerous users

The breadth of membership of this Wireless Personal Area Network (WPAN) Low Rate Study Group demonstrates the interest in this class of WPANs. Members include international wireless industry leaders, academic researchers, semiconductor manufacturers, system integrators, and end users. Already, there are industry consortium, such as Firefly (a spin-off out of HomeRF) actively addressing the requirements of ultra low power, low data rate wireless PAN class networks.

So far, 20 individuals from 12 companies and two universities participated in drafting this PAR. The target user base will be large as indicated by the growing demand for wireless connectivity in almost all devices.

c) Balanced costs (LAN versus attached stations)

The standard for Low Rate Wireless Personal Area Network (WPAN-LR) will be developed with the aim that the connectivity costs will be a reasonably small fraction of the cost of the target devices such as sensors, tags, HIDs, and bar code readers as previously mentioned.

2. COMPATIBILITY

IEEE 802 defines a family of standards. **All standards shall be in conformance with IEEE 802.1 Architecture, Management and Interworking. All LLC and MAC standards shall be compatible with ISO 10039, MAC Service Definition1, at the LLC/MAC boundary. Within the LLC Working Group there shall be one LLC standard, including one or more LLC protocols with a common LLC/MAC interface. Within a MAC Working Group there shall be one MAC standard and one or more Physical Layer standards with a common MAC/Physical layer interface. Each standard in the IEEE 802 family of standards shall include a definition of managed objects, which are compatible with OSI systems management standards.**

Note: This requirement is subject to final resolution of corrections and revision to current ISO 10039, currently inconsistent with ISO 8802 series standards.

The MAC (Medium Access Control) Layer of the Wireless Personal Area Network (WPAN) Standard will be compatible with the IEEE 802 requirements for architecture, management, and inter-networking.

3. DISTINCT IDENTITY

a) Substantially different from other IEEE 802 standards.

Current projects in 802.15 and or by current standards and projects in 802.11 do not permit the raw data rate of 200 Kbps or much slower raw data rates in this class of WPAN essential for achieving the extremely low power consumption requirements (see PAR section 9).

Current projects in 802.15 and or by current standards and projects in 802.11 may not provide balanced cost for the WPAN class of devices listed in section 1a.

Current projects in 802.15 and or by current standards and projects in 802.11 may not address the reduced complexity requirements for the WPAN class of devices listed in section 1a.

The 802.11 Standard optimizes for throughput at long distance and roaming whereas the WPAN optimizes for low cost and low power consumption in a small form factor.

Current projects in 802.15 and or by current standards and projects in 802.11 do not address location tracking capabilities which this WPAN class of devices may support.

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

The Wireless Personal Area Network Low Rate (WPAN-LR) Standard will consist of one Medium Access Control and one Physical Layer. We are unaware of any existing standard that will address this class of devices.

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

The proposed Wireless Personal Area Network Low Rate (WPAN-LR) Standard will be a distinct document with clearly distinguishable specifications.

4. TECHNICAL FEASIBILITY

a) Demonstrated system feasibility

There have been sufficient test results, simulations, and non-standard implementations to indicate that the power management, network frequency management, and network management services objectives of WPAN-LR are feasible.

b) Proven technology, reasonable testing

There are examples of technology that exist today, which will allow design and fabrication of these radio systems.

c) Confidence in reliability

The air interface protocol will be designed to meet commercial reliability standards. Existing products and prototypes provide confidence in the reliability of the proposed project.

5. ECONOMIC FEASIBILITY

a) Known cost factors, reliable data

High volume applications in unlicensed bands provide a low cost source of components. Existing products and prototypes indicate costs should be less.

b) Reasonable cost for performance

Based on test results, prototype,and production solutions, the estimates meet expected size, cost, and power requirements.

c) Consideration of installation costs

One of the WPAN-LR standard objectives includes low cost installation with minimal to no operator intervention.