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**IEEE P802.11**  
**Wireless LANs**

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**Wireless Personal Area Network (WPAN) Five Criteria and  
2.4GHz Coexistence Strategy**

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**Abstract**

The following document was written during the January 14-15, 1998 meeting of the IEEE Wearables Standards Ad Hoc Committee in Memphis, TN USA. The document was subsequently edited several times throughout the remainder of 1998, and in January 1999, in support of the Wireless Personal Area Network (WPAN) Study Group PAR effort.

The intent of this document is to address the five (5) Standards Development Requirements called out in the IEEE Project 802 document which defines the functional requirements and guidelines for the IEEE 802 family of Local Area Networks and Metropolitan Area Networks. Reference: Institute of Electrical and Electronics Engineers, Inc. Draft 6.8 Revised: July 10, 1991 (translated into HTML by Vic Hayes, January 1, 1997, update of Jan 13). In addition, this document addresses the issue of analysing the coexistence in the 2.4GHz band with current RF Transceivers i.e., 802.11 Standard FHSS and DSSS and Wireless Personal Area Networks (WPANs).

**1. STANDARDS DEVELOPMENT CRITERIA**

All projects authorised within the IEEE 802 family of LANs (including IVD LANs) and MANs shall meet the following five criteria.

**1.1. Broad Market Potential****a) Broad sets of applicability**

The increasing adoption of wearable and hand-held computing and communicating devices, and the proliferation of peripheral devices for them, has made clear the need to provide wireless connectivity, for such devices.

Examples of applications include Collaborative Maintenance, Mobile Worker, Medical Sensing, Data Synchronization, etc. Examples of devices, which can be networked, include Computers, PDA/HPCs, printers, microphones, speakers, bar code readers, sensors, displays, Pagers, and Cellular & PCS Phones.

The wireless capability will provide functionality, efficiency, productivity and, in some cases, safety of highly mobile workers using computing and communicating systems.

**b) Multiple vendors and numerous users**

The breadth of membership of this Wireless Personal Area Network (WPAN) Study Group demonstrates the support of this PAR. Members include international wireless industry leaders, academic researchers, semiconductor manufacturers, system integrators, and corporate end users. Individuals from more than 30

companies participated in drafting this PAR. The target user base will be large as indicated by the growing demand for PDAs, HPCs, Pagers, Cellular & PCS Phones, etc.

**c) Balanced costs (LAN versus attached stations)**

The standard for Wireless Personal Area Network (WPAN) will be developed with the aim that the connectivity costs will be a reasonably small fraction of the cost of the target devices e.g., PDA/HPCs, printers, microphones, speakers, bar code readers, sensors, displays, Pagers, and Cellular & PCS Phones.

## 1.2. 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.

## 1.3. Distinct Identity

**a) Substantially different from other IEEE 802 standards.**

The 802.11 Standard may not provide balanced cost for the WPAN class of devices listed above. The 802.11 Standard does not address the power consumption envelope of the WPAN class of devices listed above.

The 802.11 Standard may not address the reduced complexity requirements for the WPAN class of devices listed above.

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

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

The Wireless Personal Area Network (WPAN) Standard will consist of one Medium Access Control and Physical Layer per problem. We are unaware of any existing standard that will address this class of devices. The Bluetooth Specification as currently drafted is not a standard and is not available in the public domain.

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

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

## 1.4. Technical Feasibility

**a) Demonstrated system feasibility**

There are several research activities that lead us to believe that the power management, network frequency management, and network management services objectives of WPANs are feasible. Unlike WLANs, WPANs have a greater ability to trade-off range and bandwidth and still meet the essential requirements.

**b) Proven technology, reasonable testing**

There are examples of technology that exist today.

**c) Confidence in reliability**

The air interface protocol will be designed to meet commercial reliability standards. The data from existing products and prototypes representing candidate approaches provide confidence in the reliability of the proposed solutions.

## 1.5. Economic Feasibility

**a) Known cost factors, reliable data**

Reduced performance requirements of WPANs will allow a substantially reduced cost of implementation over WLAN benchmarks. The use of 2.4 GHz by other high volume applications will provide a low cost source of components.

**b) Reasonable cost for performance**

Based on research results, prototype, and production solutions, implementation estimates meet requirements.

**c) Consideration of installation costs**

One of the WPAN standard objectives includes low cost installation with minimal operator intervention.

## **2. Strategy for WPAN Coexistence in the 2.4GHz band**

We have identified WPAN coexistence with WLANs in the 2.4 GHz band as a critical success factor. Coexistence is defined as minimizing mutual interference such that the effect of the addition of a WPAN to a WLAN coverage area has approximately the same effect as adding an additional, non-co-operating WLAN, localised to the WPAN coverage area.

**Appendix**

Wireless Personal Area Networking Study Group Document Archive

Web Browser:

<ftp://ftp.flexipc.com/wearablesgroup/Index.htm>

FTP :

<ftp://ftp.flexipc.com/wearablesgroup/>