

IEEE P802.15
Wireless Personal Area Networks

Project	IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs)
Title	Peer Aware Communications (PAC) Study Group 5 Criteria
Date Submitted	[January 20, 2012]
Source	Myung Lee lee@ccny.cuny.edu
Re:	[IEEE P802.15.8 Study Group 5 Criteria]
Abstract	[Study Group 5 Criteria.]
Purpose	[Working document for the 5 Criteria 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.

Peer Aware Communications (PAC)--5 Criteria

1. Broad Market Potential

a) Broad sets of applicability.

There is a large and increasing demand for applications based on the awareness of their proximal area for desired services by peer aware communications (PAC) with a potential to grow to billions of connected devices in the near future. And, there is a notable trend of the distributed service platform which has a potential of overcoming the limitation of the existing centralized service platform.

Examples of applications for PAC include social networking, advertising, gaming, streaming, device control, p2p services, urgent notification, emergency service, internet of things, etc.

Examples of devices with PAC capability include mobile phone, tablet PC, laptop, TV, kiosk, set-top box, camera, camcorder, printer, projector, sensors, etc. Peer awareness will make these devices easy to use and offer functionalities essential for envisioned PAC applications.

By establishing the PAC standard group, the potential user base will be large as indicated by the growing demand for wireless P2P communication in almost all devices.

b) Multiple vendors and numerous users

The participation of members from various industry sectors and institutions including international wireless industry leaders, academic researchers, government researchers, semiconductor manufacturers, system integrators, consumer electronics companies, service/contents providers and end users in the IEEE 802.15 PAC study group demonstrate the broad interest in the utilization of PAC technologies.

There are at least 10 manufacturers providing CE solutions, several of whom are participating in the PAC Study Group and already provide non-standard silicon solutions for the PAC application spaces. 8 participants responded to the Call for Presentation in participating in the PAC standardization activity.

Peer-awareness and wireless capability is essential in achieving the full market potential; standardization will reduce costs and improve functionality to the industry and the consumers they serve, and contribute significantly to creating better solutions world-wide.

c) Balanced costs

The proposed project 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 mobile phones, tablet PC, laptop, and other devices as previously mentioned.

2. Compatibility

IEEE 802 defines a family of standards. All standards shall be in conformance with the IEEE 802.1 Architecture, Management, and Interworking documents as follows: 802 Overview and Architecture, 802.1D, 802.1Q, and parts of 802.1f. If any variances in conformance emerge, they shall be thoroughly disclosed and reviewed with 802.1.

Each standard in the IEEE 802 family of standards shall include a definition of managed objects which are compatible with systems management standards.

This standard will be compliant with the IEEE 802 Architecture, Management, and Inter-networking documents as required. There is no specific technology feature anticipated in the standard that could preclude this compliance.

If needed, managed objects will be defined consistent with existing policies and practices for IEEE 802 standards.

3. Distinct Identity

a) Substantially different from other IEEE 802 standards

Existing standards may be able to provide parts of the envisioned PAC services, but no single standard provides peer to peer and infrastructureless communications with fully distributed coordination.

i) Fast Neighbor Discovery without Association

The neighbor discovery process in PAC is unique among IEEE 802 standards in two aspects. First, it is to be used for peer-to-peer and group communications and to be a part of functions implemented at PHY and MAC layers. Secondly, the discovery process is performed without the association process, which further reduces the latency incurred from the neighbor discovery.

ii) Fast association with distributed coordination

The association process in PAC is unique among IEEE 802 standards because it does not rely on a centralized coordinator or a dedicated server. Further, as PAC devices will be coordinated in a distributed manner for peer to peer and group communications, the PAC association process will be different from the ones used in other IEEE 802 standards. The centralized association process would suffer from the overloading if there exist many mobile devices, while the distributed process to be adopted by PAC can avoid overloading and achieve faster association.

iii) Group communications

Group communication is a key functionality to support in many applications for PAC such as social networking and P2P applications. Those applications will be facilitated by implementing parts of the group communication functions at PHY and MAC layers. Individual PAC devices can join simultaneously multiple groups. PAC group communications will be managed without any central coordinator.

iv) Peer to peer and infrastructureless communications

Unlike all other IEEE 802 standards, PAC will support the peer to peer and infrastructureless communication at PHY and MAC layers. Peer-to-peer communication refers to the direct communication between any two PAC devices without any mediating device. This mode of communication is necessary for the networks without infrastructure like basestations. Peer to peer communication is also the key technology for multihop relay communication, which can support applications for disaster recovery and emergency.

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

. There is no 802 standard that effectively addresses all the key core requirements of PAC outlined above. This " standard will address a unique solution for that.

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

The proposed PAC standard will be a distinct document with clearly distinguishable specifications.

4. Technical Feasibility

a) Demonstrated system feasibility

There are multiple technologies today that provide the use of globally available licensed/unlicensed bands complying with the typical signaling and data rate of PAC. These technologies have been demonstrated and well documented in other IEEE 802 standards.

b) Proven technology, reasonable testing

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

c) Confidence in reliability

Previously demonstrated applications of the technology provide confidence in the reliability of the proposed project.

d) A coexistence assurance document will be submitted to the 802.19 TAG.

5. Economic Feasibility

a) Known cost factors, reliable data

High volume devices and applications like mobile phones will enable a low cost source of PAC components. IEEE 802.11, IEEE 802.15.1, and IEEE 802.15.4 are examples of the industry's ability to create low cost radios.

b) Reasonable cost for performance

Based on performance and related costs of existing WPAN systems, a PAC implementation will meet the expectations. The PAC implementation is expected to have similar complexity with existing WPAN system and performed in single radio chip.

c) Consideration of installation costs

The PAC devices will have no impact on individual device installation costs and will reduce overall system level implementation costs because the PAC devices can operate without infrastructure .