Overview of P1905.1

DCN 1905_1-11-0061-04-WGDC

December 2011, Miami, FL USA
Introduction:

With the increase of bandwidth intensive home networking applications and consumers’ endless appetite for services, home networking technologies have become the latest frontier in the evolution of service delivery.

Both Wired and Wireless home networking technologies have significant market presence due to the value they create for end users. Wireless networks offer mobility and Wired technologies offer extensive bandwidth or outlet ubiquity for transmissions. Wired and Wireless technologies complement each other to provide full home coverage.

To address the wide variety of applications, regions, environments, and topologies, multiple connectivity technologies are needed. Over the last ten years, more than one billion home networking devices have been deployed in the market and hence any proposed solution must interoperate with this deployment.

IEEE P1905.1:

IEEE P1905.1 defines an abstraction layer for multiple home networking technologies that provides a common interface to widely deployed home networking technologies: IEEE 1901 over power lines, Wi-Fi for wireless, Ethernet over twisted pair cable and MoCA 1.1 over coax (See Figure 1)

The P1905.1 abstraction layer supports connectivity selection for transmission of packets arriving from any interface or application. The P1905.1 layer does not require modification to the underlying home networking technologies and hence does not change the behavior or implementation of existing home networking technologies.
The work behind P1905.1 is to define a common fabric that spans established home networking technologies and to define a common data and control Service Access Point. Packets can arrive and be transmitted over any interface, regardless of the upper protocol layers or underlying network technology.

Specifically, P1905.1 introduces a software layer between layers 2 and 3 that abstracts the individual details of each interface, aggregates available bandwidth, and facilitates seamless integration. This layer simplifies setup, for example, by eliminating the need for a user to enter different passwords to access each of the links. P1905.1 also specifies end-to-end quality of service (QoS) while simplifying the introduction of new devices to the network, establishing secure connections, extending network coverage, and providing advanced network management features including discovery, path selection, and Quality of Service (QoS) negotiation.

Among the many benefits P1905.1 offers are:

*Ease of Use:* It is imperative that network setup and use is transparent to consumers. P1905.1 provides common setup procedures for adding
devices to a network, establishing secure links, implementing QoS, and managing the network.

Fallback: When a link goes down temporarily or is congested, an alternative route is available. This reduces the number of problems and interruptions that users experience, as well as reduces the number of support calls that service providers must manage.

Aggregated Throughput: The ability to use all of a hybrid network’s available throughput across the different interfaces is essential for maximizing throughput.

Multiple Simultaneous Streams: With applications such as interactive TV, even a single person may be watching multiple streams simultaneously.

Load Balancing: The hybrid network must be able to intelligently distribute video over different paths to limit congestion and maintain reliability.

QoS: P1905.1 specifies end-to-end QoS without compromising the internal integrity of any protocol or medium over which it runs.

Backwards Compatibility: Many service providers already have installations within the home using IEEE 1901, Wi-Fi, Ethernet, and Multimedia over Coax Alliance’s MoCA specification. P1905.1 is being designed for interoperability with deployed technologies.

Security: P1905.1 allows devices to be configured the same way with a simple button push, for example. P1905.1 also enables consistent password and authentication procedures for legacy devices.

Advanced Diagnostics: The overall network monitors itself to ensure reliable and uninterrupted operation.

Self-Install: This element is essential to keeping costs down. To achieve this, equipment has to be simple to install for consumers and capable of self-configuration. For example, when a homeowner plugs in a second access point – regardless of whether it is IEEE 1901-, MoCA-, or Wi-Fi-based – the primary AP will automatically configure it to take the network name and password. Pairing is kept simple through a standard push button mechanism, thus avoiding complex password configurations.

Mobility: Wireless connectivity is required to support mobile PDAs, handsets, and tablets.

Universal Connectivity: For true transparency, consumers need to be able to connect to the hybrid network from every room in the house without having to be aware of which part of the network their device is currently interfacing with. Users must also be assured of seamless handover when moving from one room to another.
Energy Management: Optimizing network power usage across different technologies results in more efficient and greener operations.

Wide Industry Support: Major companies are working together to form a compelling standard. Broad industry support from chipmakers, OEMs and service providers results in a diverse and extensive ecosystem of equipment and services.

Summary:

IEEE P1905.1 revolutionizes the networking experience for consumers by greatly simplifying network installation while providing a seamless user experience. A broad base of industry-leading chipmakers, equipment manufacturers and service providers are collaborating to bring IEEE P1905.1 to fruition. This widespread support demonstrates the technology’s potential to enhance the user experience and enable the next generation of connected services for consumers.

As of December 2011, IEEE 1905.1 WG has an approved draft standard.

As evidence of growing interest in P1905.1 the following entities are participants in the development of this standard:

- Broadcom
- Cisco
- devolo AG
- Entropic Communications
- France Telecom
- HomePlug
- HomePNA
- HD-PLC
- MoCA
- Panasonic System Networks Co
- Qualcomm
- Ralink Technology
- Sagemcom
- Sony Corporation
- SPiDCOM Technologies
Overview of P1905.1

STMicroelectronics
Toshiba Research Europe Ltd.
Verizon
Vixs Systems, Inc.