

# IEEE Standard for a Convergent Digital Home Network for Heterogeneous Technologies

IEEE Communications Society

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Power Line Communications Standards Committee

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3 Park Avenue  
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USA

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# IEEE Standard for a Convergent Digital Home Network for Heterogeneous Technologies

Sponsor

**Power Line Communications Standards Committee**  
of the  
**IEEE Communications Society**

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**Abstract:** An abstraction layer for multiple home networking technologies that provides a common interface to widely deployed home networking technologies is defined in this standard: IEEE 1901 over power lines, IEEE 802.11 for wireless, Ethernet over twisted pair cable, and MoCA 1.1 over coax. Connectivity selection for transmission of packets arriving from any interface or application is supported by the 1905.1 abstraction layer. Modification to the underlying home networking technologies is not required by the 1905.1 layer, and hence it does not change the behavior or implementation of existing home networking technologies. Introduced by the 1905.1 specification is a layer between layers 2 and 3 that abstracts the individual details of each interface, aggregates available bandwidth, and facilitates seamless integration. The 1905.1 also facilitates end-to-end quality of service (QoS) while simplifying the introduction of new devices to the network, establishing secure connections, extending network coverage, and facilitating advanced network management features including discovery, path selection, autoconfiguration, and quality of service (QoS) negotiation.

**Keywords:** abstraction layer, access point (AP) autoconfiguration, data models, fragmentation and reassembly, IEEE 802.1 bridge discovery, IEEE 802.11™, IEEE 1901™, IEEE 1905.1™, MoCA, pairwise master key, push button, registration, security, topology discovery protocol, wireless fidelity (Wi-Fi)

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The Working Group gratefully acknowledges the contributions of the following entities and participants. Without their assistance and dedication, this standard would not have been completed.

The following entities submitted technical contributions or commented on the standard at various stages of the project development.

Broadcom	HD-PLC Alliance	Panasonic Corporation
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France Telecom	MoCA	Toshiba Corporation
GE	MStar	Verizon
HGI	NTT Advanced Technology Corp.	Vixs Systems, Inc.
HomeGrid Forum		ZTE Corporation

The following individuals submitted technical contributions or commented on the standard at various stages of the project development.

Sundeep Ahluwalia	Jean Grappy	Jordan Nicol
Jim Allen	Duncan Ho	Barry O'Mahony
Avner Aloush	Paul Houzé	Txema Ogara
Todd Antes	David Hunter	Stephen Palm
Mitch Aramaki	Aref Iskandar	Andrea Pecciccione
Gilles Barberi	Rajeev Jain	Martin Renard
Michael Bahr	Gina Jacalne	Purva Rajkotia
Frederic Bard	Georgios Kalogridis	Rob Ranck
David Barr	William Keasler	Antonio Salas
Duncan Bees	Patrick Keliher	Roger Samy
Ivar Beljaars	Joon Bae Kim	Vincenzo Scarpa
Edith Berard	Neal King	Sid Schrum
Peter Caldera	Philippe Klein	Andreas Schwager
William Carney	Avi Kliger	Kevin Sievert
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Bruce Chang	Yoshihiro Kondo	Lydi Smaini
Joseph Choghi	Gary Langille	Matt Theall
Philippe Christin	Rick Li	Rami Verbin
Patrick Clement	Qiongwen (Jodie) Liang	Chao-Chun Wang
Etan Cohen	Oleg Logvinov	James Wang
Olga Cordero-Brana	Rahul Malik	Lin Wang
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Jeff Drake	Marcos MartinezEric Masera	Michael Wilson
John Egan	Anil Mengi	James Yee
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Jean-Philippe Faure	Parag Mogre	Abdel Younes
Norm Finn	Bibha Mohanty	Boshan Zhang
Randy Gellens	Richard Nesin	Dezhi (James) Zhang
Navid Ghazisaidi	Lup Ng	Junjian Zhan

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## Introduction

This introduction is not part of IEEE Std 1905.1-2013, IEEE Standard for a Convergent Digital Home Network for Heterogeneous Technologies.

Among the home networking technologies, wireless networks offer mobility and wired technologies offer extensive bandwidth or outlet ubiquity for data communications. 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. Each of these different technologies has a unique interface to higher layer entities, thus, leading to software and hardware design complexities in multiconnectivity devices. This complexity must be reduced and new features/functions must be enabled that can take advantage of the multiple paths available between devices.

IEEE Std 1905.1 addresses these requirements by defining an abstraction layer for multiple home networking technologies that provides a common interface to widely deployed home networking technologies: IEEE Std 1901™-2010 over power lines, IEEE Std 802.11™-2012 for wireless, Ethernet over twisted pair cable, and MoCA® 1.1 over coax.<sup>a,b</sup>

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<sup>a</sup> Information on references can be found in Clause 2.

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## 1. Overview

### 1.1 Scope

This standard defines an abstraction layer for multiple home network technologies. The abstraction layer provides a common data and control service access point to the heterogeneous home network technologies described in the following specifications: IEEE Std 1901™-2010, IEEE Std 802.11™-2012, IEEE Std 802.3™-2008, and MoCA® 1.1.<sup>1,2</sup> This standard is extensible to work with other home network technologies.

The abstraction layer supports a dynamic interface selection for transmission of packets arriving from any interface (upper protocol layers or underlying network technologies). End-to-end quality of service (QoS) is enabled in an IEEE 1905.1 network.

Also specified are procedures, protocols, and guidelines to provide a simplified user experience to add devices to the network, to set up encryption keys, to extend the network coverage, and to provide network management features to address issues related to neighbor discovery, topology discovery, interface selection, QoS negotiation, and network control and management.

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