Home Network Transport

Standards Overview and Work Plan

September 2020 Q1/15 meeting

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Home Network Transport is an ITU-T Project dealing with studies and Recommendations on the Home Network.

Home Network Transport Standards Overview and Work Plan

**Issue 11, September 2020**

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| Revision Status Report: Major Updates of Version 11, September 2020 |
| 1) Section 3 - Home Network Activities in ITU-TTable 1 - “ITU-T study groups working on Home Network related topics” In this version 11: * ITU-T SG5: Recommendations K.146 (06/2020); K.147 (06/2020) and K.117 (12/2016) have been added.
* ITU-T SG9: Recommendations related to Home Network have been updated.
* ITU-T SG17: Recommendations X.1112 (11/2007); X.1114 (11/2008); X.1331 (03/2018) and X.1197 (2012) Amd.1 (09/2019) have been added.
* ITU-T SG20: Recommendation Y.4410 (01/2011) has been added.

2) Section 4 - Existing Recommendations within ITU-T SG15 – WP1/15Table 2 – “Published” Recommendations related to Home Network In this version 11: * ITU-T SG15 Recommendations G.9901(06/2017); G. 9905 (08/2013); G.9905 Amd.1(11/2016); G Suppl. 57 (07/2015); Technical Paper “G.hn Smart Grid applications” and Technical Paper “Use of G.hn in Industrial Applications” have been added to reflect Q15/15 merger into Q18/15.
* ITU-T SG15 Recommendations G.9960 (2018) Amd.1; G.9960 (2018) Amd.2; G.9961 (2018) Amd.1; G.9961 (2018) Cor.2; G.9961 (2018) Amd.2; G.9962 (2018) Cor.1; G.9962 (2018) Amd.1; G.9964 (2011) Amd.3; G.9991 (2019) Amd.1 have been added.

3) Section 5 - Recommendations “Under Study” within ITU-T SG15 – WP1 In this version 11:* Table 3 – Recommendations “Under Study” related to Home Network has been updated with the latest Q18/15 activities resulting from September SG15 WP1 plenary meeting.

4) Section 6 - Other groups within ITU and other Standard Developing Organizations In this version 11:* ITU-R SG5: Report M.2227-2 has been added
* Bluetooth has been added
* ETSI ATTM, BRAN and CABLE have been reviewed and updated
* IEEE 802.3 has been updated.
* IEEE 802.11 has been reviewed and updated.
* ISO-IEC JTC 1/SC 25 has been reviewed, restructured and updated
* TIA-1113 and TTC JJ-300.00 have been added

5) Section 7 - Web-Based Home Network Transport (HNT) Standards Overview has been added6) Section 8 – Contacts list has been updated |

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**HOME NETWORK TRANSPORT** **STANDARDS OVERVIEW AND WORK PLAN**

Issue 11, SEPTEMBER 2020

# 1. Introduction

As the use of electronics and communications equipment proliferates in the home, as well as their
technologies and protocols, there have been several proposals for standardization of equipment,
transport and networking within the "home network"-

# 2. Broadband in-premises networking – Home Network

The continuing customer demand for ever higher bit rate data services, high-speed Internet access and other innovative services, and the ongoing needs of network operators to leverage in-premises connectivity for distributing within the home IPTV and other applications, will require the development of new Recommendations and enhancements to existing Recommendations covering all aspects of in-premises Networking Transceivers. These studies will include, but are not limited to, the transport of higher layer protocols, the management and test of the in-premises systems, spectral management aspects and energy saving techniques.

Given the interdisciplinary nature of Home Network applications, it is expected that a high degree of cooperation with other ITU Sectors (ITU-R, ITU-D), ITU-T Study Groups, Questions, Focus Groups (FGs), Joint Coordination Activities (JCAs), Global Strategic Initiatives (GSIs), as well as other international bodies will be required.

Within the ITU-T, the study and development of Recommendations related to transport in the access networks - in premises networks - is being carried out in a number of different Study Groups (see Table 1 below), e.g. SGs 5, 9, 13, 15, and 16. Also ITU-R and other standards bodies, forums and consortia are also active in this area. See Sect. 2 for a list of such activities.

Recognizing that without a strong coordination effort there is the danger of duplication of work as well as the development of incompatible and non-interoperable standards, the ITU-T designated Study Group 15 as the **Lead Study Group** on **Home Network.**

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# 3. Home Network Activities in ITU-T

This section provides an overview of the existing Home Network related ITU-T activities.
Several ITU-T study groups are working on Home Network related topics.
Table 1 below gives an updated overview of such activities.

Table 1 – ITU-T study groups working on Home Network related topics

| **Items** | **SGs and aspects** |
| --- | --- |
| **Environment, climate change and circular economy**continuation of**Environment, climate change and circular economy**continuation of**Environment, climate change and circular economy** | **SG5****SG5** **SG5** | **WP1/5 “EMC, lightning protection, EMF”** Q1/5 “Protection of information and communication technology (ICT) infrastructure from electromagnetic surges “- ITU-T K.85 (11/2011): Requirements for the mitigation of lightning effects on home networks installed in customer premises. Q2/5 “Equipment resistibility and protective components”- ITU-T K.21 (07/2019) : Resistibility of telecommunication equipment installed in customer premises to overvoltages and overcurrents. This Recommendation has enhanced test level values for Ethernet and PoE ports where the IEEE 802.3 LAN A conditions are not met. - ITU-T K.66 (11/2019): Protection of customer premises from overvoltages. - ITU-T K.98 (08/2014) and Cor. 1 (03/2015): Overvoltage protection guide for telecommunication equipment installed in customer premises. This Recommendation analyses equipment port surge voltages for a.c. mains configuration types of TN-S, TN-C, TN-C-S, TT and IT resulting from a lightning strike to either the telecommunications line or the a.c. mains supply.*TD 488 WP1 September 2020*SG5 informs that the new Recommendation ITU-T K.147 (ex K.Eth) was consented at the ITU-T SG5 meeting held from 11 to 20 May 2020:- ITU-T K.147 (06/2020): Ethernet port resistibility testing for overvoltages and overcurrents. This Recommendation covers the different “IEEE 802.3:2018” Ethernet twisted pair implementations, their configurations, how surges are coupled into the system and what surge mitigation measures are used. Both Power over Ethernet, PoE, and Power over Data Line, PoDL, are covered. Following the overview, the rational is given for the Recommendation ITU-T K series surge and power fault test circuit approaches.Furthermore, SG5 recommends to add Recommendation:- ITU-T K.117 (12/2016): Primary protector parameters for the surge protection of equipment Ethernet ports. Recommendation ITU-T K.117 specifies the common-mode, differential mode and common mode to differential mode conversion surge parameters and test circuit requirements of an Ethernet port primary protector. The preferred surge generator voltage levels are 2.5 kV, 6 kV and 12 kV, but the test circuits can be used for any surge voltage environmental. Power over Ethernet (PoE) feed requirements are also given. Ethernet signal performance parameters are not covered.Q4/5 “Electromagnetic compatibility (EMC) issues arising in the telecommunication environment” - ITU-T K.74 (03/2015): Electromagnetic compatibility, resistibility and safety requirements for home network devices. This Recommendation provides the description and references to harmonize the newly developed Recommendation and EMC standards. - ITU-T K.92 (05/2012): Conducted and radiated electromagnetic environment in home networking. - ITU-T K.93(12/2016): Immunity of home network devices to electromagnetic disturbances. This existing Recommendation provides test method for home network equipment against broadband noises. - ITU-T K.106 (03/2015): Techniques to mitigate interference between radio devices and cable or equipment connected to wired broadband networks and cable television networks. This Recommendation provides guidance to solve interference problems in home networking environments between radio devices and the cable or equipment connected to wired broadband networks and/or cable television networks.- ITU-T K.146 (06/2020): Management of interferences on telecommunication transmissions on copper other than speech.Recommendation ITU-T K.146 deals with the management of electromagnetic interference produced by electrified railways traction systems on telecommunication systems in DSL frequency band. |
| **WP2/5 “Environment, Energy Efficiency and the Circular Economy”** Q6/5 “Achieving energy efficiency and smart energy”- ITU-T L.1310 (07/2017) “Energy efficiency metrics and measurement for telecommunication equipment” contains Clause 12 dedicated to “Energy efficiency metric for small networking devices”.- ITU-T L.1340 (02/2014) “Energy efficiency reference values for telecommunication equipment and infrastructure” contains Clause 9.1 on “Informative values for small networking devices”.Q7/5 “Circular economy including e-waste”- ITU-T [L.1001 (11/2012): External universal power adapter solutions for stationary information and communication technology devices](http://www.itu.int/ITU-T/recommendations/rec.aspx?rec=11826). - ITU-T L.1006 (12/2016): Test suites for assessment of the external universal power adapter solutions for stationary information and communication technology. Q9/5 “Climate change and assessment of information and communication technology (ICT) in the framework of the Sustainable Development Goals (SDGs)”- ITU-T L.1410 (12/2014): Methodology for environmental life cycle assessments of information and communication technology goods, networks and services. Status of work under above Questions of SG5 is contained in the ITU-T SG5 work programme at following URL:<https://www.itu.int/itu-t/workprog/wp_search.aspx?sg=05>More information about ITU-T SG5 can be found at following URL:<https://www.itu.int/en/ITU-T/studygroups/2017-2020/05/Pages/default.aspx> |
| **Broadband cable and TV** | **SG9** | **WP2/9 “Cable-related terminals and applications”** Q6/9 “Functional requirements for residential gateway and set-top box for the reception of advanced content distribution services”- ITU-T J.126 (12/2007): Embedded Cable Modem device specification - ITU-T J.128 (10/2008): Set-top Gateway specification for transmission systems for interactive cable television services. - ITU-T J.290 (11/2006): Next generation set-top-box core architecture. - ITU-T J.291 (11/2006): Next generation set-top-box cable architecture. - ITU-T J.292 (11/2006): Next generation set-top-box media independent architecture. - ITU-T J.293 (06/2008): Component definition and interface specification for the next generation set-top box. - ITU-T J.294 (09/2010): Residential gateway requirements for the support of broadcast and IP-based interactive services over cable television networks.- ITU-T J.295 (01/2012): Functional requirements for a hybrid cable set-top box. - ITU-T J.296 (06/2012): Specification for hybrid cable set-top box. - ITU-T J.297 (03/2018): Requirements and functional specification of cable set-top box for 4K ultra high definition television. - ITU-T J.298 (03/2019): Requirements and technical specifications of a cable TV hybrid set-top box compatible with terrestrial and satellite TV transport. Status of work under above Questions of SG9 is contained in the ITU-T SG9 work programme at following URL:<https://www.itu.int/ITU-T/workprog/wp_search.aspx?sg=9>More information about ITU-T SG9 can be found at following URL:<https://www.itu.int/en/ITU-T/studygroups/2017-2020/09/Pages/default.aspx>*Note: TD 117 WP1 June 2017*: Ex-question Q5/9 has been re-numbered as Q6/9 with same title: Q6/9 “Functional requirements for residential gateway and set-top box for the reception of advanced content distribution services”, Q9/9 “Requirements for advanced service capabilities for broadband cable home networks” has been moved to SG15 and is removed from the list of Questions of SG9. |
| **Future networks (& cloud)** | **SG13** | **WP3/13 “Network Evolution & Trust”**Q16/13 “Knowledge-centric trustworthy networking and services”More information about ITU-T SG13 can be found at following URL:<https://www.itu.int/en/ITU-T/studygroups/2017-2020/13/Pages/default.aspx> |
| **Transport, access and home** | **SG15** | **WP1/15 “Transport aspects of access, home and smart grid networks”**During its 27 January – 7 February 2020 meeting, ITU-T Study Group 15 agreed to merge Q1/15 “Coordination of access and home network transport standards” into Q18/15 “Broadband in-premises networking” with the new title “Technologies for in-premises networking and related access applications”.See section 4 - table 2 the list of “Published” Recommendations and section 5 - table 3 the list of Recommendations “Under Study” related to “Technologies for in-premises networking and related access applications”. |
| **Multimedia** | **SG16** | **WP1/16 “Multimedia content delivery”**Q21/16 “Multimedia framework, applications and services”- ITU-T H.610 (07/2003): Full service VDSL – System architecture and customer premises equipment. - ITU-T H.622 (06/2008): A generic home network architecture with support for multimedia services. - ITU-T H.622.1 (10/2008): Architecture and functional requirements for home networks supporting IPTV services. - ITU-T H.622.2 (11/2015): Service capabilities and framework for virtual home networks. More information about ITU-T SG16 can be found at following URL:<https://www.itu.int/en/ITU-T/studygroups/2017-2020/16/Pages/default.aspx> |
| **Security** | **SG17** | **WP1/17 “Telecommunication/ICT Security”**Q6/17 “Security aspects of telecommunication services, networks and Internet of Things” *TD 483 WP1 September 2020*- ITU-T X.1111 (02/2007): Framework of security technologies for home network.- ITU-T X.1112 (11/2007): Device certificate profile for the home network.- ITU-T X.1114 (11/2008): Authorization framework for home networks.- ITU-T X.1331 (03/2018): Security guidelines for home area network (HAN) devices in smart grid systems.- ITU-T X.1197 (2012) Amd.1 (09/2019): Guidelines on criteria for selecting cryptographic algorithms for IPTV service and content protection More information about ITU-T SG17 can be found at following URL:<https://www.itu.int/en/ITU-T/studygroups/2017-2020/17/Pages/default.aspx> |
| **Internet of things (IoT) and smart cities and communities (SC&C**) | **SG20** | **WP1/20**Q4/20 “e/Smart services, applications and supporting platforms”- ITU-T Y.4410/Y.2291 (01/2011): Architectural overview of next generation home networks.- ITU-T Y.4415 (06/2018):Architecture of web of objects-based virtual home network.More information about SG20 can be found at following URL:<https://www.itu.int/en/ITU-T/studygroups/2017-2020/20/Pages/default.aspx> |

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# 4. Existing Recommendations within ITU-T SG15 – WP1/15

“Published” Recommendations related to “Technologies for in-premises networking and related access applications” are listed here for convenience in Table 2.

Table 2 – “Published” Recommendations related to Home Network

| **Rec. No.** | **Title** | **Status** | **Date** |
| --- | --- | --- | --- |
| [G.9901 (06/2017)](https://www.itu.int/rec/T-REC-G.9901-201706-I) | Narrowband orthogonal frequency division multiplexing power line communication transceivers - Power spectral density specification | Published | 06/2017 |
| [G.9902 (10/2012)](http://www.itu.int/rec/T-REC-G.9902-201210-I) | Narrowband orthogonal frequency division multiplexing power line communication transceivers for ITU-T G.hnem networks | Published | 10/2012 |
| [G.9902 (2012) Amd.1 (03/2013)](http://www.itu.int/rec/T-REC-G.9902-201303-I%21Amd1) | Narrowband orthogonal frequency division multiplexing power line communication transceivers for ITU-T G.hnem networksAmendment 1 | Published | 03/2013 |
| [G.9902 (2012) Amd.2 (08/2013)](http://www.itu.int/rec/T-REC-G.9902-201308-I%21Amd2) | Narrowband orthogonal frequency division multiplexing power line communicationtransceivers for ITU-T G.hnem networksAmendment 2: Clarifications on payload encoder and addition of a network admission procedure | Published | 08/2013 |
| [G.9903 (08/2017)](http://www.itu.int/rec/T-REC-G.9903-201708-I) | [Narrow-band OFDM power line communication transceivers for G3-PLC networks](http://www.itu.int/rec/T-REC-G.9903/en) | Published | 08/2017 |
| [G.9904 (10/2012)](http://www.itu.int/rec/T-REC-G.9904-201210-I) | Narrowband orthogonal frequency division multiplexing power line communication transceivers for PRIME networks |  Published | 10/2012 |
| [G.9905 (08/2013)](https://www.itu.int/rec/T-REC-G.9905-201308-I) | Centralized metric-based source routing | Published | 08/2013 |
| [G.9905 (2013) Amd.1 (11/2016)](https://www.itu.int/rec/T-REC-G.9905-201611-I%21Amd1) | Centralized metric-based source routingAmendment 1 | Published | 11/2016 |
| [G.9951 (02/2001)](http://www.itu.int/rec/T-REC-G.9951-200102-I) | Phoneline networking transceivers − Foundation | Published | 02/2001 |
| [G.9952 (11/2001)](http://www.itu.int/rec/T-REC-G.9952-200111-I) | Phoneline networking transceivers – Payload format and link layer requirements | Published | 11/2001 |
| [G.9953 (03/2003)](http://www.itu.int/rec/T-REC-G.9953-200303-I) | Phoneline networking transceivers – Isolation function | Published | 03/2003 |
| [G.9954 (01/2007)](http://www.itu.int/rec/T-REC-G.9954-200701-I) | Home networking transceivers – Enhanced physical, media access, and link layerspecifications | Published | 01/2007 |
| [G.9958 (03/2018)](https://www.itu.int/rec/T-REC-G.9958-201803-I) | Generic architecture of home networks for energy management | Published | 03/2018 |
| [G.9959 (01/2015)](http://www.itu.int/rec/T-REC-G.9959-201501-I) | Short range narrow-band digital radiocommunication transceivers - PHY and MAC layer specifications | Published | 01/2015 |
| [G.9960 (11/2018)](https://www.itu.int/rec/T-REC-G.9960-201811-I) | Unified high-speed wireline-based home networking transceivers - System architecture and physical layer specification | Published | 11/2018 |
| [G.9960 (2018) Cor.1 (09/2019)](https://www.itu.int/rec/T-REC-G.9960-201909-I%21Cor1) | Unified high-speed wire-line based home networking transceivers – System architecture and physical layer specificationCorrigendum 1 | Published | 09/2019 |
| [G.9960 (2018) Amd.1 (02/2020)](https://www.itu.int/rec/T-REC-G.9960-202002-P%21Amd1) | Unified high-speed wire-line based home networking transceivers - System architecture and physical layer specificationAmendment 1 | Published | 02/2020 |
| [G.9960 (2018) Amd.2 (07/2020)](https://www.itu.int/rec/T-REC-G.9960-202007-I%21Amd2) | Unified high-speed wireline-based home networking transceivers - System architecture and physical layer specificationAmendment 2 | Published | 07/2020 |
| [G.9961 (11/2018)](https://www.itu.int/rec/T-REC-G.9961-201811-I) | Unified high-speed wireline-based home networking transceivers - Data link layer specification | Published | 11/2018 |
| [G.9961 (2018) Cor.1 (09/2019)](https://www.itu.int/rec/T-REC-G.9961-201909-I%21Cor1) | Unified high-speed wireline-based home networking transceivers – Data link layer specificationCorrigendum 1 | Published | 09/2019 |
| [G.9961 (2018) Amd.1 (02/2020)](https://www.itu.int/rec/T-REC-G.9961-202002-P%21Amd1) | Unified high-speed wireline-based home networking transceivers – Data link layer specificationAmendment 1 | Published | 02/2020 |
| [G.9961 (2018) Cor.2 (03/2020)](https://www.itu.int/rec/T-REC-G.9961-202003-P%21Cor2) | Unified high-speed wireline-based home networking transceivers – Data link layer specificationCorrigendum 2 | Published | 03/2020 |
| [G.9961 (2018) Amd.2 (07/2020)](https://www.itu.int/rec/T-REC-G.9961-202007-I%21Amd2) | Unified high-speed wireline-based home networking transceivers - Data link layer specificationAmendment 2 | Published | 07/2020 |
| [G.9962 (11/2018)](https://www.itu.int/rec/T-REC-G.9962-201811-I) | Unified high-speed wire-line based home networking transceivers - Management specification | Published  | 11/2018 |
| [G.9962 (2018) Cor.1 (03/2020)](https://www.itu.int/rec/T-REC-G.9962-202003-P%21Cor1) | Unified high-speed wire-line based home networking transceivers – Management specificationCorrigendum 1 | Published | 03/2020 |
| [G.9962 (2018) Amd.1 (07/2020)](https://www.itu.int/rec/T-REC-G.9962-202007-P%21Amd1) | Unified high-speed wire-line based home networking transceivers - Management specificationAmendment 1 | Published | 07/2020 |
| [G.9963 (11/2018)](https://www.itu.int/rec/T-REC-G.9963-201811-I) | Unified high-speed wireline-based home networking transceivers - Multiple input/multiple output specification | Published | 11/2018 |
| [G.9964 (12/2011)](http://www.itu.int/rec/T-REC-G.9964-201112-I) | Unified high-speed wireline-based home networking transceivers – Power spectraldensity specification | Published | 12/2011 |
| [G.9964 (2011) Amd.1 (02/2016)](http://www.itu.int/rec/T-REC-G.9964-201602-I%21Amd1) | Unified high-speed wire-line based home networking transceivers - Power spectral density specificationAmendment 1 | Published | 02/2016 |
| [G.9964 (2011) Amd.2 (09/2016)](https://www.itu.int/rec/T-REC-G.9964-201609-I%21Amd2) | Unified high-speed wire-line based home networking transceivers - Power spectral density specificationAmendment 2 | Published | 09/2016 |
| [G.9964 (2011) Amd.3 (02/2020)](https://www.itu.int/rec/T-REC-G.9964-202002-P%21Amd3) | Unified high-speed wireline-based home networking transceivers – Power spectral density specificationAmendment 3 | Published | 02/2020 |
| [G.9970 (01/2009)](http://www.itu.int/rec/T-REC-G.9970-200901-I) | Generic home network transport architecture | Published | 01/2009 |
| [G.9971 (07/2010)](http://www.itu.int/rec/T-REC-G.9971-201007-I) | Requirements of transport functions in IP home network | Published | 07/2010 |
| [G.9972 (06/2010)](http://www.itu.int/rec/T-REC-G.9972-201006-I) | Coexistence mechanism for wireline home networking transceivers | Published | 06/2010 |
| [G.9972 (2010) Cor.1 (04/2014)](http://www.itu.int/rec/T-REC-G.9972-201404-I%21Cor1) | Coexistence mechanism for wireline home networking transceiversCorrigendum 1: Revised definition of coexisting systems categories | Published | 04/2014 |
| [G.9973 (08/2017)](http://www.itu.int/rec/T-REC-G.9973-201708-I) | Protocol for identifying home network topology | Published | 08/2017 |
| [G.9977 (02/2016)](http://www.itu.int/rec/T-REC-G.9977-201602-I) | Mitigation of interference between DSL and PLC | Published | 02/2016 |
| [G.9977 (2016) Cor.1 (08/2017)](http://www.itu.int/rec/T-REC-G.9977-201708-I%21Cor1) | Mitigation of interference between DSL and PLC: Corrigendum 1 | Published | 08/2017 |
| [G.9978 (11/2018)](https://www.itu.int/rec/T-REC-G.9978-201811-I) | Secure admission in a G.hn network | Published | 11/2018 |
| [G.9979 (11/2018)](https://www.itu.int/rec/T-REC-G.9979-201811-I) | Implementation of the generic mechanism in the IEEE 1905.1a-2014 standard to include applicable ITU-T Recommendations | Published | 11/2018 |
| [G.9980 (11/2012)](http://www.itu.int/rec/T-REC-G.9980-201211-I) | Remote management of customer premises equipment over broadband networks –Customer premises equipment WAN management protocol | Published | 11/2012 |
| [G.9991 (03/2019)](https://www.itu.int/rec/T-REC-G.9991-201903-P) | High speed indoor visible light communication transceiver - System architecture, physical layer and data link layer specification | Published | 03/2019 |
| [G.9991 (2019) Amd.1 (07/2020)](https://www.itu.int/rec/T-REC-G.9991-202007-P%21Amd1) | High-speed indoor visible light communication transceiver – System architecture, physical layer and data link layer specificationAmendment 1 | Published | 07/2020 |
| [G.9992 (03/2019)](https://www.itu.int/rec/T-REC-G.9992-201903-P) | Indoor optical camera communication transceivers - System architecture, physical layer and data link layer specification | Published | 03/2019 |
| [G Suppl. 57 (07/2015)](https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=12577) | Smart home profiles for 6LoWPAN devices | Published | 07/2015 |
| [ITU-T SG15 Technical Paper TP G.HN SG Appl. (06/2010)](https://www.itu.int/dms_pub/itu-t/opb/tut/T-TUT-HOME-2010-PDF-E.pdf) | Applications of ITU-T G.9960, ITU-T G.9961 transceivers for Smart Grid applications: Advanced metering infrastructure, energy management in the home and electric vehicles | Published | 06/2010 |
| [ITU-T SG15 Technical Paper TPLS.G-HN (07/2015)](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=10309" \o "See more details) | Operation of G.hn technology over access and in-premises phone line medium | Published | 07/2015 |
| [ITU-T SG15 Technical Paper GSTP-HNIA](https://www.itu.int/pub/T-TUT-HOME-2020-1) | Use of G.hn in Industrial Applications | Published | 02/2020 |
| [ITU-T SG15 Technical Paper Wireline Broadband (12/2011)](https://www.itu.int/pub/T-TUT-HOME-2011) | Wireline broadband access networks and home networking | Published | 12/2011 |
| [J.190 (07/2007)](http://www.itu.int/ITU-T/recommendations/rec.aspx?id=9203&lang=en) | Architecture of MediaHomeNet | Published | 07/2007 |
| [J.191 (03/2004)](http://www.itu.int/ITU-T/recommendations/rec.aspx?id=7202&lang=en) | IP feature package to enhance cable modems | Published | 03/2004 |
| [J.192 (11/2005)](http://www.itu.int/ITU-T/recommendations/rec.aspx?id=8666&lang=en) | A residential gateway to support the delivery of cable data services | Published | 11/2005 |

# 5. Recommendations “Under Study” within ITU-T SG15 – WP1

Recommendations “Under Study” related to “Technologies for in-premises networking and related access applications” are listed here for convenience in Table 3.

**Status: September 2020**

**Table 3 – Recommendations “Under Study” and related to Home Network**

**Table updated with the latest Q15 and Q18 activities resulting from September 2020 SG15 WP1 plenary meeting**

| **Work item** | **Question** | **Status** | **Timing** | **Approval process** | **Subject / Title** | **Base text(s)** | **Editor(s)** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| [G.9904.1 (ex G.prime-x)](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=13378) | Q18/15 | Under study | 2021-06 | AAP | Narrow-band OFDM power line communication transceivers for PRIME networks with extended band plan | - | Les Brown |
| [G.9991 (2019) Cor.1](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16460) | Q18/15 | Consented | 2020-09 | AAP | High-speed indoor visible light communication transceiver - System architecture, physical layer and data link layer specification (Corrigendum 1) | [TD 594R1-PLEN](http://www.itu.int/md/T17-SG15-200127-TD-PLEN-0512)  | Marcos Martinez |
| [G.9991 (2019) Amd.](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16460)2 | Q18/15 | Consented | 2020-09 | AAP | High-speed indoor visible light communication transceiver - System architecture, physical layer and data link layer specification (Amendment 2) | [TD 593R1-PLEN](http://www.itu.int/md/T17-SG15-200127-TD-PLEN-0512)  | Marcos Martinez |
| [G.fin](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16479) | Q18/15 | Under study | 2022-01 | AAP | High speed fibre-based in-premises transceivers - system architecture, physical layer and data link layer specification | - | Wu Jia, Xuming Wu |
| [G.hn2](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=14270) | Q18/15 | Under study | TBD | AAP | Evolution of unified high-speed wire-line based home networking transceivers | - | Marcos Martinez |
| [G.IoT](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=15205) | Q18/15 | Under study | TBD | AAP | System architecture, PHY layer and DLL layer for IoT Smart Home over PLC | - | Yue Sun, Tony Zeng |
| [G.uvs](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=15204) | Q18/15 | Under study | TBD | AAP | Support UHD video service over G.hn (G.uvs) | [TD 529-WP1](http://www.itu.int/md/T17-SG15-200127-TD-WP1-0471)  | Wu Jia, Tony Zeng |
| [TP-ARCH-HN](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16478) | Q18/15 | Under study | 2021-06 | Agreement | Technical paper on architecture, function, and service of home network | - | Tony Zeng |
| [TP-GHN](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=15112) | Q18/15 | Under study | 2020-09 | Agreement | Overview of the G.hn technology | [TD 472R1-WP1](http://www.itu.int/md/T17-SG15-200127-TD-WP1-0472)  | Tony Zeng |
| [TP-SG](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=14971) | Q18/15 | Agreed | 2020-09 | Agreement | Technical paper on the use of G.hn technology for smart grid | [TD 624R1-PLEN](http://www.itu.int/md/T17-SG15-200127-TD-WP1-0476)  | Tomer Cohen |
| [TP-UC-HN](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=15207) | Q18/15 | Under study | 2021-06 | Agreement | Technical paper on the use of ITU-T G.hn technology for in-home networking | - | Marcos Martinez |
| [TP-VLC](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=15206) | Q18/15 | Under study | 2021-06 | Agreement | Technical paper on the use of ITU-T Visible Light Communication technology | [TD 470-WP1](http://www.itu.int/md/T17-SG15-200127-TD-WP1-0470)  | Marcos Martinez |
| G.9960 (2018) Cor.2 | Q18/15 | Consented | 2020-09 | AAP | Unified high-speed wire-line based home networking transceivers – System architecture and physical layer specification (Corrigendum 2) | TD 616-PLEN | Les Brown |
| G.9961 (2018) Amd.3 | Q18/15 | Consented | 2020-09 | AAP | Unified high-speed wireline-based home networking transceivers – Data link layer specification (Amendment 3) | TD 618R1-PLEN | Les Brown |
| G.9963 (2018) Amd.1 | Q18/15 | Consented | 2020-09 | AAP | Unified high-speed wireline-based home networking transceivers – Multiple input/multiple output specification (Amendment 1) | TD 625-PLEN | Les Brown |

**6.** **Other groups within ITU and other Standard Developing Organizations**

This following list is intended to improve understanding and communication of the on-going work related to Home Network in the other groups within ITU and other Standardization Developing Organizations and may help identify possible gaps or overlaps.

| **Standards Org.** | **SGs, Committees, Aspects, Activities** |
| --- | --- |
| **ITU-R**continuation of  **ITU-R**continuation of  **ITU-R** | **SG1** **WP1A** | **SG1 “Spectrum Management”**WP1A “Spectrum engineering techniques”*Note: TD 733 WP1 September 2016*Working Party 1A has noted two amendments to Recommendation ITU T G.9964, “Unified high-speed wireline-based home networking transceivers – Power spectral density specification” of the G.hn family of ITU-T Recommendations:- Amendment 1 – New PSD element for 200 MHz bandplan coax cable systems; - Amendment 2 – Revisions to the specification of spectral content for telephone line systems (e.g., VDSL2).Working Party 1A will keep in mind the continuing interest in home-networking and access systems operating over coax and telephone lines, as well as PLT operating over the low voltage electrical mains supply, as Working Party 1A continues to study co-existence issues involving wired telecommunication systems and radiocommunication systems.More information about ITU-R SG1 can be found at following URL:<https://www.itu.int/en/ITU-R/study-groups/rsg1/Pages/default.aspx>More information about ITU-R WP1A can be found at following URL:<https://www.itu.int/en/ITU-R/study-groups/rsg1/rwp1a/Pages/default.aspx> |
| **SG5****WP5A** | **SG5 “Terrestrial Services”**WP5A “Land mobile service excluding IMT; amateur and amateur-satellite service”- Guide to the use of ITU-R texts relating to the land mobile service, including wireless access in the fixe service (last update: 9 May 2019).Radio Local Area Networks (RLANs) and Multiple Gigabit Wireless Systems (MGWS)WP 5A conducts work on radio local area networks (RLANs) and Multiple Gigabit Wireless Systems (MGWS) under Question [ITU-R 212-4/5](http://www.itu.int/pub/R-QUE-SG05.212) .RLANs/MGWS could be used to implement a home network. For a description of this work refer to: – section 8.2 “Nomadic Wireless Access” of the [Guide to the use of ITU-R texts relating to the land mobile service, including wireless access in the fixed service](http://www.itu.int/oth/R0A06000001/en), and in particular Recommendation [ITU-R M.1450-5](http://www.itu.int/rec/R-REC-M.1450/en), which recommends characteristics of broadband radio local area networks, – section 8.4 “Multiple Gigabit Wireless Systems” of the [Guide to the use of ITU-R texts relating to the land mobile service, including wireless access in the fixed service](http://www.itu.int/oth/R0A06000001/en), and in particular Recommendation [ITU-R M.2003-1](http://www.itu.int/rec/R-REC-M.2003/en), which provides general characteristics and radio interface standards for MGWS in frequencies around 60 GHz and [ITU-R Report M.2227-2](https://www.itu.int/dms_pub/itu-r/opb/rep/R-REP-M.2227-2-2017-PDF-E.pdf) which describes applications, deployment scenarios and technical characteristics of MGWS.Cordless Telecommunication Systems: Refer to section 11 of the Guide, and in particular Recommendation [ITU-R M.1033-1](https://www.itu.int/rec/R-REC-M.1033/en), which provides technical and operational characteristics of cordless telephones and cordless telecommunication systems.More information about ITU-R SG5 can be found at following URL:<https://www.itu.int/en/ITU-R/study-groups/rsg5/Pages/default.aspx>More information about ITU-R WP5A can be found at following URL:<https://www.itu.int/en/ITU-R/study-groups/rsg5/rwp5a/Pages/default.aspx> |
| **SG6WP6B** | **SG6 “Broadcasting Service”**WP6B “Broadcast service assembly and access”*TD 220 WP1 October 2018* ITU-R WP6B studies a global platform for the broadcasting services on the basis of Question [ITU‑R 140/6](http://www.itu.int/pub/R-QUE-SG06.140). The global platform is a delivery platform to facilitate distribution of broadcast content to end-users with various receiving devices in multiple reception environments, implemented by using both broadcasting and non-broadcasting (e.g. broadband) technologies. In order to realize such platforms, higher speed and more robust home network transport may be required, for example for multi-channel UHDTV. Report [ITU-R BT.2400-3](https://www.itu.int/pub/R-REP-BT.2400) “Usage scenarios, requirements and technical elements of a global platform for the broadcasting service” includes technical elements for the global platform and describes delivery of multi-channel 8k content over 10G-EPON network, which is one of the recent access networks. More information about ITU-R SG6 can be found at following URL:<https://www.itu.int/en/ITU-R/study-groups/rsg6/Pages/default.aspx>More information about ITU-R WP6B can be found at following URL:<https://www.itu.int/en/ITU-R/study-groups/rsg6/rwp6b/Pages/default.aspx> |
| **Bluetooth®** | **Bluetooth® Technology**<https://www.bluetooth.com/>**-** Bluetooth Core Specification - Revision: v5.2 - Revision Date: 2019-12-31- Supplement to the Bluetooth Core Specification - Revision: v9 - Revision Date: 2019-12-31The Bluetooth® Core Specification defines the technology building blocks that developers use to create the interoperable devices that make up the thriving Bluetooth ecosystem. The Bluetooth specification is overseen by the Bluetooth Special Interest Group (SIG) and is regularly updated and enhanced by Bluetooth SIG Working Groups to meet evolving technology and market needs.Bluetooth devices Power Class 1 have a transmit power of 100 mW and an operation range of typically ~ 100m. Devices power classes 2 and 3 have an operation range of typically ~10 m and ~1 m respectively and are regarded as WPAN devices.Information on Bluetooth technology can be found at:<https://www.bluetooth.com/specifications/bluetooth-core-specification/> |
| **BBF** | **Broadband Forum**[https://www.broadband-forum.org](https://www.broadband-forum.org/)*TD 334 GEN Jan-Feb 2020*Broadband Forum Technical Committee Chair informs that on October 14, 2019, Broadband Forum took the final step to become ‘open’, adopting new Bylaws, which resulted in the Forum considering all its activities to be ‘open’ for the purposes of the U.S. Export Administration Regulations. The new Bylaws eliminate any restrictions on sharing Forum documentation and allow for anyone with interest to have access to Forum deliberations and documents if they apply for it.More information on this change can be found at <https://www.broadband-forum.org/about-bbf/legal>Information on Broadband Forum Projects “Connected Home” can be found at:<https://www.broadband-forum.org/projects/connected-home>Published Broadband Forum Technical Reports related to HNT can be found at:<https://www.broadband-forum.org/technical-reports>Broadband Forum Abstract Test Plans related to HNT can be found at:<https://www.broadband-forum.org/abstract-test-plans>Broadband Forum Work in Progress related to HNT can be found at:<https://www.broadband-forum.org/broadband-forum-resources/work-in-progress> |
| **ETSI TC ATTM** | **ETSI TC ATTM “Technical Committee Access, Terminals, Transmission and Multiplexing (ATTM)”**<https://www.etsi.org/committee/1390-attm>List of Standards related to Fixed-line Access can be found at:<https://www.etsi.org/technologies/fixed-line-access>- TS 105 175-1 V2.0.0 (2011-10): Access, Terminals, Transmission and Multiplexing (ATTM); Plastic Optical Fibre System Specifications for 100 Mbit/s and 1 Gbit/s. - TS 105 175-1-1 V1.1.1 (2015-10): Access, Terminals, Transmission and Multiplexing (ATTM); Plastic Optical Fibres; Part 1: Plastic Optical Fibre System Specifications for 100 Mbit/s and 1 Gbit/s; Sub-part 1: Application requirements for physical layer specifications for high-speed operations over Plastic Optical Fibres. - TS 105 175-1-2 V1.1.1 (2015-04): Access, Terminals, Transmission and Multiplexing (ATTM); Plastic Optical Fibres; Part 1: Plastic Optical Fibre System Specifications for 100 Mbit/s and 1 Gbit/s; Sub-part 2: 1 Gbit/s and 100 Mbit/s physical layer for Plastic Optical Fibres.- TS 103 247 V1.2.1 (2018-11) : Access, Terminals, Transmission and Multiplexing (ATTM); Singlemode Optical Fibre System Specifications for Home Cabling.- TR 102 994 V1.1.1 (2012-08) : Access, Terminals, Transmission and Multiplexing (ATTM); In Home Cabling for Integrated Broadband Cable and Television Services.- TS 102 220 V1.1.1 (2014-04): Access and Terminals (AT); Technical Specification: Delivery of Cable based services across a home access to the devices in the home.- TS 101 573 V1.1.1 (2012-09): Access, Terminals, Transmission and Multiplexing (ATTM); General engineering of optical building cabling.More information about ETSI ATTM can be found at following URL:<https://portal.etsi.org/TB-SiteMap/ATTM/ATTM-ToR> |
| **ETSIBRAN**continuation of **ETSIBRAN**  | **ETSI BRAN “Broadband Radio Access Networks”**<https://www.etsi.org/committee/1389-bran>List of Standards related to Radio-LAN can be found at:<https://www.etsi.org/technologies/radio-lan>- EN 300 328 V2.2.2 (2019-07): Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz band; Harmonised Standard for access to radio spectrum. This document covers Wideband Data Transmission equipment. Examples of Wideband Data Transmission equipment are equipments such as IEEE 802.11™ RLANs [i.3], Bluetooth®wireless technologies, Zigbee™, etc.- EN 301 893 V2.1.1 (2017-05): 5 GHz RLAN; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU.5 GHz wireless access systems (WAS) including RLAN equipment are used in wireless local area networks which provide high speed data communications in between devices connected to the wireless infrastructure. This document also addresses ad-hoc networking where devices communicate directly with each other, without the use of a wireless infrastructure.- TR 103 631 V1.1.1 (2019-03): Wireless Access Systems including Radio Local Area Networks (WAS/RLANs) in the band 6 725 MHz to 7 125 MHz. License exempt Wireless Access Systems including Radio Local Area Networks (WAS/RLANs) represent the primary broadband wireless access technologies used for wireless internet access. This document provides information on the intended applications, the technical parameters, mitigation techniques, the relation to the existing spectrum regulation and additional new radio spectrum requirements for technology neutral wireless access systems including radio local area networks (WAS/RLANs) capable of operating in the 6 725 MHz to 7 125 MHz range.- EN 302 567 V2.1.1 (2017-07): Multiple-Gigabit/s radio equipment operating in the 60 GHz band; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU.60 GHz radio equipment are capable of operating at data rates of multiple-gigabit per second. This document specifies technical characteristics and methods of measurements for radio equipment with integral antennas operating indoor or outdoor at data rates of multiple-gigabit per second in the 60 GHz frequency range.Broadband Radio Access Networks (BRAN); HIPERLAN Type 2HIPERLAN/2 systems are intended to be operated as private or public systems making use of the 5 GHz frequencyrange.- TR 101 683 V1.1.1 (2000-02): Broadband Radio Access Networks (BRAN); HIPERLAN Type 2; System Overview.- TS 101 475 V1.3.1 (2001-12): Broadband Radio Access Networks (BRAN); HIPERLAN Type 2; Physical (PHY) layer.- TS 101 761-1 V1.3.1 (2001-12): Broadband Radio Access Networks (BRAN); HIPERLAN Type 2; Data Link Control (DLC) Layer; Part 1: Basic Data Transport Functions.- TS 101 493-1 V1.1.1 (2000-04): Broadband Radio Access Networks (BRAN); HIPERLAN Type 2; Packet based Convergence Layer; Part 1: Common Part.More information about ETSI BRAN can be found at following URL:<https://portal.etsi.org/TB-SiteMap/bran/bran-tor> |
| **ETSI EE** | **ETSI EE “Environmental Engineering”**<https://www.etsi.org/committee/1395-ee>- EN 301 575 V1.1.1 (2012-05): Environmental Engineering (EE); Measurement methods for energy consumption of Customer Premises Equipment (CPE). This document defines the energy consumption measurement methods for Broadband CPE telecommunication equipment.More information about ETSI EE can be found at following URL:<https://portal.etsi.org/TB-SiteMap/ee/ee-tor> |
| **ETSI CABLE** | **ETSI CABLE “Integrated Broadband Cable Telecommunication networks”**<https://www.etsi.org/committee/1392-cable>- ES 203 386 V1.1.1 (2017-08): Integrated broadband cable telecommunication networks (CABLE); Embedded Router.This document defines a core set of features that enable multiple subscriber devices to gain access to operator provided high-speed data service using DOCSIS.More information about ETSI CABLE can be found at following URL:<https://portal.etsi.org/TB-SiteMap/CABLE/CABLE-ToR> |
| **ETSI DECT**continuation of**ETSI DECT** | **ETSI DECT “Digital Enhanced Cordless Telecommunications (DECT™)”**<https://www.etsi.org/committee/1394-dect>- EN 300 175-1 V2.8.1 (2019-12): Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 1: Overview.- EN 300 175-2 V2.8.1 (2019-12): Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 2: Physical Layer (PHL).- EN 300 175-3 V2.8.1 (2019-12): Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 3: Medium Access Control (MAC) layer.- EN 300 175-4 V2.8.1 (2019-12): Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 4: Data Link Control (DLC) layer.- EN 300 175-5 V2.8.1 (2019-12): Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 5: Network (NWK) layer.- EN 300 175-6 V2.8.1 (2019-12): Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 6: Identities and addressing.- EN 300 175-7 V2.8.1 (2019-12): Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 7: Security features.- EN 300 175-8 V2.8.1 (2019-12): Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 8: Speech and audio coding and transmission.- EN 300 444 V2.5.1 (2017-10): Digital Enhanced Cordless Telecommunications (DECT); Generic Access Profile (GAP)- TS 102 939-1 V1.3.1 (2017-10): Digital Enhanced Cordless Telecommunications (DECT); Ultra Low Energy (ULE); Machine to Machine Communications; Part 1: Home Automation Network (phase 1).- TS 102 939-2 V1.3.1 (2019-01): Digital Enhanced Cordless Telecommunications (DECT); Ultra Low Energy (ULE); Machine to Machine Communications; Part 2: Home Automation Network (phase 2).- TR 103 445 V1.1.1 (2017-07): Digital Enhanced Cordless Telecommunications (DECT); DECT security technical review; Security review and assessment 2017.- TR 103 422 V1.1.1 (2017-06): Digital Enhanced Cordless Telecommunications (DECT); DECT evolution technical study; Requirements and technical analysis for the further evolution of DECT and DECT ULE.Roadmap of DECT can be seen in Technical Report:- TR 103 513 V1.1.1 (2019-11): Digital Enhanced Cordless Telecommunications (DECT); DECT Technology RoadmapMore information about ETSI DECT can be found at following URL:<https://portal.etsi.org/TB-SiteMap/dect/dect-tor> |
| **HomeGrid Forum** | **HomeGrid Forum**<http://www.homegridforum.org/>HomeGrid Forum (HGF) is an industry alliance formed to support the development and deployment of a unified coaxial, phoneline, powerline, and plastic optical fiber home networking technology called G.hn (Gigabit Home Networking).HomeGrid Forum G.hn Certification Testing- see <https://homegridforum.org/certification-overview/> |
| **IEC** | **CISPR** | **International special committee on radio interference - EMC requirements**<https://www.iec.ch/emc/iec_emc/iec_emc_players_cispr.htm> |
| **IEEE**continuation of**IEEE**continuation of **IEEE**continuation of**IEEE**continuation of **IEEE**continuation of **IEEE** | **IEEE 802.3**continuation of **IEEE 802.3**continuation of **IEEE 802.3** | **IEEE 802.3 Ethernet Working Group**<http://www.ieee802.org/3/>*TD 505 WP1 September 2020*IEEE 802.3 Working Group communicates following update:IEEE Std 802.3-2018, *Standard for Ethernet*, is the current revision. <https://standards.ieee.org/standard/802_3-2018.html>This revision has nine approved amendments, IEEE Std 802.3cb-2018, IEEE Std 802.3bt-2018, IEEE Std 802.3cd-2018, IEEE Std 802.3cn-2019, IEEE Std 802.3cg-2019, IEEE Std 802.3cq-2020, IEEE Std 802.3cm-2020, IEEE Std 802.3ch-2020, and IEEE Std 802.3ca-2020.The following are example HNT applicable technologies in IEEE Std 802.3-2018 (including its amendments):* The 10BASE-T, 100BASE-TX and 1000BASE-T specifications for operation over various grades of twisted pair cabling have long been used as a home networking technology, and they continue to be applicable.
* Home gateways typically include both IEEE Std 802.11 specified capabilities and either 10/100 Mb/s or 10/100/1000 Mb/s Ethernet ports.
* 2.5GBASE-T, 5GBASE-T and 10GBASE-T provide a migration path for higher bandwidth home networks.
* 1000BASE-RHA is a plastic optical fiber port type targeted for home networks.
* Fiber optic Ethernet port types would be applicable to HNT especially in cases where a non-conductive medium is required. It is appropriate to note that BASE-T port types are not specified for outdoor cable installations.
* For access to the home, the approved standard includes various speeds of operation for Ethernet Passive Optical Networks.
* The standard also includes DTE Power via the MDI (also called Power over Ethernet) capabilities applicable to HNT (e.g., to provide power to security equipment). These specifications include multiple options for BASE-T cabling with options for amount of power provided to the Powered Device.

Other optional Ethernet capabilities have relevance to HNT including: * Time Sensitive Networking related functions appropriate to support applications running over HNT, and Energy-Efficient Ethernet specifications for many port types to reduce energy consumption.
* IEEE Std 802.3.1-2013 specifies SNMP management modules for various Ethernet port types and capabilities. IEEE Std 802.3.2-2018 YANG Data Model(s) specifies YANG data models for selected Ethernet port types.

Much of the current work within the IEEE 802.3 Working Group (current activities are listed on the 802.3 home page <http://ieee802.org/3>) may not be applicable to HNT, but a few recent and current activities are highlighted below as possibly related.* Two maintenance projects IEEE P802.3cr Isolation (Maintenance #14), and IEEE P802.3cv (Maintenance #15) are updating IEEE Std 802.3 to implement editorial and technical corrections, refinements, and clarifications for Power over Ethernet.
* The recently completed IEEE Std 802.3ca-2020, 25 Gb/s and 50 Gb/s Ethernet Passive Optical Networks, and in development IEEE P802.3cp Bidirectional 10 Gb/s, 25 Gb/s, and 50 Gb/s Optical Access PHYs Task Force, and IEEE P802.3cs Increased-reach Ethernet optical subscriber access (Super-PON) will provide enhancements for home access networks.
* The P802.3cx, Improving PTP Timestamping Accuracy Task Force will specify higher precision time stamping, which may find HNT applications.
* The P802.3da, 10SPE Multidrop Enhancements Task Force is targeting industrial, building and other markets, but may potentially find applications in smart homes.
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| **IEEE 802.11**continuation of **IEEE 802.11**continuation of **IEEE 802.11** | **IEEE 802.11 Working Group for Wireless Local Area Networks**<http://www.ieee802.org/11/>IEEE Std 802.11-2016 - IEEE Standard for Information technology—Telecommunications and information exchange between systems Local and metropolitan area networks—Specific requirements - Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications.IEEE Std 802.11-2016 - Clause 19 (Supersedes IEEE 802.11n-2009 Amendment 5 of IEEE 802.11-2007): IEEE Standard for Information technology—Telecommunications and information exchange between systems Local and metropolitan area networks—Specific requirements - Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications - Clause 19: High-throughput (HT) PHY specification.Identified as Wi-Fi 4 by the Wi-Fi Alliance.IEEE Std 802.11-2016 - Clause 20 (Supersedes IEEE 802.11ad-2012 Amendment 3 of IEEE 802.11-2012): IEEE Standard for Information technology—Telecommunications and information exchange between systems Local and metropolitan area networks—Specific requirements - Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications - Clause 20 - Directional multi-gigabit (DMG) PHY specification.IEEE Std 802.11-2016 - Clause 21 (Supersedes IEEE 802.11ac-2013 Amendment 4 of IEEE 802.11-2012): IEEE Standard for Information technology—Telecommunications and information exchange between systems Local and metropolitan area networks—Specific requirements - Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications - Clause 21 - Very high throughput (VHT) PHY specification.Identified as Wi-Fi 5 by the Wi-Fi Alliance.IEEE Std 802.11aj-2018 - IEEE Standard for Information Technology--Telecommunications and information exchange between systems Local and metropolitan area networks--Specific requirements Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications Amendment 3: Enhancements for Very High Throughput to Support Chinese Millimeter Wave Frequency Bands (60 GHz and 45 GHz).IEEE Std 802.11ah-2016 - IEEE Standard for Information technology--Telecommunications and information exchange between systems - Local and metropolitan area networks--Specific requirements - Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications Amendment 2: Sub 1 GHz License Exempt Operation.P802.11ax Task ForceP802.11ax - IEEE Draft Standard for Information Technology -- Telecommunications and Information Exchange Between Systems Local and Metropolitan Area Networks -- Specific Requirements Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications Amendment Enhancements for High Efficiency WLAN.Identified as Wi-Fi 6 by the Wi-Fi Alliance. Refer to <https://standards.ieee.org/standard/802_11-2016.html> for more information on 802.11-2016,and to <http://www.ieee802.org/11/> for status of draft amendments P802.11ay and P802.11ax.Additional information about Wi-Fi can be found on the Wi-Fi Alliance® website at following URL: <https://www.wi-fi.org/>Information about the Wi-Fi generation names and user interface visuals can be found at:[Generational Wi-Fi User Guide](https://www.wi-fi.org/download.php?file=/sites/default/files/private/Generational_Wi-Fi_User_Guide_20181003.pdf)  |
| **IEEE 1901** | **IEEE Standard for Broadband over Power Line Networks: Medium Access Control and Physical Layer Specifications**<https://standards.ieee.org/standard/1901-2010.html>IEEE Std 1901-2010 - IEEE Standard for Broadband over Power Line Networks: Medium Access Control and Physical Layer Specificationsand amendmentIEEE Std 1901a-2019 - IEEE Standard for Broadband over Power Line Networks: Medium Access Control and Physical Layer Specifications -- Amendment 1: Enhancement for Internet of Things Applications |
| **IEEE 1901.1** | **IEEE Standard for Medium Frequency (less than 12 MHz) Power Line Communications for Smart Grid Applications**<https://standards.ieee.org/standard/1901_1-2018.html>IEEE Std 1901.1-2018 - IEEE Standard for Medium Frequency (less than 12 MHz) Power Line Communications for Smart Grid Applications |
| **IEEE 1901.2** | **IEEE Standard for Low-Frequency (less than 500 kHz) Narrowband Power Line Communications for Smart Grid Applications**<https://standards.ieee.org/standard/1901_2-2013.html>IEEE Std 1901.2-2013 - IEEE Standard for Low-Frequency (less than 500 kHz) Narrowband Power Line Communications for Smart Grid Applicationsand amendmentIEEE Std 1901.2a-2015 - IEEE Standard for Low-Frequency (less than 500 kHz) Narrowband Power Line Communications for Smart Grid Applications - Amendment 1 |
| **ISO/IEC**continuation of**ISO/IEC**continuation of**ISO/IEC**continuation of**ISO/IEC**continuation of**ISO/IEC**continuation of**ISO/IEC** | **JTC 1/SC 6** | **JTC 1/SC 6 “Telecommunications and information exchange between systems”**<https://www.iso.org/committee/45072.html>- ISO/IEC 12139-1:2009 - Information technology — Telecommunications and information exchange between systems — Powerline communication (PLC) — High speed PLC medium access control (MAC) and physical layer (PHY) — Part 1: General requirements- ISO/IEC 12139-1:2009/COR 1:2010 - Information technology — Telecommunications and information exchange between systems — Powerline communication (PLC) — High speed PLC medium access control (MAC) and physical layer (PHY) — Part 1: General requirements — Technical Corrigendum 1ISO/IEC 12139-1:2009 is a physical and medium access control layer specification with respect to the connectivity for In-home and Access network high speed powerline communication stations. |
| **JTC 1/SC 25**continuation of **JTC 1/SC 25**continuation of **JTC 1/SC 25**continuation of **JTC 1/SC 25**continuation of **JTC 1/SC 25**continuation of **JTC 1/SC 25** | **JTC 1/SC 25 “Interconnection of Information Technology Equipment”** <https://www.iso.org/committee/45270.html>All information related to ISO/IEC JTC 1/SC 25 is available on the[IEC web site](http://www.iec.ch/dyn/www/f?p=103:7:0::::FSP_ORG_ID:3399)Scope of ISO/IEC JTC 1/SC 25The scope of SC 25 is to provide technologies for interconnection of information technology equipment in Customer premises – see also [ISO/IEC JTC 1/SC 25 Scope](https://www.iec.ch/dyn/www/f?p=103:7:0::::FSP_ORG_ID:3399)ISO/IEC JTC 1/SC 25 Subcommittee(s) and/or Working Group(s):- SC 25/WG 1 “Home Electronic System (HES)” develops IoT (Internet of Things) standards for the interconnection of electrical and electronic equipment and products for homes and small buildings. - SC 25/WG 3 “Customer Premises Cabling” develops standards for customer premises cabling systems including test procedures, planning and installation guide. The list of standards published by ISO/IEC JTC 1/SC 25 is available using the URL below:[ISO/IEC JTC 1/SC 25 Publications](https://www.iec.ch/dyn/www/f?p=103:22:19262524188633::::FSP_ORG_ID,FSP_LANG_ID:3399,25#top) The work programme of ISO/IEC JTC 1/SC 25 is available using the URL below:[ISO-IEC JTC 1/SC 25 Work Programme](https://www.iec.ch/dyn/www/f?p=103:23:19262524188633::::FSP_ORG_ID,FSP_LANG_ID:3399,25)Sea also Section 6.3: ISO/IEC JTC1/SC25 Work Programme generated on 2019-10-02**ISO/IEC JTC 1/SC 25/WG 1 “Home Electronic System (HES)”***TD 403 WP1 Jan – Feb 2020*The “Home Electronic System (HES) Overview” dated June 2019 prepared by Dr. Kenneth Wacks - Convener of ISO/IEC JTC 1/SC 25/WG 1 and provided in *TD 403 WP1 Jan – Feb 2020* is attached below. The major HES standards specify the architecture and protocols of the Home Electronic System. These are found in the ISO/IEC 14543 series. Presently three sets of protocols are specified, namely the ISO/IEC 14543-3 series, the ISO/IEC 14543-4 series and the ISO/IEC 14543-5 series. They all conform to a common architecture specified in ISO/IEC 14543-2-1: see below the list of major standards for HES Architecture.- TS 15044: Information technology - Terminology for the Home Electronic System (HES).- 14543-2-1: Architecture Part 2-1: Introduction and device modularity.- 14543-3-1: Architecture Part 3-1: Communication layers - Application layer for network based control of HES Class 1.- 14543-3-2: Architecture Part 3-2: Communication layers - Transport, network and general parts of data link layer for network based control of HES Class 1.- 14543-3-3: Architecture Part 3-3: User process for network based control of HES Class 1.- 14543-3-4: Architecture Part 3-4: System management - Management procedures for network based control of HES Class 1.- 14543-3-5: Architecture Part 3-5: Media and media dependent layers - Powerline for network based control of HES Class 1.- 14543-3-6: Architecture Part 3-6: Media and media dependent layers - Twisted pair for network based control of HES Class 1.- 14543-3-7: Architecture Part 3-7: Media and media dependent layers - Radio frequency for network based control of HES Class 1.- TR 14543-4: Architecture Part 4: Home and building automation in a mixed-use building.- 14543-4-1: Architecture Part 4-1: Communication layers - Application layer for network enhanced control devices of HES Class 1.- 14543-4-2: Architecture Part 4-2: Communication layers - Transport, network and general parts of data link layer for network enhanced control devices of HES Class 1.- 14543-4-3: Architecture Part 4-3: Application layer interface to lower communications layers for network enhanced control devices of HES Class 1.- 14543-5-1: Architecture Part 5-1: Intelligent grouping and resource sharing for Class 2 and Class 3 - Core protocol.- 14543-5-3: Architecture Part 5-3: Intelligent grouping and resource sharing for HES Class 2 and Class 3 - Basic application.- 14543-5-4: Architecture Part 5-4: Intelligent grouping and resource sharing for HES Class 2 and Class 3 - Device validation.- 14543-5-5: Architecture Part 5-5: Intelligent grouping and resource sharing for HES Class 2 and Class 3 - Device type.- 14543-5-6: Architecture Part 5-6: Intelligent grouping and resource sharing for HES Class 2 and Class 3 - Service type.Since these three protocols cannot directly communicate with each other, SC 25/WG 1 has also specified a series of interoperability and gateway standards, the ISO/IEC 18012 and ISO/IEC 15045 series: see below the list of major standards for HES Guidelines for product interoperability, Gateway and Interfaces.- 18012-1: Guidelines for product interoperability - Part 1: Introduction.- 18012-2: Guidelines for product interoperability - Part 2: Taxonomy and application interoperability model.- 15045-1: Gateway - Part 1: A residential gateway model for HES.- 15045-2: Gateway - Part 2: Modularity and protocol.- 10192-1: Interfaces - Part 1: Universal Interface (UI) Class 1.- TR 10192-2: Interfaces - Part 2: Simple Interface Type 1.For the protection of the home and related communications, a set of standards have been specified. ISO/IEC 24767-1 specifies the security requirements. For protection of the communications between devices in the home that do not have the capability to support IP, a simpler security protocol has been specified in ISO/IEC 24767-2: see below:- 24767-1: Home network security - Part 1: Security requirements.- 24767-2: Home network security - Part 2: Internal security services - Secure communication protocol for middleware (SCPM).In order to support energy harvesting devices, i.e. devices that do not depend on batteries or mains power, very energy-efficient wireless communication protocols have been developed (ISO/IEC 14543-3-10 and ISO/IEC 14543-3-11): see below:- 14543-3-10: Architecture Part 3-10: Amplitude modulated wireless short-packet (AMWSP) protocol optimized for energy harvesting - Architecture and lower layer protocols.- 14543-3-11: Architecture Part 3-11: Frequency modulated wireless short-packet (FMWSP) protocol optimised for energy harvesting - Architecture and lower layer protocols.The ISO/IEC 29145 series specifies an efficient wireless mesh network: see below:- 29145-1: Wireless beacon-enabled energy efficient mesh network (WiBEEM) for wireless home network services - Part 1: PHY layer.- 29145-2: Wireless beacon-enabled energy efficient mesh network (WiBEEM) for wireless home network services - Part 2: MAC layer.- 29145-3: Wireless beacon-enabled energy efficient mesh network (WiBEEM) for wireless home network services - Part 3: NWK layer.ISO/IEC SC 25 also has the responsibility for maintaining the ISO/IEC 29341 series of specifications originally developed by the UPnP Forum.In addition to these communication protocol specifications, SC 25/WG 1 published also a set of specifications to manage energy usage and generation in the home. These are in the ISO/IEC 15067-3 series.See also the Technical Reports on Intelligent homes:- TR 29107-1: Information technology - Intelligent homes - Taxonomy of specifications — Part 1: The scheme.- TR 29108: Information technology - Terminology for intelligent homes.**ISO/IEC JTC 1/SC 25/WG 3 “Customer Premises Cabling”** The cabling standards ISO/IEC 11801 series specify a cabling infrastructure supporting the transport of all kinds of information on customer premises with help of primarily balanced cable and optical fibre cable, and in some cases also of correctional cables. Up to now standards have been published for offices, homes, industrial premises and data centres: see below the list of major standards related to home cabling.- 11801-1: Generic cabling for customer premises – Part 1: General requirements.- 11801-1- Corrigendum 1: Generic cabling for customer premises — Part 1: General requirements — Technical Corrigendum 1.- 11801-4: Generic cabling for customer premises – Part 4: Single-tenant homes.- 11801-4 – Corrigendum 1: Generic cabling for customer premises — Part 4: Single-tenant homes — Technical Corrigendum 1.- ISO/IEC 14763-2: Implementation and operation of customer premises cabling - Part 2: Planning and installation.- TR 14763-2-1: Implementation and operation of customer premises cabling - Part 2-1: Planning and installation - Identifiers within administration systems. .The ISO/IEC JTC 1/SC 25 Work Programme generated on 2019-10-02 and provided in *TD 403 WP1 Jan – Feb 2020* is attached below. |
| **MoCA®**continuation of**MoCA®**continuation of**MoCA®**continuation of**MoCA®** | **MoCA®** Multimedia over Coax Alliance<http://www.mocalliance.org/>*TD 475 WP1 Jan - Feb 2020*MoCa informed per mail on 30 July 2019 that at this date the section regarding MoCA has no need for edits or updates.*TD 309 WP1 July 2019* The Multimedia over Coax Alliance, MoCA®, supports three versions of its MoCA home networking MAC/PHY specifications (MoCA 2.0/Bonded, MoCA 2.5 and MoCA 3.0). MoCA 3.0 was recently approved and is capable of 10 Gbps actual data rates and provides peer-to-peer encryption capability. MoCA 1.0 and 1.1 specifications have been sunset and the Alliance no longer certifies products using these protocols.MoCA Access 2.5 MAC/PHY Specification is a network access extension standard is capable of 2.5Gbps (downlink) and 2 Gbps (uplink) data rates over coaxial cable.**MoCA Access** **2.5** **MAC/PHY specification includes**:* Supporting any type of coaxial typology as “Home Run”, Cascade or Star/branch;
* Support for up to 63 client modems;
* Co-existence with any TV/DOCSIS or Satellite services;
* Using 200, 300, 400 or 500MHz bands in spectrum between 400‐1675MHz;
* Providing 1.0, 1.5, 2.0 or 2.5Gbps MAC data rates;
* Configurable for symmetrical data services;
* QoS services to standard reservation protocols supporting up to 8 priority levels;
* Low latency (3.0msec on average);
* Very low Packet Error Rate: 1e‐6 and 1e‐8 respectively for Nominal (NPER) and Very Low (VPER) modes;
* Strong security and privacy features (support for IEEE Std 802.1X authentication, 128\_bit AES/CTR encryption,

 pairwise dynamic keys, perfect forward secrecy;* Power management: Sleep and standby low power modes.

The Alliance is working on MoCA Access 3.0, capable of 10 Gbps data rates with additional management and encryption/security features. It will be backward interoperable with MoCA Access 2.5.MoCA technology specifications and protocols do not interoperate with the G.hn protocol, but both MoCA and G.hn could coexist on the same coaxial cable with the correct filters.**MoCA Home 2.0** - Up to 1 Gbps actual data rate.- Deterministic (scheduled) media access with 3.5ms average latency. - Two packet error modes: Very low Packet Error Rate (1e-8) and Nominal Packet Error Rate (1e-6).- Single or dual 100 MHz channels operating in the frequency range of 500…1650MHz.- Power states: active, low power, standby and sleep mode.- Backward interoperable with MoCA 1.1.**MoCA Home 2.5**- Up to 2.5 Gbps actual data rate. - MoCA protected setup (MPS)- Management Proxy- Enhanced Privacy- Network wide Beacon Power - Bridge detectionMoCA 2.5 is backward interoperable with MoCA 2.0 and MoCA 2.0 Bonded.**MoCA Home 3.0**- Capable of 10 Gbps actual data rates and provides peer-to-peer encryption capability.MoCA-Profiles-Chart-2018vNonMoCASecMoCASec™ is a peer-to-peer security feature accessible for MoCA 2.0 and 2.5 via firmware download, and is embedded in MoCA 3.0. Expected availability is Q1 2019.MoCA has historically distinguished between PHY and MAC data rates. The Alliance has always emphasized true and realized data rates and has conducted numerous field tests to verify MAC rates. MoCA does not believe that promoting PHY data rates provides value or contributes to the promotion and adoption of any standard in particular or home networking in general.See also:[www.mocalliance.org](http://www.mocalliance.org)[www.mocainyourhouse.com](http://www.mocainyourhouse.com) |
| **TIA** | **TIA (Telecommunications Industry Association)**<http://standards.tiaonline.org/>TIA-1113 - 2008 Edition, May 2008: Medium-Speed (up to 14 Mbps) Power Line Communications (PLC) Modems using Windowed OFDM |
| **TTC** | **TTC (The Telecommunication Technology Committee)**<https://www.ttc.or.jp/e>- TTC JJ-300.00 – Version 3.0 – May 25 , 2017: Home-network Topology Identifying Protocol (HIP) |

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**7. Web-Based Home Network Transport (HNT) Standards Overview**

A web-based HNT Standards Overview has been set up in order to make the Standardization Lists in Section 3 (Table 1), Section 4 (Table 2) and in Section 6 more manageable and user-friendly. The web-based overview is organized by broadband home network technologies and the various systems generations related to each technology. It also provides examples of Home Network applications. The web-bases HNT Standards Overview enables an easy identification and download of the publicly available Standards, Recommendations, Technical Specifications and Reports related to each system generation and associated technical matters. The web-based HNT Standards Overview focuses on the most relevant published and updated documents related to Home Network Transport. The taxonomy used for these web-based HNT Standards Overview is described below**.**The items (i.e. titles of Standards, Recommendations, etc.) are available by topics & sub topics, responsible ITU Working Groups and other SDOs. They are also searchable on number, title and description. The topics, subtopics and items of the web-based ANT Standards Overview appear alphanumerically listed; this is inherent in the data base system.
The current contents of the web-based HNT Standards Overview can be seen at [Web-based Home Network Transport (HNT) Standards Overview​](https://www.itu.int/net4/ITU-T/landscape#?topic=0.132&workgroup=1&searchValue=&page=1&sort=Revelance)[​](https://www.itu.int/net4/ITU-T/landscape#?topic=0.105&workgroup=1&searchValue=&page=1&sort=Revelance).
The link is hosted on the ITU-T SG15 website, in the same place as the NNT Standards Overview and Workplan - under section “Documentation”.

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| --- |
| **Home Network Transport Standards Overview** |
| **Part 1: General on Home Network** |
| **Home Network architecture and functions** | **Home Network security** |  |  |
| **Part 2: Wireline home networking** |
| **Over phone line**- HomePNA transceivers- Phoneline Enhanced HomePNA transceivers- Phoneline G.hn unified transceivers | **Over powerline – Power Line Communications (PLC)**- Narrowband PLC transceivers- Broadband PLC transceivers- Powerline G.hn unified transceivers- Mitigation of interference | **Over coaxial cable**- Multimedia over Coax Alliance (MoCA)- Coax Enhanced HomePNA transceivers- Coax G.hn unified transceivers | **Over Ethernet twisted-pair cable**- IEEE 802.3 transceivers over Catx cable- Catx G.hn unified transceivers |
| **Over plastic optical fibre (POF)**- ETSI POF based home networking- IEEE 802.3 transceivers over POF- POF G.hn unified transceivers | **Over glass optical fibre** |  |  |
| **Part 3: Wireless home networking** |
| **General on WLAN and WPAN Wireless Access** | **IEEE 802.11 Wireless LAN / Wi-Fi** | **Sub 1 GHz Wireless LAN** | **ETSI HiperLAN Type 2** |
| **IEEE 802.15 based Wireless PAN-** Bluetooth- Zigbee | **Optical wireless communications-** Visible Light Communication / Li-Fi | **Z-Wave** |  |
| **Part 4: Home Network applications** |
| **General on Smart Home Network** | **Cable-based services** | **Telecommunications services**- Digital Enhanced Cordless Telecommunications (DECT) | **Internet connectivity**- Internet connectivity over wireline networking- Internet connectivity over wireless networking |
| **In-home Access Points connectivity-** In-home Access Points connectivity over wireline networking- In-home Access Points connectivity over wireless networking | **Personal connectivity** | **IoT / Domotics applications**- IoT / Domotics over wireline networking- IoT/ Domotics over wireless networking |  |
| **Part 5: Smart Grid applications** |
| **Part 6: Home and Building Automation Systems** |
| **Home Electronic System (HES)** |  |  |  |
| **Part 7: Use of Home Network transceivers in industrial applications** |
| **Part 8: Home Network cabling** |
| **Part 9: Environment and power supply of Home Network equipment** |
| **Part 10: Safety and protection of Home Network equipment** |
| **Part 11: Operation and Maintenance (OAM) of Home Network** |
| **Management of Home Network devices** | **Data models for Home Network** | **Performance testing of Home Network equipment** | **Conformance testing of Home Network equipment** |

**Examples of Home Networks applications**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Technology** | **Standards** | **Internet connectivity** | **In-home Access Points connectivity** | **Personal connectivity** | **IoT /Domotics applications** |
| **Wireline home networking** |
| **HomePNA (Phoneline)** | G.9951; G.9952; G.9953; G.9954 | X |  |  |  |
| **G.hn (Phoneline)** | G.9960; G.9961; G.9962; G.9963; G.9964 | X | X |  |  |
| **Narrowband PLC (Powerline)** | G.9901; G.9902; G.9903; G.9904; G.9905 |  |  |  | X |
| **Broadband PLC (Powerline)** | IEEE 1901 | X | X |  |  |
| IEEE 1901a | X | X |  | X |
| **G.hn Broadband PLC (Powerline)** | G.9960; G.9961; G.9962; G.9963; G.9964 | X | X |  | X |
| **MoCA (Coax)** | MoCA Alliance | X | X |  |  |
| **HomePNA (Coax)** | G.9954 | X | X |  |  |
| **G.hn (Coax)** | G.9960; G.9961; G.9962; G.9963; G.9964 | X | X |  |  |
| **IEEE 802.3****Ethernet (Catx)** | 1000BASE-T; 2.5-5-10GBASE-T | X | X |  |  |
| 802.3cg |  |  |  | X |
| **G.hn (Catx)** | G.9960; G.9961; G.9962; G.9963; G.9964 | X | X |  |  |
| **ETSI (PoF)** |  | X | X |  |  |
| **IEEE 802.3 (PoF)** | 1000BASE-RHA | X | X |  |  |
| **G.hn (PoF)** | G.9960; G.9961; G.9962; G.9963; G.9964 | X | X |  |  |
| **Over glass optical fibre** | Under study |  |  |  |  |
| **Wireless home networking** |
| **802.11** | Wi-Fi 4, 5, 6  | X | X |  | X |
| **Bluetooth andZigbee** |  |  |  | X | X |
| **LiFi** | G.9991 | X |  | X | X |
| **Sub-1 GHz** **and Z-Wave** | IEEE 802.11ah;G.9959 |  |  |  | X |
| **DECT ULE** |  |  |  |  | X |

**8.** **Contacts**

| **Body**  | **Contact person** | **Link to the Web-Site** | **Status of contact****NotesLiaison Tracking** |
| --- | --- | --- | --- |
| Broadband Forum | Mr. Robin MershCEOrmersh@broadband-forum.orgLincoln LavoieBroadband Forum Technical Committee Chairlylavoie@iol.unh.eduLes Brown, Physical Layer Transmission Work Area co-director lesbrown@sympatico.ca | [www.broadband-forum.org/](http://www.broadband-forum.org/) | TD 334 GEN Jan-Feb 2020TD 277 WP1October 2018Liaison RapporteursLes Brown, lesbrown@sympatico.caFrank Van der Puttenfrank.van\_der\_putten@nokia.com |
| ETSI TC ATTM (Access Terminals, Transmission and Multiplexing) | Chairman: ATTMDominique RocheeG4Udominique.roche@eg4u.orgATTM Technical SecretaryPat O’KeeffeeG4U Pat.okeeffe@eg4u.ie  | [portal.etsi.org/home.aspx](http://portal.etsi.org/home.aspx) | TD 466 WP1Jan Feb 2020TD 139 WP1Jan – Feb 2018 |
| IEEE 802.3  | David LawChair, IEEE 802.3 Ethernet Working Groupdlaw@hpe.com | [ieee802.org/3](http://ieee802.org/3) | TD 505 WP1September 2020TD 477 WP1Jan – Feb 2020TD 345 GENJan - Feb 2020Liaison RapporteurPeter Stassarpeter.stassar@huawei.com |
| MoCA® Multimedia over Coax Alliance | Rob GelphmanVP of Marketing and Member RelationsMoCArobgelphman@mocalliance.org | [www.mocalliance.org](http://www.mocalliance.org)[www.mocainyourhouse.com](http://www.mocainyourhouse.com) | TD 475 WP1Jan - Feb 2020TD 309 WP1July 2019 |
| ITU-R WP1A |  | [www.itu.int/en/ITU-R/study-groups/Pages/default.aspx](http://www.itu.int/en/ITU-R/study-groups/Pages/default.aspx) |  |
| ITU-R WP5A |  | [www.itu.int/en/ITU-R/study-groups/rsg5/rwp5a/Pages/default.aspx](http://www.itu.int/en/ITU-R/study-groups/rsg5/rwp5a/Pages/default.aspx) |  |
| ITU-R WP5B |  | [www.itu.int/en/ITU-R/study-groups/rsg5/rwp5b/Pages/default.aspx](http://www.itu.int/en/ITU-R/study-groups/rsg5/rwp5b/Pages/default.aspx) |  |
| ITU-R WP5C |  | [www.itu.int/en/ITU-R/study-groups/rsg5/rwp5c/Pages/default.aspx](http://www.itu.int/en/ITU-R/study-groups/rsg5/rwp5c/Pages/default.aspx) |  |
| ITU-R WP6A |  | <http://www.itu.int/en/ITU-R/study-groups/rsg6/Pages/default.aspx> |  |
| ITU-R WP6B | Paul GardinerChairman, WP6BPaul.Gardiner@sony.com |  | TD 220 WP1October 2018 |
| ITU-T SG5  | Fryderyk LewickiWP1/5 ChairmanOrange Polskafryderyk.lewicki@orange.com | <http://www.itu.int/en/ITU-T/studygroups/2017-2020/05/Pages/default.aspx> | TD 488 WP1September 2020TD 405 WP1Jan – Feb 2020TD 332 WP1July 2019 |
| ITU-T SG9 | Zhongzhao LIRapporteur of Q10/9lizhongzhao@abp2003.cn  | <http://www.itu.int/en/ITU-T/studygroups/2017-2020/09/Pages/default.aspx> | TD 314 WP1July 2019 |
| ITU-T SG11 | Andrey KucheryavySG11 Chairmanakouch@mail.ru | <http://www.itu.int/en/ITU-T/studygroups/2017-2020/11/Pages/default.aspx> | TD 481 WP1September 2020 |
| ITU-T SG13 |   | <http://www.itu.int/en/ITU-T/studygroups/2017-2020/13/Pages/default.aspx> |  |
| ITU-T SG16 |  | <http://www.itu.int/en/ITU-T/studygroups/2017-2020/16/Pages/default.aspx> |  |
| ITU-T SG17  | Jonghyun BaekRapporteur of Q6/17jhbaek@kisa.or.kr | <http://www.itu.int/en/ITU-T/studygroups/2017-2020/17/Pages/default.aspx> | TD 483 WP1September 2020TD 319 WP1July 2019 |
| ITU-T SG20 |  | <http://www.itu.int/en/ITU-T/studygroups/2017-2020/20/Pages/default.aspx> |  |
| ITU-D SG1  |  | https://www.itu.int/net4/ITU-D/CDS/sg/index.asp?lg=1&sp=2018&stg=1 |  |
| ITU-D SG2 |  | https://www.itu.int/net4/ITU-D/CDS/sg/index.asp?lg=1&sp=2018&stg=2 |  |
| ISO/IEC JTC 1/SC 25 | Marco PeterSecretary ISO/IEC JTC 1/SC 25peter@zvei.org | <https://www.iso.org/committee/45270.html> | TD 403 WP1 Jan – Feb 2020 |

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