Home Network Transport

Standards Overview and Work Plan

April 2021 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 12, April 2021**

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| Revision Status Report: Major Updates of Version 12, April 2021 |
| In this version 12, following changes, additions and updates have been made: 1) The structure of the document has been modified for clarity. 2) Section 1.1 - Existing Recommendations within ITU-T SG15 – WP1/15  Table 1 – “Published” Recommendations related to Home Network within ITU-T SG15 Question 18   * ITU-T SG15 Recommendations G.9960 Cor.2 (10/2020); G.9991 Cor.1 (10/2020); have been added. * ITU-T SG15 Technical Paper GSTP-HNSG (2020) has been added.   3) Section 1.2 - Recommendations “Under Study” within ITU-T SG15 – WP1  Table 2– Recommendations “Under Study” related to Home Network   * The list of items “Under Study” has been updated with the latest Q18/15 activities resulting from April 2021 SG15 WP1 plenary meeting.   4) Section 1.3 - Home Network Activities within other ITU-T Study Groups  Table 3 - “ITU-T study groups working on Home Network related topics”   * ITU-T SG5: Recommendations TK.21Amd.1 (06/2020); new edition K.34 (12/2020); K.98 Cor.2 (06/2020) and K.147 Cor.1 (01/2021); new edition L.1310 (09/2020) have been added/updated. * ITU-T SG9: Recommendation J.1611 has been added. * ITU-T SG15-WP2 Recommendations for indoor fibre cable G.657 (11/2016); L.103 (04/2016); L.104 (10/2006); L.111 (10/2020) have been added. * ITU-T SG17: Recommendations X.1197 Erratum 1 (03/2020) has been updated * ITU-T SG20: Recommendations Y.4469 (08/2020); Y.4465 (01/2020) and Y.4474 (08/2020) have been added.   5) Section 2 - Other groups within ITU and other Standard Developing Organizations  Table 4 - Home Network related activities in other groups within ITU-R & other SDOs   * ITU-R SG1: Report SM.2351 (06/2017) has been added. * ETSI ATTM, BRAN and CABLE have been reviewed and updated. * ETSI GR F5G 001 V1.1.1 (2020-12) and GR F5G 002 V1.1.1 (2021-02) have been added. * IEC 60793-2-40 Ed.5 and 60794-6 Ed.1 have been added. * IEEE 802.3 has been updated. * IEEE 802.11-2020, IEEE P802.11be and IEEE P802.11bf have been updated/added. * IEEE 1901-2020 has been updated. * ISO-IEC JTC 1/SC 25 has been reviewed and updated. * MoCA® has been updated. * Zigbee and Z-Wave have been added   5) Section 3 - Web-Based Home Network Transport (HNT) Standards Overview has been updated.  6) Annex 1 “Overview of Home Network applications” and Annex 2 “List of Contacts” have been updated. |

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

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# General

The HNT Standards Overview and Work Plan is a living document. The actual version is available at <https://www.itu.int/en/ITU-T/studygroups/Pages/sg15-hnt.aspx> .  
A web-based HNT Standards Overview completes the present document and is available at[Web-based Home Network Transport (HNT) Standards Overview .​](https://www.itu.int/net4/ITU-T/landscape" \l "?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)

# Introduction

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 services and applications, require the development of new Recommendations and enhancements to existing Recommendations covering all aspects of in-premises networking transceivers. These studies 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 standards bodies will be required.

Within the ITU-T, the study and development of Recommendations related to transport in the Home Network is being carried out in a number of different Study Groups - see in Section 1 Tables 1, 2 and 3 below - e.g. SGs 5, 9, 13, 15, 16, 17 and 20. Also ITU-R and other standards bodies, forums and consortia are active in this area - see in Section 2 Table 4 below - 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.**

To represent the multitude of home networking technologies and services offered to the customer, the Table 5 in **Annex 1** provides an overview of Home Network applications and related Home Network technologies.

A critical part of the HNT standardization work is the network of contacts for the development of relevant standards and the tracking of correspondence, usually in the form of liaisons, to guide the work. The list of contacts in **Annex 2** provides an overview of the other relevant Study Groups in the ITU and other Standardization Groups corresponding through liaisons with Study Group 15 about matters related to the HNT Standards Overview and Work Plan.

# 1. Home Network Activities within ITU-T

# 1.1 Existing Recommendations within ITU-T SG15 – WP1/15 “Transport aspects of access, home and smart grid networks”

“Published” Recommendations related to “Technologies for in-premises networking and related access applications” are listed here for convenience in Table 1.  
*Note: During its 27 January – 7 February 2020 meeting, ITU-T Study Group 15 agreed to merge Question 15 “Communications for smart grid” into Question18 “Broadband in-premises networking” with the new title “Technologies for in-premises networking and related access applications”.*

**Status: April 2021**

Table 1 – “Published” Recommendations related to Home Network within ITU-T SG15 Question 18

| **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!Amd1) | Narrowband orthogonal frequency division multiplexing power line communication transceivers for ITU-T G.hnem networks Amendment 1 | Published | 03/2013 |
| [G.9902 (2012) Amd.2 (08/2013)](http://www.itu.int/rec/T-REC-G.9902-201308-I!Amd2) | Narrowband orthogonal frequency division multiplexing power line communication transceivers for ITU-T G.hnem networks Amendment 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!Amd1) | Centralized metric-based source routing Amendment 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 layer specifications | 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!Cor1) | Unified high-speed wire-line based home networking transceivers – System architecture and physical layer specification Corrigendum 1 | Published | 09/2019 |
| [G.9960 (2018) Amd.1 (02/2020)](https://www.itu.int/rec/T-REC-G.9960-202002-P!Amd1) | Unified high-speed wire-line based home networking transceivers - System architecture and physical layer specification Amendment 1 | Published | 02/2020 |
| [G.9960 (2018) Amd.2 (07/2020)](https://www.itu.int/rec/T-REC-G.9960-202007-I!Amd2) | Unified high-speed wireline-based home networking transceivers - System architecture and physical layer specification Amendment 2 | Published | 07/2020 |
| [G.9960 (2018) Cor.2 (10/2020)](https://www.itu.int/rec/T-REC-G.9960-202010-I!Cor2) | Unified high-speed wire-line based home networking transceivers – System architecture and physical layer specification  Corrigendum 2 | Published | 10/2020 |
| [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!Cor1) | Unified high-speed wireline-based home networking transceivers – Data link layer specification Corrigendum 1 | Published | 09/2019 |
| [G.9961 (2018) Amd.1 (02/2020)](https://www.itu.int/rec/T-REC-G.9961-202002-P!Amd1) | Unified high-speed wireline-based home networking transceivers – Data link layer specification Amendment 1 | Published | 02/2020 |
| [G.9961 (2018) Cor.2 (03/2020)](https://www.itu.int/rec/T-REC-G.9961-202003-P!Cor2) | Unified high-speed wireline-based home networking transceivers – Data link layer specification Corrigendum 2 | Published | 03/2020 |
| [G.9961 (2018) Amd.2 (07/2020)](https://www.itu.int/rec/T-REC-G.9961-202007-I!Amd2) | Unified high-speed wireline-based home networking transceivers - Data link layer specification Amendment 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!Cor1) | Unified high-speed wire-line based home networking transceivers – Management specification Corrigendum 1 | Published | 03/2020 |
| [G.9962 (2018) Amd.1 (07/2020)](https://www.itu.int/rec/T-REC-G.9962-202007-P!Amd1) | Unified high-speed wire-line based home networking transceivers - Management specification Amendment 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 spectral density specification | Published | 12/2011 |
| [G.9964 (2011) Amd.1 (02/2016)](http://www.itu.int/rec/T-REC-G.9964-201602-I!Amd1) | Unified high-speed wire-line based home networking transceivers - Power spectral density specification Amendment 1 | Published | 02/2016 |
| [G.9964 (2011) Amd.2 (09/2016)](https://www.itu.int/rec/T-REC-G.9964-201609-I!Amd2) | Unified high-speed wire-line based home networking transceivers - Power spectral density specification Amendment 2 | Published | 09/2016 |
| [G.9964 (2011) Amd.3 (02/2020)](https://www.itu.int/rec/T-REC-G.9964-202002-P!Amd3) | Unified high-speed wireline-based home networking transceivers – Power spectral density specification Amendment 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!Cor1) | Coexistence mechanism for wireline home networking transceivers Corrigendum 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!Cor1) | 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!Amd1) | High-speed indoor visible light communication transceiver – System architecture, physical layer and data link layer specification Amendment 1 | Published | 07/2020 |
| [G.9991 (2019) Cor.1 (10/2020)](https://www.bluetooth.com/specifications/specs/core-specification-supplement-9/) | High-speed indoor visible light communication transceiver – System architecture, physical layer and data link layer specification Corrigendum 1 | Published | 10/2020 |
| [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 (02/2020)](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 GSTP-HNSG (09/2020)](https://www.itu.int/pub/T-TUT-HOME-2020-2) | Technical paper on the use of G.hn technology for smart grid | Published | 09/2020 |
| [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 |

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# 1.2. Recommendations “Under Study” within ITU-T SG15 – WP1 “Transport aspects of access, home and smart grid networks”

Recommendations “Under Study” related to “Technologies for in-premises networking and related access applications” are listed here for convenience in Table 2.  
*Note: During its 27 January – 7 February 2020 meeting, ITU-T Study Group 15 agreed to merge Question 15 “Communications for smart grid” into Question 18“Broadband in-premises networking” with the new title “Technologies for in-premises networking and related access applications”.*

**Status: April 2021**

**Table 2 – Recommendations “Under Study” and related to Home Network** **within ITU-T SG15 Question 18**

**Table updated with the latest Q18 activities resulting from April 2021 SG15 WP1 plenary meeting**

| **Work item** | **Question** | **Status** | **Timing** | **Approval process** | **Subject / Title** | **Base text(s)** | **Editor(s)** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| G.9903 Amd.1 | Q18/15 | Consented 2021-04-23 | 2021-04 | AAP | Narrowband orthogonal frequency division multiplexing power line communication transceivers for G3-PLC networks – Amendment 1 | TD 707-PLEN | [Cedric](mailto:lesbrown@sympatico.ca) Chauvenet |
| [G.9904.1 (ex G.prime-x)](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=13378) | Q18/15 | Under study | 2021-12 | AAP | Narrow-band OFDM power line communication transceivers for PRIME networks with extended band plan | - | [Les Brown](mailto:lesbrown@sympatico.ca) |
| [G.9961 (2018) Amd.3](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16792) | Q18/15 | Approved 2021-04-23 | 2021-04 | AAP | Unified high-speed wireline-based home networking transceivers - Data link layer specification Amendment 3 | [TD 706-PLEN](http://www.itu.int/md/T17-SG15-200907-TD-WP1-0529) | [Les Brown](mailto:lesbrown@sympatico.ca) |
| [G.9963 Amd.1](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16793) | Q18/15 | Approved 2021-04-23 | 2021-04 | AAP | Unified high-speed wireline-based home networking transceivers - Multiple input/multiple output specification: Amendment 1 | TD 719-PLEN | [Marcos Martinez](mailto:mmartinez@maxlinear.com) |
| [G.9991 (2019) Amd.2](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16781) | Q18/15 | Approved 2021-04-23 | 2021-04 | AAP | High-speed indoor visible light communication transceiver - System architecture, physical layer and data link layer specification - Amendment 2 | TD 721R1-PLEN | [Marcos Martinez](mailto:mmartinez@maxlinear.com) |
| [G.fin](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16479)-SA | Q18/15 | Under study | 2021-12 | AAP | High speed fibre-based in-premises transceivers - system architecture | Q18-201214-C09R1 | Qiang Cheng, Xinrui Shi |
| [G.fin](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16479)-PHY | Q18/15 | Under study | 2022 | AAP | High speed fibre-based in-premises transceivers – physical layer | - | Junwei Li, Xuming Wu |
| [G.fin](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16479)-DLL | Q18/15 | Under study | 2022 | AAP | High speed fibre-based in-premises transceivers – data link layer | - | Xinrui Shi, Wu Jia |
| [G.fin](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16479)-NM | Q18/15 | Under study | 2022 | AAP | High speed fibre-based in-premises transceivers – network management | - | Yue Sun, Shuzhi Gou |
| G.hetnet | Q18/15 | Under study | 2021-12 | AAP | Terminology & overview of the architecture of Heterogeneous Home Networks | T17-SG15-C-2586 | [Marcos Martinez](mailto:mmartinez@maxlinear.com), Tony Zeng |
| [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 | Q18-210309-TD48 | [Tony Zeng](mailto:tony.zengyan@huawei.com) |
| [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 | TD 614-WP1 | Yue Sun, [Tony Zeng](mailto:tony.zengyan@huawei.com) |
| G.9976 | Q18/15 | Consented 2021-04-23 | 2021-04 | AAP | Support UHD video service over G.hn | [TD 716R1-PLEN](http://www.itu.int/md/T17-SG15-200907-TD-WP1-0529) | [Wu Jia](mailto:jiawu9@chinaunicom.cn), [Tony Zeng](mailto:tony.zengyan@huawei.com) |
| [TP-ARCH-HN](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16478) | Q18/15 | Agreed 2021-04-23 | 2021-04 | Agreement | Technical paper on architecture, function, and service of home network | TD 713R1-PLEN | [Tony Zeng](mailto:tony.zengyan@huawei.com) |
| TP-FTTR-UC | Q18/15 | Agreed 2021-04-23 | 2021-04 | Agreement | Technical paper on Use Case & Requirements of Fibre-to-The-Room (FTTR) | TD 715R1-PLEN | Qiang Cheng; Xuming Wu |
| [TP-GHN](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=15112) | Q18/15 | Under study | 2021-12 | Agreement | Overview of the G.hn technology | TD 714-PLEN | [Tony Zeng](mailto:tony.zengyan@huawei.com) |
| [TP-UC-HN](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=15207) | Q18/15 | Under study | 2021-12 | Agreement | Technical paper on the use of ITU-T G.hn technology for in-home networking | TD 625-WP1 | [Marcos Martinez](mailto:mmartinez@maxlinear.com) |
| [TP-VLC](http://www.itu.int/itu-t/workprog/wp_item.aspx?isn=15206) | Q18/15 | Under study | 2021-12 | Agreement | Technical paper on the use of ITU-T Visible Light Communication technology | TD 624-WP1 | [Marcos Martinez](mailto:mmartinez@maxlinear.com) |

# 1.3. Home Network Activities within other ITU-T Study Groups

This section provides an overview of the existing Home Network related activities within other ITU-T Study Groups.  
  
Table 3 below gives an updated overview of such activities.

Status: April 2021   
 Table 3 – Home Network related activities within other ITU-T Study Groups

| **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** | **SG5 “Environment, climate change and circular economy”**  *TD 548 WP1 April 2021* ITU-T SG5 informs ITU-T SG15 that it has reviewed the Roadmap and for the time being, ITU-T SG5 does not have any update to provide regarding the Home Network Transport (HNT) Standards Overview and Work Plan.  **WP1/5 “EMC, lightning protection, EMF”** Q1/5 “Electrical protection, reliability, safety and security of ICT systems” - ITU-T K.66 (11/2019): Protection of customer premises from overvoltages. - 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.  Q2/5 “Protecting equipment and devices against lightning and other electrical events”- ITU-T K.21 (07/2019) and Amd.1 (06/2020): 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.98 (08/2014) and Cor.1 (03/2015), Cor.2 (06/2020): 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* ITU-T 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) and Cor.1 (01/2021): 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) aspects in ICT environment”  - ITU-T K.34 (12/2020): Classification of electromagnetic environmental conditions for telecommunication equipment - Basic EMC Recommendation. - 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.85 (11/2011): Requirements for the mitigation of lightning effects on home networks installed in customer premises. - 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. |
| **WP2/5 “Environment, Energy Efficiency and the Circular Economy”**  Q6/5 “Environmental efficiency of digital technologies” - ITU-T L.1310 (09/2020) “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 “E-waste, circular economy and sustainable supply chain management” - 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 digital technologies in the framework of the Sustainable Development Goals (SDGs) and the Paris Agreement” - 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** | **WP1/9 “Cable transport and terminals, including video and data”**  Q6/9 “Functional requirements for terminal devices of the integrated broadband cable network”  *TD 553 WP1 April 2021* Question 6 of ITU-T SG9 informs that the draft new Recommendation ITU-T J.1611 “Functional requirements for Smart Home Gateway” has been AAP consented during SG9 E-meeting 25 November 2020.  - 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.  - ITU-T J.1611 (01/2021): Functional requirements for Smart Home Gateway  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> |
| **Future networks  (& cloud)** | **SG13** | **WP3/13 “Network Evolution, Trust and Quantum Enhanced Networking”**  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”** - Refer to Table 1 and Table 2 of present HNT Standards Overview and Work Plan document.  **WP2/15 “Optical technologies and physical infrastructures”** Q5/15 ”Characteristics and test methods of optical fibres and cables, and installation guidance” **-** ITU T G.657 (11/2016): Characteristics of a bending-loss insensitive single-mode optical fibre and cable for the access network.  - ITU-T L.103 (04/2016): Optical fibre cables for indoor applications.  - ITU-T L.104/L.67 (10/2006): Small count optical fibre cables for indoor applications.  - ITU-T L.111 (10/2020): Optical fibre cables for in-home applications.  More information about ITU-T SG1 can be found at following URL <https://www.itu.int/en/ITU-T/studygroups/2017-2020/15/Pages/default.aspx> |
| **Multimedia** | **SG16** | **WP1/16 “Multimedia content delivery”**  Q11/16 “Multimedia systems, terminals, gateways and data conferencing”  - 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.  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.622.2 (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 “5G, IoT and ITS security”** Q6/17 “Security for telecommunication services 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) and Erratum 1 (03/2020): 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 “Data analytics, sharing, processing and management, including big data aspects, of IoT and SC&C” - 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. - ITU-T Y.4469 (08/2020): Reference architecture of spare computational capability exposure of IoT devices for smart home. - ITU-T Y.4465 (01/2020): Framework of Internet of things services based on visible light communications. - ITU-T Y.4474 (08/2020): Functional architecture for Internet of things services based on visible light. Communications  More information about SG20 can be found at following URL <https://www.itu.int/en/ITU-T/studygroups/2017-2020/20/Pages/default.aspx> |

**2****.** **Home Network Activities within ITU-R and in other Standards Development Organizations**

This following list is intended to improve understanding and communication of the on-going work related to Home Network within ITU-R and in other Standardization Developing Organizations and may help identify possible gaps or overlaps.  
Table 4 below gives an updated overview of such activities.

Status: April 2021   
 Table 4 – Home Network related activities within ITU-R and in other Standard Developing Organizations

| **Standards Org.** | **SGs, Committees, Aspects, Activities** | | |
| --- | --- | --- | --- |
| **ITU-R**  continuation of  **ITU-R**    continuation of  **ITU-R**  continuation of  **ITU-R** | **SG1**  **WP1A**  **SG1**  **WP1B** | **SG1 “Spectrum Management”** WP1A “Spectrum engineering techniques”  *TD 554 WP1 April 2021*  In its liaison in TD 554 WP1 from April 2021, ITU-R WP1A reports that it has noted several areas of current interest in the work plan of ITU-T SG15 Question 18 (Table 3 in the “Home Network Transport Standards Overview and Work Plan- Issue 11, September 2020”) particularly on the use of power wirelines for various narrow-band communication projects supporting smart grid utility management, smart metering and the internet of things. These can suffer disruption from various forms of electromagnetic interference and radio frequency noise, as do radiocommunication systems.  ITU-R WP1A informs that it has started work on studies directed towards the “*Evaluation of radiated electromagnetic disturbances of household appliances and their interferences over an IoT network*” - (see attached document below “Preliminary draft report ITU-R SM.EMI-IoT).    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>  WP1B “Spectrum management methodologies and economic strategies”  - Report [SM.2351](https://www.itu.int/pub/R-REP-SM.2351): “Smart grid utility management systems”.  This report provides an overview of smart grid communications and features, communication network technologies, reference architecture, wireline and wireless standards and references of deployments in several countries.  More information on ITU-R WP1B can be found at following URL <https://www.itu.int/en/ITU-R/study-groups/rsg1/rwp1b/Pages/default.aspx>  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> | |
| **SG5**  **WP5A**  **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) . LANs/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 WP5A can be found at following URL <https://www.itu.int/en/ITU-R/study-groups/rsg5/rwp5a/Pages/default.aspx>  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> | |
| **SG6 WP6A** | **SG6 “Broadcasting Service”** WP6A “Terrestrial broadcasting delivery”  *TD 547 WP1 April 2021*  In its liaison in TD 547 WP1 from April 2021, ITU-R WP6A Rapporteur on “Power Line Telecommunications (PLT) and General EMC-Related Potential Interference Issues” reports that it has analysed the work plan of ITU-T SG15 Question 18 (Table 3 in the “Home Network Transport Standards Overview and Work Plan- Issue 11, September 2020”) and provides a compilation of its work in the document “Update on recent EMC related issues” attached below.  ITU-R WP6A Rapporteur notes that no issues have been identified that would need an immediate response on possible concerns, but issues with PLT (in Q18 projects G.9904.1, G.Iot and G.uvs) have been identified where further monitoring, supported by studies by the broadcasting community, is essential.  More information about ITU-R WP6A can be found at following URL <https://www.itu.int/en/ITU-R/study-groups/rsg6/rwp6a/Pages/default.aspx>  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> | |
| continuation of  **ITU-R** | **SG6**  **WP6B** | **SG6 “Broadcasting Service”** WP6B “Broadcast service assembly and access”  *TD 220 WP1 October 2018*  ITU-R WP6B studied 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 WP6B can be found at following URL <https://www.itu.int/en/ITU-R/study-groups/rsg6/rwp6b/Pages/default.aspx>  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> | |
| **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> | | |
| **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: 2019-12-31  The 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.  Bluetooth is a IEEE 802.15.1 based wireless system.  More information on Bluetooth technology can be found at <https://www.bluetooth.com/specifications/bluetooth-core-specification/>  and <https://www.bluetooth.com/specifications/specs/> | | |
| **ETSI TC ATTM**  continuation of **ETSI TC ATTM** | **ETSI TC ATTM “Access, Terminals, Transmission and Multiplexing”** <https://www.etsi.org/committee/1390-attm>  *TD 580 WP1 April 2021* ETSI ATTM AT2 informs that it will study the new version of the HNT Standards Overview and Work Plan in its next AT2 meeting.  List of standards, technical specifications and reports related to Home Networks - 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. - TS 102 873 V1.1.1 (2010-10): Access, Terminals, Transmission and Multiplexing (ATTM); Optical External Network Testing Interface  Technical specifications related to Smart Grid - TS 104 001 V2.2.1 (2019-01): Open Smart Grid Protocol (OSGP); Smart Metering/Smart Grid Communication Protocol  More information about ETSI ATTM can be found at following URL <https://portal.etsi.org/TB-SiteMap/ATTM/ATTM-ToR>  Work Programme of ETSI ATTM can be found at following URL <https://portal.etsi.org/tb.aspx?tbid=689&SubTB=689,693,851,706,694,695#/> | | |
| **ETSI TC BRAN**  continuation of **ETSI TC BRAN** | **ETSI TC BRAN “Broadband Radio Access Networks”** <https://www.etsi.org/committee/1389-bran>  List of standards, technical specifications and reports related to Home Networks  - 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.  - 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 2 HIPERLAN/2 systems are intended to be operated as private or public systems making use of the 5 GHz frequency range. - 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>  Work Programme of ETSI BRAN can be found at following URL <https://portal.etsi.org/tb.aspx?tbid=287&SubTB=287#/> | | |
| **ETSI TC DECT**  continuation of **ETSI TC DECT** | **ETSI TC DECT “Digital Enhanced Cordless Telecommunications”** <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 Roadmap  More information about ETSI DECT can be found at following URL <https://portal.etsi.org/TB-SiteMap/dect/dect-tor>  Work Programme of ETSI DECT can be found at following URL <https://portal.etsi.org/tb.aspx?tbid=19&SubTB=19,894#/> | | |
| **ETSI TC EE** | **ETSI TC 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>  Work Programme of ETSI EE can be found at following URL <https://portal.etsi.org/tb.aspx?tbid=28&SubTB=28,29,30,635,853#/> | | |
| **ETSI ISG F5G** | **ETSI ISG - Fifth Generation Fixed Network (F5G)** <https://www.etsi.org/committee/1696-f5g>  - GR F5G 001 V1.1.1 (2020-12): Fifth Generation Fixed Network (F5G); F5G Generation Definition Release #1 - GR F5G 002 V1.1.1 (2021-02): Fifth Generation Fixed Network (F5G); F5G Use Cases Release #1  More information about ETSI ISG F5G can be found at following URL <https://portal.etsi.org/Portals/0/TBpages/F5G/ISG_F5G_ToR_D-G_APPROVED_20191210.pdf>  Work Programme of ETSI F5G can be found at following URL <https://portal.etsi.org/tb.aspx?tbid=885&SubTB=885#/> | | |
| **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> |
| **IEC** | **SC 86A** | | **Fibres and cables** <https://www.iec.ch/dyn/www/f?p=103:7:::::FSP_ORG_ID:1398>  *TD 476 GEN April 2021 (SC 86A WG1) and TD 477 GEN April 2021 (SC 86A WG3)*  Published (or in preparation) documents related to HNT:  From SC 86A WG1:  - IEC 60793-2-40 Ed.5, Optical fibres - Part 2-40: Product specifications - Sectional specification for category A4 multimode fibres  From SC 86A WG3: - IEC 60794-6 Ed.1: Optical Fibre Cables Part 6: Indoor-Outdoor cables - Sectional specification for Indoor-Outdoor cables |
| **IEEE**  continuation of  **IEEE**  continuation of  **IEEE**  continuation of  **IEEE**  continuation of  **IEEE**  continuation of  **IEEE** | **IEEE 802.3**  continuation of  **IEEE 802.3** | | **IEEE 802.3 Ethernet Working Group** <http://www.ieee802.org/3/>  *TD 582 WP1 April 2021*  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 eleven approved amendments, IEEE Std 802.3cb-2018, IEEE Std 802.3bt-2018, IEEE Std 802.3cd2018, 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, IEEE Std 802.3ca-2020, IEEE Std 802.3cr-2021, and IEEE Std 802.3cu-2021.  A revision of IEEE Std 802.3-2018 is underway in parallel with other amendments proposing new additions to the family of Ethernet capabilities. This next revision will merge the above amendments (and possibly other amendments) into the next revision. 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 PHY 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.   * The approved IEEE Std 802.3bt-2018 Power via MDI over 4-Pair defines a method for provision of more electrical current than supported in earlier Power over Ethernet specifications. Specifications for Power over Ethernet have been updated in recently approved amendments and additional updates are proposed by IEEE P802.3cv (Maintenance #15). * IEEE Std 802.3cg-2019, 10 Mb/s Single Pair Ethernet though primarily targeted to Industrial applications, will likely find uses in smart home networking and Internet of Things. IEEE P802.3da is a current project on enhancements for single pair Ethernet. * The IEEE P802.3cx project is working on improved PTP timestamping accuracy. The higher precision time stamping may find HNT applications. |
| **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 802.11-2020 - 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 802.11-2020 - 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 802.11-2020 - 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 802.11-2020 - 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 802.11-2020 – Clause 25 (Supersedes IEEE Std 802.11aj-2018 Amendment 3 of IEEE 802.11-2016: Enhancements for Very High Throughput to Support Chinese Millimeter Wave Frequency Bands (60 GHz and 45 GHz): 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 25 - China millimeter-wave multi-gigabit (CMMG) PHY specification.  IEEE Std 802.11-2020 – Clause 23 (Supersedes IEEE Std 802.11ah-2016 Amendment 2 of 802.11-2016: Sub 1 GHz License Exempt Operation): 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 23 - Sub 1 GHz (S1G) PHY specification  IEEE 802.11ax-2021 - IEEE Approved 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_11-2020.html> for more information on 802.11-2020, and to <https://standards.ieee.org/standard/802_11ax-2021.html> for status of approved draft amendment 802.11ax.  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)  New IEEE 802.11 standardization projects applicable to Home Networks IEEE 802.11 has approved the creation of a new task group to work on a major amendment, IEEE 802.11be, for next generation wireless LAN:  IEEE P802.11be™ to Enable Extremely High Throughput (EHT) and Low Latency for Wi-Fi®.  For more information on IEEE P802.11be can be found at <https://beyondstandards.ieee.org/ieee-p802-11be-to-enable-extremely-high-throughput-eht-and-low-latency-for-wi-fi/> and at: <https://www.ieee802.org/11/Reports/tgbe_update.htm>  IEEE P802.11bf is a new Task Group about WLAN sensing within the IEEE 802.11 working group  More information on IEEE P802.11bf can be found at: <https://www.ieee802.org/11/Reports/tgbf_update.htm> |
| **IEEE 1901** | | **IEEE Working Group on Power Line Communications (COM/PLC)** <https://sagroups.ieee.org/1901/>  *TD 639 WP1 – April 2021*  IEEE 1901 Working Group communicates following update: The scope of the IEEE 1901 Working Group is to maintain and advance the IEEE 1901 standard “IEEE Standard for Broadband over Power Line Networks: Medium Access Control and Physical Layer Specifications” originally approved in 2010.  Most recent activities included the development of IEEE 1901a-2019 “Amendment 1: Enhancement for Internet of Things Applications” and the revision of IEEE 1901-2010. This has resulted in the publication of IEEE 1901-2020 - IEEE Standard for Broadband over Power Line Networks: Medium Access Control and Physical Layer Specifications.  This new revision IEEE Std 1901-2020 incorporates the amendment 1of the previous 2010 edition -  IEEE 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.  For more information on IEEE 1901-2020, see at <https://standards.ieee.org/standard/1901-2020.html>  The Working Group is currently working on the P1901b project “Standard for Broadband over Power Line Networks: Medium Access Control and Physical Layer Specifications - Amendment: Enhancements for Authentication and Authorization”. |
| **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 Applications and amendment IEEE 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**  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 1  ISO/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**  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 25 The 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=103:7:1288324492443::::FSP_ORG_ID,FSP_LANG_ID:3399,25)  ISO/IEC JTC 1/SC 25 Subcommittee(s) and/or Working Group(s) responsible for home networks: - 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=103:22:1288324492443::::FSP_ORG_ID,FSP_LANG_ID:3399,25)  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)  **ISO/IEC JTC 1/SC 25/WG 1 “Home Electronic System (HES)”**  *TD 546 WP1 April 2021* In its liaison ISO/IEC JTC 1/SC 25 notes that ITU-T SG15 has projects in the field of home networks (“domotics”) such as: - Technical paper on architecture, function, and service of home network - Technologies for in-premises networking and related access applications ISO/IEC JTC 1/SC25 recommends that ITU-T SG15 references standards developed by SC25 that are relevant to SG15 projects. The scope of SC25 covers areas important for home networks and applications, as stated in the following except from the scope:   * Standards for home and building electronic systems in residential and commercial environments to support interworking devices (IoT-related) and applications such as energy management, environmental control, lighting, and security.   In its liaison ISO/IEC JTC 1/SC 25 attaches a summary “Home Electronic System (HES) Overview” dated September 2020 prepared by Dr. Kenneth Wacks - Convener of ISO/IEC JTC 1/SC 25/WG 1 – see attached below.    This summary provides an overview of the more than 50 standards and technical reports published and under development originated in SC25/WG1. This document served as reference for the update of the “List of HES standards and technical reports” below as well as Part 6 of the “Web-Based Home Network Transport (HNT) Standards Overview” - see Section 3 - of the present document.  **List of HES standards and technical reports**  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 standards and technical reports for HES Architecture. - TS 15044: Information technology - Terminology for the Home Electronic System (HES). - 14543-2-1: HES Architecture Part 2-1: Introduction and device modularity. - 14543-3-1: HES Architecture Part 3-1: Communication layers - Application layer for network based control of HES Class 1. - 14543-3-2: HES 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: HES Architecture Part 3-3: User process for network based control of HES Class 1. - 14543-3-4: HES Architecture Part 3-4: System management - Management procedures for network based control of HES Class 1. - 14543-3-5: HES Architecture Part 3-5: Media and media dependent layers - Powerline for network based control of HES Class 1. - 14543-3-6: HES Architecture Part 3-6: Media and media dependent layers - Twisted pair for network based control of HES Class 1. - 14543-3-7: HES Architecture Part 3-7: Media and media dependent layers - Radio frequency for network based control of HES Class 1. - TR 14543-4: HES Architecture Part 4: Home and building automation in a mixed-use building. - 14543-4-1: HES Architecture Part 4-1: Communication layers - Application layer for network enhanced control devices of HES Class 1. - 14543-4-2: HES 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: HES Architecture Part 4-3: Application layer interface to lower communications layers for network enhanced control devices of HES Class 1. - 14543-4-301: HES Architecture Part 4-301: Application protocols for home air conditioners and controllers. - 14543-5-1: HES Architecture Part 5-1: Intelligent grouping and resource sharing for Class 2 and Class 3 - Core protocol. - 14543-5-3: HES Architecture Part 5-3: Intelligent grouping and resource sharing for HES Class 2 and Class 3 - Basic application. - 14543-5-4: HES Architecture Part 5-4: Intelligent grouping and resource sharing for HES Class 2 and Class 3 - Device validation. - 14543-5-5: HES Architecture Part 5-5: Intelligent grouping and resource sharing for HES Class 2 and Class 3 - Device type. - 14543-5-6: HES Architecture Part 5-6: Intelligent grouping and resource sharing for HES Class 2 and Class 3 - Service type. - 14543-5-7: HES Architecture - Part 5-7: Intelligent grouping and resource sharing for HES Class 2 and Class 3 - Remote access system architecture. - 14543-5-8: HES Architecture - Part 5-8: Intelligent grouping and resource sharing for HES Class 2 and Class 3 - Remote access core protocol. - 14543-5-9: HES Architecture - Part 5-9: Intelligent grouping and resource sharing for HES Class 2 and Class 3 - Remote access service platform. - 14543-5-11: HES Architecture - Part 5-11: Intelligent grouping and resource sharing for HES Class 2 and Class 3 - Remote user interface. - 14543-5-12: HES Architecture - Part 5-12: Intelligent grouping and resource sharing for HES Class 2 and Class 3 - Remote access test and verification. - 14543-5-21: HES Architecture - Part 5-21: Intelligent grouping and resource sharing for HES Class 2 and Class 3 - Application profile - AV profile. -14543-5-22: HES Architecture - Part 5-22: Intelligent grouping and resource sharing for HES Class 2 and Class 3 - Application profile - File profile. - 14543-5-101: HES Architecture - Part 5-101: Intelligent grouping and resource sharing for HES Class 2 and Class 3 - Remote media access profile. - 14543-5-102: HES Architecture - Part 5-102: Intelligent grouping and resource sharing for HES Class 2 and Class 3 - Remote universal management profile.  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 standards and technical reports 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: HES Gateway - Part 1: A residential gateway model for HES. - 15045-2: HES Gateway - Part 2: Modularity and protocol. - 10192-1: HES Interfaces - Part 1: Universal Interface (UI) Class 1. - TR 10192-2: HES Interfaces - Part 2: Simple Interface Type 1. - 10192-3: HES Interfaces - Part 3: Modular communications interface for energy management.  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 the list of standards for security. - 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 the list of standards for wireless communication. - 14543-3-10: HES Architecture Part 3-10: Amplitude modulated wireless short-packet (AMWSP) protocol optimized for energy harvesting - Architecture and lower layer protocols. - 14543-3-11: HES 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. - 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.  In addition to these communication protocol specifications, SC 25/WG 1 published a set of standards to manage energy usage and generation in the home, GridWise, lighting systems and residential security systems. These are found in the ISO/IEC 15067-2, ISO/IEC 15067-3 and ISO/IEC 15067-4 series: see below the list of standards and technical reports for energy management, lighting and residential security systems. - TR 15067-2: HES Application model - Part 2: Lighting model for HES - 15067-3: HES Application model - Part 3: Model of a demand-response energy management system for HES. - TR 15067-3-2: HES Application model - Part 3-2: GridWise - Interoperability context-setting framework. - 15067-3-3: HES Application model - Part 3-3: Model of a system of interacting energy management agents (EMAs) for demand-response energy management. - TR 15067-3-7: HES Application model - GridWise transactive energy systems research, development and deployment roadmap. - TR 15067-3-8: HES Application model - Part 3-8: GridWise transactive energy framework. - TR 15067-4: HES Application model - Part 4: Security system for HES.  SC 25/WG 1 published also a set of standards for the home network resource management - these are found in the ISO/IEC 30100 series – and a standard ISO/IEC 14762 for the functional safety requirements: see below the list for standards for home network resource management and safety. - 30100-1: Home network resource management - Part 1: Requirements. - 30100-2: Home network resource management - Part 2: Architecture. - 30100-3: Home network resource management - Part 3: Management application. - 14762: Functional safety requirements for home and building electronic systems (HBES).  See also the ISO/IEC 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. - 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. - TS 29125 and Amd.1: Telecommunications cabling requirements for remote powering of terminal equipment. |
| **MoCA®**  continuation of **MoCA®** | **MoCA®** Multimedia over Coax Alliance <http://www.mocalliance.org/>  *TD 578 WP1 April 2021* MoCa provided a complete update of the section “MoCA home networking MAC/PHY specifications” as below.  The Multimedia over Coax Alliance, MoCA®, supports three versions of its MoCA home networking MAC/PHY specifications (MoCA Home™ 2.0/2.0 Bonded, MoCA Home™ 2.5 and MoCA Home™ 3.0).  MoCA 1.0 and 1.1 specifications are sunset and the Alliance no longer certifies products using these protocols.  **MoCA Home 2.0/2.0 Bonded**  - Up to 1 Gbps MAC data rate - Deterministic (scheduled) media access with 3.6 ms 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 400…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 MAC data rate  - MoCA protected setup (MPS) - Management Proxy - Enhanced Privacy - Network wide Beacon Power  - Bridge detection   * MoCA Home 2.5 is backward interoperable with MoCA Home 2.0/2.0 Bonded.   **NOTE**: MoCASec™ is a peer-to-peer security feature accessible for MoCA Home 2.0/2.0 Bonded and MoCA Home 2.5 via firmware download. Peer-to-peer security is embedded in MoCA Home 3.0.  **MoCA Home 3.0** - Up to 10 Gbps MAC data rate with a channel bandwidth of up to 1600 MHz and 5 Gbps with a channel bandwidth of up to 800 MHz  - Less channel bandwidth required to achieve 2.5 Gbps of MAC data rate (300 MHz ~ 400 MHz)  - Low latency (as low as 1.4 ms)  - Provides peer-to-peer security capability  - Strong security and privacy features (support for IEEE Std 802.1X, 128-bit AES-CTR)  - Up to four 400 MHz channels operating in the frequency range of 200…2075MHz  - Support for network-wide reduced power mode - Support for remote password provisioning without user intervention  - MoCA Home 3.0 is backward interoperable with MoCA Home 2.0/2.0 Bonded and MoCA Home 2.5.  **MoCA Access™ 2.5** MAC/PHY Specification is a network access standard capable of 2.5 Gbps data rates over coaxial cable. For more details: <http://www.mocalliance.org/access/index.htm>.  The Alliance emphasizes true and realized data rates and has conducted numerous field tests to verify MAC rates. | | |
| **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) | | |
| **Zigbee** | **Zigbee Alliance** <https://zigbeealliance.org/>  Zigbee is a IEEE 802.15.4 based wireless system. Zigbee Technical Specifications can be found at <https://zigbeealliance.org/solution/zigbee/>  More information about Zigbee technology and applications can be found at <https://zigbeealliance.org/solutions/> | | |
| **Z-Wave** | **Z-Wave Alliance** <https://z-wavealliance.org/>  Z-Wave PHY and MAC layers are defined by ITU-T Recommendation [G.9959](http://www.itu.int/rec/T-REC-G.9959-201501-I) . Z-Wave specifications can be found at <https://z-wavealliance.org/z-wave-specifications/> More information about Z-Wave technology can be found at <https://z-wavealliance.org/about_z-wave_technology/>  More information on Z-Wave technology for the Internet of Things and connected objects can be found at <https://www.z-wave.com/> | | |

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

A web-based HNT Standards Overview has been set up in order to make the standards lists in Section 1.1 (Table 1), Section 1.2 (Table 2), Section 1.3 (Table 3) , Section 2 (Table 4) and related applications in Annex 1 (Table 5) more manageable and user-friendly. The web-based overview is organized by Home Network Transport mediums and the various systems and technologies. It also provides examples of Home Network applications as described in Annex 1. The web-based HNT Standards Overview enables an easy identification and download of the publicly available Standards, Recommendations, Technical Specifications and Reports related to each system, technology and associated technical matters. The web-based HNT Standards Overview focuses on the most relevant published and updated documents related to Home Network. 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 HNT Standards Overview appear alphanumerically listed; this is inherent in the data base system.   
The web-based HNT Standards Overview is available 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– on the page “Documentation”.

|  |  |  |  |
| --- | --- | --- | --- |
| **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)** - HES terminology and architecture - HES interoperability, gateways and interfaces - HES security - HES wireless communication – AM and FMWSP, WiBEEM - HES home network resource management - HBES safety requirements | **HES Applications** - HES energy management, GridWise and lighting - HES residential security systems |  |  |
| **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** |

**Annex 1 - Overview of Home Networks applications**

**Table 5 – Overview of Home Network applications and related Home Network technologies**

| **Technology** | **Standards** | **Internet connectivity** | **In-home Access Points connectivity** | **Personal connectivity** | **IoT / Domotics applications** | **Smart Grid / Energy**  **Management** |
| --- | --- | --- | --- | --- | --- | --- |
| **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 | X |
| IEEE 1901.2 IEEE 1901.2a |  |  |  |  | X |
| **G.hn  Broadband  PLC  (Powerline)** | G.9960 G.9961 G.9962 G.9963 G.9964 | X | X |  | X | X |
| **Other  Broadband  PLC  (Powerline)** | IEEE 1901 | X | X |  | X | X |
| IEEE 1901.1 | 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  2.5GBASE-T 5GBASE-T 10GBASE-T | X | X |  |  |  |
| IEEE 802.3cg |  |  |  | X |  |
| **G.hn  (Catx)  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** | | | | | |  |
| **IEEE 802.11** | Wi-Fi 4, 5, 6 | X | X |  | X |  |
| **Bluetooth** | Bluetooth specifications |  |  | X | X |  |
| **Zigbee** | Zigbee specifications |  |  |  | X | X |
| **LiFi** | G.9991 | X |  | X | X |  |
| **Sub-1 GHz**  **and Z-Wave** | IEEE 802.11ah  G.9959  Z-Wave specifications |  |  |  | X | X |
| **DECT ULE** |  |  |  |  | X |  |
| **ISO/IEC JTC 1/SC 25 “Interconnection of Information Technology Equipment”** | | | | | | |
| **HES** |  |  |  |  | X | X |

**Annex 2 - List of Contacts**

| **Body** | **Contact person** | | **Link to the Web-Site** | **Status of contact**  **Notes Liaison Tracking** |
| --- | --- | --- | --- | --- |
| Broadband Forum | Lincoln Lavoie Broadband Forum Technical Committee Chair [lylavoie@iol.unh.edu](mailto:lylavoie@iol.unh.edu) | | [www.broadband-forum.org/](http://www.broadband-forum.org/) | TD 334 GEN  Jan-Feb 2020  Liaison Rapporteur Frank Van der Putten [frank.van\_der\_putten@nokia.com](mailto:frank.van_der_putten@nokia.com) |
| IEC SC 86A Fibres and cables |  | | <https://www.iec.ch/dyn/www/f?p=103:7:0::::FSP_ORG_ID:1398> | TD 476 GEN and TD 477 GEN April 2021  Liaison Rapporteur Peter Pondillo Corning Incorporated [pondillopl@corning.com](mailto:pondillopl@corning.com) |
| ETSI TC ATTM (Access Terminals, Transmission and Multiplexing) | Chairman: ATTM Dominique Roche eG4U [dominique.roche@eg4u.org](mailto:dominique.roche@eg4u.org)  ATTM Technical Secretary  Pat O’Keeffe  eG4U  [Pat.okeeffe@eg4u.ie](mailto:Pat.okeeffe@eg4u.ie)  ATTM AT2 Olivier Bouffant ATTM/AT2 Chairman [olivier.bouffant@orange.com](mailto:olivier.bouffant@orange.com) | | [portal.etsi.org/home.aspx](http://portal.etsi.org/home.aspx) | TD 580 WP1 April 2021 |
| ETSI ISG F5G 5th Generation Fixed Network | |  | <https://www.etsi.org/committee/1696-f5g> | TD 575 WP1 April 2021  Liaison Rapporteur Tony Zeng Huawei China [tony.zengyan@huawei.com](mailto:tony.zengyan@huawei.com) |
| IEEE 802.3 | David Law Chair, IEEE 802.3 Ethernet Working Group [dlaw@hpe.com](mailto:dlaw@hpe.com) | | [ieee802.org/3](http://ieee802.org/3) | TD 582 WP1 April 2021  TD 466 GEN April 2021  Liaison Rapporteur Peter Stassar [peter.stassar@huawei.com](mailto:peter.stassar@huawei.com) |
| IEEE 1901 Working Group on Power Line Communications (COM/PLC) | Chair,  Jean-Philippe Faure  [jean-philippe.faure@progilon.com](mailto:jean-philippe.faure@progilon.com) | | <https://sagroups.ieee.org/1901/> | TD 639 WP1 April 2021 |
| MoCA®  Multimedia over Coax Alliance | Roberta Silverstein, Managing Director Multimedia over Coax Alliance, MoCA (R) [robertas@mocalliance.org](mailto:robertas@mocalliance.org) | | [www.mocalliance.org](http://www.mocalliance.org) [www.mocainyourhouse.com](http://www.mocainyourhouse.com) | TD 578 WP1 April 2021 |
| ITU-R WP1A | John Shaw Chairman, Correspondence Group on EMC Related Interference and  Coexistence of wired telecommunication systems with radiocommunication systems [shawzone@gmail.com](mailto:shawzone@gmail.com) | | [www.itu.int/en/ITU-R/study-groups/Pages/default.aspx](http://www.itu.int/en/ITU-R/study-groups/Pages/default.aspx) | TD 554 WP1 April 2021 |
| 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 WP5D |  | | [www.itu.int/en/ITU-R/study-groups/rsg5/rwp5d/Pages/default.aspx](http://www.itu.int/en/ITU-R/study-groups/rsg5/rwp5d/Pages/default.aspx) |  |
| ITU-R WP6A | John Shaw Rapporteur on Power Line Telecommunication (PLT) and general EMC-related potential [shawzone@gmail.com](mailto:shawzone@gmail.com) | | <http://www.itu.int/en/ITU-R/study-groups/rsg6/Pages/default.aspx> | TD 547 WP1 April 2021 |
| ITU-R WP6B | Paul Gardiner Chairman, WP6B [Paul.Gardiner@sony.com](mailto:Paul.Gardiner@sony.com) | |  | TD 220 WP1 October 2018 |
| ITU-T SG5 | Fryderyk Lewicki WP1/5 Chairman Orange Polska [fryderyk.lewicki@orange.com](mailto:fryderyk.lewicki@orange.com) | | <http://www.itu.int/en/ITU-T/studygroups/2017-2020/05/Pages/default.aspx> | TD 548 WP1 April 2021 |
| ITU-T SG9 | Shizhu Long Shenzhen Skyworth Digital Technology Co. Ltd  China Rapporteur of Q6/9 [longshizhu@skyworth.com](mailto:longshizhu@skyworth.com) | | <http://www.itu.int/en/ITU-T/studygroups/2017-2020/09/Pages/default.aspx> | TD 553 WP1 April 2021 |
| ITU-T SG11 | Andrey Kucheryavy SG11 Chairman [akouch@mail.ru](mailto:akouch@mail.ru) | | <http://www.itu.int/en/ITU-T/studygroups/2017-2020/11/Pages/default.aspx> | TD 471 GEN April 2021 |
| 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 Baek Rapporteur of Q6/17 [jhbaek@kisa.or.kr](mailto:jhbaek@kisa.or.kr) | | <http://www.itu.int/en/ITU-T/studygroups/2017-2020/17/Pages/default.aspx> | TD 483 WP1 September 2020 |
| 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 Peter Secretary ISO/IEC JTC 1/SC 25 [peter@zvei.org](mailto:peter@zvei.org) | | <https://www.iso.org/committee/45270.html> | TD 546 WP1 April 2021 |

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