



**Access, Terminals, Transmission and Multiplexing (ATTM);  
Ethernet and power over cables;  
Part 2: Ethernet and power over coaxial cables  
for IP video surveillance**

*iTeh STANDARD PREVIEW  
(see www.it-europe.com)  
Full standards list: https://standards.iteh.ai/catalog/standards-etsi/105-176-2-v1-1-2019-06  
https://standards.iteh.ai/catalog/standards-etsi/105-176-2-v1-1-2019-06  
4d93-b70d-46b2c5f62a75/etsi-ts-105-176-2-v1-1-2019-06*

---

**Reference**

DTS/ATTMSDMC-6

---

**Keywords**

HomePlug av, ip, power over coaxial cable, smart appliance, smart city, video, video security, video surveillance

**ETSI**

650 Route des Lucioles  
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C  
Association à but non lucratif enregistrée à la  
Sous-Préfecture de Grasse (06) N° 7803/88

---

**Important notice**

The present document can be downloaded from:

<http://www.etsi.org/standards-search>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the prevailing version of an ETSI deliverable is the one made publicly available in PDF format at [www.etsi.org/deliver](http://www.etsi.org/deliver).

Users of the present document should be aware that the document may be subject to revision or change of status.

Information on the current status of this and other ETSI documents is available at

<https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx>

If you find errors in the present document, please send your comment to one of the following services:

<https://portal.etsi.org/People/CommiteeSupportStaff.aspx>

---

**Copyright Notification**

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© ETSI 2019.

All rights reserved.

**DECT™**, **PLUGTESTS™**, **UMTS™** and the ETSI logo are trademarks of ETSI registered for the benefit of its Members.

**3GPP™** and **LTE™** are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.

**oneM2M™** logo is a trademark of ETSI registered for the benefit of its Members and of the oneM2M Partners.

**GSM®** and the GSM logo are trademarks registered and owned by the GSM Association.

# Contents

Intellectual Property Rights .....	5
Foreword.....	5
Modal verbs terminology.....	5
Executive summary .....	5
Introduction .....	6
1 Scope .....	7
2 References .....	7
2.1 Normative references .....	7
2.2 Informative references.....	7
3 Definition of terms, symbols and abbreviations.....	8
3.1 Terms.....	8
3.2 Symbols.....	8
3.3 Abbreviations .....	9
4 The E&PoC System .....	9
4.1 Introduction .....	9
4.2 System overview .....	9
4.3 Ethernet & Power over Coax system block diagram .....	10
4.3.1 rDEV (Receiver Device) definition .....	10
4.3.2 eDEV (Edge Device) / eSYS definition.....	11
4.3.3 rSTA (Receiver Station) definition.....	11
4.3.4 eSTA (Edge Station) definition .....	12
4.4 Supported topologies.....	12
4.4.1 Forewords on supported topologies.....	12
4.4.2 Linear Bus topology.....	12
4.4.3 Point-to-point topology .....	12
5 Interoperability requirements for an E&PoC system .....	12
5.1 Communication mode background.....	12
5.1.1 Specification context.....	12
5.1.2 Requirements .....	13
5.2 E&PoC System and BSS.....	13
5.2.1 Specification context.....	13
5.2.2 Requirements .....	14
5.3 Neighbour networks .....	14
5.3.1 Specification context.....	14
5.3.2 Requirements .....	15
5.4 Security in E&PoC system .....	15
5.4.1 Specification context.....	15
5.4.2 Requirements .....	15
5.5 Receiver Device (rDEV) per-port PoC reset .....	15
5.5.1 Specification context.....	15
5.5.2 Requirements .....	16
5.6 Support to installation (Optional).....	16
5.6.1 Specification context.....	16
5.6.2 Requirements .....	16
5.7 Hot-Plug support .....	16
5.7.1 Specification context.....	16
5.7.2 Requirements .....	16
6 Power distribution requirements for an E&PoC system.....	17
6.1 Edge DEV (eDEV) / Edge System (eSYS) power .....	17
6.1.1 Specification context.....	17
6.1.2 Requirements .....	18
6.1.3 Requirements .....	18

6.1.4	Requirements .....	18
6.2	Receiver Device (rDEV) per-port PoC.....	19
6.2.1	Specification context.....	19
6.2.2	Requirements .....	19
6.3	Receiver Device (rDEV) per-port PoC control (Optional) .....	19
6.3.1	Specification context.....	19
6.3.2	Requirements .....	20
7	Data transmission requirements for an E&PoC system .....	20
7.1	Receiver Station / Device throughput capability .....	20
7.1.1	Specification context.....	20
7.1.2	Requirements .....	21
7.2	Adapter eDEV throughput & streaming capability .....	21
7.2.1	Specification context.....	21
7.2.2	Requirements .....	22
7.3	Terminal eDEV throughput & streaming capability .....	22
7.3.1	Specification context.....	22
7.3.2	Requirements .....	22
<b>Annex A (normative):</b>	<b>Requirements summary .....</b>	<b>24</b>
<b>Annex B (informative):</b>	<b>Change History .....</b>	<b>25</b>
History .....		26

**iTeh STANDARD PREVIEW**  
 (standards.iteh.ai)  
 Full standard:  
<https://standards.iteh.ai/catalog/standards/sist/6235fa99-d492-4d93-b70d-46b2c5f62a75/etsi-ts-105-176-2-v1.1.1-2019-06>

---

# Intellectual Property Rights

## Essential patents

IPRs essential or potentially essential to normative deliverables may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: "*Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards*", which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<https://ipr.etsi.org/>).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

## Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

---

# Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Access, Terminals, Transmission and Multiplexing (ATTM).

The present document is part 2 of a multi-part deliverable covering the Ethernet and power over cables, as identified below:

- Part 1: "Overview, common and generic aspects";
- Part 2: "Ethernet and power over coaxial cables for IP video surveillance".**

---

# Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

---

# Executive summary

The present document describes standardization specification for an Ethernet & Power over Coax technology intended to promote the development of interoperable Ethernet & Power over Coax solutions for Video Surveillance.

The Ethernet & Power over Coax (E&PoC) technology standardized in the present document enables an energy efficient and sustainable transition from legacy analogue Video Surveillance systems to IP Video Surveillance systems by enabling the transmission of IP data over coaxial cable infrastructures, also called IP-over-Coax solutions, while ensuring safe and reliable power delivery, hence allowing a robust, manageable and interoperable infrastructure.

The Ethernet & Power over Coax technology (E&PoC) also addresses network extension issue by providing the ability to extend a Video Surveillance Network with additional IP cameras or devices without having to run an entirely new cable from the head end device to a new front end device. Ethernet & Power over Coax technology allows plug-and-play connectivity, allowing seamless connection and addition of a front end device to the network.

The Ethernet & Power over Coax technology (E&PoC) relies on the HomePlug AV family of standards, which is a robust, very stable and interoperable technology largely deployed over the world for very high rate applications like in-home LAN extension over power lines, but also in commercial environments such as access networks in Asia.

---

## Introduction

The objective of the present document is to provide requirements that would ensure interoperability between a set of communication devices, also referred as edge devices (e.g. IP cameras, adapter devices, Power over Coax cameras), and connected over a coaxial cable infrastructure to a receiver device (e.g. Power over Coax switch device).

The present document provides requirements covering system-level issues - e.g. neighbour networking, receiver device port reset, hot-plug - power distribution and data transmission over an Ethernet & Power over Coax system.

**iTeh STANDARD PREVIEW**  
(standards.iteh.ai)  
Full standard:  
<https://standards.iteh.ai/catalog/standards/sist/6235fa99-d492-4d93-b70d-46b2c5f62a75/etsi-ts-105-176-2-v1.1.1-2019-06>

---

# 1 Scope

The present document specifies Ethernet & Power over Coax system characteristics in such a way that interoperability issues arising from the connection of several Ethernet & Power over Coax devices in such system are minimized, providing a specification that can be used as the basis for testing and certification.

---

## 2 References

### 2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <https://docbox.etsi.org/Reference/>.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are necessary for the application of the present document.

- [1] IEEE Std 1901™-2010: "IEEE Standard for Broadband over Power Line Networks: Medium Access Control and Physical Layer Specifications".

NOTE: Available at <https://standards.ieee.org/findstds/standard/1901-2010.html>.

- [2] HomePlug AV Specification Version 1.1 May 21, 2007.

NOTE: Available at [https://docbox.etsi.org/Reference/homeplug\\_av11/homeplug\\_av11\\_specification\\_final\\_public.pdf](https://docbox.etsi.org/Reference/homeplug_av11/homeplug_av11_specification_final_public.pdf).

- [3] HomePlug AV Specification Version 2.1 February 21, 2014.

NOTE: Available at [https://docbox.etsi.org/Reference/homeplug\\_av21/homeplug\\_av21\\_specification\\_final\\_public.pdf](https://docbox.etsi.org/Reference/homeplug_av21/homeplug_av21_specification_final_public.pdf).

### 2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

Not applicable.

## 3 Definition of terms, symbols and abbreviations

### 3.1 Terms

For the purposes of the present document, the following terms apply:

**Basic Service Set (BSS):** set of stations that is compliant with the Basic Service Set (BSS) definition, as described in IEEE 1901 [1].

**E&PoC Basic Service Set (BSS):** set of E&PoC stations (E&PoC STAs) forming an E&PoC network

**E&PoC Station (E&PoC STA):** device or chipset that contains a Medium Access Control (MAC) and physical layer (PHY) interface to the communication and power medium that are compliant with the specification defined in the present document

NOTE: One device may embed several E&PoC STA, e.g. an IEEE 1901 power over coax switch device may embed several chipsets, each chipset being considered as an E&PoC STA (actually an rSTA).

**E&PoC System:** Ethernet & Power over Coax system made of one or more receiver stations (rSTA) and one or more edge stations (eSTA) - i.e. multiple E&PoC BSSs) - as defined in clause 4.3.1

**edge Device (eDEV):** communication device having edge connectivity - e.g. PoC IP camera, PoC adapter as defined in clause 4.3.2

NOTE: There are 2 types of eDEVs: Adapter eDEV and Terminal eDEV. Terminal eDEV devices are typically Ethernet and IP devices. Such IP devices may implement an IPv4 or an IPv6 stack, supporting either a fixed or a dynamic (e.g. DHCP) IP configuration, and providing adequate user interface to configure the IP addresses.

**edge Station (eSTA):** E&PoC edge station, as defined in clause 4.3.4

**edge System (eSYS):** both Terminal eDEV or entity composed of an Adapter eDEV and the communication device (e.g. an IP camera) connected to this Adapter eDEV

**HomePlugAV Station:** device that contains an HomePlugAV-conformant Medium Access Control (MAC) and PHYSical layer (PHY) interface to the communication and power medium, compliant with either [2] or [3]

**IEEE 1901 Station:** device that contains an IEEE 1901-conformant Medium Access Control (MAC) and physical layer (PHY) interface to the communication and power medium, compliant with [1], [2] and [3]

**linear bus topology:** topology wherein at least two eDEV / eSYS are connected to a same rDEV port, using T-connectors

**point-to-point topology:** topology wherein only one eDEV / eSYS is connected to an rDEV port

**Power over Coax (PoC):** ability for an rDEV to provide power to an eDEV / eSYS through a coaxial cable

**receiver Device (rDEV):** communication device having receiver capability - e.g. PoC switch, as defined in clause 4.3.1

**receiver Station (rSTA):** E&PoC receiver station, as defined in clause 4.3.3

**User Interface (UI):** mechanism (preferably keyboard and display) to enable user interaction with the network, as defined in [1], [2] or [3]

### 3.2 Symbols

Void.



### 3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

1901 STA	IEEE 1901 Station
AV	Audio Video
AVLN	Audio Video Logical Network, HomePlug AV IN-Home Logical Network
BM	BSS Manager
BSS	Basic Service Set
CI	Crosstalk Interference
DEV	Device
E&PoC BSS	E&PoC Basic Service Set
E&PoC STA	E&PoC Station
E&PoC	Ethernet and Power over Coax
eDEV	E&PoC edge Device
eSTA	E&PoC edge Station
eSYS	edge System
FFT	Fast Fourier Transform
IP	Internet Protocol
LAN	Local Area Network
MAC	Medium Access Control
NMK	Network Management Key
NN	Neighbour Network
OFDM	Orthogonal Frequency Division Multiplexing
PHY	Physical layer
PoC	Power over Coax
rDEV	E&PoC receiver Device
rSTA	E&PoC receiver Station
STA	Station
UI	User Interface
UIS	User Interface Station
VMS	Video Management System

## 4 The E&PoC System

### 4.1 Introduction

The clause 4 provides an overview of an E&PoC System for video surveillance, focusing on the several system devices and wiring infrastructure, as well as the network topologies for this system.

### 4.2 System overview

An E&PoC System allows transferring data between an Edge Device (eDEV), as defined in clause 4.3.2, and a Receiver Device (rDEV), as defined in clause 4.3.1, over a coaxial cable infrastructure. Typically, an Edge Device (eDEV) is sending one or more video streams to the Receiver Device (rDEV). Both eDEV and rDEV are relying on IEEE Std. 1901-2010 and HomePlugAV MAC and PHY layers to operate layer 1 and 2 communication (as defined in [1], [2] and [3]). These video streams are further conveyed to a remote Video Management System (VMS) and/or recorded on a dedicated server, through a dedicated LAN.

An E&PoC System also allows transferring power from a Receiver Device (rDEV) to an Edge Device (eDEV) - e.g. a PoC camera - or an Edge System (eSYS) - e.g. an Adapter device connected to an IP camera - over a coaxial cable infrastructure.

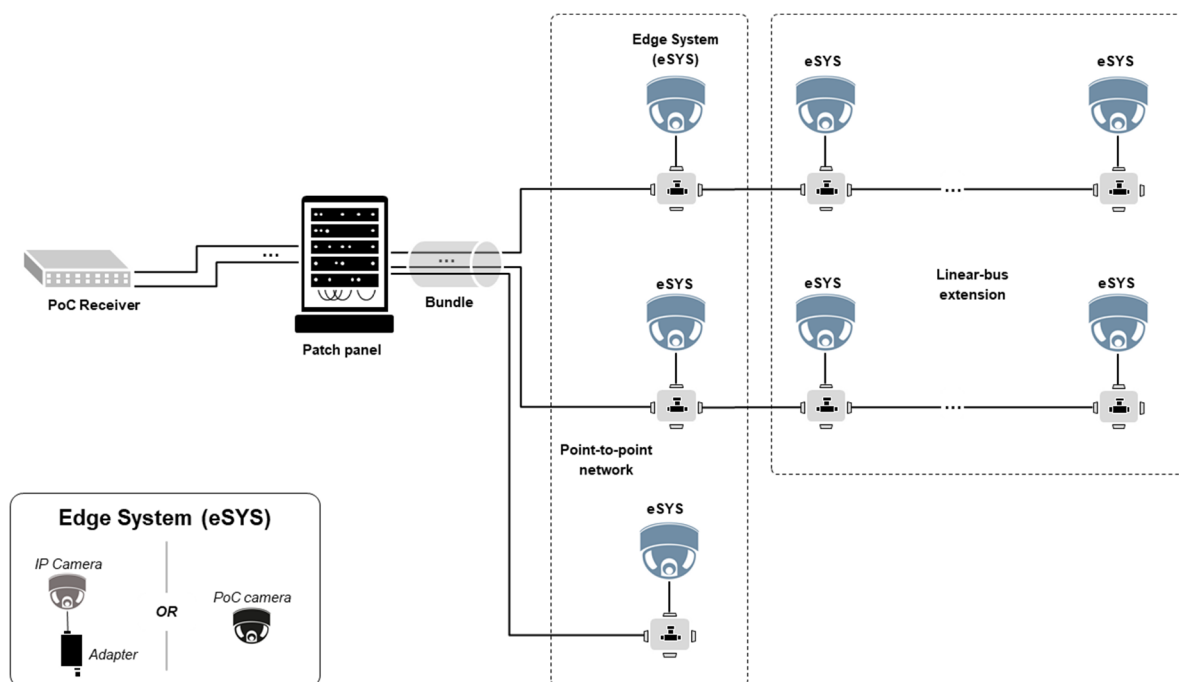


Figure 1: E&PoC system and topology example

## 4.3 Ethernet & Power over Coax system block diagram

### 4.3.1 rDEV (Receiver Device) definition

An E&PoC receiver device, or rDEV, is an E&PoC device having receiver capability.

An E&PoC receiver device (rDEV) shall provide coaxial cable connectivity.

An rDEV is in charge of receiving video streams from one or more eDEV it is connected to, while supplying power to these eDEV through a Coax cable.

An rDEV may embed one or more rSTAs (see also clause 4.3.3).

A typical Receiver Device is a PoC switch device, which is compliant with the present specification document.