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Wireline Access Network Systems;
General engineering for existing network reuse;
Implementation of IP equipment on existing coaxial networks

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Foreword

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

Modal verbs terminology

In the present document "**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).

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1 Scope

The present document supports deployment of video surveillance equipment standardized in ETSI TS 105 176-2 [i.1] and ETSI TR 105 177 [i.2] on existing networks.

2 References

2.1 Normative references

Normative references are not applicable in the present document.

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 regards to a particular subject area.

[i.1] ETSI TS 105 176-2 (V1.1.1): "Access, Terminals, Transmission and Multiplexing (ATTM); Ethernet and power over cables; Part 2: Ethernet and power over coaxial cables for IP video surveillance".

[i.2] ETSI TR 105 177 (V1.1.1): "Access, Terminals, Transmission and Multiplexing (ATTM); Benefit Analysis of Ethernet and power over coaxial cables - IP Video Surveillance Case Studies".

[i.3] ETSI GR OEU 029 (V1.1.1): "Energy Efficient IP Video Surveillance Systems over Coaxial Cables".

[i.4] ETSI EN 305 174-8 (V1.1.1): "Access, Terminals, Transmission and Multiplexing (ATTM); Broadband Deployment and Lifecycle Resource Management; Part 8: Management of end of life of ICT equipment (ICT waste/end of life)".

[i.5] ETSI TS 105 174-8 (V1.1.1): "Access, Terminals, Transmission and Multiplexing (ATTM); Broadband Deployment and Lifecycle Resource Management; Part 8: Implementation of WEEE practices for ICT equipment during maintenance and at end-of-life".

[i.6] ISO/IEC 11801-1 (2018): "Information technology -- Generic cabling for customer premises".

[i.7] EIA/TIA 568-C.2: "Balanced Twisted-Pair Telecommunications Cabling and Components Standards".

[i.8] EN 50173-1:2018: "Information technology - Generic cabling systems - Part 1: General requirements" (produced by CENELEC).

[i.9] IEEE 802.3af™: "IEEE Standard for Information Technology - Telecommunications and Information Exchange Between Systems - Local and Metropolitan Area Networks - Specific Requirements - Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications - Data Terminal Equipment (DTE) Power Via Media Dependent Interface (MDI)".

[i.10] IEEE 802.3at™: "IEEE Standard for Information technology-- Local and metropolitan area networks-- Specific requirements-- Part 3: CSMA/CD Access Method and Physical Layer Specifications Amendment 3: Data Terminal Equipment (DTE) Power via the Media Dependent Interface (MDI) Enhancements".

[i.11] IEEE 802.3bt™: "IEEE Standard for Ethernet Amendment 2: Physical Layer and Management Parameters for Power over Ethernet over 4 pairs".

3 Definition of terms, symbols and abbreviations

3.1 Terms

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

User Interface (UI): mechanism (preferably keyboard and display) to enable user interaction with the network

3.2 Symbols

Void.

3.3 Abbreviations

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

BNC	Bayonet Nut Connector
CCTV	Close Circuit TeleVision
CuR	Red Copper (Cuivre Rouge)
DSL	Digital Subscriber Line
E&PoC	Ethernet and Power over Coax
FeCu	Steel Copper (Acier Cuivré)
I-BNC	I Bayonet Nut Connector
ICT	Information & Communication Technology
IP	Internet Protocol
LAN	Local Area Network
LSZH	Low Smoke Zero Halogen
NF	French Norm (Norme Française)
POC	Power over Coax
PoC	Power over Coaxial
POE	Power Over Ethernet
PoE	Power over Ethernet
PUR	Polyurethane
PVC	PolyVinylChloride
T-BNC	T Bayonet Nut Connector
UI	User Interface
VMS	Video Management System

4 Implementation of a wired capillary architecture

4.1 Capillary Architecture Wiring Types

4.1.1 Generalities

The implementation of a wired capillary architecture is considered and broadly described as in Figure 1.

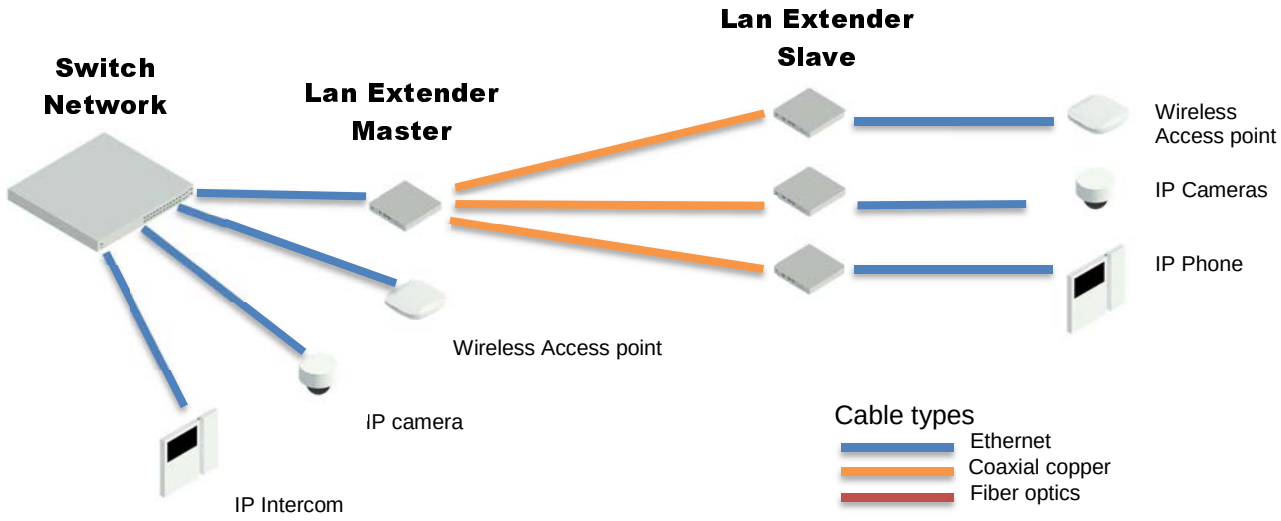

Figure 1: Capillary Architecture

Table 1: Types of wiring

Cable use	Conductor type	Equipment use	POE	Circuit bypass
Analog video	Coaxial conductor	Old standard	NO	NO
	Optical fibre	With dedicated converter	NO	NO
IP video Other IP equipment	Symmetric twisted pairs	Standard for equipment within 90 m	Low power equipment	NO
	Coaxial conductor	Standard for equipment over 90 m and less than 500 m Very exceptionally up to 1 800 m (after report validation)	Low power equipment	YES
	Optical fibre	Standard for equipment over 500 m	NO	NO

4.1.2 Coaxial wiring

Coaxial cables will be used to connect access points that are more than 90 m from their network connection.

For renewal, it will be common to use existing coaxial cables regardless of their length for IP transport.

Commonly used coaxial cables have a characteristic impedance of 75 Ω.

Signals transported over coaxial wiring are historically analogue video signals. Use of Ethernet 10b2 type cables for such signals been used for such signals, and new applications of DSL technology now allow Ethernet signals to be transported over bifilar or + wires.

Coaxial link chains can be used to distribute signals over long lengths of cable with suitable end equipment. Depending on the signals to be transmitted, they allow the use of T-connectors.

4.2 IP binding channel

4.2.1 IP link channel over Ethernet cable (point to point)

Each element should meet a minimum category for the IP channel to match the described class, as described in Figure 2.

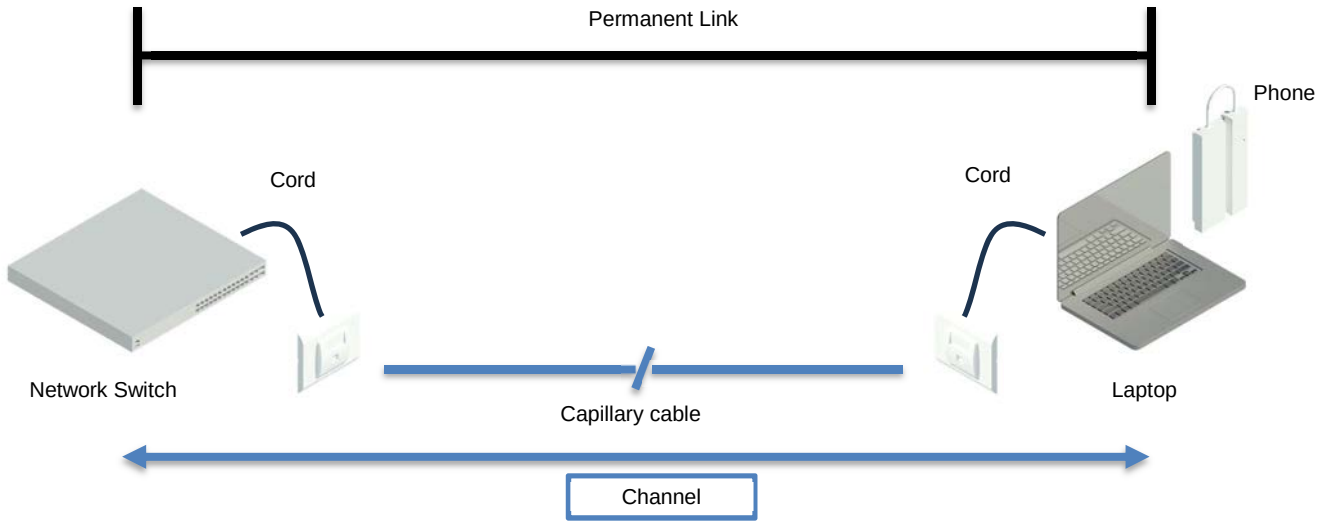

Figure 2: IP link chain

In operating mode, the following recommendations apply:

- Single equipment connection.
- Single cable connects installations, each equipment is connected by flexible patchcords.
- While additional breakpoints are possible but not recommended, it is important to note that they reduce bond length performance.

As a reminder, from class D, the categories have been subdivided as in Table 2.

Table 2: Category (cable)

Category (cable)	CAT5	CAT5e	CAT6	CAT6a	CAT7	CAT7a	CAT7+
Frequency of use (according to standards)	100 MHz	100 MHz	250 MHz	500 MHz	600 MHz	1 000 MHz	1 200 MHz
Characterization frequency	200 MHz	200 MHz	450 MHz	550 MHz	900 MHz	1 200 MHz	1 500 MHz
Class (links)	D	D	E	Ea	F	Fa	Fa

The use of CAT6 or CAT6A is recommended to improve the velocity of propagation of the signal to receiver at the camera.

The patch cord should have a minimum section of AWG24 stranded copper (Not copper Clad Aluminium).

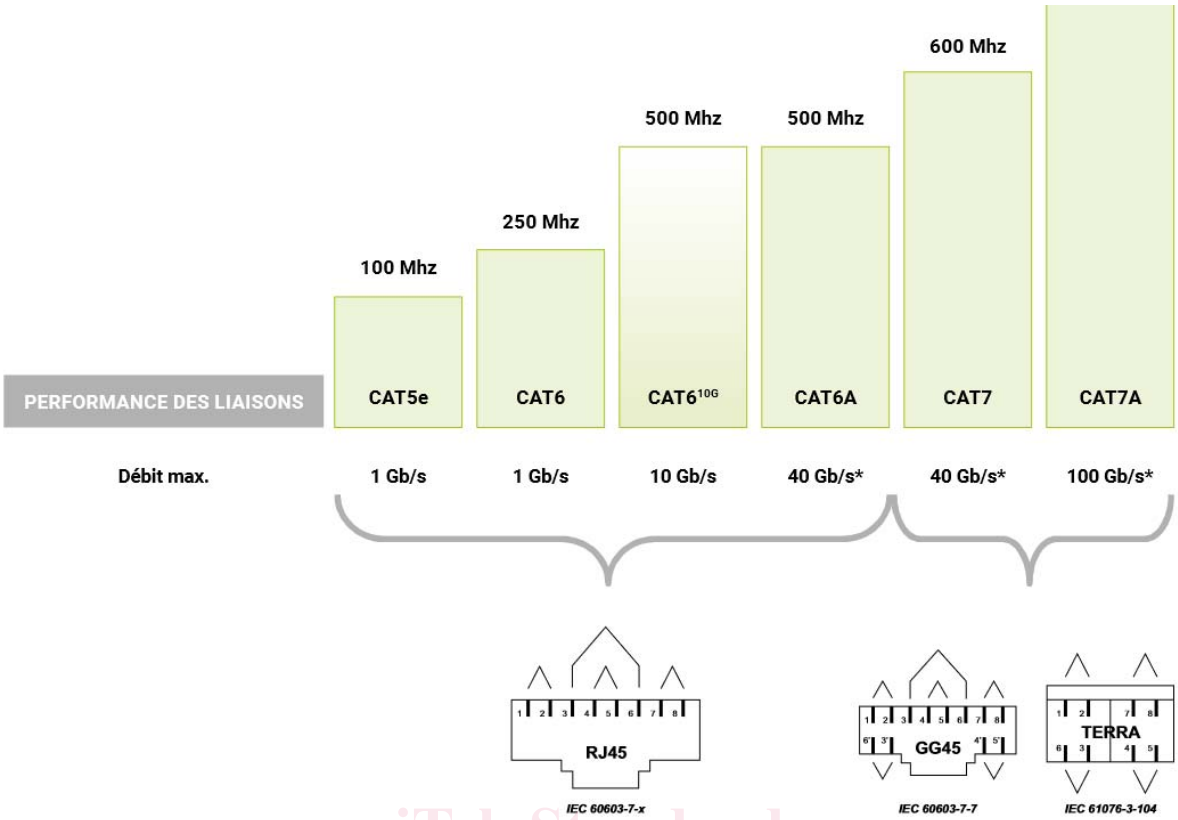

Figure 3: Cable categories and their characteristics

It is advisable to specialize in CCTV wiring. This is to limit malicious disconnections:

- Separation of CCTV concentration points.
- Camera access point is enclosed in the terminal installation, no accessible wall access.
- Outdoor Ethernet access points should be protected against corrosion (IP65 installation).

4-pair cables will be subject to a validation test performed according to ISO/IEC 11801 [i.6] Class Ea, EIA/TIA 568-C.2 CAT6A [i.7], EN 50173-1 [i.8] Class Ea standard, for Ethernet link channel whose ends are connected in RJ45 (see Figure 4).

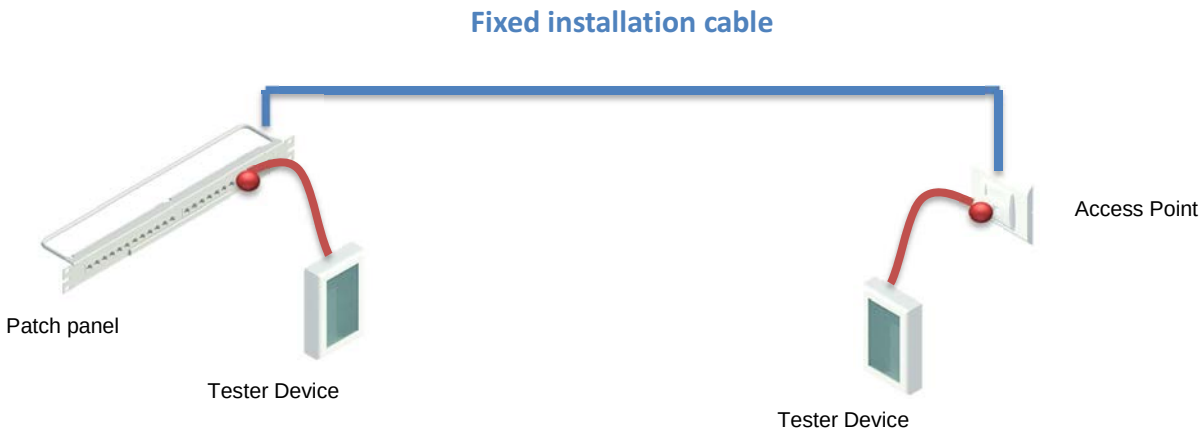

Figure 4: Permanent link test

For this test, two measurement patchcords supplied with a tester are used.