

SHEET 5

CABLE TELEVISION SYSTEM TRADITIONAL TELEVISION AND IPTV



INTRODUCTION

Access to 'full digital', as an inevitable technological development, clearly demonstrates the place of Digital Communication (Internet, TV, etc.) in our life.

Already well established in the residential environment, television is now increasingly becoming a part of the service industry environment.

With high throughput digital solutions, distribution over coaxial type cabling is stumbling upon its limits, and gradually giving way to twisted pair, thus contributing to digital convergence.

CONVERGENCE AND IP

CONVERGENCE

This is a term used to cover a reality that has become increasingly palpable as data exchange has become easier. IP (Internet Protocol) has made a major contribution to standardizing data exchange rules and formats. In a building, convergence means unification of networks, communication systems (computer and telephony), security systems and building management on the same medium.

Having initially been independent of the other systems of the company, video surveillance systems are converging increasingly with IP networks such as computer or telephone systems.

IP PROTOCOL

Regardless of the communication medium used (twisted pair, fiber optics, wireless, etc.), IP (Internet Protocol) defines the simple and highly standardized communication rules that allow any of the items of equipment or systems to communicate with each other.

Although twisted pairs require conversion for analog systems, they are a favored medium for these two types of installation.

In the next five years, FULL IP technology should reach almost half of the video surveillance market. It is therefore necessary from now on to plan an appropriate infrastructure for this migration.

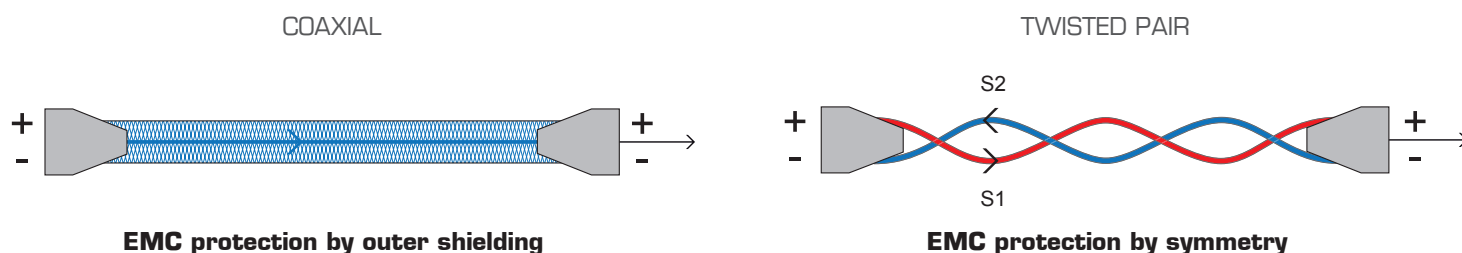
TELEVISION OVER TWISTED PAIR

FROM COAX TO TWISTED PAIR

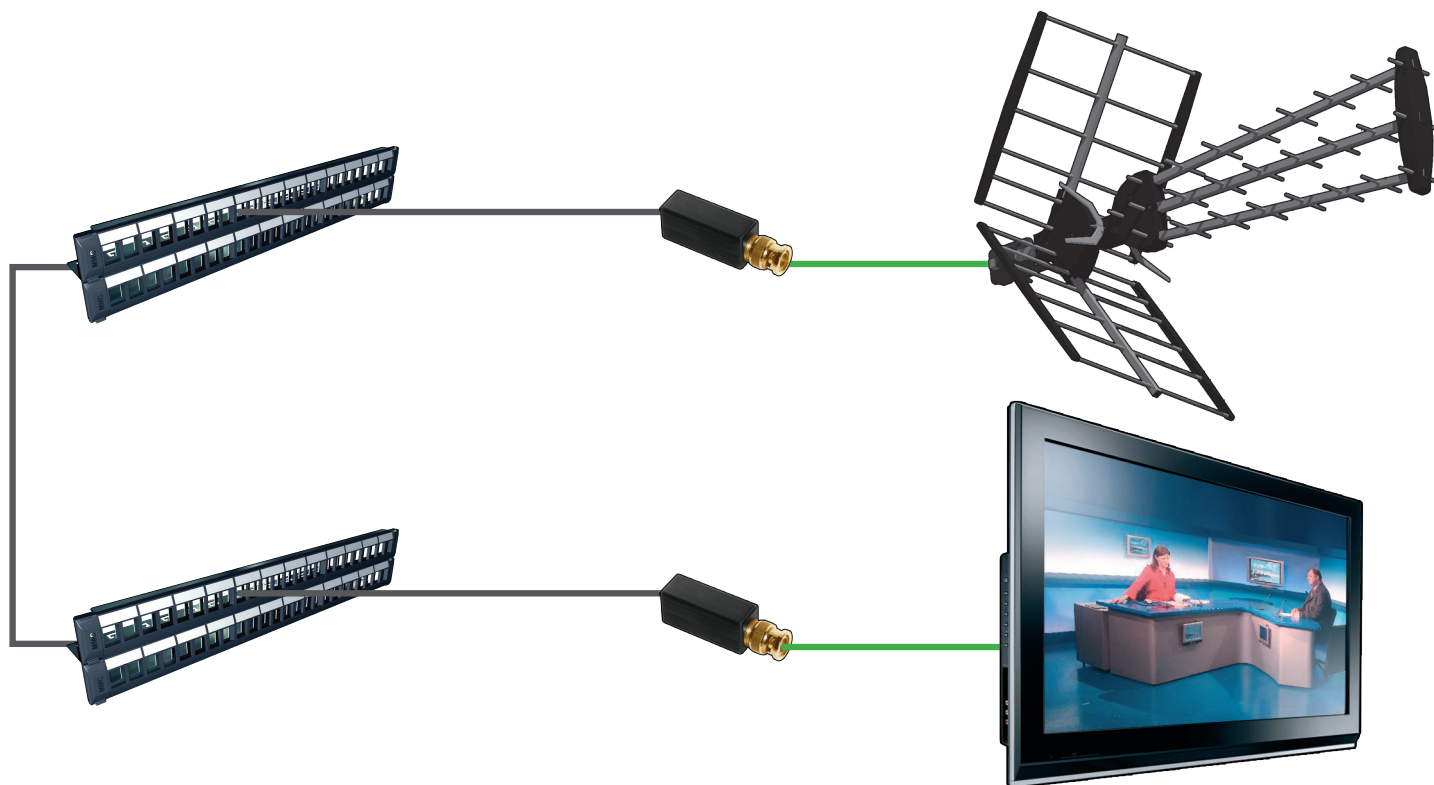
Signal transmission over a coaxial cable is of the unbalanced or asymmetrical type with an impedance of 75 Ohm. The braiding connected to the ground, is used as a reference point for the signal transmitted over the core of the cable.

Conversely, over twisted pair, this transmission is of the balanced or symmetrical type with an impedance of 100 Ohm. In this case, the signal is determined by the difference in levels over a pair.

Medium conversion between the coaxial cable and the twisted pair cable is provided by a balun incorporating balun (balanced/unbalanced) functions combined with an impedance adaptation.

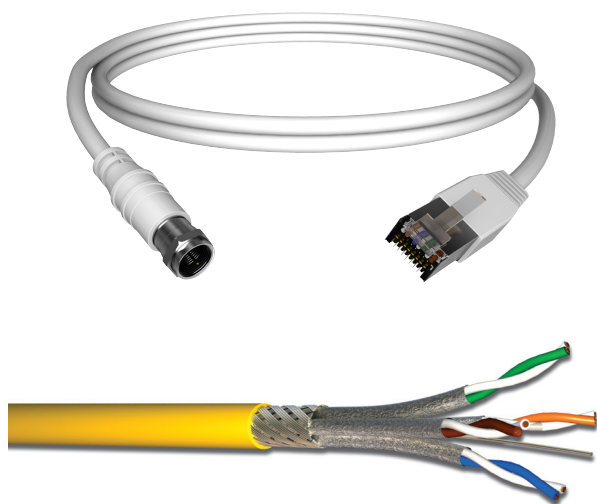


As we are dealing with an HF signal (0 to 862 MHz frequency for terrestrial television), the size of the conductor core and that of the insulation play an essential role in its transmission. Comparing a coaxial cable with a twisted pair cable gives better understanding of why the latter is far from being the most efficient for transmission of HF signals.



Example of distribution of an HF TV signal over a twisted pair cable

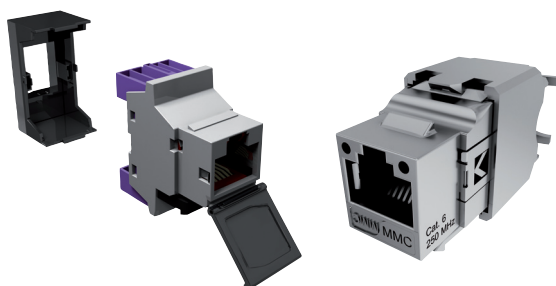
On signal reception, a first Balun of 'F'/RJ45 plug type transforms the signal to adapt it to twisted pair. Conversely, at the wall socket, a second IEC/RJ45 type Balun operates the inverse transformation.



ATTENUATION, THE MAIN CONSTRAINT

This type of transmission requires the source signal to be strong (between 80dB and 110dB) with an excellent signal-to-noise ratio (S/N). On the other hand, the length of this type of connection cannot exceed 45 m because, over that length, the signal may not be received by the television set.

Therefore, twisted pair cables with strong AWG (22 or 21) of type Cat7 and Cat7A are to be recommended to minimize signal loss over the length of the connection.



GOOD QUALITY CONNECTORS TO TAKE ON HF

The RJ45 connector turns out to be a leak point for the HF signal, much like a valve left open.

It is advisable to choose good quality shielded connectors, preferably Zamak, thus offering a very good level of immunity to interference.

IPTV

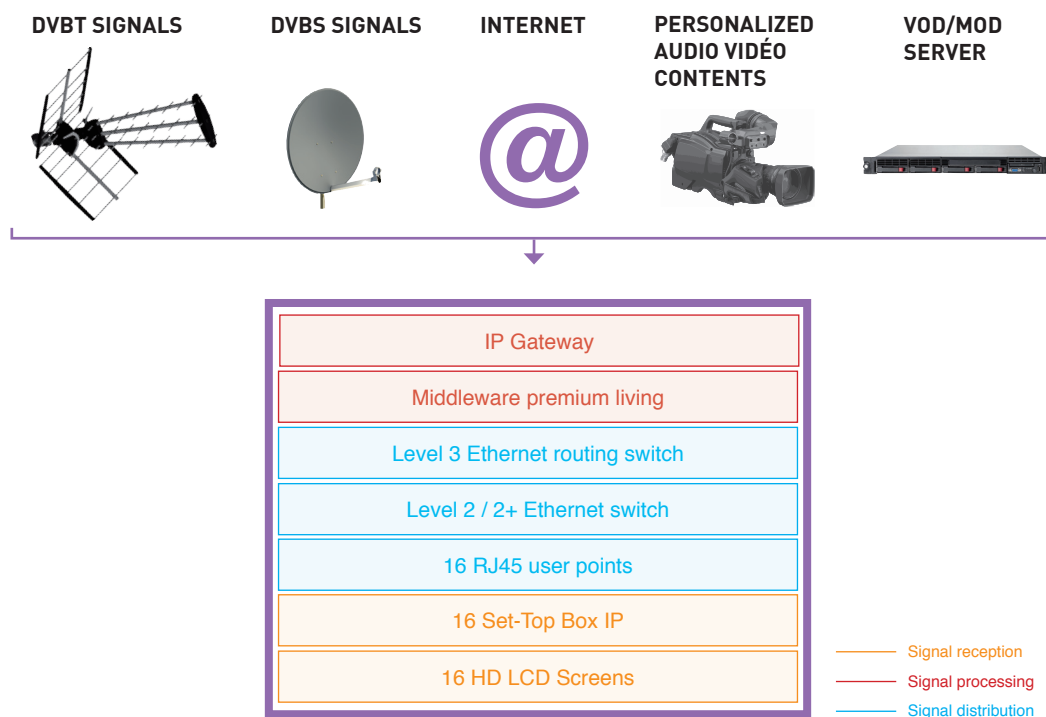
TELEVISION OVER ETHERNET NETWORKS

Ethernet networks are very widespread in the service industry and are now essential assets for businesses. The solution may be to use these networks as a medium for the distribution of TV signals.

For this purpose, the HF signal is processed upstream and 'converted' to an IP frame (Ethernet protocol) in order to be transmitted using the standard computer infrastructure.

The sources used can be a terrestrial television HF signal, a satellite signal, or compressed video of Mpeg2, Mpeg4 or H264 type. Depending on the type of data, this is encapsulated in an IP frame and routed directly to a Set Top Box. This special box, connected to the RJ45 socket by a network cable, processes information and restores it in the form of a digital signal to the television set, in most cases via an HDMI connection.

IPTV, as a perfect example of IP convergence, opens up the way to new services, as well as a new way of providing information to the consumer.



TV - AN ESSENTIAL MEDIUM IN THE BUILDING?

A thorough analysis of its functions makes IPTV seem unavoidable for sites with public access, such as:

- Hotels and retirement homes
- Hospitals and private clinics
- Schools, colleges, faculties, research institutes
- Businesses
- Penitentiary institutions
- Fairs, conference rooms, and colloquia

For each of these areas of application, IPTV offers new services for each consumer, while meeting an ever growing demand and ever more strict requirements:

- All television sources and channels (terrestrial, satellite, etc.). The offer is becoming unlimited.
- Video on demand (VoD), to show films and documentaries.
- Dynamic display to transmit information, training, etc.

Thus, each person consumes the televised content of his/her choice, at his/her preferred times, completely independently.

WHAT IS THE MINIMUM INFRASTRUCTURE FOR IPTV? SD OR HD?

Depending on the program, low or high resolution, the throughput to be taken into account will vary:

- SD = 4/5 megabit
- HD = 10/11 megabit

Availability rate

Depending on the environment of the application, the availability rate required can vary. Thus, television is a critical medium in a hotel, whilst there may be a higher level of tolerance in an educational setting.

In this case, the 'Redundancy', 'LACP', 'Load Balancing' and 'Failover' type functions will be implemented on the network with major impact on cabling infrastructure in terms of dimensioning.

Functions

The wealth of functions must also be taken into account. The presence or not of a VoD server, for example, can have a major impact on the network, because it can generate extra traffic.

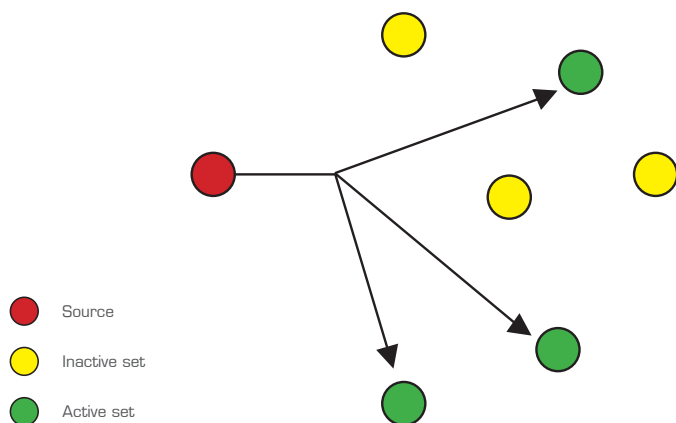
Number of users

Lastly, the number of user sets will also have an impact on the type of architecture to be deployed.

Unicast or multicast?

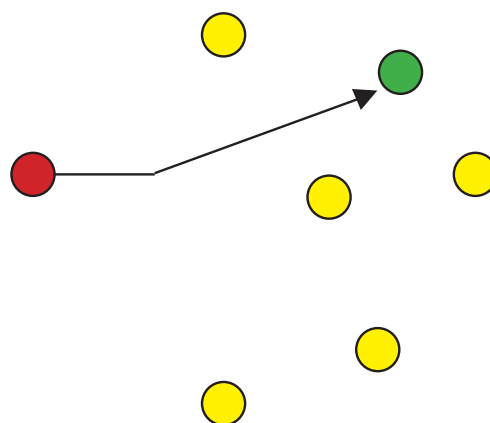
- Multicast

Network connection in which one source speaks to several receivers (Set Top Boxes) at once. This type of connection is used systematically for the transmission of TV programs, because in this case, the same frame will be received by several sets (optimization of bandwidth).



- Unicast

Network connection in which one source speaks to a single receiver. This is the case, for example, with VoD, where, most of the time, a single person requires a specific program.



TYPE OF CABLING RECOMMENDED

For all these reasons, Cat. 6 structured pre-cabling is widely recommended. In addition, depending on the environments, EMC immunity will be strongly recommended.

In the case of backbone connections in fiber optics, OM3 will be preferred.

IPTV, THE NEXT BIG ISSUE?

IPTV is certainly the best example of IP convergence. The demand is immense and associated offerings and services are just starting to diversify.

In this context, it is imperative to opt for a shielded Cat. 6A infrastructure to deal with the inevitable increase in throughputs that is to be expected.