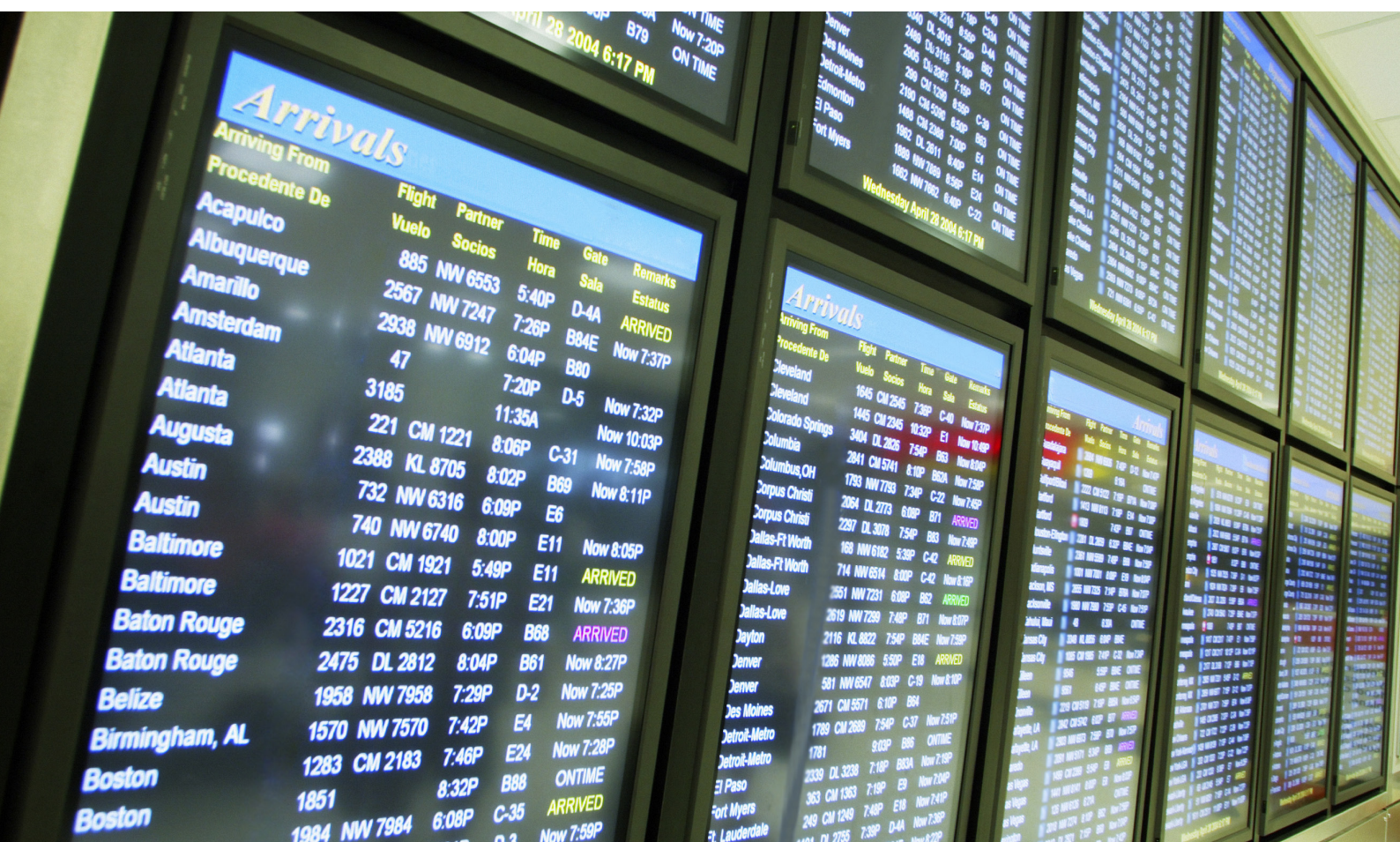## SHEET 3

VIDEO NETWORKS
REMOTE VIDEO, PROJECTION AND REMOTE DISPLAY

INTRODUCTION

Display screens, television sets, and video projectors are now an omnipresent feature in our everyday lives. Their purpose is to show video content - to inform us, appeal to us or guide us. They are often found at business premises, stations, airports and other public access sites.

In all cases, the key aspect is image quality, regardless of the medium used.

Transmission of video signals is surely the most demanding application, because it combines throughput and propagation delay problems.

But what are the existing video transmission technologies? What are the infrastructure typologies to be used? And what are the constraints to be considered?

Image quality is linked directly to the quantity of information to be transmitted, with increasingly high resolutions. Images have not stopped improving but are using more and more bandwidth.

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.

PROTOCOLE IP

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.

REMOTE HD VIDEO

HDMI / RJ45 CONVERSION

An HDMI signal can be carried over a twisted pair cable (minimum category 5e) without IP packaging. But in that case, the maximum length of the connection must not exceed 50 meters in Full HD (1080p, and 100m in 1080i). Connecting an HD item of equipment remotely at building level therefore poses a problem of scale.

These converters generally use two twisted pair cables, the first for the 5 Volt DDC signal, the second HDCP compatible (copyright protection protocol), for the video signal (see Fig 1). 'HDCP Pass-through' converters only use a single twisted pair cable.

HDMI / IP
Convertor

HDMI / IP
Convertor

— HDMI/HDMI patch cord

— Cat.6a F/FTP twisted pairs cable
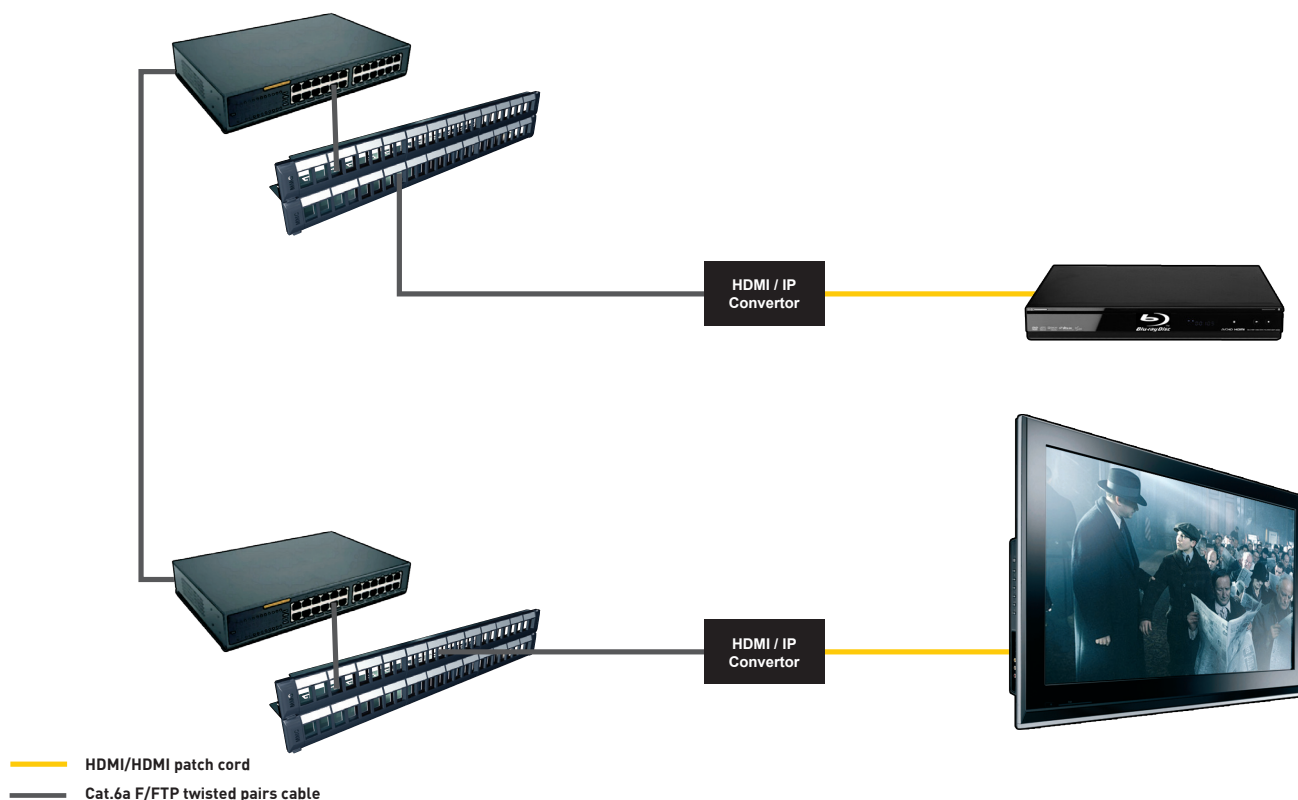
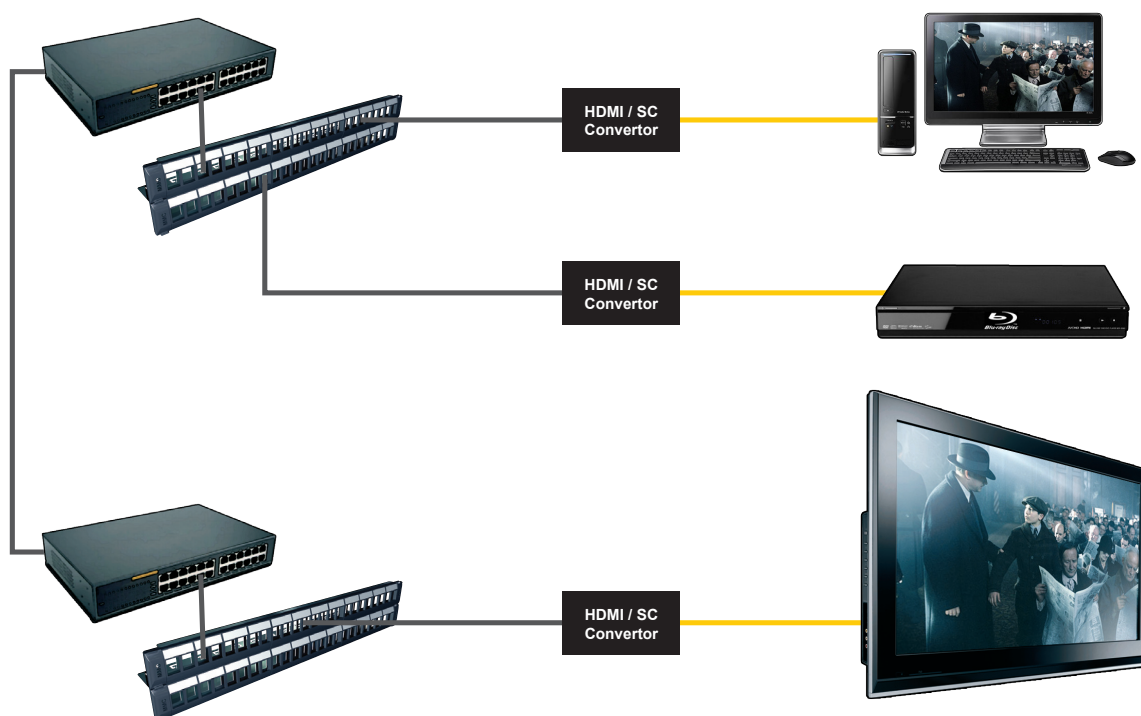## HDMI / FIBER OPTIC CONVERSION

In order to overcome distance constraints, certain converters extend the video connection to a distance of 330m using on a multi-mode optical link (Fig.2). A connection based on twisted pairs may be added to implement infrared control.
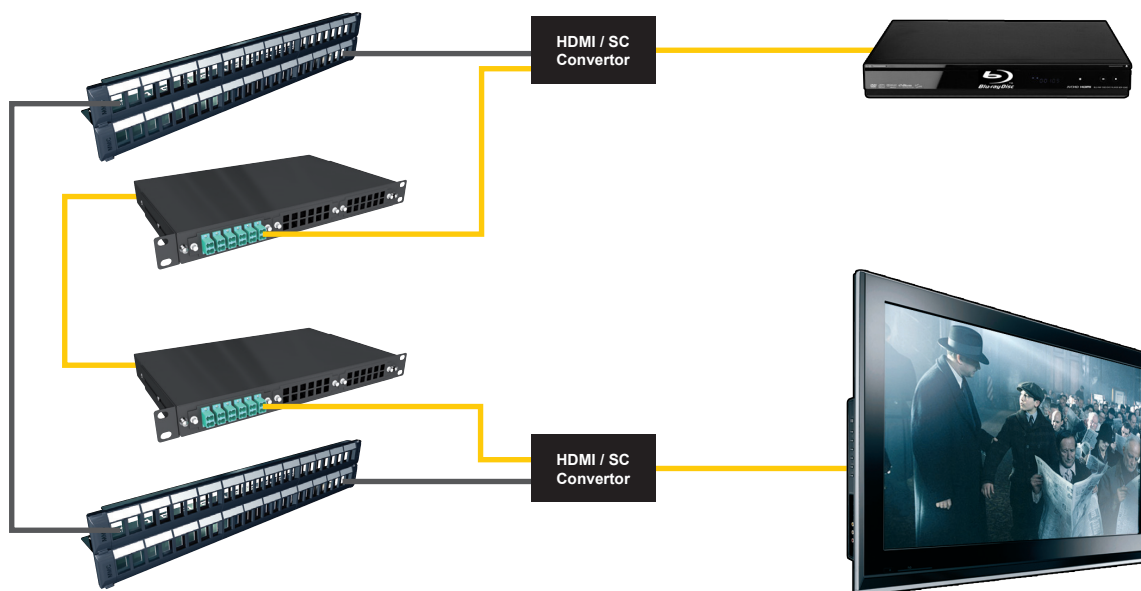
Connections between converters using multi-mode fiber optics and twisted pair cables

HDMI / IP CONVERSION

Another solution to the constraint of distance is to use HDMI/IP converters. These items of equipment are used to transmit the same signal as HDMI 1.3, based on the Ethernet protocol, with the same throughput and distance constraints.

The bandwidth of the cabling system must then be constant in order not to create service interruption, and the error rate must be close to zero. It is therefore necessary to use shielded pre-cabling with a high level of electromagnetic immunity, which will make it possible to provide a constant level and quality of signal. A shielded Cat. 6A type infrastructure solution is therefore recommended

Excellent E.M.C.

Bad E.M.C.
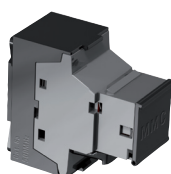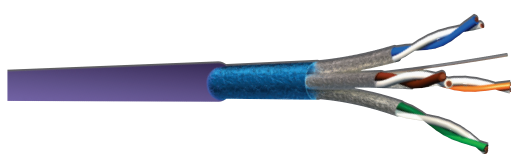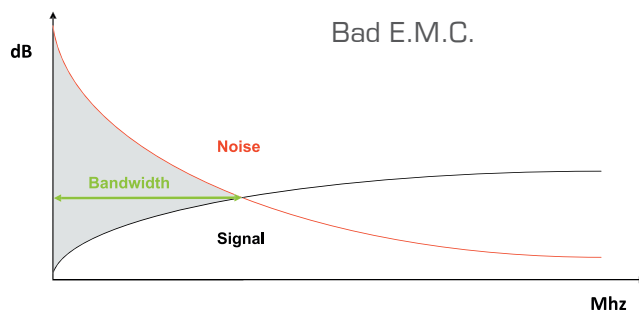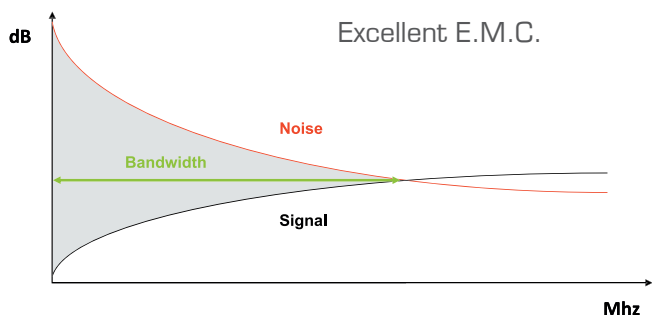
F/FTP Blindage par ruban général et individuel

VIDEO PROJECTION

In meeting rooms, employees now have the option of projecting their presentations using a video projector. In the majority of cases, the video projector is connected using a VGA cable of maximum length 3m to 5m. A 'Balun' type conversion system, used to convert the signal and to carry it over a twisted pair cable, can be implemented, thus facilitating use in rooms where, very often, the video projector is installed on the ceiling.

CONNECTION LENGTHS
The maximum distance depends on the use of passive or active baluns and on the required display resolution:

TYPE	RESOLUTION	AVERAGE CAT6 CABLE LENGTH	
		Passive Balun	Active Balun (12V DC)
VGA	640x480	137m	305 m
SVGA	800x600	107m	305 m
XVGA	1024x768	76 m	305 m
SXGA	1280x1024	61 m	260 m
WXGA	1366x768	55 m	260 m
UXGA	1600x1200	-	245 m
WSXGA	1680x1050	-	260 m
WUGGA	1920x1200	-	180 m

The active baluns use one of the twisted pairs to transmit power supply from one balun to another.
In all cases, the SKEW value (difference between propagation delays of the 4 pairs of cable) is essential. The SKEW represents the difference between the twist steps of each of the pairs, and it must be less than 45 nanoseconds.
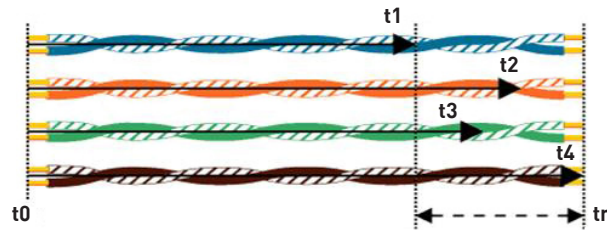
SHIELDED CABLING OR NOTHING
For this system to operate, it is absolutely necessary that the ground should be shared between the VGA source (often a computer) and the video projector. The use of a shielded cabling system ensures equipotentiality at both ends.

REMOTE DISPLAY

Remote displays are widely used in public places because they allow to provide information in a way that is dynamic and generally pleasing to the eye.
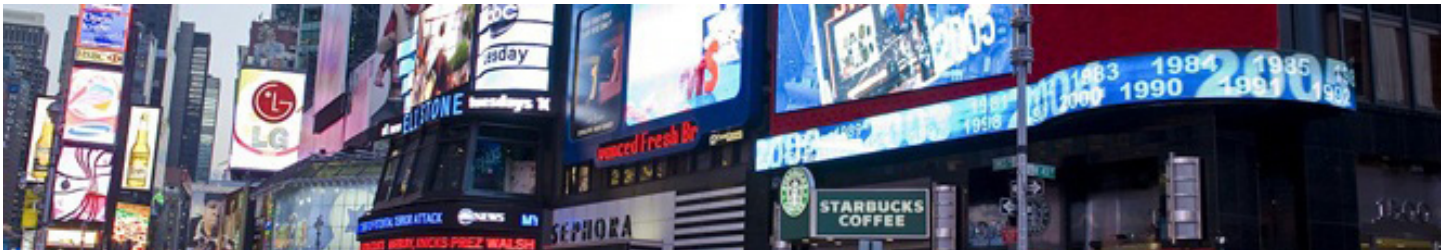Display of arrival and departure information in airports or stations
Display of information on subways
Display of taxi or restaurant information in hotel foyers
Advertising display on the street
Display of itinerary information, directions, etc.

OPERATION OF TRANSMISSIONS
Remote display is now performed by IP transmission using an Ethernet protocol. The information is sent remotely and stored locally in the screen memory. The display is 'Dynamic' because it is very simple to download another sequence to change the display quickly.

Whiteboarding station

10 Megabits/s.

100 Megabits/s.

1000 Megabits/s.

1 Gigabits/s.
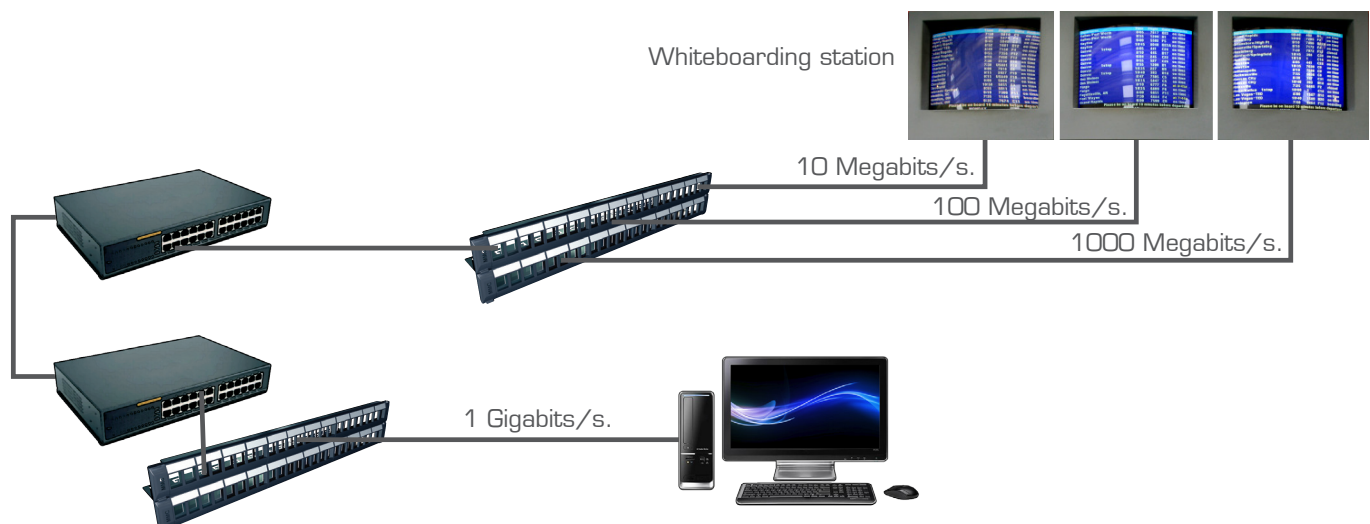
(*.swf). Conversely, depending on the importance of the data, operational reliability must be guaranteed up to 100%.

'CRITICAL' REMOTE DISPLAY TO MANAGE FLOWS OF PEOPLE

In an airport, for example, a remote display is used to give passengers information and guidance. The slightest fault or malfunction could put airport operation and management at risk. Three information systems are predominant:

TIDS : Travel Information Display System
**FIDS** : Flight Information Display System
BIDS : Baggage Information Display System
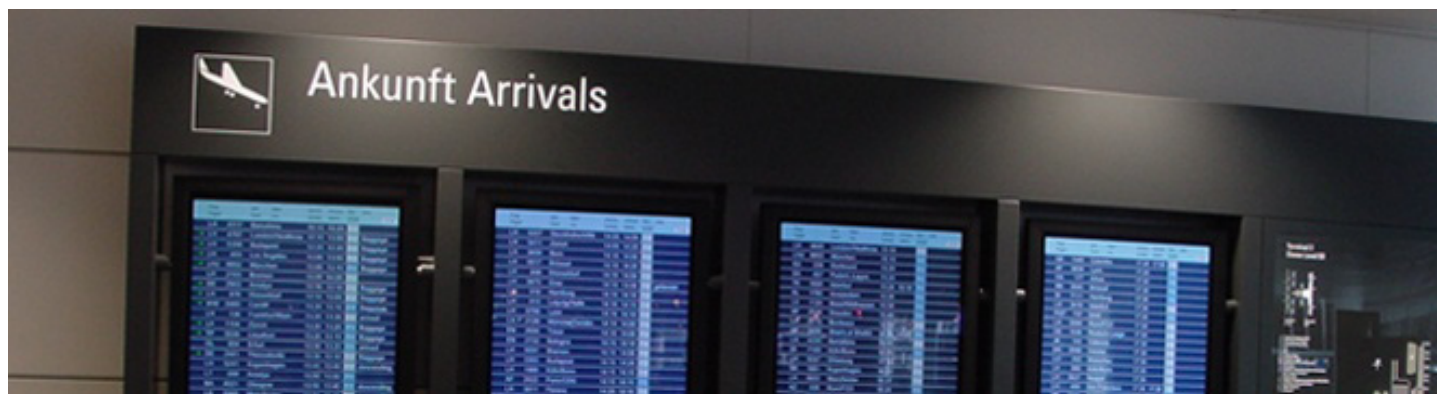
Robust and resistant network cabling is therefore required, together with sufficient bandwidth. To achieve this, use of shielded Category 7 S/FTP cables with copper braiding and an aluminum screen provides protection in an environment where there is a high level of interference (radar, cell phones, Wi-Fi terminals, etc.)

INSTALLATION PRECAUTIONS

The installations often being implemented outdoors, cables with PVC or LSZH jackets must be prohibited since these materials are not resistant to rain or UV rays from the sun. Instead, cables with outer jackets in UV-resistant polyethylene, like LE VG64PE or CX64PE from Multimedia Connect, should be used.
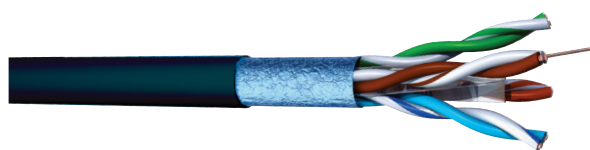
IN SUMMARY

Each solution for video signal transmission offers a solution to a highly specific problem. However, selecting a good quality structured pre-cabling is always recommended, given the constraints associated with the video signal:

TYPE OF SIGNAL TRANSMISSION	STRUCTURED PRE-CABLING SOLUTION		
	Cat. 6 shielded	Cat. 6A shielded	Cat. 7 shielded
HDMI / RJ45 simple conversion	⊙	●	
HDMI transmission under IP	⊙	●	
Transmission by balun	⊙	●	
Whiteboarding		⊙	●

● : Recommended   ⊙ : Suitable