

SHEET 4

AUDIO NETWORK

IP PUBLIC ADDRESS AND CONVERSION



INTRODUCTION

Public address systems in public spaces and buildings are increasingly widespread and very often combined with video systems. Access to sound is therefore no longer reserved for concert halls or cinemas, and is spreading to classrooms, meeting rooms or reception areas.

The items of equipment providing the audio signal are rarely fitted with an RJ45 direct output. However, audio is not excluded from convergence, since it is now possible to transmit an analog or digital audio signal over very great distances, simply by using an impedance transformer.

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.

AUDIO CONVERSION OVER TWISTED PAIRS

Audio in buildings takes the form of three main types of use:

- Conversion of Hi-Fi to RJ45
- Conversion of Audio PC to RJ45 (particularly combined with video projector)
- Conversion of standard Stereo Audio to RJ45



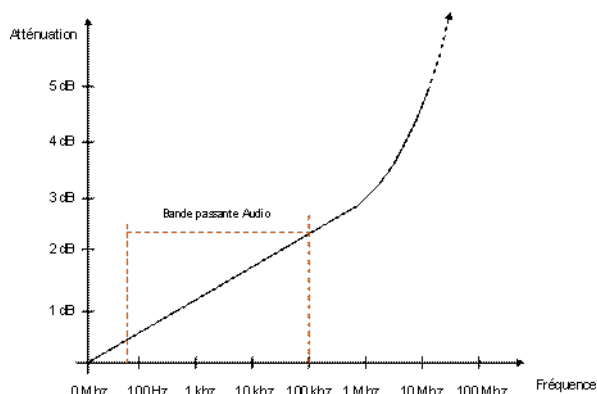
Stereo Hi-fi Balun



Stereo Audio Balun

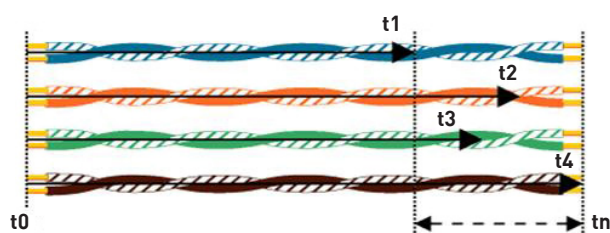


Stereo PC Balun



TRANSMISSION OF AN AUDIO SIGNAL OVER ONE PAIR

Sound is an analog signal, with frequencies between 60 Hz and 20 KHz. At network transmission level, it is safe to consider these as low-frequency signals. The twisted pair then acts as a low-pass filter and allows low frequencies to pass without significant loss.



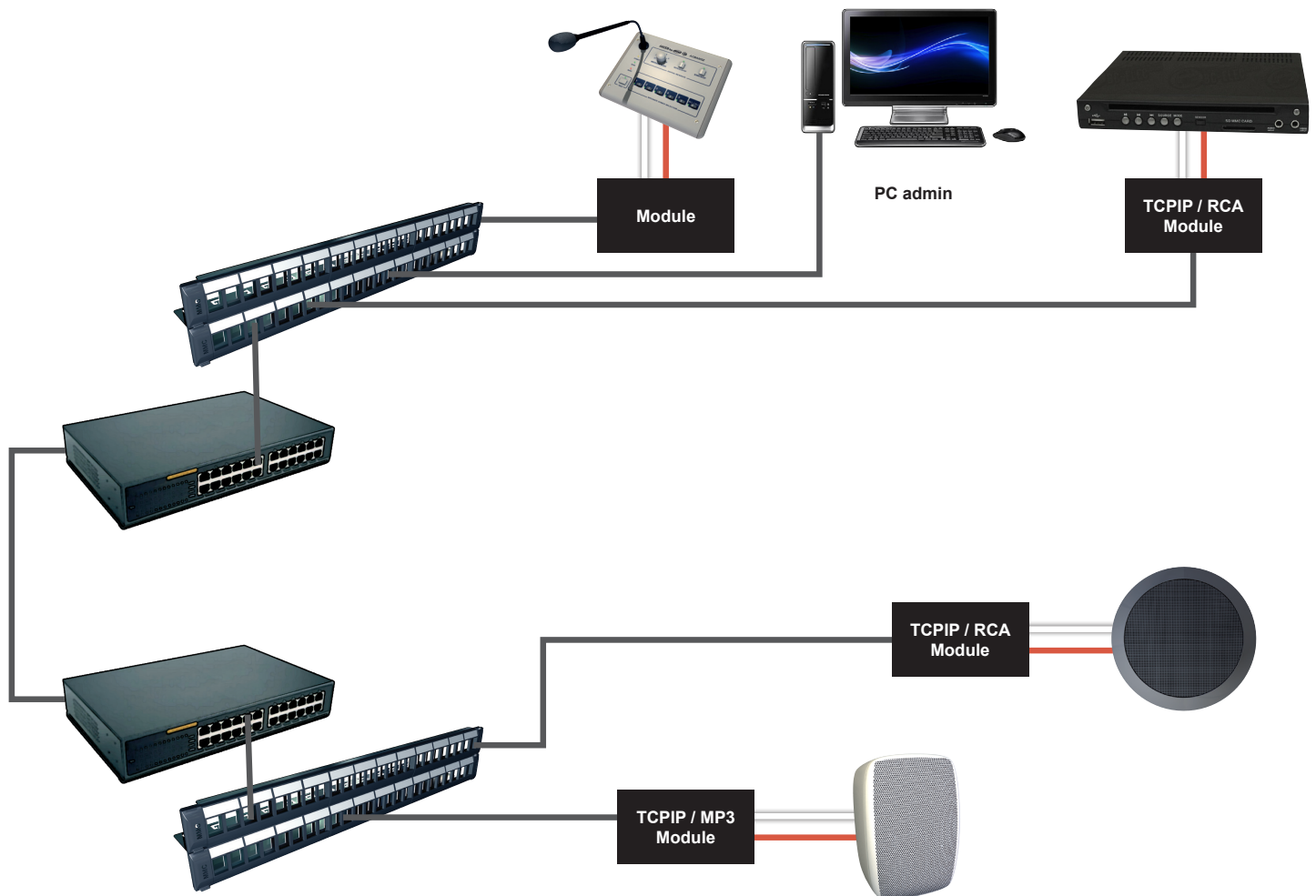
THE 'SKEW' OR THE LIMIT OF THE TWISTED PAIR

Even more than with video, the SKEW is a fundamental parameter of audio transmission over pairs. The sounds must not arrive with a time delay, as this would risk turning the sound message into a cacophony. Special cables with identical twist steps are used to cancel the SKEW effect in audio transmissions (e.g. cable ref. xxxx from CAE Group).

IP AUDIO TRANSMISSION: PUBLIC ADDRESS IP (PA OVER IP)

A PA or Public Address system is a complete sound system allowing transmission of music or special messages over large distances within a building, while managing transmission zones and levels.

Mainly used in public spaces such as supermarkets, hotels, churches, car parks, etc., Public Address systems generally use 100 Volt line technology. It has recently become possible to use IP to transmit this same information from the emission source to the speakers.



BITS-RATE IS NOT A CONSTRAINT

The quantity of audio information to be transmitted is not very restrictive for a 100Megabits/s network because generally there is a throughput of 8Kbits/s per equipment connection.

The greatest constraint remains the latency time expressed by the signal propagation delay. Therefore, cables with a very high transmission speed will be preferred.

INSULATOR TYPE	NVP:	PROPAGATION SPEED (KM/S)
High Density Polyethylene (HD PE)	66%	198 000
Skin-Foam-Skin Polyethelene (SFS PE)	78%	234 000
Fluoro Ethylene Propylene, "Teflon" (FEP)	71%	213 000
Polyolefin	68%	204 000

AMPLIFICATION, ALWAYS A DELICATE OPERATION

Another major difficulty concerns the power level to be delivered at the speakers. The IP converters necessitate amplification on signal reception. It is therefore necessary to supply power to them locally, which adds an extra constraint to the installation. However, the future development of remote power feeding (PoE, PoE+) makes it possible to anticipate the possibility of transmitting and amplifying the signal over a single twisted pair cable. In this case, the power distributed must exceed 50 Watt in order to allow adequate amplification.



WHAT IP CONTRIBUTES

A Public Address installation entails upstream definition of its zones in relation to the specific requirements of the site where the audio system is installed. When changes are made to the site, or when the operation is modified, it is sometimes necessary to reorganize the cabling.

Management of the IP sound system allows for direct addressing of each peripheral by means of its IP address. Thus, each zone can be redefined without changing the infrastructure. Management of sound messages can thus be enlarged or restricted depending on time constraints (e.g. management of a car park on week days and during weekends, railway and road traffic, etc.)

Installation of a very high bandwidth Ethernet network is definitely recommended, with QoS service quality, unicast/multicast management and IGMP functions. Cat.6A infrastructure is recommended.