

# STRUCTURED CABLING

## THE BACK BONE FOR TELEPHONY, NETWORKING, VIDEO AND SECURITY

There is a growing demand for IP end points - be it telephones, cameras, access control systems, sensors and intelligent building management systems. This brings into focus the need for a **common standard cabling system** that must be robust in design and very reliable to support voice, data, images and control signals. The Cabling system forms the backbone of any building complex, office installation or manufacturing plant. It must be the 'super expressway' that supports the fast and uninterrupted transmission of IP traffic.

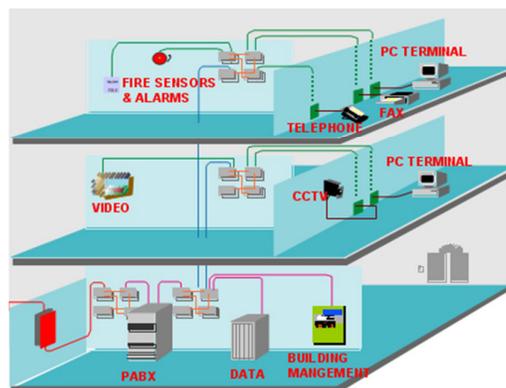
A Structured cabling system provides this flexible cabling platform for Telephony, Networking, Video and Security services. It is designed to support different telephone, security and computer systems from any vendor.

### Origin of structured cabling

During the early days of networking, various vendor-dependent cabling systems existed for carrying data and voice. Troubleshooting and managing these proprietary systems was very difficult and time consuming as network managers had to maintain two distinct networks (data and voice). This led to the evolution of structured cabling.

### Definition of Structured Cabling.

A structured cabling system is a complete system of cabling and associated hardware, which provides a comprehensive telecommunications infrastructure. This infrastructure serves a wide range of uses, such as to provide telephone service or transmit data through a computer network. It should not be device dependent. Further, Structured cabling provides a flexible cabling plan and can support computers, telephone systems and IP traffic from any vendor. Structured cabling is a hierarchy, based on backbone cables and horizontal cables. Backbone cables carry signals between telecommunication closets and floors of a building. Horizontal cables deliver services from telecom closets to work areas.



### Main Elements of a Structured Cabling System.

The **Vertical** and the **Horizontal**. The purpose of the **vertical** is to act as the high capacity backbone of the system. This would normally operate between different floors of the building and also main resource centres such as computer rooms and possibly the public service access point to the building. The **horizontal** element is concerned with the linking of individual access points to the main backbone or vertical element.

At the point of transition from vertical to horizontal, there is a requirement for some form of adaptability or conversion. This is termed a **wiring closet**. A wiring closet may consist of many things. For instance, a voice wiring system would normally have a distribution frame for the vertical cabling and another for the horizontal element. These would then be cross connected (jumpered) as required. In data communication systems, the wiring closet may consist of several converter types depending upon the balun types in use as well as a patch

and jack frame, allowing flexibility of switching connections on that floor. The wiring closet may also contain a series of switches which would combine signals from several floor cables to be combined on a single vertical fibre optic cable. The termination points are called **user outlets**.

#### Cable types.

Unshielded twisted 4 pair (UTP) cables form the horizontal element of the system. These cables come in different categories and the commonly used categories are CAT 5, CAT5E, and CAT 6 .

Category 6 cable contains four twisted wire pairs. Attenuation, near end crosstalk (NEXT), and power sum next (PSNEXT) in Cat 6 cable and connectors are all significantly lower than Cat 5 or Cat 5e, which uses 24 AWG wire. The increase in performance with Cat 6 comes mainly from increased wire size – 22AWG. CAT 5 cables support applications up to 100Mb/s and CAT5E cables target support of Gigabit Ethernet. The maximum frequency specified for both CAT5 and CAT5E IS 100Mhz. CAT6 supports Gigabit Ethernet at frequencies up to 250Mhz.

Fibre optic cable generally forms the vertical element of the system. Most LAN networks use multi-mode fibre.

As communication speeds increase and equipment prices drop, networks that take the optical fibre direct to the desktop are likely to increase. Since optical fibre transmits signals via light waves, it is inherently resistant to all forms of electromagnetic interference.

#### Patch panels.

These are installed in the wiring closet and are designed for the management of cable connections. On the front side of a patch panel there are jacks designed to receive short patch cables, while on the back of the panel there are either jacks or punch down blocks that receive the connections of longer and more permanent cables. This makes it easier to manage 'moves and changes'. Similarly, the function of Fibre optic patch panels, also known as fibre distribution panels, is to terminate the fibre optic cable and provide access to the cable's individual fibres for cross connection. Fibre patch panel can use fibre patch cables to cross-connect, connect to fibre optic communication equipment or test the individual fibre in the fibre cable.



#### User Outlet.

The user outlet is the socket into which the end user equipment is plugged into.



**Patch cords and drop leads.**

Patch cords are used to connect ports at the patch panel and drop leads to connect the end user equipment to the wall outlet.

**Design and Installation of the Structured cabling system.**

Installers must be trained in the correct procedures required to handle both UTP and fibre optic cables. Factory crimped patch cords must be used to ensure that the termination is as good as the cable. Quite often, installers crimp RJ45 plug connectors at site. The quality of this crimping is questionable and this could affect the performance of the entire system.

**Future Proofing.**

A properly designed and implemented structured cabling solution should not restrict system upgrades for a period of 20 years. Most manufacturers offer a 20 year, product and application, warranty, on all installations implemented by an accredited Partner.