

# Veterans Benefits Administration

## Information Technology Design Guide

### VBA Cable Plant Description



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## VBA Cable Plant Description

### INTRODUCTION

The Cable Plant provides the means by which telephone and data services are routed where needed within a VBA facility. ISDN video teleconferencing services may also be routed by the cable plant. These services enter the facility at the building's demarcation point (Demarc). The Local Exchange Carrier is responsible for delivering and terminating the services at the Demarc. Within the facility, the services are extended, by VBA contractor, from the Demarc to the respective Voice and Data Main Distribution Frames (MDF). Telephone Voice signals are processed by the facilities' Electronic Private Automated Branch Exchange (EPABX) telephone switch. Data signals flow between the VBA Wide Area Network, Computer Room, and Work Stations located throughout the facility. In most cases VBA Work Stations will require both telephone and data services. Some VBA areas will require video teleconferencing as well. The cable plant is used to connect the distributed VBA Work Stations to these services: it consists of two subsystems:

- *Telephone/Data Spaces and Cable Pathways* provide the staging spaces and pathways route to distribute cables throughout the facility. This spaces and pathways are architectural features of the building and should be addressed during the buildings' design and construction stages. The space housing the EPABX, Computer Room, Telephone/Data Closets, conduits, riser sleeves between floors, cable trays, raised access floors, or cellular floors are all components of this subsystem. See the **VBA RO Telephone/Data Spaces & Cable Pathways Design Guide** for a complete description.
- Cable and connecting hardware, referred to as the *Cabling Distribution System*, are the actual medium: copper wires and fiber optic strands, used for transporting the telephone, video teleconferencing, and data signals throughout the facility. Backbone cables and connecting hardware connect the equipment housed in the EPABX space and Computer Room to the equipment housed in Telephone/Data Closets which are distributed throughout the facility. Horizontal cables and connecting hardware are used to connect each Work Station to its associated Telephone/Data Closet. See the **VBA Telephone/Data Cabling Design Guide** for a complete description.

### CABLE PATHWAYS AND SPACES

#### Main Distribution Frames (MDF)

For new construction, the Telephone MDF and Data MDF spaces should both be located in the Computer Room. In existing facilities with older phone equipment, the Telephone MDF may be located in a separate Telephone Equipment Room. If possible, the Telephone Equipment Room should be located adjacent to Computer Room. By so doing, these spaces may share a dedicated air conditioning system, a common raised floor and ramp, or a common depressed slab. They may also share a common backbone cable pathway system (conduit).

The Telephone MDF space contains the Local Exchange Carrier entrance facility demarcation connecting hardware, the EPABX and operator's console, and the MDF connecting hardware which connects the EAPBX to the entrance facility demarcation, on one side, and the backbone cabling, on the other.

## Telephone/Data Closets / Intermediate Distribution Frames

The Telephone/Data Closets are the Cable Plant's Intermediate Distribution Frames (IDFs). The IDFs house the equipment racks on which are mounted the terminating hardware and patch panels used to cross-connect the telephone/video backbone cabling from the Telephone MDF to the horizontal cables running out to the Work Stations. These same racks house hardware used to terminate the fiber optic data backbone from the Date MDF (the Computer Room), the Local Area Network equipment, and horizontal patch panels. The horizontal patch panels are used to program the horizontal circuits, running out to the Work Station outlets, to the service required at each Work Station jack.

## Conduit

A conduit system is used to provide a direct backbone pathway from the Telephone & Data MDFs to each Telephone/Data Closet. The conduit pathways will include pull boxes and riser columns, as necessary, to connect all Telephone/Data Closets to the MDFs.

In multi-story facilities, Telephone/Data Closets on successive floors are connected to one another by 4 inch riser sleeves and should be arranged in vertical columns to provide a straight riser path. The closets should be located and should be of sufficient number so that no horizontal cable length need be more than 280 cable feet to reach a Work Station outlet.

## Cable Trays

Cable trays are used to provide a pathway for horizontal cable running from the Telephone/Data Closet to the Work Station outlets. The trays may be installed in the space between the suspended ceiling and the slab above, or between a raised access floor and the slab below. The cable trays are routed throughout the facility so that no Work Station is more than 30 feet from a tray. Ceiling or floor cable trays are routed along facility corridors whenever possible to facilitate access to the trays.

## CABLING DISTRIBUTION SYSTEM

### Backbone Cable and Connecting Hardware

All VBA facilities require telephone/video and data backbones.

- Telephone/video backbone consists of 100 ohm Category 5e or better multi-pair Unshielded Twisted Pair (UTP) copper riser cable. This backbone runs between the Telephone MDF space and each Telephone/Data Closet. This backbone may also be used to convey ISDN video teleconferencing signals to selected Telephone/Data closets.
- The Data backbone is a fiber optic cable that runs between the Data MDF in the Computer Room and each Telephone/Data Closet. Each fiber optic backbone contains 12 strands of tight-buffered, 62.5/125 micron, graded index multi-mode fiber and is protected by a one inch inner duct. Each strand is terminated in SC type connectors. These connectors are accessible on the front panel of breakout boxes or patch panels mounted on free-standing 19 inch equipment racks.
- The EAPBX communicates with its MIS terminals. These terminals may be located remotely from the EAPBX. When that is the case, an additional backbone cable must be run between

the EAPBX and each Telephone/Data Closet that will have an MIS terminal within its zone. The MIS backbone cable is a 4-pair, 100 ohm Category 5 or better UTP cable.

### **Horizontal Cable and Connecting Hardware**

Typically three Category 6, 4 pair, UTP cables are routed between a Telephone/Data Closet and each associated Work Station outlet (the three horizontals are referred to as a Triplex drop). A horizontal cable is not committed to service type until it is patch cable programmed in the associated Telephone/Data Closet. A horizontal cable may be patched to convey network data, or telephone, or ISDN video teleconferencing service to its outlet (ISDN video is typically used in Conference rooms).

At the Work Station outlet, each cable is terminated in a Category 6 RJ-45 jack. The jacks are mounted in outlet faceplates on walls, floors, or furniture. The faceplates are located within 10 feet of a Work Station which may be a cubicle, desk or office. A typical faceplate will have three RJ45 jacks (Triplex) but the faceplate family should allow for up to four RJ45 jacks: a very active Work Stations may require four outlets, two of which will be telephone. Some Work Stations, for printers and classrooms, may need dual data outlets only. Still other drops, with only a fax machine or wall telephone, may need only a single telephone outlet. A drop intended to support ISDN video teleconferencing will require all three RJ45 jacks.

The RO's current business lines dictate the furniture plan which, in turn, dictates the number and location of horizontal drops. To minimize the impact of future space re-alignments, we recommended that additional horizontal drops be allocated, one Triplex for every 200 square feet, in those areas not currently occupied by RO personnel - an example is an area currently designated to house file cabinets.

### **Document Versions**

<i>Version</i>	<i>Date</i>	<i>Changes</i>
1.00	9/17/04	Original Document
1.10	9/21/10	This version has a minor change to the Cabling Distribution System section of the document. Due to the Digital Phone PBX being introduced into the VBA the minimum type of cable for Telephone/video backbone cabling is now Cat 5e.