

MODERN HOME CABLING GUIDE

- Internet ◆
- Cable TV ◆
- Security Systems ◆
- Phone ◆



Introduction

This Whitepaper provides design and installation guidelines for cabling and conduits of following systems:

1. Internet/data cabling
2. TV cabling including HDTV
3. Phone cabling
4. Security cameras cabling
5. Electrical Fencing cabling
6. Fiber to the home (FTTH) cabling

While building a new home or renovating an existing, you need to be sure that design and installation of your cabling for Internet, Cable TV, security cameras and phone is done in a proper manner so as to take care of technology needs of today and coming 20 years. A modern 350 square yards and larger home will normally have following requirements of cabling and their outlets:

Optical fiber cable entry to home

The telecom operator will have an entry point of its fiber cable near outer boundary wall of the house. A PVC duct of 1 inch dia has to be installed from this point to the central distribution point within your house. A typical two fiber cable has outer diameter of around 7.5mm (0.3 inches). PVC duct of 1 inch diameter can be used to accommodate two fiber cable.

If concealed PVC pipe (1 inch) cannot be laid upto entry point, open PVC pipe be laid from entry point to the location where concealed pipe is coming out of the building.



Main Distribution Cabinets at each floor

Each floor should have a distribution cabinet. This cabinet would be in addition to electrical distribution cabinet. Ideally, distribution cabinets should be installed at same location on each floor so that vertical distribution of cables can be easily made through cable risers or ducts of larger diameter. Typical dimension of data distribution cabinet would be 24" x 24" x 6". Wooden cabinet are best suited for this purpose. For data and TV cabling, ducts of 2 inch diameter can be used for floor to floor connection.

There should be a separate place or cabinet to accommodate house UPS batteries. A lead acid battery of 150AH has a typical dimension of 5"W 12"H 21"L. Two batteries are normally required at each floor. The cabinet or place for battery should be accordingly designed. There has to be empty space in the cabinet after put-ting batteries and holes for air circulation as acid batteries emit fumes.



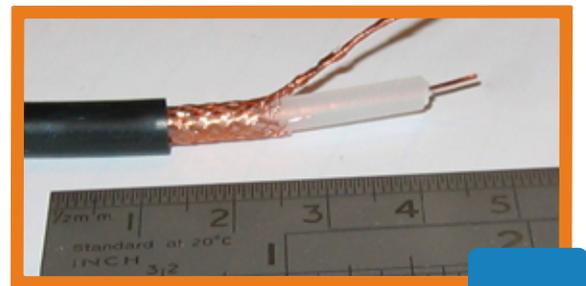
Three or four electrical power sockets connected to home UPS should be installed within each cabinet. The cabinet could be ideally made of waterproof seasoned ashwood or diyar with back sheet of one inch thick of waterproof imported plywood. The door/cover of the cabinet should be flushed with the wall and the cabinet should be grouted within the wall.

The duct from external boundary wall for optical fiber cable's entry point should be terminated in this cabinet. Ideally, separate duct route from cabinet at each floor should be provided up to external boundary wall so that a separate ONT can be installed on each floor if required. The location of cabinet should be in the central lobby of the house because ONT come with built in Wi-Fi routers and their placement has to be at central location in order to get good Wi-Fi signals in the house. Ethernet, Video and Phone cables of same floor should be terminated in this cabinet. Separate Ethernet, video and phone cables should be laid in vertical ducts to connect distribution cabinet on one floor with distribution cabinet on another floor.

Cable TV connection in each bedroom room, TV lounge, drawing room and servant room:

Coaxial Cabling for analog and digital TV services

Each room of the house including bedrooms, TV lounge, drawing room and servant room has to be provided with an analog and digital TV cable connection. These connections are provided on copper coaxial cabling, RG-6 cable of a branded quality. Cable connectors, jointers, splitters and face plates have to be of good quality and terminated by trained technicians. Cold press connectors are recommended. There should not be any sharp bend in RG-6 cabling. For each Cable TV socket, there has to be two supporting electric power sockets (5-10 Amps) to give power to TV set, digital set top box and HD box. Electric power sockets should be on home UPS depending upon your needs. These sockets should be installed close to installation place of your TV set as per interior drawings. Coaxial cabling can be done in series, from one room to another, depending upon the distance. All coaxial cabling of one floor can be brought to a central distribution box of that floor and then a single coaxial cable can be taken to ground floor, instead of terminating all cables of all floors to ground floor.



Data cabling for HDTV services

High definition TV services require Ethernet/data cabling to each TV set. One RJ45 socket of Cat5/6 cabling has to be installed at the location of each TV set as per interior drawings. This RJ45 socket will be used to connect HD Box with TV set via HDMI cable. Ethernet socket should be adjacent to coaxial Cable TV socket and an electric power socket. Electric power sockets should be on home UPS depending upon your needs. Cat5e or Cat6 cabling and faceplates can be used as per budget. There should not be any sharp bends in Ethernet cabling. The Ethernet, coaxial and electrical power sockets should be installed at around 4 feet height from the ground so that these sockets are covered by the TV screen after installation. Two electrical power sockets are recommended, one for TV and other for HD Box. Each data cable for HDTV Service should be terminated separately at Main Distribution Cabinet where ONT will be installed.

Ethernet connection in each bedroom, TV lounge and drawing room.

Each room should have an Ethernet connection for data/Internet connectivity. Location of Ethernet/RJ45 socket could be at a different place than RJ45 socket for HDTV.



Ethernet connection in main lobby, lounge or central point of each floor:

These RJ45 sockets will be used to connect Wi-Fi routers/access points. For large houses, two to four Wi-Fi routers need to be installed at each floor at central places. Each faceplate should have an electric power outlet which must be on home UPS.



Phone connections in each room, TV lounge, drawing room, servants room and security guard room:

This would be on Cat 3 single pair pure copper phone cable of good quality.

Intercom or video phone connection on the gate:

This would have either single pair copper cable or Ethernet cabling as per specifications of the intercom to be installed. On both sides, concealed electrical power will be required and it should be backed by home UPS.



Security cameras at all four corners of house and boundary walls:

If legacy CCTV cameras are to be installed, they would have coaxial RG-6 + 2 wire electrical cabling backed by home UPS. If IP cameras are to be installed, this would require Ethernet cabling. No separate electrical cabling is required if IP cameras support PoE (Power over Ethernet). PoE switch backed by home or a dedicated UPS has to be installed at central distribution cabinet to power the IP cameras.



Electrical fencing at boundary walls.

If the home has one gate, it would require two data and two electrical points in each side of gate. If home has more gates, each gate should have this configuration. Electrical points should be on home UPS.



Optical Network Terminal (ONT)

This requires single or two fiber optical cable to be terminated at the point. If home has two separate portions, ground and first floor, then two separate ONTs may be required for each floor. Optical fiber cables have to be run from ONT to outside boundary wall of your home in concealed and underground conduits just like you take electric power cables from meter on outer boundary wall to distribution box. If you have already laid fiber optic cable in concealed and underground conduits, then make sure that the loop of fiber cable is securely placed outside boundary wall. Do not cut fiber optic cable from boundary wall because same fiber cable will be connected to Nayatel Network.

ONTs have built-in WiFi routers. So the installation point should be a central point on each floor for better distribution of wireless signals. ONT will require an electrical socket. Normally ONTs are backed by a dedicated UPS. So this electrical socket may not necessarily be on home UPS. If you do not opt for Nayatel UPS, then make sure that electrical socket used to connect ONT is connected to home UPS to avoid service disruption during power outage and load shedding. Conduit size for optical fiber cable should be one inch diameter. There should not be any sharp bends in these conduits.



Important Points

1. Coaxial, Ethernet and phone cables can be run in a single conduit of 0.75 to 1 inch diameter. Make sure that no more than 50% area of duct is utilized to ensure safety of cables and future maintenance. At no points, these conduits be merged with electrical conduits or wires.
2. The boxes of faceplates should be at least 6 x 6 inch size because coaxial cable splitters will also be installed within these boxes. So the box size should be bigger than faceplates.
3. Fiber cables should be run in a separate conduit.
4. There should be one wall grouted distribution wooden cabinet on each floor, the door/cover flushed with the wall. Minimum dimension of cabinet should be 2 ft wide, 2 ft high and 6 inches clear depth. Following equipment would be installed in each cabinet:
 - ONT
 - UPS for ONT
 - PoE switch
 - UPS for PoE switch (this UPS typically requires external batteries, so the size of cabinet has to be increased).
 - ATA/Phone switch
 - Two or three electrical power outlets connected on home UPS.
 - All coaxial, Ethernet and phone cabling would be terminated within this distribution box.
 - Controller for electrical fencing system.
5. All cabling should be properly labelled.
6. A network diagram should be prepared by the contractor. A laminated copy of diagram should be left in the cabinet for future troubleshooting of the system.

