



CenturyLink™

# FTTP Guidelines for Developers, Builders, and CenturyLink

*Working together*

Voice | Data | Internet | Wireless | Entertainment

CenturyLink, along with the Developer and Builders, has the best interests of the resident in mind. We strive to provide an enjoyable, hassle-free experience upon moving into a new home.

## **Getting Started:**

The deployment and service activation of the FTTP residential infrastructure requires very specific processes and guidelines to ensure proper functionality, reliability, and on-time service delivery.

The following information will guide you through this process. You'll find:

- What you can expect from CenturyLink
- Key events and milestones
- Roles and responsibilities
- Structured wiring options
- FTTP Minimum Wiring Standards and structured wiring equipment specifications

# CenturyLink Is With You Every Step Of The Way

CenturyLink provides the expertise you expect and deserve.

## Key Events and Milestones:

1. Network architecture selection based on community need
2. Site preparation
  - Easements/ROWS
  - Building(s) & equipment placement
  - Streets/final grading
3. Fiber network installation
4. Begin service drop placement
5. Begin end-user communications and marketing
6. Optical network equipment placements
7. Install back-up power supply units (UPS)
8. Network testing and activation
9. In-service

# Developer/Builder Roles and Responsibilities

## Pre-Installation/Activation

CenturyLink requests you to provide a weekly/monthly notification (by date and address) of when a premises is ready for drop placement after final grade and before sod is placed.

## Why is this necessary?

This directly benefits the customer by:

1. Allowing installation of equipment and fiber before landscaping and final construction.
2. Facilitating the new home-owner's ordering process.
3. Reducing customer service delays.

## FTTP Minimum Wiring Standards

Much like a development's architectural standards specify design parameters, colors, shingle grades, and type of siding, FTTP communications require minimum standards. CenturyLink provides FTTP Minimum Wiring Standards in this guidelines document.

## Structured Wiring Specifications, Testing and Certification (for FTTP)

The FTTP residential infrastructure requires very specific guidelines to ensure proper functionality and reliability.

For new construction, CenturyLink provides Structured Wiring and Equipment Specifications for your use.

To ensure successful turn-up of a homeowner's communications services we require the developers/builders installer perform a Level III Performance Test and a completed FTTP Network Certification form for each new construction.

To certify that structured wiring meets or surpasses all specifications, Level III printed data certification tests for CAT5E cabling is required (using test equipment capable of printing test results, such as an Agilent WireScope 350).

Certification is complete once the installer fills out the FTTP Network Certification form (included with Structured Wiring and Equipment Specifications) to confirm compliance with the CenturyLink Structured Wiring and Equipment Specifications. The Level III Test Results and completed Certification Form are to be kept onsite in the Smart Panel.

***It is important that CenturyLink premises wiring specifications are met, to eliminate customer service delays and avoid additional charges associated with repeat trips due to non-specified equipment and wiring standards.***

# Minimum Wiring Standards, Ethernet Fiber To The Premises (FTTP)

## SINGLE-FAMILY HOME AND MULTI-DWELLING UNIT

### ***Minimum Wiring Requirements***

The Developer is responsible for communicating the Minimum Wiring Standards to each builder and will use reasonable efforts to monitor builders' compliance with the Minimum Wiring Standards. If the builder fails to comply with the Minimum Wiring Standards, CenturyLink shall not be required to extend the Network to the affected units until the Minimum Wiring Standards are met. Contact your CenturyLink engineering representative with questions.

**Note:** Contractor shall comply with all applicable governmental regulations to include federal, state, county, city and all other applicable codes and ordinances. The contractor shall furnish without extra charge any additional material and labor which may be required for compliance with these laws, rules, and regulations.

### ***Overview***

The intent of this document is to provide requirements and recommendations as guidelines for the installation of structured wiring and equipment for the transmission and/or reception of voice, data and/or video services over FTTP facilities maintained by CenturyLink.

### ***Definitions***

**Minimum Point of Entry (MPOE):** Defined as the point at which customer premises wiring exits the premises and connects with CenturyLink-provided facilities.

**Customer Premises Unit:** Defined as living space supported by a single electric meter.

**Environmentally Controlled:** Defined as a location shielded from rain and moisture, within a living or storage space, and maintained at temperatures between 32 and 104 degrees Fahrenheit.

(See Illustration on page 7)



# Single-Family Homes & Multi-Dwelling Units with Separate MPOEs for Each Customer Premises Unit

## Minimum Requirements

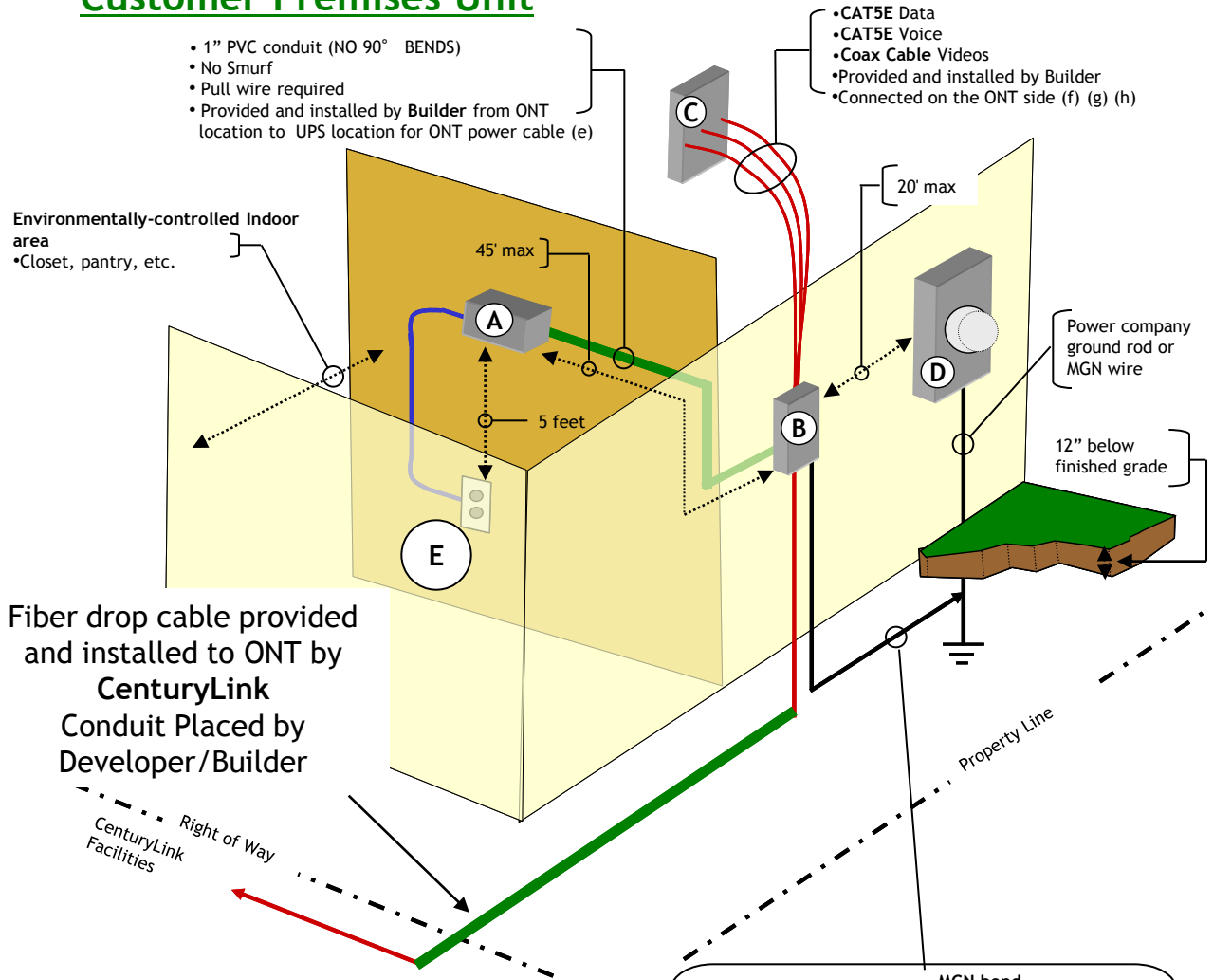
- a. **Minimum Point of Entry (MPOE):** Located within 20ft of AC electrical power meter/Multi-Ground Neutral (MGN). For distances beyond 20 feet drive an 8 foot 5/8 inch diameter rod. Ground the protector/terminal/ONT to the rod using AWG #6 bare solid copper wire and bond the rod to the MGN also using AWG #6 bare solid copper wire per NEC standards.
- b. **UPS Location:** Environmentally-controlled location, to be no less than 14 in. wide x 24 in. tall x 12 in. deep, 50 in. above ground level, and within 100ft wire run distance from MPOE, for mounting of Uninterruptible Power Supply (UPS). We recommend locating the UPS on the first-floor close to the MPOE in a dry area such as a pantry, closet, etc.
- c. **UPS Power:** 110-volt electrical outlet within 5ft wire run distance of the UPS, for each individual customer premises and fed by each customer's individual electric meter. The required UPS location shall not be supported or provisioned on a Ground Fault Circuit Interrupted (GFCI) electrical circuit. After the initial install, the backup battery is the responsibility of the property owner.
- d. **Conduit:** 1" inch conduit, with pull string, from MPOE to ROW and or property line nearest CenturyLink facilities for each customer premise unit, buried 18" below final grade, and marked at both ends
- e. **Inside Conduit:** 1-inch PVC conduit (no Smurf), with pull wire, no more than 100ft wire run distance from UPS location to MPOE. Bends shall be electrical sweeps, no 90° bends allowed.
- f. **Smart Panel:** Recommended to provide broadband distribution supporting voice, data, and video services. A 110-volt non-GFCI electrical outlet is recommended inside each Smart Panel. It is recommended that the Smart Panel or Central Point of Contact be centrally located on the first floor of the structure. Two 1"-conduit risers are required from the Smart Panel or Central Point of Contact (CPC) to the top floor or ceiling plane for future distribution considerations.
- g. **Ethernet High Speed Data:** One Cat5E cable is required from MPOE to Smart Panel or Central Point of Contact for delivery of data service to each customer premises unit. If a distribution panel is not installed, a single cable run from the MPOE to a single RJ45 jack is required. As a minimum, CenturyLink FTTP Standards require one CAT5E cable with RJ45 data jack for Internet access. For multiple data jack locations, a hub can be used to facilitate one computer. For multiple data jack locations for multiple computers a router is recommended. Data cable runs are to be no more than 300' in length.
- h. **Voice:** One Cat5E cable from MPOE to Smart Panel or Central Point of Contact for delivery of voice service to each customer premises unit. If a distribution panel is not installed, a single cable run from the MPOE to a single RJ11 jack is required. As a minimum, CenturyLink FTTP Standards require one CAT 5E cable with RJ11 voice jack for voice service. NOTE: If the developer/builder uses two Cat5E's - one for voice and one for data - it is recommended that one Cat5E have a blue jacket and the other have a gray jacket to help distinguish between data (blue) and voice (gray).
- i. **Video:** One RG6 coaxial cable from MPOE to Smart Panel or Central Point of Contact for delivery of video service, if CenturyLink is the video provider of choice, to each customer premises unit. If a distribution panel is not installed, a single cable run from the MPOE to a single cable outlet jack is required. As a minimum, CenturyLink FTTP Standards require one RG6 coax cable with video jack for video access. Runs are to be no more than 100' in length from MPOE. All cable connectors are to be compression type.

## Variations when Multi-Dwelling Units have a Single MPOE for all Customer Premises Units

- j. **UPS Location:** Environmentally-controlled location, to be no less than 14 in. wide x 24 in. tall x 12 in. deep, 50 in. above ground level, and within 100ft wire run distance from MPOE, for mounting of Uninterruptible Power Supply (UPS) for every four customer premises units.
- k. **UPS Power:** 110-volt non-GFCI electrical outlet within 5ft wire run distance of the UPS, for every four customer premises units and fed by a common individual electric meter.
- l. **UPS Responsibility:** Four customer premises units sharing a common UPS unit require either the building owner or HOA to assume responsibility for the 110-volt electrical outlet and UPS backup battery replacement. If this is not possible, the Multi-Dwelling Units must be wired with a separate MPOE for each.

# FTTP (Ethernet) Wiring Standards Diagram

## Customer Premises Unit



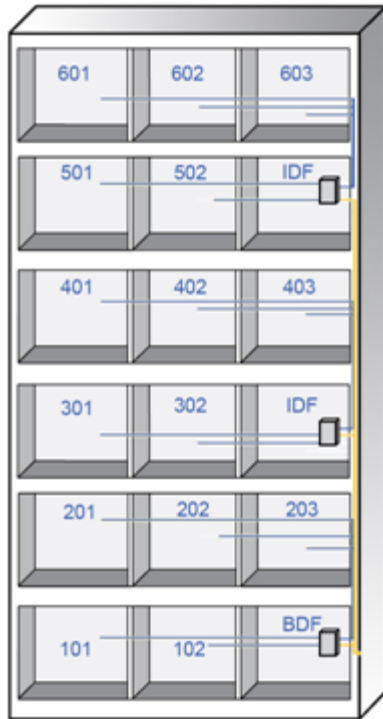
- A** Uninterruptible Power Supply (UPS)  
• Provided and installed by CenturyLink  
• Must be located within 100 wire feet of ONT for Single and Multi-Family Units (c) (j)
- B** ONT (FTTP NID)  
• Minimum Point of Entry (MPOE)  
• Provided and installed by CenturyLink  
• To be located within 20 feet of AC power MGN (a)
- C** Smart Panel  
• Provided, installed and connected to by Builder  
• Provides distribution to interior rooms (f)
- D** AC Power Meter
- E** Non-GFCI 110-volt outlet  
• Provided and installed by Builder (d) (j)

**Notices:** Local CenturyLink engineering requirement supersede illustrated design detailed.  
For specific installation requirements and application details check with the Local CenturyLink engineering team.

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# MDU Wiring Diagrams





# GATES, Guard Shacks, Pools, and Out Buildings

**Gates:** The Builder will need to provide a location for the ONT equipment to be attached to an exterior wall of the dwelling (no less than 14in wide x 14 in tall). The Builder will also need to provide and install a NEMA-3 type cabinet to house the ONT and associated equipment in the event there is not an environmentally controlled room for it to be mounted in.

**(Enclosure needs to be no less than 24in wide x 24in high x 6 1/2in deep)**



**Guard Sheds, Pool & Out Buildings:** Builder will need to provide a 110 volt AC electrical outlet within 5 ft. wire run distance of the UPS if mounted in an environmentally controlled room. If the builder is providing an environmentally controlled cabinet the 110 AC outlet needs to be mounted in the cabinet. The UPS location is not recommended to be supported or provisioned on a Ground Fault Interrupted (GFI) electrical circuit however, if nothing else is doable, this is usable with the builder/HOA taking responsibility for reset if tripped.

**Builder will need to:** provided (2) Cat5e, or (2) Cat6 wires along with a path to the termination point in order to provide service.

# ANSI/EIA/TIA Telecommunication Guidelines and Specifications

## Cable Specifications

- Telephone: Cat5E (marked “voice”) - 4-pair unshielded twisted pair cable, 24 AWG solid copper gray jacket.
- Data Cable: Cat5E 4-pair unshielded twisted pair cable, 24 AWG solid copper blue jacket. Data cable runs should be no more than 300ft in length.
- Coaxial Cable: RG-6 60% shielded solid copper center.

## Video Specifications

- Industry standards require splitters with a bandwidth of 5 Mhz to 1,000 MHz.
- All coaxial cable must be terminated with compression connectors. No screw-on or hex-crimp connectors shall be used in wall plate terminations or at the feeding splitter. No interior coax cable shall exceed 100'.
- Exterior connections must be weather-proofed and sealed to prevent corrosion.

## Smart Panel Specifications

*Size according to the amount of services to be installed.*

- 14” panel for 2-3 rooms of structured wire bundles
- 24” panel for 3-4 rooms of structured wire bundles
- 36” panel for 4-5 rooms of structured wire bundles
- 48” panel for 5-6 rooms of structured wire bundles
- Mount between 16" on-center studs
- Hinged door
- Built-in 110V non-GFCI power outlet

**NOTE:** Home networking applications may require an additional 110v non-GFCI outlet located near the Smart Panel. For multiple data jack locations, a hub can be used to facilitate one computer. For multiple data jack locations for multiple computers a router is recommended.

## Cable runs from Smart Panel to each significant room

The full structured bundle consists of:

- One 4-pair Cat5E cable for voice
- One 4-pair Cat5E cable for data
- Two coax cables for video

All voice cables shall be Cat5E rated and all data cables shall be Cat5E rated homeruns to the Smart Panel or CPC (no splitting, splicing, or looping is permitted) wired and tested to ANSI/EIA/TIA 568B guidelines and be terminated at the Smart Panel or CPC.

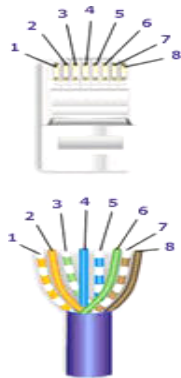
# ANSI/EIA/TIA Telecommunication Guidelines and Specifications

**NOTE:** All residential structured wiring and terminations must meet ANSI/TIA/EIA-T568B transmission requirements and testing.

## Terminations

### DATA Cat5E:

Each Cat5E 4-pair cable must be terminated completely in an 8P8C modular jack at the outlet location and at the Smart Panel or CPC. Maintain T568B throughout the installation.



**568-B Wiring**

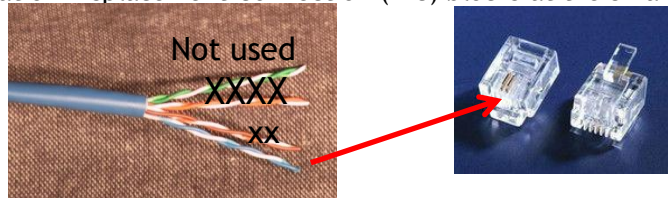
Pair #	Wire	Pin #
1 - White/Blue	White/Blue	5
	Blue/White	4
2 - White/Orange	White/Orange	1
	Orange/White	2
3 - White/Green	White/Green	3
	Green/White	6
4 - White/Brown	White/Brown	7
	Brown/White	8

**<< 568-B Diagram**

**NOTE:** T568A wiring is for commercial applications only! USE T568B for residential.

### Telephone (Voice) Cat5E

Each Cat5E 4-pair cable must have the white blue pair terminated in an 2P2C RJ-11 modular jack at the outlet location and on the Insulation Displacement Connection (IDC) blocks at the Smart Panel or CPC.



### Video (TV) Coax RG-6

Each RG-6 coax cable must be terminated and connected to the modular jack and splitters using compression connectors only. No screw-on or crimp connectors shall be used.

## Smart Panel Telephone, Data, Video, and Audio Modules

The Smart Panel must include as a minimum:

- A basic telecom module or equivalent.
- A multi-port patchable module or equivalent (includes ports for security system).
- A network module or equivalent.
- 8-port hub module or equivalent.
- Video amplifier module or equivalent.
- Video distribution module or equivalent.
  - o Optional modules as required (audio, expansion modules).*

# ANSI/EIA/TIA Telecommunication Guidelines and Specifications

## Outlets:

Outlets must be modular jack type or equivalent that are configurable for each access point and connected to the Smart Panel or Central Point of Contact (CPC). (See outlet illustrations below.)

## Minimum Outlet Placement Specifications:

- ❑ Living Room/Family Room/Great Room (Each defined by floor plan) - Two 4-port outlets featuring one telephone (Cat5E), one data (Cat5E), and two coax TV connections (RG6) in each. (Audio is optional.)
- ❑ Kitchen - One double-port with one telephone Cat5E RJ-11 and one Cat5E RJ-42 rated outlet. (Video and audio optional.)
- ❑ Bedrooms - Two 4-port multi-media outlets. Each outlet includes one telephone (Cat5E), one data (Cat5E), and two coax (RG6) connections in each. (Audio is optional.)
- ❑ Office/Den/External Living Space (Garage/Buildable Attic) - One 4-port multi-media outlet providing one telephone (Cat5E), one data (Cat5E), and two coax (RG6) connections.
- ❑ Laundry/Utility (not required if closet space) - One double-port outlet providing: one telephone (Cat5E) connection and one data (Cat5E) rated outlet. (Video and audio optional.)

## General Installation Specifications:

- ❑ Regional grounding and coding requirements must be followed for pre-wiring and trim out. (If any requirements listed here are in conflict with local codes, the local codes shall apply.)
- ❑ All conduits must contain a pull string labeled "For communication use only".
- ❑ All cable runs must adhere to minimum bend radius specifications and include a minimum of 18" additional cable slack behind box or mud ring.
- ❑ All cable runs must be at least 12" from parallel 110-VAC runs and must not cross over fluorescent lighting fixtures or other high voltage fixtures or devices.
- ❑ All cable runs must use modular jacks and plugs for cross-connection and be clearly labeled on both ends of the cable to identify termination location.
- ❑ Pull strings must be left from all installed voice, data, or video service locations to the Smart Panel or Central Point of Contact (CPC) for later expansion.
- ❑ All voice and data cables shall be Cat5E rated homeruns to the Smart Panel or CPC (no splitting, splicing, or looping is permitted) wired and tested to ANSI/EIA/TIA 568B guidelines and be terminated at the Smart Panel or CPC.
- ❑ No hard fasteners or staples may be used on low-voltage voice, data, video, or security cables in the pre-wiring or trim-out stages. Holes drilled in wood studs are to be 40% oversized. Grommets shall be used in metal stud applications.
- ❑ Connectors must be installed per manufacturer's specifications by trained and certified technicians, including the use of recommended tools and test equipment.
- ❑ Where it is necessary to penetrate a fire-rated wall, the hole must be sleeved with EMT and appropriate pulling bushings must be installed. The sleeve and penetrating hole must be sealed with a fire-retardant sealant. Where it is necessary to place an outlet in a fire-rated wall, a metal junction must be used to house the outlet.

# Voice, Ethernet HSI and Video Network Systems

## Wall Jacks

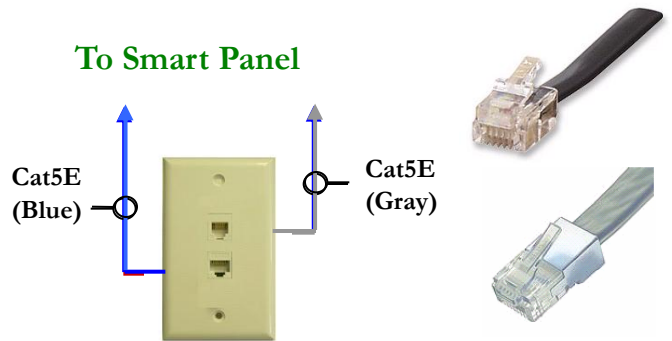
**NOTE:** Ethernet, unlike ADSL, requires separate wiring systems.  
Below are typical configurations

### A. Typical Voice (RJ11) & Data (RJ45) double-port wall jack

Requires two separate connections:

- One Cat5E for voice
- One Cat5E for Ethernet data

**Minimum Outlet Placement Specifications:**  
One outlet required in kitchen  
One outlet required in laundry/utility (not required if closet)

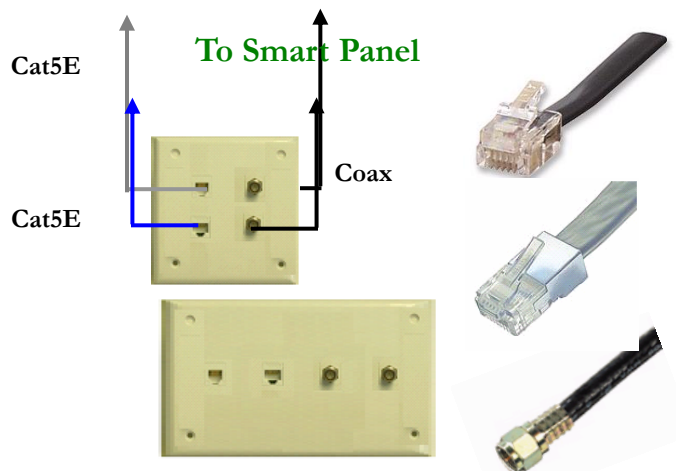


### B. Typical 4-port multi-media Voice, Data & Video wall jacks

Requires three separate connections:

- One Cat5E for voice
- One Cat5E for Ethernet data
- Two RG6 coaxial cable for video

**Minimum Outlet Placement Specifications:**  
Two outlets required in living/family/great room  
Two outlets required in bedrooms  
One outlet required in office/den/external living space (garage/build-able attic)



Using the above illustrations as examples, the top jack (RJ11) is specific to voice and the second jack (RJ45) is specific to Ethernet data. Each jack requires its own connection. Ethernet Data and Voice can not share the same Cat5E home wiring network.



# FTTP Ethernet Checklist and Home Certification

**Unit Information**    **Builder:** \_\_\_\_\_  
**Lot#:** \_\_\_\_\_    **Street Address:** \_\_\_\_\_

	CHECKLIST	STRUCTURED WIRING MINIMUM REQUIREMENTS
	<b>Ground</b>	
	<b>Multi-Ground Neutral (MGN)</b>	Located within 20 ft of AC electrical power meter/Multi-Ground Neutral (MGN)
	<b>Power Supply</b>	<b>Local Power Supply (LPS)</b>
	<b>Environmentally Controlled Location LPS Local Power Supply (LPS)</b>	Environmentally-controlled indoor location, to be no less than 14 in. wide x 24 in. tall x 12 in. deep, 50 in. above ground level, and within 100ft wire run distance from MPOE, for mounting of LPS
	<b>110 volt, non-GFCI for LPS Outlet</b>	110 volt, non-GFCI electrical outlet within 5 ft wire run distance of the LPS
	<b>Conduit</b>	<b>No Smurf</b>
	<b>Inside 1 Inch PVC conduit to LPS</b>	1 inch PVC conduit, with pull wire, no more than <u>100 ft</u> wire run distance in length, from LPS to MPOE
	<b>Structure Wiring MPOE to Smart Panel</b>	<b>Data Hub or Router Recommended</b>
	<b>Data Service – 1 - Cat 5E Cable Excluding Blue or White Cat 5E Sheathing</b>	1-Cat 5E cable from MPOE to Smart Panel or other distribution point for delivery of data service
	<b>Voice Service – 1 – Cat 5E Cable Preferred Blue or Gray Cat 5E Sheathing</b>	1- Cat 5E cable from MPOE to Smart Panel or other distribution point for delivery of voice
	<b>Video Service – 1 - RG 6 Coaxial Cable</b>	1-RG 6 Coaxial cable from MPOE to Smart Panel or other distribution point for delivery of video service

# Certification

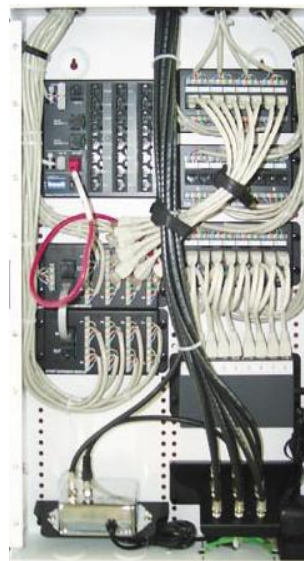
## Smart Panel Information:

- **Manufacturer:** \_\_\_\_\_
- **Location in home:**    \_\_\_ Garage    \_\_\_ Closet
- **Router manufacturer:** \_\_\_\_\_

## Outlets Information: Number of outlets installed:

- **Voice(cat5e)outlets:** \_\_\_\_\_
- **Data (cat5e) outlets:** \_\_\_\_\_
- **Coaxial RG-6 outlets:** \_\_\_\_\_

- Each Cat5E 4-pair cable must be terminated completely in an un-keyed 8P8C modular jack at the outlet location, and at the Smart Panel or CPC. Maintain T568B throughout the installation.



## CenturyLink ONT Interface Information:

### Length of interface cabling:

- **Cat 5e voice interface:** \_\_\_\_\_ ft. **Cat5e data interface:** \_\_\_\_\_ ft.
- **Coaxial TV interface:** \_\_\_\_\_ ft. **1" PVC conduit for LPS** \_\_\_\_\_ ft.

- Communications contractor certifies and warranties here forth that the list home above is installed to and fully compliant with **CenturyLink** FTTP, and TIA-EIA 570A telecommunications and data standards. The required Level III printed data certification tests for cat5e cabling is attached and submitted with this certification sheet.

**Certification Date:** \_\_\_\_\_

**Communications Installer:** \_\_\_\_\_

**Communications Installer Signature:**

\_\_\_\_\_

FTTP ONT **BBDLC** 2014-0515 v1