

Passive FTTR solution, components and in-home cabling

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Outline

- Background
- Passive FTTR solution
- Cabling components in FTTR
- In-home cabling
- Summary

Background

Why is FTTR developing rapidly?

■ Infrastructure foundation:

Average coverage of FTTH is 65% in world and more than 90% in China.

FTTR is the next choice to give full gigabit coverage in the whole house.

■ Market demand:

Live broadcast, online education and meetings, cloud VR, cloud gaming, and other new network services.



■ Standard development:

Rapid development of technical standards, Such as ITU-T, ETSI and so on.

■ Usage foundation:

Many operators have provided FTTR cabling solution for home users. And more than 2 million household or office in China have used FTTR service.

Background

Two FTTR implementation solution

■ Passive solution:

All-optical network, optical cable and connector for cabling.

Using the existing indoor circuit to realize power supply.

■ Hybrid Cabling Solution:

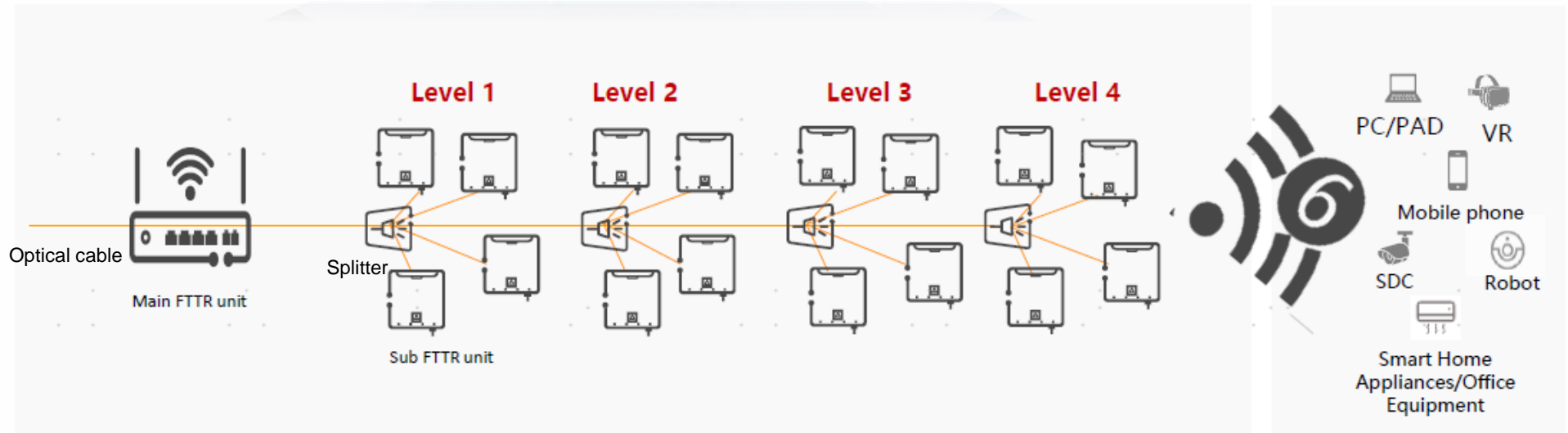
Using optical/metallic hybrid cable and connectors for cabling.

Remote power supply for ONTs. More flexible cabling.



Passive FTTR solution

P2MP network solution



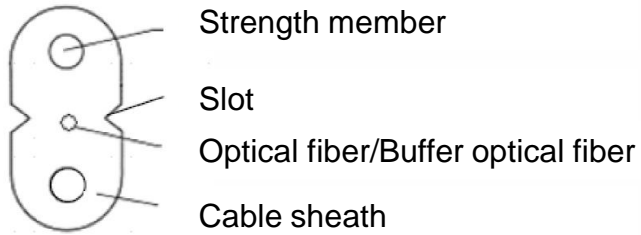
- Based on GPON technology.
- Good scalability: each 1:5 unequal splitter supports 4 sub gateways, support up to 4 splitters, maximum 16 sub gateways for 16 rooms.
- Flexible deployment, using less cable compared with other solutions.

Suggested performance of FTTR network

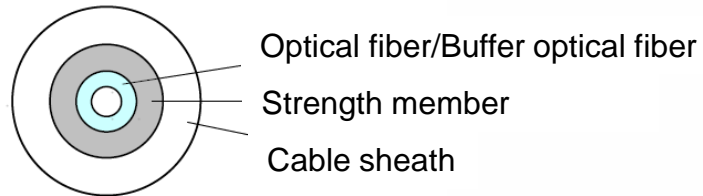
Item	Performance
Link loss	$\leq 25\text{dB}$
Link return loss	$\geq 28\text{dB}$
Connector type	SC(Pre-installation type, Field-Mountable type)
Fiber count in cable	Simplex
Fiber type	G.657A2 or G.657B3

Cabling components in FTTR

Optical cable--Common indoor cable



Bow-type simplex indoor cable



Round simplex indoor cable

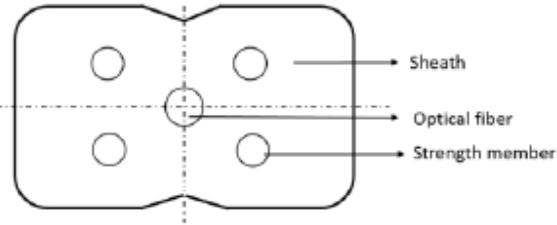
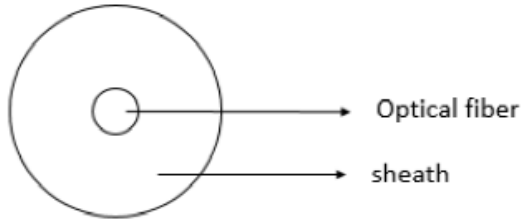
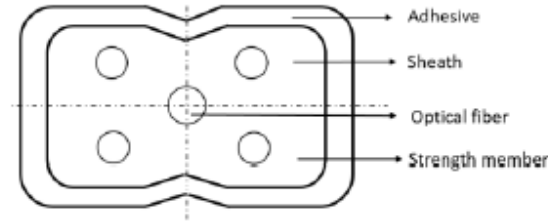
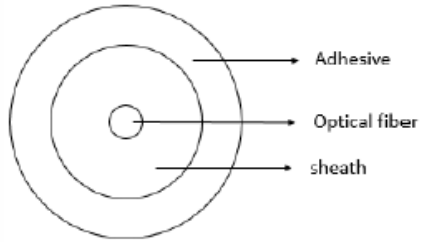
General Characteristic:

- Flame retardant
- If installed in concealed duct, low friction sheath is preferred
- Small outer diameter, light weight, small space occupied and excellent bending performance
- If installed directly on the wall surface, the sheath color is suggested to be similar with the wall



Cabling components in FTTR

Optical cable--Transparent indoor cable

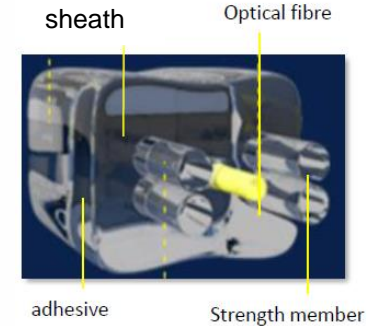


Round type

(typical 0.9mm diameter)

Bow type

(Reinforced)



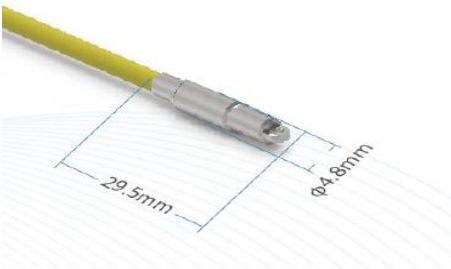
General Characteristic:

- Transparent for minimum visibility
- Two type design , with adhesive or not
- Cable with self-contained adhesive can be easily deployed

Cabling components in FTTR

Optical connector

Typically used in concealed duct installation



Miniature optical connector(SC)



Field-Mountable optical connector (SC)

Typically used in Wall surface installation

(Pre-terminated cable assembly)



Common optical connector (SC)

General Characteristic:

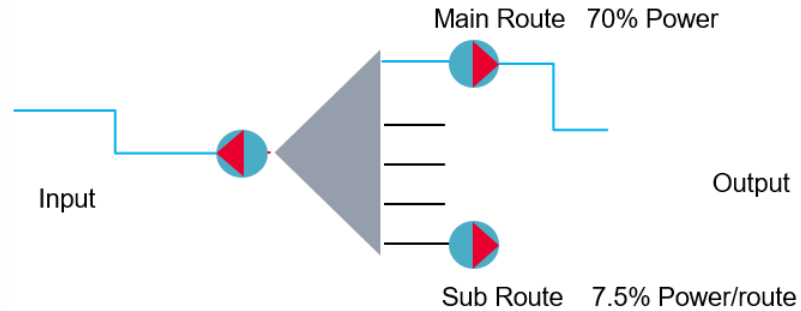
- Insertion loss ≤ 0.3 dB
- All the type can be mated with conventional SC connector by conventional SC adapter

Cabling components in FTTR

Optical splitter



1:5 unequal splitter



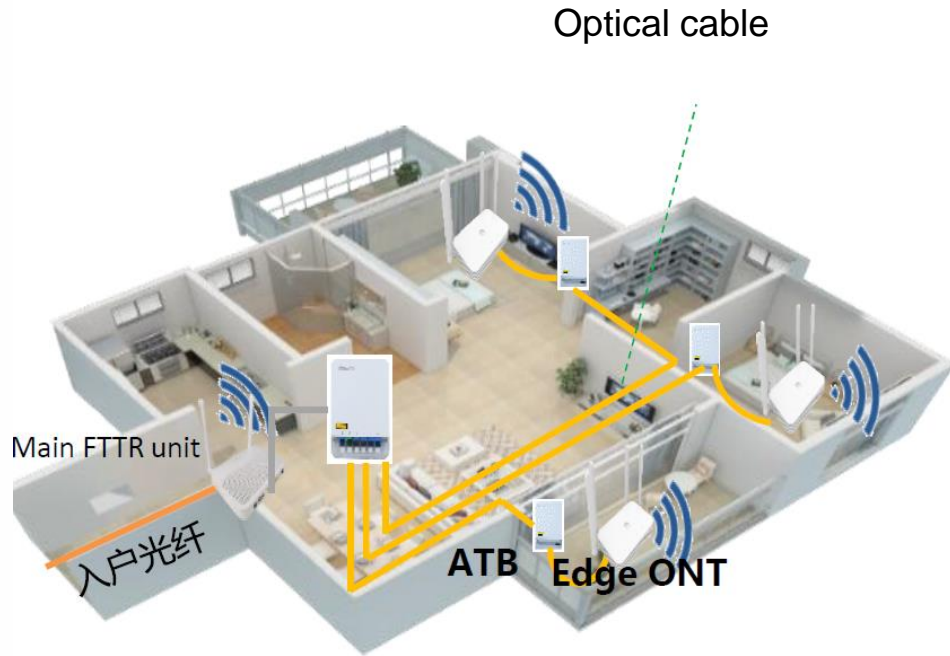
General Characteristic:

- Insertion loss of main route ≤ 2 dB
- Insertion loss of sub route ≤ 16 dB

Note: 1:9 splitter can be used in FTTR solution for Business

In-home cabling

General



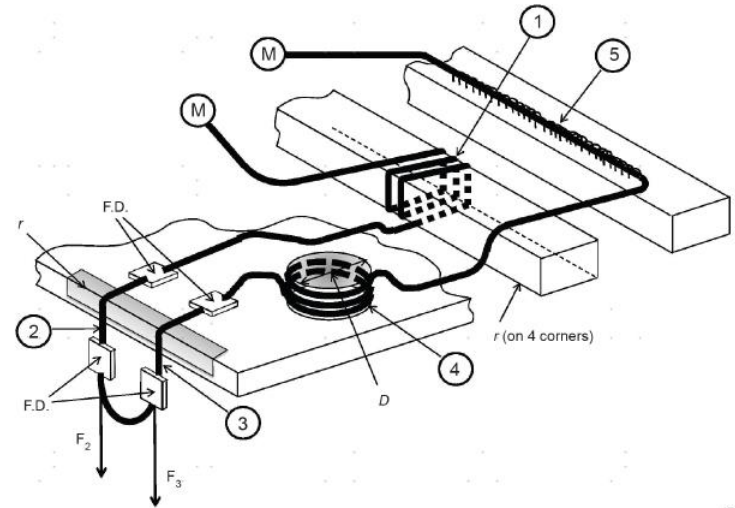
Two typical installation method for cable:

- Concealed duct installation
Suitable for house with concealed duct which have enough space for optical cable. The cable should have enough tensile force(maybe bigger than 100N).
- Wall surface installation
Suitable for multiple scenarios, higher installation efficiency.

Indoor simulated installation test per IEC 60794-1-21 E27

- 1) Fourteen or fifteen 90° corner bends (1 mm radius)
- 2) One 90° corner bend (1 mm radius) with a 2 kg load.
- 3) One 90° corner bend (1 mm radius) with rated residual load.
- 4) Two 10 mm diameter mandrel wraps.
- 5) Thirty attachment points, as same with the actual installation method.

(Many fastening methods for cables can be considered, including appropriate staples, adhesives, and cable ties. Methods shall be compatible with the substrate used and local practices.)



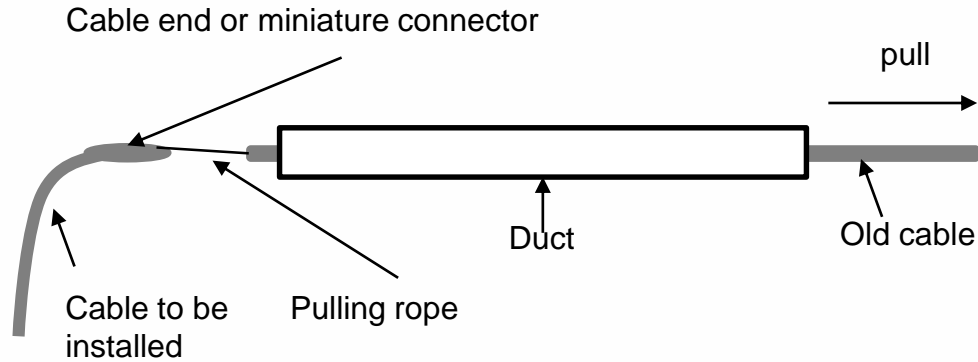
Recommended Requirements:

No damage to the cable or cable elements.

Attenuation change ≤ 0.40 dB at 1 550 nm.

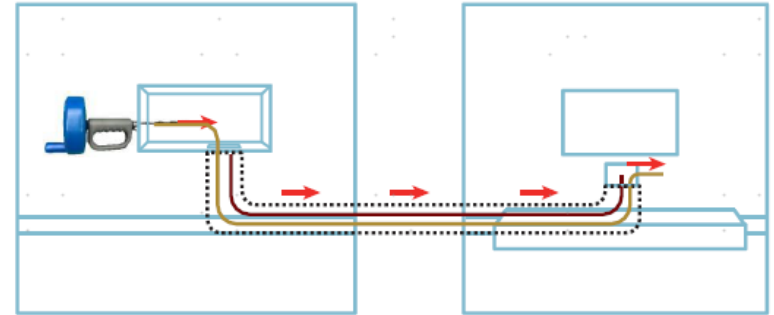
In-home cabling

Concealed duct installation methods – examples



Pulled by useless old cable (such as telephone lines, network lines, etc)

Note: air-blowing is also a choice for duct installation in home.



Pulled by spring duct threader

In-home cabling

Wall surface installation – by cable self-contained adhesive

- 1. Prepare the melting tool and the optical cable pre-assembled with the adhesive coating.
- 2. The installer can use the melting tool to melt the adhesive on the surface of the optical cable, then the optical cable can be fixed on the wall.



In-home cabling

Wall surface installation – by dispensing glue

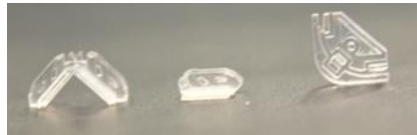
Type: cold glue or hot melt glue



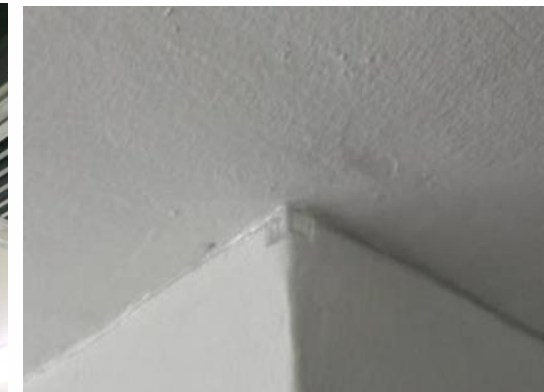
Cold glue



Hot glue gun



Corner accessories

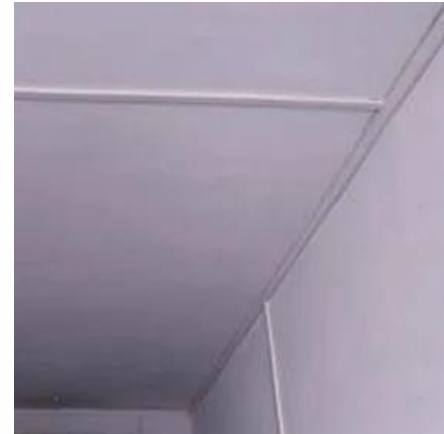
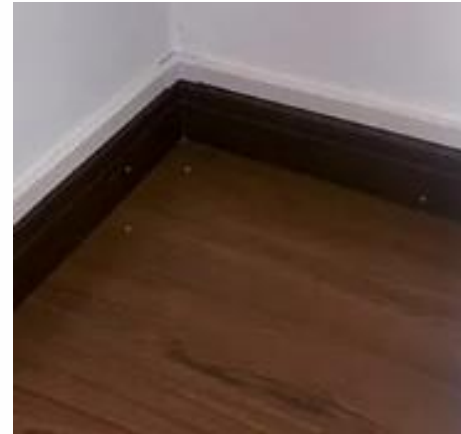
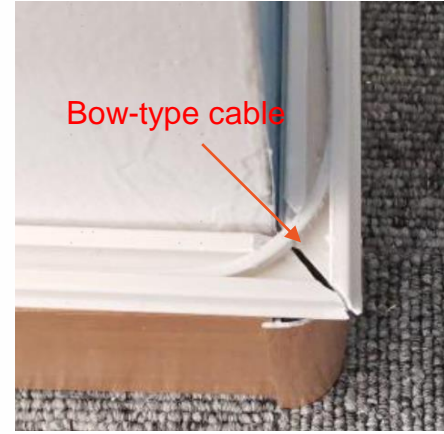


In-home cabling

Wall surface installation – by cable pathway



Cable pathway



Summary

- **Passive FTTR Solution**

- All-optical network, simple structure, good scalability, flexible deployment
- Passive P2MP solution is widely used, especially in home scenario (easy to power supply)

- **Cabling components**

- Optical cable, simplex, common indoor cable/transparent design
- Optical connector, common type, miniature design, or field-Mountable type
- Optical splitter, 1:5 unequal splitter

- **In-home cabling**

- Mature and multiple installation techniques
- Concealed duct installation
- Wall surface installation, elegant, high efficiency, suitable for various scenarios

Thank you !