Cybersecurity

Electronic and Communication Technologies

FTTx Technologies

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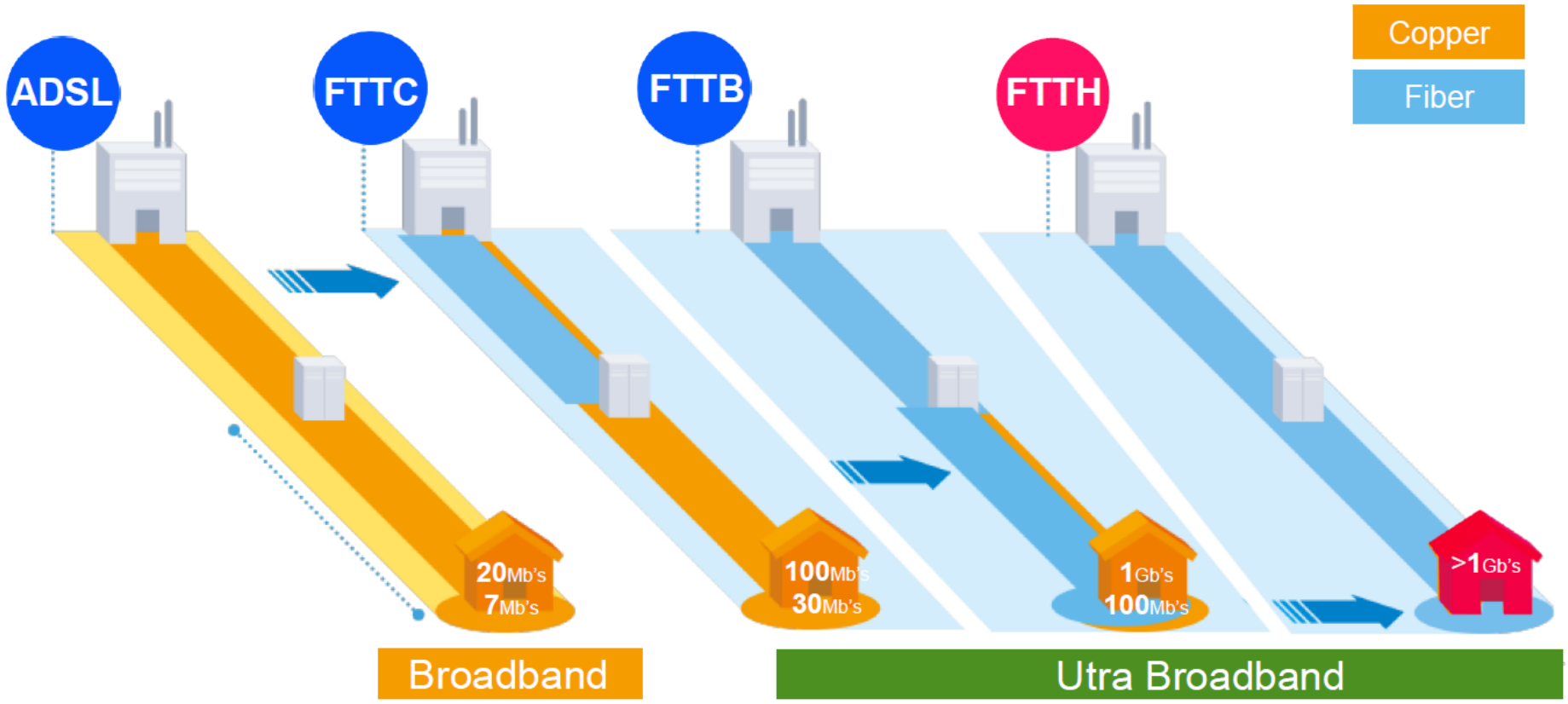
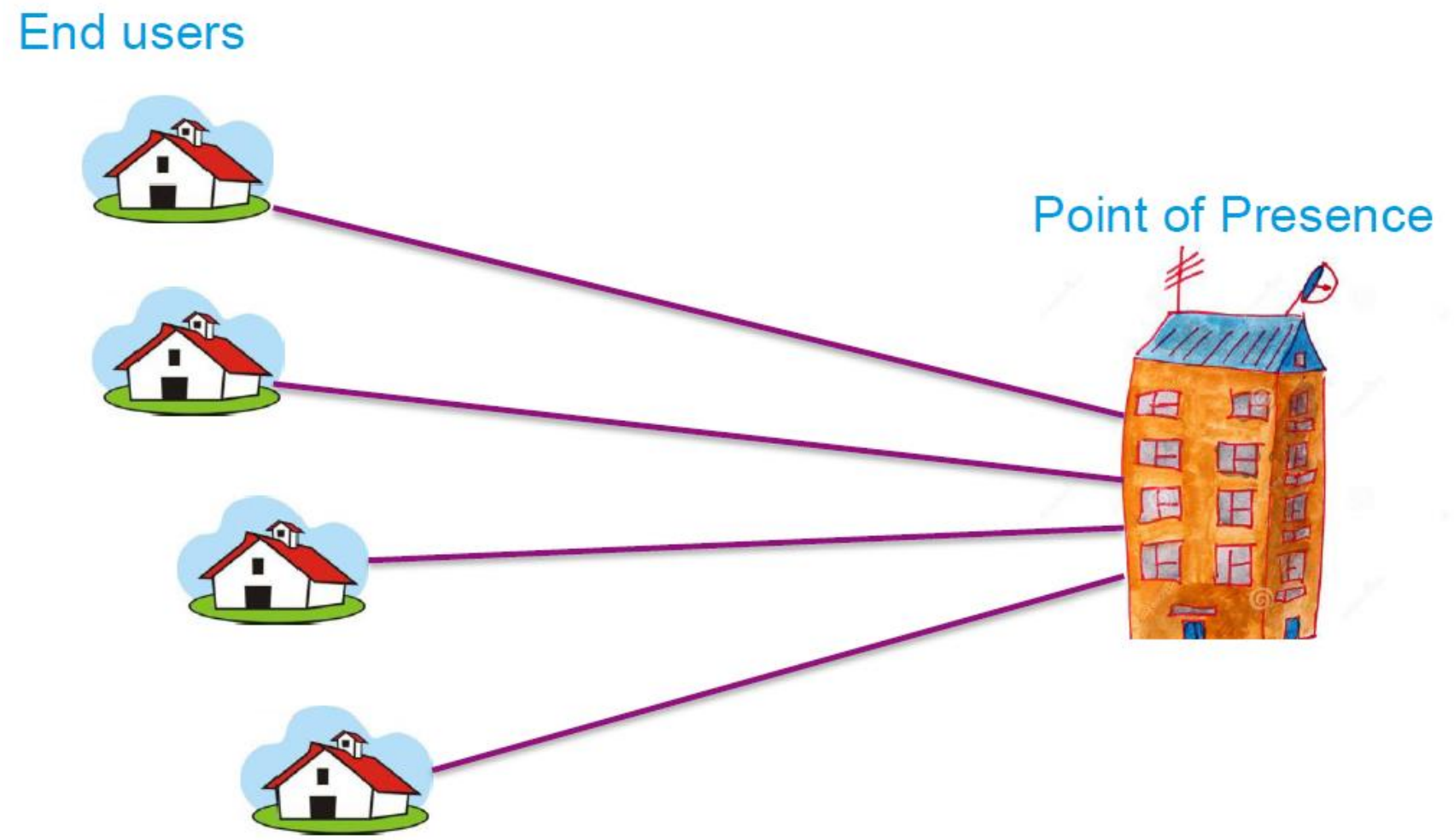
Transport and Access Networks

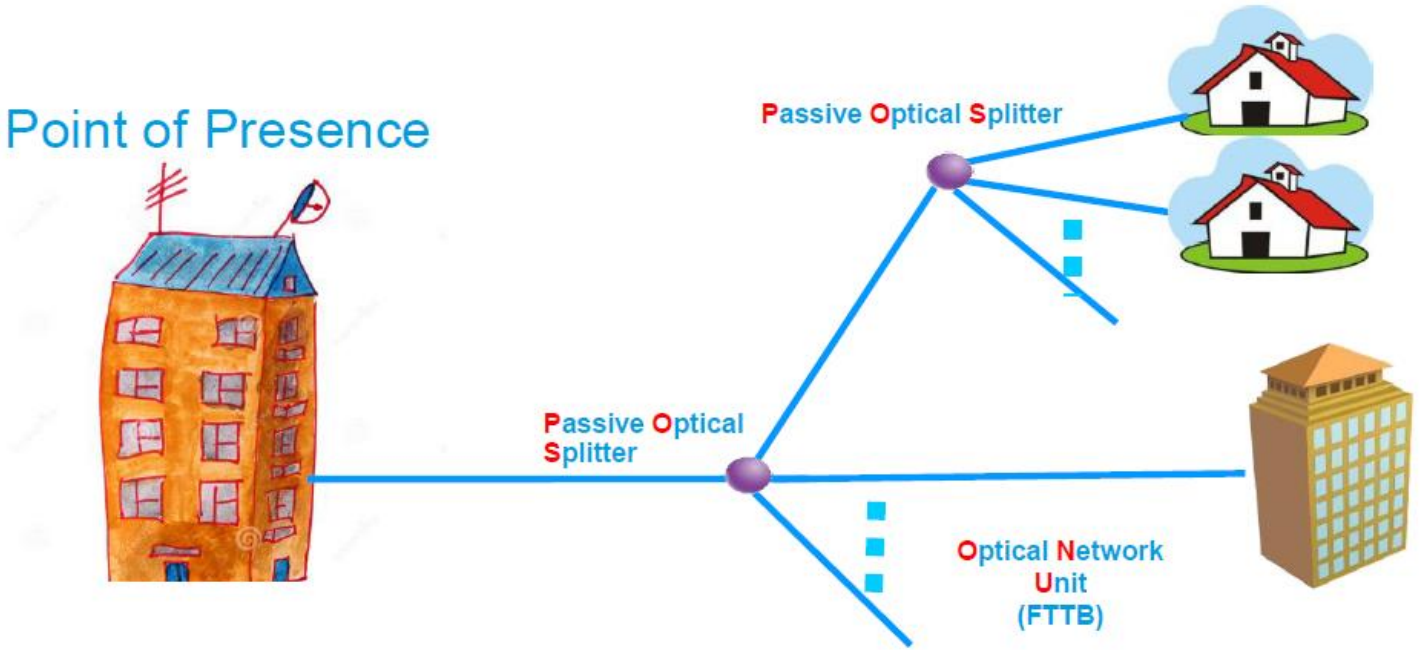
Access Network Technologies



Point-to-Point Architecture

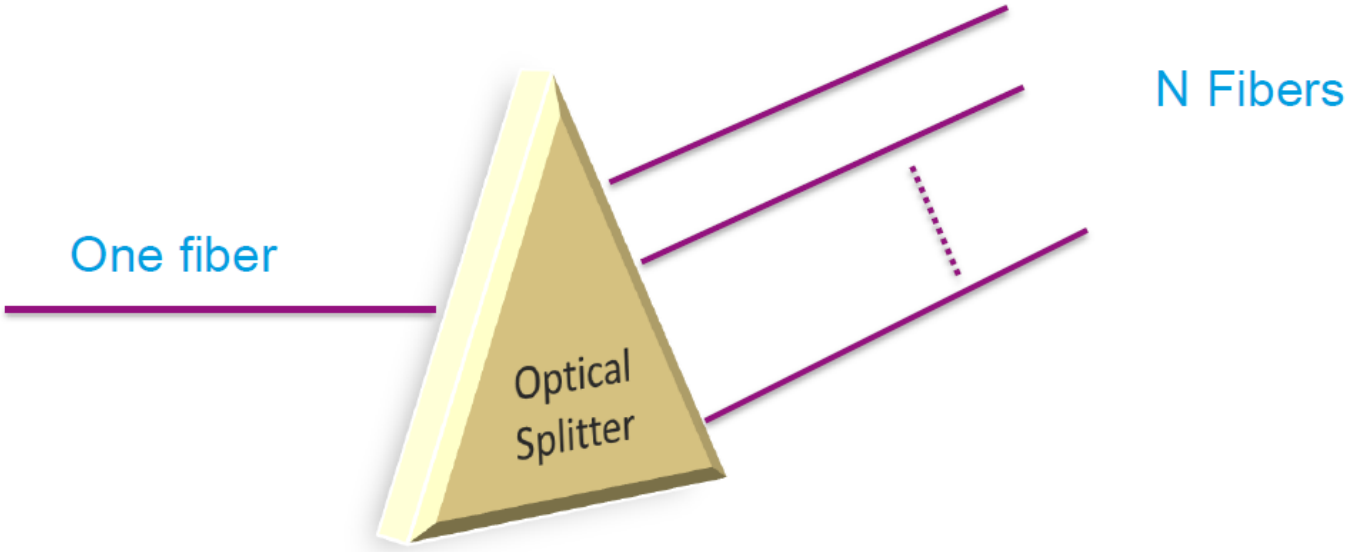


Point-to-Multipoint Architecture: Passive Optical Network



Dominant Technology: Gigabit Passive Optical Network GPON

The (Passive) Optical Splitter

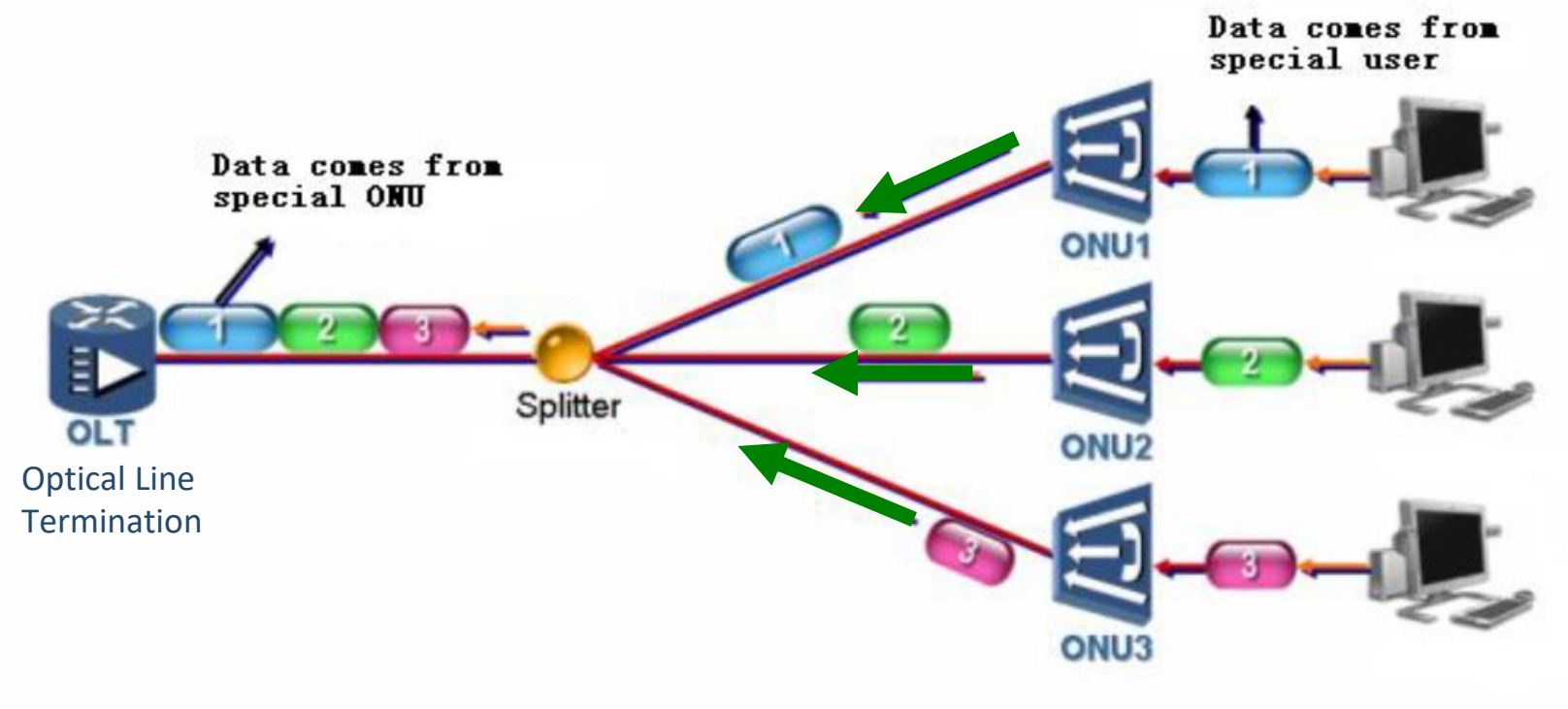


Tipical ratio
1:4 1:16 or 1:32

The (Passive) Optical Splitter

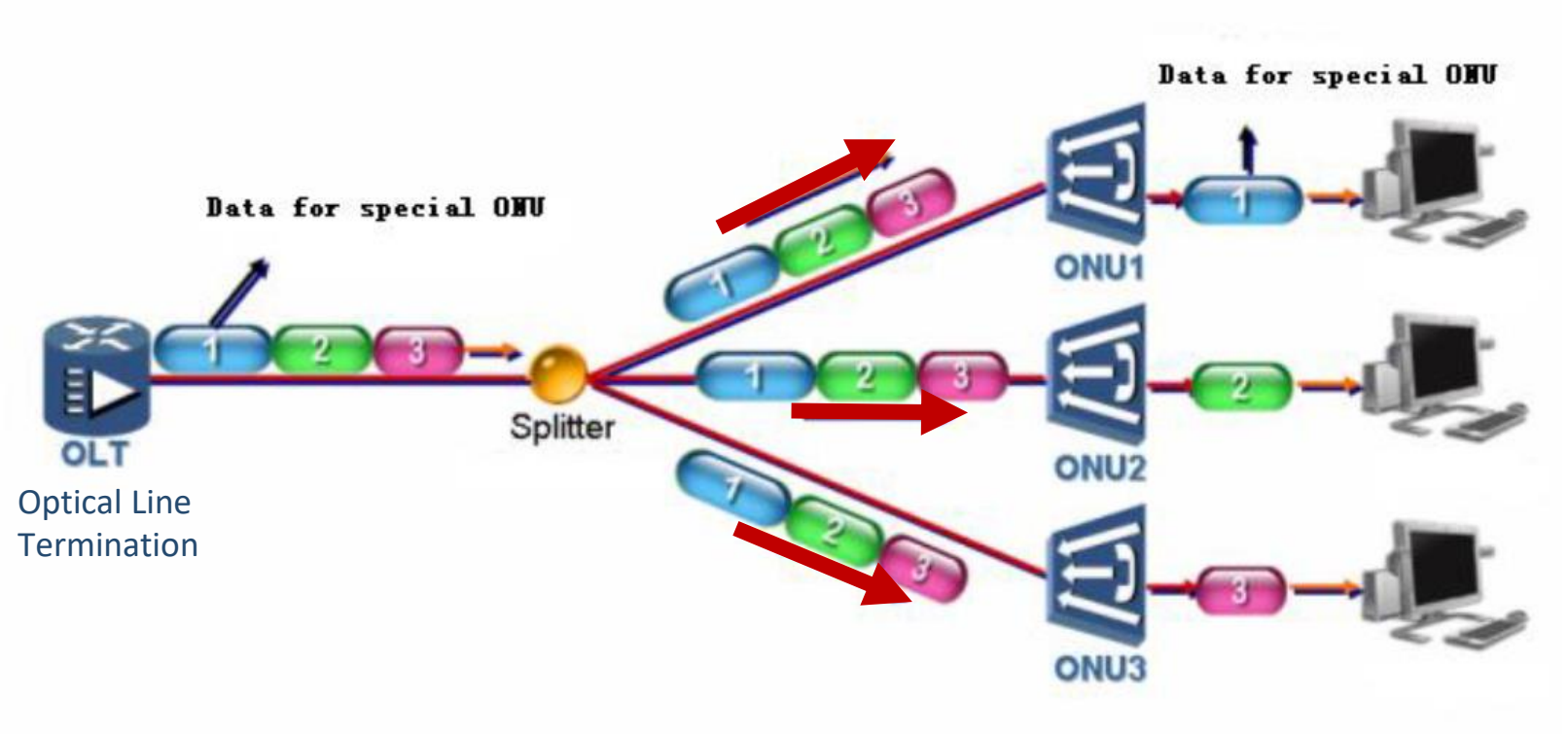
1 : 4

Upstream TDMA



In a GPON Network, upstream and downstream data packets are transmitted in wavelengths in the 1290-1330nm (typ. 1310) and 1480-1500nm (typ. 1490) ranges respectively.

Downstream TDM Multiplexing (Broadcast)



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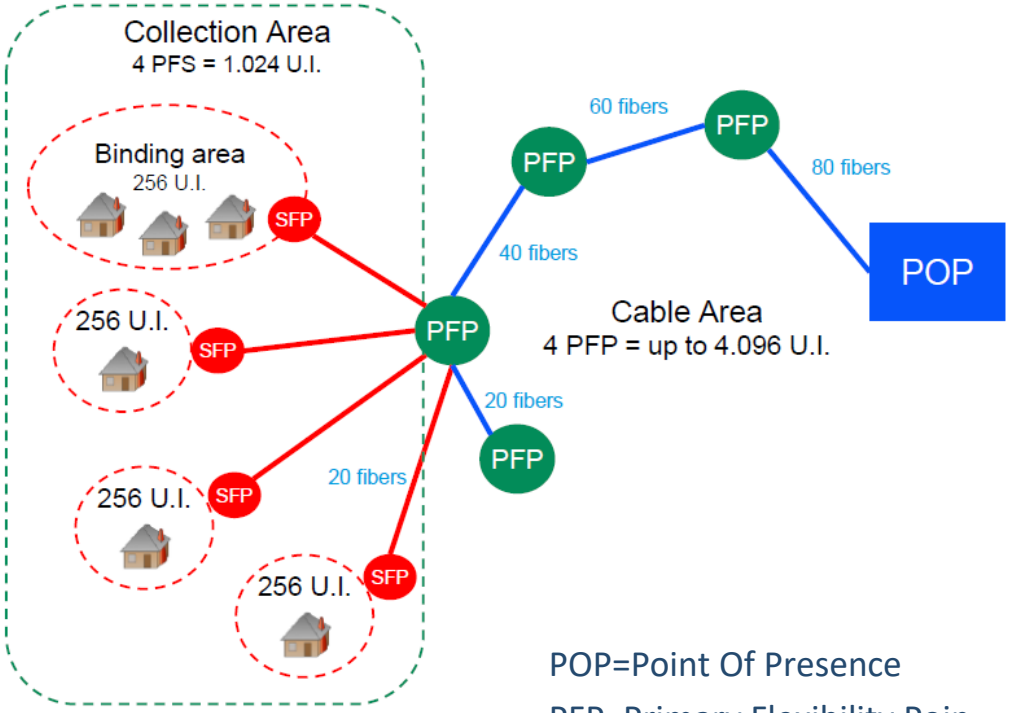
Sample Network Architecture: OPEN FIBER's Gigabit PON



Definitions

- **Cable Area:** House-Holds area served by the same cable.
- **Collection Area:** House-Holds area served by the same Primary Flexibility Point.
- **Binding area:** House-Holds area served by the same Secondary Flexibility Point.

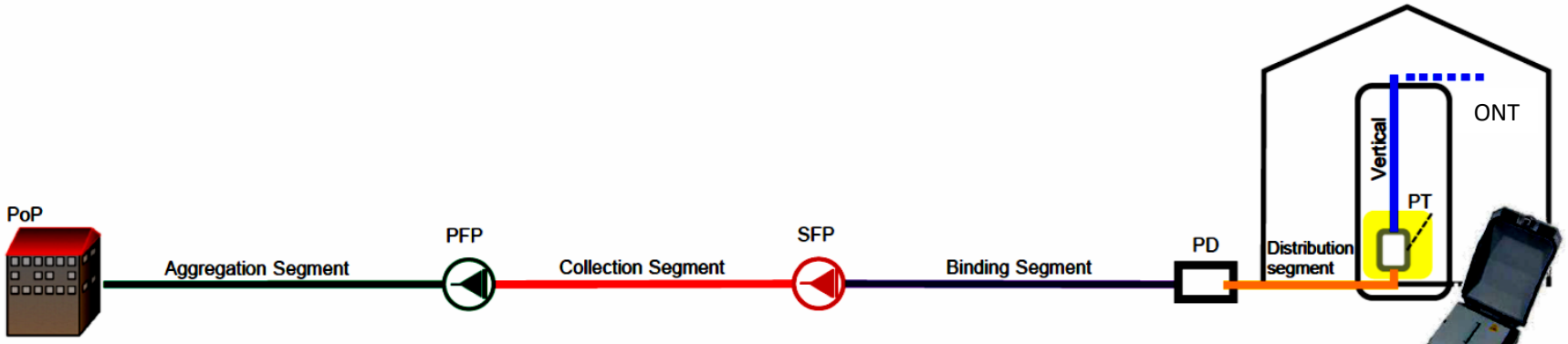
POP=Point Of Presence

PFP=Primary Flexibility Poin

SFP=Secondary Flexibility Point

U.I.=Unità Immobiliare (Residential Unit)

The Vertical Segment/Termination Point (PT)

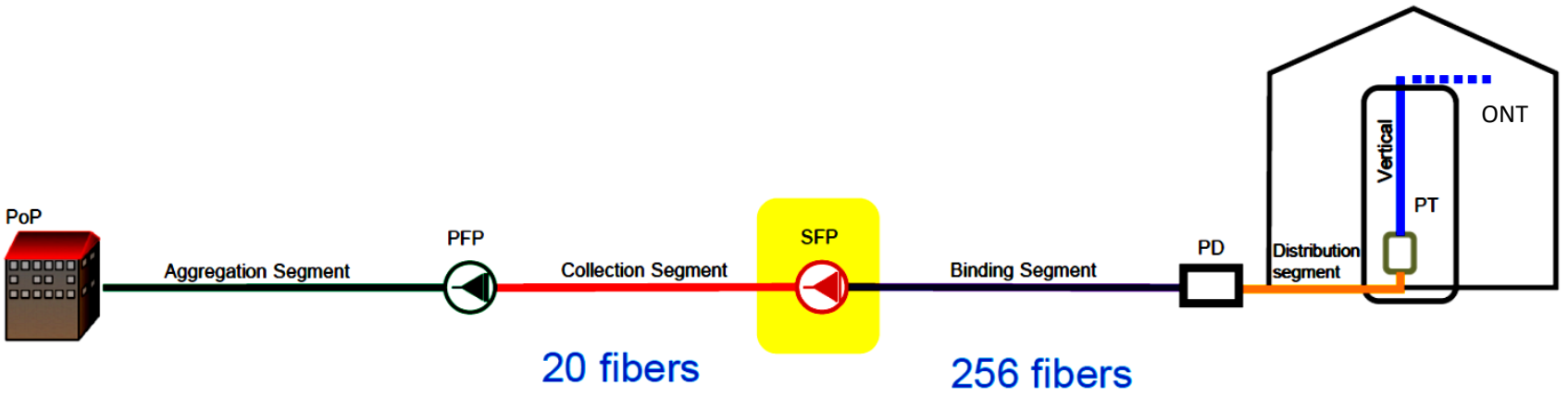


PT is the fiber termination point within the building.

During construction, for costs reduction, only one fiber is terminated for testing purposes. Subsequent connections will be made directly during delivery phase.

The Vertical segment is realized, where possible, simultaneously during construction of the network.

The SFP



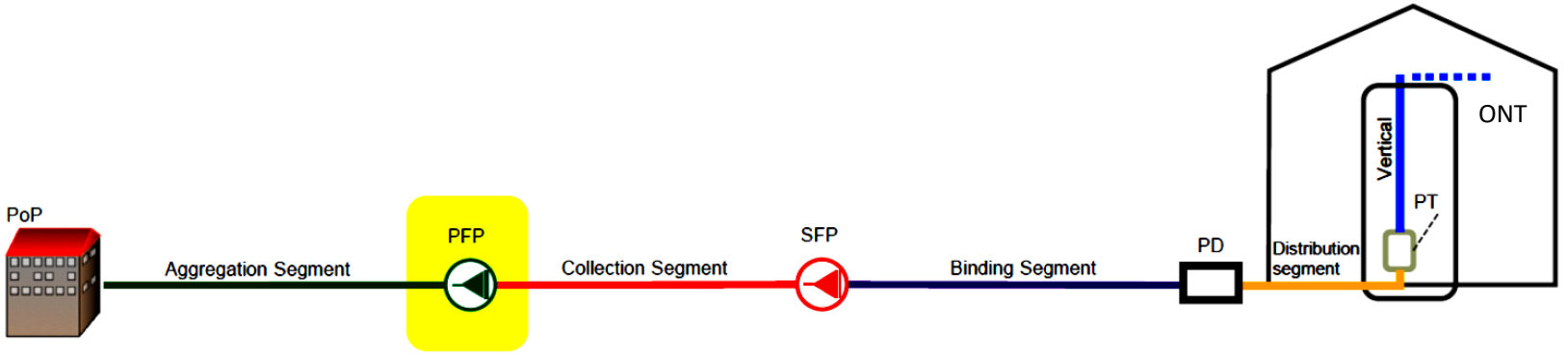
In the Open Fiber network the SFP usually is an outdoor cabinet with 20 splitters 1:16 inside. This is due to the needed flexibility to easily provide a dedicated GPON to at least 5 different OLOs. The cabinet is also engineered to host:

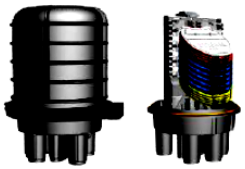
- splitters for GPON connections.
- ODF for permutation.
- Area to perform junctions toward households.
- Area to perform junctions toward business buildings with P2P architecture.

OLO=Optical Local Operator

The SFP

The PFP

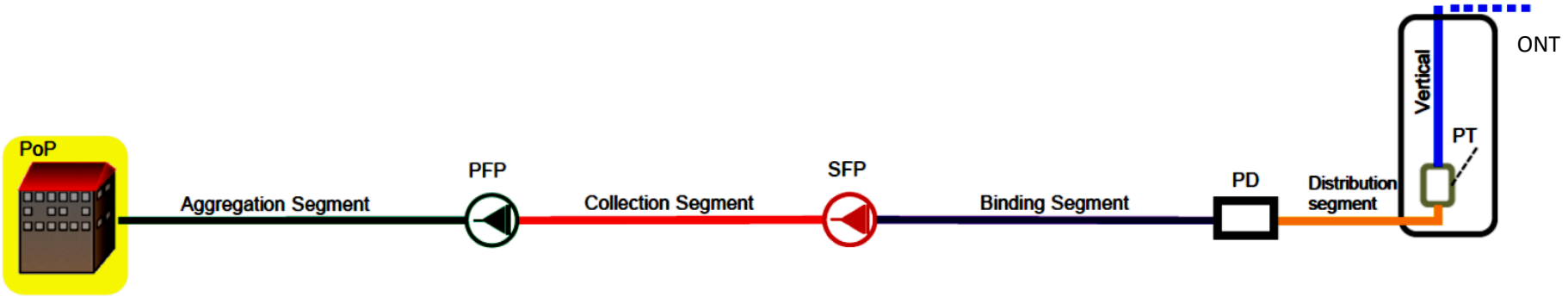




The PFP is the node at which the first level of splitting occurs with a 1: 4 ratio.
It hosts 20 splitters.
The PFP is usually housed in a manhole.

The PFP

The PoP



The Open Fiber POP is able to connect around 70,000 HouseHolds. There are two different type of POP:

- Outdoor, made using shelters or cabinets on concrete platforms.
- Indoor, set up in special rooms.

The Open Fiber POP includes two segregated areas:

- An area reserved for Open Fiber personnel, which contains optical distribution frames and active transport equipment
- An area dedicated to the housing of OLO devices (OLT)

Future Evolution of G.PON

- The infrastructure will NOT change
- Slowly, multichannel WDM wil be introduced

GPON	XG-GPON	XGS-PON	NG-PON2
Downstream	Downstream	Downstream	Downstream
2,5 Gbit/s	10 Gbit/s	10 Gbit/s	40 Gbit/s
Upstream	Upstream	Upstream	Upstream
1,25 Gbit/s	2,5 Gbit/s	10 Gbit/s	10 Gbit/s

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