GPON – FTTx Cabling Design & Solutions

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GPON – FTTx Cabling Designs and Solution

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Lecture Outline:

1. Key Components of Structured Cabling Systems
2. Key Components of FTTx Cabling
3. Fiber splitters and other FOC components, LCP’s (BEP’s), NAP’s and IOO’s (OTO’s)
4. Active Equipment in FTTx cabling: OLT and ONU/ONT
5. Introduction to GPON FTTx Cabling
6. Introduction to Network Topologies
7. FTTx Cabling Architecture
8. Traditional LAN Cabling Vs. GPON FTTx Cabling
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Key Components of SCS

**COPPER SOLUTION**
- COPPER CABLES
  - CAT5E, CAT6, CAT6A, CAT7
- PATCH PANELS
  - 24P, 48P
- KEYSTONE JACKS
  - CAT5E, CAT6
- FACEPLATE
  - 1P, 2P, 3P, 4P, 6P
- PATCH CORDS
  - CAT5E, CAT6
- COPPER PRE-TERMS
- MODULAR PLUG WITH RUBBER BOOTS

**FIBER SOLUTION**
- FOC CABLES
  - OS1/OS2, OM1, OM2, OM3, OM4
- FIBER PATCH PANELS
  - 24C, 48C, 72C, 96, 144C, 216C, 288C
- FOC ADAPTERS
  - SC, LC, FC, ST, MU, E2K, MTRJ, MTP/MPO
- OPTICAL INDOOR OUTLET
  - 1P, 2P, 4P
- FIBER PATCH CORDS / PIGTAILS
  - SC, LC, FC, ST, MU, E2K, MTRJ, MTP/MPO
- FIBER PRE-TERMS
- FIBER CONNECTORS WITH RUBBER BOOTS
  - SC, LC, FC, ST, MU, E2K, MTRJ, MTP/MPO
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Key Components of FTTx Cabling

- **FOC CABLES, SM G-652-D OS1/OS2**
- **FIBER PATCH PANELS, SM 24C, 48C**
- **FOC ADAPTERS, SM SC-UPC, SC-APC**
- **OPTICAL INDOOR OUTLET, SM 1P, 2P, 4P**
- **FIBER PATCH CORDS/PIGTAILS, SM SC-UPC, SC-APC**
- **FIBER PRE-TERMS SC-UPC, SC-APC**
- **FIBER CONNECTORS WITH RUBBER BOOTS, SC-UPC, SC-APC**

**FOC SOLUTION**

- **FOC HORIZONTAL DROP CABLES G657-A1 & A2 (1 CORE, 2 CORE)**

**SPLITTER FIBER PATCH PANELS**
- 1:04 PLC, 1:08 PLC, 1:16 PLC, 1:32 PLC, 1:64 PLC

**FTTx DISTRIBUTION BOX (WITH SPLITTER/S)**
- 1:04 PLC, 1:08 PLC, 1:16 PLC, 1:32 PLC, 1:64 PLC
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Key Components of FTTx Cabling

What’s splitter

Fiber optic splitter is used to split the fiber optic light into several parts at a certain ratio. It is a power distributor. And it also can combine the light into one fibre.

For example, a 1X2 50:50 fiber optic splitter will split a fiber optic light beam into two parts, each get 50 percent of the original beam.
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Key Components of FTTx Cabling

<table>
<thead>
<tr>
<th>Parameters</th>
<th>PLC splitter</th>
<th>FBT splitter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Wavelength (nm)</td>
<td>1260~1620</td>
<td>1310 ± 40 1490 ± 10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1550 ± 40</td>
</tr>
<tr>
<td>Split Ratio</td>
<td>even split</td>
<td>95%:5% 90%:105 80%:20%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>70%:30% 60%:40%</td>
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<tr>
<td></td>
<td></td>
<td>50%:50% for 1X2 type,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>others are even split</td>
</tr>
<tr>
<td>Reliability</td>
<td>good</td>
<td>bad when two many 1x2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>splitters spliced together</td>
</tr>
<tr>
<td>Volume</td>
<td>small</td>
<td>small for single steel pipe</td>
</tr>
<tr>
<td></td>
<td></td>
<td>splitter, big for cascaded</td>
</tr>
<tr>
<td></td>
<td></td>
<td>splitter</td>
</tr>
<tr>
<td>Price</td>
<td>Expensive for low Channel</td>
<td>good cost performance for</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1X2,1x4</td>
</tr>
</tbody>
</table>
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Key Components of FTTx Cabling

Splitter Applications

Optical Fibers  Metallic Cables

FTTN

>1000ft. (300m)

FTTC

<1000ft. (300m)

FTTB

FTTH
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Active Equipment Involved in FTTx Cabling

- Dual Power Supply (Optional): Dual DC, Dual AC or DC+AC
- Splitting ratio: 1:64 (EPON) ; 1:128 (GPON)
- Bandwidth allocation
- ONU Batch software upgrade

<table>
<thead>
<tr>
<th>PORT Type</th>
<th>Description</th>
<th>OLT Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 PORT EPON</td>
<td>Cassette OLT (4 * EPON, 4*10G, 8 * Combo GE), Default AC single-power</td>
<td>EPON OLT</td>
</tr>
<tr>
<td>8 PORT EPON</td>
<td>Cassette OLT (8 * EPON, 4*10G, 8 * Combo GE), Default AC single-power</td>
<td>EPON OLT</td>
</tr>
<tr>
<td>8 PORT GPON</td>
<td>Cassette OLT (8 * GPON, 4 <em>GE combo port; 2</em> 10G SFP+ port, 1* console port), Default AC single-power</td>
<td>GPON OLT</td>
</tr>
<tr>
<td>16 PORT GPON</td>
<td>Cassette OLT (16 * GPON, 4 <em>GE combo port; 2</em> 10G SFP+ port, 1* console port), Default AC single-power</td>
<td>GPON OLT</td>
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## EPON ONU Products

<table>
<thead>
<tr>
<th>Products</th>
<th>Type</th>
<th>User interface</th>
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</thead>
<tbody>
<tr>
<td>SFU</td>
<td>1GE RJ45</td>
<td></td>
</tr>
<tr>
<td>SFU</td>
<td>4FE RJ45</td>
<td></td>
</tr>
<tr>
<td>SFU</td>
<td>4GE RJ45</td>
<td></td>
</tr>
<tr>
<td>SFU</td>
<td>4FE RJ45+11n 300M WIFI</td>
<td></td>
</tr>
<tr>
<td>SFU</td>
<td>4GE RJ45+11n 300M WIFI+CATV (W for single fiber)</td>
<td></td>
</tr>
<tr>
<td>SFU</td>
<td>4FE RJ45+11n 300M WIFI+CATV (W for single fiber)</td>
<td></td>
</tr>
<tr>
<td>SFU</td>
<td>1GE RJ45+3FE RJ45+11n 300M WIFI+CATV (W for single fiber)</td>
<td></td>
</tr>
<tr>
<td>SFU</td>
<td>4FE+1CATV</td>
<td></td>
</tr>
<tr>
<td>SFU</td>
<td>1GE+3FE+1CATV (W for single fiber)</td>
<td></td>
</tr>
<tr>
<td>POE (PD)</td>
<td>8FE RJ45</td>
<td></td>
</tr>
<tr>
<td>MDU</td>
<td>8FE RJ45</td>
<td></td>
</tr>
<tr>
<td>MDU</td>
<td>16FE RJ45</td>
<td></td>
</tr>
<tr>
<td>MDU</td>
<td>24FE RJ45</td>
<td></td>
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</tbody>
</table>
GPON – FTTx Cabling Designs and Solution

Active Equipment Involved in FTTx Cabling

### GPON ONU Products

<table>
<thead>
<tr>
<th>Products Type</th>
<th>User interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPON SFU</td>
<td>1GE RJ45</td>
</tr>
<tr>
<td>GPON SFU</td>
<td>1GE RJ45 +CATV (W for single fiber)</td>
</tr>
<tr>
<td>GPON SFU</td>
<td>1GE RJ45 +1FE+1VOIP</td>
</tr>
<tr>
<td>GPON HGU</td>
<td>4GE RJ45</td>
</tr>
<tr>
<td>GPON HGU</td>
<td>4GE RJ45+11n 300M WIFI</td>
</tr>
<tr>
<td>GPON HGU</td>
<td>4GE RJ45+11n 300M WIFI+CATV (W for single fiber)</td>
</tr>
<tr>
<td>GPON HGU</td>
<td>4GE RJ45+11n 300M WIFI+1USB</td>
</tr>
<tr>
<td>GPON HGU</td>
<td>4GE RJ45+11n 300M WIFI+1USB +1CATV +1USB (W for single fiber)</td>
</tr>
<tr>
<td>GPON HGU</td>
<td>4GE +2VOIP+11n 300M WIFI+1USB</td>
</tr>
<tr>
<td>GPON HGU</td>
<td>4GE +2VOIP+11n 300M WIFI+1USB +1CATV +1USB (W for single fiber)</td>
</tr>
<tr>
<td>GPON HGU</td>
<td>4GE +2VOIP+2WIFI+2USB (2.4G 2<em>2 300M; 5.0G 3</em>3 1300M)</td>
</tr>
<tr>
<td>GPON HGU</td>
<td>4GE +2VOIP+2WIFI+2USB (2.4G 3<em>3 450M; 5.0G 3</em>3 1300M)</td>
</tr>
</tbody>
</table>

![GPON ONU Products Diagram](image-url)
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Active Equipment Involved in FTTx Cabling

GPON ONU Highlights

4LAN + 2 Voice + WiFi

4LAN + 2 Voice + WiFi + CATV
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Active Equipment Involved in FTTx Cabling

Smart PON - All in one (For home, Hotels)

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2GE+1RJ11+WIFI+HDMI+IPTV+2USB+Zigbee</td>
</tr>
<tr>
<td>2GE+1RJ11+WIFI+HDMI+IPTV+2USB</td>
</tr>
<tr>
<td>2GE+1RJ11+WIFI+HDMI+OTT+2USB+Zigbee</td>
</tr>
<tr>
<td>2GE+1RJ11+WIFI+HDMI+OTT+2USB</td>
</tr>
</tbody>
</table>
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Introduction to GPON FTTx Cabling

GPON OVERVIEW

PON/GPON grew from a requirement for more bandwidth in the Service Provider Market. (Higher access speeds than DSL could deliver) More Bandwidth (2.5G Downstream and 1.2G Upstream)

- Higher Subscriber density
- Best replacement for aging copper / coax infrastructure
- Environmentally friendly - green
- Reduce power and TCO (Total Cost of Ownership)

• Long term life expectancy of the fiber infrastructure
• Lower capital expenditures, since AN eqpt. and components are considerably reduced and/or completely excluded in the FTTx network
• Lower operating costs through reduction of active components, support for greater distances between equipment nodes
• Reduced re-occurring operating and maintenance costs
Introduction to GPON FTTx Cabling

GPON OVERVIEW

• The adoption and worldwide acceptance grew as GPON FTTH proved that it has contributed much to the service providers in terms of time, money and human resources

• Contributes to the improved client service levels and over-all customer satisfaction; thus enhancing retention rates

• And most notably, GPON FTTH technology solutions; introduced new opportunities and services applications to service providers, introducing additional revenue streams which can be adopted and integrated into their present services offering; thereby increasing top line revenue without increasing cost
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Introduction to GPON FTTx Cabling

Basic Parameters of GPON

➢ GPON identifies 7 transmission speed combination as follows:
  0.15552 Gbit/s up, 1.24416 Gbit/s down
  0.62208 Gbit/s up, 1.24416 Gbit/s down
  1.24416 Gbit/s up, 1.24416 Gbit/s down
  0.15552 Gbit/s up, 2.48832 Gbit/s down
  0.62208 Gbit/s up, 2.48832 Gbit/s down
  1.24416 Gbit/s up, 2.48832 Gbit/s down
  2.48832 Gbit/s up, 2.48832 Gbit/s down
Among them, 1.24416 Gbit/s up, 2.48832 Gbit/s down is the mainstream speed combination supported at current time.

➢ Maximum logical reach: 60 km

➢ Maximum physical reach: 20 km

➢ Maximum differential fibre distance: 20 km

➢ Split ratio: 1:64, it can be up to 1:128
GPON Principle----Data Multiplexing

GPON adopts Wavelength Division Multiplexing (WDM) technology, facilitating bi-direction communication over a single fiber.

To separate upstream/downstream signals of multiple users over a single fibre, GPON adopts two multiplexing mechanism:

- In downstream direction, data packets are transmitted in a broadcast manner;
- In upstream direction, data packets are transmitted in a TDMA manner.
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GPON Principle----Downstream Data
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GPON Principle----Upstream Data

- TDMA mode
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Introduction to GPON FTTx Cabling

Consumer’s Bandwidth Reqmts. Met By FTTH

GPON are premium for ALL services!!!

VDSL2 can cover even the HDTV service!

ADSL2+ can cover the Triple-play service bandwidth requirement.

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Web Surfing
Video Conferencing, Premises Surveillance
SDTV VOD, Telecommuting
File Sharing, Home Video Sharing/Streaming
Real Time SDTV, Network PVR
Multi-Player Gaming, Interactive Distance Learning
Telemedicine
Large File Sharing
HDTV VOD
Next Hosted Applications & Storage

(per sub)

FTTH
VDSL2
ADSL2+
Cable Modem
Dial-up

Upstream
150 100 25 20 10 5 0 5 Mbps

Downstream
10 15 20 25 100 150

GPON are premium for ALL services!!!

ADSL2+ can cover the Triple-play service bandwidth requirement.

VDSL2 can cover even the HDTV service!

GPON are premium for ALL services!!!

ADSL2+ can cover the Triple-play service bandwidth requirement.

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Web Surfing
Video Conferencing, Premises Surveillance
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Large File Sharing
HDTV VOD
Next Hosted Applications & Storage

(per sub)
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Introduction to Network Topologies

Ethernet Vs. PON FTTx

• There are 2 choices for Fiber Access:
  – Point to Point
  – Point to Multi-point

• Point to Point is sometimes called Active Ethernet
• Point to Multi-point is called PON (passive optical network)
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Introduction to Network Topologies

Topology

Point to Multi-Point [P2MP]

Point to Point [P2P]
➢ PON is a kind of passive optical network featuring one-to-multiple-point architecture;
➢ PON is short for Passive Optical Network;
➢ PON consists of Optical Line Terminal (OLT), Optical Network Unit (ONU) and Passive Optical Splitter.
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Introduction to Network Topologies

Key
- OLT: Optical Line Terminal
- POP: Point of Presence
- LCP: Local Convergence Point
- NAP: Network Access Point
- IOO: Indoor Optical Outlet
- ONT: Optical Network Termination
- OTO: Optical Telecommunications Outlet
- CPE: Customer Premises Equipment
- BEP: Building Entry Point
- FD: Floor Distributor
- ONT/CPE: Optical Network Terminal/Customer Premises Equipment

Figure 1 FTTH in-house installation reference model
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Introduction to Network Topologies

Access Node [AN] (Operator)

Active

Passive

Customer Premise [CP]

OLT

ONT

But it really consists of many different components
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FTTx Cabling Architecture
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FTTx Cabling Architecture

OPTICAL DISTRIBUTION NETWORK WITH POLE MOUNT NAP AND LCP
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Traditional LAN Cabling Vs. GPON FTTx Cabling

TRADITIONAL LAN CABLELING:

DETAILS:

➢ Number of Floors = 05 floors
➢ Ground Floor = MDF Location
➢ Grd Flr. To 5th Flr. = 15 rooms or tenant units

ASSUMPTIONS:

➢ Need to have at least 2 voice ports per room
➢ Need to have at least 2 data ports per room
➢ Need to have 6 CCTV ports per floor
➢ Need to have at least 2 access control or biometrics
➢ Need to have at least 1 port paging systems or intercom/s
➢ Need to have 4 data ports for digital signage/s on every floor
Traditional LAN Cabling Vs. GPON FTTx Cabling

Using traditional Ethernet LAN cabling, this will be the suggested Ethernet lay-out for voice and data.
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Traditional LAN Cabling Vs. GPON FTTx Cabling
Using traditional Ethernet LAN cabling, this will be the suggested layout for CCTV, intercom, access control, etc.
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Traditional LAN Cabling Vs. GPON FTTx Cabling
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Traditional LAN Cabling Vs. GPON FTTx Cabling

**GPON FTTx CABLING:**

**DETAILS:**
- Number of Floors = 05 floors
- Ground Floor = MDF Location
- Grd Flr. To 5th Flr. = 15 rooms or tenant units

**ASSUMPTIONS:**
- Number of SC Ports Per Room = 2
- G657A1 indoor drop fiber core = 1 or 2
- No. of SC Adapter/s per I.O.O. = 2
- No. of LCP (Local Convergence Point) = 0
- No. Of Network Access Point (NAP) = 05
- No. of Fiber Distribution Panel per Flr. = 05 (optional)
- No. of ONT’s (optical node terminal)/floor = 15
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Traditional LAN Cabling Vs. GPON FTTx Cabling

GPON FTTH EQPT. REQUIREMENTS (FOR TELECOMS AND ENTERPRISE NETWORK)

<table>
<thead>
<tr>
<th>AUXILIARY SYSTEMS</th>
<th>OLT EQUIPMENT</th>
<th>LOCAL CONVERGENCE POINT (LCP)</th>
<th>OPTICAL DISTRIBUTION FRAME (ODF)</th>
<th>FDB / NAP (Network Access Point)</th>
<th>INDOOR OPTICAL OUTLET (OTO / IOO)</th>
<th>OPTICAL NODE TERMINAL (ONT / ONU)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSTN</td>
<td>G3000-08PT</td>
<td>LCP 1:8</td>
<td>FIBER PATCH PANEL OR OPTICAL DISTRIBUTION FRAME (ODF)</td>
<td>NAP 1:32</td>
<td>INDOOR OPTICAL OUTLET (OTO / IOO)</td>
<td>GPON ONU (AK-6461 / 6461W)</td>
</tr>
<tr>
<td>Internet</td>
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<td></td>
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<td>IPTV</td>
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<tr>
<td>CCTV</td>
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<tr>
<td>Paging</td>
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<tr>
<td>Digital Signage</td>
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</tr>
</tbody>
</table>

CUSTOMER SUPPLIED

GPON OLT

1:08 FTTx SPLITTER BOX

FIBER PATCH PANEL OR OPTICAL DISTRIBUTION FRAME (ODF)

1:32 PLC RACK MOUNT SPLITTER

INDOOR OPTICAL OUTLET

GPON ONU (AK-6461 / 6461W)
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Traditional LAN Cabling Vs. GPON FTTx Cabling
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Traditional LAN Cabling Vs. GPON FTTx Cabling

PROPOSED MDF BAY RACK LAY-OUT

MAIN MDF GPON OLT EQPT. C3 CABINET (COMMAND AND CONTROL CABINET)

OLT EQUIPMENT

G3000-08PT
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Traditional LAN Cabling Vs. GPON FTTx Cabling

GPON FTTH VERTICAL RISER LAY-OUT

RISER  IDF ROOM  SCHOOL BUILDING FLOOR/S

4 FIBER CORE  1:16 NAP

4 FIBER CORE  1:16 NAP

4 FIBER CORE  1:16 NAP

4 FIBER CORE  1:16 NAP

5 RUNS X 4 FIBER CORE

INDOOR OPTICAL OUTLET LAY-OUT
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Traditional LAN Cabling Vs. GPON FTTx Cabling

TYPICAL GPON FTTH LAY-OUT NAP AND END-USER CABLING LAY-OUT

CONDUITS (PVC)

CABLE TRAY

OVERHEAD PULLBOX
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Traditional LAN Cabling Vs. GPON FTTx Cabling

Typical End-User Distribution Lay-Out

4LAN + 2 Voice + WiFi + CATV
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Traditional LAN Cabling Vs. GPON FTTx Cabling

SOGO HOTEL DETAILS:

- Number of Floors = 12
- Number of Basements = 02
- With Mezzanine and Roof Deck
- Number of Rooms per Floor
  - 3rd to 12th floor = 14 rooms x 12 floors
  - Ground Floor = 05 rooms
  - Mezzanine Floor = 07 rooms
  - 2nd Floor = 07 rooms
- Total No. of ONT Units = 175 units

GPON FTTH ASSUMPTIONS:

- No. of hori. drop fiber runs (2 core LFIC) = 175
- No. of SC Adapter/s per I.O.O. = 02
- No. of Indoor Optical Outlets (OTO)/IOO = 175
- No. of LCP’s (1:8) = 02
  - 1 active LCP / 1 spare LCP
- No. Of NAP’s (1:16) = 27
  - 2 NAP’s per Floor (1 ADMIN NAP AND 1 HOTEL GUEST NAP)
## FTTH PROJECT – NUMBER OF ONT UNITS PER FLOOR

<table>
<thead>
<tr>
<th>FLOORS</th>
<th>CORE A</th>
<th>CORE B</th>
<th>TOTAL</th>
</tr>
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<tbody>
<tr>
<td>ROOF DECK</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>13TH</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>12TH</td>
<td>14</td>
<td>1</td>
<td>15</td>
</tr>
<tr>
<td>11TH</td>
<td>14</td>
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<td>15</td>
</tr>
<tr>
<td>10TH</td>
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<td>7TH</td>
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<td>6TH</td>
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# GPON – FTTx Cabling Designs and Solution

## Traditional LAN Cabling Vs. GPON FTTx Cabling

### FTTH PROJECT – SERVICES OFFERED PER FLOOR

<table>
<thead>
<tr>
<th>FLOORS</th>
<th>VOICE</th>
<th>DATA</th>
<th>WIFI</th>
<th>CCTV</th>
<th>AD TV</th>
<th>CATV</th>
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</table>
GPON – FTTx Cabling Designs and Solution

Traditional LAN Cabling Vs. GPON FTTx Cabling

**Schematic Diagram - Fiber Optic Vertical Riser Cable System (Option 01)**

- **CORE A (Hotel Rooms)**
  - ROOF DECK
  - 13TH FLR.
  - 12TH FLR.
  - 11TH FLR.
  - 10TH FLR.
  - 9TH FLR.
  - 8TH FLR.
  - 7TH FLR.
  - 6TH FLR.
  - 5TH FLR.
  - 4TH FLR.
  - 3RD FLR.
  - 2ND FLR.
  - 1ST FLR.
  - BASEMENT 1
  - BASEMENT 2

- **CORE B (Admin Rooms)**
  - ROOF DECK
  - 13TH FLR.
  - 12TH FLR.
  - 11TH FLR.
  - 10TH FLR.
  - 9TH FLR.
  - 8TH FLR.
  - 7TH FLR.
  - 6TH FLR.
  - 5TH FLR.
  - 4TH FLR.
  - 3RD FLR.
  - 2ND FLR.
  - 1ST FLR.
  - BASEMENT 1
  - BASEMENT 2

- **Optical Distribution Frame (ODF)**
- **Fiber Distribution Hub (FDH)**

- 1 run x 36 core riser FOC
- 1 run x 24 core riser FOC
- 16 PORT NAP OR FDU OR FIBER DISTRIBUTION BOX TYPICAL TO ALL FLOORS
- 2 CORE G657A2 FTTH DROP CABLE FOR EACH ROOMS

Bicsi
GPON – FTTx Cabling Designs and Solution

Traditional LAN Cabling Vs. GPON FTTx Cabling

CORE A (HOTEL ROOMS)  CORE B (ADMIN ROOMS)

ROOF DECK

13TH FLR.

12TH FLR.

11TH FLR.

10TH FLR.

9TH FLR.

8TH FLR.

7TH FLR.

6TH FLR.

5TH FLR.

4TH FLR.

3RD FLR.

2ND FLR.

MEZZANINE

GROUND FLR.

BASEMENT 1

BASEMENT 2

SCHEMATIC DIAGRAM - FIBER OPTIC VERTICAL RISER CABLE SYSTEM
(OPTION 02)
GPON – FTTx Cabling Designs and Solution

Traditional LAN Cabling Vs. GPON FTTx Cabling

NAP/FDB SAMPLES W/ 1:16 FIBER SPLITTERS 01
Splitter in cassette box

PLC splitter with 0.9mm tails

NAP/FDB SAMPLES W/ 1:16 FIBER SPLITTERS 02

NAP LAY-OUT ON CORE A (HOTEL ROOMS)

NAP LAY-OUT ON CORE A (ADMIN ROOMS)

ON ALL FLOORS EXCEPT ROOFDECK, 13TH, 2ND, MEZZANINE GRD, BASEMENT 1 AND 2

ON ALL FLOORS INCLUDING ROOFDECK AND THE TWO BASEMENT/S 1 AND 2
GPON – FTTx Cabling Designs and Solution

Traditional LAN Cabling Vs. GPON FTTx Cabling

OTO OR IOO (Indoor Optical Outlet)

ONT (Optical Node Terminal)

DETAILS OF OTO / ONT BOX ON TYPICAL GUEST ROOM
GPON – FTTx Cabling Designs and Solution

Traditional LAN Cabling Vs. GPON FTTx Cabling

SAMPLE LAY-OUT PLAN OF OTO / ONT BOX ON TYPICAL GUEST ROOM
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Traditional LAN Cabling Vs. GPON FTTx Cabling

NAP 1:16

LCP 1:16

Optical Terminal Outlet (OTO)

220v

VoIP

Broadband Internet

CATV/Video

SINGLE LINE PICTOGRAM – TYPICAL UNIT
GPON – FTTx Cabling Designs and Solution

Traditional LAN Cabling Vs. GPON FTTx Cabling

BORACAY HOTEL DETAILS:

➢ Number of Building/s = 02 (Building A and Building B)
➢ Number of Floors = 05 (Building A and Building B)
➢ Number of Rooms per Floor
  ❖ Ground Flr. To 5th Flr. = 38 rooms x 5 floors 2 buildings
  ❖ Total No. Of IOO = 380
  ❖ Total No. of ONT Units = 380 units

GPON FTTH ASSUMPTIONS:

➢ No. of riser trunk FOC cable (4 core) = 10 (5 runs per building x 2 buildings)
➢ No. of hori. drop fiber runs (2 core LFIC) = 380
➢ No. of SC Adapter/s per I.O.O. = 02
➢ No. of Indoor Optical Outlets OTO/IOO = 380
➢ No. of LCP’s (1:2) = 02
➢ No. Of NAP’s (1:32) = 20 (10 NAP’s per building)
  ❖ 2 NAP’s per Floor
### FTTH PROJECT – SERVICES OFFERED PER FLOOR

**BUILDING A**

<table>
<thead>
<tr>
<th>FLOORS</th>
<th>VOICE</th>
<th>DATA</th>
<th>WIFI</th>
<th>IPTV</th>
<th>CATV</th>
<th>AD TV</th>
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### FTTH Project – Number of ONT Units per Floor

<table>
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<tr>
<th>FLOORS</th>
<th>BLDG. 4 Core (Cableruns)</th>
<th>BLDG. 2 Core Hori. (Drop Cable Runs)</th>
<th>NO. OF LCP</th>
<th>NO. OF NAP</th>
<th>NO. OF IOO</th>
<th>NO. OF ONT</th>
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# GPON – FTTx Cabling Designs and Solution

Traditional LAN Cabling Vs. GPON FTTx Cabling

## FTTH PROJECT – SERVICES OFFERED PER FLOOR

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<tr>
<th>BUILDING B</th>
<th>FLOORS</th>
<th>VOICE</th>
<th>DATA</th>
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**TOTAL:** 190 190 190 190 190 05 10
## GPON – FTTx Cabling Designs and Solution

### Traditional LAN Cabling Vs. GPON FTTx Cabling

#### FTTH PROJECT – NUMBER OF ONT UNITS PER FLOOR

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<th>FLOORS</th>
<th>BLDG. 4 CORE (CABLERUNS)</th>
<th>BLDG. 2 CORE HORI. (DROP CABLE RUNS)</th>
<th>NO. OF LCP</th>
<th>NO. OF NAP</th>
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<tr>
<td>3RD FLOOR</td>
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**TOTAL:** 10 190 01 10 190 190
GPON – FTTx Cabling Designs and Solution

Traditional LAN Cabling Vs. GPON FTTx Cabling

HOTEL BUILDING A

HOTEL BUILDING B

SCHEMATIC DIAGRAM - GPON FTTx VERTICAL RISER CABLE SYSTEM
Traditional LAN Cabling Vs. GPON FTTx Cabling

**LCP LAY-OUT USING PLASTIC WALL BOX**

- 5 RUNS X 2C SM FOC CABLE
- VERTICAL RISER CONDUIT
- SM SC/APC FIBER PIGTAILS X 10 SETS

**1:2 LCP**

LCP (LOCAL CONVERGENCE POINT)

- ODF-12

**NAP LAY-OUT ON BLDG. A AND B**

- 5 RUNS X O3C SM FOC CABLE
- VERTICAL RISER CONDUIT
- SM SC-APC FIBER PIGTAILS X 10 SETS

**NAP-1 X 2 1:32**

- 36 RUNS X 2C HORIZONTAL DROP FTTH CABLE
- TO OTO OR INDOOR OPTICAL OUTLET

1. Cable entry port diameter is 11 – 15 mm
2. Drop cable output port is 16, having 2 mm width
3. No light should passed on each output port of both LCP and NAP
4. The cable entry port has removable grommet.
5. The LCP and NAP maintains the use of plastic strain relief and duct plug to hold the drop cables.

**NAP/IDF WITH 1:32 FIBER SPLITTERS**

**DETAILS OF LCP AND NAP ON EACH BLDG. AND PER FLOOR**
GPON – FTTx Cabling Designs and Solution

Traditional LAN Cabling Vs. GPON FTTx Cabling

Case Study: 20 Storey building, 394 nodes

Present Method of Deployment
Layers of Routers and Switches

GPON FTTx Solution

Cost: $1586K
Space: 212RU
Cable Weight: 12705 lbs
Power: 35485 watts

Cost: $515K
Space: 32RU
Cable Weight: 931 lbs
Power: 22521 watts
GPON – FTTx Cabling Designs and Solution

Traditional LAN Cabling Vs. GPON FTTx Cabling

- **Total Space Requirements (RU)**
  - FiberLAN: 32
  - Copper: 212

- **Total Cable Weight (pounds)**
  - FiberLAN: 931
  - Copper: 12705

- **Power requirements (watts)**
  - FiberLAN: 22521
  - Copper: 35485

- **Estimated Average Annual Opex ($)**
  - FiberLAN: $50,494
  - Copper: $221,868
Thank You

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       reggie.posadas@yfc.com.ph
CPN : 0917-6200172