GPON

Gigabit Ethernet

in Hotels, Resorts, and campus-like projects
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GPON vs. Gigabit Ethernet in Hotels, Resorts and campus-like environments

There is a lot of discussion about what is more appropriate, GPON or Ethernet Gigabit, for a campus like networking, as is the case in a hotel, resort, university, mining and petrol camps, etc.

One thing is clear, each these technologies, were developed with the best techniques to work under the scenario for which they were created. Question arises on the “boundary” zones.

Each player defends the advantages of its own solution. It’s not easy to discern whether the arguments, in favor of one or the other, are truly technique, or they are colored by commercial considerations.

First, let’s go the basics of each technology.

**GPON Technology.**

The GPON deployments are based on fiberoptic distribution, and passive splitters.
OLT and ONT’s are indispensable components in the GPON network system.

The function of the OLT is to control the float information and convert the interface to Fiberoptic.

Under long distance and last-mile scenarios, GPON advantages shines:

- Optical splitters (typically 1:32) are passive, so no power is required at this point. This is a key point to deploy this technology when passive splitters are to be installed on street cabinets. It’s not easy nor cheap to get mains connections and maintain power supplies.
- The use of fiber optic in places easily accessible, offers intrinsic protection making more difficult tapping and intercepting communications. Obviously, this is not exclusive of GPON, as Ethernet Switches can use fiber too.
- GPON carries Ethernet packets across much further distances (kilometers) with less noise and greater bandwidth.
- Optionally, it can support RF overlay, so digital RF TV channels can be distributed together with Ethernet data.
- Mass deployment scenarios are capable for multi-dwelling units (MDUs).
- Secure. With encryption to all downstream traffic, no access to networking protocols for the client systems and centralized management.

GPON also has some requirements and limitations:

- It requires an ONT (with its own power supply) per site, or per room in a hotel scenario.
- The ONT is a device which receives the full data stream, extracts the data which belongs to the particular site and delivers it to an ethernet port.
- Fiber optic has a huge bandwidth, but good ONT’s can process up to 2.5Gps traffic, so as a matter of fact the total bandwidth shared by all the 32 end points is 2.5Gps for all purposes. In worst case, the bandwidth assigned to each end point is 78Mbps. Sure, statistical traffic plays its role, and user can expect a higher bandwidth in real scenarios.
- Speeds can slow down during peak usage times.
- If ONT is shared between several rooms, the bandwidth is reduced/shared again.
- Not truly symmetrical. It has slower upload speeds.
- GPONs ability to withstand harsh environments and no need for climate control in most circumstances.

**Gigabit Ethernet**

- It is the standard on Ethernet LAN, and it is used almost everywhere.
- Does not require installation of separate boxes, nor power supplies at each end point. An Ethernet outlet is all which is required.
- Commodity Ethernet hardware available through a huge number of suppliers.
- Higher bandwidth and truly symmetrical per end point.
- Supports multicast traffic including IGMP.
- Multicasting is one of the most efficient mechanisms to distribute data (ex. Live IPTV channels) from one sender to multiple receivers concurrently.
- Gigabit Ethernet can use fiber optic where it is need, that is, in the trunk line, and copper in the connection to the room, which offer easier cabling and cheap outlets.
- VLAN deployments much more flexible than in GPON.
- Network design flexibility. Offers separation of physical and logical networking.
- Better support. It’s much easier to find qualified personnel, and training courses.
It is the industry technology wave front. IEEE officially adopted IEEE Std. 802.3ba in June 2015, paving the way for both 40 Gigabit Ethernet and 100 Gigabit Ethernet

Which one to use?

If your network is to be installed outdoor, on street cabinets, aerial or underground enclosures...

if it has very long distances, remoteness of location, extremes of temperature...
if you require to use RF overlay to distribute television channels...
no doubts, GPON is the technology to be used.
If your network is within a building and you distribute TV programs by IPTV multicast, using standard Gigabit Ethernet offer clear advantages.

Can be both technologies be combined? Yes, sure.
The best know use of GPON is the so-called FTTH which stands for Fiber To The Home (Figure 1). But this only one of the case uses.

You have already noticed on Figure 1, that being GPON, on the left side, there a traditional Gigabit Ethernet network:

GPON can be used generically on FTTx (also spelled Fiber to the x) or fiber in the loop.

Definitions (from the Wikipedia):

The telecommunications industry differentiates between several distinct FTTX configurations. The terms in most widespread use today are:

FTTP (fiber-to-the-premises): This term is used either as a blanket term for both FTTH and FTTB, or where the fiber network includes both homes and small businesses

FTTH (fiber-to-the-home): Fiber reaches the boundary of the living space, such as a box on the outside wall of a home. Passive optical networks and point-to-point Ethernet are architectures that are capable of delivering triple-play services over FTTH networks directly from an operator’s central office.

FTTB (fiber-to-the-building, -business, or -basement): Fiber reaches the boundary of the building, such as the basement in a multi-dwelling unit, with the final connection to the individual living space being made via alternative means, similar to the curb or pole technologies
FTTD (fiber-to-the-desktop): Fiber connection is installed from the main computer room to a terminal or fiber media converter near the user’s desk.

FTTR (fiber-to-the-router): Fiber connection is installed from the router to the ISP’s fiber network.

FTTO (fiber-to-the-office): Fiber connection is installed from the main computer room/core switch to a special mini-switch (called FTTO Switch) located at the user’s workstation or service points. This mini-switch provides Ethernet services to end user devices via standard twisted pair patch cords. The switches are located decentrally all over the building, but managed from one central point.

FTTF (fiber-to-the-frontage): This is very similar to FTTB. In a fiber to the front yard scenario, each fiber node serves a single subscriber. This allows for multi-gigabit speeds using XG-fast technology. The fiber node may be reverse-powered by the subscriber modem.

FTTE / FTTZ (fiber-to-the-telecom-enclosure or fiber-to-the-zone): is a form of structured cabling typically used in enterprise local area networks, where fiber is used to link the main computer equipment room to an enclosure close to the desk or workstation. FTTE and FTTZ are not considered part of the FTTX group of technologies, despite the similarity in name.[5]

FTTdp (Fiber To The Distribution Point). This is very similar to FTTC / FTTN but is one-step closer again moving the end of the fiber to within meters of the boundary of the customers premises in last junction possible junction box known as the “distribution point” this allows for near-gigabit speeds.

FTTN / FTTLA (fiber-to-the-node, -neighborhood, or -last-amplifier): Fiber is terminated in a street cabinet, possibly miles away from the customer premises, with the final connections being copper. FTTN is often an interim step toward full FTTH (fiber-to-the-home) and is typically used to deliver ‘advanced’ triple-play telecommunications services.

FTTC / FTTK (fiber-to-the-curb/kerb, -closet, or -cabinet): This is very similar to FTTN, but the street cabinet or pole is closer to the user’s premises, typically within 1,000 feet (300 m), within range for high-bandwidth copper technologies such as wired ethernet or IEEE 1901 power line networking and wireless Wi-Fi technology. FTTC is occasionally ambiguously called FTPP (fiber-to-the-pole), leading to confusion with the distinct fiber-to-the-premises system.

Many names, in fact Fiber to Everywhere, but all of them stands for the same concept. Use a Gigabit Ethernet distribution after the GPON ONT, combining both technologies for the best result.

Both technologies can be combined, and in fact most GPON networks use GPON when needed, but Gigabit ethernet on the core network, and on the ONT side to extend the network to more points or services.
If you are interested on this issue, and want to decide by yourself with arguments from both sides, you can read:

A Cisco paper (seller of Gigabit Ethernet although offers GPON too) paper defending Gigabit Ethernet here: Ethernet against GPON paper

Rebuttal of the Cisco paper by Tellabs (vendor of GPON equipment) and defending GPON here: GPON against Ethernet paper

A Deep study exploring in detail advantages of each of the technologies: deep comparative GPON vs Gigabit Ethernet

Or simply google GPON vs Gigabit Ethernet.

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