FIBER OPTIC FIELD GUIDE

What are the components of an FTTH network?

An FTTH (Fiber to the Home) network is one continuous light path from the central office to the living room. Between those two ends sit a handful of parts, each with a job and most with a three-letter name. Here they are in the order the signal travels, so the acronyms stop running together.

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It starts as a PON

Nearly all FTTH is built as a PON (Passive Optical Network). Passive means exactly that. Between the OLT and the home there is no powered equipment, only glass, splices, and splitters. One fiber out of the OLT is shared by many homes. That shared architecture is why fiber to the home is affordable to build.

GPON and XGS-PON are the two you'll see most. They differ mostly in speed.

OLT: the active end that drives the PON

The OLT (Optical Line Terminal) is the active, powered equipment that drives the PON. On older builds it lives in a central office or headend. On modern builds, especially rural and overbuild markets, you'll find OLTs out in the field just as often, hung in strand-mount hardened enclosures or sitting in purpose-built cabinets closer to the customers. Wherever it sits, one OLT port lights a single feeder fiber and serves a whole group of subscribers, commonly 32 or 64 of them, sending data downstream to every home and sorting the upstream traffic coming back.

Feeder cable to the first splitter

A high-count feeder cable carries the PON fibers from the OLT to the first splitter location. Feeder is the backbone of the access network, so it is the heaviest count you will handle, often 144 fibers and up.

Splitters: centralized or distributed

The feeder lands at the first optical splitter, a passive device that takes one feeder fiber in and fans it out to many, written as 1x8, 1x16, 1x32, or 1x64. One PON fiber in, up to 64 subscriber fibers out.

Two common ways to deploy splitters:

Centralized split. All the splitters live in one spot, usually an FDH (Fiber Distribution Hub) cabinet on a pad or strand. Feeder in, split, distribution out. Easy to find, easy to document, easy to patch.

Distributed split. The splitters are spread along the network, often inside closures or terminals out in the plant. The split happens closer to where the customers actually live. Less fiber in the distribution segment, more splice work in the field.

Free in your browser: OTDR trace analyzer, splice matrix builder, fiber analysis, link loss calculator, and more at johnstonetechs.com.
Informational guidance; verify critical measurements against certified test equipment.

Larger networks cascade splitters in two stages regardless of which model.

Distribution cable and splice closures

From the splitter, distribution cable runs toward the streets where customers live. Along the way, cables are joined and branched inside a FOSC (Fiber Optic Splice Closure), the sealed case that holds and protects splices out in the plant, whether it is hung aerial, buried, or set in a handhole. A closure houses splices. No ports. Nothing a customer plugs into. In a distributed-split network, this is also where you'll often find splitters.

Terminals: where the drop breaks out

Near the homes, distribution fiber reaches a terminal, where the drops break out. Depending on the operator you will see it called an FDT (Fiber Distribution Terminal), an FAT (Fiber Access Terminal), or an MST (Multiport Service Terminal). The MST is the hardened, plug-and-play version. A drop plugs into a port, no splice needed. The number that matters at a terminal is its port count.

Drop cable to the home

The drop cable is the last span of outside plant, running from the terminal port to the side of the house. It is a low-count cable, usually one or two fibers, and it ends at or near where the fiber enters the building.

ONT: the active end at the home

Inside the home sits the ONT (Optical Network Terminal), sometimes called an ONU. The ONT is the far end of what the OLT started. Same job in reverse. The powered box that turns the light back into the Ethernet, phone, and video services the customer actually uses.

XD: the fibers you will not use

Not every fiber in a cable gets lit. Spares left for future builds show up on paperwork marked XD (or simply "dead"), meaning the fiber is present but not spliced through at that point. They stay in the documentation so the count stays complete and the next tech knows they were parked on purpose.

Quick reference

- OLT: Optical Line Terminal, active equipment that drives the PON, located in a CO/headend or in the field
- PON: Passive Optical Network, the shared, unpowered fiber architecture
- Splitter: passive 1xN device that shares one feeder fiber among many homes
- FDH: Fiber Distribution Hub, the field cabinet that holds splitters in a centralized-split network
- Centralized split: all splitters in one location, usually an FDH
- Distributed split: splitters spread along the network, often inside closures or terminals
- FOSC: Fiber Optic Splice Closure, the sealed case that protects OSP splices
- FDT / FAT / MST: the terminal where distribution breaks out to drops
- ONT / ONU: Optical Network Terminal, the active box at the customer premises

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- XD: a spare or dead fiber, present but not spliced through at that point

Documenting the splices and terminals that tie this network together? The free Splice Matrix Builder draws the feeder, splitter, closures, and terminated legs the way a work print shows them, and prints a clean as-built. For the color standards behind every count, see the fiber color chart builder. New to the paperwork itself? Start with how to read a fiber optic work print.