Optical Distribution Network (ODN) innovation and market sizing

Exploring the key trends and growth opportunities in the ODN Market

SAMPLE

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Contributors

Santiago Remis, Consultant

Santiago joined IDATE in September 2019 as a Consultant within the Media Telecom BU after having completed a Master's Degree in Industrial and Networks Economics with a specialization in Digital Economics. Santiago has strengthened skills in the organization of the Telecommunication Market from an economic perspective. He monitors techno-economic strategies and innovation in this sector, in both fixed and mobile technologies (4G, 5G, FTTx). He takes part in the drafting of study reports to follow, detect and understand market trends, and present the results. He has active participation in international groups and organizations (such as the European Commission).

Jean-Luc Lemmens, Telecom Business Unit Director

Jean-Luc joined IDATE in September 2017. Jean-Luc is in charge of the IDATE Telecom business unit, devoted to media, wireless, fiber, regulatory and industry economics. He is focusing on the main challenges met by telecom and media players, FTTx strategies, regulatory management, telecom-media convergence challenges, new services business modelling and diversification.

Jean-Luc hosted the 5G Indoor roundtable organized during the last Mobile World Congress

He has devoted 20 years to the digital ecosystem's strategic challenges. Before joining IDATE, Jean-Luc spent five years as strategy manager for French carrier, Bouygues Telecom and, before that, worked in the Telecom department at McKinsey & Company.

Jean-Luc holds an Executive MBA from HEC-Paris and is graduated from the Louvain school of management (Belgium). He has dual French and Belgian nationality.

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Synopsis & key issues

The report discusses the Optical Distribution Network (ODN), which plays a critical role in fiber-based networks by connecting central offices and end users. It highlights the strategic importance of designing, building, and managing the ODN efficiently and cost-effectively for telecommunications operators. The report examines the growing demand for fiber networks, and how this demand is driving innovation in ODN equipment technology and services. The report provides an overview of the key players in the market, including CommScope, Corning, Huawei, Fujikura and Prysmian.

Key issues:

- Strategic importance of efficient and cost-effective ODN design, construction, and management.
- Growing demand for fiber networks and resulting innovation in ODN technology and services.
- Emergence of plug-and-play ODN products and high value-added services.
- Importance of future network expansion and customer handoffs in ODN equipment design.
- Shift from off-the-shelf products to customised turnkey solutions.
- Competitive market with major players such as CommScope, Corning, Huawei, Fujikura and Prysmian

Players analysed in the report

- CommScope
- Corning
- FiberHome
- Fujikura
- Huatel
- Huawei
- Prysmian
- R&M
- Shenzen Optico Comm.
- Sindi Technologies Co.
- Summit Telecom

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02 FTTx SOLUTIONS AND ODN

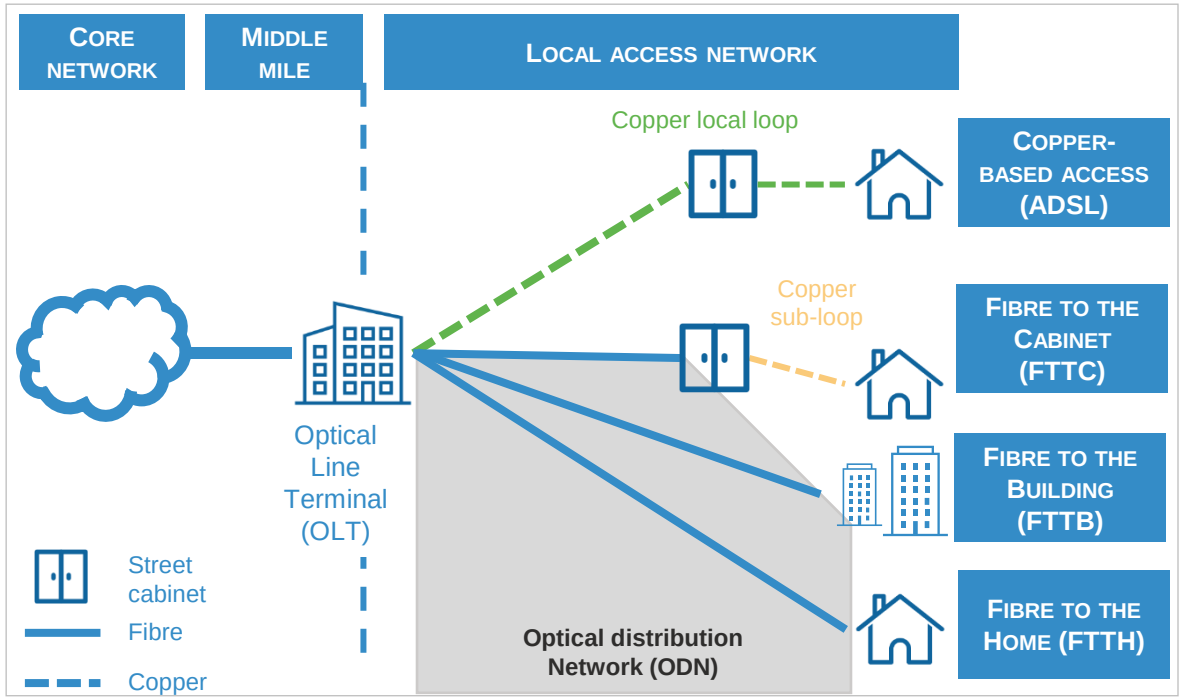
Exploration of the FTTx and ODN networks (1/2)

FTTx architecture overview

> Overview of FTTx network architecture and the importance of ODN

- Over the past decade, FTTx networks have been at the heart of operators' Next Generation Access network strategies worldwide, with deployments in almost every country.
- An FTTx network consists of a Passive Optical Network (PON), which allows multiple customers to share the same connection, without any active components (i.e. components that generate or transform light by optical-to-electrical-to-optical conversion).
- There are many variations of FTTx architecture, the main ones being Fiber-to-the-Home (FTTH), Fiber-to-the-Building (FTTB), and Fiber-to-the-Cabinet (FTTC).
- Most variations depend on the distance between the end user and the fiber-based infrastructure; in FTTC configurations, the end network can be copper-based (such as VDSL) or cable-based (such as DOCSIS 3.0 and above).
- A PON (Passive Optical Network) consists of a central office node, called an Optical Line Terminal (OLT), one or more user nodes, called Optical Network Units (ONUs) or Optical Network Terminals (ONTs) located at the consumer premises, and the fibers and splitters between them, called the Optical Distribution Network (ODN).

Fibre-based network architectures



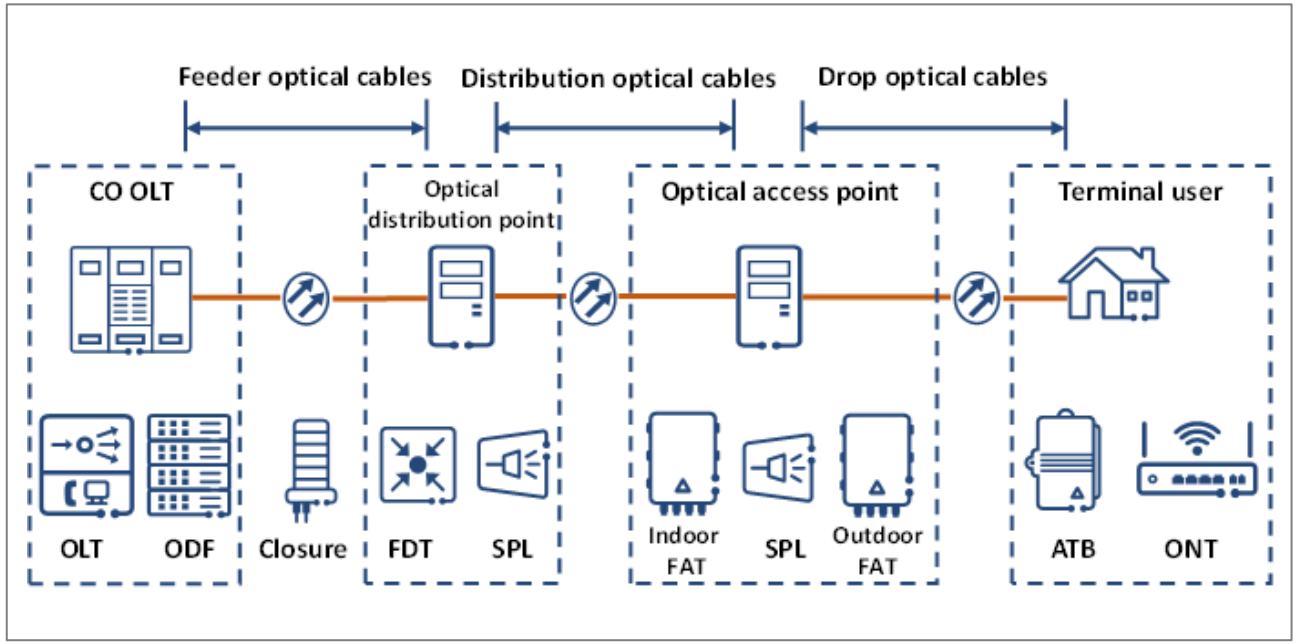
Source: IDATE, *Optical Distribution Network innovation and market sizing*, July 2023

Exploration of the FTTx and ODN networks (2/2)

Optical Distribution Network (ODN) overview

- The ODN provides the optical transmission medium for the physical connection of the ONUs to OLTs, with a range of 20 km or more.
- In the ODN network, a fiber optic cable, fiber optic connectors, passive optical splitters, and auxiliary components work together.
- The ODN is composed of three segments and two points:
  - **Feeder Fiber:** The feeder fiber originates from the optical distribution frame (ODF) in the central office (CO) telecommunications room and terminates at the optical distribution point for long-distance transmission.
  - **Optical Distribution Point:** Each feeder fiber can terminate at a 1x32 optical splitter in the cabinet, which can in turn can connect to up to 32 distribution fibers. Fiber splice closures are used to house and protect splices and manage fiber cables at the optical distribution and access point level.
  - **Distribution Fiber:** The distribution fiber distributes the fiber in the areas on either side of the optical distribution point to the optical access point.
  - **Optical Access Point:** Instead of a centralized splitting implementation (with a central splitter at the Optical Distribution Point), multiple smaller splitters, such as 1x4 and 1x8, can be distributed within the Optical Access Point.
  - **Drop Fiber:** The drop fiber connects the optical access point to terminals (ONTs), providing a fiber drop into the user's home.
- ODN solutions include a range of products that primarily address the distribution box, splice closure and terminal box levels.

Components of the ODN an a PON network architecture

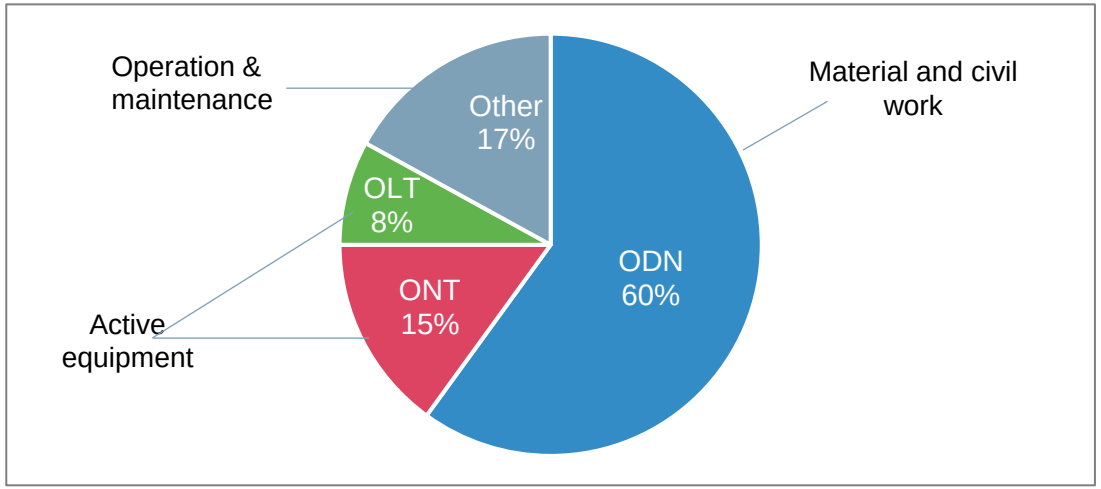


Source: FS.COM GmbH

ODN: A critical link in FTTx deployments (2/2)

Full-fiber infrastructure network cost per household and challenges

Average cost structure per household for a full-fiber infrastructure network



Source: IDATE, *Optical Distribution Network innovations*, June 2023

- **ODN is a major cost item in FTTx** (Fiber to the x) deployments.
- **ODN design and management is key** for operators to achieve a faster return on investment.

ODN challenges

- ODN planning and design must be tailored to each deployment area and require highly skilled manpower, resulting in high manpower costs.
- Many ODN solutions rely heavily on paperwork and human labor, which reduces efficiency and increases the probability of human error.
- Inaccurate ODN resources can cause carriers' OPEX to increase, resulting in invalid capacity expansions and resource audits.
- The need for a more efficient ODN is exacerbated by the industry's strong push toward digitization and the surge in online usage caused by the Covid-19 pandemic.
- ODN equipment must enable the digital transformation of operators' activities at the network management level.

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