EBOOK

How to optimize the design and implementation of fiber optic networks

Streamline engineering processes from planning to maintenance and provide an operations-ready network model

Fundamental expansion of fiber optic networks

The communications industry is experiencing unprecedented technological evolution, fierce competition and demands for service reliability, especially in Europe.

Data consumption in the 21st century has also become far more pervasive than placing a call or sending an email. Residential consumers have grown accustomed to having access to high-speed internet services for a large number of users in each household that support everything from streaming television shows and movies to playing video games.

When it comes to businesses and critical citizen services, utilities, transportation and public safety cannot function without reliable communications systems. As such, many companies today compete for telephone, internet and entertainment business, including the bundling of multiple services, add-on options and the rapidly changing wireless environment.

This all points to fiber optic networks expanding exponentially because of the high demand for data services, both residential and commercial, and the new backhaul of wireless services from cell towers.

Fiber has also evolved into a fundamental component of high-speed broadband communications networks required for smart grid, fiber to the home (FTTH) and intelligent information management systems. Thanks to fiber optic networks, each of these solutions links sensors, communications and critical infrastructure through high-speed backhaul communications.

Increased competition and telecommunications as critical infrastructure in Europe

According to QY Research, the European GIS telecom market size is expected to reach €380 million in 2025, pointing to enhanced competition among vendors.

In addition, telecommunications has evolved into a core part of critical infrastructure. In fact, the European Union Program for Critical Infrastructure Protection (EPCIP) describes critical infrastructure as “an asset, system or part thereof which is essential for the maintenance of vital societal functions, health, safety, security, economic or social well-being of people, and the disruption or destruction of which would have a significant impact.”

To that end, the exchange of information between people, devices, sensors and machines clearly qualifies as both essential and critical. Simply put, long-term disruption to telecommunications services poses a threat to the safety and welfare of citizens.

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Fiber networks in action

A wide range of telecommunications providers in Europe has seen tremendous value by optimizing and expanding their fiber optic networks:

- **Proximus** is a leading provider of digital services and communications in Belgium and internationally. Its goal is to connect every home and business in Belgium to high- or very high-speed connectivity through a fiber rollout. Proximus has connected more than 620,000 homes and businesses in more than 20 cities. It connects a home or business to fiber every 34 seconds.
- **Virgin Media O2**, one of the U.K.'s largest businesses, is working to upgrade its entire fixed network of 15.5 million connections to full fiber to the premises (FTTP) by 2028. The company will upgrade the cable element of its fiber-rich network and make use of full-fiber technology capable of delivering symmetrical 10 Gbps download and upload speeds and beyond. The company offers the fastest speeds at scale in the U.K.
- **Valtellina SpA** is one of the largest communications systems integration companies in Italy. Its customers include Telecom Italia and Infratel Italia. It is a specialist in laying fiber optic cabling at industrial sites and revamping telephone exchange and data transmission centers. Working at scale, Valtellina has been able to reduce network data preparation and production time from 10 days to less than an hour.

The rise of 5G networks

In addition to providing public sector organizations, businesses and consumers with improved high-speed and low-latency wireless networks, 5G is expected to dramatically speed up the development of next-generation solutions. These include autonomous driving, augmented reality, the digitalization of infrastructure, IoT, smart cities and much more.

To effectively bring 5G to life and reduce implementation times and costs, network operators require network design and management software to solve a variety of problems, including knowledge sharing, standardization of design and implementation processes, field activities management, control of infrastructure costs and permissions.

Simultaneously managing the vast scale of infrastructure, equipment, teams and construction sites also requires an evolution of information systems to support 5G. Operators will need intensive collaboration between the field and back office and wider availability of analytical tools for real time activity insights.

Organizations with fiber optic networks can establish a more robust smart grid by improving data interoperability between smart devices and power providers.

Fiber optics for IoT and smart grids

The rise of IoT will present insurmountable data and network capacity challenges that are too complex for traditional network connections. Thankfully, fiber optic networks have the ability to drive the big data and networking requirements, making IoT a reality.

From a utilities perspective, organizations with fiber optic networks can establish a more robust smart grid by improving data interoperability between smart devices and power providers. The power grid is also moving toward a competitive model with more distributed generation, and fiber can provide a new source of revenue.

For example, EPB of Chattanooga, Tennessee, built one of the most highly regarded smart grids in the U.S. based on a fiber optic communications infrastructure. This infrastructure has also enabled EPB to deliver state-of-the-art communications services to homes and businesses and provide advanced communication options such as broadband and video.

Many providers find that conventional GIS tools lack the detail and ability to model the relationships needed to integrate with operational systems and coordinate the network's logical and physical elements.

Design it right the first time: the need for fiber network design and management

Fiber optic networks are highly complex to develop and need to be designed right the first time to minimize cost overruns and adhere to the overall strategic principles of the provider. This design approach can also help providers gain more customers more efficiently, which can support revenue growth.

In addition, many telecommunications providers develop network designs internally and have external engineering firms managing the more detailed designs and overall implementation.

This can be a challenging process. It is often decentralized, and users rely on tools like spreadsheets, which can lead to errors.

While digital solutions can help support better and more centralized design and implementation processes, there is often also a lack of real-time information and the necessary integrations and connectivity.

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With this in mind, telecommunications network operators need a network model that delivers accurate, current information across their organization while also reducing legacy and cumbersome paperwork. They also need integrated solutions for relevant improvements, optimized processes and better communication.

A new way to optimize and grow fiber networks

With expanded competition in the fiber network arena, providers are challenged with being able to effectively optimize, grow and manage their networks.

From troubleshooting to enhancing latency to expanding the network's footprint in buildings, highly optimized fiber optic networks lead to higher customer satisfaction and the ability to more easily expand networks.

Understanding the full capacity of a network (now and into the future) is important for telecommunication providers to be able to map out the strategic growth of their networks. Utility companies also need to manage fiber networks for their smart grids and for selling fiber network access and capacity. The industry requires powerful technology to support these growing and changing infrastructure needs.

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A high-level look at NetWorks Comms

Octave NetWorks Comms streamlines engineering processes from planning to maintenance and maintains an operations-ready network model accessible across the business.

NetWorks Comms is an advanced telecommunications GIS that provides location-based information and tools for the complete lifecycle of civil infrastructure and fiber network management from design and construction to maintenance and operations, both in the back office and the field.

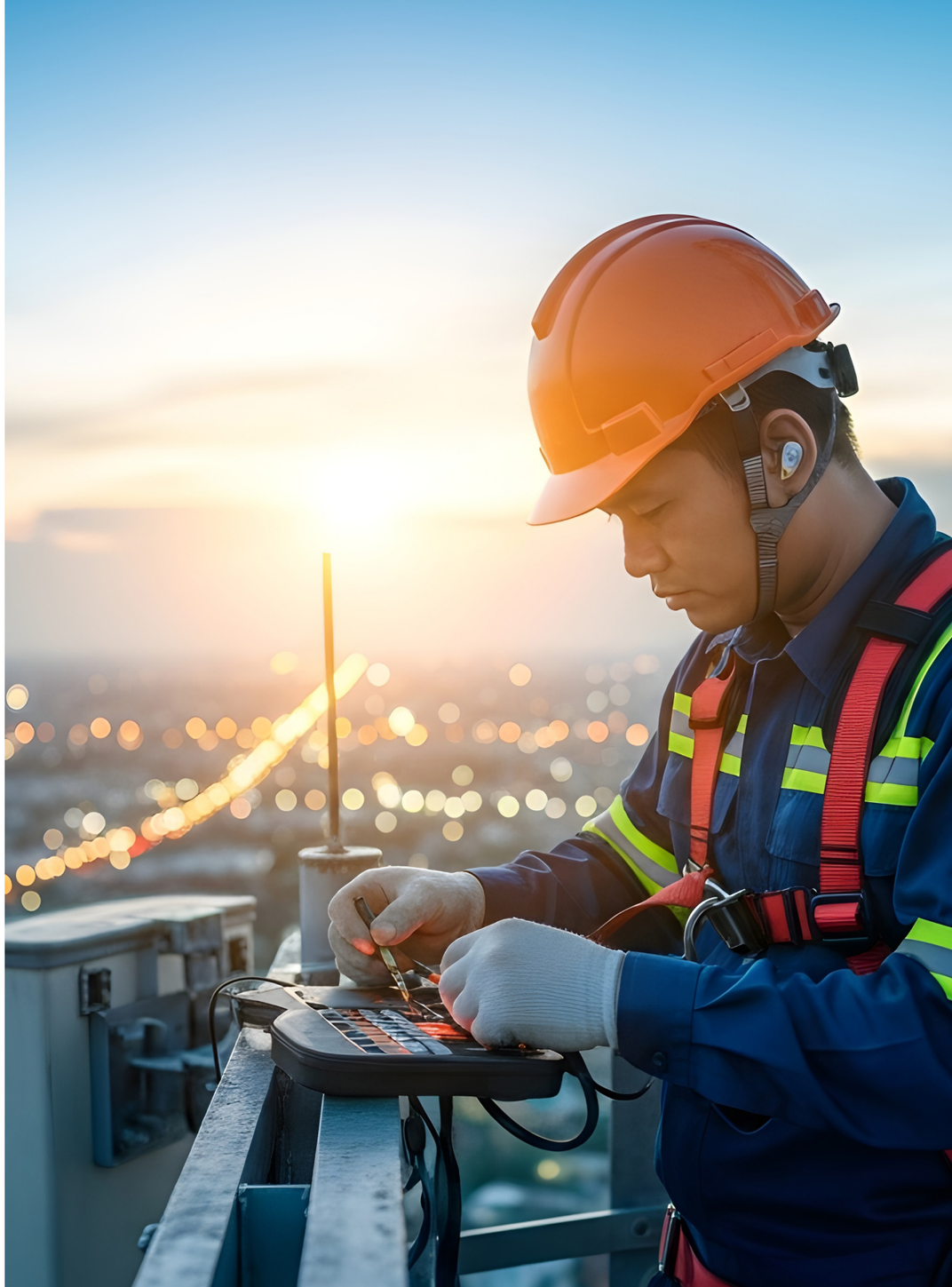
Whether managing assets outside or inside containers, as well as buildings and racks, this solution facilitates key business processes, such as work order design and execution, mapping, asset records management and maintenance records of the entire system.

Its feature-rich interface helps plan, connect and deploy fiber networks, supporting full tracing capabilities, fault analysis and path redundancy. NetWorks Comms can assess, manage and track the status of projects, equipment and connections and coordinate with other systems to model the full engineering lifecycle.

Critical capabilities of NetWorks Comms

NetWorks Comms offers the widest range of critical capabilities for designing, managing, and optimizing fiber optic networks, including:

- **Advanced editing:** Full computer-aided design capabilities exist within the GIS environment for improving network design and documentation while removing latency and errors from network records. The smart editing tools use rules to drive semi-automated placement with integral data validation, helping operators capture high-quality data faster.
- **Rich telecoms model:** An out-of-the-box, rich and highly functional connected telecoms model that accommodates the connectivity of the complete network from any terminating device to the inside plant (ISP) termination. It also supplies the inventory and connectivity of fiber, copper and equipment components – all within a single database.
- **Complete engineering lifecycle:** Rich version management, analysis, tracking and reporting capabilities for modeling and managing the complete engineering lifecycle, including coordination with other business platforms, such as enterprise resource planning (ERP), work and asset management system (WAMS), and field operations.
- **OSS/NRM integration:** NetWorks Comms operates alongside a range of OSS/NRM platforms, including Amdocs OSS (previously Cramer Dimension), Visionael OSS (PR) and Ericsson Granite Inventory (formerly Telcordia Granite Inventory). Integrating and coordinating Octave's advanced telecoms GIS with an OSS/NRM system streamlines processes, enhances data quality and currency, speeds up operations and extends functional capabilities.
- **Enterprise scalability:** Proven in production environments – ranging from tens to thousands of connected users in businesses from local to multinational operations. In addition to its scalable architecture, NetWorks Comms helps establish consistency and teamwork by applying corporate design practices and standards through work processes and business rules.



Key benefits of NetWorks Comms

From optimizing resources and return-on-investment (ROI) to improved business processes and reduced financial risk, NetWorks Comms offers a wide range of key benefits, including:

- **Optimized resources:** The NetWorks Comms model records asset details and relationships to support most functions by filtering and rendering information in different ways, on the fly: as text, maps, schematics or diagrams. This provides each user the right level of detail in the right way for his or her task, without maintaining duplicated data.
- **Better ROI:** By coordinating NetWorks Comms engineering capabilities with other business systems, operators can streamline workflows and gain valuable insights, such as comparing alternative design proposals from technical and financial perspectives. It also reduces overall project time as teams can create and assess alternative design scenarios, compare relative costs and benefits and determine in advance the list of materials and tasks necessary to construct the chosen scheme.
- **Improved processes:** Edits within NetWorks Comms are immediately available in the model and accessible via the database. Lower data latency and universal access allow NetWorks Comms to support time-sensitive use cases, resulting in faster operations, greater efficiency and enhanced capabilities. The solution also improves field, installation and repair processes:
    - Improved field processes lead to lower costs and increased productivity due to the bidirectional flow of information between office and field, the elimination of paper copies and duplicate work, reduced field visits and travel time and fewer project delays with accurate bills of materials.
    - Improved installation and repair processes shorten response and intervention times. The response time during a failure significantly improves thanks to the availability of functions that allow you to track the network, locate the true source of the problem, identify and communicate with affected customers and help field engineers resolve the issue.
- **Reduced financial risk:** NetWorks Comms reduces financial risk by assessing high-level costs of proposed plans. It enables planners to design and assess alternative proposals for build-out, including the siting of distribution points, service areas and deployment methods.

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About Octave

Octave is a leader in enterprise software, turning data into decisive action and intelligence into your edge. Our software solves for and simplifies complexity, from the design and build to operations and protection of people, property and assets – for any scope, at any scale. For decades, we've partnered with customers to sharpen performance, elevate efficiency and amplify results. From factory floors to entire cities, our solutions are tuned to scale up what's possible from day one onward.

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