Build for tomorrow: Inside FTTx network construction's digitalisation journey

The telecoms industry is experiencing a significant shift towards a fibre-for-everything era. Fibre optic networks play a vital role in meeting the growing demand. According to the World Broadband Association (WBBA), the global broadband market is valued at more than US$356 billion. However, the construction of FTTx networks is becoming more complex in several aspects such as the coexistence of multiple access technologies and overlapping of new and existing networks. In addition, emerging business models like demand aggregation and community-build call for greater agility. Faced with such promising market trends and challenges, it has become crucial to improve the FTTx network design and construction, write Qiang Yin, the deputy general manager of OSS Product Line, and Gary Lee, a senior product manager of OSS Product Line at Whale Cloud International

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Over the past decades, IT technologies have been used to drive FTTx network construction. Initially, tools like AutoCAD and Excel were used for design and budgeting purposes. As technology advanced, digital geospatial tools such as Google Maps/Earth and ArcGIS were employed to aid with additional features of route and location designs. Digital photography was used to document the completion of construction. These tools have significantly improved the efficiency, accuracy and optimisation of FTTx network construction.

In spite of significant progress having been made in IT tools, strategies still tend to be dominated by the legacy way of working which limits the improvements in cost savings and efficiency enhancement that can be achieved.

Why not consider introducing the idea of digital transformation?

IT tools centre on data collection, processing, storage for data safety, reliability and availability. Digital transformation places a greater emphasis on using digital technology to transform business models, processes and culture to improve operational efficiency and foster innovations, operation efficiency and effectiveness.

The actual implementation of digital technologies in FTTx network construction remains limited. A recent survey conducted by ISE in 2023 revealed that only 6% of respondents believed that digital technology could improve the efficiency of the permit process by more than 50%. 19.8% of participants thought that geographic information system (GIS) tools could fully serve as design tools. Digital photography was being used by 65% of respondents for documenting restorations. Real-time location and progress information was rated at 73 out of 100.

This indicates that the current fibre management systems focus on information and document management with less focus on end-to-end processes. We therefore need to understand factors affecting efficiency and cost during the construction lifecycle for our product design. ▶

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We try to identify the factors in two dimensions namely cost and time over the lifecycle. The lifecycle includes regulatory permitting, planning and designing, construction quality, testing, project scheduling and progress management as well as supply chain and manpower management. Statistically, the permission process typically takes up 10% of a project's duration and regulatory changes can necessitate programme changes with significant impact on time and cost.

Insufficient geographic information may lead to an uneconomical routing design. Inadequate construction quality assurance, testing and acceptance may result in increased project costs and risks. Poor communication and unrealistic scheduling will adversely affect project progress. Shortage of material supply and labour will cause construction delays and escalated costs.

Steps to take for the digitalisation of FTTx construction

We envision that the initial step towards digitalisation involves digitalising the planning and design process, which many operators have already undertaken. While using CAD for planning and design is a form of digitalisation, we believe that a well-digitised design drawing should encompass multiple dimensions. It should store various structured information such as geographic data, population distribution, municipal facilities, legacy networks, routing plans, equipment connections, materials and construction techniques. This comprehensive approach makes it easy to systematically generate targeted views for different service application scenarios such as permission application, design services, project budgeting, work package breakdown and task management.

In addition, a collaborative mechanism should be implemented to enable fast responsiveness in design change from survey or site construction. This mechanism allows multiple individuals to contribute to the design change and as-built updates while maintaining high data accuracy.

Digitising design drawings and adopting a design-driven construction approach maximises and facilitates an informed decision-making process throughout the project lifecycle in a controlled and efficient manner.

The next crucial step is to establish a digital platform hosting the digital design drawings which facilitate the end-to-end lifecycle processes. An FTTx project typically involves various stages, including planning and design, budgeting, execution, testing and acceptance as well as data synchronisation upon completion.

To achieve digitalisation transformation, it is essential to migrate the aforementioned aspects

to a centralised platform. This platform serves as a repository for all project data and enables seamless flow and integration between different design and construction stages. By digitising the business processes and utilising data instances, the platform ensures a streamlined and cohesive approach throughout the project lifecycle. This digitalisation allows for efficient communication, improved collaboration and enhanced decision-making, ultimately driving the success of the FTTx construction project.

The third step is to utilise a wide range of digital technologies. These technologies may include GIS, information management (IM), Internet of Things (IoT), artificial intelligence (AI), virtual reality/augmented reality (VR/AR), 3D modeling tools and street view resources. By embracing these digital technologies and services, we can enhance automation levels and eliminate resistance that may arise from unfamiliarity or discomfort.

To facilitate this adoption, we have identified several scenarios that are well-suited for making use of digital technologies and services. These scenarios include automatic design, automated printing, automatic split of the work packages and assignment of construction tasks, automated quality control and seamless resource synchronisation with legacy systems.

Last but not least, culture change is a crucial aspect of successful digital transformation. The adoption of new technologies and the integration of digital processes often require a shift in organisational culture to embrace innovation, agility, collaboration and continuous learning. Cultural change is a gradual process that requires consistent effort, communication and leadership support.

How Whale Cloud can help?

Whale Cloud, with its extensive experience in the telecoms industry, has been deeply engaged in providing advanced methodologies, tools and industry expertise for digital transformation. Deriving insights from technological and business innovations in the internet arena, Whale Cloud aims to work together with our customers to reduce barriers to the adoption of digital technology and accelerate the industry's digital transformation.
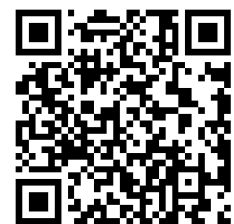
In this context, Whale Cloud has developed a Fiber Management as a Service (FaaS) offering, built on its Zsmart OSS product portfolio. These digital services cover the complete lifecycle of FTTx. By offering digital solutions tailored to the industry's specific needs, Whale Cloud enables operators to embrace digital transformation effectively, thereby realising its full potential in driving efficiency and productivity for a successful FTTx network construction. ■
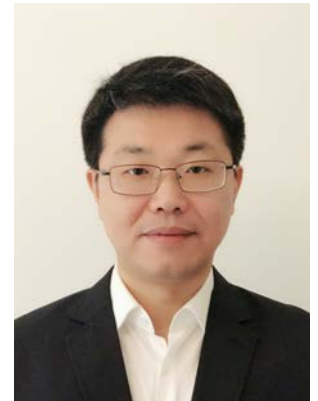
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