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The 'how-to' guide for accelerating fiber deployments

#4: High level fiber planning and cost optimization

In the previous "how-to" guides, we addressed the large reduction in project OPEX and duration that advanced program planning and project orchestration can yield.

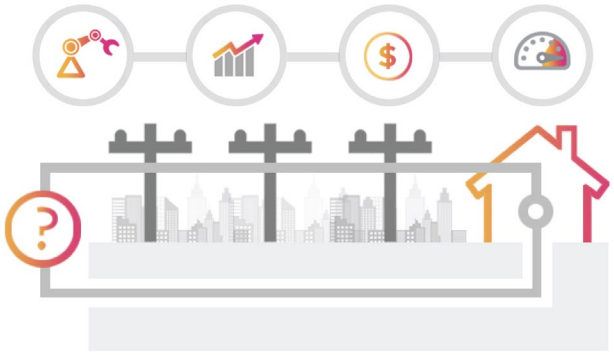
In this installment, we'll look at the additional cost reductions and efficiencies that can be achieved with advanced fiber planning. Profit margins on fiber rollout projects are very sensitive to cost, so properly engineering a fiber rollout can be the difference that makes a project commercially viable.

Starting on the right foot

Large fiber to the home (FTTH) projects are usually broken down into hundreds of sub-projects for every region, each with multiple fiber-serving areas. For each serving area, the network needs to be accurately planned and designed for every street, so that all houses and multiple dwelling units (MDUs) are ready to be connected during the fulfillment phase.

Every detail needs to be considered with costs calculated and analyzed. This applies not only to FTTH projects, but to any significant fiber build project, where every route needs to be optimized to minimize equipment and construction work. While previously, this may have been done manually, such an approach is no longer viable. A growing number of service providers and network construction companies are therefore now turning to automated planning and optimization tools, as well as innovative techniques to speed up and improve the accuracy of high-level fiber planning and cost optimization.

High level fiber planning for large scale projects needs an automated planning and optimization approach



Achieving accurate, optimized project cost-estimates is almost impossible without the right planning tools.

Planning challenges and opportunities

Project cost-estimates are obviously critical input for project go/no-go decisions as well as tactical planning decisions that influence project costs and future service profitability. Yet, achieving accurate, optimized cost-estimates is almost impossible without the right planning tools. Lack of advanced planning tools can also result in poorly planned projects with inflated construction costs, unreliable operations and costly maintenance. Over-engineered designs can avoid some of the pitfalls, but lead to more expensive network infrastructure costs.

Automating high-level design and optimization

While the concept of network design automation has existed for some time, tools and techniques have advanced considerably over the past few years. Today, high-level design automation tools can make use of engineering and business rules, and GIS data, to provide optimized fiber network designs for each specific serving area. These can also be "fine-tuned" if required by the designer before being committed to low-level design. Assisted planning is also relevant at the fulfillment phase to minimize lead-in costs and customer connection times.

Setting project priorities

Calculations can provide costs per home passed, customer connection costs and likely service adoption rates per serving area. By combining GIS-based cost data with customer and marketing data, it is then possible to estimate returns on investment (ROI), enabling smarter project prioritization based on business value. This way, fiber rollout projects in specific neighborhoods that have the highest revenue potential can be scheduled earlier in order to achieve both quicker payback and higher profits.

GIS based fiber planning tools can improve design accuracy. This is a plan view of the street topology with color coded distribution areas (image courtesy of FiberPlanIT)

A cost-reduced, accurate BoM

When automated optimization methods are employed, less expensive and more reliable designs are achieved, compared to a traditional manual design approach. And at the same time, project risk is reduced.

Another advantage is reuse: the capability to discover and reuse existing fiber, ducts, poles, and other infrastructure, and use them in designs to reduce deployment costs. Also, damage to existing infrastructure can be avoided. When laying underground fiber ducts in areas where existing utilities are present (such as gas and water lines, electricity cables), one must know their exact location or at least be able to estimate them within a small margin of error. This is possible with planning tools that leverage GIS data.

FTTH networks using gigabit passive optical network (GPON) technology connect multiple subscribers to a single point of presence (POP) using passive fiber splitters. Another example of a planning 'must-have' is to be able to accurately estimate how many subscribers each POP will serve and the total number of POPs required within each local area.

Automation can be applied to fiber routing and clustering using GIS data, street plans and satellite images. Automated fiber planning tools that use special algorithms can calculate the optimal routes for fiber and related infrastructure, along with clustering of subscribers to minimize the cost of equipment and works. The cost of cables, trenching, splicing, enclosures and splitters is factored in.

Use of automated fiber design tools can reduce planning time from weeks to just days compared with manual design methods. Also, automated fiber design tools typically reduce cabling and trenching by 10%[1], which is critical in the drive to reduce fiber rollout costs.

Once the planning phase has been completed, detailed costs can be generated together with a calculated bill of materials (BoM).

Fiber network project simulation strengthens the business case

Since large-scale FTTH deployment projects can be highly complex, software simulation techniques can help planners estimate and optimize project costs by simulating fiber network design and build projects. These simulation models can also be run with different constraints so that various design-and-build scenarios can be compared, with each resulting in a calculated bill of material. This type of modelling can help show how cost predictions are derived in detail and strengthen the business case for the entire project.

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Summary

Service providers and network construction companies face a number of challenges when planning and estimating fiber network rollout and upgrade projects. Accurate high-level fiber planning and optimization is essential for a successful business case. Automated planning tools using GIS data and design simulation models can significantly reduce risk and improve project ROI. In the next 'how-to' guide in this series, we will take a look at the next phase in fiber deployment: outside plant detailed design and construction.

[1] Source: FiberPlanIT

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