Creating Speed and Agility in New Network Deployments with a Factory Built Network

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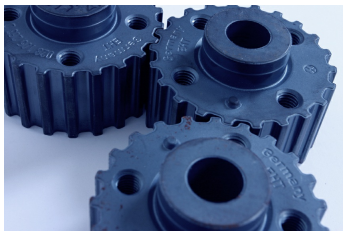


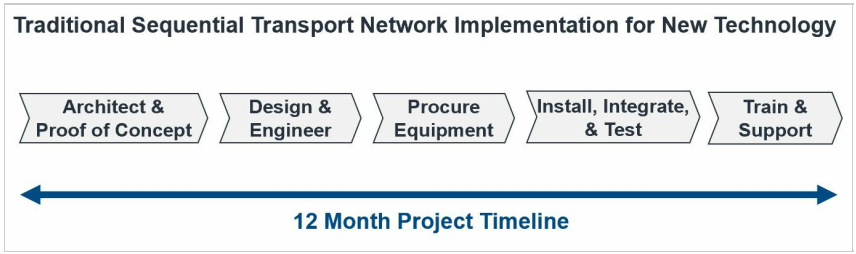
Today, network operators seeking competitive edge must prioritize and exercise agility. The most successful must rapidly vet and deploy new technology so that they can compete by offering greater value in the most appropriate technology, performance, predictability and ecosystem enablement.

To explain the pressure for rapid deployment, it's essential to look at today's disruptive business environment. Rapidly increasing bandwidth requirements for transport networks is a major driving factor. An ever-increasing need for network implementation speed is also the result of an increasingly competitive landscape for such enterprises as cloud service providers, content providers, and traditional competitive communications service providers. In response to these pressures, equipment manufacturers have dramatically shortened their product development cycles, which means operators are constantly introducing new higher bandwidth products and technology into networks as they work to add bandwidth via new fiber paths or network upgrades. To add complexity and pressure, many of today's network operators are running in a business environment with rapid new customer acquisition and frequent new service introductions.

For these operators, network build speed is life. Simply put, it's essential to success. A business model that leverages the Factory Built Network (FBN) procedure delivers that speed while preserving the highest in network fidelity.

Transforming a Sequential Process into Parallel Methodology

The traditional process for deploying a new transport network is sequential, resulting in long project timelines and drawing heavily upon scarce internal optical engineering resources, especially when new products or technology are involved. Alternately, an equipment manufacturer, which might also be competing for those same scarce resources, delivers a level of vendor lock-in—a **net reduction in agility**—along with that new network. This sequential methodology usually leads to a project duration of over 12 months. A 12-month time horizon doesn't count as rapid deployment, and with such disruption in today's business landscape, it doesn't foster agility.



Developing a new business model

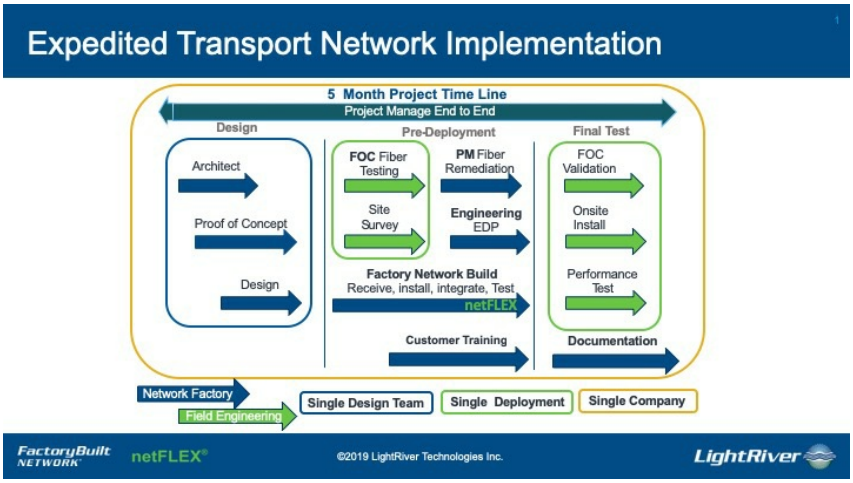
LightRiver's Design, Build, Educate, Transfer (DBET) business model upends the traditional process. As LightRiver worked closely with customers to dramatically

shorten project timelines, it became evident that a paradigm shift was required. Every aspect of an optical network build that could be performed in parallel had to be undertaken. Furthermore, the entire value chain needed to be brought in-house, so that it could be tightly integrated and so that transitions between project phases could be made seamless.

The first area that LightRiver focused on vertically integrating was network architecture, product selection, and network design. Our customers require transport networks that are multilayer. Additionally, they want to leverage best-of-breed products at each layer, so they usually command multivendor networks. In the past, network operators were required to sequentially work through multiple proofs of concept with multiple equipment vendors. LightRiver addressed this problem by building a state-of-the-art multivendor interoperability networking facility called LightRiver Labs. Within LightRiver Labs is over $50 million of networking equipment, including the latest generation of packet optical networking hardware at each layer from the tier 1 network equipment suppliers.

This allows LightRiver Network Architects to understand a customer's unique networking priorities and to perform a targeted technology "bake-off" for each level of the network—often simultaneously. This is a huge project time-saver and unburdens customers' engineering resources. But this aspect is just the beginning of the parallel processing. As the network architecture is being solidified and the proofs of concept are being executed in our Labs, LightRiver's optical engineers are already engaged in the network design process, creating site-by-site bills of material and cost estimates for the hardware and professional services. This allows the architecture, proof of concept, and design tasks to conclude almost concurrently, with a LightRiver Project Manager keeping each task on schedule and allowing the design phase to accelerate towards the finish line.

Next comes the pre-deployment phase, where the majority of the network build tasks are completed efficiently to elevated quality standards. LightRiver closely coordinates and overlaps all tasks within this phase to ensure accelerated timeframes along with the closely monitored standards of quality. While LightRiver "factory builds" the network in our custom network staging facility, we simultaneously perform site surveys and fiber testing and then manage any required remediations. Final engineering is then completed utilizing actual fiber test results. And, once the network is fully *Factory Built,* it becomes the ideal instructional platform for customers requiring knowledge transfer.



How the Factory Built Network differs

A tremendous amount of innovation has gone into the creation and implementation of the Factory Built Network process. Networks are first constructed in a specialized network factory, where they are racked, provisioned, audited, and tested by relevant experts in each technology. Then the equipment is custom-crated—with all cards, patch cords, labels, and provisioning in place—before being shipped to field locations. In contrast to a traditional field-built approach, the vast majority of the installation work is performed in a central staging facility or network "factory." This difference allows for the implementation of the most agile production process, from inventory management

to high-volume construction, which expedites the project timeline. It also enables the use of experts for each step of the deployment process, and the resolution of parts, software, design or compatibility problems before the networks leave the factory.

Testing

After a Factory Built Network has been completely built, with every jumper run and circuit provisioned in the factory, it can be comprehensively audited and tested. Since it is fully deployed in a single location, it can be audited and tested far more extensively than a network deployed entirely in the field. With a Factory Built Network, quality checks can be performed on 100 percent of all labels and jumpers. The inspection of every patch cord via 400X scope can be supervised. The neatness and routing of every optical patch cord can be verified. **This ultimately results in a higher-performing and more reliable network.**

In a factory environment, systems can undergo an entire week of “burn-in” to ensure successful functioning, rather than hours or days in a traditional field-built network. In the factory, bit error rate (BER), throughput, latency, and jitter testing can be completed efficiently with test systems geared towards testing multiple circuits simultaneously. In addition, comprehensive system failover testing can be conducted at all hardware levels. As a final factory performance test, LightRiver utilizes the netFLEX optical domain controller platform to enhance network delivery using our intelligent Factory Built Network (iFBN) option to further ensure the network elements are tuned for optimized performance and a Factory Network Build Certification Report is issued, with customer enablement of paramount importance. This data-driven delivery approach provides a benchmark for Day 1 network health and performance, allowing advanced, network-custom analytics to empower all stakeholders under our DBET business model.

Site Survey, Fiber Testing, and Engineering

While the network is being Factory Built, LightRiver can perform site surveys, fiber testing, and final engineering. **In over 50 percent of surveyed sites, remediation is required for site readiness problems or fiber plant issues. These remediations become the critical-path items in a network build.** While other entities break apart and outsource site surveys and fiber plant testing, LightRiver performs both during the same site visit with in-house experts. LightRiver has created industry best practices for these functions, as site and fiber path readiness create the foundation upon which a transport network is built. One of these best practices is for the LightRiver Project Manager to actively manage remediation efforts to resolution and then for the LightRiver Field Team to validate the remediations are to carrier-grade standards at the time of network deployment.

The output of the site surveys and fiber testing is an Engineering Design Package (EDP) that fully documents all elements of the onsite network build both graphically and in writing. This becomes the as-built documentation once corrections from the field install and digital images are provided to verify all details of an install.

Onsite Installation and Final Test

With the network completely Factory Built and site remediations completed, the network is rapidly installed and field-tested against the factory benchmarks provided via netFLEX iFBN. To foster the highest levels of collaborative transparency, a comprehensive and regulated set of site photos are loaded daily onto a secure customer portal, such that all approved stakeholders have real-time visual feedback on project progress. LightRiver spends 60 percent less time on customer sites with a Factory Built Network and scheduling is far more predictable, as virtually all network troubleshooting is accomplished prior to the network leaving the factory. This once again frees up customer resources, including escorts, engineers, and project managers. And if customers are seeking ongoing proactive and automated network assurance, netFLEX can be readily integrated back into the deployed network to enable a SaaS network health-check, further freeing up scarce optical engineering resources.

Conclusion

With faster deployment and greater reliability, the time-saving Factory Built Network procedure creates agility for network operators. As a result, network operators can enjoy the benefits of their new systems sooner while reaping the advantages of lower costs and higher performance.