FNT

// simplify complexity

KEY FACTORS FOR A SUCCESSFUL NETWORK TRANSFORMATION

A UTILITY PROVIDER'S GUIDE

WHAT YOU CAN EXPECT IN THIS WHITEPAPER

This paper offers best practices and practical advice on how to transform the grid's mission-critical underlying communications network.

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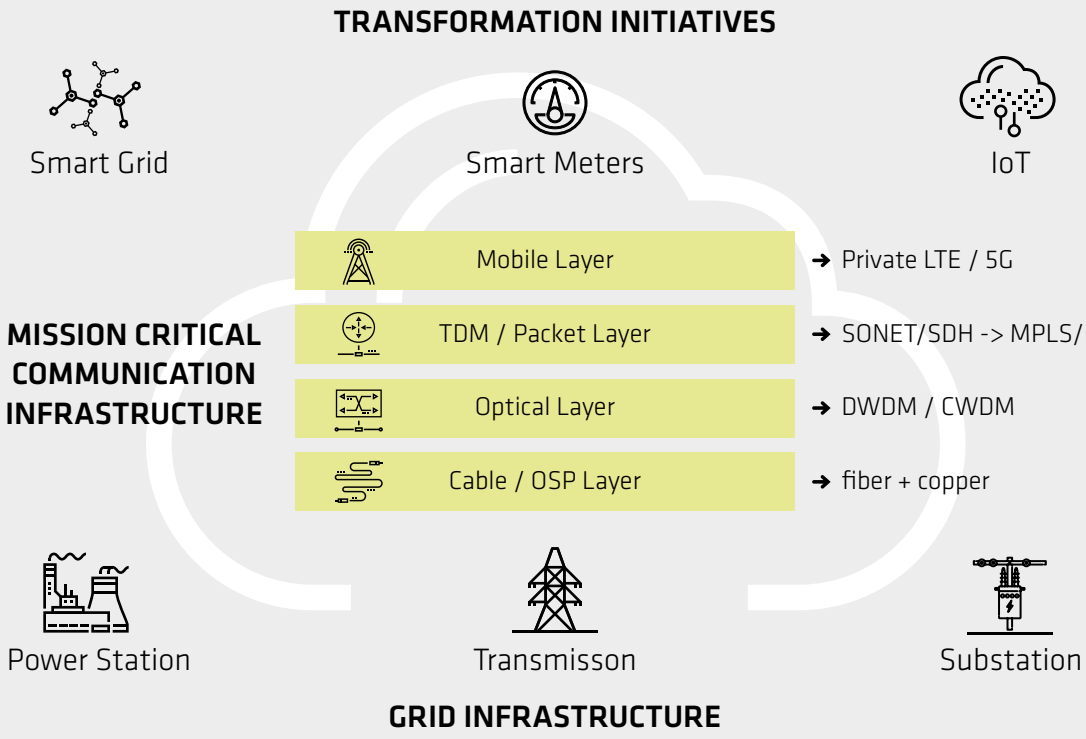


The underlying communication network plays a key role in an electric utility's grid infrastructure and its ability to transform into a digital utility provider. It must continue supporting the delivery of telecommunication services to the critical infrastructure while simultaneously supporting transformation initiatives. Traditional inside/outside plant cable infrastructure and classical telco transport network infrastructure must adapt to accommodate new transport technologies as well as mobile network initiatives and integrate with data center infrastructure to support the ongoing virtualization activities. The ability to transform a mission critical network infrastructure without any business impact is one of the most important key success factors for utility operators to keep pace with new technological demands and market trends. Transparency across all passive and active, physical, logical and virtual resources forms the foundation for any structured transformation process.

PRE-TRANSFORMATION PREPARATION

Emerging technologies are disrupting the utilities industry. To keep pace with customer expectations and escalating demands, utility providers must transform their grid's underlying communications networks.

As network transformation is a huge undertaking with far-reaching implications for an organization, executing a seamless transition is a major challenge. There are three steps that utility providers must follow to ensure all of the necessary elements are accounted for during the transformation journey:

1

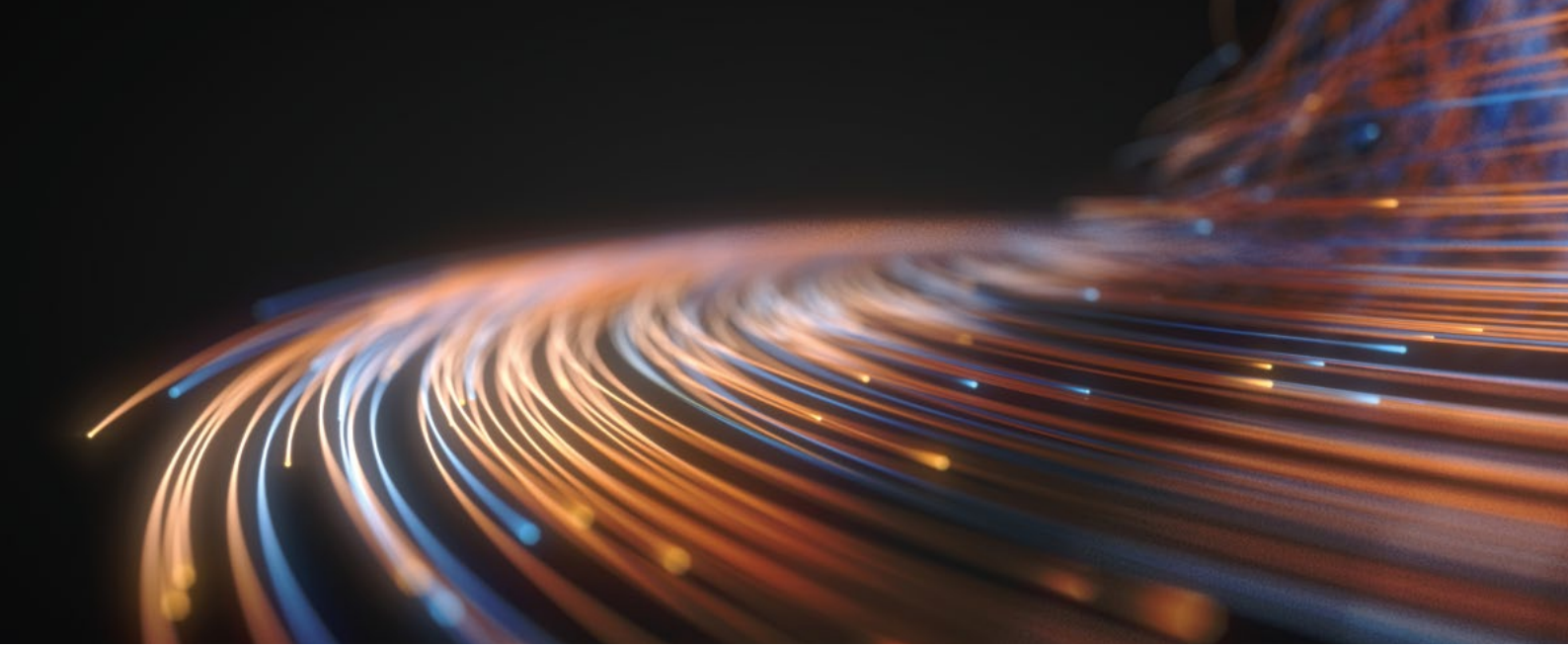
- **Step 1: Gain a clear view of your starting position.** Understanding your current state requires a complete inventory of physical and logical resources, services, customers, capacities and redundancies. The difficulty many utilities face at this point in the process is their data is not easily aggregated. It's common to have multiple databases, housing different types of data, stored in different systems. These databases do not communicate with each other, which is a difficult barrier to overcome and renders comprehensive network change impossible.

2

- **Step 2: Map out individual transformation steps.** This requires analyzing the network resource and service data compiled in Step 1 to understand what you have and how everything is connected. This is the basis for determining what must change to enable the new technologies you will introduce. This is difficult for many utilities whose network transformation planning is a largely manual effort, shouldered primarily by engineering staff and project management.

3

- **Step 3: Execute network migration and rollout actions.** Even the best migration plan won't yield the desired results without structured execution. Proper execution is tracked in the field and in the operations center to ensure all network changes are implemented as planned. Equally as important, all network changes must be directly reflected in the information base to ensure not only that the network functions as intended, but that accurate data is always available to planning, operation and fulfillment teams for future transformation steps and ongoing operation of the network.



BEST PRACTICES TO FACILITATE CHANGE

With 25 years of experience helping utilities transform telecommunications networks and IT infrastructure, FNT has identified three critical success factors that can significantly impact the outcome of a network transformation initiative. The following best practices can be applied throughout the entire transformation journey:

1. CONSOLIDATE INFORMATION IN A UNIFIED DATA MODEL.

The three steps previously described share a common element – they all rely on a master reference database. In the context of a network transformation, building a master reference database of all physical, logical and virtual assets and resources will set utilities up for ongoing success. A common central database for intelligence on network data will ensure that all activities are based on the same consistent view of the network. This also eliminates common problems that are caused by data coming from different sources, built on different vendors' data models and technologies.

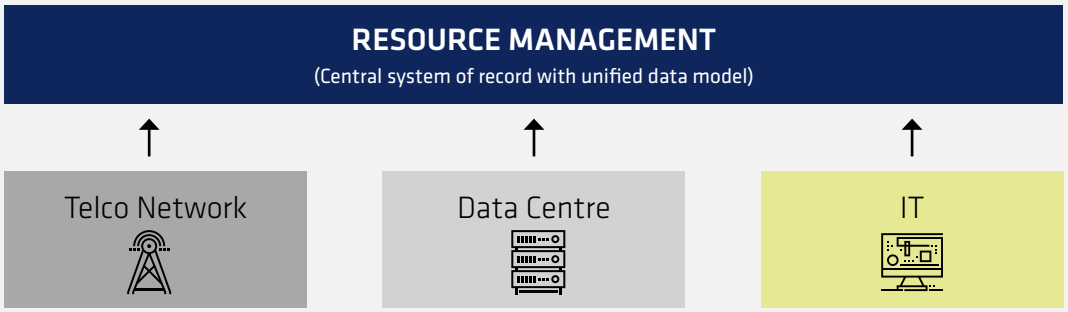
2. USE SOFTWARE TO AUTOMATE.

The best way to ensure a smooth network transition is to find a tool that can support both legacy and new technologies side by side, support a seamless changeover when the time is right, and manage the change properly without impacting services. Automating the transformation steps with a documentation and planning platform ensures accurate network resource and service data. Creating a master reference database based on a Commercial off-the-shelf (COTS) software solution can radically accelerate this step. Software supported inventory management with a library of predefined components of the different devices from various suppliers speeds up the setup of the master reference database as well as the addition of new equipment into the network and reduces the effort for the user to define these components.

A robust planning mode functionality should include assigning active, physical and logical resources, the passive cable infrastructure layer, as well as auto-routing capabilities that span the physical and logical layer to encompass nodes and sites. Auto-routing is important because it ensures that the optimal signal path on the physical layer and the best route on the logical layer are identified. It should also perform automated redundancy checks across all hierarchies, which is a protective measure that ensures required supplier-agnostic redundancy configurations are considered across all technologies and layers, both active and passive.

Another important aspect of network planning is assessing the impact of planned changes to identify any potential impacts on services and customers before changes are implemented. Using software to automate task planning gives the ability to assess the planned state, which is key to achieving a seamless changeover between technologies. Available redundancy information and corresponding SLA data will enable utility providers to identify if any services need to be rerouted to avoid disruption or an SLA breach.

For changes within the passive cable infrastructure, this process-driven approach is the only way to keep data accurate over time. For changes involving active resources and logical connectivity, a reconciliation mechanism via supplier EMS/NMS systems can be implemented and data can be synchronized to verify whether changes were executed as planned. Using this process-driven approach the planned changes are documented in detail, work orders are automatically created, execution is traced and status updates are made. All changes are directly reflected in the database, and the documentation is automatically updated as a result of this process. Such "closed loop" management ensures data consistency, which is critical in the continuous cycle of network maintenance.



A unified data model is very important to efficiently support use cases and processes, end-to-end, that rely on disparate data provided by the diverse mix of technologies in the network required to deliver connectivity and service. This data model must be standardized and preconfigured for frequently used scenarios for immediate out of the box use. It must also be flexible enough to adapt to customer specific needs, such as new objects and attributes, by configuration. Finally, the unified resource management solution needs open API integration capability to facilitate automation and reconciliation.

3. EMBRACE THE PRINCIPAL OF UNIFIED RESOURCE MANAGEMENT.

Unified resource management supports the realization of a seamless network transition. It leverages one central database across active telco transport network, including passive inside/outside plant infrastructure, plus IT and data center resources. This is important because VNFs are a big part of digitalization. As more network functions move from the network to the data center, it is critical to maintain the same level of control regardless of where the assets reside.

To be truly unified, resource management must:

- **Rely on a vendor and technology agnostic master reference database.** This database will supply all relevant information for operational processes such as planning, engineering, service assurance and service fulfillment.
- **Provide full transparency across the network.** This will enable network operators to document, plan and manage inside and outside plant cable network infrastructure as well as telco transport network resources during their transition to packet based networks.

Since unified resource management covers the entire spectrum of assets and resources within one integrated data model, users can navigate between the different layers and across all resource types:

- **Active telco transport network** (classical telco network infrastructure such as DWDM, MPLS, Carrier Ethernet, SONET/SDH)
- **Passive inside and outside plant infrastructure (cable infrastructures** such as trenches, ducts, micro-ducts, splice enclosures and cassettes, patch panels, all cable types in the field and within the building)
- **Mobile Radio Access Network** devices and resources (antennas, active nodes, cells and configuration data per site)
- **Virtual resources** of NFVI and VNFs (including IT server, storage, data center infrastructure capabilities to manage floor space, power and cooling capacities)

Adhering to the principles of unified resource management is critical to maintain a high-performing communications network during the transformation process and after. Automating via a unified management platform inclusive of planning, documentation and management will provide comprehensive and deep insights into the communications network and ensure continuous, end-to-end documentation of the passive and active network. Implementing a unified resource management approach also enables utility providers to benefit from automated processes including planning and engineering and service assurance:

- **Planning and engineering.** Planning and engineering processes focus on the domain where transformations are planned and address capacity utilization and rollout efficiency. They provide a structured framework and ready environment for automated routing of connections across the network, performing redundancy checks across all layers, generating and distributing work orders and updating the database when changes are implemented.
- **Service assurance.** Service assurance processes ensure that business impact is minimized during and after the transformation and support operational efficiency, customer satisfaction, and SLA compliance. Automated impact analysis across all layers identifies affected services in case of failure and facilitates maintenance activity by identifying and informing affected customers and internal groups upfront, or rerouting services. Automated data enrichment for monitoring and trouble ticketing solutions optimizes operations and automates incident and problem management processes. Mobile access to resource data ensures that field technicians always have access to accurate data to fulfill their tasks.

KEY TAKEAWAY

In the evolving electric utilities industry, transitioning to packet-based networks is necessary to enable a smart grid, support new services, respond to changing customer demands, and drive operational efficiencies. Leveraging the principles of unified resource management to transform the grid's underlying communications networks is a key success factor.

Not only will this provide a complete view of all resources and the ability to manage them holistically, it will also enable the provisioning of accurate data to other tools and solutions within the OSS/IT environment. Regardless of where you are in the network transformation process, the strategies outlined in this paper can guide you and simplify the journey.

CUSTOMER EXAMPLE

A utility customer uses FNT to help operate its 12,000 km fiber optic and 4,800 km copper cable connections at 1,500 locations with FNT Command. In order to upgrade their network, they consolidated and replaced various legacy solutions and introduced a single data repository. This repository includes all the technologies used in their heterogeneous multi-vendor transport network, as well as passive cable inside/outside plant infrastructure. They use FNT Cable and Outside Plant Management and FNT Telco Active Inventory to plan all changes on accurate data, across passive and active, physical and logical layers, and perform redundancy checks across all layers based on the integrated data model.

As a result, they were able to achieve their goals:

- ✓ Optimize the creation of signal paths/circuits based on consistent data using FNT's auto-routing functionality.
- ✓ Create and adhere to validation rules based on medium, connector, and wire type - and get it right the first time.
- ✓ Automatically generate and distribute work orders based on planned tasks.
- ✓ Make better business decisions based on accurate capacity overview of used and available resources.
- ✓ Reduce the amount of effort and time spent on analyzing the impact of a change in the network from 2-3 days down to less than one hour.
- ✓ Get immediate impact analysis on services and customers affected in case of outages or for maintenance window planning.

About FNT

FNT GmbH, headquartered in Ellwangen (Jagst), Germany, simplifies the management of highly complex digital infrastructures in companies and public authorities with its FNT Command Platform. With the cloud-enabled "software made in Germany", IT, telecommunications and data center infrastructures can be efficiently recorded as digital twins and documented across all levels from buildings to digital services. The software also offers open interfaces and numerous functions for planning, implementing and automating transformations and changes in an integrated manner. FNT's customers include more than 500 companies and government agencies worldwide, including more than half of the DAX-40 listed corporations. FNT operates offices in several locations in Germany as well as in New York, London, Singapore and Timisoara and has an international partner system with market-leading IT service providers and system integrators.