Accelerating Digital Transformation with Unified Resource Management

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In today's on-demand world, IoT is driving a rapid rise of connected devices. Everything that can be digitalized will be. Rapidly advancing technologies and market forces such as mobile 5G, fiber rollouts, and automation are pressuring telecom providers to quickly adapt to the evolving ecosystem. That's why an overwhelming majority of CSPs are either actively implementing digital transformation programs or are currently in the planning process.

Emerging 5G networks create new opportunities for operators to provide services at greater capacities, accelerated speeds, and lower latencies. To service both residential and business customers in this hyper-connected digital world, service providers are planning and executing extensive transformations in technology and architecture. These transformations are necessary to support the modern infrastructures that make smart cities, smart grids, Industry 4.0, and many other use cases possible.

These transformations support bandwidth upgrades and enable the introduction of software-defined networking (SDN) technologies and network function virtualization (NFV) solutions. They involve large core data centers and many new edge data center sites, all of which must be set up and outfitted with substantial IT server and storage equipment, including the virtualized applications. It's important to note that a vast number of fiber rollouts are required to connect new mobile sites and provide the capacity in the backbone and between the data center sites to deliver high-speed, high-quality access connectivity to business and residential customers.

Although it is necessary for operators to transform their infrastructure, it can be a difficult undertaking. Enabling the Future Mode of Operation of both physical and virtualized networks and services requires massive transformation activities. These activities are easier to execute when a system of unified resource management is in place.

Making a Smooth Transformation

In the continuous cycle of change that occurs during network transformations, rollouts, and even routine maintenance, reliable information is a must-have. Documenting all changes within a central resource repository is important, as inaccurate information can cause disastrous ripple effects throughout the entire infrastructure. Having a single source for all network and service resource data is the foundation of unified resource management.

Unified resource management solves the problems caused by the diverse array of resources required to operate today's technologies. These technologies require physical resources, logical telco resources, virtual IT resources, and VNFs based on data center resources. While physical, logical, and virtual resources can be easily managed separately, it is challenging to manage them in unison. Since the products and services that are delivered to customers use both traditional network services and virtualized components, seamless navigation throughout these different types of resources is a crucial success factor.

The transparency provided by a unified resource management solution enables the planning and documentation of all relevant physical, logical, and virtual resources, capacities, and assets across the telecommunications network, IT, and data center

infrastructure. Simplifying resource management in this way gives providers the ability to manage resources via a single source that integrates with key systems.

To illustrate why this is so vital, consider today's mobile networks. They are a complex mix of traditional network technologies, passive fiber infrastructure, mobile technologies, a virtualized mobile core, and BBU functions. Unified resource management supports holistic management of all these resources, regardless of where they reside or whether they relate to active or passive devices or physical, logical, or virtual resources. It covers all types of mobile RAN active nodes, passive equipment, and configuration data at mobile sites. It includes the active nodes and logical connectivity in fronthaul, backhaul, and core, and comprises the underlying passive inside- and outside-plant cable infrastructure as well as the virtualized resources and space, power, and cooling capacities in core and edge data centers.

Unified resource management makes network and cable infrastructure rollouts, extensions, and changes easier to plan and more efficient to execute, with significantly less manual rework. If there is a network or service issue, the operator will have access to all available information to analyze and remedy the situation. End-to-end visibility and the ability to see dependencies and impacts across all layers is critical. Unified resource management provides the required relationship and dependency information, and it takes into account essential details such as redundant links used on underlying layers. In the absence of unified resource management, where data sources are distributed and data quality is questionable, any network change will take much longer to perform and is more prone to error.

A telco provider that implements a unified resource management strategy will benefit from:

- One central database across the traditional active telco network, including passive inside/outside plant infrastructure, plus virtualized resources based on IT server and data center resources
- A master reference database to support operational processes such as planning and engineering, service fulfillment, and service assurance
- A vendor- and technology-agnostic data repository that provides all relevant data and capacity information for use in planning rollouts and transformations and performing impact analysis of planned changes before they are implemented
- A single-source-of-truth repository providing all relevant resources required to deliver new services and enabling immediate impacted analysis in case of outages to identify all affected services and customers

Because 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 including:

- Active telco transport network (classical telco network infrastructure such as DWDM, MPLS, Carrier Ethernet, SONET/SDH, etc.)
- Passive inside- and outside-plant infrastructure (cable infrastructures such as trenches, ducts, micro-ducts, splice enclosures and cassettes, in the field and within the building)
- Mobile RAN (antenna devices, active nodes, cells and configuration data per site)
- Virtual resources of NFVI and VNFs, including IT server, storage, and data center infrastructure

Automation in the Digital World

Not all unified resource management solutions are created equal. It is important to implement one with a single repository of resource information across all relevant telco, IT, and data center domains. It's also important that this repository dynamically updates as changes occur. Network changes occur with varying frequencies,

depending on whether the resources in question are physical, logical, or virtual. To achieve automation, the repository must expose resource information via API to other systems. Utilizing software solutions enables automation and streamlines business processes for maximum efficiency. Telco companies that implement a unified resource management solution will be able to achieve complete transparency across their telco active inventory, manage underlying cable and outside plant infrastructures more effectively, improve the effectiveness of mobile RAN configuration data and infrastructure management, and dramatically simplify hybrid resource management via a holistic view across physical, logical, and virtual resources.

Telco Active Inventory Management

The centralized management of all network and service resources is essential to provide relevant resource information for planning and engineering, service fulfillment, and service assurance processes. Such a solution supports all types of transport network technologies and provides seamless navigation throughout all hierarchical layers. Having a central database for all resource-related data ensures that all activities carried out by various people with various roles within the organization are based on a shared master data source.

Cable and Outside Plant Management

Proper documentation of inside- and outside-plant cable infrastructure can provide full transparency across the network and enable the efficient operation, planning, and management of complex passive network infrastructures. The ideal solution should cover all physical end-to-end connections within a central repository. To plan new connections, auto-routing capabilities should enable routing of new connections end-to-end across the passive infrastructure. From a planning perspective, it ensures changes are based on accurate as-built documentation and that all changes are reflected in a centralized management system. From a service assurance perspective, this is the best defense against service interruption.

Mobile RAN Management

Implementing a mobile RAN management solution can simplify the documentation, planning and rollout of new sites, network extensions, and modifications to existing sites. As these activities require precise knowledge of all active and passive components and configuration data within the mobile network, it’s important to use a mobile RAN management solution that keeps network planners up to date on available resources based on accurate as-is documentation.

Hybrid Resource Management

As virtualization advances, more and more networks have many VNFs, from multiple suppliers, that are executed on different NFVI platforms. To master virtualization challenges, service providers must document all virtual resources in one place, across supplier silos. From a resource and capacity perspective, all relevant information must be available for both operation and planning. A hybrid resource management solution can deliver the holistic, vendor-agnostic, technology-neutral information repository operators need to simplify planning and managing the growing virtualized environment.

Overall, how communication service providers, mobile network operators, and Internet service providers respond to the challenges of the rapidly changing business environment will determine their ability to remain competitive in a digital world. Operators must master today’s change drivers to give customers the competitive speeds and advanced digital services they want and to provide stakeholders with the profitability they expect.

Meeting these customer needs while generating revenue and increasing productivity in a digitally transforming world requires a modern and future-proof ICT infrastructure. Upgrading network infrastructure is the key to deploying the new technologies required for the digital future. Legacy OSS/BSS simply cannot handle these requirements.

While networks undergo this transformation in technology and architecture to keep pace with market trends, normal business operations must be maintained and high-quality services must continue to be delivered. Reliable service assurance, planning and engineering, and service fulfillment processes are essential for delivering services that meet SLA requirements and keeping OPEX under control. All of these processes are reliant on up-to-date resource information.

Unified resource management can help CSPs, MNOs, and ISPs convert opportunities into revenue by not only supporting existing networks but also networks of the future. Documenting the enormous amount of asset information throughout networks within a central repository is the key to gaining a clear understanding of utilization, capacities, and statuses for more efficient planning, service assurance, and fulfillment processes. With a holistic view of assets and an accurate, up-to-date inventory of all physical, logical, and virtual network resources, providers will be able to make confident decisions for planning, building, and deploying new services and capitalizing on new business opportunities.