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Supporting a Gigabit Society with Unified Resource Management

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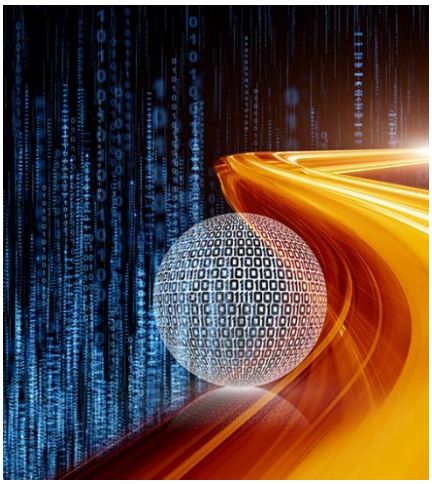

Emerging trends and technologies are disrupting the telecommunications industry and impacting all areas of business. Communication service providers (CSPs) must keep pace with mobile 5G rollouts, IoT devices, and sensors needed for new business applications, smart cities, and Industry 4.0 use cases—all while continuously delivering uninterrupted, high-quality services fast enough to meet the requirements of today's gigabit society.

How can service providers successfully adapt to changing market dynamics, support these disruptive technologies, and stay ahead of the competition? A critical cornerstone for success lies in how they manage their infrastructure.

To keep pace with this data volume surge, CSPs need to roll out more fiber for B2B and B2C market segments as well as additional fiber connections to mobile sites. This needs to be done in combination with the introduction of new technologies, virtualizations and cloud applications requested by today's gigabit society. Consequently, CSPs need to operate a hybrid network infrastructure based on a mix of physical, logical, and virtual resources, and passive inside and outside plant infrastructure provided by many different suppliers.

While hybrid infrastructures offer service providers more possibilities and greater agility than traditional infrastructures, they also increase complexity. This is due to different telco technologies that are now merged with IT and data center techniques, in combination with resources provided through partner ecosystems, for instance based on cloud models. All these different resources and dependencies between the individual infrastructure elements need to be managed properly throughout the entire lifecycle.

The three most common challenges that arise when managing hybrid infrastructures are outdated inventory management systems, poor data quality, and a lack of visibility throughout the network.

Outdated inventory tools

Many of the infrastructure documentation and resource inventory systems in use today are based on legacy database implementations, spreadsheets, and operations dashboards that can only answer questions about the individual infrastructure domains for which they were originally designed. These tools simply do not have the capabilities to deliver a transparent and holistic view of the entire infrastructure, which is precisely what is required to manage a modern hybrid digital infrastructure. Legacy inventory and resource management tools typically fail because they are not able to provide the required level of flexibility and configurability to support the introduction of new technologies such as 5G or IoT, or the use of new virtualized or cloud-based resources and IT techniques. A new resource management solution for hybrid infrastructure management is needed to support today's requirements.

Poor data quality

CSPs typically use a range of vendor and technology specific management systems to operate their multi-vendor, multi-technology network infrastructure. When several database tools and spreadsheets are used for inventory management, there is usually no data reconciliation between the network and the different management systems. Although inventory synchronization has been under discussion for decades, most inventory systems today are still not synchronized with the network, or are only partially so, which leads to inconsistent information and poor data quality. This in turn creates delays, errors, costly reworking, and ultimately, profit loss.

Lack of visibility

It's difficult to determine which services will be impacted by changes made within the network without full transparency across all passive cable and active network hierarchies and dependencies. CSPs usually still have separate inventories of active network and passive cable infrastructure for historical reasons, but for the required orchestration and automation of today's use cases, operational needs and design, planning, rollout or network transformation requirements, these siloed inventory approaches are no longer viable.

Without accurate as-is documentation, extensions cannot be planned properly, which can lead to errors and manual reworks. The same applies in case of failures or outages in the network. Without full transparency across all hierarchies and dependencies, it is not possible to determine immediately the impacted services and customers. Therefore, implementing a new inventory management system is necessary, one that can consolidate the different legacy tools into one hybrid infrastructure data model and provide a holistic, end-to-end view across all dependencies.

Choosing the right infrastructure management solution

To overcome these challenges and successfully meet the changing requirements of the digital world, CSPs must utilize a comprehensive database of all assets, resources, connections, and dependencies to feed their planning, operations, and service assurance and fulfillment processes.

A unified resource management solution across the hybrid infrastructure network will provide greater visibility into digital infrastructure, eliminate data silos, and improve data quality throughout the organization. Ideally, CSPs should look for a management solution with an open architecture and standard interfaces to expose data to other systems. The following features and capabilities are key success factors to look for.

Real-time inventory

An accurate and up-to-date inventory of all physical, logical, and virtual network and service resources will improve the utilization of all network resources and enable CSPs to make confident decisions about how to plan, build, deploy and manage the business. High-performance data reconciliation and delta calculation mechanisms are required to synchronize with the network to keep data accurate.

Process integration

As-is documentation of network resources and the planning of changes, transformations, and rollouts must be closely linked and integrated. This requires that planning data is always based on as-is data and that workflow integration manages the relevant processes and ensures that status changes in the planning process are directly reflected in the as-is documentation for the next planning iteration.

Geographical mapping

GIS capabilities can improve operational efficiency and add location intelligence to the different use cases.

Data sharing

A unified resource management solution must provide this data to all other relevant IT and OSS systems, which need specific parts for the different operational use cases. Therefore the solution should feature an open architecture, with standard interfaces to expose data to other systems, and be adaptable to fit unique scenarios and environments.

Comprehensive reporting

Real-time reporting and dashboarding are needed to ensure all legal and compliance regulations are met, to support capacity management use cases, and to provide comprehensive reporting for all relevant fulfillment and assurance use cases.

As communication service providers upgrade and transform networks, roll out new technologies such as 5G, and lay new fiber to keep pace with digital transformation, full transparency into all network resources with all the dependencies across all hierarchies is business critical. A fully integrated GIS tool can provide the expanded functionality CSPs need. The combination of location intelligence with network infrastructure details will enable smarter decisions about network capacity and resiliency, improve network design and planning, and support many other use cases to ensure that networks are optimized to handle the demands of the digital world.

To significantly minimize errors and manual reworks, it's important to use accurate as-is documentation to automate processes such as design, planning, and rollout phases. This entails creating work orders based on planning protocols, assigning work orders to field service teams or partners, tracking execution, and receiving documentation updates. Automating connectivity management by setting up auto-routing on physical and logical layers, including validation rules provided by the system, will also make a significant contribution to this.

To optimize service assurance and reduce mean time to repair (MTTR), immediate impact analysis is crucial to provide all necessary information about the services and customers affected by a technical failure or service interruption. The vendor-agnostic data model spanning all passive and active physical, logical and virtual resources across all technologies is a mandatory prerequisite for this. End-to-end signal tracing, visual analytics, and flexible integrations with other systems are also important characteristics of a future-proof solution.

Steps to successfully execute your digital strategy

Create a digital twin of the network

To facilitate network transformations, IoT deployments and 5G rollouts or to automate any operational use cases, the entire network—or even parts of it such as sites, towers, POPs, network elements, physical and logical connections and services, virtualized resources, and configuration parameters—can be replicated as a digital twin to address the increased complexity that these changes will bring. As a closed loop principle is integral for high data consistency and optimized operational processes, changes to the network can be planned first with the digital twin, then executed in the network, and finally verified against the digital twin through data reconciliation.

Streamlining operations, service assurance, design, planning, capacity management, orchestration, and service fulfillment can also be difficult due to the disparate nature of a hybrid network infrastructure. A digital twin can assist in all these areas by providing complex coordination and tracking. In particular, it can replicate and visualize the hybrid network infrastructure as a geo-referenced or schematic representation that shows all relevant infrastructure and resource details about used and available capacities, as well as dependencies and relationships between the resources across the technologies and vendors.

Employ the delta migration methodology

To prevent operational damage and business impacts, a zero-downtime data migration and smooth go-live of the new system is essential. Utilizing the delta migration methodology, the new system will run concurrently with the existing system, and only the delta between the existing and new solution will be migrated at each migration run. This is done by comparing the full data between the source and destination platforms but only creating and changing data that are new or different. As the two databases are synchronized, the risk of downtime is eliminated.

Because the read-and-compare operation works more efficiently than the create operation, smaller and faster data transfers and migration cycles can now occur to enable the continual adaptation of migration rules. When the migration quality reaches the required level, the old system can simply be switched off and users can proceed with using the data in the new system. A zero-downtime migration will have been achieved.

Structure documentation and planning

To gain full transparency across all resources and associated business information, structured documentation and planning is needed. The ideal solution will integrate the management of outside and inside plant cable infrastructure with the physical and logical resources of telecommunication transport networks to improve the efficiency and quality of all planning and engineering activities.

All services being offered, and the physical, logical, and virtual assets and resources required to deliver them, should be documented and managed within a central data repository that is easily accessible to users anywhere in the organization. This will create a solid foundation for all planning and network transformation and rollout activities, which must be closely linked and integrated with the as-is documentation.

Automation drives the operational shift. A unified resource management solution across the hybrid network infrastructure is a major cornerstone for any kind of resource and configuration management automation.