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Telco Digital Transformation for Cell Site Management:
GROWTH DRIVERS FOR 5G

NEED FOR TELCO DIGITAL TRANSFORMATION
Overcoming Challenges & Limitations

Telco operations for tier-1 operators have been inherently complex from standpoint of running the business and managing the network. The ramifications on capex, opex and customer experience are significant if these aspects are not well controlled. Large telcos that typically have nationwide service offerings leverage software solutions to streamline and address various facets of operations management.

This present mode has several challenges that does not allow operators to adapt to changing demands of the business environment and its dynamics. We mention some of the limitations for operators to continue with the traditional ways in the changing landscape:

- High-licensing cost of 3rd party software solutions
- Complex network assurance methods
- Non-unified view of countrywide operations
- Dealing with multiple, multi-vendor software solutions
- Inefficient supply chain
- Lack of insights in financial operations, budgets, and expenditures

Cell site management is a critical element of telco operations. Advent of 5G is triggering exponential growth of cell sites with an aim to provide ubiquitous Internet connectivity backed by access technologies such as small cells, macro cells, mm Wave devices and Wi-Fi. These are supported by data centres hosting core IP infrastructure such as routers, switches, mobile gateways & optical devices to upload and download data from application servers. Operators are now looking at an unprecedented scale of infrastructure. 5G is also coming along with set of new business use cases – low latency communication (edge computing), IIOT, next-gen gaming, private mobile networks and many more. Digital transformation will enable operators to cope up with this scale, improve internal efficiencies, meet customer expectations, enhance customer experiences, and keep the networks up running.

Digital transformation will help the operators with the following outcomes to succeed in business:

- Managing operations with unified software platform
- Rolling out faster cell sites and networks; have countrywide view of operations
- Leverage AI/ML for decision making; use predictive techniques for business and network operations forecast
- Increase network reliability; apply preventive & self-healing techniques for network failures
- Support e2e complex business workflows; automate business processes

With lens on cell site management, this whitepaper discusses various aspects of telco operations that can be managed with digital transformation software solutions to meet the above outcomes.

DIGITAL TRANSFORMATION FOR Cell Site Management

In this section, we cover digital transformation solutions for comprehensive cell site management. The solutions address various facets – network planning, finance budgeting, cell site construction and intelligent network operations. Together they help achieve the outcomes that telcos desire to meet the scale of 5G network rollout, keep the networks up running and eventually generate better RoI for their investments.

Insights Driven Network & Capacity Planning

Logistics planning software solution allow operators to improve workflow efficiency and streamline operations to launch new networks. This is very critical when operators are building data centres, hubs, and cell towers. A network and capacity planning tool aids operators to plan for network devices, NIC cards, servers, cabling, optical fibre, racks, etc. to realize the network. They can perform site level planning in different regions and markets and yet have a centralized view over the entire countrywide network planning. Once the networks are deployed, the solution analyses data streamed by the network continuously to assess the capacity and health of the network. Using AI/ML techniques the system generates recommendations for network upgrades. It analyses data coming in different formats such as logs, SNMP events, device counters to understand network utilization and with the help of closed loop automation lists the additional infrastructure needed to meet the network growth. The recommendations provided can be fine-tuned based on policies an operator has for each network location. The system is also integrated with procurement and purchase order software systems for end2end digitization of business workflows.

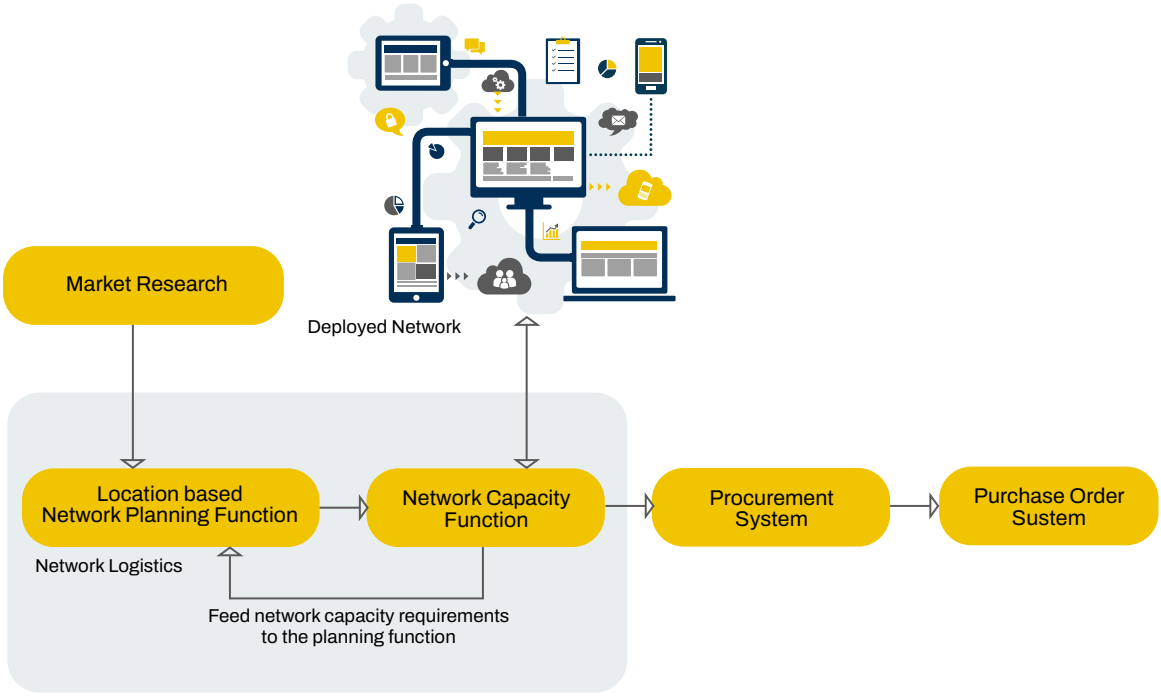

Figure 1: Digital transformation for network & capacity planning

Digital transformation also helps operators to strategically plan for business growth. Operators can make better decisions in expanding their networks if they have fine level insights on coverage of their services geographically. The picture below shows how operators can plot their service reach digitally to the granularity of the city street or a specific building. This understanding is vital in planning for new 5G cell sites, penetrate new markets and reach out to untapped customers. It helps operators to plan for better RoI and understand the gaps in demand and supply. The same can also be used to engage customers to help them understand availability of specific operator services in their areas.

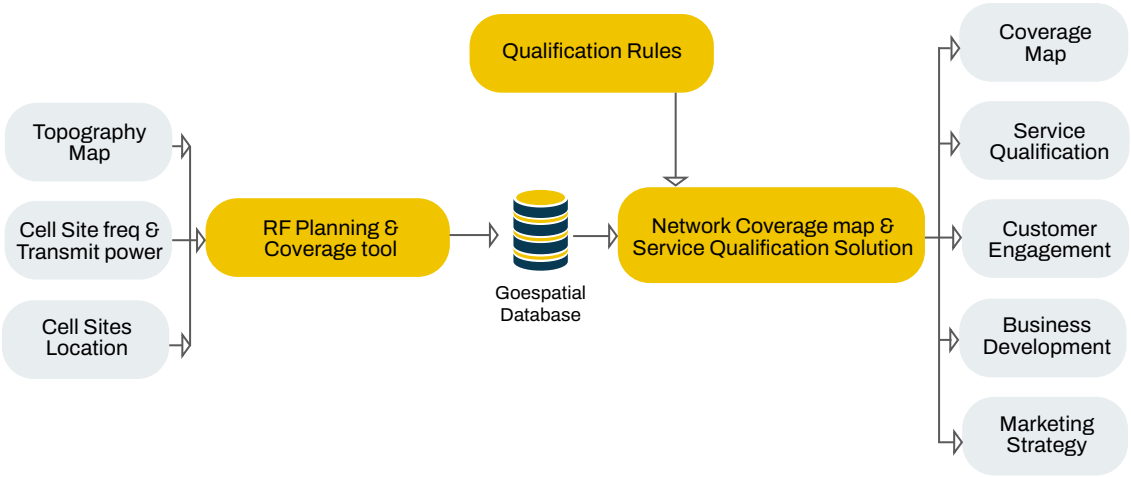

Figure 2: Understanding network coverage for business growth

An operator can feed existing cell sites location data, transmission power, frequency of each cell tower along with the topography map to 3rd party RF planning tool to generate geospatial data. This is used to plot wireless service coverage on a map which is then used to derive the above outcomes.

Unified Budget & Financial Planning

Unified budgeting and financial planning solution allows an operator to allocate budgets for different projects and track spending for the same. The solution serves nationwide operations and integrates with traditional ERP system for maintaining data integrity. In addition to raising and allocating budget requests, the tool also has capabilities for budget forecasting using machine learning models that help operators in financial planning. Extensive reporting to provide financial visibility and spending patterns at different levels in the organization is also supported. The solution also gives end-to-end visibility from raising budget request to allocation to actual spending. In-built governance model allows the operator to manage workflow for approval processes.

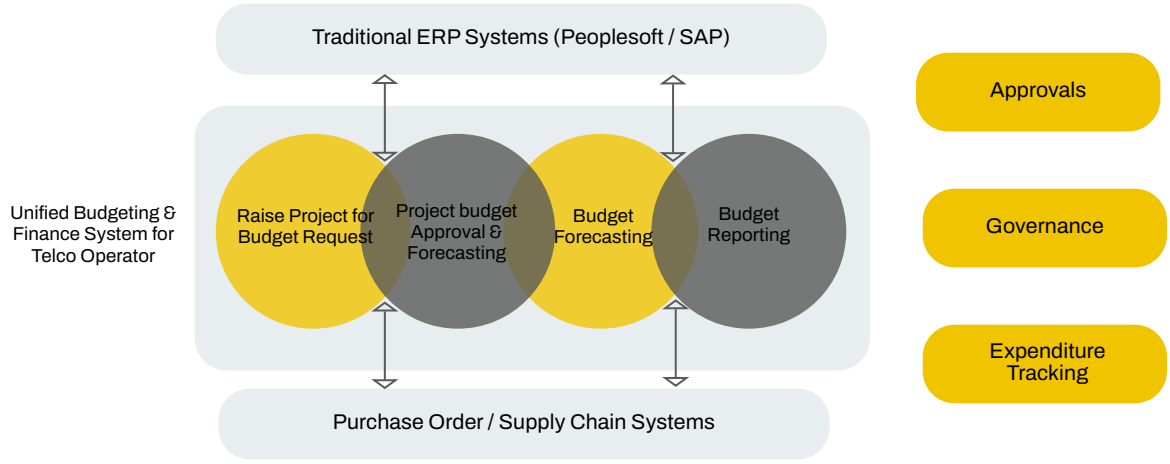

Figure 3: Digital Transformation for Financial Budgeting & Planning

A complete overview on budget allocation and cash-in-hand for all the projects enables operator to shift funds from one project to another that needs funds thereby bringing in operational efficiency.

Integrated Cell Site Engineering

Constructing cell sites is an extremely involving process not just from a construction standpoint but also from managing business workflows concerning government regulations, environmental clearances, equipment supply chain, real estate, procurements, and purchase orders to mention a few. Clearly, with involvement of so many functions the roll out process can drag too long with lack of proper coordination, insights, and activity tracking. Also, given the breadth of operations, operators require tools to analyse data that aid in decision making on multiple fronts. A digital transformation solution for cell site construction management solution is needed to address these aspects.

Figure 4: Core functions in Cell Site Construction Management

A cell site construction management solution comprehensively supports end-2-end workflows - from defining a cell site in the system to all the way making it live to process mobile subscriber traffic. Cell site construction activity is typically divided into multiple projects and each project has several milestones associated with it. The diagram below showcases some of the core functions in cell site construction activity. We will also explain how some of these functions are managed.

1 Equipment Purchase & Reservation

There is considerable amount of equipment purchase involved in setting up cell sites – routers, switches, cables, power supply modules, fibre, servers, antennas, etc. These are procured and stored in warehouses and depending upon the requirement shipped to different site locations. Reservation for equipment is done by site owners/engineers. The complete warehouse operations, equipment reservation and shipping process leads to massive savings to tune of 100s of millions of dollars by leveraging digital transformation systems. In fact, operators have managed to consolidate the number of warehouses they need to support country wide operations with the help of such platform. Additionally, operators can ensure equipment procurement is done from the right vendors providing best pricing options and enforce use of equipment in existing inventory before allowing to place purchase orders for new. The system also allows for bulk procurement of an equipment that is needed at multiple sites, allowing the operator to negotiate effectively with vendors. Any reserved equipment that lies unused can be returned to the pool so that it can be reserved for use at another site. With visualization dashboards, operator can trace how cost savings are being achieved with the system and get insights on causes for it (e.g., vendors involved, internal staff, etc.).

2 Real Estate

Real estate forms a big chunk of cell site management operations. Aspects such as contract management & approvals, rental receivables and payables, sublease of towers to other operators can be done with the help of cell site management solution. Typically, there is governance involved in the approval process that can be managed through this system. Legal attorneys are provided access to this function and other 3rd party software systems such as contract management systems can also be integrated. It is possible to maintain different versions of the contract and enforce financial terms related to annual lease increments mentioned in the contract. Contract templates are supported that can be customized based on each cell site. Given the scale of cell sites that need to be managed, the system also permits managing contracts in bulk.

3 Cell Sites Transport Connectivity

Network connectivity between cell sites belonging to the same or different operators can be planned and managed through digital transformation system. The process of network design, layout, deployment, and activation can be tracked through cell site transport connectivity subsystem – one of the functions of cell site management solution. Multiple parties are involved in use of this transport planning - network design and field engineers. This function can also interface with other 3rd party software systems to manage the business workflow between two operators. It also serves as a single source of truth for transport connectivity status and tracks various milestones toward its realization.

4 Environmental Clearances

To avail environmental and pollution control clearances, operators need to adhere to several compliances which can be managed and tracked with the help of cell site management solution.

5 Vendor Management

Operators are supported by an ecosystem of vendors that help them achieve their operational goals. These vendors could be responsible for constructing cell sites, laying down networks, creating fibre connectivity, managing networks or handling customer support requests. Typically, they are registered with the operators and are awarded contracts based on their expertise, performance, cost, and other factors. Using data analytics, digital transformation solution can help to choose the right vendor for awarding contracts. It allows for data-driven decisions and facilitates an automated & formal process for vendor selection removing personal biases and arbitrary judgements. A vendor score ranking system considers multiple parameters towards rating vendors:

- Past work completion timelines
- Project complexity
- Dependencies on other vendors
- Time deviations in milestone completions
- Cost charged by vendor in past

Using weighted formula and AI/ML algorithms, the system shows a ranked list of vendors for awarding a contract. Any decision that deviates from the recommendation is flagged to infuse transparency in decision making within the organization.

6 Others

While the list of milestones to construct a cell site is long, enlisted below are a few additional that the solution can support towards completion of cell site operations:

- Government approvals
- Structural milestones
- Power Utility milestone
- eNodeB configuration
- E911 milestone
- Call sign approval
- Closeout documents

Intelligent Network Operations

Traditionally, network engineers have been dealing with multiple software systems to manage network operations. For a tier-1 operator, we have seen operators dealing with 15 or more software systems just for network operations. To add to the complexity, different markets and territories have their own solutions – so there is lack of unified view of country wide network situation. Digital transformation allows centralized management of networks by unifying the operations under a single platform and helps operators to move away from a 'siloed' model to having a consistent view of country wide operations. The solution can also integrate with 3rd-party systems as it is not always possible to redevelop or customize every tool for purpose of integrated operations. Following are the core functions of an integrated operations management system:

Figure 5: Intelligent Integrated Operations

- Monitoring Radio Access Network (RAN) through dashboards; essentially track eNodeB KPIs for real time status.
- Perform automated health check-ups of eNodeBs.
- Manage alarms & events from various network devices & services centrally.
- Track physical operations at cell sites remotely. Prioritize various tasks & activities.
- Manage cell site activation to allow mobile subscriber voice and data traffic.
- Manage incident tickets for network and field operations

The above functions can be efficiently dealt leveraging data analytics and AI/ML techniques to meet the desired outcomes of digital transformation. We briefly describe below how network operations can be intelligently handled to drive forthcoming growth and scale of networks with 5G as the key driver essentially.

1 Real-time Data Transformation

Network devices and business support systems stream high-volume telemetry data in different formats such as syslog, SNMP events, XML, JSON, plain text and CSV. Digital transformation systems ingest this data in real-time and perform required transformations to feed to other software systems for real-time purposes such as network monitoring or analysing financial transactions. The data can also be fed to non-real time software systems that store it in data lakes. This data is then further analysed using AI/ML algorithms for different purposes such as forecasting spending patterns of customers or predicting additional inventory of network devices to meet network traffic demands.

2 Automated Ticket Assignment

Life cycle of incident tickets for network issues has been traditionally managed manually by support teams. The first level response team investigates the ticket and based on its content assigns it to relevant team or person to fix the issue. There are two issues with this approach – need for dedicated staff and time involved to manage the lifecycle of the incident. With the help of machine learning, digital transformation systems by analysing past tickets and network data can auto assign the ticket to the most appropriate handler thereby reducing the ticket handling time and team size to manage reported incidents.

3 Automated Diagnosis & Fixing of Network Issues

As networks grow chances of network failures increase. Network links can do down or remain congested, physical ports can fail, devices can perform poorly for several reasons (poor route configuration, high-cpu & memory utilization, NIC card failures, radio channel congestion and several more). Network engineers spend considerable amounts of their time troubleshooting these issues and fixing those many a time with configuration changes. Instead, digital transformation systems can be trained to auto-diagnose network issues by learning logs, network events and other KPIs and provide guided remedial actions to fix those. This helps network teams to fix issues much faster. With guided workflows to resolve issues, people with lesser network expertise can also handle network operations.

4 Maximizing Workforce Productivity

Telcos have a team of field engineers to manage cell sites tasks and handle network connectivity issues. Digital transformation solutions can be used to improve productivity of field workforce. Using data analytics and AI/ML techniques, operators can analyse past data on field tasks and create machine learning models to improve efficiency of their field operations. The machine learning models will benefit the operator in following ways:

- Estimate time to complete a field task and plan day-to-day activities of the field engineers
- Understand efficiency of an engineer and auto-assign tickets to the best-fit field engineer
- Plan for staffing needs based on the impending tasks and projects

This will lead to immense opex savings when operators will have to deal with 10s of thousands of cell sites.

BRILLIO CAPABILITIES IN Telco Digital Transformation

Brillio has stellar credentials in building digital transformation software solutions for tier-1 operators and OEMs in North America. With more than 15 years as a preferred vendor for top-notch Telcos, the company has provided comprehensive cell site management solutions covering aspects such as network planning, unified financial budgeting, cell tower construction, integrated operations, and customized IPs. Operators have witnessed significant advantages with these solutions leading to savings over 100s of millions of dollars annually along with streamlined operations. Data driven decision making, AI/ML techniques and automation are driving principles of these digital transformation systems. Led by a seasoned leadership and telco engineering talent, Brillio is enabling operators to meet the scale and demands of 5G networks. For more information, please reach out at info@brillio.com.

ABOUT US

At Brillio, our customers are at the heart of everything we do. We were founded on the philosophy that to be great at something, you need to be unreasonably focused. That's why we are relentless about delivering the technology-enabled solutions our customers need to thrive in today's digital economy. Simply put, we help our customers accelerate what matters to their business by leveraging our expertise in agile engineering to bring human-centric products to market at warp speed. Born in the digital age, we embrace the four superpowers of technology, enabling our customers to not only improve their current performance but to rethink their business in entirely new ways. Headquartered in Silicon Valley, Brillio has exceptional employees worldwide and is trusted by hundreds of Fortune 2000 organizations across the globe.

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