TATA COMMUNICATIONS
TRANSFORMATION SERVICES

TATA

# Rip & Replace
# Ensuring Efficient Decommissioning & Migration of Network Elements

White Paper

## Background

Several telecom service providers worldwide are replacing network elements because of the security concerns raised in the equipment of one Original Equipment Manufacturer (OEM). Take the case of the United States of America (USA), which has banned the use of products of some OEMs because intelligence agencies have highlighted a significant security risk of using these network elements for telecommunications purposes. Several other countries, including Australia and the United Kingdom, followed the US in banning the use of equipment of this OEM.

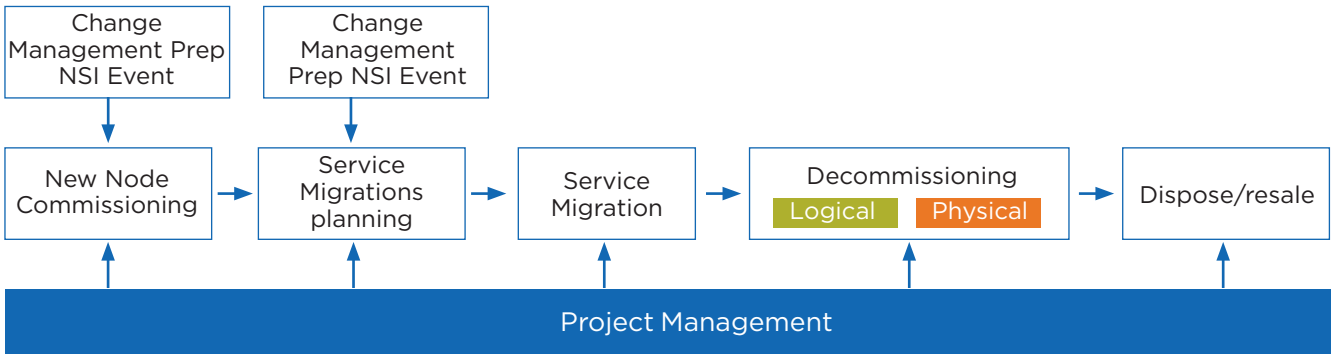
Telecom service providers across different geographies extensively deploy products of this particular OEM as it is known to offer cheaper rates and better payment terms. Considering that the telecommunications networks come under critical infrastructure, several countries have not only banned the purchase and use of products manufactured by this OEM but are working together to decommission the already deployed network elements. Last year, the US Government allocated $1.9 billion for the rip-and-replace program to compensate telecom service providers for removing gear that is considered risky for national security.

Decommissioning of already deployed equipment demands massive migration and ripping of network elements. The service providers will need to remove already deployed gear and replace it with more reliable and trusted equipment. Migration and decommissioning initiatives are not just expensive but can potentially impact the network uptime and customer experience.

It is then imperative for telecom service providers to have a well-planned strategy to ensure a seamless transition to the new gear without any impact on the network performance and customer experience. A partner with proven expertise in supporting service providers execute massive digital transformation projects can make the difference between the success and failure of their rip and replace strategy.

## Stages of Rip and Replace Programs

The rip and replace programs involve the following stages:




Let's go through the details of each block:

## Change Management Preparation for NSI and SI Events

Change management preparation is the first step in any rip-and-replace initiative and is vital for the seamless execution of the program.

Retiring nodes will be in the production network, hence, identifying the risk profile of the node is important. During this stage, a node should be assessed for:

- Traffic rerouting options
- Redundancy availability
- OOB (out of band) connectivity availability
- Customer segment mix – Premium Customers, Business Customers, SOHO Customers, Retail customers etc.
- Identifying SLA (Service Level Agreement) impacts on the existing customer base

As part of the first step of the initiative, a detailed and thorough assessment of the node undergoing service migration is performed. This assessment is used to determine the risks associated with the activity and helps in planning for the necessary mitigation actions. Upon assessment, the PE ticket is prepared and registers it in the system for review and approval from CAB (Change Advisory Board).

### Change Management

(Large OEM)

- Managing planned events projects

(Multiple Tier 1 Telcos)

- 31000+ planned events successfully for IPRAN, IP core, transport for 12+ years and continuing

(Global Tier 1 Telco)

- 35000+ planned events successfully for IP core, transport for 12+ years and continuing

(Global Tier 1 Telco)

- Managing PE process for IP, Transport, IPRAN and Wireless

TATA COMMUNICATIONS
TRANSFORMATION SERVICES

TATA

## New Node Installation and Commissioning

The service providers will need to deploy a new node before ripping off the existing one. This includes:

Field Activities:

1. Racking and stacking of new node
2. Power up – electrical terminations
3. Initial configuration and connectivity

Configuration and Testing Activities:Configure the node

4. Terminate network connectivity backhaul and fronthaul
5. Establish redundancy and test
6. Configure services and perform testing
7. Commission the node
8. Document Records – Update inventory and upload logs, among others

The Configuration and Testing activities can be successfully executed from the back office at scale and consistency in the above activity list. There will be a component of field tech coordination during network termination and testing, which can be designed in a workflow.

It is critical to deploy a successful back-office node commissioning model to help scale and fast track network rollout.

### New Node Commissioning

(Large OEM)

- Node Installation and Commissioning for Transport and IP nodes

(Multiple Tier 1 Telcos)

- Commissioned 3000+ core routers 10000+ access routers and more

(Global Tier 1 Telco)

- Supporting a tier-1 service provider
- Commissioned 600+ OTN shelves and continuing

(Global Tier 1 Telco)

- Managing 47,000+ deployed network elements

TATA COMMUNICATIONS
TRANSFORMATION SERVICES

TATA

## Service Migration Planning

Service migration planning involves a detailed analysis of the source node and destination node and their readiness for planned activity events. The key tasks involved in service migration planning are:

- Perform Prechecks, including:
    - Analyze alarms of nodes to identify current issues and analyze the impact
    - Check Software/IOS/Firmware compatibility of the new node. In case of any discrepancy, update records and PE procedure document with proper notes and estimate additional efforts
    - Check OOB connectivity for both retiring and new nodes. Initiate a ticket and get it fixed on priority in case of any issue.
    - Check for partial service configurations through configuration review, and validate
- Capture detail and validate against risk profile as per change management ticket
- Check field tech/contractor scheduling and availability
- Prepare for unforeseen events and develop a mitigation plan

It is critical to perform thoroughly planned network and service migrations for customers.

### Migration

**(Tier 1 Telcos & Large OEMs)**

- Service migrations
- Optical Transport Network node migrations

**(Multiple tier 1 Telcos)**

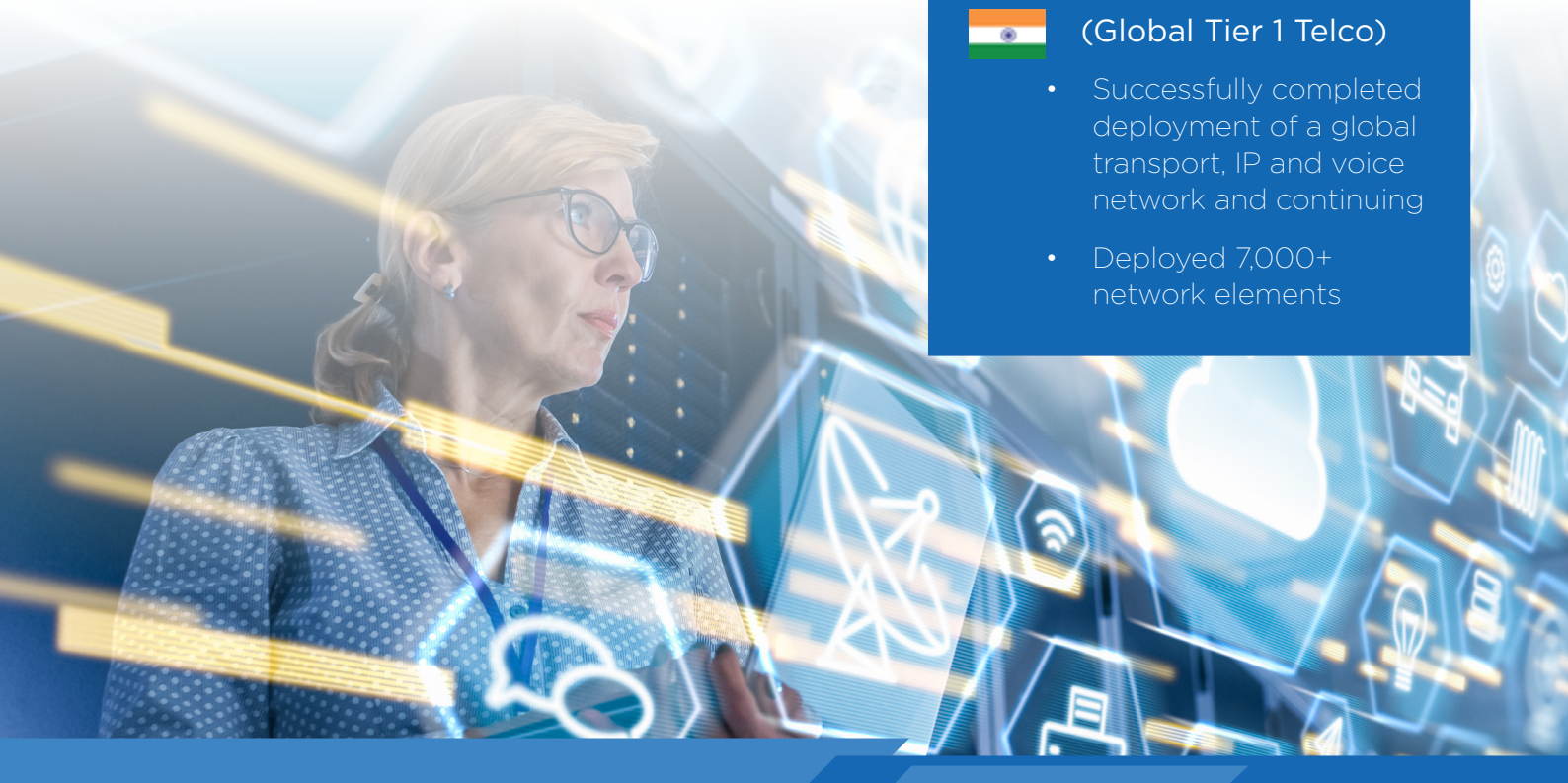
- 5000+ nodes migrated in 2 years
- 2M+ services and counting

**(Global Tier 1 Telco)**

- Avg of 125 migrations planned in a month
- 5000+ nodes migrated in 2 years for transport network
- 2M+ services and counting

**(Global Tier 1 Telco)**

- Successfully completed deployment of a global transport, IP and voice network and continuing
- Deployed 7,000+ network elements



## Service Migrations

As part of the rip-and-replace initiative, telecom services providers will need to migrate existing services from a retiring node to a new node. However, service migration can potentially lead to network downtime, adversely impacting the service providers' reputation and revenue, so it needs to be governed by planned event procedures and governance.

The service partner As a trusted partner of the telecom service providers, TCTS follows field-proven procedures and best practices to ensure successful service migrations. Below are some recommended best practices for service migration activities:

- Tested and Validated MOPS: Methods of Procedure (MOPs) are key to successful service migrations. Based on our years of experience, TCTS has formulated robust and field-proven MOPs to ensure seamless execution of the rip and replace strategy:
  - Running prechecks a day before the scheduled migration: It is important to run prechecks a day prior on source as well as destination nodes to validate the health of nodes for planned migration. Any identified discrepancy that may hinder the smooth service migrations is addressed during this time. Migration is rescheduled in case the identified problems cannot be fixed by the end of the day prior to the scheduled migration.
  - Node locking: Upon successful prechecks, it is highly recommended to lock the node for any configuration changes, including new service provisioning and de-provisioning, such as disconnections. As a standard practice, no software/firmware upgrades are allowed till the successful completion of service migration.
  - Final prechecks before service migrations: This activity is undertaken just before the planned event starts. This ensures that the node is ready for service migration. Below are some activities for final prechecks:
    - OOB connectivity testing to ensure the functionality
    - Accessibility of node from EMS, latency, and stability to EMS
    - Upstream link stability – IGP and EGP stability, link errors and stability
    - Redundancy states of links, cards, ports, power supplies, and rings
    - Field tech availability, readiness, and ETA to reach on-site
      - Essential availability – Power meter, fiber cleaners and tool kit, among others.
      - Ensuring spares availability with field tech (extra patch cords, connectors, power cords in case required)
    - NOC engineer availability
    - On-call support engineer availability
    - OEM desk hotline and shift engineer availability

- Controlled service migration: Upon successful prechecks, the migration engineer starts the event, informs all key stakeholders, and executes the migration procedure as per MOP. Each command response of the node must be captured in logs right from start to end and must be stored in a central repository for other stakeholders to review. During, execution, migration engineers release critical milestone completion updates to stakeholders to ensure effective execution of the migration process.
- Mature exception handling framework development: Handling exceptions during the service migration window is a critical task. If the migration team faces any unforeseen issues, they must decide to back out of the event and initiate a rollback sequence at the right time. During this time, the migration team must capture the logs of incidents and store them for future reference. These logs can also be used to perform RCA and strengthen processes for future migrations. The migration team must then develop a logical and risk assessment based backout matrix.
- Inventory updates: Ensuring inventory updates to avoid discrepancies is a critical step in the entire process flow. If inventory updates are automatically scheduled, then ensuring that updates are running as per plan is crucial.
- Automating service migrations using open source-based technologies: Service providers can help develop lightweight custom automation scripts using open source-based technologies to migrate services from source node to destination node. Nowadays, most EMSs have scripting features, however, they don't support multi-vendor scenarios. This is mainly because system architectures and command syntax are different for equipment manufactured by two different OEMs.

  There are off-the-shelf tools available to automate migration processes, however, such tools come with significantly higher license costs. Hence custom develop scripting using open-source technologies is recommended where these customer automation services are inbuilt into solutions. These are almost guaranteed to work and provide the advantage of customers owning the scrips since they are designed keeping their unique requirements in mind.

# Decommissioning – Logical

After successful service migration to the new node and completion of the stability period, the source can be decommissioned. While typically this is not likely to impact the service, it still needs to be governed through the change management process as a threat activity.

Before decommissioning the node, specific details of the node need to be captured and stored. Below are the recommended practices for the same:

- Capturing the serial number of each card, chassis, power supply of node
- Capturing firmware and software versions in the cards and nodes flashcards
- Configuring node configuration for the repository
- Running and capturing technical stats
- Bill of quantity capturev

Logical decommissioning can be initiated upon successfully capturing the relevant information for future purposes. It includes:

1. Wiping out all configuration of node and cleansing it
2. Resetting node to factory defaults
3. Running bit-wiping on all flashcards. This process is also known as zero fill.
4. Removing node records from inventory systems, a node can be suspended for some period in NMS/EMS and later it can be permanently deleted. Timelines of the process are usually dependent on the service providers' processes and practices.

## Decommissioning

### (Large OEM)

- Optical Transport Network node decommissioning

### (Multiple tier 1 Telcos)

- 2700+ IP network elements
- 250+ Core routers
- 500+ access routers and switches decommissioned successfully

### (Global Tier 1 Telco)

- 350+ Network sites decommissioned successfully for a tier-1 service provider and continuing

### (Global Tier 1 Telco)

- Successfully decommissioned 1500+ network elements for a large consolidation project

## Decommissioning - Physical

This step demands coordination for onsite decommissioning, removal, and disposal of assets from a service provider's network. The TCTS approach includes the following tasks:

1. Provide a checklist to the service provider before the technician's attendance at the sites, to ensure they have time to familiarize themselves with the requirements.
2. Review the asset decommissioning and removal list, completed in advance by the service provider
3. Identify any gaps and any asset clarification by the service provider, including noting potential discrepancies between customer location specifications and the completed checklist.
4. Perform decommissioning at the service provider's site.
    a. Power down and disconnect equipment from the network.
    b. Disconnect associated equipment cables from equipment.
    c. Work with the appropriate Network Operations Center (NOC) or equipment provider
5. Perform disposal of assets.
    a. Pick devices from the site.
    b. Wipe data from the devices.
    c. Sustainable disposal of devices.
6. Provide the Certification of Completion to the service provider for review and approval in accordance with the Review and Approval Process.

## Ensuring Sustainable Disposable

Network element disposal and repurposing is a crucial task before the completion of the rip-and-replace initiative. There are several ways to repurpose existing routers and switches. In case, the router is not allowed to be reused by the regulations, it can be auctioned to qualified suppliers. Typically, the suppliers acquire the devices from telecom service providers and resale/repurpose them in other emerging markets where they can legally be used.

It is critical to have appropriate processes and partners to ensure proper disposal and repurposing of the devices. Experienced operators provide flexibility across varied models to ensure the disposal and repurpose of the removed gear. Typically, it involves the following activities:

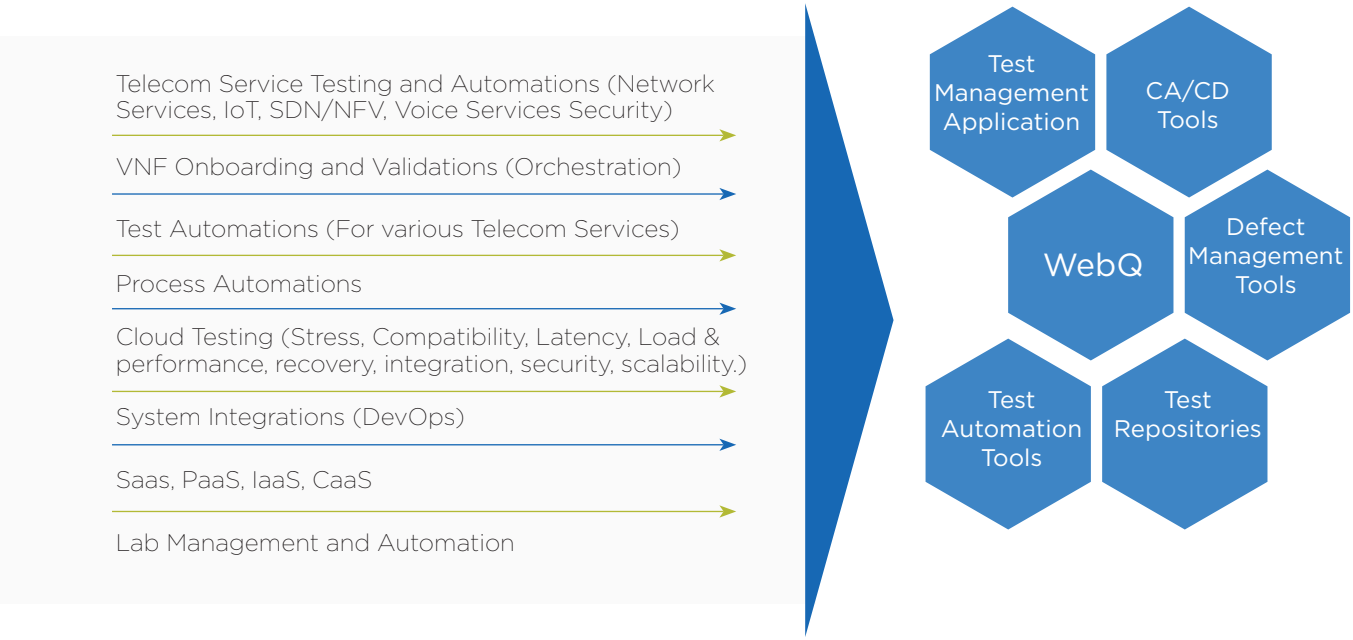
- Inventory review – determine useable equipment vs. disposable equipment
- Electrical DC/AC power connections removal
- Cable removal and cable mining– external cables and intra-equipment cables
- Circuit pack removal and packing
- Frame removal and packing
- Support and overhead structure removal
- HVAC removal
- Labeling of material – both materials to keep and dispose
- Building restoration, including patching holes in floor and walls, replacement of ceiling tiles
- Shipment of material to retain into inventory
- Proper handling of any hazardous material
- Proper handling of any storage data devices – including proper destroying of media
- Shipment of disposable material to the scrapper
- Close out documentation for Customer
- Sign-off by site personnel

## Other Best Practices

### 1. Automation

Automation has a critical role in delivering a seamless migration and transformation experience by helping telecom service providers custom automate network device configuration and testing. It allows telecom service providers to import ready scripts and orchestrate their execution on the network enabling massive-scale deployments. This should also integrate with CI/CD tools to test and automate Operations Support Systems (OSS), EMS and Network Management System (NMS) tasks.

On similar lines TCTS has developed WebQ platform which can be integrated into the solution to fast-track any network commissioning, service provisioning, service migration, network decommissioning, network testing and validation activities.




The following python scripts can be quickly deployed:

| New Network Roll out: | New Network Roll out: |
|---|---|
| • BoQ capture script<br>• Software Upgrade script<br>• Golden Configuration script (CSP's golden config can be pushed)<br>• Service Provisioning<br>• Node Health and Network testing, Validations, and reports | • Service type identification and report from node<br>• Service states capture before migration<br>• Service swing - with syntax translation<br>• Service Testing, Validation, and status report<br>• Before and after service state comparison analysis |

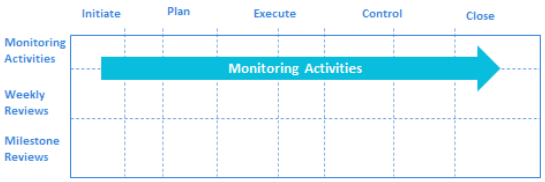
## 2. Leveraging Experts

The team should comprise of experts with extensive experience in efficiently delivering complex telecommunication projects. Project managers should be geared to work around the constraints and develop a strategy in line with the customer's network strategy to deliver exceptional value.

| Genesis & Limber | isomerize | Evolve |
|---|---|---|

**Key Objectives:**

- Establish the Program Office
- Define Engagement Management
- Engage Key Program Stakeholders
- Draft Program project plan
- Identify and map Resources
- Identify risks and challenges





Periodically Validate Program progress


Continual Stakeholder Engagement and Feedback


Activity Reviews


Quality and Risk Framework

**Key Objectives:**

- Closure of Pending Risk/ Ope Items
- Quality Assessment
- Completion notification to key stakeholders
- Knowledge Tranfer
- Final Handover
- Document lessons learns

### People & proces

- Clearly identified roles and resposibilities
- Well defined process for E-2-E project management
- Use of tollgates and milestones

### Tools used

- MS Projects
- Project manager
- Clarizen

### Skill set

- PMP certification
- Telecom Domain knowledge / Experience

### KPIs monitored

- On time delivery
- Adherence to international standards / Quality control practies
- CAPEX monitoring / optimization

## Project management practices:

The team must comprise of engineers who coordinate with customers to understand,

a. High-level network architecture
b. MOP for Hardware Migration
c. Understand standard configuration templates (for making devices remotely reachable)
d. Product information
e. Technical documents
f. Coordinate with the field team, vendors, and end customers
g. Provide any remote Level 1 hardware replacement support.

### Project Management

a. Develop a detailed project plan with the customer for the scope
b. Weekly, monthly migration schedule along with the customer
c. Derive the project implementation
d. Track project SLAs and timelines
e. Resolve issues on-site related to the scope.
f. Weekly, monthly, quarterly Governance.
g. Reports and dashboards.

### 3. Proven OEM Expertise

The rip and replace program focusses on decommissioning of vulnerable OEM equipment from the network and replacing them with trusted gear. The vulnerable equipment is deployed at different layers of telecom operators' networks such as transport, IP, and mobility. All these technologies carry consumer data making it imperative for the service providers to fast-track the decommissioning to sanitize the network.

It is critical to have experience and expert resources working on all alternate OEM equipment. The service providers must leverage this capability to ensure seamless and agile migrations from vulnerable to trusted telecom equipment. The experts should be either certified by OEMs or come with extensive hands-on experience in working on the equipment. This enables to shorten the learning curve thus accelerating the execution of the migration initiative.

## In Conclusion

Rip and replace is a complex project which consists of various stages to free the network of vulnerable elements and replace them with equipment from trusted sources. Since there is a possible impact on services, telecom service providers must work with a partner with proven expertise and strong hands-on experience in executing similar projects. This will ensure a shorter learning curve and thus faster execution without any negative impact on the network uptime and customer experience.

## References

1. Joe Biden signs law to ban Huawei, ZTE from doing business in US,
   12 Nov 2021, Business Standard

2. Huawei and ZTE handed 5G network ban in Australia,
   23 Aug 2018, BBC News

3. Huawei ban: UK to impose early end to use of new 5G kit,
   30 Nov 2018, BBC News

4. FCC finalizes program to rip and replace Huawei, ZTE telecom equipment in the U.S.,
   Lauren Feiner & Amanda Macias, 13 Jul 2021, CNBC

TATA COMMUNICATIONS
TRANSFORMATION SERVICES

## About Author

Amod Kavathekar
Regional Director – Solutions Engineering

Amod is digital transformation professional and design thinker. Amod has over 22 years of experience in working with leading telecom service providers globally. He has planned, deployed, and managed complex telecom networks for tier 1 telcos and has experience in network operations & management, technology migrations, planning & engineering, and network deployment. On Next-Gen technologies, Amod is a virtualization expert and multivendor certified professional on SD-WAN. He holds a Bachelor's degree in IT Business Management and Engineering diploma in Electronics.

## About Tata Communications Transformation Services (TCTS)

Tata Communications Transformation Services (TCTS), a 100% subsidiary of Tata Communications Ltd, provides leading business transformation, managed network operations, network outsourcing and consultancy services to telecommunication companies around the world. TCTS delivers operational efficiency, cost transformation and revenue acceleration solutions for all the stages of the carrier process lifecycle including but not limited to network engineering and design, optimization, implementation, and operations. TCTS planned, designed, and deployed the world's largest LoRA WAN IoT (Internet of Things) network and is running successfully.

TCTS is a part of the Tata group which comprises of over 100 operating companies in seven business sectors. TCTS leverages the market expertise of Tata group's global telecom operation capabilities and globally established IT, process and consulting skills. It carries the rich traditions and business ethics of the Tata companies.

TCTS is headquartered in Mumbai, India with global offices in Europe, North America and the Middle East. TCTS offers a flexible delivery model and has two world-class India delivery centres in Pune and Chennai. These facilities operate entirely independent from its parent affiliate, preserving full confidentiality in managing all customers' business processes. For more details on TCTS and how we can help your company build, operate and transform, please contact us at tcts.contactus@tatacommunications.com or visit www.tatacommunications-ts.com To hear more from TCTS experts, join us on LinkedIn and follow us on Twitter

Email us
tcts.marketing@tatacommunications.com