Network Provisioning:
Multi-Vendor Activation

A Cortex Intelligent Automation White Paper
Executive Summary

In today’s economic climate, communication services providers (CSPs) need to be more competitive and agile than ever before just to survive; to flourish, they must deliver a healthy return on shareholder investment at an acceptable level of risk. This means they need to reduce their time to market and become ever more efficient, delivering greater productivity for less cost, whilst controlling and minimising business risk. To achieve this, their internal processes must be easily adaptable, executed faster with greater precision and guarantee accuracy to reduce risk. Flexible business process automation that orchestrates the interworking of different, and often diverse, business and technology applications is the solution approach to delivering improved business operational performance.

Whether through mergers and acquisitions, new service introduction, or just organic network evolution, most - if not all - CSPs today operate heterogeneous networks, comprising a sometimes large variety of network equipment (NE) provided by differing NE vendors.

New customer services often require configuration of NE devices from different vendors, and traditionally, this has been achieved by configuring directly each NE device or using vendor-specific Element Management Systems (EMS) or Network Management Systems (NMS), via a vendor-specific Command Line Interface (CLI) or Graphical User Interface (GUI). Service provisioning teams are faced with a plethora of different CLIs and GUIs that they must use to configure multi-vendor services, increasing the cost of training, the time to complete (because of the need to ‘context switch’ between the different vendor environments), and the likelihood of error.

The need to record data about the ‘interface’ between different vendor equipment often causes users to start using spreadsheets to configure and reconcile system-wide network parameters. This spreadsheet driven approach leads to human error and decreases productivity.

The Cortex Intelligent Automation platform enables agile, incremental automation of multi-vendor activation processes, delivering to the CSP step-change improvements in operations velocity, capacity, accuracy, quality and cost.

“The digital revolution creates both significant opportunities and threats. At the same time, commoditization and digitalization of connectivity services have created an urgency to dramatically simplify and transform the efficiency of the existing business.”

TM Forum, Digital Maturity 2019
Problem Statement

Communication Service Providers are evolving complex multi-vendor networks to provide new services for 3G/4G/5G mobile, data, TV, fixed line and Unified Communications. The many disparate systems that require complex rules and knowledge to operate result in unreliable, intricate and lengthy configuration using many vendor-specific tools and an in-house favourite collection of spreadsheets which are often neither formally managed nor adequately maintained.

Network Operation Centre (NOC) / Service Operation Centre (SOC) staff are confronted with a multitude of data sources and information to provision services, often needing to manually configure multiple disparate vendor platforms to activate end-to-end services.

Frequently, the process:

- Is intensely manual
- Draws on inconsistent data sources
- Permits subjective and inconsistent application of business policies and rules
- Involves error prone “swivel chair” access to multiple systems
- Requires data conversion to meet each individual vendor’s specific needs
- Results in high error rates necessitating additional rework (typically, manual typographic mistakes are the cause of circa 4% of all errors)
- Has longer execution times than customer expectations
- Is not easily adaptable to support new service types

During the service provisioning process, provisioning staff are often required to acquire, process and manage data from a range of data sources, including:

- CRM systems (e.g., to determine customer data such as market segment)
- OM systems which hold specifics on the service changes requested
- Billing systems, to verify customer entitlement to the requested services based on the current account balance
- Inventory systems, to verify the availability appropriate network resources (ports, channels, etc) to deliver the order
- Network devices, EMSs and NMSs, to confirm the specific current network configuration
- SM, PM and CM systems, to review current operational status of devices and services

Operations staff are often distrustful of the conflicting data and information they are presented with from these range of systems. This causes difficulties when provisioning customer-ordered services that cross multiple vendor networks (such as IP-VPN services where the access network and the core MPLS network are typically delivered over different types of equipment), and is particularly problematic when migrating en masse existing services from legacy equipment or technologies.
Solving the Challenge

There is an industry need for a Multi-Vendor Activation solution, capable of reconciling data from multiple disparate systems and configuring as necessary network equipment from many different vendors. Automation of activation processes assists operations staff by simplifying most of the complexity inherent in Multi-Vendor Activation. By removing both routine and complex process steps from the human workforce, it frees them for higher value activities. They can apply their deep technical knowledge and skills in developing brand new products, or in the design for complex customer services. Alternatively, they can perform a much higher number of automation governance activities such as reviewing and approving automation actions, and in doing so, they deliver a step change in the capacity and velocity of order processing.

Automation can consistently acquire, convert and apply configuration data as needed by the multiple systems. The source data can be quickly analysed for errors - invalid or missing data - and these can be automatically addressed by applying agreed business rules. This data can be quickly and reliably converted into the format required by the various target systems, reducing the possibility of errors that can arise when this is done manually. Automation also removes the need for the myriad of ad-hoc, locally managed and in all probability incorrect documents, spreadsheets, and other tools that users generate and evolve because of shortcomings in the applications that they use. Often, the need for these disappears completely because of the automation of the activation process.
Operating at the speed of the machine requires re-thinking current ways of working. For example, in a manual process, each person may be assigned unique access credentials for each device that they might configure; in less secure environments, all users may even share the same access credentials, whether by design, or through a slackening of policy adherence. Automation results in multiple concurrent accesses to the same NE, and each of these require unique access credentials. Many organisations are deploying a credential management solution to allow for the managed, temporary and auditable allocation of access credentials to automation tools. Each access to the network element results in the automation tool requesting a temporary allocation of access credentials - different from those allocated more permanently to operations staff - which are typically valid for between 10 and 30 minutes. This helps prevent unauthorised access to each network element, maintaining the security and integrity of the network as a whole.

Prior to applying new configuration to network equipment, automation can perform verification that the NE’s current configuration is in an appropriate state that makes sense for the target configuration. For example, it can prevent configuration of a dedicated customer port if that port is already in-use on the equipment; this avoids unexpected changes to the network which can have a significant, adverse impact upon existing customer services. Alternatively, it can confirm that a referenced QoS Ingress policy exists on the NE and has a configuration that is compatible with business rules, and if not then it can automatically create it. This pre-modification sanity check reduces the possibility of applying invalid configuration to the device, reducing both the necessity of costly rework, and the time taken to complete the activation process.

Figure 2: Operating at the speed of machine requires changes to element access credential management.
Automation enables transaction-based control over the activation process, ensuring the transaction is either wholly successful or wholly rolled back. When errors are reported by the network element in response to activation commands, the error can be analysed and appropriate action is taken. These may include re-issuing the activation command, rolling back previous activation commands that had been successfully applied, or reporting the error to a user for manual actions (with some rank-based recommendations on what those manual actions might be).

After applying the required activation commands to the multiple devices, automation can initiate and validate an end-to-end service check of the new network configuration. A successful check is always the expected outcome, but there will be times when this fails. In these instances, automation can analyse the type and cause for failure (using the same business and technical logic as is used for responding to in-service faults and alarms) to determine an appropriate rectification approach, which may include issuing additional configuration commands, or restarting specific resources, services or devices as necessary. If these then fail to resolve the problem with the end-to-end test, then relevant manual intervention can be commenced.

Finally, automation can maintain and provide a complete, auditable record of decisions taken, and actions implemented. This can be useful during manual exception handling, where context detailing how the system reached the current state is an important input into the creative troubleshooting process. It can also be used as a record of truth when disputes arise over whether a requested service was correctly configured in the network.

The automation described above can typically be performed in an incredibly short time - often within minutes, when compared to a manual process that can take hours or even days. And it can operate all day, every day, with a significantly reduced involvement of operations staff. Automation delivers to activation teams faster operations, higher quality and higher capacity.

Managing the automation is also important, to understand where it is operating as expected, but also where enhancements to it may be required. Enhancements may include increasing the capacity of the infrastructure (CPU, memory, storage and networking) on which the automation executes, or of the infrastructure of other applications to enable them to operate at the higher capacity; it may include increasing the scope of automation by removing current manual oversight or governance activities, or by automating brand new processes and subprocesses. Clear, regular reporting on the performance of automation is vital; to be able to see both at a high level and in detail the capacity, velocity and quality of the automation enables relevant management decisions and actions to be taken.
Cortex Solution and Methodology

The Cortex Intelligent Automation platform is a vendor-independent solution which is capable of:

- Orchestrating multiple OSS and BSS applications, exactly as network activation operations staff do today
- Planning and allocating network and infrastructure resources in line with business and technical policies
- Consolidating information from multiple sources, including spreadsheets
- Orchestrating consistently the business rules for configuration, capacity planning, and resource and service identification/naming, for standardised service configuration and improved quality
- Removing manual errors and improving accuracy
- Reducing the process execution time and increasing the organisation capacity and velocity

Cortex applies the specialist process knowledge of NOC/SOC teams’ processes to greatly reduce provisioning and activation time-scales.
Cortex users can access the web-based Cortex LivePortal to view information from the multiple sources, for example from inventory systems and other OSS tools, in order to perform order-specific manual design and assign tasks. Once complete, Cortex will reconcile and update systems to ensure all are correctly synchronised with a defined “Master” system.

Cortex integrates with currently deployed OSS and BSS systems and tools, and performs analytical decision making using data from disparate platforms. Cortex supports the following integration technologies:

- REST & SOAP Web Services over HTTP and HTTPS
- File transfer protocols SFTP/FTP
- SSH/Telnet
- Database connectivity (Oracle, SQL Server, ODBC & OLEDB [e.g. Apache Hadoop])
- CORBA/3GPP
- SNMP
- TCP Sockets
- Active Directory/LDAP
- Networking (Ping, traceroute)
- Acquisition of temporary element access rights from credential management tools
Process exceptions which cannot be automatically resolved are escalated to users for review and action. Full process context is provided to the user, allowing them to make an informed and swift decision for the resolution of the exception.

Standard Cortex LiveView reports provide visibility, control, and governance over each of the automated process. These identify where automation is operating as expected, and also possible areas for enhancement and evolution.

Appropriate manual governance processes are configured to ensure planned network changes are queued and approved prior to making any changes to the network, where confidence in the change is not high.

Over time, as confidence increases, the need for these manual approvals reduces and may be removed entirely, further increasing the process velocity.

Prior to any contact with a network device, Cortex interacts with a credential management system to acquire temporary access credentials for the device, thereby improving the security and auditability of changes to the network.

Deployment of the automation is best performed in an iterative, agile manner. This allows gradual and incremental buy-in and acceptance by the operations staff that the automation is operating as required and expected. It avoids resistance from the team, who may feel their jobs threatened by the introduction of automation, which could lead to active resistance and even sabotage.

The Cortex Solution enables:

- Multi-Vendor Activation on a single easy-to-operate platform
- Efficient and consistent application of current processes across multiple network domains
- Removal of local ad-hoc and unmanaged data sources such as spreadsheets
- Simple adoption of future processes
- Reduced manual involvement in provisioning processes freeing up highly skilled NOC/SOC staff to perform higher-value functions
- Increased capacity in the MVA process, operating all day, every day
- Faster completion of order fulfilment, resulting in significant reductions in SLA breaches
- Increased customer satisfaction, with increased accuracy delivering services right first time.
Glossary

3G/4G/5G  Third-, fourth- and fifth-generation mobile phone technology
BSS      Business Support System(s)
CLI      Command Line Interface
CM       Configuration Management
CRM      Customer Relationship Management
CSP      Communication Service Provider
EMS      Element Management System
FTP      File Transfer Protocol
GUI      Graphical User Interface
HTTP     HyperText Transport Protocol
HTTPS    HyperText Transport Protocol with Security
IP-VPN   Internet Protocol Virtual Private Network
MPLS     MultiProtocol Label Switching
NE       Network Equipment
NMS      Network Management System
NOC      Network Operations Centre
ODBC     Open DataBase Connectivity
OLEDDB   Object Linking and Embedding, DataBase
OM       Order Management
OSS      Operational Support System(s)
PM       Performance Management
REST     Representational State Transfer
SFTP     Secure File Transfer Protocol
SM       Service Management
SOAP     Simple Object Access Protocol
SOC      Service Operations Centre
SQL      Structured Query Language
SSH      Secure Shell
About Cortex

Cortex Intelligent Automation is the first unified platform specifically built to solve the challenges preventing organisations’ acceleration to an autonomous future. Cortex rapidly creates value, using multi-purpose intelligent automation software to transform telecommunications operations.

A unified, no-code, automation and orchestration platform, Cortex Intelligent Automation delivers Workflow, Orchestration, Automation, Reasoning, Integration and Event processing. Unique, decision-driven, closed-loop, and self-adjusting automation technology seamlessly integrates into existing and legacy technologies, automating processes to increase accuracy, speed, agility, and to deliver tangible ROI.

Process design within the Cortex Intelligent Automation platform requires no programming experience, underpinned by Cortex’s mission statement of “A world where everyone can automate”, and puts the business process owners and subject matter experts at the core of the automation project. Web based and highly scalable, the platform supports a simple managed process for the migration of a process design from development to test to production environments.

With strategic delivery partners including Capgemini, TCS, and Tech Mahindra, Cortex applies proven strategies and methodologies for Intelligent Automation deployment, together ensuring that the most successful outcomes and ongoing autonomous operations are achieved.

Other Cortex Telecom Solutions

Beyond Multi-Vendor Activation, the Cortex platform also supports automated network incident management and mitigation. Cortex can perform alarm enrichment functions, including correlation of alarms and events from multiple sources, and undertake root cause analysis. Cortex presents operators with system level issues and proposed remediation, based upon rank based resolutions, reducing the ‘noise’ that often confronts users and allowing for fast and effective application of fixes.

START YOUR INTELLIGENT AUTOMATION JOURNEY TODAY
+44 23 8254 8990  www.cortex-ia.com  info@cortex-ia.com