5G success demands

B2B service delivery automation

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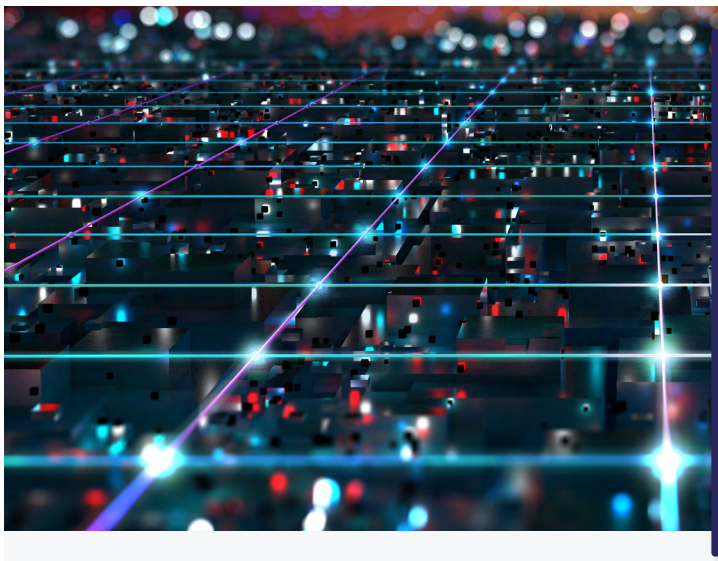


"In this paper, we'll explain why operational automation and agility in the network and OSS domains (which are essential for 5G success) must be linked to automation in the BSS stack, and how automation can provide the ability to iteratively support evolving service management requirements and ensure compliance with all necessary regulatory requirements."

Background

Automation is essential for 5G success

B2B revenues are expected to be key to the success of 5G as a commercial service. While consumer revenues matter, the advanced services that 5G (and, specifically, 5G Standalone or 5G SA) is designed to support will largely be targeted at enterprise customers, across a broad range of verticals.

Indeed, this expectation is foundational to 5G. When conceived, 5G was envisaged as an environment in which multiple performance dimensions could be met, enabled through the introduction of network slicing. There is a growing range of slice definitions, each of which is optimised for different performance requirements.

Each of these core 5G service capabilities – determined by different performance levels in each slice – set different requirements for network configuration covering capacity, xNF (Network Function) selection, and configuration. Performance requirements may also be required to change dynamically, depending on context and the overall demands on the network.

While the availability of these slices depends on the deployment of 5G SA (slicing hasn't been made commercially available at scale in previous generations, such as 5G Non-Standalone – NSA - and LTE – although the concept isn't new), the success of any future service doesn't simply depend on the technology that underpins the network. That's necessary, but not sufficient.

It is in fact tied to the speed at which CSPs can design, create, launch, retire, provision, sell, assure, and commercialise any such offers that leverage the underlying technology stack.

That's why automation and dynamic orchestration are essential, alongside (and supporting) agility.

In this paper, we'll explain why operational automation and agility in the network and OSS domains (which are essential for 5G success) must be linked to automation in the BSS stack, and how automation can provide the ability to iteratively support evolving service management requirements and ensure compliance with all necessary regulatory requirements.

The importance of

5G SA in B2B service opportunities

5G SA unlocks new service opportunities for consumer subscribers – for example, premium, QoS-optimised gaming, guaranteed streaming, and more – but the attention is firmly on B2B, as well as B2B2X.

In this context, B2B means the delivery of new, wireless services to stakeholders across different verticals, such as:

- **Smart ports**
- **Logistics and freight**
- **Transport**
- **Smart factories and Manufacturing**
- **Broadcasting & Media**
- **Automotive (such as autonomous vehicles)**
- **IoT**
- **Agriculture**
- **Smart energy and utilities**
- **Healthcare**

B2B2X is an evolving business model that can be viewed as B2B 'to any end user', which can be customers, retailers, partners, suppliers, or any other entities that might make up the "X", in any vertical.

Importantly, it is the mix of the 'B's – which can be service providers, technology companies, operators – that adds the value and enhances the offer to the customer base.

It provides multiple benefits: increased CSP revenue, an extended customer base, differentiated services, and so on. However, it does require developing new kinds of relationships, including new kinds of MVNOs, content providers, gaming platforms, and more.

Network slicing is seen as key to unlocking this opportunity, as the technique will be used to configure the differentiated services offered to stakeholders, customers and partners. According to Rethink Research, the network slicing revenue opportunity for operators, enterprises, and their technology providers will grow from essentially nothing in 2022 to $23.6 billion by 2030[1].

It notes that Media & Entertainment is currently the most popular vertical, followed by Others (reflecting the broad diversity of use cases and applications), and Manufacturing. Notably, Dynamic Slicing is more valuable as a revenue opportunity than Static or Targeted Slicing – underlining the need for agility to support changes to extant services.

1 - *https://rethinkresearch.biz/report/network-slicing-market-forecast-2023-2030/*

What is network slicing and why does it represent a new opportunity?

Network slicing provides dedicated resources – such as spectrum, capacity, network software, and servers – to a single customer, application, or service over a shared physical infrastructure. 3GPP defines a range of different slice types, each of which has an SST – Service/Slice Type definition:

- **eMBB (enhanced Mobile Broadband)**
  A slice suitable for the handling of 5G enhanced Mobile broadband and generally intended for consumer applications, including high-quality video streaming, mobile gaming, and so on.
- **URLLC (ultra-reliable low latency communications)**
  Providing performance to meet demanding applications, including industrial automation, and (remote) control systems.
- **MIoT (massive IoT)**
  Allowing support for connectivity to a dramatically increased density of IoT devices efficiently, in a given area.
- **Vehicle-to-everything (V2X)**
  Communication between a vehicle and any entity that may interact with it. V2X is an umbrella term for more specific types of vehicular communication, including V2I (vehicle-to-infrastructure), V2N (vehicle-to-network), V2V (vehicle-to-vehicle), V2P (vehicle-to-pedestrian), and V2D (vehicle-to-device).
- **Future slice types**
  It's important to note that we are still just setting out on the network slicing journey, and in time, further network slice types are likely to evolve and be defined by 3GPP.

Each network slice has different performance and operational characteristics. These can be broadly outlined, as follows:

- **Performance**
  Throughput, packet loss, jitter, latency, QoE, etc.
- **Availability**
  Uptime, time-between-failures, longevity, repair times, and so on.
- **Manageability**
  Visibility of network performance, speed of configuration, ease of maintenance, and so on.
- **Automation**
  The ability to interact with, and control, network and application parameters and threats without human intervention.
- **Security**
  Each slice may require different levels of authentication and authorisation, encryption, key handling, and so on.
- **Scalability**
  The volume and speed at which network resources can be applied to different applications, locations, and devices.

Slicing means that a single physical network can support an expanded range of services with slices adapted to the needs of different use cases, QoS requirements, KPIs, verticals (such as autonomous vehicles vs. healthcare), consumers, IoT applications, and a whole slew of new services that need specialised, low-latency capabilities. Each slice can also be configured to meet different parameters and different QoS and QoE levels, which means that each can be fine-tuned and optimised for specific use cases.

Each slice is completely segregated and isolated from others, although UEs can transition from one to another, according to access profiles – so, for example, a user device could transition between two slices used for different purposes, such as robotics vs. data transfer on a smart port campus. Of course, the considerations for supporting private networks – another opportunity for service providers – are no different.

Because 5G is expensive to deploy and operate, and because the use cases are still emerging, slicing offers operators and service providers a palette on which they can deliver customised, differentiated services – on demand and on request.

"...monetisation depends on delivering the expected outcomes. Bluntly, when a customer requests a new service, they expect it to be delivered in a timely manner."

How can CSPs realise the

network slicing/B2B service opportunity?

Regardless of whether a business buys an existing service or requests a new one, an end user will not be concerned about how that service is delivered (via a network slice or not) – unless they are specifically concerned about security and privacy, and therefore demand a dedicated slice of the network.

But what they do expect is speed, delivery, capacity, scalability, performance, optimised KPIs, robustness and resilience, and so on. Quite simply, when a customer requires a service, they expect to access it quickly, and expect it to provide the required performance and operational parameters.

It means that operators and service providers must consider multiple requirements, including minimal friction and human intervention (across the lifecycle), while ensuring fast, efficient delivery, monetisation and management (order to cash or O2C), and consistency (also across the entire lifecycle).

Of course, there will be multiple slices to manage, each requiring different network configurations – not just in terms of performance parameters (such as 5G QoS indicators [5QI]), but also in terms of the network functions (xNFs – physical, virtual, or cloud) that are required to support the services delivered by each slice.

CSPs need to consider how agile they can be in terms of time to market for different xNF configurations and variations – and how they can respond to dynamic changes necessary for assuring service performance...

Network Function (xNF) orchestration is key

NFs — the entities that are deployed to support network services and operations — can be realised in a variety of ways. They can be physical elements, virtualised or deployed in the cloud. Typically, an NF represents a logical entity as defined, for example, by 3GPP – a User Plane Function (UPF) or IMS CSCSF (IP Multi-media Sub-system Call Session Control Function, for example — although some of these may be combined into aggregated functions. Multiple NFs are involved in the delivery of a given service, so interfaces between them are generally standardised.

xNF selection, instantiation and configuration are key – does the slice use an existing resource, or does it require a new one to be deployed? Are there dedicated xNFs for the slice, and what happens when capacity / demand increases? How then does that change the commercial terms of the agreement in place?

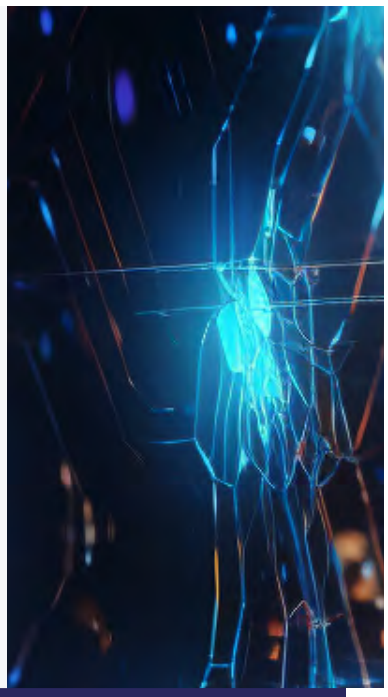
Essentially, each slice option will need network configurations in terms of xNF selection and configuration. So, CSPs need to consider how agile they can be in terms of time to market for different xNF configurations and variations – and how they can respond to dynamic changes necessary for assuring service performance through time. Here, reusability becomes another key component. How reusable are existing capabilities for slices in supporting new slice options?

This is critical, because monetisation depends on delivering the expected outcomes. Bluntly, when a customer requests a new service, they expect it to be delivered in a timely manner.

As a result, orchestration – the way in which resources are requested, deployed, and managed throughout their lifecycle, and balanced against the (competing) demands of other services in the same or adjacent slices – demands a whole new level of flexibility and agility.

It means that CSPs must address the following considerations carefully:

- How will CSPs get to market and satisfy requests, while building and meeting the SLAs that are in place for each service and slice?
- Will existing capabilities be reused, or will new dedicated virtual, logical and physical resources be required?
- How will the capabilities be assembled in the time expected?
- How will they be maintained through the life of the slice?



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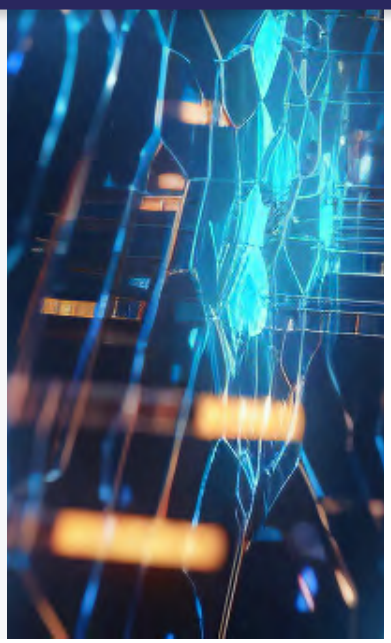

The importance of automation and agility

Automation and agility are therefore paramount. Automation is essential for handling the complex, multi-vendor, distributed nature of a 5G network and the complex network configurations required for each customer service and slice (which will extend to private networks, whether associated with a public network or as an independent offer).

Agility is essential because time to market and dynamic service control and orchestration are essential requirements for success. The network and service architecture also remains fluid, so operators will need to stay ahead of changes to their resource portfolio.

But it's not just the slice and service that require automation and agility. As we noted, they must also be monetised and assured, so automation must also extend to OSS and BSS domains.

To serve demanding enterprise customers, it's likely that new engagement models are required to meet dynamic and changing demands.

Each operator needs to enable buyers to purchase services (and the infrastructure they demand, virtual or otherwise), and be able to dynamically assemble components as soon as the transaction is complete.

All of this must be set against a background of seamless integration to the network so that requested services from buyers are rapidly orchestrated with the required capabilities delivered quickly, to the right location. The bottom line is that operators, telcos, and service providers will not be able to monetise 5G across an ever-changing array of B2B use cases unless they are automated at all levels to ensure the success of 5G and slicing.

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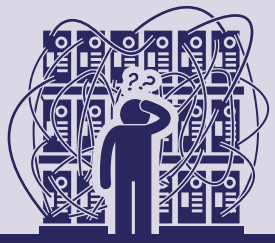


What does this mean in practice for CSPs?

Whenever a service is requested, it requires the orchestration of a chain of components and processes across its lifecycle. Each such process consists of a series of tasks that need to be connected to create an automated flow. Rather than building such an orchestration process from scratch, however, a more efficient means of operating (and repeating tasks) is to assemble them into what we term "process fragments".

These can be viewed as specific chains, for known functionalities, for example:

- Configuring a RAN solution from a given vendor.
- Configuring an NF required for UE authentication.
- Scaling a UPF when more data processing capacity is required
- Processing alarms from the RAN modules.
- Billing to meet the agreed cycle and consumption parameters, capacity requirements, number of devices, checking with revenue collection.

A process fragment can be built using individual building blocks (in We Are CORTEX, we call these "function blocks"), and they can be linked into these larger groups.

These process fragments – available for given tasks - can then be composed into a complete chain that provides end-to-end automation for any service. The process fragments used for one service (or slice) can also be used with others to build automations for other services, as each can be broken down into micro steps.

Process Fragments

What do we mean by 'process fragment'?

- Specific, simple chains with known functionalities
- Can be built using individual building or 'function' blocks
- Can be assembled into more complex chains to deliver certain tasks
- Can be transferred from one service (or slice to another)
- Can be broken down into 'micro steps'

Of course, we have to understand each service at a micro level in order to accomplish this. We can achieve that by addressing key questions. For example, we might want to consider the steps that should be taken before delivery and throughout the lifecycle of the slice or service:

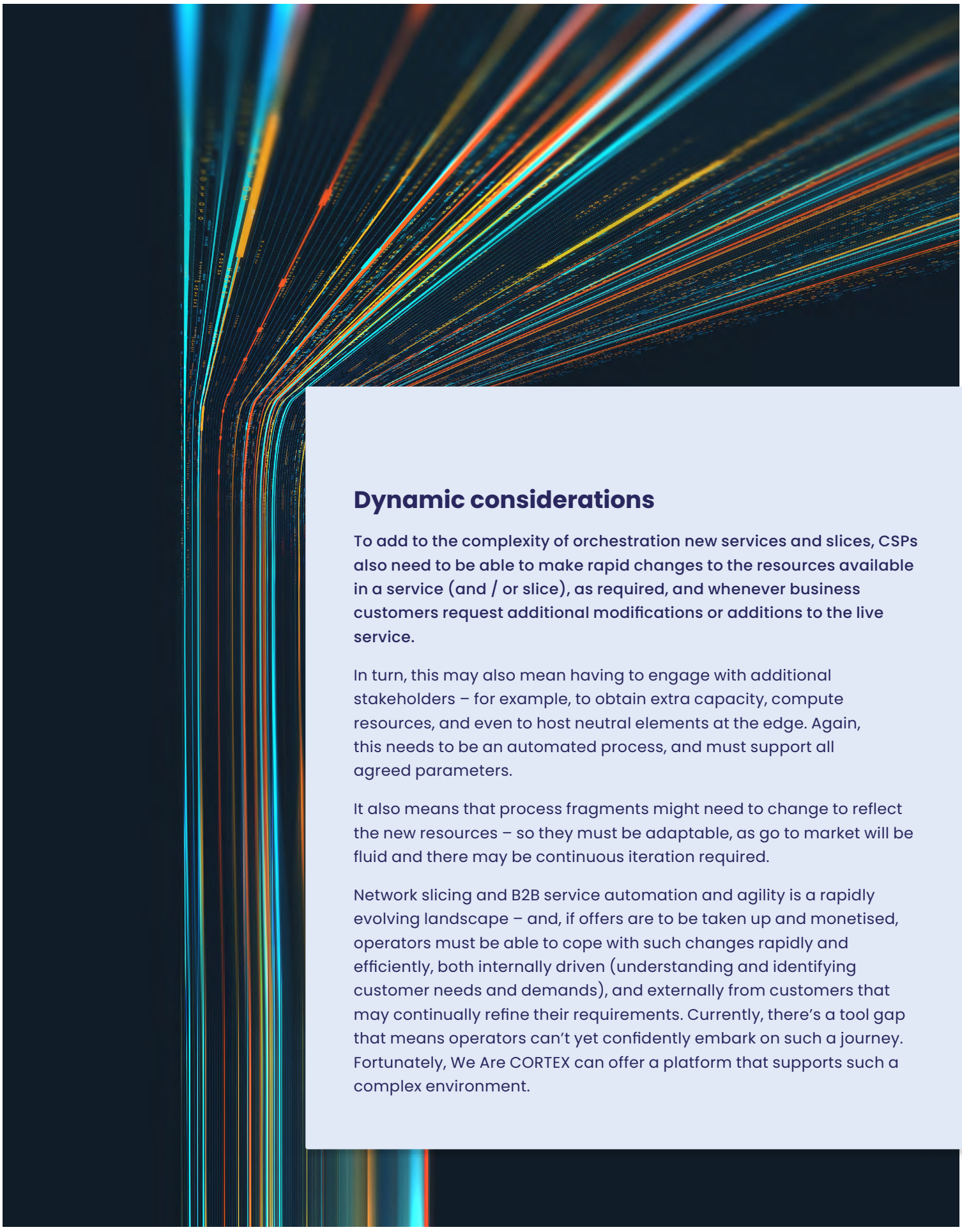
- What's the required configuration for this customer-specific slice?
- What PNF/VNF/CNFs are dedicated to this slice, and which are shared with other slices?
- How do I use one or more of "my" xNFs in the slice configuration?
- What type of slice is required – eMBB/MIoT/URLLC/etc?
- What are the geographic parameters of the slice?
- What happens if delivery requires assistance from other operators or cloud providers?
- Who is allowed to access the slice and when?
- What are the pricing options and elements that contribute to the billing arrangements?

Each of these questions yields answers that allow us to identify the necessary operational processes and procedures that should be followed, when, say, a customer orders a URLLC slice with a particular latency value.

Agility requires the ability to stitch these 'process fragments' together to create automated end-to-end provisioning, orchestration, assurance, billing, and so on – a process that also needs to be unified to the greatest extent possible.

In addition, providers need to ensure that only authorised users and processes can make requests, changes, and so on, which requires automated authentication at each step of the process in line with control policies.

So, with a catalogue of process fragments, any series of steps can be automated, with the correct fragments being selected to accelerate the task. Operators can develop their process fragment library over time, using the base function blocks, so spreading automation effectively to more services and to more operational procedures.



Dynamic considerations

To add to the complexity of orchestration new services and slices, CSPs also need to be able to make rapid changes to the resources available in a service (and / or slice), as required, and whenever business customers request additional modifications or additions to the live service.

In turn, this may also mean having to engage with additional stakeholders – for example, to obtain extra capacity, compute resources, and even to host neutral elements at the edge. Again, this needs to be an automated process, and must support all agreed parameters.

It also means that process fragments might need to change to reflect the new resources – so they must be adaptable, as go to market will be fluid and there may be continuous iteration required.

Network slicing and B2B service automation and agility is a rapidly evolving landscape – and, if offers are to be taken up and monetised, operators must be able to cope with such changes rapidly and efficiently, both internally driven (understanding and identifying customer needs and demands), and externally from customers that may continually refine their requirements. Currently, there's a tool gap that means operators can't yet confidently embark on such a journey. Fortunately, We Are CORTEX can offer a platform that supports such a complex environment.

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The importance of

choosing the right toolbox

Clearly, automating network operations and enabling rapid orchestration and evolution, with enhanced agility and flexibility, is key to future success. Service providers need an approach that leverages reusability, so that any automation or orchestration process can easily be implemented (and adapted to the current operational landscape) and then changed in line with how it evolves.

That's what We Are CORTEX offers. CORTEX comes out of the box with more than 150 pre-built Function Blocks providing discrete automated functions, enabling developers to drag and connect them up as necessary to meet the automation requirements, by composing them into process fragments.

CORTEX also enables providers to build, manage and use their own library of process fragments. By decomposing any service or slice-related activity into atomic components, operators can easily assemble molecules and chains that deliver the requisite automation – and unlock agility.

It means that automation flows can be swiftly implemented to spread automation capabilities throughout the processes that impact service (and slice) lifecycle management – O2C and beyond.

We Are CORTEX enables operators to build the right automation and orchestration framework to match the capabilities they seek to offer and which their customers demand.

We Are CORTEX is a partner that gives you the reusable tools and capabilities to automate anything – from orchestration to process management. They come with the ability to evolve — as your customers and networks evolve — and are backed by knowledge sharing and transfer across your teams – so you can take care of future automation and orchestration challenges.

Conclusion

opportunity awaits, get automated

The B2B opportunity for service providers – enabled by 5G, network slicing, private networking, and so on – is significant. The advanced services that 5G SA is designed to support will largely be targeted at enterprise customers and partners, across a broad range of verticals. Put simply, 5G SA unlocks new service opportunities for providers to serve business markets.

Specifically, network slicing offers huge opportunities, enabling service providers (which may partner together) to offer a broad range of dedicated network resources to any vertical, each with different performance requirements, on a single physical infrastructure.

In turn, each slice has different requirements for network configuration, covering capacity, xNF (Network Function) selection, scalability, security, and so on. However, even if B2B services are not delivered via dedicated network slices, in order to take advantage of this opportunity service providers need to be able to dynamically provision, orchestrate, deliver, assure, and monetise services throughout their lifecycle in the given slice. This is also likely to require rapid, iterative changes according to market or customer demand.

Automation, and the agility it supports, are fundamental to success. When enterprises request a service or slice, they expect speed of delivery, capacity, scalability, performance, optimised KPIs, robustness and resilience, and so on. It means that operators and service providers have multiple requirements to consider, including VNF orchestration, OSS and BSS domains, the reusability of existing slice processes and configurations, time-to-market, and much more.

Operators, telcos, and service providers will not be able to monetise 5G across an ever-changing array of B2B use cases unless they are automated at all levels to ensure the success of 5G and slicing. However, they need the right toolbox to be able to deliver and take advantage of the B2B opportunity.

Automating network operations and enabling rapid orchestration and evolution, with enhanced agility and flexibility, is key to future success. We Are CORTEX offers a platform for automation of operational processes, as well as the ability for service providers to build, manage, and use their own library of process fragments, helping them to cut time-to-market, improve efficiency, and meet the demands of dynamic network slicing.

It means that automated flows can be swiftly implemented to spread automation capabilities throughout the processes that impact service (and slice) lifecycle management – O2C and beyond. We Are CORTEX enables operators to build the right automation and orchestration framework to match the capabilities they seek to offer and which their customers demand.

We Are CORTEX is a partner that gives you the reusable tools and capabilities to automate anything – from orchestration to process management. They come with the ability to evolve — as your customers and networks evolve — and are backed by knowledge sharing and transfer across your teams – so you can take care of future automation and orchestration challenges.

To achieve the nirvana of both fully automated, adaptable, and agile services and slices for B2B customers, with self-service, CSPs must act now. Change is on the way, and you simply cannot afford to miss or delay the monetisation opportunities ahead. It may take time but take the first steps on that journey – contact us today to discuss your requirements.

Glossary:

Abbreviations and acronyms defined

3GPP — Third Generation Partnership Project, a consortium of Standards Development Organisations.

5QI – 5G QoS Indicator. Defines a set of QoS parameters to define a given QoS flow.

B2B2X – B2B (or a cluster of providers) providing service to 'anyone' (partners, suppliers, end users etc.).

BSS – Business Support System. The components that a telecommunications service provider (or telco) uses to run its business operations towards customers.

CNF – Cloud-native Network Function. A network function designed and implemented to run inside containers.

eMBB – enhanced Mobile Broadband. Providing high-bandwidth applications for dense, urban populations, as well as rural.

IoT — Internet of Things, essentially, remote or distributed devices connected to networks and centralised servers via one or more interfaces.

KPI — Key Performance Indicator.

LTE — Long Term Evolution, a fourth-generation mobile technology.

MIoT – Massive IoT. Support for high density estates of IoT devices efficiently and cost effectively.

MVNO – Mobile Virtual Network Operator. A provider of mobile services with its own SIMs, but which uses the network of a licensed spectrum holder.

NSA – Non-Standalone (5G). A solution for 5G networks where the network is supported by the existing 4G infrastructure. Seen as a stepping stone to 'true' 5G (5G SA).

O2C – Order-to-cash. A set of business processes that describe the finance-related component of customer sales.

OSS – Operational Support System. A set of programs that helps a communications service provider monitor, control, analyse, and manage a network.

PNF – Physical Network Function. A specialised function block with well-defined external behaviours and interfaces.

QoE — Quality of Experience. A measure (subjective or objective) of the actual experience enjoyed by users of a given service session.

QoS — Quality of Service. Defines the performance levels expected for a given service in terms of latency, throughput and other variable factors.

RAN – Radio Access Network. Provides access to, and coordinates the management of, resources across radio sites.

SA – Standalone (5G). A 5G network not reliant on any other network infrastructure and able to operate independently.

SST – Service/Slice Type. Defines the expected features for a given slice. A number of standardised SSTs are currently available.

UE – User Equipment. A generic term for devices that can attach to mobile networks.

UPF – User Plane Function. A VNF that handles data processing for UEs.

URLLC – Ultra- reliable low latency communications. Connectivity for mission-critical applications.

V2X – Vehicle-to-Everything. Communication between a vehicle and any entity that may affect, or may be affected by, it. An umbrella term that encompasses Vehicle-to-Infrastructure (V2I), Vehicle-to-Network (V2N), Vehicle-to-Vehicle (V2V), Vehicle-to-Pedestrian (V2P), and Vehicle-to-Device (V2D).

VNF – Virtual Network Function. VNFs deliver network functions to significantly speed up network services and network infrastructure deployment by substituting dedicated hardware appliances.

xNF – 'any' Network Function (e.g., PNF, VNF, CNF)

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