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BRKSPG-2018 “Orchestrating 5G End-to-End”

Session Abstract:

The current way for building a mobile network has to evolved. Operators urgently need a new model to ensure they remain competitive delivering new services faster, while decreasing both capital and operating expenses. At the same time enterprises rely on communications service providers to both supply critical network connectivity, and to be able to deliver new services. This requires highly flexible network connectivity services that can be provisioned on-demand and according to their unique performance requirements and SLA. The 5G network is expected to become the "services creation platform" for next-generation communications. The platform will be used to create separate network partitions, or "slices", with unique network performance and latency characteristics to serve a particular use case or enterprise. A software-defined architecture that includes cloud virtualization and automation will help operators meet these new application and operational demands. This session will focus on the new automation and operational requirements for 5G Software Defined Mobile Network across the different domains. During the session the attendees will learn about the operational impact and challenges associate to the evolution of the architecture toward virtualization and cloud native and solutions and approaches to address these challenges in the context of end-to-end slicing automation.

The bridge to possible

Orchestrating 5G End-to-End

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BRKSPG-2018

Agenda

5G End-to-End Orchestration

- Introduction: Why Orchestrating 5G End-to-End
- Functional & Architecture Requirements
- Cisco Approach
- Conclusion

5G End-to-End Orchestration

Introduction:

Why Orchestrating 5G End-to-End

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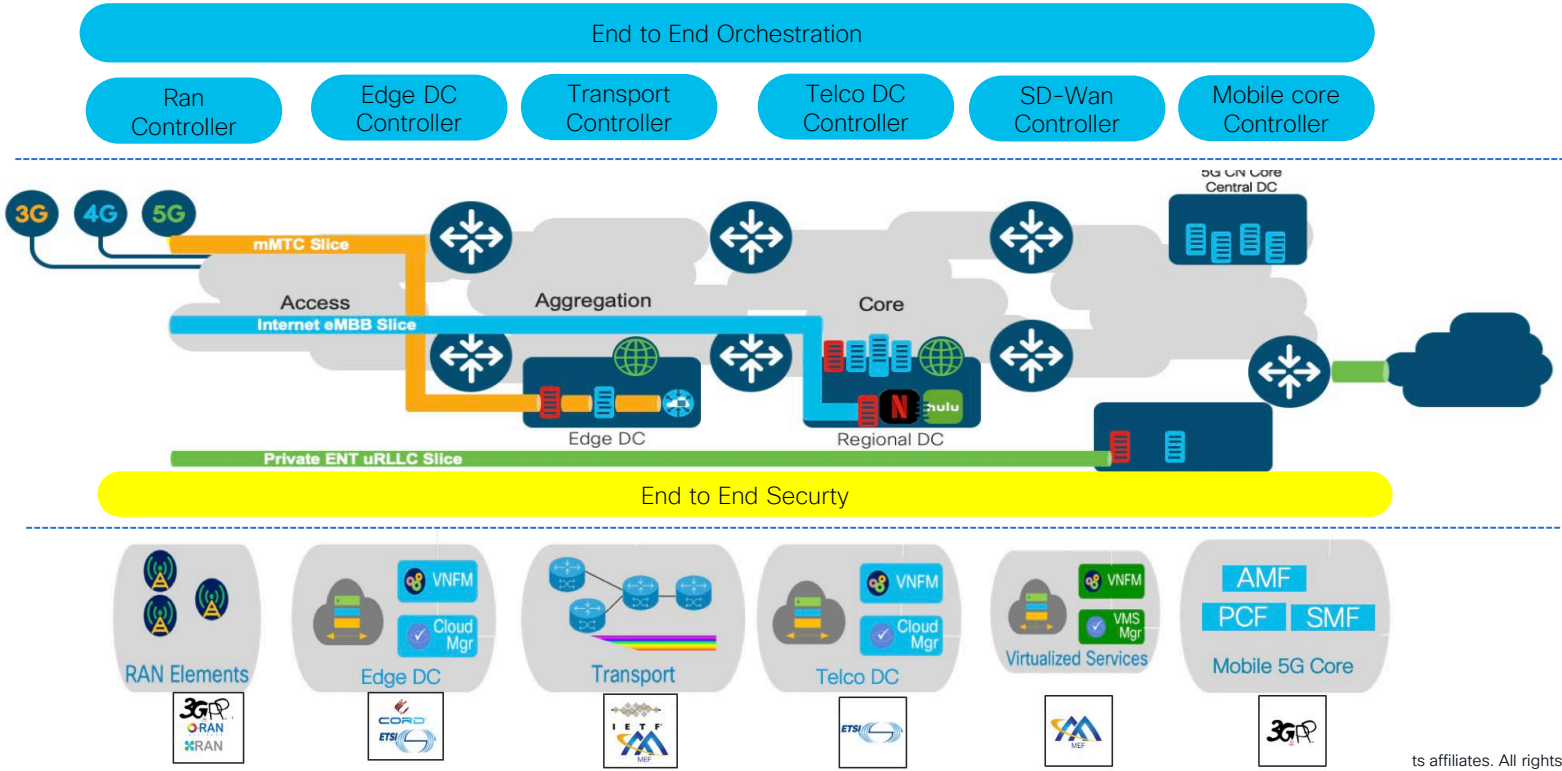
5G Slicing drives 5G End-to-End Orchestration

Network Slicing is fundamentally an end-to-end partitioning of the network resources and network functions so that selected applications/services/connections may run in isolation from each other for a specific business purpose driven by the Orchestration capabilities



Orchestration offering Network as a Service

Control / User Plane Separation, Distributed physical & Virtual Fct Based on Slice attributes, Service isolation and security

Cross Domain Service based on Multiple standard

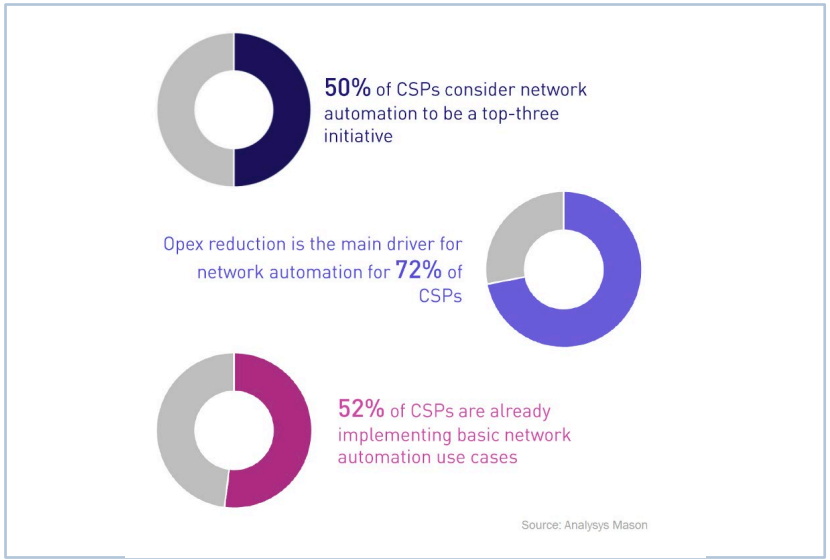
OPEX pressures are driving SPs to take on automation & Orchestration initiatives

OPEX Pressures

- CSPs' network opex has been increasing since 2012.
- Opex as a percentage of revenue grew from 11% in 2012 to 15% in 2017
- Revenue declined by 13% during the same period.
- This is an unsustainable trend that will be exacerbated with the

Analysis Mason : Network automation: a solution framework for service agility and cost economics in cloud enabled 5G networks ; February 2020

Impact on Orchestration & Automation



Analysis Mason : Network automation survey: CSPs' automation initiatives ; MARCH 2020

There is plethora of industry 5G trends that are exacerbating the need for Orchestration, as well as hindering it

From	To
Integrated HW / SW appliances	• Disaggregated systems (HW from SW) • Decomposed systems (virtualization, containers, microservices)
Virtualized Network Functions	• Containers and microservices : Modular systems, Distributed, Dynamic topologies, Ephemeral nature
Network based services	• Separation of service from transport (e.g. Control Plane vs User plane) • Network fabric architecture, with separation of overlay vs underlay
Vertically integrated product offers (e.g. Voice, Data, Mobile, Video)	• Shared horizontal cloud platform with SW based service tenants per offer
Human intensive provisioning and disjoint assurance	• Closed loop provisioning, assurance and policy • Zero Touch Service Management • Enabled by big data analytics, ML and AI
Proprietary vendor approaches	• Open approach (open source, open APIs) to solution development
Standards per service domain (e.g. 3GPP for mobile, IETF to transport, etc)	• Plethora of standards bodies (ETSI, 3GPP, O-RAN, GSMA, TMF, etc) defining automation standards • Varying degrees of completion create a fragmented view
Operating model with water fall dev, complex manual processes, long product cycles	• Rapid development adopting agile principles • Increased automation in fulfillment and assurance • Fast feature release, focusing on improving Customer Experience

5G End-to-End Orchestration

Functional & Architecture Requirements

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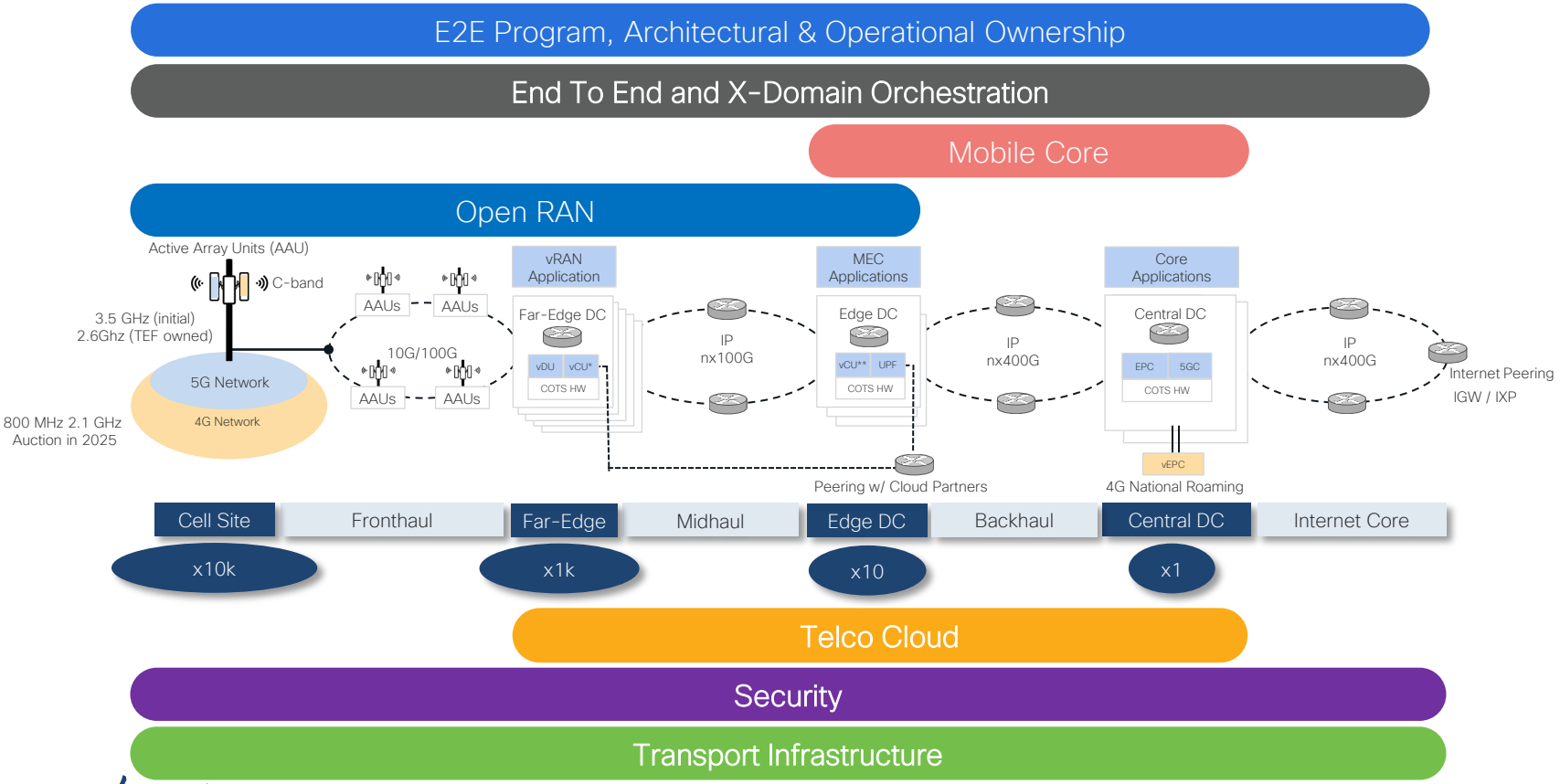
5G End to End Architecture



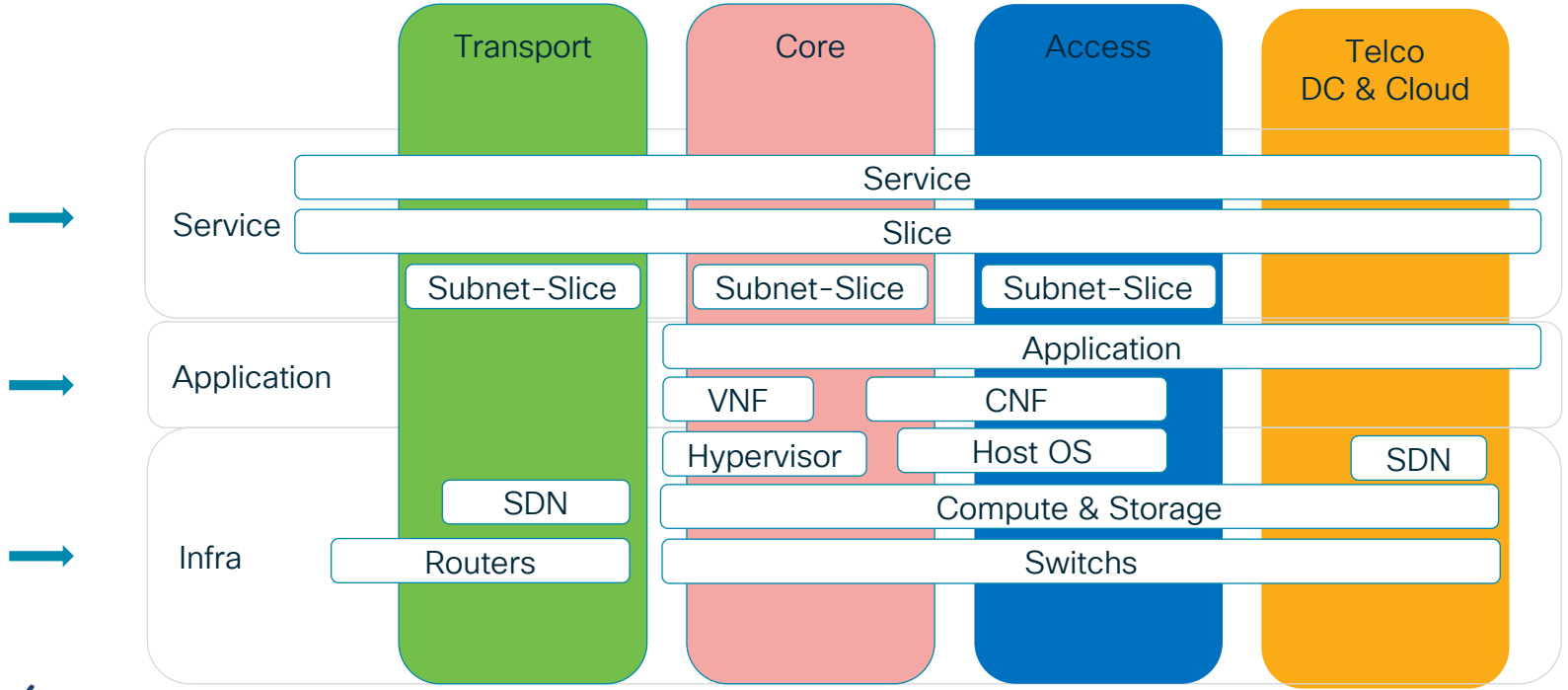
5G End to End Automation & Orchestration

A cross domain Operational Challenge Driven by Use Case

Operations

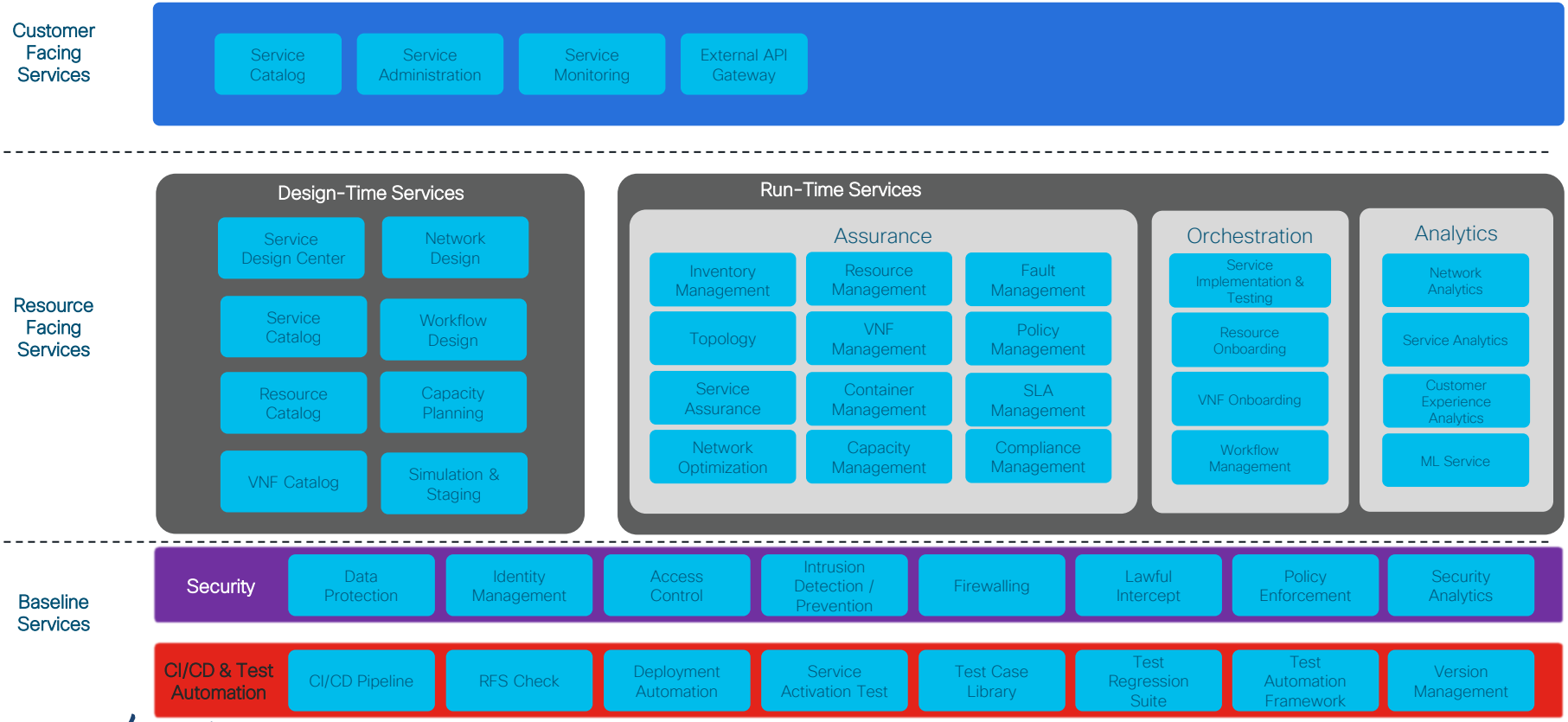
- Design
- Catalog
- Initiate
- Observe
- Validate
- Activate
- Upgrade
- Heal/Repair
- Modify
- Scale-out
- Scale-in
- Backup
- Restore
- De-activate

- *Use case A*
- *Use Case B*
- *Use case C*



5G End to End Orchestration Functional Scope

A large set of functions to cover and requiring a structure approach



5G End-to-End Orchestration

Cisco Approach

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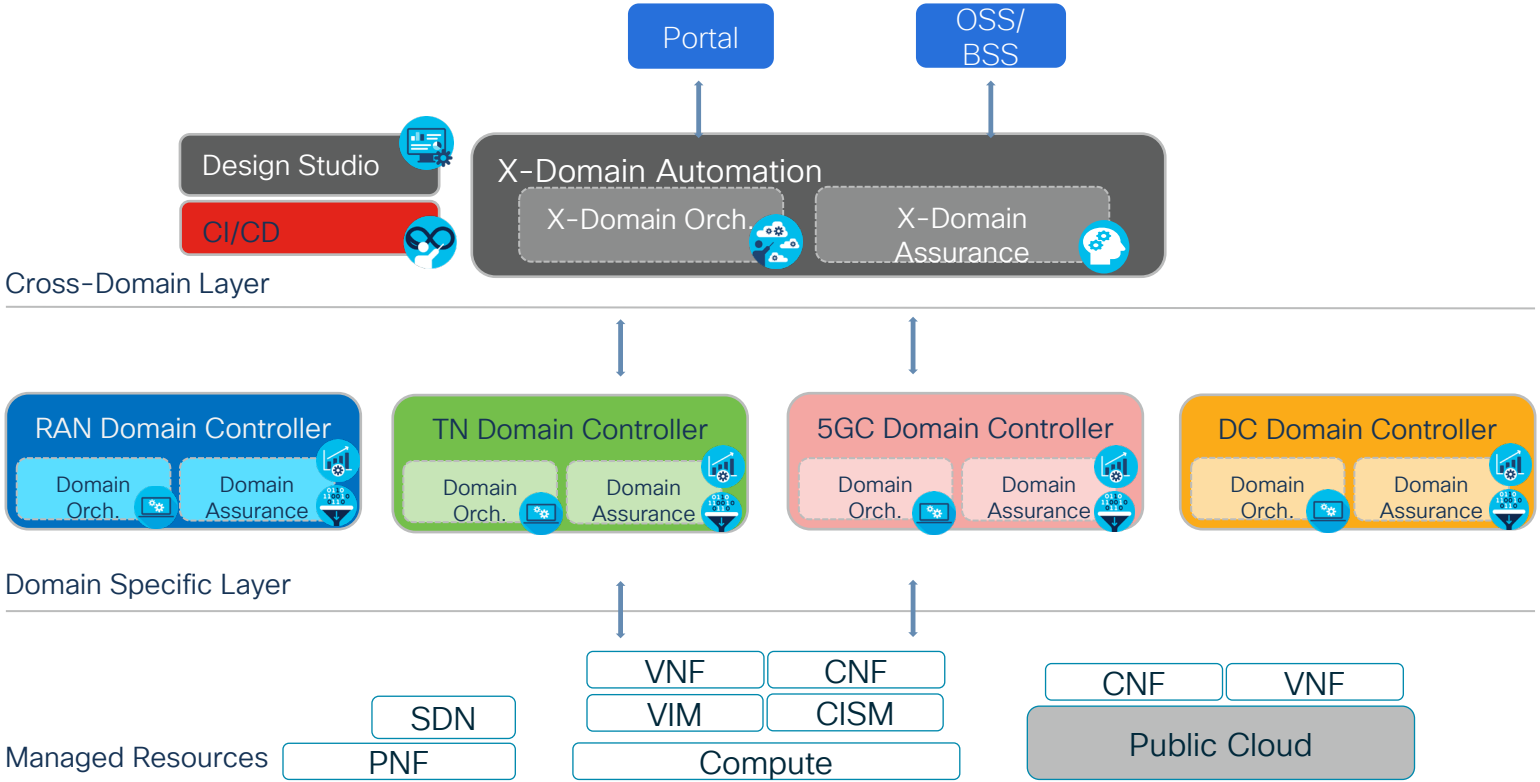
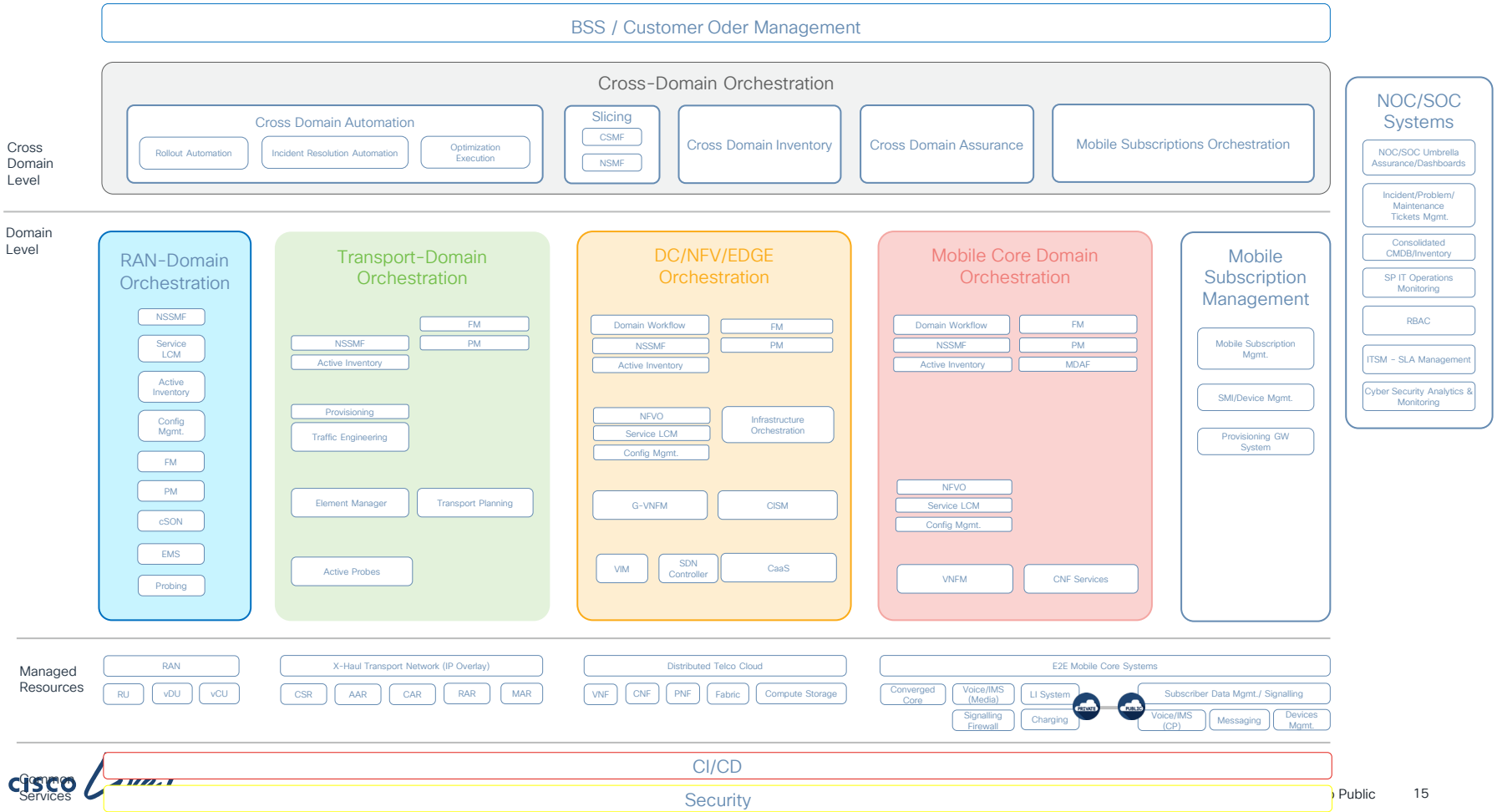
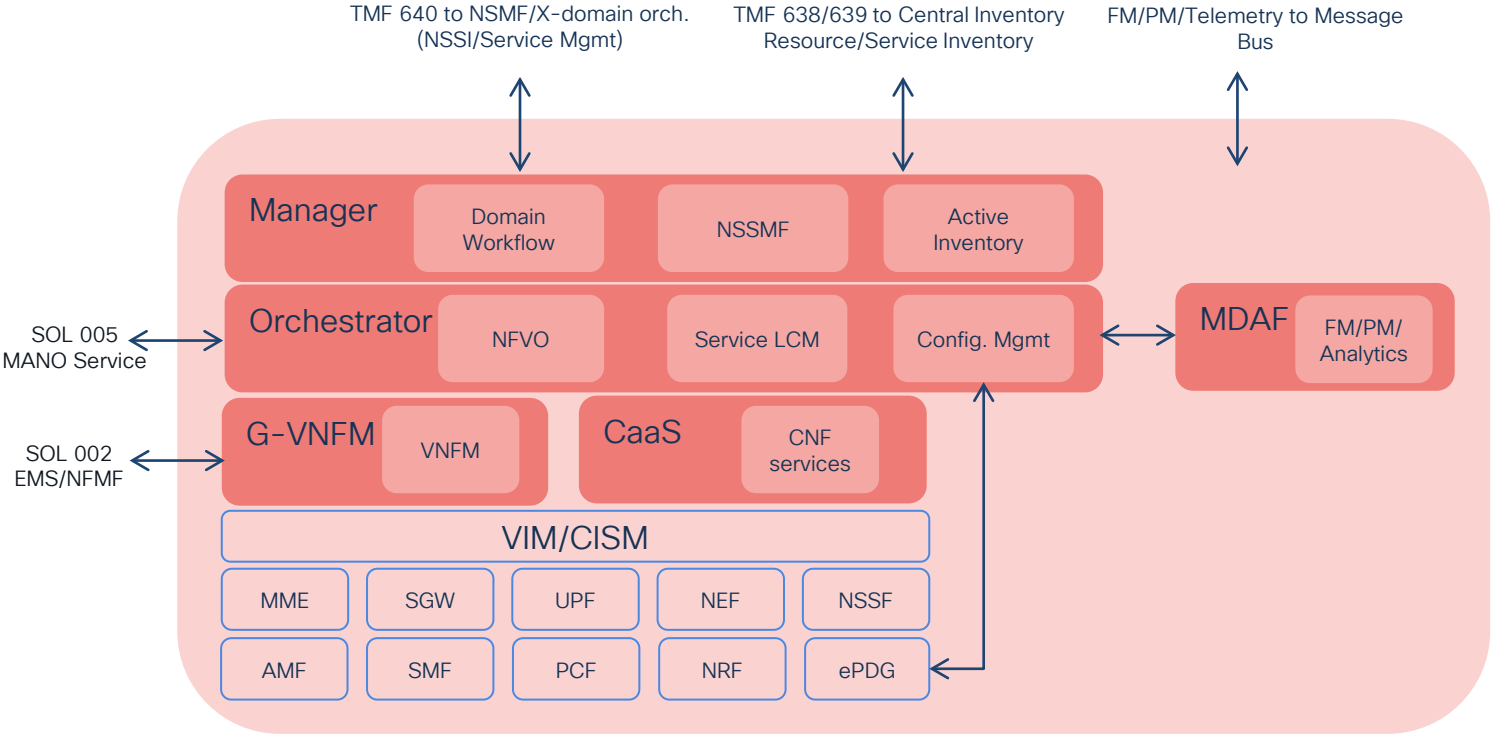
5G End-to-End Orchestration
A simple & Modular Blue-Print Architecture



5G End-to-End Orchestration Functional Framework



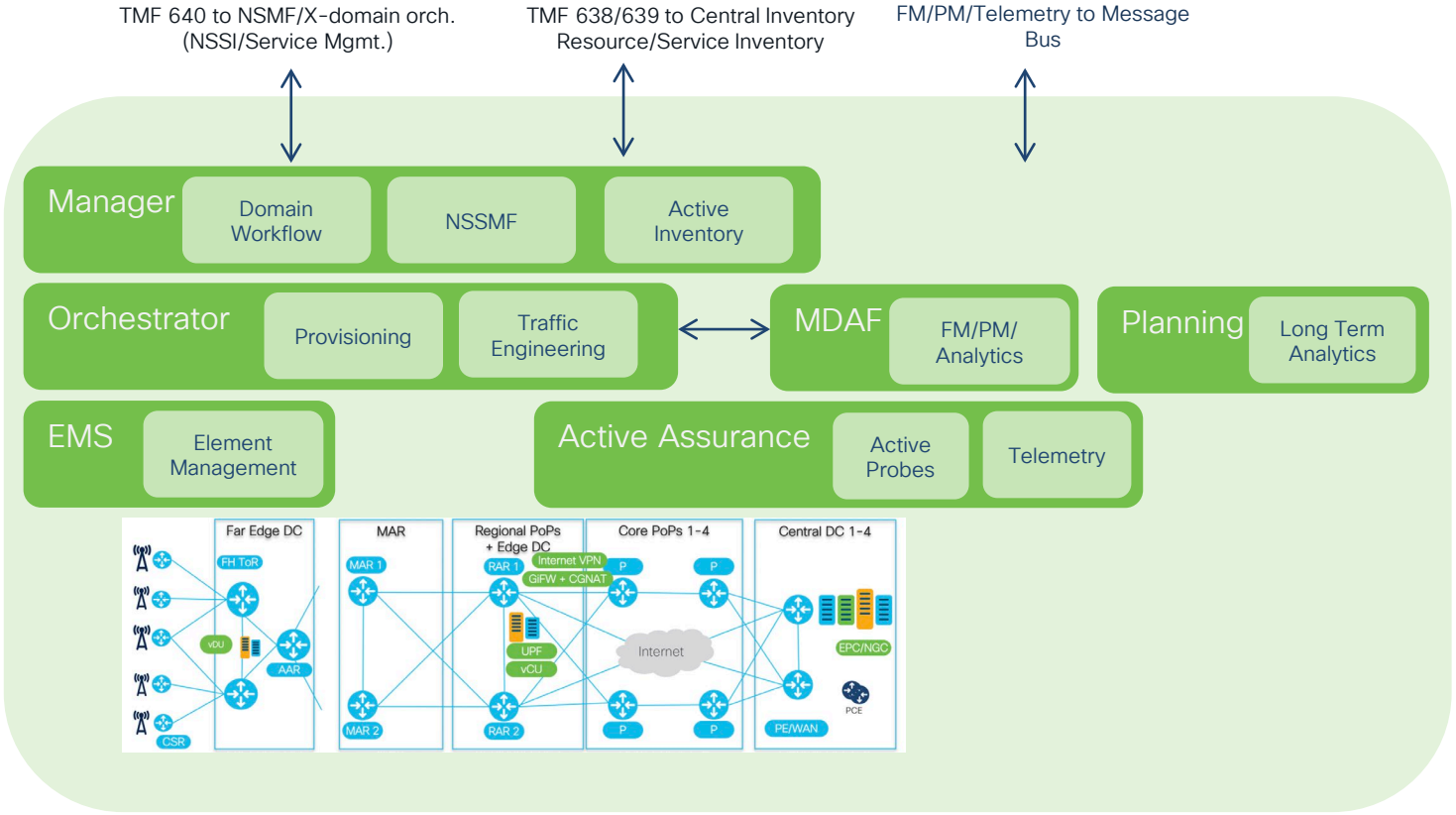
5G Core Domain Automation



Key Requirements

- 5G VNF/NF Modeling
- NSSMF service Modeling
- PM & Telemetry Modeling
- Local RFS Inventory
- 5G VNF/NF Instantiation, LCM & Day N config
- NSSMF Instantiation, LCM & Day N configuration
- 5G VNF/NF PM & Telemetry Collection
- Alarm and PM analytics for local close loop, SLA reporting and Trouble shooting
- Open and Standard APIs

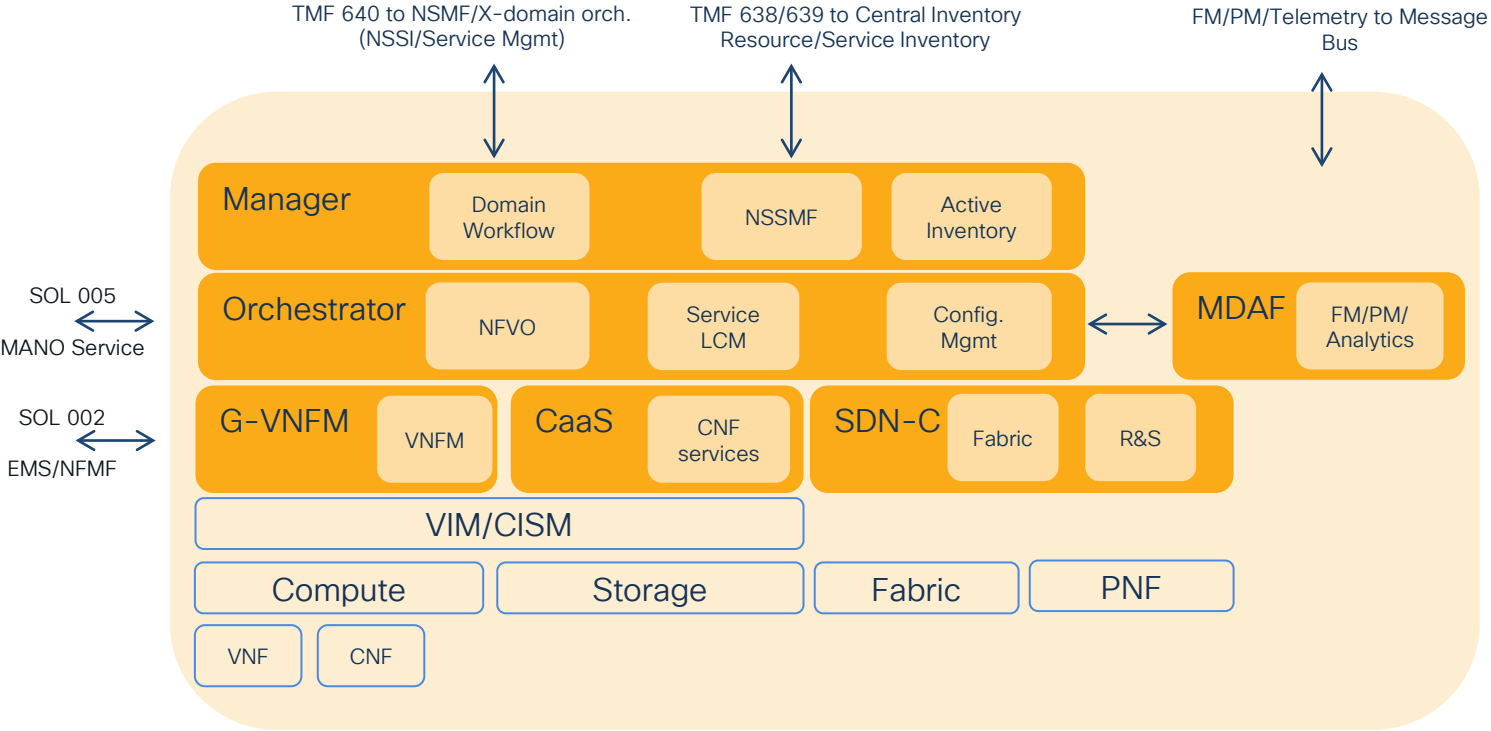
Transport Domain Automation



Key Requirements

- PNF (router, Infra) Modeling
- NSSMF service (Path, L2/L3vpn,SLA) Modeling
- PM & Telemetry Modeling
- Local RFS Inventory
- Zero Touch Deployment & Day N config
- Planning & resource allocation /reservation
- NSSMF Instantiation, LCM & Day N configuration
- PNF and Probe PM & Telemetry Collection
- Alarm and PM analytics for local close loop, Trouble shooting & SLA reporting.
- Open and Standard APIs

Telco/DC Domain Automation

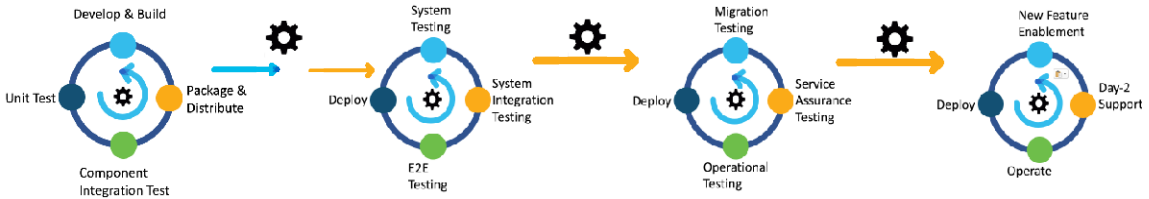


Key Requirements

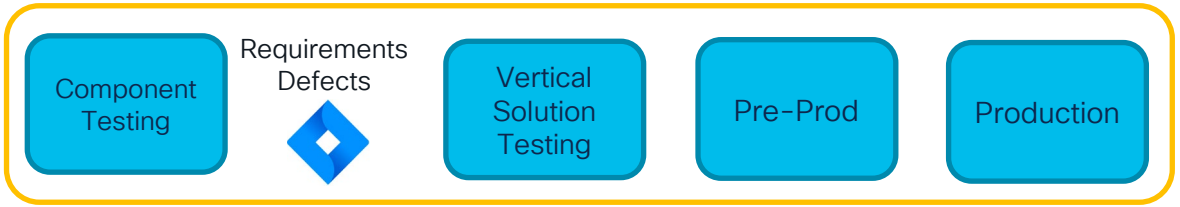
- DC Fabric, Overlay network & VNF/NF Modeling
- NSSMF service Modeling
- PM & Telemetry Modeling
- Local RFS inventory
- VNF/NF Instantiation, LCM & Day N config
- Fabric, storage, Compute& PNF configuration
- NSSMF Instantiation, LCM & Day N configuration
- Fabric, storage, Compute& PNF VNF/NF PM & Telemetry Collection
- Alarm and PM analytics for local close loop, Sla reporting and Trouble shooting
- Open and Standard APIs

A Continuous Integration & Test Automation

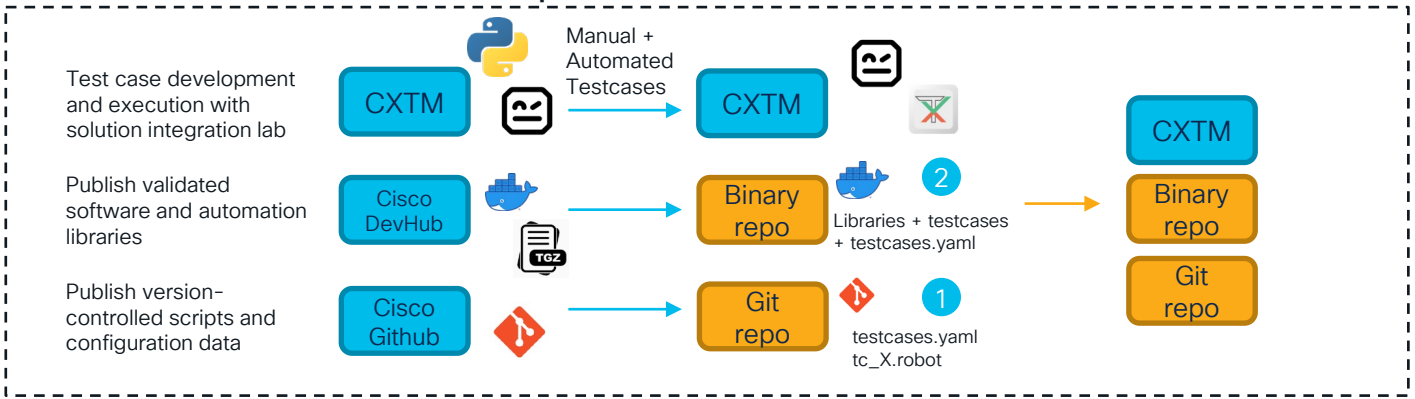
To bridges the gaps between development and operation activities and teams



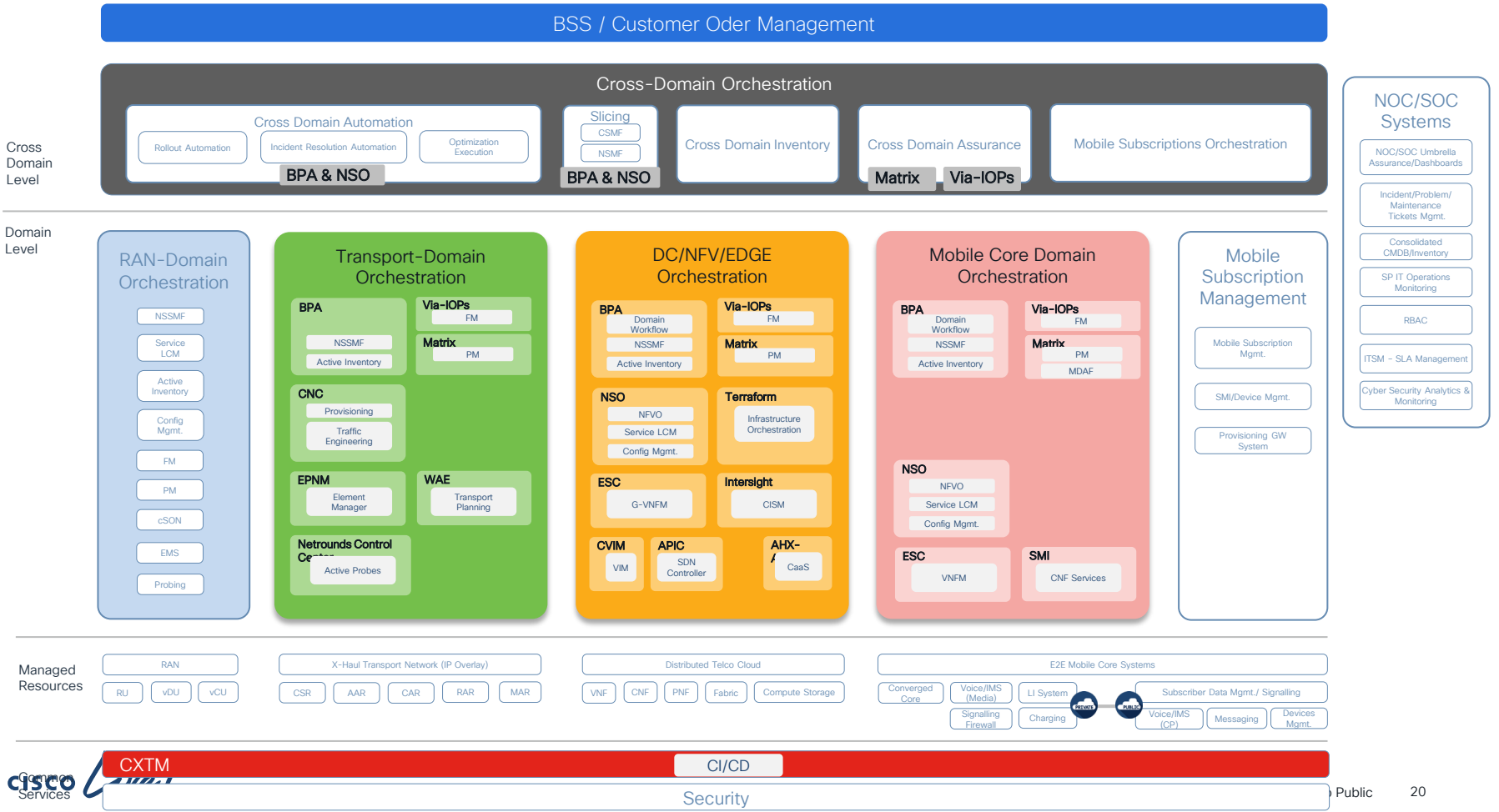
- Publish software artifacts
- Documentation and release notes
- Installation and upgrade scripts



Ci Test Automation scope



5G End-to-End Orchestration Cisco Portfolio mapping



5G End-to-End Orchestration

Conclusion

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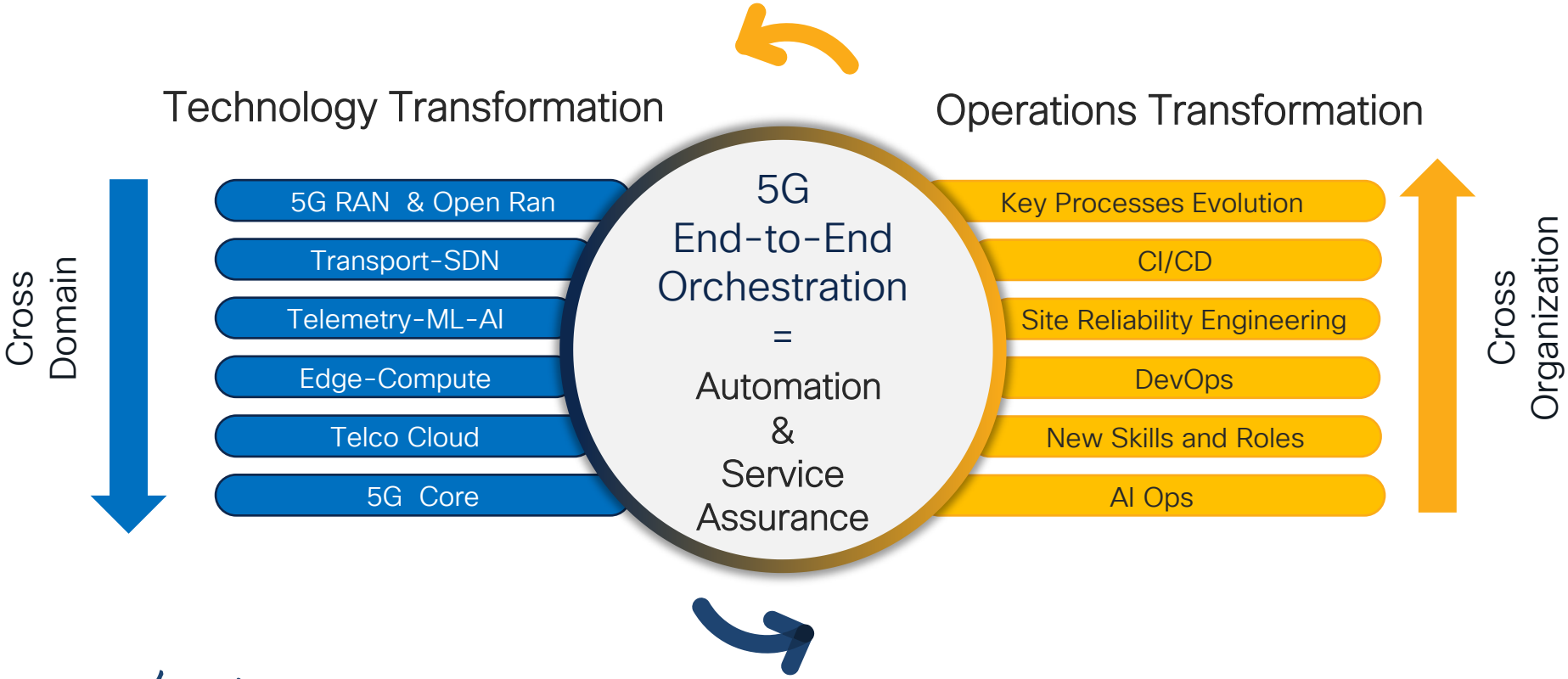
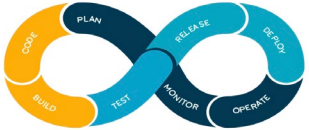
Orchestrating 5G End-to-End

A Transformational Journey driven by New Technologies & Operational process



Cisco 5G End to End Orchestration offer

Continuous Integration & Test Automation

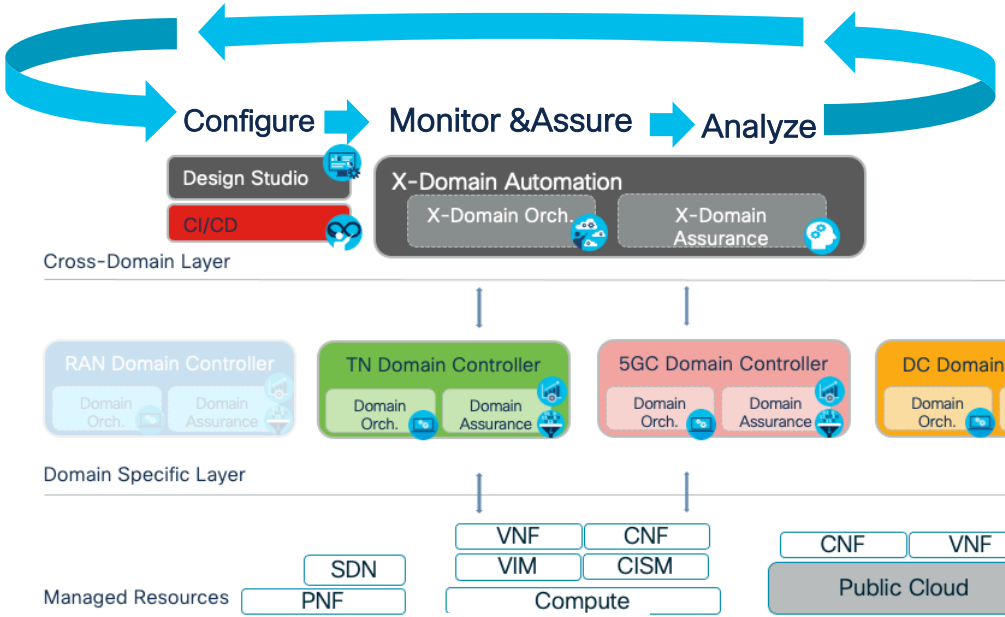


- **End To End Service** Testing & validation
- Cross Domain Components Testing
- Components & service Packages Automatic Onboarding & deployment

- NSS Testing & validation
- Domain Components Testing
- Components & NSS Packages Automatic Onboarding & deployment

- Unitary Infrastructure Testing & validation
- **Components Functional Testing**
- Automatic Infra structure Onboarding & deployment

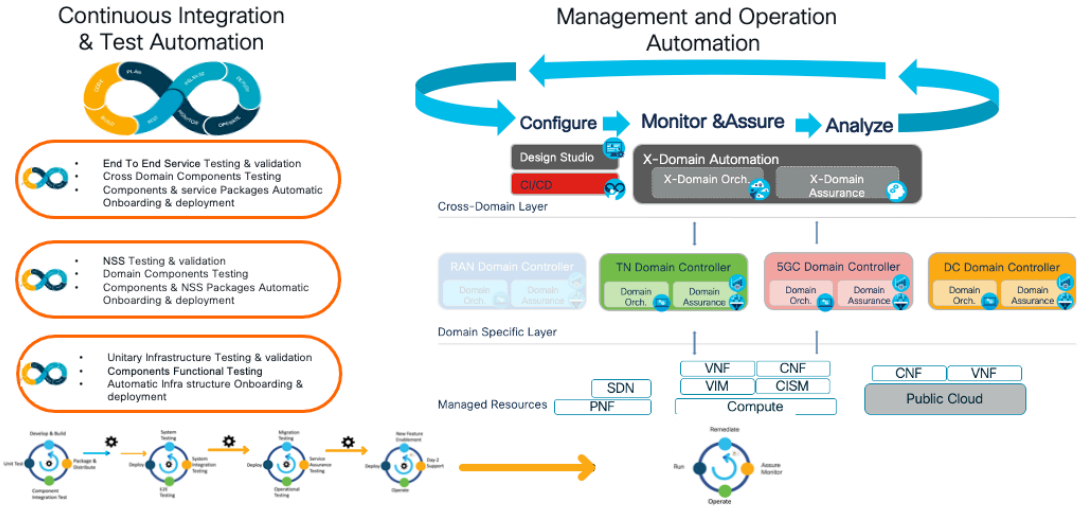
Management and Operation Automation



A Modular, Open & Agile Architecture design to operate 5G Domains and automate End to End 5G Slicing Services.

Cisco 5G End to End Orchestration

End to End 5G Orchestration is a Transformational Journey requiring:



- A phased approach
- A Functional Framework to identify the Requirements
- A Modular & Hierarchical Blue-Print Architecture
- Dedicated Domain Controller (DC-T SDN- 5G Core)
- A Cross Domain Orchestrator
- A set of Service Assurance & Analytic Applications
- A CiCd Pipeline Framework
- Service Practice

New Technology adoption & New operational Model across the board is a key success factor

The bridge to possible

Thank you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