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Kyndryl Cloud Network Intelligent Control Center

Network as a
programmable service

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Executive summary

Over the past decade, the cloud has become integral to nearly every digital and business transformation strategy, allowing clients to access the latest technologies, such as IoT, high-performance computing, and blockchain from multiple vendors to reimagine business processes and ecosystems.

However, the network and the inter-connectivity across physical infrastructure, virtual infrastructure, and “as-a-service” ingestion points hinder or block broad cloud adoption across the enterprise. Traditional networking approaches make it difficult to keep pace with change and take advantage of new and differentiating technology.

Today’s leading network service providers are virtualizing the network, separating the proprietary network appliance functions into discrete hardware and software components. This enables networks to achieve the same benefits already realized with the virtualization and software-defined enablement of systems and storage. The virtualization of the network is recognized as Network Function Virtualization (NFV) and Virtualized Network Functions (VNF).

Network Function Virtualization is the architecture that allows decoupling of proprietary network appliance functions into separate hardware and software components.

Virtualized Network Functions are the software components such as SD-WAN, FW, Load Balancing, VPN, Security, etc., that stack on top of the NFV architecture.

To fully realize the benefits of a virtualized network there must be a network orchestration and automation strategy. Together, network virtualization and network orchestration and automation can:

- Prevent vendor lock-in on integrated proprietary hardware-based platforms
- Allow for self-service functions for development teams, abstracting network integration complexity from application deployments
- Reduce risk through integrated governance and management
- Reduce time to market by orchestrating and automating integration complexities across the hybrid estate
- Improve quality through intelligent and aware operations like self-healing and cloud-native approaches

This transformation of the network will be a challenge and require a trusted partner to assist in defining the right orchestration and automation approach. Successful network orchestration and automation requires a new way of thinking about the network and commitment from business, development and operational leaders across the enterprise.

This paper describes the current market trends and enterprise requirements that are influencing the need for network orchestration and automation across virtualized networks.

20%

Less than 20% of enterprise workloads have moved to the cloud.[1]

82%

82% of surveyed leaders say that connectivity is a primary concern for moving to a hybrid cloud model.[1]

Figure 1: Network as a programmable service manages risk, reducing concern while enabling business service migration to cloud.

Industry trends

Increased time to market and resiliency of the network drives the need for programmable networks.
In the past, there was a clear demarcation between telecommunications, enterprise network and the network equipment providers. Everyone focused on their core competence, partnering to drive large-scale projects and provide services to the enterprise. But with many of these traditional products becoming commoditized, decoupled from dedicated hardware, services becoming more heavily automated and encroaching disruptors like Amazon and Google, the line of demarcation is now blurred.

Traditional telecommunication companies are in the content business, network equipment manufacturers are acquiring software companies, and cloud service providers are investing and deploying telecommunication backbones.

This encroachment and “co-opetition” coupled with software-controlled infrastructure and expansion of cloud services caused market disruption of the enterprise network space, changing the way we think about and consume the network. This disruption that was once focused on the data center (LAN) extends into cloud and remote locations (WAN) driving the need for broad orchestration and automation across the network LAN and WAN.

When asked what technical building blocks are being used for hybrid cloud transformation, **66%** of respondents identified Software Defined Networking and **37%** identified Network Function Virtualization as a core building block.[1]

Several trends that are shaping network solutions today, including:

- **Software-defined networks (SDN):** Allows administrators to manage the network through abstraction by decoupling the control plane from the underlying systems that handle traffic (the data plane).
- **Cloud adoption:** A recent study shows that 80 percent of enterprise workloads are not yet using cloud. On average, enterprises use five clouds and more than 80 percent of new applications will be developed using containers.[1] Flexible network architecture is required as the rate of change increases and workloads transform across an enterprise.
- **Management complexity:** A mix of traditional data center and cloud infrastructure, coupled with multiple network service providers and technologies makes the need for a single management approach essential.
- **Rising cost:** Application changes and Bring Your Own Device (BYOD) policies drive increased bandwidth requirements and resultant costs across MPLS-based networks. Increased management complexity creates additional expenditure.
- **Lack of agility:** Integration is necessary to drive agility across a network that contains a mix of architectures, service providers, and inconsistent performance across wide areas.
- **Increased mobility:** A mobile workforce, remote offices and increased use of Wi-Fi will require a shift in how your enterprise architecture is designed, implemented and managed.

Enterprise needs and challenges

Based on the trends highlighted in the previous section, the implications of not having the right network strategy will impact your business. Competitors who are more agile and able to leverage and integrate cloud-based services will take market share faster than traditional IT-based organizations. Missing important market opportunities due to network delays in application deployments, large network outages, and eroding margins due to increasing bandwidth cost and network complexity is no longer tolerated.

Questions to consider

As your organization considers its digital transformation strategy, it's important to look closely at your requirements. Some questions to consider:

Is your enterprise going through a digital transformation that is driving increased requirements and consumption across the network?

Is your network architecture becoming more complex due to multiple service providers, multiple technologies, multiregional locations, multiple architectures, or poor security?

Are you paying a premium for traditional network services like MPLS, exacerbated by the increased consumption in bandwidth and rising cost of management?

Are you late to market or unable to fulfill customer requirements quickly due to network performance, lack of integration and manual execution?

If these questions apply to your organization then it's time to change your approach. Kyndryl™ is in a unique position to address these challenges. We've been providing network services to the enterprise for over two decades and have over 270,000 network devices under management. We recognize the criticality and importance of the network, not only within the enterprise but over the wide area, as clients begin to transform and shift to more cloud-based business models. We provide a multivendor, fully brokered, orchestrated and automated intelligent control point for integrating and managing multivendor virtual network functions. This control point simplifies network integration across traditional and cloud-based network services.

Kyndryl Cloud Network Intelligent Control Center

Intelligence built into network transformation and management and delivered as a service
Kyndryl's Cloud Network Intelligent Control Center (CNICC) is a control point for integrating and managing multivendor virtual network functions and services. Leveraging intent-based orchestration and software-defined methods, it reduces hybrid cloud network integration complexity and improves implementation cycle-time while offering selection based on unique network needs. CNICC delivers value across the full lifecycle of a network including design, transformation and management.

Application design and behavior drive specific demands on network functions—this complexity increases when cloud is introduced. To meet business demands and quickly release applications, developers and IT leaders look to seamlessly integrate network functions without expensive capital outlays or disruptive data center transformations. CNICC provides the control plane to fulfill this shift in expectation.

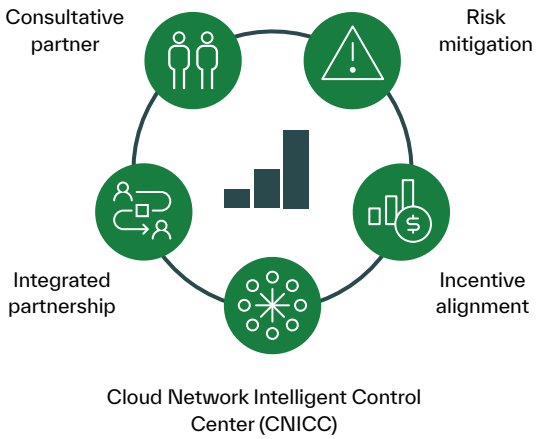

Figure 2: Guiding principles

Value
CNICC takes the complexity out of transforming, implementing and managing complex network architectures. This allows for faster time to market, greater access to cloud technologies, business model flexibility, capex reductions, and broad vendor and supplier choice.

Differentiators
We help drive transformation in the network and simplify the transformation across the enterprise network by focusing on five guiding principles:

- **Consultative partner:** With our SDN Consulting practice, we take a vendor-neutral position and focus on providing the best solution for moving to a virtualized and cloud-based network while leveraging Kyndryl's buying power and relationships.
- **Integrated partnership:** Kyndryl leverages best-in-industry network talent. With over two decades of experience in the transformation and management of enterprise networks, we have extensive experience managing partner ecosystems, co-creating cooperative innovation of pioneering solutions, along with a dedicated NFV/VNF integration development team focused on intent-based orchestration. A dedicated cloud platform manages CNICC across multiple availability zones, delivering high levels of services availability.
- **Risk mitigation:** Kyndryl is open to supporting less established OEM partners and using Kyndryl security best practices across the entire solution.
- **Incentive alignment:** We develop pricing and KPI models flexible to your expectations and business practices.
- **Cloud Network Intelligent Control Center:** To keep pace with change, CNICC is vendor agnostic and leverages DevOps principles such as CI/CD for NFV/VNF deployments including built-in performance monitoring and logging across services. Built around Red Hat® Ansible® and Red Hat Ansible Tower, CNICC leverages Ansible to reliably execute tasks across 570 different types of network devices, enabling idempotent configuration management and ensuring the network functions in its intended state. With intent-based orchestration, lifecycle plans are automatically generated and executed in the correct order; this brings the network automatically into its desired state. Manual interactions and the corresponding various interpretations are removed by applying standard operational patterns using automation to drive the desired state.

Cloud Network Intelligent Control Center

This is Kyndryl's IP using Red Hat's Ansible Automation Platform to deliver:

CNICC Orchestration Service
Delivers a cloud-based control point for integrating and managing network functions. The services are deployed in a multi-active pattern, enabling a high level of resiliency and helping disaster avoidance.

CNICC Operational Insights
Provides proactive visibility from a single point of control into network health, transformation, performance and service-level objective, and change management.

Orchestration Flow
Insights Flow

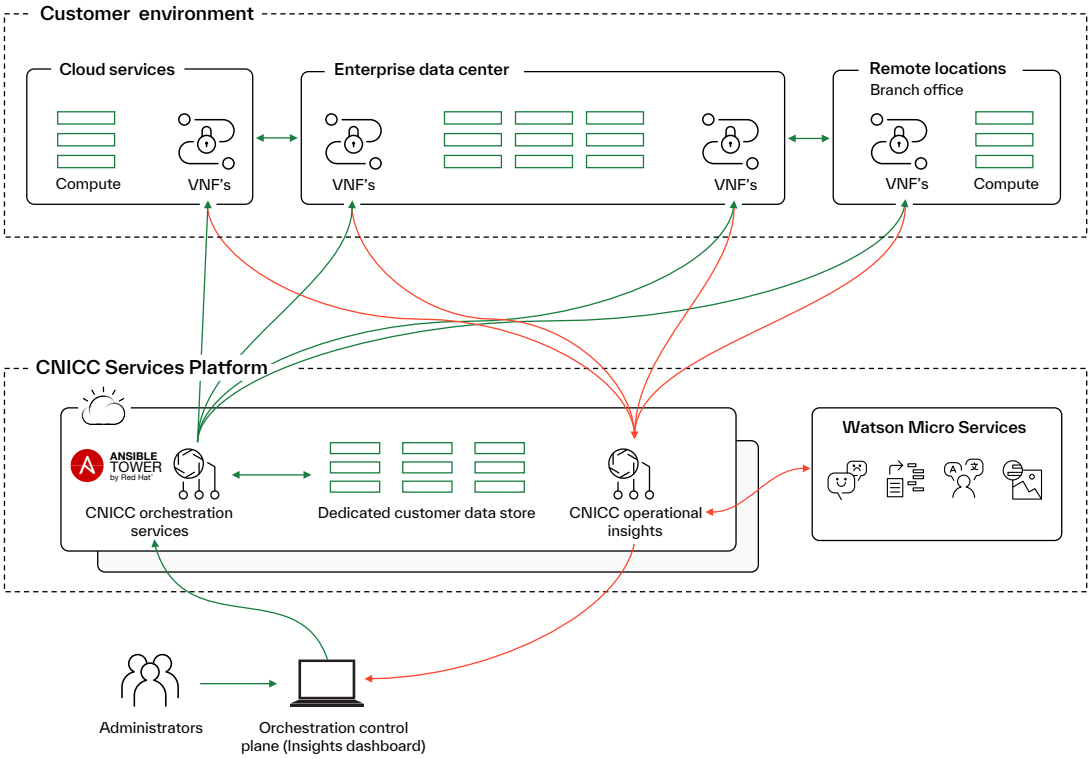

Figure 3: High level component model

To drive deeper intelligence, we developed self-healing and auto-scaling capabilities. These help ensure the desired state of the network is maintained by taking automated corrective actions to re-establish state, heal and scale without manual intervention.

CNICC High-level component model and flow
CNICC provides two core functions; an orchestration service and an operational insights service. By using a centralized cloud-based orchestration service an administrator can build, configure, deploy and enable VNF services across disparate locations in an automated and consistent way, enabling secure interconnectivity and services across locations.

Once deployed and enabled, the CNICC Operational Insights engine provides network visibility across the estate by visualizing the health, performance and service-level objective attainment. As anomalies are detected, or predicted, the CNICC Operational Insights engine can self-heal and scale to deliver expected VNF functionality.

In networking, we are moving from a practitioner-led, technology-assisted way of implementing and managing a network architecture to a technology-led, practitioner-assisted approach.

Conclusion

The automation and self-healing capabilities we've seen in systems and storage are now causing the same disruption and opportunities within networking. With SDN and the virtualization of network services into programmable software components, we can shift from a practitioner-run organization to a technology-run organization. Orchestration and automation can handle a high percentage of incident, problem and service requests while the practitioners handle complex issues and look for opportunities of continuous improvement.

The enterprise network of the future will drive virtualization across the enterprise infrastructure by using SDN-enabling the enterprise for wide-area networking at scale. As workloads shift to cloud and applications modernize for cloud, service chaining these virtualized network functions and platforms (VNFs/NFVs) that reside in the legacy data center and cloud environments will need a DevOps mindset with orchestration and automation to drive consistency across these diverse environments.

This is where we can lean on our Kyndryl's cloud and data experts who have applied their experience across industries.

Why Kyndryl

Kyndryl has deep expertise in designing, running and managing the most modern, efficient and reliable technology infrastructure that the world depends on every day. We are deeply committed to advancing the critical infrastructure that powers human progress. We're building on our foundation of excellence by creating systems in new ways: bringing in the right partners, investing in our business, and working side-by-side with our customers to unlock potential.

For more information

To learn more about Kyndryl Network Services, or Software Defined Networking and Programmable Networks, please contact your Kyndryl representative or visit kyndryl.com

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1 Next-generation hybrid cloud powers next-generation business: Hybrid cloud can help address the barriers to successful cloud deployments, IBM Market Development & Insights and IBM Institute for Business Value Research, August 2019