# Case Study: Anuta NCX empowers Telstra Cloud Gateway to deliver Global Interconnect Services

Overview:

Telstra Cloud Gateway enables managed enterprise customers with private and dedicated connectivity to multiple cloud platforms. The solution offers end-to-end service including data carriage, configuration and support. Telstra Cloud Gateway presents a simplified self-service portal for customers to decide their choice of cloud and within minutes the infrastructure is provisioned with improved security and application performance.
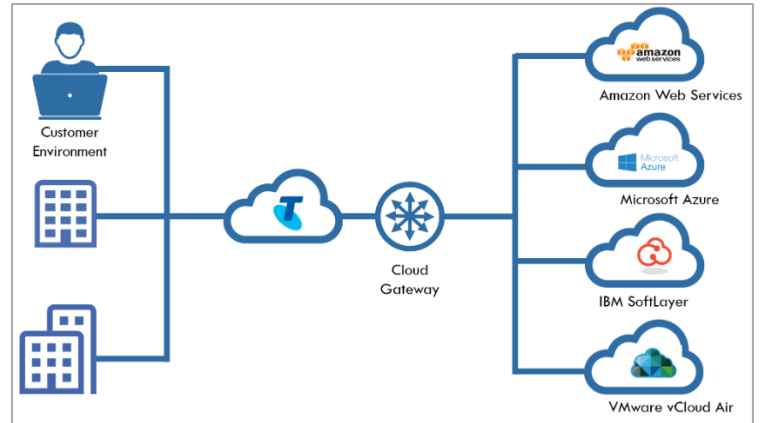
Telstra has pioneered Cloud Data Center Interconnect (CDCI) technology to offer a one-stop-shop infrastructure as a service by connecting multiple clouds to suit different customer requirements: vCloud Air for "Virtualized Environments, IBM Soft Layer for "Bare Metal" applications such as legacy applications as well as Amazon AWS and Microsoft Azure public clouds.

Technology Overview:

Domestic: Telstra uses its Provider Edge (PE) routers (ASRs) in their domestic locations and extends customer Virtual Route Forwarding (VRF) instance to Cloud Edge ASRs in multiple Equinix locations. The Equinix Internet Exchange Point (IXP) will peer with multiple cloud provider (AWS, Azure, vCloud Air, CCS, IBM SL) edge routers.
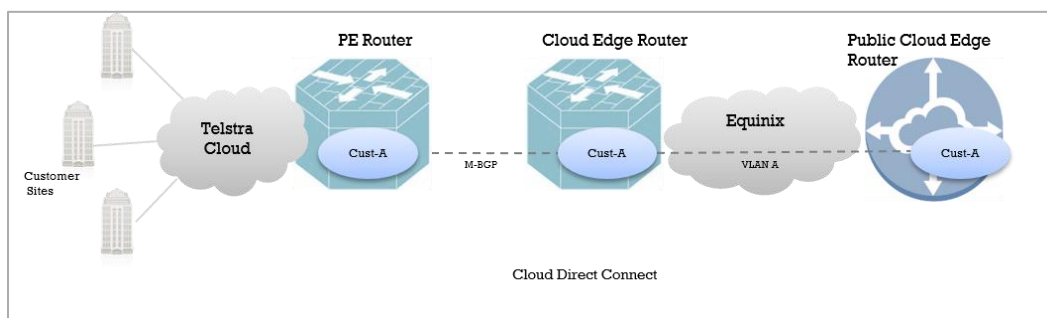
Global: The Global Cloud Gateway enables Telstra Global customers in APAC, US and UK to connect to Global cloud providers. Global Cloud Gateway follows the same design principles as Domestic deployment. However, the Global Cloud Gateway design utilizes dedicated VNFs for each customer CE router in place of the shared ASRs.

Provisioning Challenges:

Telstra received significant interest for their cloud gateway project during the pilot phase. The network operation team was inundated with provisioning hundreds of customers, each with a different set of preferences.

Each customer operation requires configuring complex networking protocols and technologies such as inter AS-MPLS, eBGP Peering, VRF separation, Private and Public Route Domains (RD), BGP Authentication, QinQ tagging, QOS Policing and Access List (ACL) configuration across multiple internet exchange points (IXP). All of these policies have to be in-sync all the time to ensure customer connectivity to multiple clouds.

Every single change request to move, add, change (MAC) the customer deployment required a complex process to avoid human errors. The Cloud Gateway environment was going through rapid innovation with the addition of new cloud platforms every quarter. Telstra needed a network orchestration platform that can automate and accelerate service provisioning and yet be flexible enough to accommodate enhancements quickly.

Technical Requirements for Orchestration:

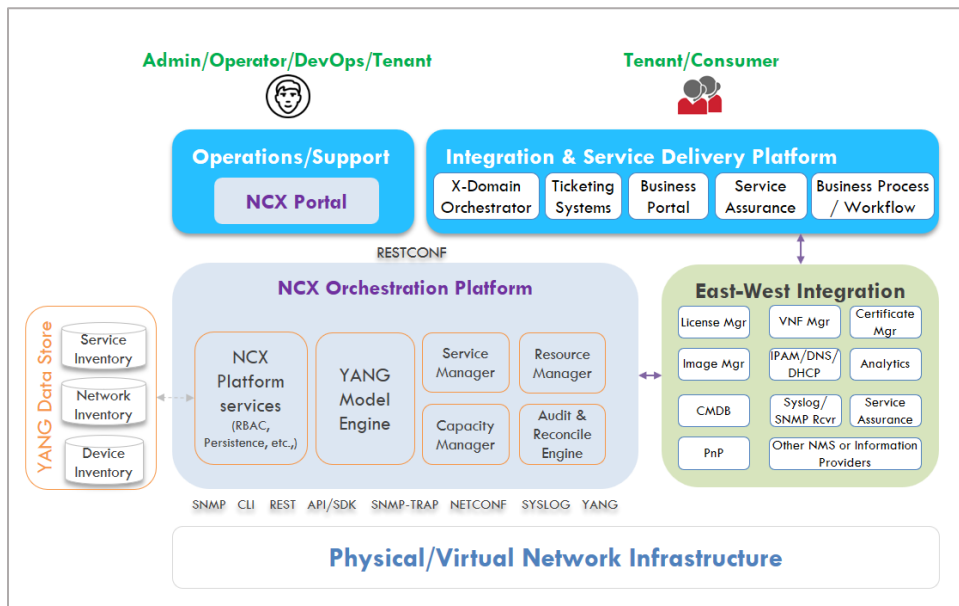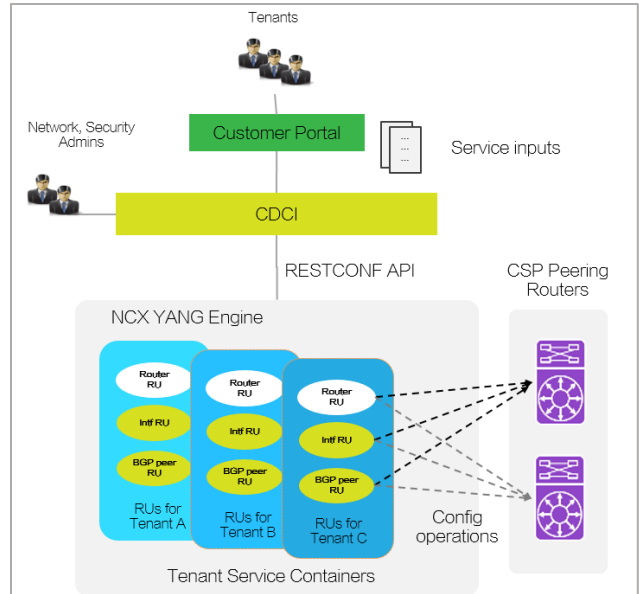| Requirement	Detailed Description
Device Support	Cisco ASR family and Cisco Virtual Routers.
Feature Support	L3 Interfaces, VRFs, Q-in-Q tagging, BGP, Static Routes, QOS, Day 1 Configuration, Smart Licensing, Prefix lists, Access Lists, Route Policies and Selective Route Leaking.
Multi-tenancy	The Orchestrator must be able to configure shared infrastructure while ensuring security and availability for each tenant.
Extensibility	Each Cloud Provider (Azure, AWS, vCloud Air etc) has its own methods and limitations of supporting the internet peering. The Orchestrator tool should be flexible to model various connectivity scenarios without requiring constant software patches. Telstra operations team is expected to update the service definition on-the-fly without vendor help.
Scalability	The solution is expected to scale to thousands of enterprise customers within the next two years. The automation solution should be able to scale horizontally with customer growth.
Self-Service	Telstra would like to offer a self-service portal so that customers can order new services, monitor and modify existing services as well as terminate services on-demand. The orchestration tool must integrate with Telstra's homegrown Cloud Gateway provisioning platform
Flexible Licensing	Telstra wanted a flexible Pay-As-You-Grow model with limited up-front cost.

Anuta NCX Solution:

Cloud Interconnect services are offered to the customers through a self-service portal. Customer requests through Telstra portal will be routed to CDCI Engine. CDCI engine would request VNF's to be deployed in the server farm. Once the VNF's are deployed, CDCI requests NCX to enable cloud connectivity.

Anuta NCX Network Service Orchestrator uses a layered, YANG model-driven approach that helps deliver vendor-neutral, extensible, scalable, and maintainable network services for both brownfield and greenfield deployments.

NCX platform enables customers to automate ANY network service across ANY network domain, ANY type of technology or architecture, ANY vendor, platform, or device and ANY Southbound Interface.

NCX includes device adapters for hundreds of different platforms from thirty-five different industry-leading vendors and provides starter kits to various use cases in multiple networking domains; including Data Center, Campus, Branch, WAN, Carrier Core, and more.

Also, NCX constantly monitors your network's elements. The customer can simply describe key performance indicators that should be monitored, and the necessary corrective actions, and they will have visibility over the entire infrastructure.

Core Capabilities of Anuta NCX	Enhancements Delivered
Accelerated Tenant On-boarding Anuta NCX automates the configuration of network services across L2-L7 multi-vendor physical, virtual and hybrid networks. NCX self-service delivery avoids handoffs between multiple operator teams resulting in lower overall OPEX and time to market.	Accelerated Time to Market
Extensible Platform with YANG Modeling NCX uses an extensible, IETF YANG based model-driven configuration and service management engine for managing multi-vendor devices. The rich YANG model enables Anuta NCX to integrate seamlessly with any platform, device or interface/protocol, delivering a truly open architecture.	Supported Multi-Vendor devices for each technology in the Telstra Environment and helped Telstra develop customized device, service and operational models.
Performance and Scale NCX distributed architecture scales to several tens of thousands of devices in the network. Both the NCX controller and agent are stateless resulting in a highly available solution. For large scale deployments, NCX supports external DB such as Oracle / Postgres SQL to store server state.	Delivered Scalability for DevOps Operations of any size and in any sector
Multi-Tenancy and RBAC (Role Based Access Control) The solution requires only one instance of NCX to manage multiple customer's infrastructure. NCX tracks each tenants' resources and tags them separately. NCX offers comprehensive role based access control and integrates with AD and LDAP to enforce authorization policies.	Catered for multiple organization and conforms to industry best practices and ensures compliance with regulations
Resource and Capacity Management NCX discovers network infrastructure including device type, role, capacity, and topology. Admin can organize the resources into multiple pods and resource pools for service provisioning. NCX maintains a real-time inventory of physical and virtual network resources and computes capacity and availability for each service offering. NCX also generates threshold based alerts to inform the impacted tenants.	Discovered existing network services and enables self-service automation for them. This relieves the operators from trivial network changes.
Integration with Self-Service Portals NCX integrates with multiple self-service portals, ticketing systems and charge back systems using a comprehensive REST API. NCX is already integrated with OpenStack, Science Logic, VMware vRealize and many other customer's home grown portal. The entire NCX Admin portal is developed using the same REST API.	Provides a fully-fledged Self-Service solution.

VNF Life Cycle Management NCX Virtual Appliance Lifecycle manager enables administrators to customize the Virtual Appliance configuration (e.g. image management, placement), activate licenses, provision services and monitor the Virtual Appliance performance and availability. The NCX service orchestrator introduces new Virtual Appliances to dynamically scale-up and scale-down the network.	Managed the life cycle of Cisco Virtual Router and helped scale the network on-demand.
Orchestrated Service Assurance Anuta NCX utilizes Key Performance Indicators (KPI) driven orchestration to ensure Service Monitoring and Service Assurance. Administrators can define KPI based one or more data points from multiple nodes and links. For example, KPI may include CPU, RAM usage, the number of sessions in one or multiple network functions (Router, FW, LB, SBCs) along with link parameters such as utilization, jitter and delay.	Telstra can define their own health, capacity and operational metrics and NCX will enforce necessary corrective actions.
Flexible Licensing Options Anuta Networks offers perpetual as well as subscription licensing options for NCX. The total price depends on the deployment size (charged per number of devices) and the specific use-case.	Telstra can take advantage of the Pay as you Grow model to support their phased roll-out approach.

Results and Key Learnings:

Anuta NCX enabled Telstra to deploy Cloud Gateway project as planned to offer multiple clouds to their domestic and global customers.

1. Delivered inter cloud network provisioning through a self-served portal within minutes
2. Reduced network team's involvement in change requests by 70%.
3. Service Models for customer use-cases were developed in less than 2 weeks.
4. Introduced consistency to network operations and improved overall security and compliance.
5. NCX offered a YANG based Extensible Platform to support future growth and requirements

Five Key Differentiators of Anuta NCX:

1. Supports the largest range of vendor devices such as Cisco, Juniper, Infoblox, Checkpoint, Citrix, F5, Fortinet, Palo Alto Networks, HP, Bluecat, Infoblox, Radware and VMware.
2. Yang Model-driven, extensible and scalable platform with the most comprehensive support for physical and virtual network devices and new age SDN controllers.
3. Support for Branch, Campus, Data Center and Carrier Core infrastructure automation across large enterprises, service providers and telecommunication operators.
4. Integrated Service Fulfillment testing with results.
5. Resource Management and KPI driven Service Assurance capabilities.

About Anuta Networks

Anuta Networks is the industry-first provider of end-to-end network services orchestration solutions for large, medium enterprises and service providers. The Company's Network Services orchestration solutions help organizations of all sizes accelerate deployments of network infrastructures and bring agility to the network. Anuta Networks' partnerships with industry leaders such as Cisco Systems, F5 Networks, VMware and many others further enable customers to rapidly transform their network services in agile infrastructure deployments. The Company is headquartered in Silicon Valley with offices in Japan, Australia, Ireland, France, Spain and India.