

CASE STUDY

EQUINIX USES 'CISCO NSO ENABLED BY TAIL-F' TO AUGMENT THE ORCHESTRATION OF ITS CLOUD EXCHANGE SERVICE

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Executive summary: Equinix accelerated its cloud aspirations by using Cisco NSO for self-provisioning of its Cloud Exchange service

Equinix is a provider of interconnection and data center services, serving more than 4800 customers through its network-neutral International Business Exchange (IBX) data centers across 15 countries.

Fast implementation and customer self-provisioning were key to Equinix in order to differentiate itself from the competition by giving its cloud customers agility and a competitive edge.

Recognising a growing demand for secure, high-performance and reliable connectivity to a large ecosystem of cloud providers, Equinix launched its Cloud Exchange offering, which is an interconnection service that provides on-demand private virtual connections for direct access to cloud provider services.

Equinix's primary aim with Cloud Exchange was to provide cloud agility self-service features with Cisco NSO¹, which is a commercial-off-the-shelf (COTS) network orchestration solution that fit Equinix's multivendor multi domain network device configuration orchestration requirements. As a result, Equinix achieved the following key benefits, of which improved operational efficiency and customer experience were by-products:

- Near zero-touch provisioning that reduced service activation to about one-tenth of the time typical without Cisco NSO.
- Accelerated time to market: it launched its Cloud Exchange services within 90 days from the start of procurement.

Figure 1: Summary of the benefits achieved by Equinix through the implementation of the network automation solution

Near zero-touch provisioning

Reduced service activation time

Increased operational efficiency through automation

Improved customer experience with self-provisioning

Accelerated time to market within 90 days

Future-proof architecture for launching new services

¹ Following Cisco's acquisition of Tail-f in July 2014, Tail-f's Network Control System (NCS) product, which was deployed by Equinix to support its Cloud Exchange service, is transitioning to the Cisco portfolio as "Cisco Network Services Orchestrator (NSO) enabled by Tail-f". As such, it is referred to as Cisco NSO in this case study.

Equinix aims to sustain its continuous growth in the highly competitive data center co-location and interconnection services market

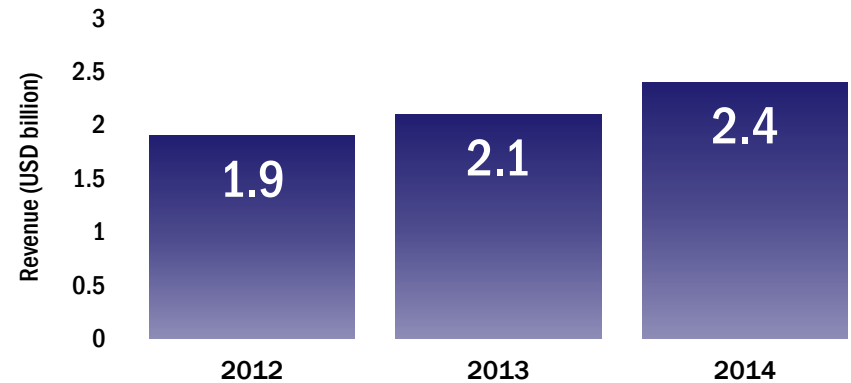
Equinix is a provider of interconnection and data center services, headquartered in Redwood City, California, United States. The company serves more than 4800 customers from a large variety of industries including cloud and IT services, network and mobile providers, content providers, financial companies and other large enterprises. It operates network-neutral International Business Exchange (IBX) data centers in 33 metro areas across 15 countries.

Equinix's solution portfolio mainly includes data center colocation services comprising space, power and cooling; interconnection offerings such as Cloud Exchange, Internet and Carrier Ethernet exchange services; and managed IT infrastructure services.

The company continues to grow its revenue and expand its footprint and offerings in new markets. It reported USD2.4 billion revenues with a 14% year-on-year growth in 2014. It generates more than half of its revenues from the Americas (NA and LATAM) and has established market presence in EMEA and APAC, which account for 26% and 18% of its overall revenue, respectively.

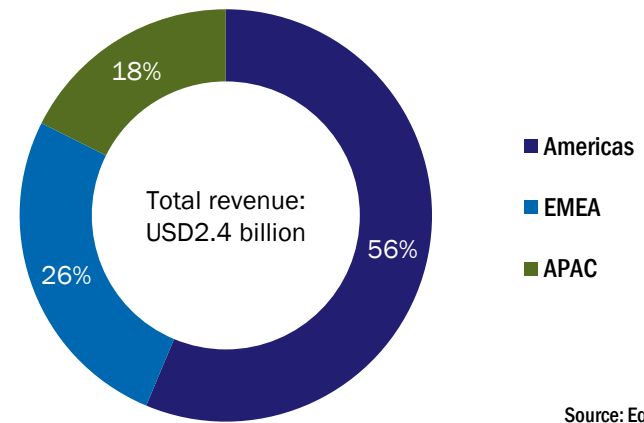
Competition in the data center colocation and interconnection market is intense; numerous carrier/cloud-neutral colocation providers, notably CoreSite, DigitalRealty, Interxion and Telecity Group, compete. Also, many CSPs such as AT&T, CenturyLink, Level 3, NTT and Verizon provide data center and related services in various markets and they are increasingly partnering with carrier and cloud neutral providers like Equinix in order to provide lower-cost multi-cloud connectivity to global cloud service providers.

Figure 2: Equinix's revenue by region, worldwide



Source: Equinix, 2015

Figure 3: Equinix's revenue, worldwide, 2012-2014¹



Source: Equinix, 2015

¹ Americas (North America (NA) and Latin America and the Caribbean (LATAM)); EMEA – Europe, the Middle East and Africa; APAC – Asia and Pacific regions.

Equinix launched Cloud Exchange service to support best-of-breed cloud strategies with high-performance and secure data centre connectivity

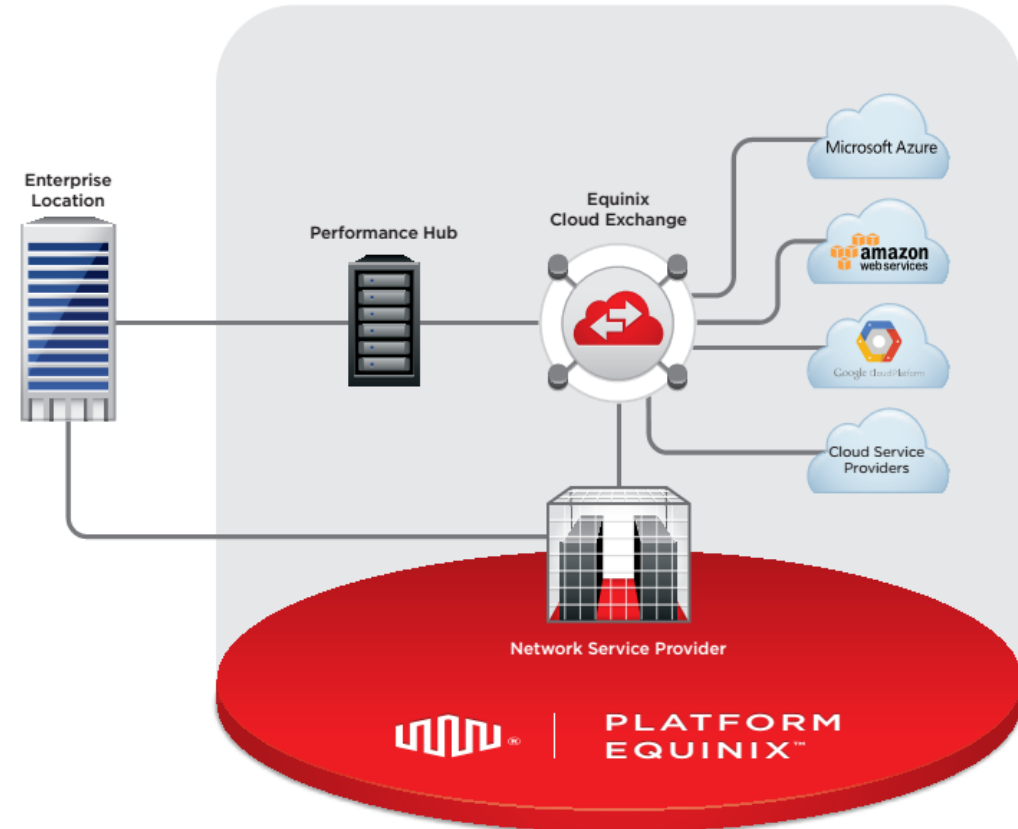
Enterprise IT is moving to public (SaaS, IaaS and PaaS), private and hybrid cloud environments to increase scalability and achieve capex/opex savings, requiring mission-critical applications to be delivered securely with high-level uptime and very low latency, which cannot be guaranteed using public Internet to connect cloud service providers and enterprise data centers.

Widespread adoption of cloud services also led to a shift in the role of enterprise IT departments, which are becoming cloud service procurers that are responsible of identifying and acquiring the most suitable cloud services for their specific applications' computing and storage needs in a bid to maximise the benefits of cloud with a best-of-breed approach and prevent vendor (and cloud provider) lock-in.

Recognising this growing demand for secure, high-performance and reliable connectivity to a large ecosystem of cloud providers, Equinix launched its Cloud Exchange offering in April 2014. Cloud Exchange is an interconnection service that provides on-demand private virtual connections for direct access to cloud providers, as shown in Figure 4.

The service enables data centre interconnection to around 450 cloud services including Amazon Web Services (AWS), Microsoft Azure, Google Cloud Platform and others, either via co-location in a Equinix data center or through a network services provider (NSP), through a single port connection. The service is available in 21 Equinix IBX locations worldwide, as of March 2015.

Figure 4: Equinix Cloud Exchange service overview



Source: Equinix, 2015

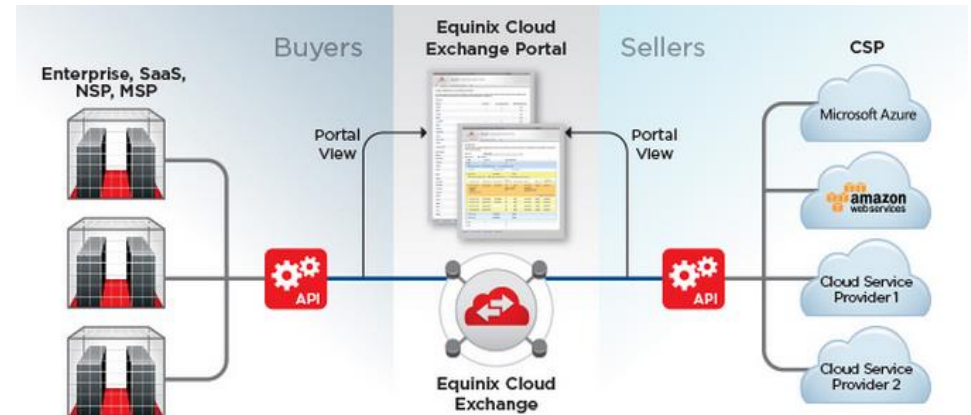
Equinix needed to enhance its SDN-based network management solution to allow customer self-service provisioning for multi-cloud connections

Quick implementation time and customer self-provisioning gives cloud customers agility and a competitive edge to bring new services to market faster and cost-effectively. However, developing high performance and secure connections in multi-cloud environments was time consuming and costly for Equinix; it typically took days or weeks using manual network configuration and service provisioning processes in its multivendor networks.

To overcome this challenge, Equinix developed an in-house network management solution to manage its Cloud Exchange service – Equinix Programmable Network (EPN). EPN is a logically centralized vendor-agnostic SDN subsystem for managing layer 2/3 virtual private network (VPN) and border gateway protocol (BGP) network services. With EPN, Equinix wanted to simplify the service provisioning process by enabling customers to provision multiple cloud services connections in near real-time through Equinix's Cloud Exchange self-service secure portal.

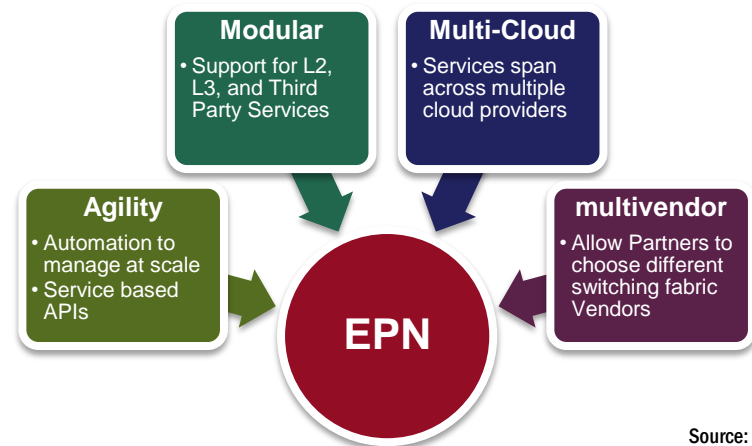
Equinix had to automate the service provisioning process in order to reduce activation times and deliver advanced on-demand connectivity services, while simultaneously keeping operational costs down by eliminating inefficient manual processes. As such, Equinix needed to enhance EPN with programmable multivendor network configuration capabilities for heterogeneous, multivendor customer and cloud partner network devices through common APIs.

Figure 5: Equinix self-service portal (Equinix Cloud Exchange) and API integration



Source: Equinix, 2015

Figure 6: Equinix Programmable Network (EPN) design principles



Source: Equinix, 2015

Cisco NSO gave Equinix a vendor-neutral and model-driven network orchestration solution to accelerate Equinix's time to market

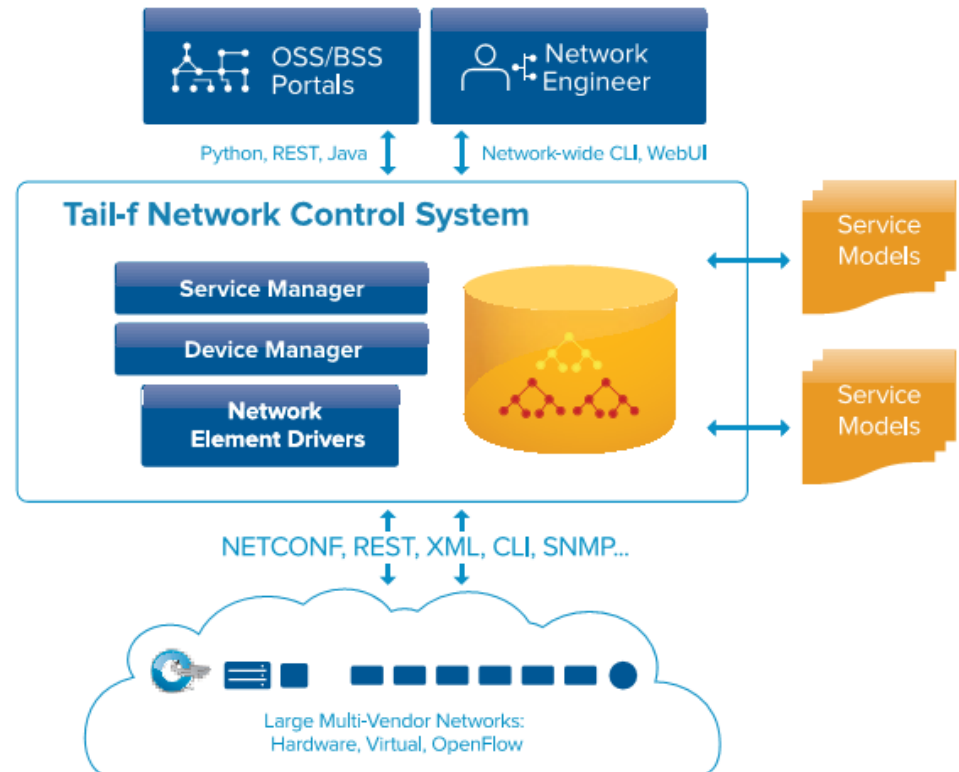
Equinix's primary aim with Cloud Exchange was to provide cloud agility self-service features. It was prepared to hire developers to create a multivendor network configuration solution to complement EPN, however, Cisco's Network Services Orchestrator (NSO) COTS network orchestration solution was a better fit for Equinix's multivendor multi domain network device configuration orchestration requirements.

Equinix was looking for a solution that would provide support for all legacy, new and forecasted network and service requirements as well as for its physical and virtual network elements. Also, it was important for the solution to be model-driven and standards based for easy integration with Equinix's upstream applications.

Equinix started its vendor selection process in early April 2014, and selected to deploy Cisco NSO because of its ability to:

- quickly deliver a working COTS solution based on the IETF YANG/NETCONF data modelling with support to other common protocols and interfaces, i.e. REST, CLI, SNMP, etc.
- support multivendor networks; Cisco NSO is interoperable with network equipment from 70 vendors
- support complex multi-cloud environments by enabling automated configuration of multiple network elements with fail-safe rollback configurations.

Figure 7: Overview of Cisco Network Services Orchestrator (NSO) enabled by Tail-f



Source: Cisco, 2015

Implementation took no more than 90 days thanks to an agile, reusable PoC implementation in addition to NSO being a COTS product

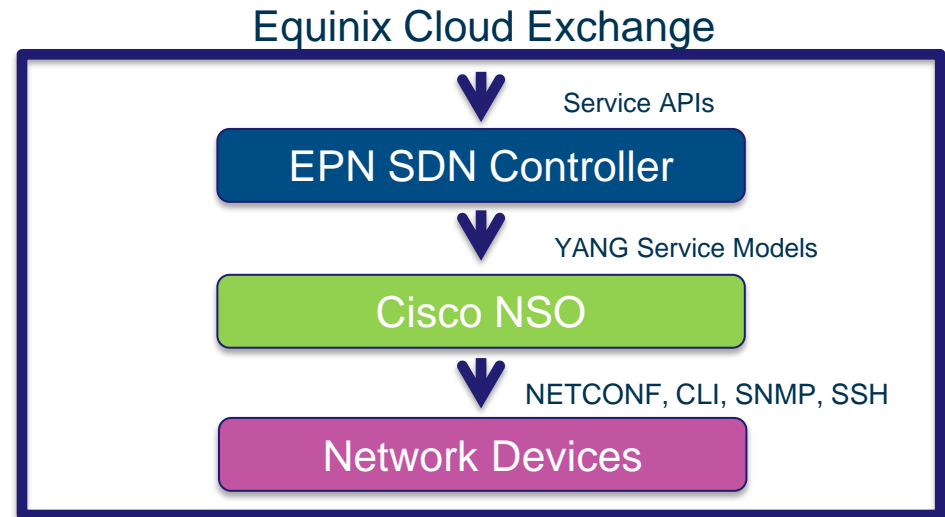
Equinix completed the vendor selection and commercial deployment in July 2014, within 90 days after the procurement process started. The Cisco NSO initial proof-of-concept (PoC) implementation, which includes prototyping, deployment of sample network services and pre/post provisioning, was reused to significantly reduce the commercial implementation timeline.

Equinix's Cisco NSO provides an IETF YANG/NETCONF compliant network mapping for Cloud Exchange services delivery that automates the end-to-end service provisioning by receiving YANG service model requests from the EPN controller and converting them to the respective network device configurations of its multivendor network, as shown in Figure 8.

As part the implementation process, Equinix and Cisco/Tail-f carried out the following activities:

- service design and implementation, including YANG to NETCONF mapping, resource accounting, authentication, access control and transaction management tasks
- southbound REST API development to the network devices which do not support NETCONF
- integration with EPN through northbound APIs from Cisco NSO developed by Cisco/Tail-f
- revision of the deployment design for commercial launch and customer self-provisioning functionalities.

Figure 8: Equinix Cloud Exchange architecture with EPN and Cisco NSO



Source: Equinix, 2015

The implementation is in a new phase as of March 2015, which includes connections to more 3rd party cloud providers. Also, Equinix is developing layer 3 (IP) VPN network services and connectivity with Cisco InterCloud. This involves integrating with Cisco Nexus 9000 Series switches and the Cisco APIC (SDN) controller.

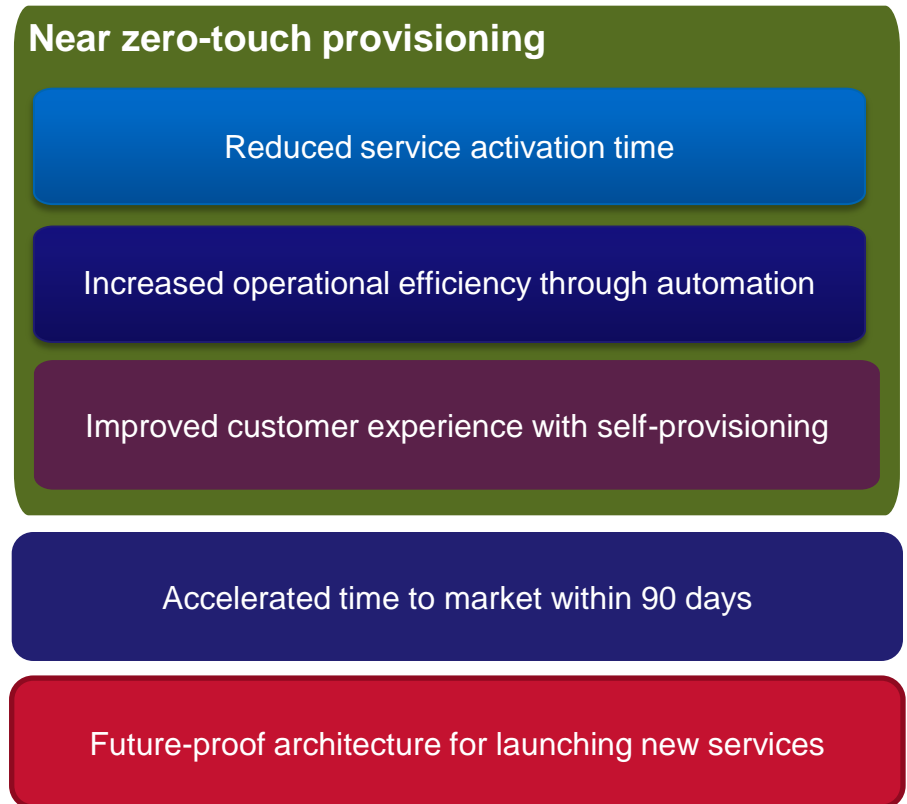
In future, for enterprise customers Equinix plans to explore policy consistency checking with Cisco for VNF service chaining with NFV/SDN orchestration.

Benefits achieved

Equinix achieved the following benefits from implementing Cisco NSO for its Cloud Exchange service offering:

- **Near zero-touch provisioning:** end-to-end automation enabled customer self-provisioning and reduced service activation to about one-tenth of the time previously required: Service activation can take up to one day with one network engineer if manual port configuration and wiring is needed compared with 10 days with 10 network engineers. If the port is already provisioned service activation can occur in minutes from the customer self-service portal. The above provides the additional by-product benefits:
 - increased operational efficiency from automated service provisioning and configurations
 - improved customer service thanks to empowerment by the self-service portal.
- **Accelerated time to market for Cloud Exchange services:** Cisco NSO enabled Equinix to launch its commercial service within three months using COTS and limited software development, compared with a mixture of in-house and about three external developers, which Equinix estimates would have taken about six months. Also, because the architecture is YANG/NETCONF compliant and automated Equinix sees it as future-proof and enabling new and enhanced services to be launched quickly and cost-effectively. At present, Equinix does not plan to use this new architecture for legacy services.

Figure 9: Benefits achieved by Equinix through the implementation of the network automation solution



Source: Analysys Mason, 2015

About the authors



Gorkem Yigit (Research Analyst) is part of the Telecoms Software research team, contributing to the Software-Controlled Networking, Service Delivery Platforms, Infrastructure Solutions and Service Assurance programmes. He started his career in the telecoms industry with a graduate role at a leading telecoms operator, before joining Analysys Mason in late 2013. He has also written an academic paper about market acceptance of cloud enterprise resource planning (ERP) software and he earned a cum laude MSc degree in Economics and Management of Innovation and Technology from Bocconi University (Milan, Italy).



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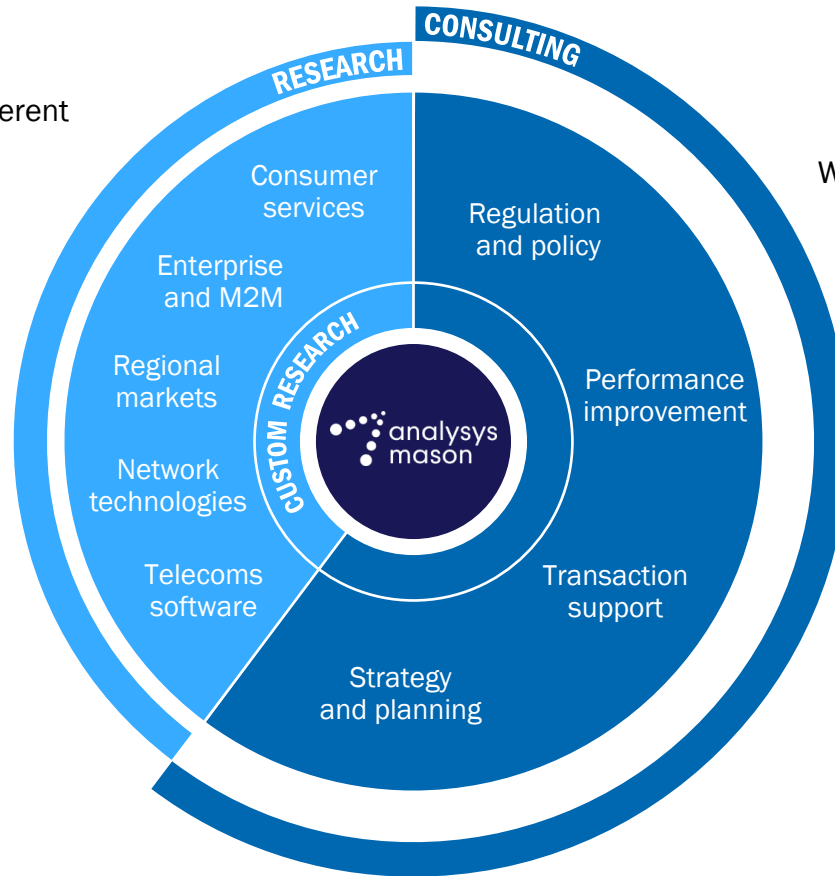
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