Tier-1 Telco Disaggregates its Broadband Network

The Operator

This case study describes the deployment of a disaggregated broadband edge in one of the largest telcos in Europe. They are an incumbent national operator with over twenty million broadband subscribers.

Network Challenge - Cost

The telco projected the costs of providing its residential broadband service, which has a significant portion of homes-passed using Fiber to the Home (FTTH), and found that they would become unsustainable. Like most telcos, its customers were demanding ever more bandwidth, and their revenues were not rising proportionately. Their architecture team looked at every aspect of its service provision and concluded that one of the areas it should be able to reduce costs was its Broadband Network Gateway (BNG) routers. These devices provide the IP services to its consumers at its network edge. It realized that recent advances in 'merchant silicon' could allow it to deploy BNGs based on open white-box switches, using third party software, at much lower cost points than it could get from traditional BNG router vendors, who only offered monolithic systems running on proprietary silicon.

Evaluating A Disaggregated Solution

It set out on a project to evaluate hardware and software from multiple vendors, with key criteria being a carrier-grade solution that could replace its existing multiservice edge routers, but at lower cost points and with the flexibility to interchange hardware vendors and software vendors, rather than being locked into a single supplier. It also embarked on a program to integrate the OSS/BSS systems into a more modern, cloud-native architecture, with more automation.

It established a supply chain for open-switches that can be interchanged with those from alternate vendors, if needed. And it selected RtBrick's multiservice edge routing software to provide the BNG functionality.

The Disaggregated Edge Goes Live – At Scale

The first live customer was connected to the disaggregated edge in 2021. Following extensive testing and a pilot that included integration into operational support systems, it has since rolled out multiple open-switches in over 160 locations. The move will eventually see the operator replace all its traditional chassis-based Broadband Network Gateways (BNGs), the routers responsible for delivering fixed broadband services, with open switches and RtBrick's routing software.

The operator has purchased RtBrick software licences to deliver connectivity to more than ten million residential broadband subscribers.

Switching Hardware

The operator has deployed a range of Ufispace switches based on Broadcom Q2C chipsets. They are deployed in a Spine-Leaf architecture to provide huge scale. It selected Ufispace 9600-72XC switches for the leaf functions and Ufispace

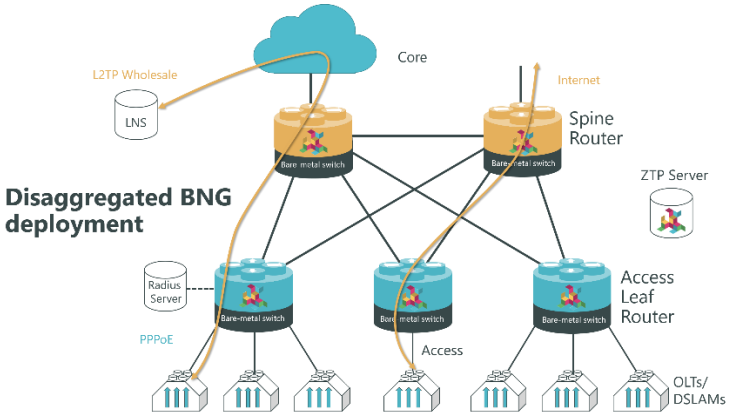
Ufispace 9600-72XC Open Switch

9600-32X switches for the spines. Both platforms provide 2.4Tbps of throughput and take up 2RU (Rack Units) of space. The leaf platforms are each capable of handling tens of thousands of broadband subscribers, and the spines connecting the leafs together support many 100Gbps ports.

Routing Software

The operator deployed RtBrick's multiservice edge routing software on the open switches, which is tightly integrated with the underlying silicon in the open switches for scale and power-efficiency. It runs as a container in Open Network Linux, which is provided with the switches.

The RtBrick routing software acts as the BNG in the operator's network, along with providing Hierarchical Quality of Service (HQoS), lawful intercept and IPTV services. It replaces traditional chassis-based routing systems.



A Spine-Leaf Architecture delivers huge scale

The RtBrick routing software provides the access protocols, PPPoE and L2TP, as well as core routing protocols including BGP and IS-IS. The spine-leaf is interconnected with a resilient routed mesh, following the BGP in Data Center paradigm as described in RFC 7938, which uses industry standard Ethernet and MPLS protocols.

OSS

The systems are configured using ZTP (Zero-Touch-Provisioning) and programmed through RtBrick's open APIs.

Network data is gathered using Prometheus, an open-source time series database. Operational data is then visualized using Grafana, which is a multi-platform open-source analytics and interactive visualization web application. Alerts are generated using Prometheus' built-in Alert Manager.

End-User Services

Consumers are provided with a residential Internet service at speeds up to 1000Mbps, with multiple levels of Hierarchical Quality of Service (HQoS), to prioritise different types of traffic. The new network edge also provides L2 VPN metro business services, whole-buy and wholesale access services for other operators.

Next Steps – More and Faster

The operator has plans to offer even faster services in the future, at speeds up to 10Gbps. It is also in the process of expanding its current deployment to add more than 10 million subscribers onto the new platform.

Conclusions

By taking a completely new approach to its network edge this Tier-1 operator has significantly lowered its cost points and has shown that disaggregation is ready for 'prime-time' deployment at large scale. So, now any operator can benefit from the lower costs and greater flexibility that come from taking this new 'cloud-native' approach to building networks.