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Software Platform-Driven Transformation of the Broadband Access Network

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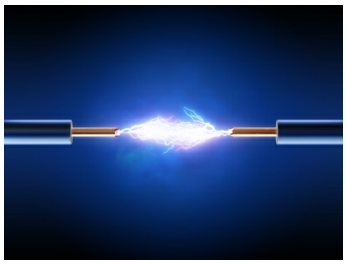
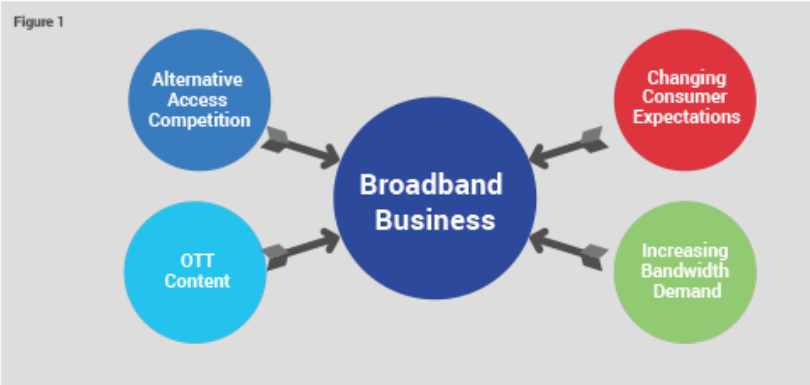


Internet access is increasingly the only network operator-provided service valued by the residential and small business customer, making it challenging for service providers to offer value to their subscribers. When switching costs and differentiation are low, the ability to satisfy and keep paying customers over the long term becomes difficult. Consumers today have a deeper relationship with the media streaming into their homes and the devices that automate their daily habits than the network that actually delivers these services. The traditional view of broadband access is dead. To be successful, service providers must leverage software platforms to transform their business, network, and operations to compete for subscribers in ways that are both familiar and alien.

The business of providing broadband service – collecting a monthly fee to connect a subscriber's home or business to the Internet over a local distribution network of copper, coax, and fiber lines – is healthy and strong. According to a 2017 report published by the International Telecommunications Union (ITU), global fixed-broadband subscriptions have increased by 9 percent annually in the last five years, aligning with data that shows 830 million young people are online, representing 80 percent of the youth population in 104 countries.

The increasing use of cloud services and streaming video has driven up bandwidth consumption and made the need for fixed broadband access more important than ever before. Unfortunately, increased data consumption driving growth in broadband subscriptions tells only part of the business story for service providers. While broadband subscriptions in the U.S. have grown in the past decade, the voice+video+data triple-play service bundle is in full retreat. According to data from IHS Markit, the number of cable customers subscribing to traditional pay-TV in the US has fallen by 10 million, over 17 percent, in the last decade. Bundled pay-TV service, like traditional voice service before it, has been eroded by Over the Top (OTT) streaming media services, leaving broadband internet access as the dominant component of the service provider business case.

Figure 1



Traditional telco and cable network operators are caught in a 'speed trap.' Not one where they must slow down to comply with some theoretical broadband speed limit, but one where they must continuously upgrade their networks to provide ever-faster top speeds, yet garnering little additional revenue for their efforts. Neilsen's Law of Internet Bandwidth has been remarkably accurate in predicting a high-end user's connection speed grows by 50 percent per year. In the next few years, we will pass the 1 Gbps threshold for premium user connectivity speed, putting pressure on service

providers to once again upgrade their access networks.

While the traditional view is that telco and cable operators battle for the subscriber's connection, the real war for the consumer's wallet is being waged by the OTT application megabrands – Amazon®, Google®, Apple®, Facebook®, and Microsoft®.The megabrands are pushing into the home and small business, providing all manner of entertainment, productivity, IoT smart home, and increasingly, wireless networking products that the consumer is quickly adopting. The consumer has a tightly-bound relationship with their wireless IoT smart home devices and talking speakers. In the minds of most consumers, broadband access is nothing more than the unseen connection that brings life to their beloved collection of devices and media sources.

Changing consumer expectations

The consumer experience revolves around the applications and devices that live within their home and smartphone. Speaking on behalf of consumers whose expectations have been established by our online experiences, I put forth these tenets as the cornerstones of the new broadband experience: we crave wireless connectivity everywhere and all the time, we want immediate and flexible service choice and delivery, we want everything to be simple yet come with full-service support, and we want it affordable in incremental bite size portions. Anything less is a disappointment.

To succeed in the business of broadband access, innovative service providers must transform themselves and meet the business objectives of increased service agility, increased operations efficiency, the creation of new revenue streams, and the realization of step-function cost reductions. Fortunately, the path to success has been blazed by the megabrand application providers.

The engine of innovation

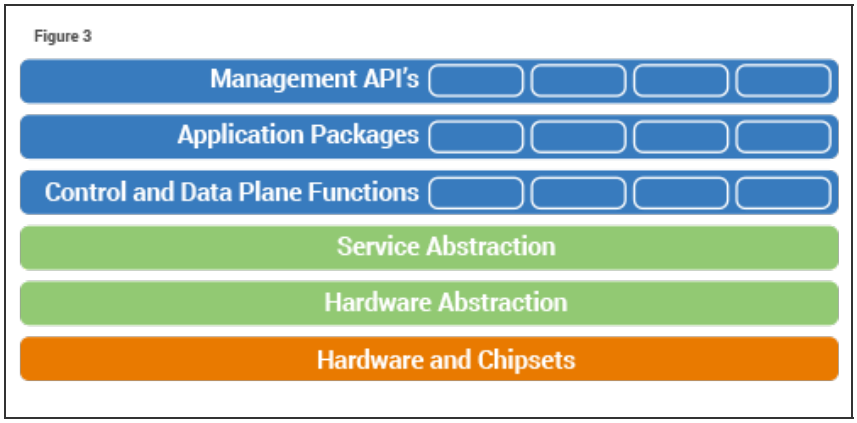
In the past, transformative innovation in the broadband business came from the silicon chipsets providing the physical layer connection between the central office or cable head end, and the subscriber's home. Service providers and systems suppliers waited patiently for the next copper, coax, or fiber technology to provide a competitive advantage. Those days are gone. While the physical layer technology is important, going forward, nearly all transformative innovation will be driven by the software that is abstracted from and rides above the physical layer. Software will define the service, not the physical network.

We've seen software-driven transformation occur in the data center and within our handheld devices. We are very familiar with the software platforms driving Amazon Web Services and Google Cloud. On our smartphones, the iOS® and Android® brand names are familiar to most consumers, yet, we mostly think of the applications and benefits derived from these platforms like the Netflix® and HULU® streaming media services made so enjoyable by the pervasively available software platforms. Joining the parade, at the beginning of 2018, streaming media pioneer Roku unveiled a whole home entertainment licensing program and voice-controlled Roku Entertainment Assistant to enable OEM brands to integrate the Roku software platform into consumer devices. Software platforms are everywhere.

Each data center, smartphone, consumer service, and device is being transformed through the power of software platforms that enable virtualized microservices that can be ported anywhere in the network. Continuous development / continuous integration (CD/CI) reduces time to market for

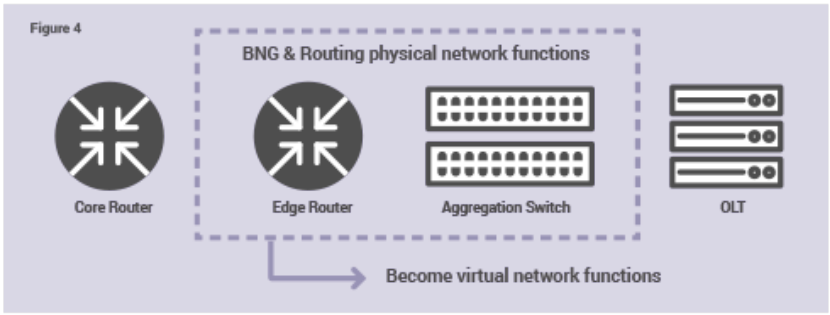
new applications while simultaneously nurturing an innovation environment that quickly responds to consumer demand. Software platforms host applications that are fully programmatic and instrumented, delivering operations efficiency across a global scale.

The exciting news for service providers is that this same software platform paradigm applies to the broadband distribution network and the on-premises systems that connect consumers to their online content. As we look across the new subscriber-centric broadband network, we see that software is having profound positive business impacts on operations efficiency, capital cost reductions, and new revenue opportunities. Two examples, one in the distribution network, and one in the premises illustrate the principles.



Software-defined access

Service providers are extending the benefits of Software Defined Networking and network virtualization into the access network's central office (CO) and cable head end. All components of the subscriber service delivery chain – broadband network gateway (BNG) router, aggregation switch, 10G/GPON OLT – are being disaggregated and reformulated to make the network centrally managed and programmatically controlled.



Software platforms, with their ability to deploy modular software components in the optimal network locations, are extending the transformation to include optimal use of the data plane. The OLT data plane is required for operation of the point-to-multipoint passive optical network (PON) operation. And because the OLT's terabit-scalable data plane must, by necessity, support per-subscriber service quality of service (QoS) and policy enforcement, the question then becomes, "What else can we use this data plane resource for?" The OLT's software platform can host a wide range of applications, including the IP aggregation and subscriber management functions found in the BNG router. Leveraging software abstraction from the underlying hardware, modularity, and portability, the software platform consolidates three networks systems into one, providing the step-function cost savings sought by service provider.

Within the software platforms, open standard APIs enable unprecedented automation, while deep layers of instrumentation extract data for analysis that drives informed business decisions. Software platforms draw on technologies from the data center, providing state-based operation, self-audit, and self-restart of each modular component, resulting in the elimination of service outages and

routine maintenance network downtime.

Revolutionizing the premises gateway

Software platforms will become the service provider's must-have managed service point-of-presence within the home and office. Subscribers expect Wi-Fi coverage throughout their home and extended living areas, yet construction techniques, the explosion of wireless devices, and the laws of physics often lead to poor coverage and subscriber frustration unfairly directed at the broadband service provider. Indeed, Wi-Fi coverage is nearly synonymous with Internet access in the eyes of most subscribers and poor Wi-Fi performance is the number one call center issue for most service providers – even when the wireless access point is not owned by the service provider. Software platforms within the premises provide the opportunity for insight, automation, and self-optimizing performance that increase customer satisfaction and lower support costs.

Software platforms at the heart of the service provider's premises gateway will become the service hub and launch pad for value-added applications. The uncontrolled proliferation of IoT devices within the home and business will benefit from centralized aggregation and service management in a similar manner as Wi-Fi devices. The flexibility of software platforms and their ability to host third-party software components enables service providers to offer new services beyond managed connectivity. Gateway-based firewall and malware protection applications can secure the home and service provider network, with assurance that real-time threat monitoring and prevention can be automated and coordinated from a central location. A distributed DoS attack detected anywhere in the network could be mitigated at the premises before harm can be done.

Software platforms will soon extend data center computing to the very edge of the service provider network, with service provider-owned premises systems the sought-after edge computing resource for a host of new applications. On-premises edge computing could extend the capabilities of low-cost IoT sensors by providing local, low latency compute resources, greatly expanding the market for facial recognition security, healthcare monitoring, and other industrial applications. Distributed software platforms will provide the framework and managed infrastructure that delivers new revenue opportunities for service providers.

Conclusion

The traditional business of broadband service providers is under stress, but from adversity comes the opportunity to drive business transformation to provide economic vitality far into the future. Innovative service providers will leverage software platforms to increase service agility and operations efficiency while delivering a framework that enables new revenue streams and structural cost reductions. From the perspective of the broadband subscriber, software platforms will deliver the new must-have triple-play service bundle: unlimited broadband from an always-on wireless connection, service flexibility with full-service analytics-driven customer support, and a gateway to an endless supply of experience-delighting applications.