Executive Whitepaper

Use Cases for Software-Defined Broadband Access

Broadband SDN: a marriage of convenience or a true love match?

To address the growing needs for personalised, app-based services such as bandwidth on demand, smart home applications, online gaming, hybrid TV and cloud-based services, operators need to transform their business models. To stay competitive and improve user experience, they must effectively differentiate their services from those delivered by over-the-top (OTT) players and provide fresh, revenue-generating offerings beyond traditional triple play.

Software-defined networking (SDN) for broadband access is a transformational opportunity for operators, driving their evolution in the right direction. It turns a dumb-pipe network into a value-added network by addressing end-to-end service delivery and by implementing service-policy enforcement closer to the end-user.

Software-defined broadband (SD-BB) introduces service and application awareness into the access network. High granularity of traffic classification allows application-specific policy enforcement at the access level, while a service- and subscriber-aware access network allows operators to rapidly employ new services, automate their processes and dramatically reduce expenditure.

Summary

Whether introducing SDN principles into the access network to shorten time to market or looking for the convenience of end-to-end, orchestrated service provisioning and control, operators are driven by clearly identified commercial benefits. The whitepaper explores the applicability of software-defined broadband with realistic, tangible use cases that provide operators with business differentiation and enable market success.

Service- and app-aware access and aggregation allow differentiated experience with fine granularity of service flows and applicable policies.

Unification of residential, business and backhaul connectivity breaks the revenue ceiling by eliminating the barriers between previously incompatible segments.

Local-cloud connectivity enables new revenue streams from differentiation of **managed cloud-based services and apps**.

Virtual unbundling, wholesale bitstream and open access are empowered with automated inter-provider provisioning with clear delineation of responsibilities.

The optimised TCO, service differentiation, process automation and speed-to-service that these top four use cases exhibit prove that SD-BB represents a natural match between operators' new opportunities and the rejuvenation of their businesses.

ISKRATEL

#1 Service- and app-aware access and aggregation
Granularity of service flows: monetisation on differentiated experience

Applying SDN principles to the access network inherently introduces fine granularity of service flows with L1-L4 classification. In practice, this allows the identification of individual service/application flows for each end-user, be it linear IPTV or best-effort internet, an OTT service (such as a high definition YouTube video or Skype conversation) or a managed service with a higher business value such as cloud-based digital video recorder (DVR), office tools in the cloud or cloud storage.

Following classification, each identified flow can be handled individually and specific rules for service policy or quality of service (QoS) can be applied to it. Operators utilising SD-BB can simply differentiate cloud DVR from linear IPTV, or access to cloud storage from best-effort web browsing, and dedicate networking resources (bandwidth, traffic prioritisation) per service, per user.
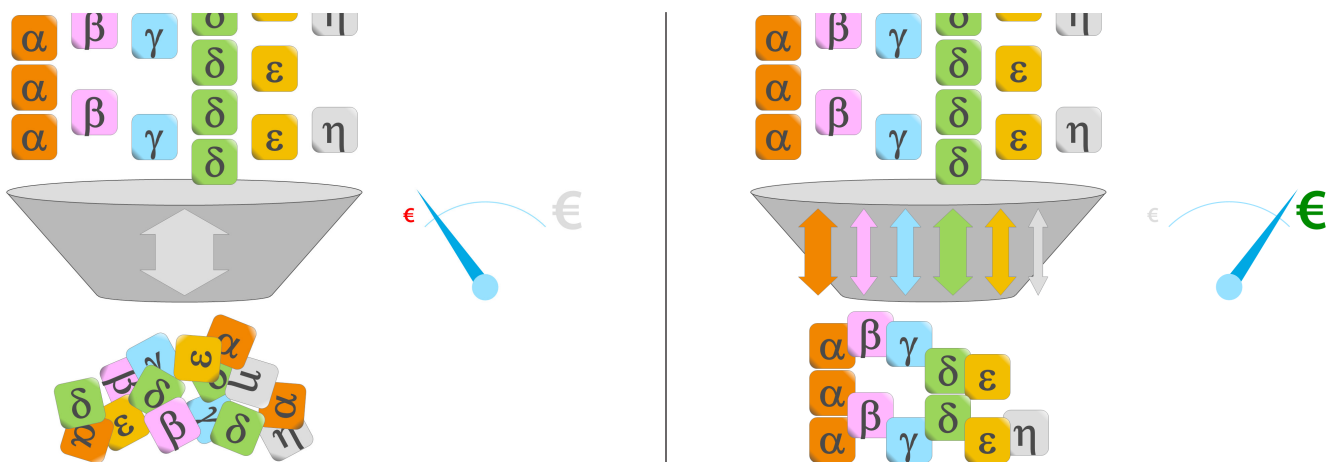
| Traditional, dumb-pipe broadband access | SDN-enabled, service-aware broadband access |

Empowered with SD-BB, operators can effectively **differentiate user experience and monetise it** with per-service-level accounting, enabling new business models and offering new services and levels of experience that end-users are willing to pay for.

Migrating the broadband network gateway functionality into access and aggregation nodes (which act as policy-enforcement points) reduces the operator's CAPEX further and contributes to an improved return on investment. In addition, the operators can provide customised or personalised services beyond usual templates, including time- or quota-limited functions, daily time plans (such as more bandwidth in the evening) or temporary actions (such as double bandwidth over holiday season at no extra cost). Provisioning of such services can be transparent and non-disruptive, while mass provisioning can be easy to implement.

#2 Unification of residential, business and backhaul connectivity
Breaking the segment barriers: breaking the revenue ceiling

Without SDN support in access and aggregation, operators used to deploy dedicated, functionally-specific access networks to serve different customer segments: high-density DSLAMs and OLTs for residential users, MEF-compliant multi-layer switches to connect business customers with stringent service level agreements (SLAs), or synchronisation-enabled devices to connect base stations serving mobile users. These resulted not only in unreasonable investments, but also in excessive rack space and power consumption, increasing operating costs.

With SD-BB, operators can effectively optimise their TCO and ease network planning, empowered by access and aggregation that serves all needs of different customer segments: residential triple play, layer-2 virtual private networks with stringent SLAs, cloud services for business customers or small-cell deployments. In fixed-mobile convergence scenarios, SD-BB allows the unification of user experience across different types of access network (fixed, wireless, mobile) or user mobility.

Furthermore, the operators can effectively exploit SD-BB to offer new services and bundles that they were not able to with dedicated access equipment. By orchestrating the whole service chain, operators can monetise on complete, end-to-end experience. In addition to providing services with guaranteed quality levels, they can offer unified bundles of services and the required connectivity, augmenting the customer experience with the possibility of auto-provisioning their services and required service levels, combining service on demand (SoD) and bandwidth on demand (BoD).

SD-BB enables the automation of the end-to-end SoD and BoD provisioning process and the introduction of innovative pricing plans, while speed-to-service delivers a significant reduction of operator OPEX. The unification of SDN-enabled access and aggregation is an evolutionary step towards network architecture that addresses ubiquitous connectivity across networks and devices (such as 5G and network slicing) and meets the needs of novel use scenarios, including industry-specific Internet of Things (IoT) or residential applications (such as smart home).

#3 Local-cloud connectivity for managed services and apps
Service and app differentiation: new revenue streams

Cloud applications (such as storage, office tools or multi-player online gaming) require reliable, often symmetrical connectivity, guaranteed bandwidth and traffic prioritisation. Mixing cloud applications with best-effort internet (such as web browsing or e-mail) at the dumb-pipe only leads to poor customer experience and frustration.

In contrast, software-defined access enables easy differentiation of services, required service levels and policies. It not only creates new revenue streams beyond traditional triple play, but also positions operators' value-added, managed apps against OTT players. Their own cloud-based services and applications allow operators to **reinforce customer loyalty and provide service differentiation, resulting in increased ARPU.**
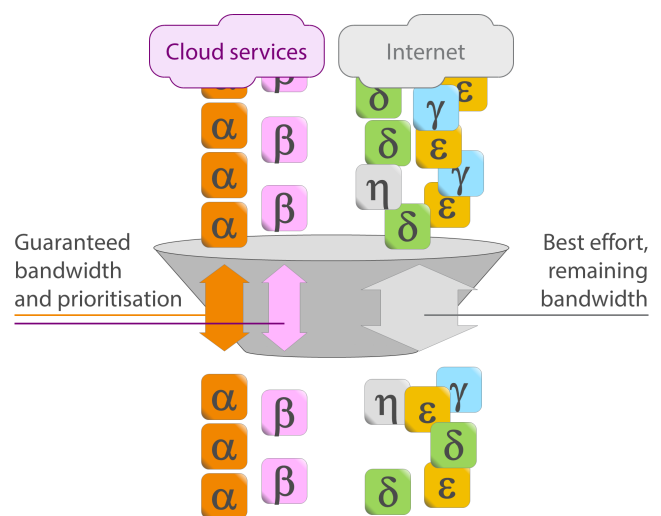
Service-level assurance at SD-BB
for managed services from the local cloud

From a customer perspective, the delivery of cloud-based services along with best-effort internet is completely transparent, regardless of the devices or clients that customers use.

#4 Virtual unbundling, wholesale bitstream and open broadband access
Functional separation: delineation of responsibilities

To promote competition among the service providers (SPs), regulation requires network providers (NPs) with a significant market power to introduce wholesale business models, avoiding needless investments into a parallel first-mile infrastructure. In relation to such structural separation, distinctive wholesale-broadband models have emerged, such as virtual unbundled local access, bitstream access and open broadband access.

Each model requires and implies a clear separation of responsibilities between SPs and NPs, which cannot be achieved without clearly-defined interfaces for service provisioning and monitoring. The ujse of structured data across these interfaces is necessary for effective service provisioning, reflected in reservation of resources in NPs' networks to guarantee required service levels. SD-BB delineates the management domains, simplifies monitoring or troubleshooting, and guarantees unambiguous accounting and revenue-sharing plans.

By structuring service and application descriptions with reusable profiles, **operators can simplify provisioning, reduce complexity and cut operating expenditure**. Profile-based provisioning simplifies inter-operator processes and works across the domains, enabling automated provisioning of services and apps (including personalisation via self-provisioning portals) that results in reduced OPEX for all involved parties.

About Iskratel's software-defined broadband solutions

With its Intelligent Service Access (ISA), Iskratel is the first solution provider to implement and deploy a true SDN application at the broadband-access network. It enables operators to have full control over guaranteed levels of quality or policies to be enforced – per individual service, app or individual user.

Iskratel's ISA supports high granularity of service flows with L1-L4 classification, flexibility of actions per flow and transparent provisioning. The flow-aware access and aggregation nodes act as service-provisioning and policy-enforcement points. Per-service classification and enforcement rules apply to all types of residential or business services and apps: triple-play services (such as internet access or IPTV), VPN services, over-the-top applications, wholesale bitstream services or operators' own managed cloud apps.

ISA facilitates end-to-end service visibility and provisioning with unique and intuitive service-oriented management. Service provisioning with reusable service profiles enables services and apps to be modelled as complete entities: from classification, marking and shaping to security, multicast or VPN-related rules.

Attaching any combination of service profiles to a user effectively enables the services/apps and service policies for the user. A network-management system facilitates centralised provisioning or integration to AAA database, as well as standard and open north- and southbound interfaces for easy integration with OSS/BSS systems or service orchestration.

ISKRATEL

Iskratel, d. o. o., Kranj

Ljubljanska cesta 24a
SI 4000 Kranj, Slovenia
Phone +386 4 207 20 00
Fax +386 4 202 26 06

info@iskratel.si
www.iskratel.si

About the author

Tomo Bogataj is responsible for strategic marketing of Iskratel's Telco solutions and has twenty years of experience in telecommunications. He co-created Iskratel's software-defined access and contributed to Iskratel being the first vendor to provide SDN-based broadband in 2010. Contact him at t.bogataj@iskratel.si.

October 2017