benu N E T W O R K S

Managed Home Network Solution

Monetize CPE Investments, Enable Differentiated Services, and Drive Home ARPU

Benu Networks' Virtual Service Edge (VSE) platform for residential applications moves the service and business logic of the customer premise equipment to a virtual instance in the service provider's edge network or data center. This architecture creates a flexible and agile way to deliver services and provide policy control at a home and device level. The VSE platform enables rapid service deployment, dynamic scale up or down, and increased customer care responsiveness. The virtualized architecture allows service providers to leverage managed cloud service delivery and stitch home devices including Internet of Things (IoT) to cloud platforms and services. The VSE delivers unmatched scalability and service agility for Managed Home services that can be dynamically right-sized based on service plan and device usage. Benu Networks' Managed Home Network solution enables compelling services such as IoT management, security, parental controls, cloud storage, data analytics and enhanced customer care.

MANAGED HOME NETWORK SOLUTION

Today's Internet service providers (ISPs) and service providers face a variety of business challenges. Providers are under constant pressure to expand broadband capacity, extend service reach and increase differentiation. However, legacy broadband access network architectures have evolved in a way that inhibits innovation, hinders service agility, and impairs profitability. Consumed by intelligent heavy-weight, broadband gateways, providers are unable to exert control over individual devices or sessions to enable differentiated services.

In addition, traditional broadband access networks are notoriously difficult and expensive to support because the Customer Edge Router (CER) embedded in the customer premises equipment (CPE) blocks service control at the device and session levels. Service provider help desk personnel lack visibility beyond the customer gateway into the home network. They often squander time and money troubleshooting issues that ultimately are not associated with service provider's equipment or network infrastructure.

From a competitive standpoint, many residential customers are turning to cloud-based services and over-the-top (OTT) providers for core telecommunications services and IT functions. These services move the network intelligence to the cloud and feature consumer-oriented, easy-to-use interfaces for managing home networks in an intuitive and simple way. If this continues, ISPs and service providers risk becoming commodity data providers as OTT providers seize the customer relationship, and more and more of the customer's wallet-share with it—advertising, customer analytics and premium services. To add insult to injury, over-the-top content providers like Netflix, Amazon, Google and Apple are all profiting off of the huge infrastructure investments made by Cable MSOs and fixed line operators.

Already faced with massive network upgrades to support skyrocketing IP video traffic growth, going forward both ISPs and Service Providers must identify new ways to monetize current infrastructure investments, win back customer relationships, and rekindle revenue and margin growth. Forward-looking providers are implementing cloud-based services—moving advanced network functions from the customer premises into the operator network—to improve service agility, contain costs, and enable differentiated applications.

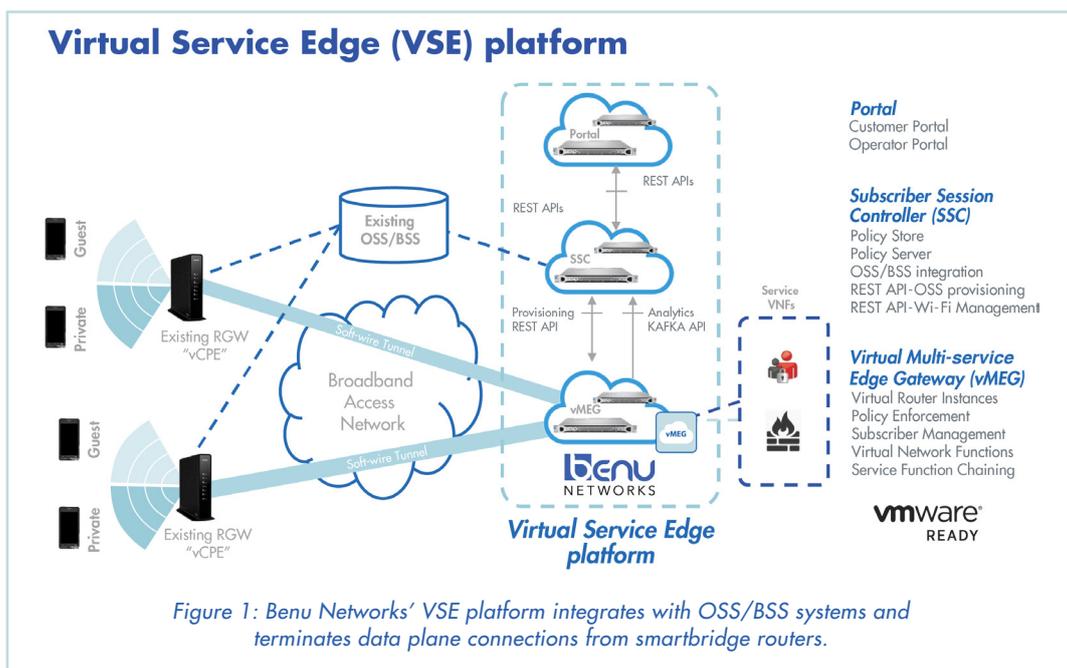## BENU NETWORKS' MANAGED HOME NETWORK SOLUTION

Benu Networks has taken a unique solution approach to enable the rapid creation, deployment and modification of home managed networking services. The solution is marketed under the name Managed Home Networking (MHN). Benu Networks' MHN solution enables carrier-class, cloud service delivery and value added managed networking services to the home mass market on an open platform that is integrated into the service provider's network infrastructure.

Benu Networks' platform, the Virtual Service Edge (VSE), leverages the latest technology in SDN and virtualization to transform the service provider's infrastructure assets to maximize profitability while addressing home price sensitivity.

The VSE platform is virtualized and distributed to increase deployment flexibility and maximize operation efficiencies and scale. This approach enables service providers to create bespoke service offerings that are integrated into their existing access, core network and OSS/BSS assets. Essentially, Benu Networks' solution is a service delivery platform (VSE) combined with a rich application suite (MHN) that transforms the Telco or MSO into an agile cloud managed services provider for home market.

BENU NETWORKS' VIRTUAL SERVICE EDGE ARCHITECTURE

Benu Networks' MHN solution is software-based, and can be orchestrated in a virtualized infrastructure (IaaS) or as an integrated COTS appliance. In both deployment scenarios, a software-based platform approach allows the service provider to operate at Web scale (i.e.: rapidly deliver new features) at a low upfront investment. Utilizing an overlay and abstracted architecture that supports a success- based spending model, the components of the MHN solution can be centralized and used to deploy services across a large logical and physical footprint. The solution leverages several key technologies in order to create novel, compelling services for service providers to offer their customers.

Figure 1: Benu Networks' VSE platform integrates with OSS/BSS systems and terminates data plane connections from smartbridge routers.

Benu Networks' Virtual Service Edge architecture has a number of sub-components that work together to enable the MHN service.

- **Benu Networks' Subscriber Session Controller:** The Subscriber Session Controller (SSC) is the Policy Engine and the Service Analytic broker of the VSE architecture. For customer on boarding, IT manages and stores all the end user profiles and carrier service templates in a highly scalable and persistent database infrastructure. For each MHN or user account, the SSC allows the creation of sets of rules with device granularity that can enable rich use cases from personal to IoT traffic classification and policing. Web services are then available for an agile integration with OSS and provisioning platforms including ACS systems for Wi-Fi management. The SSC also integrates with northbound Service Orchestrators via REST APIs enabling the service provider to automate and orchestrate end-to-end network services.

- **Benu Networks' MHN Portal:** The MHN Portal is the Web server front end for both the end user and the service provider administrator. The end user dashboard is designed to offer an intuitive path thru the functions available with two-layers design being the common routine actions followed by advanced sections where a complete set of capabilities are exposed to a user. The MHN Portal also offers a single pane of glass for the service provider network operation center NOC and service administrator. From the administrator's view, the provider's support team can assist customers, maintain the platform and troubleshoot the service.

- **Benu Networks' vMEG:** The virtual Mobile Edge Gateway (vMEG) is the aggregation point for the user traffic. It is a programmable data plane controlled by the Benu Networks' Subscriber Session Controller (SSC) Policy Engine via Restful APIs that sits in the service provider's cloud or service network. The vMEG terminates Layer 2 overlays from the CPEs and enforces policies based on service template (e.g. gold, silver, bronze service level), and MHN account specifics (e.g. personal or IoT device). The vMEG also performs other in-line IP services like DHCP, Carrier Grade NAT, firewalling, packet accounting, access control, service edge routing, and more. Network analytics are then exported via Apache Kafka architecture for large volumes of data.

- **SmartBridge:** This service moves the NAT/router functions of the customer premise router into the service provider's core network. These functions now run in a virtual router (vRouter) instance also referred to as virtual CPE. The vRouter supports the virtualization of the CPE router functions such as NAT, NAT-PMP, UPnP, DHCP, and DNS etc. The SmartBridge utilizes Ethernet over a GRE tunnel from the CPE to the vRouter instance on the VSE platform.

BENU NETWORKS' MANAGED HOME NETWORK: VALUE PROPOSITION

Benu Networks' open MHN architecture seamlessly integrates into a service provider's OSS/BSS assets, customer care processes, and other back end systems - to allow them to experience the owner's economics and seamlessly integrate the offering with other products (business, homespot, Wi-Fi). Enhancing the service offering has the potential to greatly increase customer affinity to the service, drive ARPU through additional value-added services, and differentiate the offering relative to competitors. This is of great value since it enables a service provider to enhance its brand and differentiate itself from the competition (i.e.: other service providers) as well as over-the-top (OTT) providers. This promotes stickiness to a service provider's home broadband offerings as they now can offer new features that are easily customized to the customer's specific needs.

The MHN solution integrates with 3rd party data center services such as virtual Firewalls, and leverages service function chaining technology effectively to enforce flow steering to virtual security instances based on the defined MHN policies. These steering policies can be applied at the Home level, the local network level, or the device level.

The MHN solution provides CAPEX and OPEX efficiency to the service provider. Since the platform is deployed in the service provider's core network, it seamlessly integrates with the existing access network technology. This allows the service provider to deploy the MHN service using the existing Wi-Fi capable broadband CPE (e.g. Wi-Fi DOCSIS gateways or Wi-Fi DSL DSL/Fiber routers). This implementation model can save the service provider hundreds of dollars/euros in Wi-Fi access point CAPEX savings for acquired customers, and also provides additional savings in OPEX by not requiring a truck roll for new customer deployments. The service can be activated remotely on the customer's existing Wi-Fi capable broadband gateway. Benu Networks' MHN platform accelerates a service provider's ROI to a matter of months as opposed to years.
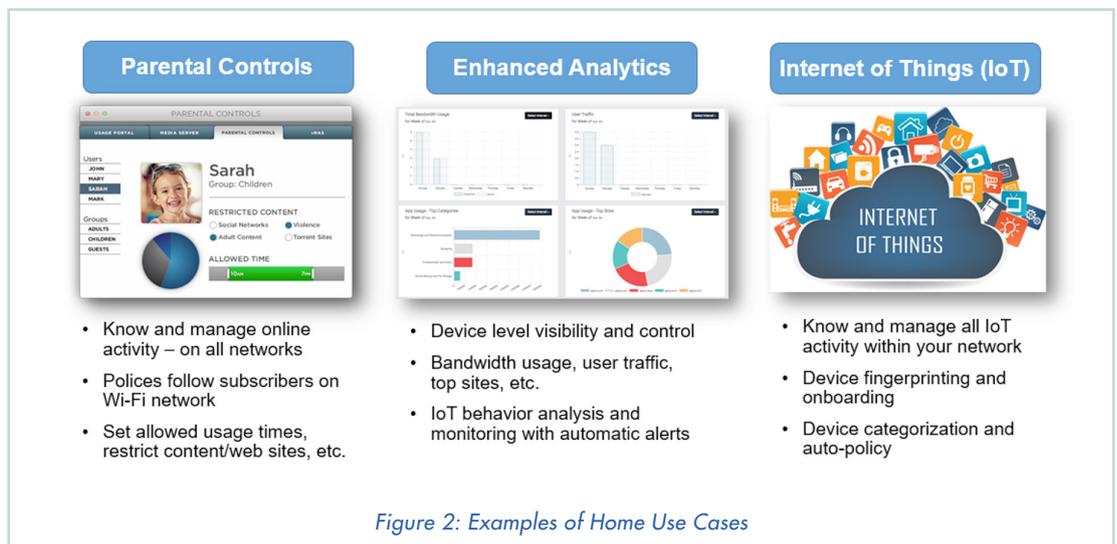

Figure 2: Examples of Home Use Cases

USE CASES FOR THE HOME

Benu Networks' MHN platform enables service providers to offer their home broadband customers new value-added managed services as an add-on tier to their existing broadband subscription. The VSE platform enables an array of home use case which include, but are not limited to the following examples:

- Managed Wi-Fi within the home
- IoT device fingerprinting, policing and security
- Security as a service (virtual Firewall)
- Network-based controls (e.g.: parental control, advanced security at device fidelity, etc.)
- Device management (e.g.: onboarding, QoS/QoE settings per device set by home admin.)
- On-demand bandwidth upgrade
- Clientless cloud storage
- Enhanced customer care
- Media Sharing and LAN-mode Gaming
- Analytics and instrumentation
- Unified service control panel

SUMMARY

Benu Networks' MBN solution affords service providers an opportunity to:

- improve upon the customer experience,
- drive ARPU by offering their home broadband customers new, value-added managed services as an add-on tier to their existing broadband subscription,
- uncover new revenue streams by capitalizing on the consumer IoT trend,
- reduce CAPEX costs by leveraging current customer premises equipment (no costly CPE upgrades are required),
- decrease OPEX costs with the remote management of the CPE infrastructure,
- and restore customer wallet share that was previously taken by over-the-top (OTT) providers.

The MHN solution also helps to promote stickiness to a service provider's home broadband offerings, since it enables the provider to deliver new features that are easily customized to the customer's specific needs. In addition, the Virtual Service Edge platform offers the service provider the ability to offer additional applications such as a Managed Business Network service and Carrier Wi-Fi.

ABOUT BENU NETWORKS

Benu Networks' carrier-class Virtual Service Edge (VSE) software platform enables the rapid creation and delivery of next generation IP services over a converged infrastructure, and empowers service providers to increase revenue, expand market leadership, and meet the dynamic needs of their business, residential and mobile customers.

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