Solution Brief

Communications Service Providers
Virtual Session Border Controller

Metaswitch Perimeta Delivers Pioneering, Cloud Native vSBC

Tests[1] show Perimeta virtual session border controller (vSBC) offers alternative to appliance-based SBCs, delivering 1,400 calls per second and 33,000 bidirectional RTP flows on Intel® Xeon® processor-based servers

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As the world begins to move toward 5G and users increasingly expect richer communications services, today's communications service providers (CommSPs) are facing pressure to modernize and to do so quickly. While CommSPs have traditionally relied on hardware-based session border controllers (SBCs) to regulate quality of service and security of IP-based voice and data communication, this comes at a tremendous cost. CommSPs are now looking to move to a software-based virtualized SBC in order to reduce costs and improve agility and scalability.

This is part of a larger trend of CommSPs moving more services to the cloud for cost optimization and scalability. SBCs historically have been single-application appliances located in the network; driving up capital and operating expenses, in part, due to the need for onsite technicians for upgrading.

CommSPs also are looking to vSBCs to help with new service deployment. Carrier marketing and sales teams would like to support new services, such as public switched telephone network (PSTN) breakout for video conference systems, video calling, or voice over Long Term Evolution (VoLTE) on mobile networks.

In recent years, VoLTE has taken off as an alternative for voice over IP (VoIP), using wireless connectivity rather than broadband internet to deliver communications services to customers. This provides a faster connection and improved audio quality on 4G/LTE networks that will get better with 5G networks. Support for services like VoLTE has become particularly important as more people complete business communications from home, where quality and connectivity is of utmost importance.

CommSPs are also facing regulatory pressures to move from time division multiplexing (TDM) to Session Initiation Protocol (SIP). This is especially required for robocall-blocking, which has become a priority as regulators take action against service providers that appear to aid these spam callers. Additionally, as the telecommunications regulators phase out support for TDM-based voice services, TDM has become more expensive with fewer options. SIP provides a virtual connection, making it more flexible.

Finally, in some cases, the existing product line used by a CommSP may be at its end of life, driving a need for the CommSP to explore other options.

Considerations for Moving from Legacy to Cloud Native–Based SBC

There are a number of considerations when moving from legacy hardware SBCs to cloud native SBCs. CommSPs want to minimize capital expenditure on new projects. CommSPs are also looking to reduce the cost of operating the network via automation. They also want to decrease time to deployment so they can rapidly deploy new services using a fast-fail methodology.

There are issues related to moving from a legacy to a cloud native SBC, such as coordinating between a large number of SBC instances and determining how to get high performance data-plane function for real-time transport protocol (RTP) forwarding, transcoding, encryption, and distributed denial of service (DDoS) protection. Other issues include how to distribute traffic to a large number of SBC instances and cost-effectively manage a large number of instances from configuration, software updates, and more.

Intel® Network Builders partner Metaswitch has developed Perimeta, one of the first cloud native virtualized session border controllers (vSBCs) to address these challenges. Perimeta can be deployed as a virtual machine or in containers, reducing the high total cost of ownership of a network based on hardware SBCs.

Perimeta vSBC from Metaswitch

Perimeta is a cloud native virtualized session border controller (vSBC) that delivers SIP interworking and security performance that enables IP-based rich communications services.

The software-based Perimeta vSBC runs on Intel® architecture-based servers and is architected for distributed signalling and media, with advanced call admission control (CAC) to prevent oversubscription of VoIP networks. The Perimeta SBC operates virtually by running on private clouds and major public cloud networks.

Perimeta supports containerization, using open source container-orchestration systems such as Kubernetes. Cloud native Perimeta is deployed as microservices that can be combined for any specific operator use case with instant scaling.

Metaswitch has developed the secure distribution engine (SDE) to address the issues related to moving from a legacy environment to a cloud native SBC. SDE is a layer 7 load balancer for SIP interconnect and trunking traffic. It distributes SIP traffic (incoming calls, for example) between session controllers. The SDE is located on the edge of the network and is the first point of contact for external SIP traffic arriving into the core network. The load balancing capability works seamlessly with multiple session controllers to provide SBC function beyond the scale of a single virtualized session controller.

To help prevent DDoS attacks, Perimeta also features dynamic blocklisting that identifies suspect traffic and blocks it if necessary. This helps protect the core service network from sudden increases in incoming traffic. This type of traffic can, if it is not intercepted, flood the network, consume available resources, and disrupt service levels. Perimeta applies dynamic blocklisting automatically in response to incoming traffic. This allows the session controller to respond quickly to an unexpected change in traffic patterns—better blocking data that is malicious or caused by malfunctioning devices repeatedly attempting to connect to the system.

Support for multiple tenancy gives CommSPs the flexibility to use Perimeta for all use cases, including mobile, fixed residential, fixed business, and wholesale interconnect.

With remote upgrading features, CommSPs can achieve faster repairs and shorter network upgrade cycles. Perimeta also enables pre-emptive maintenance, finding issues quickly with reduced downtime for reduced risk.

As shown in product tests detailed below, Perimeta can take advantage of today's multi-core servers and cloud computing resources to scale across a range of hardware and virtualized environments.

VoLTE Deployments

With VoLTE deployments intensifying, Perimeta enables CommSPs to commission new VoLTE services in a matter of weeks rather than months. Perimeta integrates with existing VoLTE core vendors, especially when deployed in the interconnect border control function (IBCF) use case.

Perimeta uses a virtual machine-based licensing model with both distributed capacity management (DCM) and logically centralized license tracking. Perimeta enables considerable savings for VoLTE migrations. For one CommSP transitioning to VoLTE, Perimeta generated significant cost saving by enabling a low per-subscriber IMS and SBC resource footprint by utilizing automation.

Perimeta Test Results

Metaswitch and Intel designed a test of Perimeta performance to demonstrate its throughput and scalability. Two key metrics for vSBCs are as follows.

- The number of calls per second a system can get out of a single Perimeta VM.
- The total number of bidirectional RTP flows per Perimeta VM.
- Perimeta software transcoding performance.

The test was configured to demonstrate CPU efficiency and utilization. A large CommSP network could need up to 1,000 vSBCs simultaneously to handle network traffic. Getting the throughput required for this large network using the minimum number of servers is an important metric. Many CommSPs are looking for vSBCs that help drive down the cost of CPU resources.

The benchmarking test of Perimeta's signaling message rates was conducted using a server powered by an Intel® Xeon® Gold 6240 processor, part of the 2nd generation Intel Xeon Scalable processor family. Connectivity was provided by the Intel® Ethernet Converged Network Adapter X710 that was configured to support single root input/output virtualization (SR-IOV) for performance and with Data Plane Development Kit (DPDK) enabled.

The virtualization infrastructure for the server included virtual machines running on OpenStack Mitaka and OpenStack Queens.

The benchmark showed Perimeta can deliver a performance of 1,400 calls/second or 9,800 SIP messages per second for each Perimeta VM (consuming eight vCPUs using eight hyper threads on four physical cores). These rates were achieved in realistic mode of operation with collection of XML data for billing enabled and with Metaswitch's Service Assurance Server (SAS) turned on for collecting network flow and service logic data for system diagnostics.

The test also benchmarked Perimeta's concurrent bidirectional media passthrough flows performance on the Intel Xeon Gold 6240 processor-based server that featured the Intel Ethernet Converged Network Adapter X710 with

SR-IOV virtual functions turned on. These tests resulted in 33,000 bidirectional RTP flows per Perimeta VM with 20 ms packetization, both for passthrough and transcoding. This performance data came from tests using a private OpenStack-based cloud server and could have higher performance if based on a dedicated server.

Benchmark tests of Perimeta's software transcoding, using DPDK to improve packet performance and configuring the system for maximum advanced media capacity, resulted in 400 channels for G729 to G722, 850 channels for AMR-NB and G.711, and 700 channels for SILK/8000 and G711. The results were achieved with four of eight vCPUs (hyper threads) devoted to software transcoding.

Conclusion

While vSBCs provide many benefits for CommSPs in replacing their existing infrastructure, performance is a critical component. With Perimeta from Metaswitch, CommSPs can migrate to the vSBC and move away from the high cost of dedicated appliances without sacrificing throughput. Perimeta is fully containerized and there are no dependencies on proprietary hardware and no encryption modules. Perimeta's elastic scaling reduces up-front hardware spending and enables a horizontal out/in scaling approach for efficiency with no limits.

2nd Generation Intel® Xeon® Scalable Processors

For its Perimeta deployments, Metaswitch utilizes servers based on 2nd generation Intel Xeon Scalable processors. The processor provides extensive platform convergence and capabilities across compute, storage, memory, network, and security. The CPU supports networking applications and offers processing headroom to deliver enhanced VM/VNF capacity and density. As seen in Perimeta's test results, 2nd generation Intel Xeon Scalable processors are designed for data-rich and innovative use cases where data plane performance is important.

Learn More

Metaswitch: https://www.metaswitch.com

Perimeta: https://www.metaswitch.com/products/perimeta-sbc

Intel Network Builders: https://networkbuilders.intel.com

2nd generation Intel Xeon Scalable processors: https://www.intel.com/xeonscalable

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Notices & Disclaimers

[1] Testing done by Metaswitch in Jan. 2020. Server was PowerEdge R640 featuring a single 2.60 GHz Intel Xeon Gold 6240 processor (microcode: 0x500001c). Intel® Hyper-Threading Technology was turned on and Intel® Turbo Boost Technology 2.0 was turned off. BIOS version was 2.3.10 and the server featured 256 GB of RAM (8 slots of 32 GB 2,933 MHz RAM). 16 GB was configured for the guest. Intel® Ethernet Converged Network Adapters X710 DA-2/DA-4 was used for networking. Operating system was Metaswitch Linux 6.10 with guest kernel 2.6.32-754.23.1.el6.orl.2.25.x86_64. Perimeta SBC v4.7.00 was the guest workload and the compiler was the GCC version 4.9.2 20150212 (Red Hat 4.9.2-6). Libraries included DPDK v2.0.0, 9.0.2, IPP 9.0.1, IPPPV, Fixed Point SILK SDK 1.0.8 beta. The host OS was Red Hat Enterprise Linux 7.4 with Red Hat OpenStack Compute (OCATA).

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