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Metaswitch Perimeta
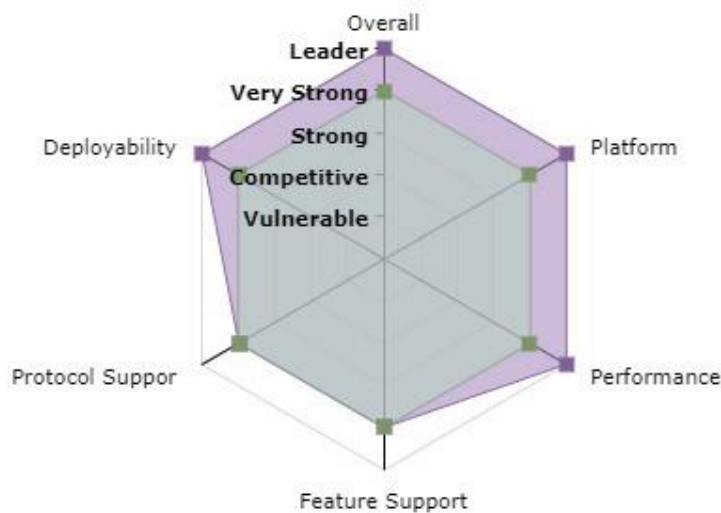
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PRODUCT ASSESSMENT REPORT - SESSION BORDER CONTROLLER

REPORT SUMMARY

Metaswitch's continued technical leadership in signaling and media processing, and an increasing alignment with larger Microsoft telco priorities, give Metaswitch a differentiated SBC value proposition.

SUMMARY

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WHAT'S NEW

- **March 2021:** Metaswitch Perimeta SBC was certified for Microsoft Direct Routing and available to use on Microsoft Azure cloud.
- **March 2021:** Metaswitch's MaX UC portfolio was selected by Hutchison Drei Austria to provide a business application platform.
- **March 2021:** Microsoft introduced Operator Connect, enabling operators to offer seamless PSTN calling to Microsoft Teams users as a managed service. Operator Connect enables enterprises to procure and assign phone numbers with no on-premise equipment required.
- **October 2020:** Microsoft introduced Azure for Operators, an initiative to help telcos better monetize enterprise adoption of hybrid and public cloud.
- **September 2020:** Metaswitch announced it has provided its Perimeta vSBC as part of Deutsche Telekom's Next Generation IP Multimedia Subsystem (NIMS) platform to "cloudify" voice telephony. NIMS will support 18 million customers through its German data centers

PRODUCT OVERVIEW

Product Name	Perimeta	
Description	Perimeta is a cloud-native virtualized session border controller (vSBC) developed to deliver the Session Initiation Protocol (SIP) interworking and security performance required to scale rich communications services. Perimeta is designed to deliver network security, advanced management of packet throughput under any load condition, extensive protocol interworking and normalization, and packet analysis for in-depth problem isolation and repair. The Perimeta solution includes a secure distribution engine (SDE) for load balancing and distributed admission control (DAM) element for simplifying large deployments.	
Components	Perimeta SBC	
Key Customers	• 2 Degrees (New Zealand) • AIS (Thailand) • Allstream • America Movil • AT&T • BICS (Belgium) • Cubic Telecom (U.S.) • Deutsche Telekom • Digicel (Jamaica) • Free (France) • Gamma (UK) • ICE Wireless (Canada) • Manx Telecom (Isle of Man) • Orange	• RINA Wireless (U.S.) • Singtel • Spark New Zealand • Sprint • Swisscom • Tata Communications (India) • Telekom Austria • Telkomsel (Indonesia) • Telstra • Tiscali • TPG (Australia) • U.S. Cellular • Vodafone

Key Rivals	• Ericsson
	• Huawei
	• Nokia
	• Oracle
	• Ribbon
	• ZTE

ESSENTIAL ANALYSIS

Strengths	Limitations
• **Cloud-Native DNA:** Perimeta offers advanced distributed capabilities and intense focus on automated microservices running throughout network and cloud environments.	• **Enterprise SBC:** Metaswitch does not currently offer the enterprise SBC capabilities of rivals like Ribbon and Nokia, a strategic choice but one that reduces Perimeta's addressable market and range of deployment scenarios at a time that these scenarios are growing in volume.
• **vSBC Innovation:** Perimeta's vSBC leads in the breadth, granularity, and flexibility of its licensing model and deployment support, enabling service innovations like monetizing operator B2C engagements, enabling IoT wearable communications, and delivering CPaaS APIs.	• **Microsoft Acquisition (Part 2):** While Metaswitch Perimeta is positioned as cloud-agnostic, some operators may be concerned that the acquisition by Microsoft might impact Metaswitch's ability to deliver the optimal SBC solution for each operator.
• **Microsoft Acquisition:** Having been acquired by Microsoft, expect increasing alignment with the hyperscaler's telco initiatives.	• **Limited Call Management API Support:** Perimeta does not support a portfolio of call management APIs capable of exposure to third-party developers, diminishing opportunities to leverage third-party innovation.

CURRENT PERSPECTIVE

LEADER

The Metaswitch Perimeta is a leader among SBC solutions. Perimeta is a cloud-native vSBC that meets operator transformation priorities, particularly in delivering webscale flexibility and cost models. Perimeta combines cloud-native, security, and advanced analytics capabilities required to drive operator fixed access, fixed interconnect, mobile access, and mobile interconnect application innovation and scaling. Metaswitch offers an impressive array of holistic vSBC lifecycle management and automation capabilities.

Metaswitch has taken steps to bring Perimeta in closer alignment with emerging enterprise SBC opportunities, particularly related to Microsoft Teams, which has seen a massive increase in uptake since the beginning of the pandemic. This could pave the way for a more cohesive approach between Perimeta and Microsoft's greater telco cloud ambitions which drove its acquisition of both Affirmed and Metaswitch.

COMPETITIVE RECOMMENDATIONS

PROVIDER

- **Reinforce Cloud Agnosticism:** Having established its SBC credibility independently, Metaswitch needs to continue to stress its vendor agnosticism, particularly in supporting non-Microsoft public cloud deployments and seamless integration of its virtual products into multiple third-party and multi-vendor deployment environments.

- **Call Out VoLTE Differentiation:** Metaswitch needs to stress its Perimeta vSBC architecture is best suited for the second wave of operator VoLTE deployments, especially for scaling new VoLTE capabilities and enabling complex interconnect applications.

- **Analytics Advantage:** Metaswitch should do more to clarify a cohesive roadmap for how operators can utilize advanced analytics through offerings like Service IQ Monitoring and through easy alignment with third-party analytics packages from Splunk and others to proactively identify and mitigate alarms before they occur.

COMPETITORS

- **Security Thought Leadership:** Some rivals like Ribbon can point to a stronger role in carving out security-focused use cases for SBCs. Perimeta supports caller ID authentication as well as the emerging STIR/SHAKEN framework in the U.S. in its Q-Call product, but can do more to become a thought leader in this area.

- **Call Management API Shortage:** Major SBC rivals can stress that Metaswitch does not extend a portfolio of call management APIs open to third-party developers, curtailing deployment options aimed at enterprise voice environments.

- **Limited Range:** Rivals can point to Metaswitch's limited set of network assets compared to some rivals; vendors with broader portfolio assets across more network domains can point to a greater end-to-end focus that may be preferable for some operators.

BUYERS

- **vIMS/vSBC Flexibility:** Operators need to investigate Metaswitch's Perimeta vSBC development priorities in accelerating monetization of B2C engagements and IoT communications, especially in relation to the vSBC monetization capabilities delivered by rivals Huawei, Oracle, Ribbon, and Nokia in vIMS environments.

- **Lifecycle Management:** Operators should evaluate the capabilities of Metaswitch's SIMPL offering to verify Metaswitch's onboarding and lifecycle management capabilities. Robust provisioning and management across multiple VMs is crucial to scaling and efficiency in virtual and public cloud deployment scenarios.

- **Evaluate Enterprise Focus:** Metaswitch has announced 50+ operators have utilized Perimeta SBC to enhance SIP trunking services and to provide direct routing for Microsoft Teams. Operators should press Metaswitch to clarify its future expansion plans in support of enterprise applications.

Metrics

PLATFORM CAPABILITIES

Rating:	Leader
Product/Series Name/ Release:	Perimeta is a software solution; the capacity is determined by the COTS hardware platform, Hypervisor (e.g., VMWare, OpenStack) and public cloud selected by the customer.
Date of Availability:	2011
Operating System:	CentOS Linux
IMS Compliance:	Perimeta can act as an IMS-compliant P-CSCF, A-BGF, I-BCF, TrGW, E-CSCF, ATCF and ATGW, and EATF, compatible with release 14 of the 3GPP specifications.
vSBC Product Name:	Perimeta
Date of Availability (vSBC):	2014
vSBC Functional Architecture:	Perimeta has always supported separation between signaling and media plane, as well as deployment with all functions integrated in a single node. In a virtual environment, this remains the case, and functions can be further decomposed as described below. Stateless processing is functionally separate from storage (including configuration and dynamic state) which is stored in distributed databases such as memcached and etcd). Accelerated hardware, such as DSPs, may be used for functions like transcoding, in which case the signaling planes can program pools of accelerated-media elements which provide the most efficient transcoding resource. Perimeta now fully supports all transcoding and transrating in software, thereby eliminating dependency on hardware-based DSPs.

vSBC VNF Architectural Decomposition:	Signaling and Media Plane can be separated or combined (as has been the case since Perimeta was initially released). In addition, the vSBC can be decomposed into further separate components (VNFCs), depending on the use-case and required scale (all components can be combined).

- First Line of Defense (DDoS), Encryption, and Signaling Distribution
- Signaling Call Processing
- IPv6/4 Interworking
- Message Manipulation
- Routing
- Admission Control
- RTP Media Relay and Policing
- Transcoding
- SRTP-RTP Interworking
- MSRP Relay
- Centralized Threat Database
- Configuration & Automation
- Subscriber Database

vSBC VNF Manager:	Virtual Perimeta can be deployed using Metaswitch Deployment Manager, VNFM, or any third-party VNFM.
NFVI Support:	Perimeta has been onboarded into NFV ecosystems from IBM, Cisco, Overture, ALU CloudBand, Amdocs, HP Helion, Mirantis, 6Wind, VMware, Netcracker, and Cloudify. Perimeta provides the service provider all choice with regard to the environment they need to deploy in. Perimeta features an Orchestration API in support of the ETSI MANO Ve-Vnfm-vnf reference point. Perimeta has been successfully trialed and/or integrated with a wide range of orchestrators including OpenStack Heat, Amdocs, Cloudify, Overture, Cisco, SoftLayer (IBM), CloudBand, and HP NFV Director. For scenarios in which carriers have a generic VNFM or their own orchestration environment, helper components and databases can be provided to simplify VNFM integration. For scenarios where there is no established or generic orchestration engine, Metaswitch provides a VNFM, supporting ETSI MANO Or-Vnfm reference point.
NFVIM Support:	Metaswitch vSBC VNF supports all NFV infrastructure managers.

vSBC Media Plane Acceleration Technologies:	Perimeta takes advantage of Intel's Data Plane Development Kit and Single Root I/O Virtualization to boost media plane performance. The Perimeta media plane makes use of vector processing techniques, poll mode operation, NUMA alignment, and cache pre-loading to minimize instruction-cache misses and optimize throughput. Perimeta can also leverage DPDK with accelerated vSwitches/vRouters in scenarios when SR-IOV is not available, or not desirable- such as DPDK-accelerated OpenVSwitch, VMware's distributed Vswitch (using vmxnet3 poll mode drivers), OpenContrail vRouter, or third-party commercial vSwitches, sometimes included as part of third-party NFVI. Recent VPP-based NFVI switching provides improved throughput without the compromises required of SR-IOV. None of these technologies are necessary for Perimeta to operate, but where available, Perimeta will make use of them for efficient data plane operation.
vSBC High-Performance Media Processing Implementation Support:	x86-based virtualized media relay processing, with accelerated networking, is recommended for the Access vSBC. DSP-accelerated virtual media transcoding processing is recommended for the Interconnect vSBC (where needed). Access Media Processing would typically be non-transcoded, but Perimeta is included on the media path to provide for stream policing, BW limiting, network topology hiding, voice quality analysis/visibility, and lawful intercept. This vSBC is deployed close to the edge (close to the PGW in the EPC) on a generic x86 platform, with SR-IOV or accelerated vSwitching. Interconnect Media Processing is deployed in the same way on a general purpose compute platform, but if transcoding is required at high scale (which it may be for legacy networks), DSP accelerators are inserted in the compute nodes for the interconnect sites, and virtual media processing elements are scheduled on those nodes using OpenStack Enhanced Platform Awareness.
vSBC Feature Enhancements:	Deployment-wide licensing is introduced for the virtualized SBC, to enable cluster-wide licensing not tied to specific instances, enabling elastic scaling and recovery throughout the cloud deployment. This is enabled through use of an additional logically centralized microservice Distributed Admissions Manager (DAM) to provide tracking and allocation, authorization of licensed capacity. The ServiceIQ Management Platform (SIMPL) interacts with virtual infrastructure manager (VIM) to manage the lifecycle procedures for the Perimeta SBC and other Metaswitch products deployed as virtual machines: installing, updating, upgrading, healing, and destroying VMs. SIMPL reduces the number of touchpoints for operators because operations are performed solely through SIMPL rather than needing direct access. SIMPL results in automatic (zero-touch) instantiation, commissioning, and configuration is provided to enable efficient lifecycle management in cloud environments. Encryption algorithms have been improved to accommodate the increased focus on application-level security that comes with the inherent multi-tenancy of NFV deployments. RTP capture (in addition to always-on detailed logic decision logging and signaling capture) is added for probe-like function in virtual environments without requiring expensive dynamic probes.

Virtualized SBC (vSBC) Load Balancing Strategy:	Metaswitch has developed Secure Distribution Engine (SDE) to provide market-leading SIP load balancing capabilities. Its extremely efficient implementation means it can handle over 10 SBCs worth of traffic on a single eight-vCPU virtual machine. It can be deployed with Perimeta and other third-party SIP devices. The load balancer copes with security and DDoS processing, with scaling and redundancy complexity handled by the backend vSBC. SDE can also be used for generic SIP load balancing, in partnership with the CWC IMS Core. Load balancing can also be supplied by DNS and ECMP/Anycast. DNS is used where possible, within trusted and untrusted networks, as it provides a resource efficient, widely deployed web-scale load balancing solution. In some scenarios, suitable load balancing can be provided in the virtual infrastructure (e.g., AWS Elastic Load Balancer).
Virtualized SBC (vSBC) High-Availability Strategy:	High availability for the vSBC is moving to an N+K model. State storage and processing are separated onto independently scalable nodes, with all nodes active and redundant resource shared throughout the cluster. This reduces the resource required for high availability. State storage nodes are deployed with cluster-wide redundant shared databases, and processing nodes are stateless, enabling them to be easily replaced or scaled out and in. Configuration is automatically shared throughout the cluster, and OAM APIs are aggregated for monitoring. High availability is achieved through the DNS or LB techniques above. Calls are preserved through the state storage node redundancy, where the level of redundancy required can be selected based on requirements (e.g., local and/or geographic).
Virtualized SBC (vSBC) Scaling Strategy:	Signaling and media nodes can scale dynamically and elastically in and out. The VNFM monitors KPIs on the different node types and automatically scales out and in according to load on that node type. Scaling over multiple sites and bursting into alternate clouds like public clouds is also possible. Both vertical (changing resources of existing nodes) and horizontal (changing number of nodes) are possible, though horizontal is strongly recommended. And with the new SDE, the SBCs can be scaled horizontally behind SDE without any maintenance window/IP address migration requirements.
Hybrid SBC Interworking:	Deployed virtualized, Perimeta can interwork with non-virtualized SBCs and also control pooled physical media plane resources (e.g., bare-metal Metaswitch SBCs) if desired. This can be useful as a stepping-stone to cloud deployment and to make use of existing hardware assets.
vSBC Public Cloud Integration Support:	Perimeta has been deployed in public clouds such as AWS, GCP, IBM SoftLayer, and Azure. This allows customers to provide service from numerous sites around the globe. This can be done either as the primary contact point for service or to provide backup in case of primary site failure. Perimeta software can be provided in AMI format for Amazon Web Services deployment. Perimeta can be deployed in public clouds and is deeply integrated for all lifecycle management functions in public clouds, including: Active Directory; Monitor; Network Watcher; DevOps; Resource Manager; VM scale sets; Key Vault; Accelerated Networking; and SLB.

PERFORMANCE

Rating:	Leader
vSBC Performance Characterization:	The minimum requirements for virtual Perimeta are: • 2 virtual CPUs (this can be Hyper Threads, so total one physical core) • 1 virtual NIC • 4GB RAM • 30GB Disk
vSBC Configuration Management:	Configuration can be roughly broken down into three areas: • System configuration (Day 0 and Day 1)- the minimal configuration for a network node to function. Perimeta examples: some local IP addresses, the connection between the SSC and the MSC, SAS location, etc. • Service configuration (Day 2)- the configuration necessary to provide general service. Perimeta examples: setup and configuration of adjacencies, MMF rules, etc. • Provisioning configuration- information about subscribers (whether individuals or groups). Perimeta examples: delegated subscribers, PBXs. Telcos need automated mechanisms for managing configuration within their networks. Customers can use our VNFM (MDM) for system configuration. Customers can use a CI/CD pipeline, or other equivalent function, to define and update service & provisioning configuration on Perimeta and SDE (and providing a framework to integrate further products in future), giving customers the ability to manage service configuration on large deployments in an efficient and scalable manner. This is aligned with the general industry move towards infrastructure as code. This framework also allows customers to test out updates to their deployment via a canarying approach. Customers do this through dedicated canary site(s), or by rolling out changes to specific NEs within a given site.
Third-Party SBC Validation:	EANTC, under the Intel partners program, validated SBC virtual performance testing with a report in September 2016. Miercom validated SBC performance for Perimeta on Dell R620 as well as ATCA 6340 and 6320 platforms in June 2013. Vodafone MVTC validated SBC performance and resiliency of Perimeta running on HP BL460C Blades in April 2014.
Third-Party vSBC Validation:	Virtual Perimeta has been tested by EANTC/Intel in August 2016, with results matching, if not exceeding, the performance of bare metal systems.

FEATURE SUPPORT

Rating:	Very Strong
Standards Support:	Perimeta is compliant with all of SIPConnect 1.1, RCS/RCSe, VoLTE (IMS 3GPP Release 14, and GSMA IPX. Metaswitch has attended a range of interop events with the Perimeta product, including those run by the MS Forum/ GSMA and the SIP Forum in order to verify this interoperability. Perimeta is also compliant with STIR/SHAKEN and NG-911 specs, FIPS and Microsoft Teams Direct Routing-certified.
Routing Intelligence:	Least cost, time of day, round robin, weighted, use of SIP redirect server, response code triggered hunting, dynamically updated routing based on VQM scores of downstream routes, SLA-based routing, ENUM (including source and destination number based on EDNS extensions). This is in addition to standard call routing based on prefixes, domains, trunk-groups, carrier codes including International routing, domestic U.S. routing, EU/ non-EU routing, LNP/MNP routing, Bi-lat routing, and SPID-based routing. Perimeta also introduced Directory Number (DN)-based traffic grouping tables.
Bandwidth Management:	Perimeta's capacity control allows an operator to define voice and video bandwidth rules at a range of granularities, from calling-number up to an entire account. In addition, the operator can dynamically define new service types based on properties of the signaling messages and assign specific bandwidth and capacity control limits for those new services.
Access Control:	Each Perimeta Session Controller exposes a range of fine-grained configurable tools for access control. The two most important options are prioritized rate-limits and filters, which work together to divert the most disruptive forms of attack. Incoming UDP or TCP traffic is separated into signaling and media. Traffic is also separated (by physical, VLAN, or subnet separation) between trusted and untrusted subnets. All media traffic is blocked by default and accepted only in response to signaling negotiations. Once a so-called pinhole has been opened, only the source address and port which completed the negotiation will be allowed to send traffic. Furthermore, traffic through each pinhole is rate-limited. Signaling traffic is prioritized, helping ensure the most important messages get through even during a denial of service attack or other network overload. A series of increasingly intelligent rate-limit filters are applied to the signaling traffic. Each filter is designed to maximize the service offered to the highest-priority sources. Separate rate-limits are applied to non-UDP/TCP traffic (for example, ARP and ICMP). On untrusted access networks, only users who authorize with a central server (e.g., via digest authentication) are allowed to access service and they can be individually limited or restricted in terms of allowed rates.

DoS/DDoS Prevention:	Perimeta has been tested against a large variety of security attacks including TCP-ACK floods, TCP-SYN floods, TCP SYN-ACK attacks, TCP FIN-ACK attacks, TCP NULL floods, ICMP attacks, ICMP echo reply attacks, IP random protocol attacks, UDP and TCP checksum error floods, overlapping fragmented packets, missing fragments, small fragments, rose attacks, random TCP flag floods, spoofed source, and empty UDP payloads. Perimeta has also been tested against packet fuzzing attacks and blended combinations of the above DoS attacks. The Defensics test suite has been employed to verify Perimeta handles over 2 million individual SIP fuzzing tests without failure. Metaswitch has also tested extensively against RTP fuzzing suites to ensure the resilience of the media plane.
Topology Hiding:	Perimeta hides the topology of networks by rewriting or removing topology-sensitive information from SIP messages. By default, the Session Controller will make the following changes to SIP messages: strip record-route and route information from the message; rewrite IP, contact, and via headers so that the source IP address is replaced with the local address of the outbound adjacency; and replace the IP addresses in c= lines in SDP with the addresses it has allocated for media forwarding.
Call/Session Admission Control:	The Session Controller can apply capacity control to calls and signaling messages passing through it. There are two main uses for capacity control: defending load-sensitive network infrastructure, such as softswitches and communications links, against potentially harmful levels of load; and policing SLAs between organizations to ensure that the levels of network utilization defined in the SLA are not exceeded. Multiple Perimeta SBCs can also call into a centralized admission control service that ensures consistent admission control across the entire network. Perimeta DAM allows resource limits to be applied across the scope of a deployment rather than in single instances. DAM microservice development represents a step in decomposing Perimeta to be fully cloud-native.
Transcoding Avoidance:	Perimeta will produce offers to the callee that avoid codecs that require transcoding. This is to reduce unnecessary transcoding. If the callee rejects the offer due to unsupported codecs, then Perimeta will send a new offer to initiate transcoding. Perimeta will allow a greater number of reservations than transcoding licenses available on the system. This is because not all reserved transcoding sessions translate into actual transcoding sessions. It will also only reserve resources for fax/DTMF tone detection where it's genuinely required by the signaling.

Blacklisting:	Blacklisting is 'dynamic' because the Session Controller applies it automatically, in response to the actual traffic it sees. In this way, the Session Controller can respond quickly to an unexpected change in traffic patterns - whether malicious, or simply caused by malfunctioning devices attempting to connect. When a Session Controller detects traffic which might indicate an attack on the core service network, it terms that traffic suspect. The Session Controller keeps a record of the amount of suspect traffic it has received from each source. When this quantity exceeds a configured threshold, that source is blacklisted. Each individual piece of traffic is tracked against all of its port source, its IP source, and its service network. A blacklisting profile defines a particular set of thresholds for one or more of the available blacklisting reasons. The blacklist table can be accessed for integration with an SDN Controller and thus distribution of the suspect sources throughout a carrier's network and programming into edge routers/ OpenFlow switches.
Emergency Services:	Perimeta can identify emergency calls and apply custom routing rules to them, as well as applying SIP message manipulation where needed. The Session Controller will also prioritize emergency calls over all other calls, to ensure the highest possible level of service. Perimeta can be configured to comply with national standardizations such as GETS, NENA, and WPS which require additional rules on the SBC to identify and categorize calls as requiring special prioritization.
Regulatory Support:	For lawful intercept/CALEA: Perimeta supports use of ETSI-102232-5, ETSI TS 101671, and PacketCable 1.5 Lawful Interception for both signaling and media intercepts. It interoperates with the Verint MF, the Utimaco LIMS, and the Xcipio SS8 devices. Perimeta also supports LI X1, X2, and X3 interface encryption. In addition to voice, Perimeta also supports tapping t.38 fax, video, and RCS flows including MSRP and capabilities exchanges. When deployed with a suitable MF such as those listed, the combination is compliant with 3GPP TS 33.107 and TS 33.108. Mid-call LI tapping is supported. Perimeta can be used to provide signing support for ATIS STIR/ SHAKEN standards, to comply with Caller-ID spoofing detection regulation in the U.S.
Service Assurance:	Packet marking can be configured on the Session Controller using QoS profiles. Each profile defines a setting for the TOS field, or alternatively (for media) specifies that the Session Controller must pass through packets without setting or altering the field. Perimeta supports packet marking using 'TOS with IP Precedence,' as described in RFC 791, RFC 1122, and RFC 1349. It also supports using the IP TOS field to carry the DiffServ code point (DSCP) as described in RFC 2474. VQM routing is also used to ensure that only a downstream link with high voice quality is selected, and will fall back to other links if it cannot satisfy quality requirements.

VoLTE User Experience:	Perimeta supports many VoLTE UX improvement features. It provides wideband and super-wideband codec support interworking wideband codecs intelligently to other wideband codecs where possible (while also avoiding unnecessarily expensive and BW-intensive codecs dynamically, if they would not improve voice quality). It routes calls via media processing elements that are located optimally for the user location, to improve end-to-end latency. It provides Voice Quality Analytics feeds to enable drill-down and operational analysis of quality and experience, based on a number of factors (e.g., device type/version, cell ID, WiFi access type, etc.). Call continuity is supported through eSRVCC, including alerting phases, as well as seamless handovers for WiFi, whether IR.51 or OTT clients. Enhanced voice quality is provided through support for adaptive and extensible adjunct jitter buffer function, as well as integration with Dolby noise reduction systems and codecs.
Reporting & Analytics:	Reporting: The Perimeta KPI Dashboard provides multiple dashboards that display metrics for each Session Controller or each adjacency. Perimeta will raise SNMP alerts for all major network/service level quality issues. Perimeta can impose blacklists at critical levels. Perimeta monitors operator-defined thresholds within the Service IQ Monitoring (SIMon) Analytics, a product that can retrieve statistics collected by Perimeta Session Controllers and display them in real-time dashboards.
	Perimeta provides for the collection of VQM call diagnostics without affecting Perimeta's capacity via the Service Assurance Server and other open diagnostics streams. Perimeta can also stream real-time data to outboard analytic packages such as Splunk for further data mining and action. These metrics can also be fed back into the automation framework of Perimeta, to ensure appropriate decisions are made in real-time based on the KPIs measured in the network.
	Perimeta exposes over 1,900 counters and statistics through SNMP to provide a holistic view across utilization, capacity, health and application performance.
Session Visibility:	The session visibility capabilities of Perimeta coupled with Metaswitch's Service Assurance Server (SAS) enable automatic access to all signaling, even when encrypted, and even within virtualized data centers where there are no obvious wires for probes to tap into. SAS provides management visibility of the end-to-end VoIP network because every session and service flow that Perimeta processes is captured and recorded for analysis and reporting,
	SAS provides both protocol level and internal software logic execution visibility to add in troubleshooting and triaging issues. SIP messages can also be streamed to a data analytics engine to mine service performance insights. Perimeta also integrates with Transaction Network Services (TNS) Call Guardian to provide call blocking and filtering analytics.

Policy Control:	Perimeta has a flexible range of rules engines to support a variety of SP requirements.
	• SIP/SDP message manipulation function that can manipulate the SIP/SDP on messages as they pass through it.
	• Function to categorize calls/messages based on the contents of the SIP/ SDP message, and then apply routing/admission control based on these categories.
	• Function to store off per-call variables and then use these variables as inputs to message manipulation rules of future messages in the same dialog/session.
	• Function to manipulate the numbers used in calls as they pass through the SBC.
	These functions can be invoked based on flexible policy matching (e.g., arbitrary regex matching of messages, service policies, and ENUM or 3xx queries).

PROTOCOL SUPPORT

Rating:	Very Strong
Signaling Protocols:	Perimeta supports use of SIP and SIP TLS for call signaling. SIP-I and SIP-T are supported in pass-through and interworking modes. H.248 is supported for control of MSCs, but not for call signaling.. Rx and Rf (over Diameter) are fully supported.. ENUM is supported for routing. Perimeta also supports Apple Push Notifications (APNs) to ensure that the Apple iPhone can receive incoming calls. Perimeta supports protocols/APIs related to Caller ID Authentication and STIR/SHAKEN. Perimeta also supports ICE/TURN to support media bypass feature for Microsoft Teams Direct Routing.
Media Protocols:	RTP, RTCP, SRTP, SRTCP, T38, MSRP, MSRPS, DTMF (inband and RFC2833), BFCP, RTCP-XR, DTLS. Perimeta supports the squelching of DTMF tones to prevent in-band DTMF information leaking across it when it performs DTMF transcoding. Perimeta also supports CN comfort noise, playing ringback tones and announcements, jitter buffering, voiceband data mode, and RTP/ RTCP multiplexing.

Hardware Transcoding:	Perimeta supports use of DSPs for transcoding. Where used, these DSPs are installed on PCIe accelerator cards in a standard COTS server of the customer's choice. The host server can be operating as either an Integrated Session Controller (ISC) or Media Session Controller (MSC). The number of cards supported per server varies with different server types, with up to six in a Dell R740. Perimeta also supports DSPs in a cloud deployment provided the hypervisor setting supports it; Perimeta VNFs can utilize the installed DSPs as an 'acceleration' technique. Additionally, Perimeta supports a hybrid distributed deployment where some SSCs/ICSs are VNFs, and some ISCs/MSCs are physical units with DSPs installed. This includes deployments with session controllers (and potentially non-transcoding media controllers) deployed separately in the cloud, all making use of a pool of dedicated transcoding MSCs, accelerated with DSPs- a technique which is attractive to make use of the best TCO provided by DSPs, if there are logistical challenges with adding DSPs to the cloud, and which also allows best use of existing/legacy transcoding resources. With an increasing range of commodity servers accepting accelerator cards for high-performance computing, and advancements in DSP architecture expected to come down the line, Metaswitch expects increased density deployment options to become available over the next year.
Software Transcoding Strategy:	Perimeta supports software transcoding on general purpose CPUs, enabling functional completeness in a wide range of environments. It uses a multi-threaded, sideways-scalable software architecture that makes the most of L1/2/3 instruction and data cache localization to extract highest efficiency from the general purpose CPU. The codec libraries are specifically designed and optimized for x86 CPUs (rather than being ported DSP software), making use of the latest libraries and instructions from Intel and others. Tone detection/injection, packet loss concealment, DTX, and highly adaptive jitter smoothing are all supported. Perimeta now supports all codec transcoding/transrating in software, eliminating the need for separate DSPs.
Codec Support:	All codecs can be passed through. G.711, G.722, G.723.1, G729AB, G.726, AMR-NB, AMR-WB, T.38, EVS, iLBC, SILK and OPUS can be transcoded.
Signaling Encryption:	TLS (v1.3 support), IMS-AKA, and IPsec fully supported using native encryption support provided by x86 CPUs. Perimeta supports over 1 million TLS endpoints and IMS-AKA endpoints in a single instance, scalable by clustering instances. IPsec tunnels can be programmed using both IKEv1 and IKEv2.
Media Encryption:	SRTP (pass-through and interworking)- supported using native encryption support provided by x86 CPUs. Perimeta supports up to 420,000 SRTP pass-through streams and 140,000 RTP/SRTP interworked streams in a single instance. Capacity in pass-through mode is as for RTP traffic.
VoLTE Roaming Support:	Perimeta supports all VoLTE roaming options, and can interwork between them, providing flexibility to the MNO and IPX provider. 3GPP TRF and OMR VoLTE function is supported. S8HR is supported, with Perimeta providing function to ensure suitable handling of emergency calls for roaming subscribers. LBO-HR is supported, as P-CSCF, IBCF, and with ATCF/ATGW/EATF function for handling call continuity in these environments. LBO-VR is supported, as above, with the addition of TRF and OMR function for both call continuity and optimal routing.

VoWiFi Security Support:	Perimeta supports either TLS or IPsec (IMS-AKA) encryption for VoWiFi untrusted access, including handling IMS-AKA with NATs.
WebRTC Support:	Perimeta can support operating as a WebRTC gateway, providing interworking between SIP over WebSockets and standard SIP, between AVPF RTP and standard AVP, and between SRTP OPUS and G.711 media streams. This allows it to act as the eP-CSCF for WebRTC-based access in an IMS network. In terms of non-audio streams, generic streams such as DataChannel are supported between WebRTC endpoints.
SDN Controller Support:	Perimeta exposes a variety of network information relevant to SDN, such as blacklisted IP addresses and ranges, as well as flow-related information (media and signaling) that can be used for QoS control by an SDN controller. In VoLTE deployments, as well as many other access deployments, session flow QoS is handled by a PCRF-like function which Perimeta controls over the Rx interface. Metaswitch plans work to allow SDN controllers to program additional blacklist information via open APIs, once the OpenFlow API extensions become rich enough.
API Support:	Perimeta has programmatic APIs to control all of its functions: service policy, lifecycle events (upgrade, diagnostics), diagnostics tests- pings/probing/ test registrations, viewing databases (calls, registrations, blacklists). The interfaces supported are RESTful HTTPS APIs, ONAP, Netconf, and SNMP. Perimeta has added support for Ansible lifecycle management playbooks in orchestrated OpenStack environments.

DEPLOYABILITY

Rating:	Leader
Product Platform Portfolio:	Perimeta, at its core, is a carrier-grade, software-based SBC, able to run on a variety of platforms: 1) ATCA chassis with redundancy built in available for purchase directly from Metaswitch; 2) Perimeta software installed on Dell R230, R630/R640, or R730/R740 rack servers in a variety of CPU configurations roughly categorized as low, medium, and high performance, available for purchase directly from Metaswitch; 3) Perimeta software sold separately to be installed on any of a variety of preapproved platforms from Cisco, HP, and IBM, with others being added on a continuous basis; and 4) Perimeta software sold separately to run inside a variety of hypervisors including KVM and VMware or clouds like Amazon AWS, Azure, or GCP.
Configuration Options:	Perimeta can be deployed in either integrated mode (ISC carrying both signaling and media) or distributed mode (SSC carrying signaling, MSC carrying media). It can also support a hybrid mode, with an ISC having additional media capacity through use of MSCs under control of the ISC. When operating in a distributed-mode, with MSCs and either ISCs or SSCs, the different Perimeta session controllers can either be colocated in the same facility or separated across the network. Perimeta can also be decomposed into various microservices to turn it into the world's first cloud-native SBC.

Platform Customization:	Perimeta is a software SBC that can run on a variety of platforms: ATCA cards using standard Intel Xeon CPUs, COTS hardware using standard Intel Xeon CPUs, and virtualized environments. Optional commercially available DSP cards mentioned further below.
Operations & Management:	Perimeta supports a full range of FCAPS interfaces. Configuration can be applied by different interfaces, namely, a user-friendly CLI, a RESTful JSON API, a Netconf API, or a GUI. The GUI can be accessed via an installed client or a web client. The RESTful JSON API can be used to programmatically create and modify the service configuration- e.g., service interfaces and their properties. The system uses SNMP for statistics monitoring and alarms. Metaswitch's ServiceIQ Management Platform VM (SIMPL VM) is a VM that simplifies the management of other Metaswitch VMs. SIMPL provides a unified and consistent way to deploy, commission, and update Metaswitch products on VMware vSphere, VMware vCloud and OpenStack. Metaswitch IP Management Platform (SIMPL) automates lifecycle management of large volumes of Metaswitch VMs, and also supports Azure lifecycle management with ARM.
Licensing Model:	Perimeta supports several licensing methods: Appliance, BYOH, and Virtual. Perimeta may also have its own license (known as an appliance scope license), or it may share a deployment scope license with one or more other Perimetas. Each deployment scope license may have an instance limit and/or session/usage limits, determining how many of each session controller type or session can use the license. Perimeta now also supports subscription-based licensing in Azure Cloud for Teams Direct Routing and is expanding to additional Perimeta use cases.
SBC Deployments:	Over 1,000 deployments, in over 500 operators globally.
SBC IMS Deployments:	Perimeta has been deployed in many IMS networks over the past several years including AT&T, Sprint, Tiscali, Manx Telecom, Telekom Austria, SingTel, 2 Degrees, ICE Wireless, Digicel, Illinois Valley Cellular, James Valley Cellular, RINA, United Wireless, Union Wireless, U.S. Cellular, CSpire and Spark New Zealand. AT&T selected Perimeta as the primary virtual SBC to be deployed in its software-centric IMS network. Sprint also deployed Perimeta as a PCSCF for its VoLTE network.
SBC IMS Core Interoperability:	IMS core vendors with whom Perimeta has successfully interworked include Ericsson, Metaswitch Clearwater, Iskratel, Alcatel-Lucent, Cisco, Samsung, OpenIMS, ZTE, Huawei and Tekelec.
SBC-as-a-Service:	Perimeta supports complete multi-tenancy via virtualization, where a large number of small virtual SBCs can run on the same host. It also supports multi-tenancy via configuration, where different enterprises can have their own SBC instances. Lastly, Perimeta offers APIs that allow operators to integrate their existing enterprise self-service portals with Perimeta, allowing for deployment of SBC-as-a-service on an on-demand basis. Metaswitch also offers Teams Direct Routing as a managed service for carriers.

Multivendor vVoLTE Support:	Perimeta is deployed in multiple multi-vendor solutions for vVoLTE and vIMS. For example: AT&T deploys the vSBC alongside third-party vIMS; 2 degrees and Sprint deploy alongside both Metaswitch vIMS and other third-party elements (PCRF, VoLTE TAS, etc.).
NFV MANO Deployability:	Perimeta features an Orchestration API in support of the ETSI MANO Ve-Vnfm-vnf reference point. For scenarios in which carriers have a generic VNFM or their own orchestration environment, helper components and databases can be provided to simplify VNFM integration. For scenarios where there is no established or generic orchestration engine, Metaswitch provides a VNFM, supporting the ETSI MANO Or-Vnfm reference point. When virtualized, Perimeta offers the Virtual function Event Stream (VEM) interface to report telemetry to OPAN, using the VES V5.4.1 interface for alarm and statistics reporting.
Third-Party NFV Ecosystem Participation:	Perimeta has been onboarded into NFV ecosystems from IBM, Cisco, Overture, ALU CloudBand, Amdocs, HP Helion, Mirantis, 6Wind, VMware, Netcracker, Cloudify, and ONAP. At MWC 2016 and 2017, Perimeta and other Metaswitch products were showcased in leading demos by many NFV vendors including VMware, Affirmed, HPE, and Openet.
Date of First Deployment (vSBC):	2014
Virtualized SBC Deployments (Telco Private Cloud):	Perimeta is deployed in a virtual environment in the following announced operators: AT&T, Sprint, BT, Tiscali, DT, Telekom Austria, TelAlaska, AIS, MANX Telecom, IrisTel, and 2 Degrees, as well as approximately 100 further operators.
Virtualized SBC Deployments (Public Cloud):	Metaswitch has several production deployments using Amazon Web Services and IBM SoftLayer.
Virtualized SBC Deployments (Vendor Cloud):	Metaswitch has discussed deploying Perimeta as an SBC-as-a-service in the Metaswitch vendor cloud, but it has not seen significant interest in this deployment model.