

Clearwater Core

IMS from Metaswitch, Industry Leaders in Cloud Native Communications

Metaswitch virtual IMS, Clearwater Core, represents a fundamentally new approach to developing, delivering and deploying communications networks, with software solutions accelerated through collaboration, at web-scale and within low-cost elastic data centers.

- » 3GPP R14 Compliant
- » Scalable, resilient and high-performance
- » Standard Support SLA
- » Reduces costs whilst nurturing innovation

Based on a radically different design that can deliver the massive scale and performance in conjunction with simple automation and low resource footprint necessitated by the ongoing push towards 5G and beyond, Metaswitch is providing network operators a fully supported and maintained solution for cloud-native IMS Core.

Cloud Native IMS Core

Clearwater is an implementation of IMS built using web development methods to provide voice, video and messaging services to millions of users. Architected from the ground up for massively scalable deployments within virtualized public or private elastic compute clouds, Clearwater combines the economics of over-the-top (OTT) style service platforms with the standards compliance and reliability expected of telco-grade communications network solutions. The web services-oriented design inherent to Clearwater makes it ideal for instantiation within NFV (network functions virtualization) environments as a virtualized network function (VNF).

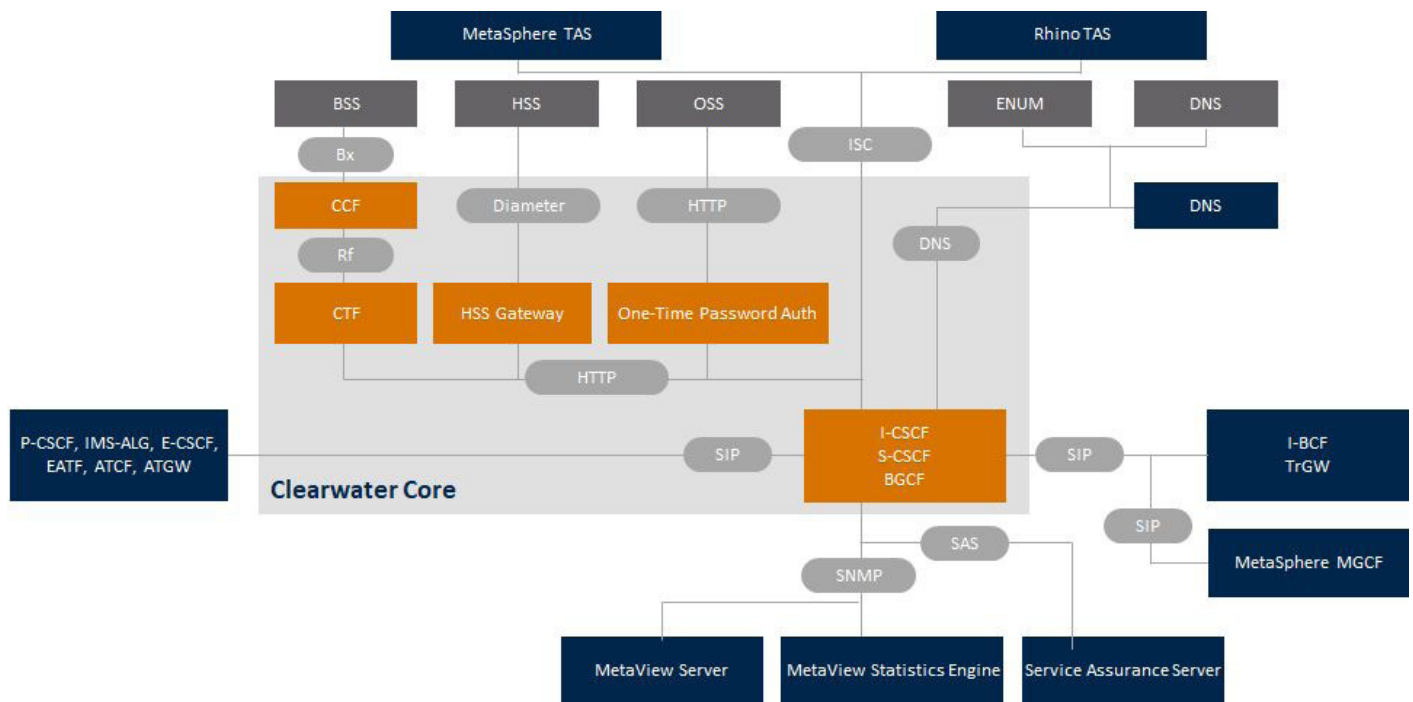
Clearwater Core

Meeting the demand of worldwide network operators, Clearwater Core is a hardened and supported subset of the open source project which is then combined with powerful analytics options afforded by Metaswitch SAS.

Key differentiators of this solution include:

- Scaling
- Service-based architecture
- Automation
- Analytics





Clearwater Core includes the functional elements representing an IMS core: I-CSCF S-CSCF and BGCF. Additionally, Clearwater Core can be deployed with the following:

- Perimeta - the industry’s leading SBC as a P-CSCF, E-CSCF, IMS-AGW, ATCF, ATGW, EATF, IBCF, TrGW
- Service Assurance Server (SAS)
- MetaView Statistics Engine, a centralized statistics aggregation and dashboard element
- MetaView Server, a centralized alarm monitoring element
- One-time Password Authorization element, allowing just-in-time provisioning of new subscribers
- a CCF element for converting Rf based billing streams into file-based CDRs.

Clearwater Core is offered under a standard commercial license, with the support, maintenance, SLAs and ongoing feature development that customers require for their critical communications infrastructure.

When combined with Clearwater developer ecosystem partners, Clearwater Core can also be employed as the foundation for delivering extremely competitive OTT text, voice, video, and messaging services along with highly abstracted telephony developer environments.

The Clearwater Architecture

Clearwater was designed from the ground up to be optimized for deployment in virtualized cloud environments. It leans heavily on established design patterns for building and deploying massively scalable web applications, adapting these design patterns to fit the requirements of SIP and IMS.

Clearwater was built in a manner that enables all components to scale out horizontally using simple, stateless, load-balancing. Long-lived state is not stored on individual nodes, avoiding the need for complex data replication schemes. Instead, long-lived state is stored in cloud-optimized clustered storage technologies such as Apache Cassandra and Memcached.

Characteristics of innovative internet software architectures, interfaces between the front-end SIP components and the back-end services use RESTful web services APIs while interfaces between the various components use connection pooling with statistical recycling of connections. This guarantees that traffic loads are effectively spread evenly as nodes are added and removed from each layer.

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It is notable that the new Service-Based Architecture adopted by the 5G standards is very closely related to the model Clearwater Core already uses, since it is based on HTTP APIs and simple request/response or subscribe/notify semantics. This is not accidental, but a result of the standards authors wanting to simplify the task of creating a cloud-native 5G core, and realizing that the Service-Based Architecture which Clearwater Core exemplifies is the best way to achieve that end.

Unmatched Reliability and Resilience

The Clearwater approach to reliability follows common design patterns for scalable web services, keeping most components largely stateless and storing long-lived state in specially designed resilient and scalable clustered data stores.

Targeting short-lived state maintenance, all nodes are transaction-stateful rather than dialog-stateful proxies. As nodes remain in the signaling path for individual transactions only, outages do not cause established SIP dialogs to fail. Long-lived state, such as SIP registration data and event subscription state is stored in a clustered, redundant shared data store (Memcached) which is not tied to any individual node.

Similarly, the subscriber management microservice only retains local state for pending requests, with all long lived state being stored redundantly in associated database clusters (Memcached) while being mastered on the HSS itself.

Optionally, a lightweight HSS can be provided, suitable for fixed-line IMS deployments backed by an OSS. This uses a highly redundant database cluster (Cassandra) to store configured subscriber state.

Geographic redundancy is facilitated by deploying a single Clearwater Core instance across two or more distinct data center locations with a secure, private, connection between them, enabling the replication of registration information. Standard cloud-based DNS services are then employed to manage failover.

Proven Scale and Performance

Selected by global Tier 1 operators such as Sprint, Clearwater Core is a sound foundation for any IMS network. Tests by independent bodies such as EANTC have shown it can easily scale to 20M subscribers and deliver 60M BHCA performance, with no fundamental limitations beyond this.



MANO, Active Analytics and Performance Monitoring

Critical in software-defined service function chains built on NFV constructs, Clearwater supports a wide range of management and orchestration (MANO) lifecycle operations. This includes instantiation, configuration, startup, clustering, quiescing and termination. Clearwater Core is delivered as a set of OVA or QCOW2 images for deployment on VMware and OpenStack. It supports simple and rapid onboarding to any TOSCA-capable NFVO.

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Clearwater Core can also be deployed in container environments such as Docker and Kubernetes, allowing more efficient resource usage and faster response to changing loads.

While standard SNMP interfaces are exposed for performance and fault monitoring, carriers implementing Clearwater Core will also benefit from the Metaswitch Service Assurance Server. SAS provides proactive, real-time, analysis of all Clearwater processes, presented in simplified ladder diagram and detailed decode views. This includes SIP messages, HTTP and Diameter queries, Cassandra and ENUM lookups plus all authentication, rule-matching and routing performed by individual nodes.

Clearwater & Metaswitch: Taking the Bite Out of IMS

Together with near-term NFV initiatives, Clearwater Core is helping revolutionize the telecommunications marketplace by easing the transition to new software-defined service function chains that are uniquely flexible, resilient and scalable.

With Clearwater, your IMS core can be operating in a matter of hours, with Metaswitch standing behind this critical infrastructure, providing superior support, custom engineering, bespoke professional services and consultancy. To learn more contact Metaswitch at www.metaswitch.com/contact.

Specifications

Commercial License

- Software binaries only available from Metaswitch
- Guaranteed Service Level Agreements (SLAs)
- 7 x 24 x 365 support

Professional Services

- Bespoke engagements
 - Supporting trials, proof of concepts
 - Systems Integration
 - Contact Metaswitch for more details

IMS Specifications

- I-CSCF, S-CSCF, BGCF, CCF
- 3GPP IMS Release 14
- Full compliance statement available as ETSI TS 102 790-1 PICS pro forma
- To request the PICS, please contact Metaswitch

Supported OS

- Ubuntu 18.04
- Distributed as OVA/QCOW2 install images

Other Open Source Projects Used Include

- Cassandra
- Memcached
- pjsip
- freeDiameter

Contact Metaswitch for the complete list

Deployment Models Include

- VoLTE
- RCS/RCS-e
- Enterprise IMS
- IOT
- OTT voice/video
- Developer API Ecosystem
- PacketCable 1.x to 2.x migration
- CLASS 5 replacement
- Hosted Business Voice

Acknowledgements

This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit at www.openssl.org