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Oracle Communications Subscriber-Aware Load Balancer

Oracle Communications Subscriber-Aware Load Balancer enables linear, non-disruptive scaling of capacity up to millions of subscribers from a single Session Initiation Protocol (SIP) Internet Protocol (IP) address. It supports the delivery of any IP Multimedia Subsystem (IMS), Rich Communications Services (RCS), or next-generation network (NGN) service as well as any SIP application—voice, video, presence, messaging, and multimedia—over any mobile or fixed line access network, including the internet.

Overview

Oracle Communications Subscriber-Aware Load Balancer is used to front-end clusters of Oracle Communications Session Border Controller (SBC) for SIP signaling. Subscriber-Aware Load Balancer is a high-performance load balancer optimized for clustering SBCs. It provides dynamic, adaptive load balancing of subscribers based on SBC availability and health score, subscriber capacity, system utilization, and user defined policies.

Subscriber-Aware Load Balancer features carrier-grade high availability. Deployed as 1:1 active-standby units, Subscriber-Aware Load Balancer checkpoint configuration and cluster state to ensure no loss of active sessions in the event of single system failures.

An SBC cluster scales subscriber capacity without requiring architectural forklifts or network disruptions. As all elements of the cluster are SIP subscriber and session-aware, it provides a superior solution in terms of scalability, dynamic adaptive load balancing, redundancy, and management compared to traditional load balancers and SIP redirect servers.

High-capacity, high-throughput access SBC clusters

Oracle Communications Subscriber-Aware Load Balancer enables the creation of SBC clusters that can each support up to millions of subscribers from a single IP address for SIP signaling.

Real-time Transport Protocol (RTP) media flows directly from endpoints to the SBCs maximizing cluster throughput and minimizing media latency.

Linear, non-disruptive SBC capacity

Applications

- Session border controller (SBC) clustering
- Any subscriber-based IP Multimedia Subsystem (IMS) or non-IMS service
- Any private or public, fixed or mobile access network

Key features

- Adaptive, session-aware load balancing of SIP sessions
- Dynamic expansion and contraction of subscriber capacity
- Intracluster protocol for state exchange between Oracle Communications Subscriber-Aware Load Balancer and SBC cluster members
- Low-latency control plane
- Geographical distribution of SBC clusters
- Carrier-grade high availability

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Dynamic, adaptive stateful load balancing

Oracle Communications Subscriber-Aware Load Balancer distributes subscribers to specific SBCs in the cluster at time of registration based upon SBC availability, health score, capacity, and current load. This information is exchanged between SBCs and Subscriber-Aware Load Balancer using an intra-cluster protocol. Moreover, if the cluster is composed of different members such as a mix of appliance SBCs with different capacity or a mix of appliance and virtualized SBCs, Subscriber-Aware Load Balancer uses each individual member's performance characteristics so as to optimize performance of the cluster as a whole without overloading slower members.

SBCs can be easily added or even removed from the cluster without any service disruption, assuming that sufficient capacity exists in the cluster. Subscribers are redistributed across the reconfigured cluster only when they do not have active calls or sessions in progress.

Low latency

Subscriber-Aware Load Balancer binds subscriber to an SBC from the cluster based on loading and subscriber geography. Once binding is established, it utilizes "fast-path" to perform packet forwarding of subsequent signaling messages leading to low latency.

Subscriber-Aware Load Balancer virtualization

Oracle Communications Subscriber-Aware Load Balancer can be run as a Virtual Network Function (VNF). Supported hypervisors for Subscriber-Aware Load Balancer VNF include:

- Kernel Based Virtual Machine (KVM),
- VMware ESXi.

Subscriber-Aware Load Balancer software supports deployment on Oracle Cloud Infrastructure (OCI), Amazon Web Services (AWS) and Google Cloud Platform public clouds. To reduce the need for cloud expertise, orchestration using Terraform scripts is supported on OCI and AWS.

Management and orchestration (MANO)

Oracle Communications offers VNFs for session delivery platforms including SBCs, load balancers and session routers. Oracle's strategy is based on providing carrier-grade VNFs that can be orchestrated in a flexible manner by a variety of environments, including the major industry orchestration and automation third party offerings.

Oracle Communications Subscriber-Aware Load Balancer supports REST API to automate instantiation, enable remote configuration and perform monitoring of Subscriber-Aware Load Balancer VNFs.

Key benefits

- Maintains cluster wide subscriber awareness and SBC utilization for intelligent SBC selection and rebalancing
- Scales to support up to millions of subscribers with no additional signaling latency
- Delivers greater security than SIP- aware load balancers
- Simplifies endpoint management
- Protects against site disasters and loss of connectivity
- Satisfies all access border control requirements
- Protects SBC investment
- Allows cluster composed of heterogeneous members and protects each against overload

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Catalyst to virtualization

Oracle Communications Subscriber-Aware Load Balancer helps operators' transition to virtualization by enabling an incremental introduction of virtualized SBCs in hybrid clusters alongside purpose build SBCs.

Hybrid clusters can support multiple services, applications, and access networks.

- Any service: Mobile, residential, or enterprise
- Any application: Voice, video, presence, messaging, videoconferencing, content and video share, unified communications, and collaboration
- Any access network: 3G, Long-Term Evolution (LTE), Worldwide Interoperability for Microwave Access (WiMAX), DSL, cable, fiber to the x (FTTx), leased line, internet, IPv4, IPv6, and IPv4/IPv6 interworking.
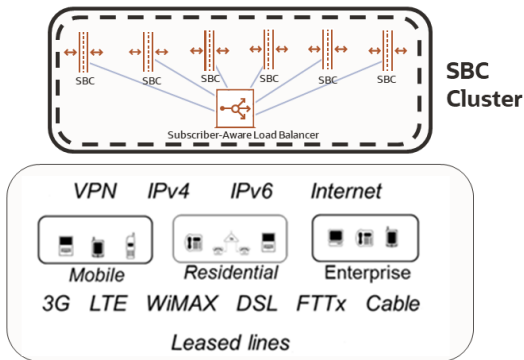
Figure 1. An Oracle Communications Session Border Controller cluster can be virtualized to physically support multiple services, applications, and access networks

Co-located or geographically distributed deployment models

To enable geographic distribution and preserve IP endpoint address transparency, the Oracle Communications Subscriber-Aware Load Balancer uses IP-in-IP encapsulation Request for Comment 2003 (RFC 2003) to forward traffic to the SBC.

The following deployment models provide geographic redundancy and network resiliency:

- **Co-located SBC cluster**: Oracle Communications Subscriber-Aware Load Balancers and SBCs are physically co-located in the same data center or aggregation Point of Presence (POP)
- **Distributed SBC cluster**: Oracle Communications Subscriber-Aware Load Balancers and SBCs are physically distributed and separated from each other. Each Subscriber-Aware Load Balancer only has access to a specific group of SBCs. This solution provides geographic redundancy

Related products

- Oracle Communications Session Border Controller
- Oracle Communications Session Router
- Oracle Enterprise Session Border Controller
- Oracle Session Delivery Management Cloud
- Oracle Communications Session Delivery Manager
- Oracle Communications Operations Monitor

Investment protection

The Oracle Communications Session Border Controller cluster supports existing SBC investment and can be comprised of a heterogeneous mix of SBC hardware platforms and VNFs. It also supports all Access SBC (A-SBC) configurations such as A-SBC with Proxy Call Session Control Function (P-CSCF) and IMS Access Gateway (IMS-AGW), P-CSCF signaling function only or A-SBC only.

Carrier-grade SBC functions and features

The Oracle Communications Session Border Controller cluster solution supports all of Oracle's carrier-grade SBC functions and features in the areas of security, service reach maximization, service-level agreement (SLA) assurance, revenue protection, and regulatory compliance.

SBC security framework addresses the unique security challenges of delivering SIP-based interactive IP communications over the Internet. This framework includes advanced security features, a highly scalable architecture, and comprehensive monitoring and reporting capabilities.

The Oracle Communications Subscriber-Aware Load Balancer supports IP Media Subsystem-Authentication and Key Agreement (IMS-AKA) and Transport Layer Security (TLS) including TLS 1.3 encryption.

Centralized management

SBC and Subscriber-Aware Load Balancer can be configured and managed by Oracle Session Delivery Management Cloud – a cloud native application for management and monitoring of Oracle Communications network functions. From Oracle Communications Session Delivery Manager – a centralized on-premises management system-SBCs can be added to or removed from the cluster, subscribers can be migrated, and software can be upgraded.

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