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Data Sheet

Oracle Communications Cloud Native Core, Service Communication Proxy (SCP)

Oracle SCP – A cloud native 5G core signalling router eases the operation, enhances resiliency & security, and enhances the visibility into the core network.

Oracle 5G Service Communication Proxy (SCP) is a cloud native 5G core signalling router that helps you efficiently secure and manage your 5G network by providing routing control, resiliency, security, and observability to the core network. Oracle's SCP addresses the challenges of the new service-based architecture (SBA) in the 5G core. It is designed using cloud native principles and brings 5G awareness to address many challenges introduced by the Service Based Architecture (SBA) of the 5G core.

SCP in the 5G network

3GPP has defined Service-Based Architecture (SBA) for the 5G network. SBA lets network elements or network functions (NFs) in 5G core communicate with each other over a service-based interface. It allows the decoupling of NFs with more precise functionalities with authorization to access each other's services.

SCP is a decentralized solution that provides signalling control to a 5G core network. It is composed of Service Proxy Controllers and Service Proxy Workers and is deployed alongside other 5G network functions. It learns the topology of the operators 5G core from the Network Repository Function (NRF) and provides routing control by creating traffic routing rules based on interactions with the NRF.

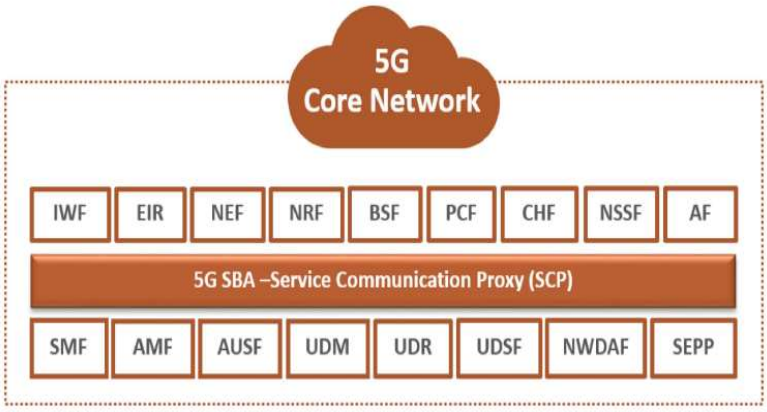

Figure 1. SCP in a 5G Core network

"Oracle's capabilities will essentially serve as the control tower of our network core, enabling our customers to consume software on demand and facilitating the advanced core functions required to power a truly automated network."

Marc Rouanne
Chief Network Officer,
DISH Wireless

Key Business Benefits

- Ease of operation though traffic balancing.
- Enhance resilience & security through alternate routing.
- Enhanced visibility into 5G core, though 5G SBI traffic feed for monitoring.

SCP makes a robust 5G Core

3GPP Release 16 introduced indirect communication between service consumer and producer via SCP, which off- loads network functions from performing following responsibilities:

- Delegated discovery and selection
- Load balancing & alternate routing
- 5G SBI traffic feed for monitoring
- Rate limiting and producer
- Congestion control

Oracle SCP Architecture

The Oracle SCP Architecture consists of components shown in Figure 2.

- SCP Controller – Learns network topology by subscribing to notifications from the NRF. It then derives routing policies and transfers them to the SCP workers. Also hosts the configuration interface for SCP.
- SCP Workers - Use the routing policies to route the 5G SBA signalling traffic between consumer and producer NFs.
- OAM – CNCC is used to configure the SCP and Observability (metrics, logs, traces) is provided using cloud native tools.

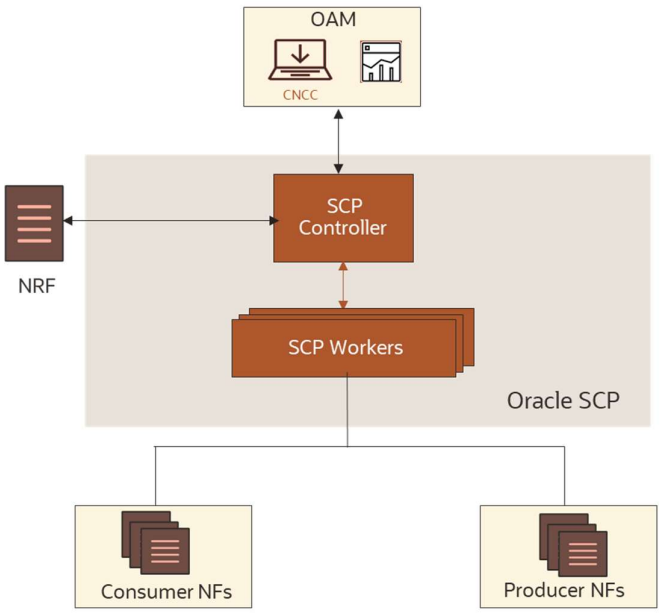

Figure 2. Architecture of SCP

Key Features

The Oracle SCP provides signalling control and reliability in HTTP2.0 service-based architecture like Diameter Signalling router (DSR) provides in 4G diameter core. The prominent features of SCP are:

- Load balancing across NF instances.
- Creating traffic routing rules based on the interactions with the NRF.
- Offloading of NFs with alternate routing and retries.
- Implementing congestion controls and prioritization.
- Limiting the effect of cascaded failures.
- Providing visibility into the 5G network.
- Resolving interoperability issues.

Detail Description of features and Benefits

Oracle Communications SCP not only resolves the challenges introduced by the 5G Service Based Architecture but also optimizes signalling controls. It enables service provider to get a better visibility into the core network. The prominent features of Oracle Communications SCP are listed as below:

- **Ease of Operation**
  - **Simplifies Network Topology**

    Indirect communication via SCP eliminates the need of every NF creating connections to every other NF in the network. Consumer NF only needs to create redundant connections towards SCP. This off-loads the consumer NFs from handling complex connection management.
  - **Improves Load Balancing**

    The SCP has a complete view of all the messages arriving for a given NF type. It supports schemes such as round robin and weighted round robin and factors in current load and NF availability to improve load balancing.
  - **Improves Routing Control**

    The SCP provides enhanced routing control at a per NF service level based on routing rules created using NF notifications received from NRF.
  - **Canary Upgrade for Producer NFs**

    The SCP provides enhanced routing control based on routing rules created using NF notifications received from NRF.The SCP plays a crucial role in the roll out of new NF releases. It supports mechanism that allows for a new release to be exposed to a fraction of the users or friendly users. Once successful, the SCP slowly opens up additional users to the new release in a controlled manner providing confidence to the operator during the roll out.
  - **Mediation-** SCP can manipulate the incoming HTTP messages by modifying the HTTP headers and JSON payload before they are forwarded to the destination NF. As the operators upgrade their 5G Core, this functionality brings an immense benefit by ensuring interoperability and compatibility between existing and new NFs thus reducing the OPEX.
- **Enhance Resiliency**
  - **Alternate Routing, Circuit Breaking, Rate Limiting & Outlier Detection**

    The SCP boosts resiliency in 5G network by providing features like alternate routing, outlier detection and circuit breaking. It relieves consumer NFs from remembering and interpreting complex routing rules associated with next hop selection and at the same time makes re-routing decisions based on load conditions and health status of NF providers.

In the absence of an alternate route, the SCP will quickly reject requests destined to a failed or degraded NF, thereby acting as a circuit breaker. This prevents valuable resources at the consumer NFs from being tied up waiting for responses from providers. The SCP also performs retries on behalf of the service consumer there by relieving the service consumer from this burden and leaving it to focus on the application

- **Provides congestion control**

  In the event of an overload, the SCP can identify and prioritize important messages over others and proxy them towards the overloaded producer NFs. The SCP protects the network from flooding by malicious or rogue consumer NFs and at the same time protects producer NFs from being overloaded.

- **Enhanced visibility into 5G core**
  - **5G SBI traffic feed for monitoring –** SCP plays the role of 5G SBI mirror by intercepting 5G SBA traffic between NFs and providing enriched message feed to external monitoring/analytics solutions. Existing tap-based solution cannot be used because of challenges in 5G core like HTTPS (encrypted SBA traffic), network translations in K8s cluster. Operators benefit by obtaining rich insights in their core network and enables new differentiators like Analytics as a Service.
  - **5G aware metrics**

    As services requests are proxied via the SCP, the SCP collects metrics and KPI related to message processing such as request and response counts or messages/sec or average transaction latency, etc. With this information, the SCP is in a unique position to provide a status of the network health indicators at any given time.
  - **5G aware tracing**

    SCP can support subscriber tracing using subscriber identifiers like SUPI with minimal performance impact. This enables Network Operators to obtain E2E visibility on control plane flows.
  - **HTTPS Enabled -** SCP provides support for native HTTPS support in SBA traffic between 5G NFs. This brings maximum security by preventing unsolicited interception of packets. The security can be further bolstered by packet screening functionality to mitigate against DOS attacks.

Oracle SCP is the Pioneer in SCP Market

Oracle was able to foresee the issues in managing the 5G SBA control plane and leveraged its experience in solving similar challenges in 4G network with its industry leading Diameter Signalling Router. Oracle along with tier-1 operators, started working closely in the 3GPP standards for SCP Standardization and are the pioneer in the 5G core SCP Market

Summary

Deploying a 5G Next Generation Core is no easy task. 5G replaces a traditional mobile core network architecture with a new Service Based Architecture (SBA), allowing the CSPs to leverage service re-use. It also allows service producers and consumers to evolve independently, enabling CSPs to introduce new capabilities incrementally and rapidly with lower risk and effort. While this new architecture enables more flexibility, agility, and service deployment speed, it will require "soak time" to mature and address real deployment challenges. Oracle Communication Cloud Native Core, SCP addresses the many challenges introduced by the 5G core Service Based Architecture (SBA) by providing routing control, resiliency, and observability into the 5G core network. Oracle Communications is where 40+ years of heritage in network experience meets cloud innovation to deliver highly secure, robust, and flexible cloud native 4G/5G core network solutions. Oracle's dominance in 4G control plane, being the category inventor for Diameter Signalling Router, continues in the 5G signalling core with the distinct advantage of delivering 5G Core signalling solutions in a cloud native environment based on Oracle's cloud leadership and expertise.

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