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Oracle Communications Service Communications Proxy (SCP) datasheet

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Introduction

Oracle 5G Service Communication Proxy (SCP) is a cloud native 5G core signaling router that helps you efficiently secure, optimize and manage your 5G network by providing routing control, resiliency, security, and observability to the 5G core network. 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.

Oracle Communications SCP in the 5G network

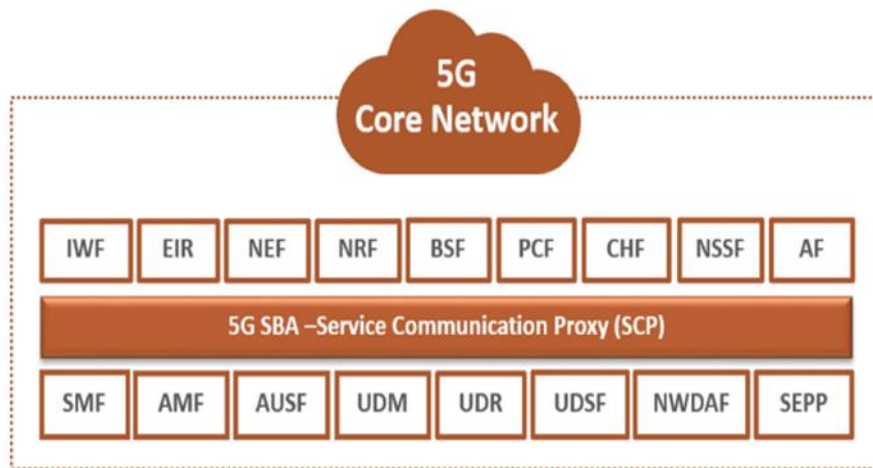
3GPP has defined Service-Based Architecture (SBA) as the foundation for the 5G network. SBA lets network elements or network functions (NFs) in 5G core communicate with each other over a service-based interface (SBI). It allows the decoupling of Network Functions with more precise functionalities with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

Oracle SCP is a decentralized solution that provides signaling control to a 5G core network. It is composed of Service Proxy Controllers, 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.

Oracle SCP also enhances security by enabling NF Authorization in 5GC through Open Authorization (OAuth) Framework and Client Credentials Assertion (CCA) procedure that validates consumer's CCA with information in consumer's TLS certificate.

Oracle SCP plays part of analytics solution through message feed which can help to get deeper insight into the network.

Figure 1.SCP in a 5G core network



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:

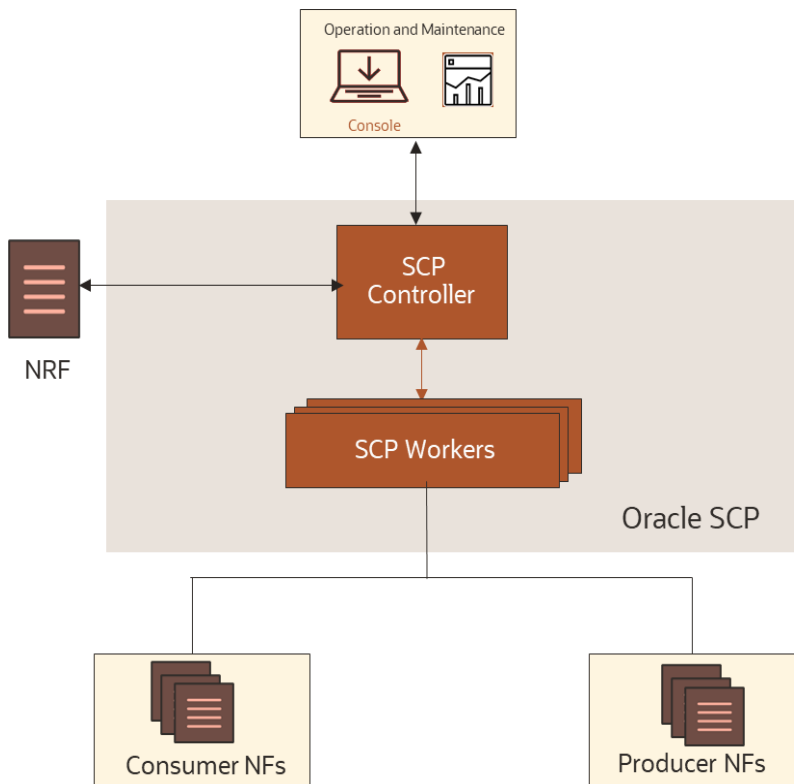
- Delegated discovery and selection
- Load balancing & alternate routing
- 5G SBI traffic feed
- Rate limiting and producer congestion control

Oracle SCP Architecture

The Oracle SCP functional diagram consists of components as 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 signaling traffic between consumer and producer NFs.
- Operation and Maintenance Console – Used to configure the SCP and observability (metrics, logs, traces) provided using cloud native tools.

Figure 2. Oracle Communications SCP Functional diagram



Features and benefits

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

Ease of operability

- **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.
- **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, weighted round robin, factors in current load and NF availability to improve the load balancing.
- **Improves Routing Control** - The SCP provides enhanced routing control at, per NF service level based on routing rules created using NF notifications received from NRF.
- **Canary Upgrade for Producer NFs**- 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 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.

Enhances resilience

- **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
- **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.
- **SCP health check** - SCP provides health status to client peers (consumer/producer NFs/NRFs/next hop SEPP/next hop SCP) to verify the overall health of SCP, and improve their transaction success rate by proactively knowing the health of SCP

Enhances visibility into 5G core

- **5G SBI traffic feed** - SCP plays the role of 5G SBI traffic mirror and provides enriched message feed to the external monitoring/analytics solutions through Oracle Data Director. Existing tap-based solution cannot be used because of challenges in 5G core like HTTPS (encrypted SBA traffic), network translations in K8s cluster etc. Oracle SCP solves these problems and enables more business use-cases on top of it.
- **5G aware metrics** - SCP collects metrics and KPI related to message processing such as request and response counts or messages/sec or average transaction latency, etc. as services requests are proxied via the SCP. 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.

Improves security

- **HTTPS support** – Oracle SCP provides 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.
- **Open Authorization (OAuth)** - Oracle SCP supports OAuth security framework.
 - **NF producer registration with NRF** - Publish authorization criteria for NF producer for example allowed consumer NFs and scopes.
 - **NF Consumer interacts with NRF** - Registration/authentication and access token request.
 - **NRF grants token** - NRF validates consumer NF against authorization criteria and grants token to consumer NF.
 - **Service request with access token** - Producer NF validates and verifies the access token given by consumer NF in service request before allowing access.
 - **SCP role** - Producer discovery/selection and access token lifecycle are delegated to SCP.
- **Client credentials assertion (CCA)** - SCP supports CCA validation, which plug the security loophole. This procedure validates consumer's CCA with information in consumer's TLS certificate. Without SCP control any rogue Network Function with a valid certificate can reuse a valid CCA header to access an un-authorized service.

Oracle SCP is pioneer in 5G 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 Signaling Router (DSR). Oracle along with tier-1 operators, started working closely in the 3GPP standards for SCP Standardization and is the pioneer in the 5G core 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 communications SCP has been deployed across the globe for tier-1 operators like [DISH](#), [Orange](#). 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 Signaling Router, continues in the 5G signaling core with the distinct advantage of delivering 5G core signaling solutions in a cloud native environment based on Oracle's cloud leadership and expertise.

“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 operability through traffic balancing.
- Enhance resilience & security through alternate routing.
- Enhanced visibility into 5G core, through 5G SBI traffic feed for monitoring.

Related products

- Oracle Communications Cloud Native Core, Network Repository Function (NRF)
- Oracle Communications Cloud Native Core, Security Edge Protection Proxy (SEPP)
- Oracle Communications Cloud Native Core, Binding Support Function (BSF)
- Oracle Communications Cloud Native Core, Policy Control Function (PCF)
- Oracle Communications Cloud Native Core, Policy and Charging Rules Function (cnPCRF)
- Oracle Communications Cloud Native Core, Cloud Native Environment (CNE)
- Oracle Communications Cloud Native Core, Network Exposure Function (NEF)
- Oracle Communications Cloud Native Core, Network Slice and Selection Function (NSSF)
- Oracle Communications Cloud Native Core, Unified Data Repository (UDR)
- Oracle Communications Cloud Native Core, Network Data Analytics Function (NWDAF)
- Oracle Communications Cloud Native Core, Data Director (DD)

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