

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

Oracle Communications SCP creates a secure 5G core signaling architecture that provides routing control, resiliency and observability into the 5G core network. These features enable elastic growth, interoperability and rapid introduction of new services, while reducing complexity and maintenance cost. Oracle Communications SCP is designed on the principles of cloud native and leverages open source service mesh software to address the many challenges introduced by the Service Based Architecture (SBA) of the 5G core.

## WHAT MAKES THE 5G CORE UNIQUE?

The fifth generation of mobile networks radically changed the way components in the core communicate with each other. The core network in 5G follows a Service Based Architecture where network elements advertise and provide services which can be consumed by other elements in the core. This allows for the adoption of web scale technologies and software into telecom networks. Web scale technologies rely primarily on open source software and bring in significant automation. Service mesh is an emergent technology proposed to address challenges related to congestion control, traffic prioritization, overload control, and optimized routing, within a cloud native environment. A cloud native service mesh is a dedicated common service for handling communication between services in a microservices architecture. It makes inter-service communication safe, fast, secure, and reliable. A service mesh simplifies applications by decoupling the network and providing end-to-end security, load balancing, traffic splitting, and more. However, an off-the shelf service mesh solution is not 5G aware.

### Key Business Benefits

- Increases network efficiency by providing effective load balancing across 5G core Network Function (NF) instances.
- Provides visibility into the 5G core network.
- Helps CSPs resolve interoperability issues and deliver better services to their customers

## THE SERVICE COMMUNICATION PROXY FOR 5G

Oracle Communications continues to shape industry standards; with active participation in the 3GPP standards committee, Oracle along with other global tier 1 operators have helped to standardize the SCP in 3GPP Release 16. Experience in building and operating cloud native environments, and delivering signaling, routing, and policy solutions, have allowed Oracle to add 5G awareness to the service mesh foundation. This awareness is essential for helping Communications Service Providers (CSPs) overcome the many challenges the new service based architecture presents, particularly related to traffic routing, prioritization, overload control, load balancing, and interworking. Oracle's cloud native microservices based 5G Core solution supports multiple deployment options with a distributed architecture for resiliency, scalability, and security, providing operators with choice and peace-of-mind.

### PRODUCT DESCRIPTION

Oracle Communications Cloud Native Core, SCP is a decentralized solution that provides signaling 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. The SCP provides routing control mechanism by creating traffic routing rules based on interactions with the Network Repository Function (NRF). The Oracle Communications SCP also provides resiliency and observability to the 5G core network while enabling elastic growth, interoperability and rapid introduction of new services. This allows CSPs to more effectively and efficiently operate their 5G network while reducing complexity and maintenance costs.

#### Key Features

The Oracle SCP provides similar signaling control and reliability in HTTP2.0 based 5G Service Based Architecture as the Diameter Signaling Router (DSR) provides in a diameter based 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.
- Supporting traffic splitting/steering.

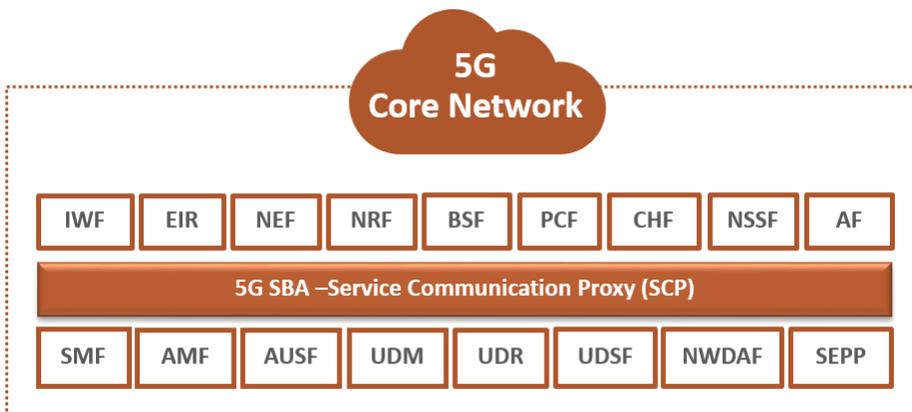


Figure 1. SCP in a 5G Core network

Oracle Communications SCP is modelled after the cloud native service mesh solution and is made up of a control plane and data plane that scale independently. The control plane is used to transfer routing rules from the controller to the worker while the data plane is used to transport 5G SBA messages.

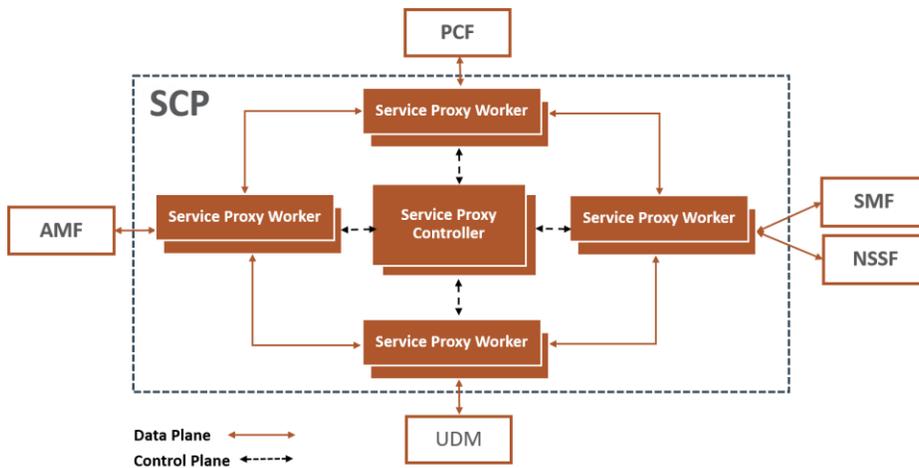


Figure 2. Oracle Communication Cloud Native Core, SCP System Architecture

**Table 1: Description of SCP Architecture**

Parameter	Description
<b>Service Proxy Controller</b>	SCP control plane managing routing policies, authorization, etc.
<b>Service Proxy Worker</b>	Lightweight SCP data plane component performing routing and enforcement of policies pushed by controller
<b>PCF</b>	Policy Control Function
<b>AMF</b>	Access and Mobility Management Function
<b>SMF</b>	Session Management Function
<b>NSSF</b>	Network Slice Selection Function
<b>UDM</b>	Unified Data Management

Oracle Communications SCP not only resolves the challenges introduced by the 5G Service Based Architecture but also optimizes signaling 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:

- **Reduces connections to/from Network Functions (NFs)** - By being deployed alongside NF instances and acting as an outbound proxy for the NF instances, the SCP eliminates the need for 5G NFs to setup direct connections between each other. Connections can be optimized such that each NF instance maintains a set of redundant connections to the SCP and use those connections for all outbound requests.
- **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 and resiliency** - The SCP provides enhanced routing control based on routing rules created using NF notifications received from NRF. 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

#### Oracle Communications Solutions

- Oracle Communications Cloud Native Core, Policy and Charging Rules Function (CNPCRF)
- Oracle Communications Cloud Native Core, Policy Control Function (PCF)
- Oracle Communications Cloud Native Core, Network Repository Function (NRF)
- Oracle Communications Cloud Native Core, Unified Data Repository (UDR)
- Oracle Communications Cloud Native Core, Unstructured Data Storage Function (UDSF)
- Oracle Communications Cloud Native Core, Binding Support Function (BSF)
- Oracle Communications Cloud Native Core, Network Function Cloud Native Environment (NF CNE)
- Oracle Communications Cloud Native Core, Interworking and Mediation Function (IWF)
- Oracle Communications Cloud Native Core, Network Exposure Function (NEF)
- Oracle Communications Cloud Native Core, Network Slice Selection Function (NSSF)
- Oracle Communications Cloud Native Core, Security and Edge Protection Proxy (SEPP)

Oracle Communications cloud native deployable Network Functions (NFs) enable service providers to manage and monetize the 5G network. CSPs can manage and analyze quality of service and create policies for innovative digital lifestyle services through Oracle Communications products and solutions.

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.

- **Supports metrics, KPIs & reports** - 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 view of how the network health indicators at any given time.
- **Provides congestion control** - The SCP has the ability to reprioritize traffic as well as protect the network from flooding by malicious or rogue consumer NFs and at the same time protect provider NFs from being overloaded. In the event of an overload, the SCP can identify and prioritize the important messages over others and proxy towards the overloaded provider NF.
- **Supports canary testing** - The SCP plays a crucial role in the roll out of new NF releases. It supports mechanisms that allow 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.

## ISTIO (IT SERVICE MESH) VS ORACLE SCP

In the IT world, often an of the shelf Service Mesh(Istio) is used for reducing complexity of managing microservice deployments by providing a uniform way to secure, connect, and monitor microservices. However, Istio is not 5G aware, and not built to the standards of telecom core networks set of requirements and expected performance. Below is a quick comparison between Oracle’s SCP and Istio.

**Table 1: Istio (IT Service Mesh) vs OC SCP (5G Core NF)**

Service mesh feature required for 5g network	Will istio suffice?	Will SCP suffice?	SCP benefits over Istio
Performs 5G aware load balancing	No	Yes	Istio is not aware of “capacity”, “priority” and “load” published by producers as part of their NF profile
Offloads 5G alternate routing	No	Yes	Istio is not aware of NF specific attributes like DNN, SUPI range, NF Group Id, supported features etc
5G based traffic prioritization	No	Yes	Istio doesn’t understand the 5G request payload and throttling mechanism is not available
Offloads producer discovery & selection	No	Yes	Istio is not aware of NF specific attributes like DNN, SUPI range, NF Group Id etc
Tracing based on Operator 5G policy	No	Yes	Istio cannot provide tracing based on 5G attributes

Providing “True load” information	No	Yes	Istio is not aware of NRF
5G mediation capabilities	Partial	Yes	Istio cannot perform message body mediation
Subscriber Location Function (SLF)	No	Yes	Istio unaware of the SLF concepts
Enables canary testing based on “NF service version” of 5G NF services	Yes	Yes	Significant manual overhead to supporting canary testing via Istio
Handle hybrid deployments	No	Yes	

## 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 incrementally and rapidly introduce new capabilities with lower risk and effort. While this new architecture will enable 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 address the many challenges introduced by the 5G core Service Based Architecture (SBA) by provides 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 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.

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