ORACLE

Oracle Communications Network Slice Selection Function (OCNSSF)

The OCNSSF is built from the ground up with CNCF principles. The architectural design eases operations and provides a versatile platform for slice associations and allocations for user sessions.

Network slicing, one of the prominent features of 5G, allows connectivity and data processing to be custom-made to meet specific requirements. Network slicing is a method of creating unique, logical, and virtualized networks over a common multidomain infrastructure, capable of providing a high-quality service as per the service level agreement (SLA). Network capabilities can be customized to include data speed, quality, latency, reliability, security, and services. These capabilities are always provided based on a service level agreement (SLA) between the mobile operator and the customer.

The Oracle Communications Network Slice Selection Function (OCNSSF) helps telcos to build multiple virtual networks on a shared infrastructure to offer tailored services to a varied set of users. Furthermore, it enables operators to deploy applications and services flexibly and quickly to accommodate specific requirements for a diverse set of offerings.

As Industry 4.0 further propels 5G services, network slicing can be leveraged in a broad range of industries, such as manufacturing, supply chain, and healthcare to name a few.

In manufacturing low latency enables the monitoring of machines, controls and provides clear insights to enable better management. In healthcare, increased bandwidth and low latency provides stronger video and images, increasing the quality and value of interactions between practitioners and patients. Click here to find out more about how different industries are leveraging 5G.

NSSF in the 5G network

The OCNSSF system is a solution which sits in the middle of the 5G core, selecting the optimal network slice available for the service requested by the user. For example, it allows the users to select customized networks with different functionalities such as mobility, as well as performance requirements such as latency, availability, and reliability.

The OCNSSF stores authorization data, policy rules, slice availability data, and slice mapping. The Consumer Network Function (NF) Access and Mobility Management Function (AMF) interact with the NSSF through communication interface N22.

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

Marc Rouanne
Chief Network Officer,
DISH Wireless

Key benefit

- Built on CNCF principle
- Integrates with Oracle Automated Test Suite for E2E automated 5G core testing
- Provides sustainable support for maximization of investment

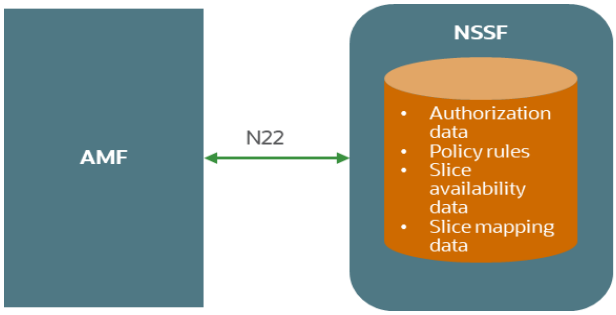

Figure 1. 5G core AMF- NSSF reference point

The OCNSSF architecture

The OCNSSF has a three-tiered architecture: a connectivity tier, a business tier, and a data tier.

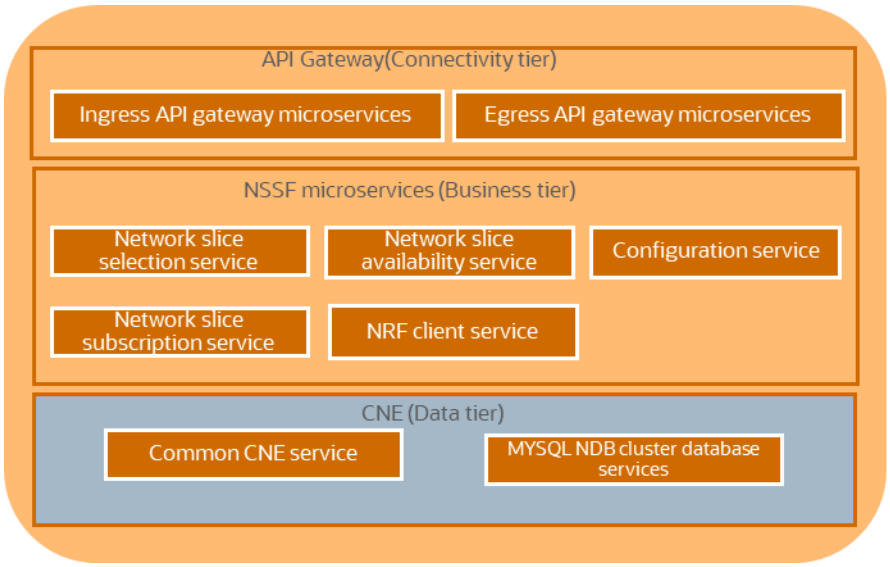

Figure 2. Oracle Communications Cloud Native Core, NSSF system architecture

The **connectivity tier** load balances the traffic via ingress API gateway and egress API gateway. It also provides authenticity and integrity protection.

The **business tier** provides the business logic of NSSF. It has network selection, network selections availability, configuration services, network selection subscription, and Network Repository Function (NRF) client microservices.

The **data tier** uses Oracle MySQL Network Database (NDB) cluster as the backend database which provides high availability and georedundancy capabilities.

Oracle Communications Cloud Native Environment (OCCNE) provides common services for all installed applications, including a **runtime environment** for all cloud native applications, **automation solutions** to deploy, upgrade, and maintain cloud native applications , **multilevel security measures** to protect against malicious attacks, **redundancy, or high availability**, **observability** to capture metrics, logs, and traces for both itself (OCCNE) and the cloud native

Key features

- Network selection based on the time of day uses enhanced policy to avoid congestion
- Versatile slice association and slice selection policy
- High availability through geo-redundancy
- Access to Oracle online support tools, upgrade rights, pre-existing fixes, and assistance from technical support experts
- Security alerts and updates
- Critical patch updates
- Protection from Distributed Denial of Service (DDoS) attacks through rate limiting

Oracle Communications solutions and related network functions

- Oracle Communications Cloud Native Core, Binding Support Function (BSF)
- Oracle Communications Cloud Native Core, Service Communication Proxy (SCP)
- 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, Security and Edge Protection Proxy (SEPP)

applications along with a Bastion Host to access the Kubernetes cluster for maintenance purposes.

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 services through Oracle Communications products and solutions

Features and benefits

The prominent features of the OCNSSF are listed below:

- **Built on cloud native principles**
    - Based on Kubernetes, Dockers, containerized microservices architecture.
    - Cloud agnostic and can be deployed in any public or private or on-premises cloud.
    - Supports both communication deployment models C and D. Model C and model D have been introduced in 3GPP release 16. The consumer and producer 5G core network functions communicate via Service Communication Proxy (SCP). The difference between model C and D is the responsibility of discovery of producers. In model C, consumers continue to own the responsibility of producer discovery but delegate the selection and communication logic to SCP. In model D the producer discovery and selection are delegated to SCP which is responsible for selecting the appropriate producers within a selection criterion and then establishing a communication path between the consumer and the selected producer.
- **Intelligent slice selection and allocation**
    - **Time of day-based network slice instance selection**
        - Configures policy to select the slice based on the time spans through the feature TOD (time of day-based slice selection). Provides a policy to select a network slice based on date or day or time span, or any combination of the these, to avoid congestion and overloading of a single slice.
        - Applies the policies to assist AMF with authorized slice information based on user equipment's (UE) current location, during UE registration. The OCNSSF has built-in intelligence which avoids overloading common AMF based on Oracle's proprietary relevance algorithm and performs traffic segregation, enhancing overall service quality.
    - **Slice associations and allocations to user session**
        - Network slice selection service used by an NF service consumer (AMF) retrieves the information related to network slice. It enables network slice selection in the serving home public land mobile network (HPLMN).
        - Network slice availability service stores and maintains a list of supported S-NSSAIs per tracking area (TA). It allows NF service consumer (AMF) to update and subscribe for notifications for any addition or deletion of supported S-NSSAIs.

- **High availability**
    - Leverages redundancy through a geo-redundant deployment model across three sites ensuring high availability.
    - Inherently supports against DDoS attacks through rate limiting features making the network highly available.
    - Takes advantage of the Oracle Automated Test Suite (ATS) for cluster automation testing with zero manual intervention.

- **Highly secure**
    - Provides confidentiality through OAuth 2.0 access token-based authorization for AMF to NSSF communication.
    - Manages OAuth access token-based authorization, and NF authentication using Transport Layer Security (TLS) certificates.
    - Built-in features provide protection against Distributed Denial-of-Service attacks, with a rate limiting feature for ingress and egress messages which helps to prevent the DDoS attack.
    - Supports encryption using HTTPs.

- **Ease of operation**
    - Eases the operations by providing in-service upgrade.
    - Supports ease of integration through automated pipeline.
    - Provides cloud native observability stack and accelerates the building of new capabilities and features.
    - Intelligently configures network slice availability for single – network slice selection assistance information (S-NSSAIs) from AMFs, auto-learns AMFs / AMF sets in the network from NRF.

Summary

In the fifth generation of mobile technology network slicing plays a critical role in enabling new business models and innovative services spanning both consumer and enterprise use cases. For example, in Industry 4.0 use cases network slicing will include new SLA delivery models that go beyond traditional operation management capabilities.

CSPs need a partner with strong experience in cloud native environments to leverage automation and analytics. To unlock the value of their network they will need to make it programmable and differentiated for agile service delivery. Oracle Communications provides integrated communications and cloud solutions for service providers and enterprises to accelerate their digital transformation journey in a communications-driven world. Let Oracle help you on your journey from network evolutions to digital business, to customer experience.

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