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Communications

Managing 5G Signaling Complexity

5G core signaling: Creating a robust cloud native network

Monetizing telecom infrastructure, reducing network maintenance costs, handling traffic overload, managing signaling peaks, and securing the network from any kind of attack or breach have been the top priorities for operators throughout the different mobile technology generations. With the introduction of cloud native technologies, and adding another "G" to the spectrum, addressing these challenges is even more critical in 5G. The wide range of use cases in 5G come with their own set of signaling challenges. Operators around the world will have to put extra effort in making their 5G network more flexible, agile, scalable and secure; and the network core is where it all starts. The core is the *brain* of a telecom network with all the important decisions related to signaling, policy, charging, routing, and more made here. **The fifth generation of mobile networks has radically changed the way elements in the core communicate with each other.** The 5G core follows a Service Based Architecture (SBA) where network elements advertise and provide services which can be consumed by other elements in the core via application programming interfaces (APIs). SBA combined with cloud native technologies increases the flexibility, agility and scalability of the 5G core in support of new use cases.

Need for a reliable signaling and routing unit

Within the next five years, 5G networks will need to support more than 21 billion IoT devices[i] and 1.4 billion 5G connections[ii]. Enabling use cases like high bandwidth video streaming and mission critical IoT solutions requires ultra-low latency. Supporting this wide variety of use cases brings in unprecedented network signaling complexity and traffic overload. To come to grips with 5G's signaling complexity, **you need to rethink your signaling strategy** and ensure that your network is robust enough to adapt to the evolving needs of your business.

Operators are required to support 2G, 3G, 4G, and 5G for at least the next decade, adding more signaling complexity, interworking and interoperability issues. Moreover, with 5G touching every aspect of our life with its broad set of use cases, the potential security threat is ought to increase. Operators need to invest heavily to secure their 5G networks before they can touch upon use cases in support of business and mission-critical industry vertical applications such as healthcare and banking.

Deploying a robust signaling and routing framework can help operators tackle the most serious issues.

The signaling and routing unit in the control plane of 5G core comprises of the network functions that are responsible for:

Managing signal and traffic

Maintaining integrity and security

Enabling the design of differentiated services

Helping with better utilization of network resources

Besides supporting increased traffic and reducing the cost and complexity of the 5G network, a robust signaling and routing framework helps operators to realize the full potential of various 5G use cases.

i   Norton: https://us.norton.com/internetsecurity-iot-5-predictions-for-the-future-of-iot.html#:~:text=1.,to%2021%20billion%20IoT%20devices

ii GSMA: https://www.gsma.com/wp-content/uploads/2019/04/The-5G-Guide_GSMA_2019_04_29_compressed.pdf

What are the benefits of a robust cloud native signaling and routing framework in the 5G core?

Efficient implementation of Service Based Architecture
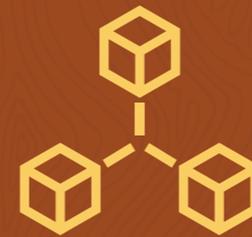
Seamless rollout of new 5G services across a multigeneration network

Monetization of new services with customized network slices

Increased security and integrity

More efficient deployment and management of network functions

Better scalability and connectivity

The signaling and routing unit comprises of following Network Functions

NF Repository Function (NRF)

Interworking and Mediation Function (IWF)

Network Slice Selection Function (NSSF)

Network Exposure Function (NEF)

Security and Edge Protection Proxy (SEPP)

Service Communications Proxy (SCP)

Binding Support Function (BSF)

NF Repository Function (NRF)

NRF works as a centralized repository for all the 5G core network functions in an operator's network. It maintains updated records of the services provided by each of the elements in the 5G core that are expected to be instantiated, scaled and terminated without manual intervention. This decoupling between the service consumer and the service provider increases the flexibility, scalability and efficiency of the new 5G core network. It helps operators to effectively manage their 5G network by providing automated resource control in the core.

Oracle Communications Cloud Native Core, NRF is a key component required to implement the new Service Based Architecture (SBA) in the 5G core.

NRF

Interworking and Mediation Function (IWF)

Interworking between 4G and 5G is the fundamental requirement for early deployment of 5G services. The 3rd Generation Partnership Project (3GPP) has defined a dedicated path for transitioning to 5G using existing 4G infrastructure. Given the heavy investments in creating an ecosystem around the 4G Evolved Packet Core (EPC), operators are still looking forward to reaping the benefits of their investment. A future proof roadmap with options to incrementally deploy 5G services while supporting 4G is a key requirement of any sound network evolution.

Oracle Communications Cloud Native Core, IWF works as a bridge between a 5G core and a 4G Evolved Packet Core (EPC). IWF helps operators to reduce the cost and effort of supporting two networks at the same time.

IWF

Network Slice Selection Function (NSSF)

Along with increased speed, bandwidth and latency, 5G and cloud native technologies enable new business models and offer customized dedicated network slices for different services across various industries. This requires a high degree of deployment flexibility and efficient network resource utilization for operators, so that they can help enterprises to efficiently launch innovative services in a cost-effective way. The NSSF provides network slice selection capabilities by enabling service providers to configure end-to-end dedicated logical network instances, optimized for specific functional requirements of different applications and services.

NSSF

Configure dedicated logical network instances for specific functional requirements and customized services, with Oracle Communication Cloud Native Core, NSSF.

Network Exposure Function (NEF)

For businesses to create over-the-top application on the 5G core network, operators need to securely expose their 5G network services to their developers and 3rd party developers. The NEF acts as a centralized point of service exposure and plays a key role in authorizing all access requests originating from outside 3GPP network to enable cellular IoT, non-IoT, edge computing and API gateway use cases for operators.

Securely expose your 5G network services to 3rd party applications over API with Oracle Communications Cloud Native Core, NEF.

NEF

INCREASE THE SECURITY AND INTEGRITY OF YOUR 5G CORE NETWORK WITH THE

Security and Edge Protection Proxy (SEPP)

The use of cloud services, fueled by digital transformation initiatives are yielding new business workflows that, in turn, are creating new opportunities for fraudulent activity. As a result, new and traditional threats and vulnerabilities will need to be managed in the 5G ecosystem. Security in a 5G network has to be deployed and implemented at various stages.

One very important stage is inter- Public Land Mobile Network (PLMN) communications, which typically contain highly confidential user information. The SEPP sits at the perimeter of the PLMN enabling secured inter-network function communication across the PLMN network. It maintains confidentiality and integrity of the 5G core.

SEPP

Oracle Communications Cloud Native Core, SEPP make your 5G core more secure and less susceptible to network threats.

Service Communications Proxy (SCP)

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The new service based architecture brings in unprecedented benefits for operators. But at the same time, this architecture is not fully equipped to deal with some of the major challenges that come with increased signaling traffic such as:

- Routing and optimization
- Traffic management
- Robustness scalability, and security
- Network visibility
- Core security—authorization and authentication

Implementing a service-mesh in the 5G core could be a solution to this problem, but an off-the-shelf service-mesh is not 5G aware. The SCP addresses this problem by adding 5G awareness to the service-mesh and creating a secure 5G core signaling architecture that provides routing control, resiliency, and observability into the 5G core network.

Reduce the cost and complexity of managing a 5G core network, and enable elastic growth, interoperability and rapid introduction of new services with Oracle Communications Cloud Native Core, SCP.

SCP

Binding Support Function (BSF)

Different Network Functions (NFs) in a 5G network coordinate with Policy Control Function (PCF) to provide call, messaging, data and other support services to users. To support all subscribers and user equipment (UEs), multiple and separately addressable instances of the PCF are deployed in the network. Therefore, different NFs need binding support to identify the right PCF instance for session correlation and policy revalidation. The BSF provides this binding support in the 5G core network.

Oracle Communications Cloud Native Core, BSF provides Protocol Data Unit (PDU) session binding functionality, by binding an application function request to one of many PCF instances deployed in 5G network.

BSF

Oracle Communications Network Function Cloud Native Environment (NF CNE) enhances security, resiliency, and performance of a 5G core by providing a common environment for service providers to perform the operation and lifecycle management of their <u>5G core network</u>.

Host your 5G core on the Oracle Communications production and carrier grade cloud native environment

Various network elements work in conjunction with each other to make a highly functional 5G core. These elements may come from different vendors and need different degrees of scaling flexibility. Oracle Communications Cloud Native Core NF CNE provides a holistic set of services to efficiently manage the 5G NFs. The flagship components of NF CNE include:

- Runtime services (virtualization and networking)
- Orchestration and management services
- Storage services
- Security services
- Observability services (logging, tracing, and metrics)

Built on Oracle's best-of-breed philosophy and decades of experience in designing cloud-based applications, the NF CNE not only helps operators to accelerate software releases and lowers software maintenance costs but also eases the process of managing the core network as different solutions from various vendors can be deployed and managed on a common platform.

Accelerate innovation, by significantly shortening software delivery times with the Oracle Communications Automated Testing (ATS) suite

There is a considerable benefit of deploying an automated testing solution in terms of cost, effort and overall test coverage. With adoption of DevOps and CI/CD in the telecom domain, the number of software releases has significantly increased making manual testing even more challenging. **Oracle Communications ATS helps operators to execute functional, regression and performance test cases** with few button clicks and zero intervention from the user. As a result, operators are able to quickly deploy new software releases and rapidly roll out new features.

Oracle Communications Automated Test Tools and Scripts (ATS) helps operators to automate the complete testing lifecycle of 5G Network Functions.

Design a highly effective and robust 5G core with Oracle Communications best of breed Signaling and Routing Network Functions

Oracle Communications has been redefining innovation in signaling for over 40 years as a trusted partner to more than 1500 customers across the world and protecting 500+ mission critical multivendor networks against signaling threats. Our best of breed products like **EAGLE**, **Session Border Controller (SBC)** or **Diameter Signaling Router (DSR)** are deployed with all 20 of the top global telecom providers.

Oracle Communications is focused on providing customers with only the best-of-breed technology, and a future proof roadmap as they embark on their journey to cloud and 5G. Our own 5G signaling journey started on a high note, when we led the initiation and adoption of **Service Communication Proxy (SCP)** in release 16 of 3GPP. Oracle Communications is reimagining communications to connect the world by delivering products and services with quality, security, and customer centricity. Our industry-leading products are helping operators across the globe to deploy the best-of-breed network.

Oracle Communications is well positioned to support you in your journey to 5G by creating an incremental and seamless path to 5G and providing the best-of-breed software to create service differentiation and new revenue streams.

Learn More
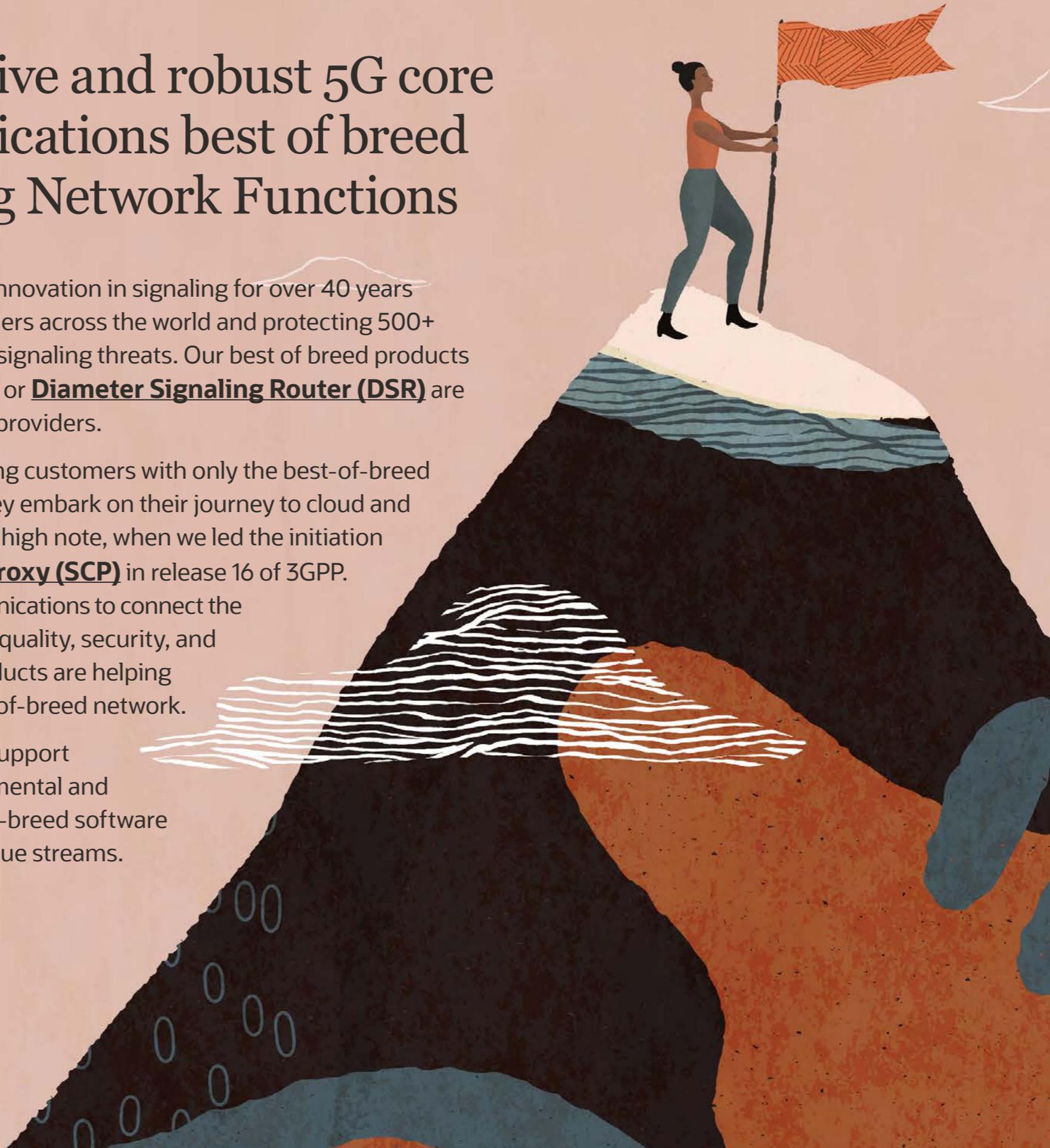
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