Maximize 5G Service Provider Revenue

The role of 5G Signaling

Executive Brief

Many service providers have begun to deploy 5G stand-alone core but have not yet included a key network signaling function to take full advantage of the service-based architecture. Without this the 5G core doesn't deliver on its flexibility and scalability promises. A simple addition of the Service Communication Proxy (SCP) fixes this and reduces operations expenses at the same time. Further, service providers that have not yet deployed 5G SA gain additional benefits by including SCP right from the start.

Introduction

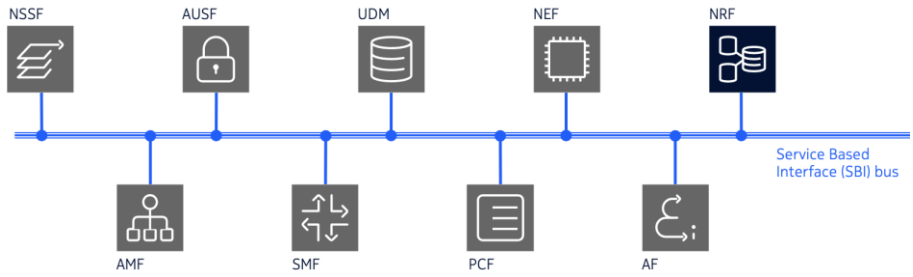
5G non-standalone (NSA) upgrades the radio only in a network, adding more bandwidth and capacity using cm wave and mm wave bands. The addition of the 5G core evolves the network to 5G standalone (SA), which promises new services by adding capabilities that mobile networks previously lacked. These include very low latency, ultra-high reliability, network slicing, service flexibility, and cloud elasticity.

The early 5G SA deployments used an introductory form of connections between the network functions (NFs) in the core (called 5G signaling), and most still use this today. However, the 3GPP has since released specifications for mature signaling that brings the full benefits of the 5G core. Most service providers today with 5G SA core have not yet adopted this update, and therefore cannot take full advantage of the flexibility and scalability that the 5G core was designed to achieve. This both limits the type and scale of services they can introduce and increases operational costs.

Service based architecture

The single most important attribute introduced in the core with 5G is the service-based architecture (SBA). This works by forming a software 'bus' allowing the automatic addition, deletion, and scaling of NFs in the core. The operator does not to provision every single connection that an NF will need. The network repository function acts as a "matchmaker" between NFs, so they can automatically connect.

Figure 1. The Service-Based Architecture (as usually depicted)

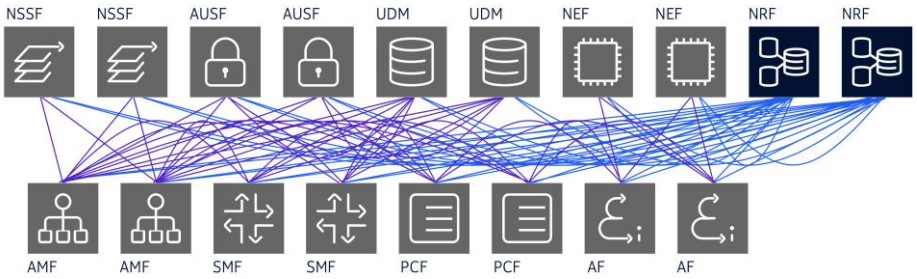


Network functions both consume and provide services, and use the network repository function (NRF) as a kind of matchmaker to dynamically connect to each other.

Today's typical implementation

The image above is a logical view. The actual connections between NFs consist of point-to-point TCP/IP sessions, usually encrypted with TLS. Most service providers today must provide a-priori provisioning of these connections for a NF to every other entity to which it *might* need to connect. This makes adding or removing an NF very much *not* automatic. Worse yet, there are many instances of every NF. The result is more cost to add new services, higher ongoing operational costs, and more complex NFs.

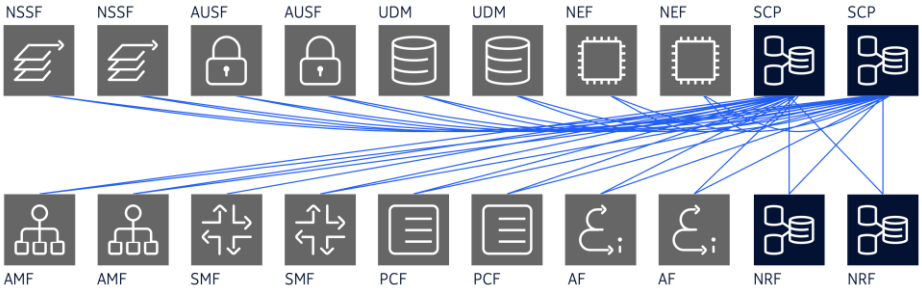
Figure 2. The Service-Based Architecture (as typically implemented today, without SCP)



The SCP enables truly dynamic SBA

3GPP introduced the Service Communication Proxy (SCP) in Release 16 to remedy this problem. SCP acts like an ethernet switch – it turns the mesh connections above into a hub-and-spoke topology. The most advanced SCPs also act as an intermediary between NFs and the NRF, so that each NF, when added, must *only* be connected to each SCP instance[1]. This is called a Model D configuration.

Figure 3. The Service-Based Architecture with SCP in a Model D configuration



Conclusion

Service providers who have deployed 5G SA core should update to the target architecture by adding the SCP, in a Model D configuration (as shown). Service providers who have yet to deploy 5G SA should include the SCP from the start. Nokia and ABI Research conducted a TCO analysis that shows this is less costly by as much as 26% of core deployment costs compared to starting without the SCP, then adding it later.

The addition of the SCP makes it far easier to add new NFs, since they must only connect to the SCP. It reduces operational costs by creating a single probe point for analyzing signaling problems, as well as for protocol adaptation. See Nokia's eBook and our use case examples, that explain these benefits in more detail.

Find out more at Nokia 5G Signaling.

[1] SCPs, like all NFs, have many redundant instances to remove single points of failure

About Nokia

At Nokia, we create technology that helps the world act together.

As a B2B technology innovation leader, we are pioneering the future where networks meet cloud to realize the full potential of digital in every industry.

Through networks that sense, think and act, we work with our customers and partners to create the digital services and applications of the future.

Nokia OYJ
Karakaari 7
02610 Espoo
Finland
Tel. +358 (0) 10 44 88 000
Document code: SR18xxEN (April) CID213135