5G Core Network - Short Overview

5G Core Network - a Short Overview - Grandmetric

The 5G System includes 3 main components: 5G Access Network (5G-AN), **5G Core Network (5GC)**, Use Equipment (UE).

We are going to talk about 5GC components as defined at 3GPP SA (3GPP TS 23.501 V0.4.0 2017-04)

5G system using new techniques such as Network Function Virtualization and Software Defined Networking. In the 5G network the concept of keeping users in the center is changing as with latest technological advancements various use cases of connectivity have completely different data requirements.
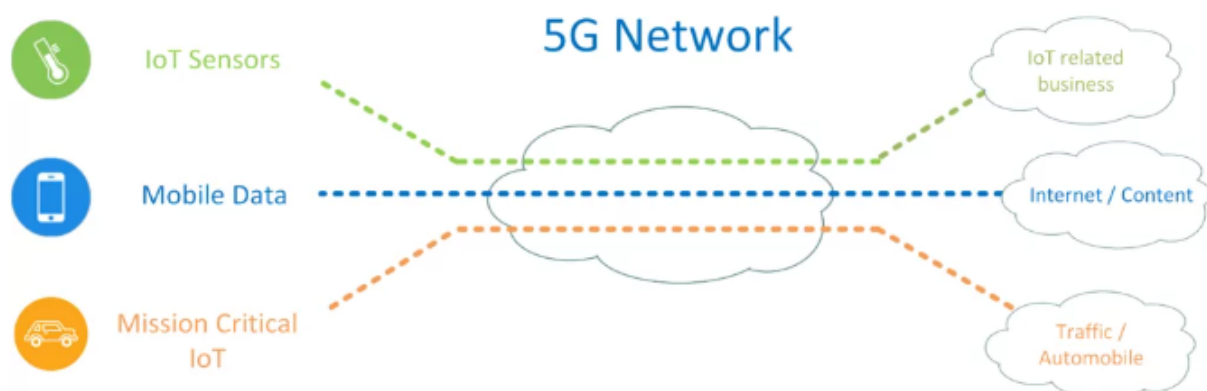
Having such requirements in mind the 3GPP kept an idea of having a flat architecture where CP (Control Plane) functions are separated from the UP (User Plane). This allows operators to use dimensioning, deploying and adapting the network to their needs.

Another important concept in the 5G design was minimization of the dependencies between the Access Network (AN) and the Core Network (CN) with a common AN-CN interface for integration of the 3GPP and non -3GPP access types purposes.
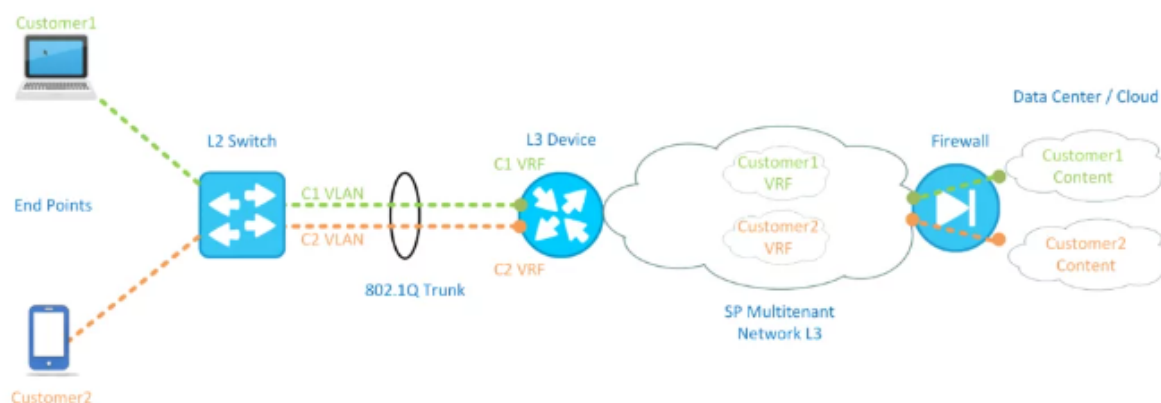
5G-mobile vs. IP-network techniques: 5G Network Slicing

5G Network Slicing - Grandmetric

The concept of multi-tenancy or slicing is rather known in the IP Networking world and can be achieved on different levels. Because 5G needs to support an end-to-end slicing, it is important to design on RAN, as well as on Backhaul, Internet Edge, and Data Centers. Each of the segments should be able to slice the available network resources with given business SLA.

Level 2 Slicing can be achieved by Virtual LAN (VLAN) instances or VxLAN (encapsulated L2). The first one is used widely in the market by Service providers as well as in Enterprise environments. Through the years VLANs serve the role of traffic separation and broadcast domain limitations and are used in almost every segment of the network. VxLANs (are more scalable) have become popular nowadays as cloud environments are gaining popularity. VxLAN frames are encapsulated with UDP thus can be transported across L3 clouds.

Level 3 Slicing is performed mainly with Virtual Routing and Forwarding (VRF) instances. VRFs creates virtual domains and routing tables giving the isolation of IP packets thus allowing service providers to utilize common infra even with overlapping IP addressing spaces. In LAN environments VRFs are used for traffic separation hop by hop by isolating particular segments. In SP environments, VRF accommodates the Route Target and Route Distinguisher tags which travel with IP Packets and are imposed at the Provider Edge router when coming into SP cloud and exposed at PE when coming out from SP cloud (+ usage of L3 VPN in MPLS network, MP-BGP routing, IS-IS etc.).

5G Core Network Functions

[5G Core Network - a Short Overview - Grandmetric](#)

[5G Core Network (5GC) Functions - Grandmetric Blog](#)

[Your quick guide to Network Functions in 5GC - Ericsson](#)

For enabling different data services and requirements of the 5GC, **Network Functions** are being used. They were simplified by making them software-based. Some of the functions look very similar to the corresponding functions in the previous generations' core networks (CN).

 Network still has to carry out some basic functions such as: communicate with UE, store its subscription and credentials, allow access to external networks & services, provide security and manage the network access and mobility. However, there are some new functions, which are needed to enable the new network paradigms like slicing and service-based networking.
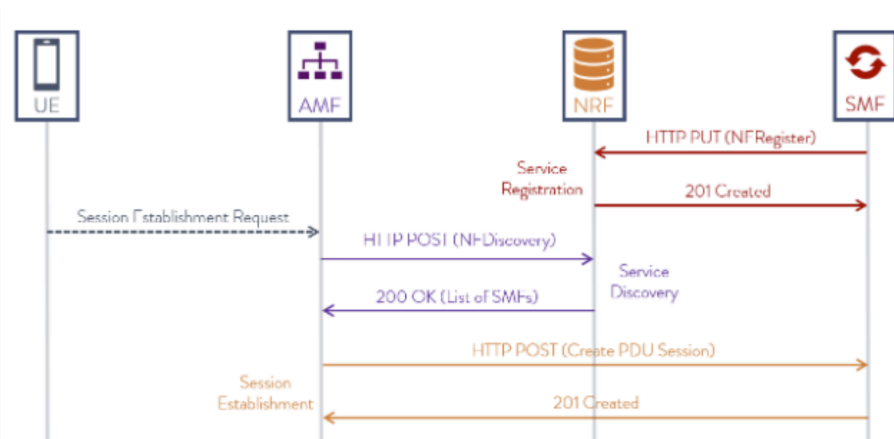
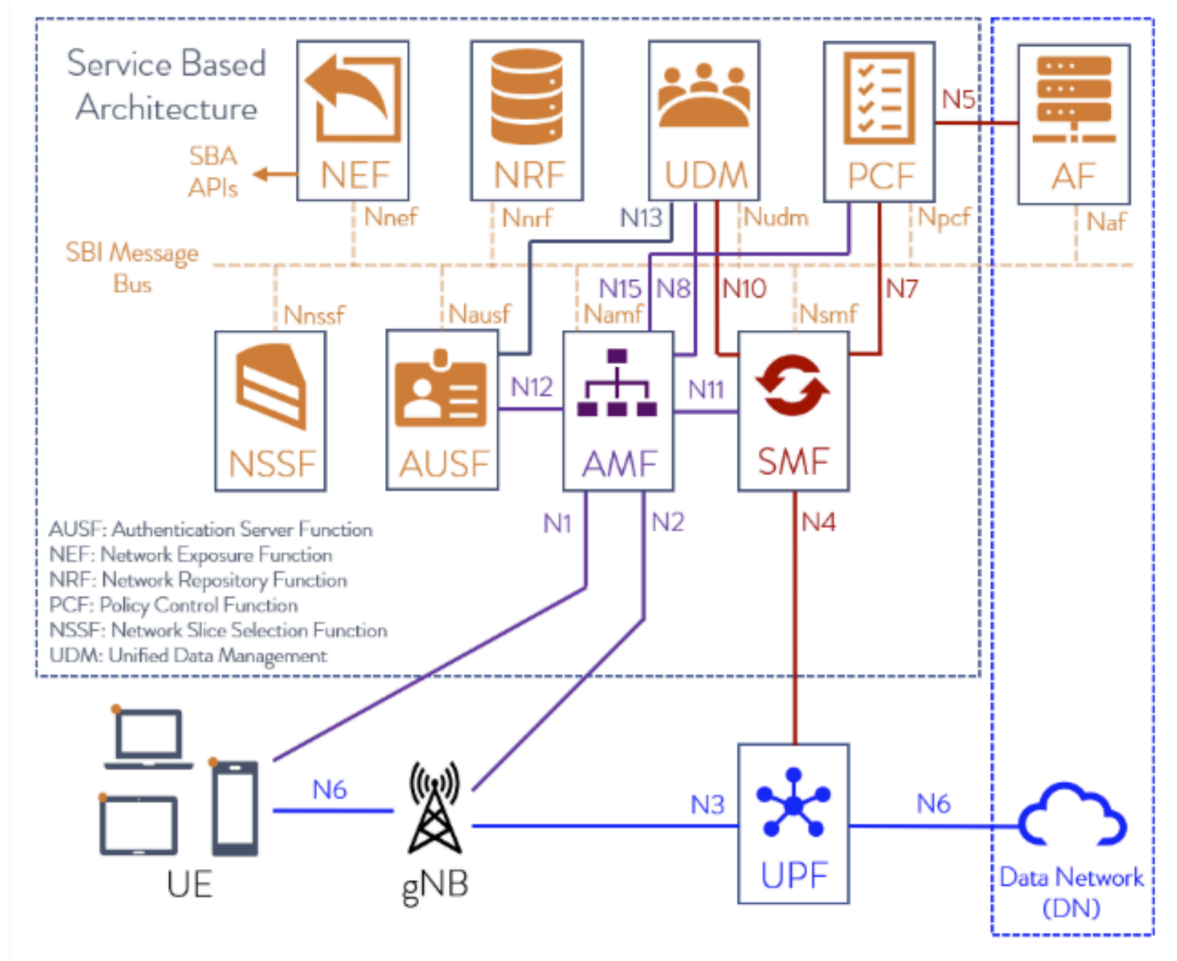5G System architecture consists of the following network functions (NF):

- Authentication Server Function **AUSF** - acts as an authentication server.

- Core Access and Mobility Management Function **AMF** - supports the termination of NAS signaling, NAS ciphering & integrity protection, registration management, connection management, mobility management, access authentication and authorization, and security context management.

- Data Network **DN** - operator services, Internet access or 3rd party services

- Structured Data Storage network function **SDSF** - used to store data in a structured way within a network. It relies on a predefined schema for efficient storage, retrieval, and analysis of data. In the context of 5G networks, it improves reliability by storing structured and unstructured data related to network functions.

- Unstructured Data Storage network function **UDSF** - responsible for storing unstructured data generated or consumed by various 5G services and applications. This data might include multimedia content, documents, or any other form of unstructured information.

- Unstructured Data Storage network function **NSSF** - supports selecting the Network Slice instances to serve the UE, determining the allowed NSSAI, and determining the AMF set to be used to serve the UE.

- NF Repository Function **NRF** - supports service discovery function, maintains NF profile and available NF instances;

- Network Exposure Function **NEF** - supports exposure of capabilities and events, secure provision of information from external applications to the 3GPP network, and translation of internal/external information;

- Policy Control Function **PCF** - supports a unified policy framework, providing policy rules to CP functions, and access to subscription information for policy decisions in UDR.

- Session Management Function **SMF** - supports session management (session establishment, modification, release), UE IP address allocation & management, DHCP functions, termination of NAS signaling related to session management, DL data notification, traffic steering configuration for UPF for proper traffic routing.

- Unified Data Management **UDM** - supports application influence on traffic routing, accessing NEF, and interaction with a policy framework for policy control.

- User Plane Function **UPF** - supports packet routing & forwarding, packet inspection, QoS handling, acts as an external PDU session point of interconnecting to Data Network (DN) and is an anchor point for intra- & inter-RAT mobility.

- Application Function **AF** - resides in the control plane of the 5G Service-Based Architecture (SBA), and its main responsibilities include: accessing the NEF for

retrieving resources; interacting with the Policy Control Function (PCF), enabling policy control; traffic routing for applications; provides application services to subscribers. (Exploring the 3GPP AF – Application Function - Emblasoft)

- Short Message Service Function **SMSF** - provides the capability to handle Short Message Service (SMS) traffic. While SMS has been traditionally associated with older generation networks like 2G, 3G, and 4G, the 5G SMSF ensures that SMS services are still supported and integrated within the 5G ecosystem. More details on implementation: 5g Short Message Service Function (SMSF) (telecomtrainer.com)

- Session Management Function **SMF** - primarily responsible for interacting with the decoupled data plane, creating, updating and removing Protocol Data Unit (PDU) sessions and managing session context with the User Plane Function (UPF). More details: What is the 5G Session Management Function (SMF)? - Microsoft Community Hub

- Service Capability Exposure Function **SCEF** - enabling secure and controlled access to network services by third-party applications, allowing them to utilize the capabilities provided by the underlying network infrastructure. More details: SCEF (Service Capability Exposure Function) (telecomtrainer.com)

- Policy and Charging Rules Function **PCRF** - ensuring policy control and charging functionalities, allowing service providers to effectively manage network resources, control quality of service (QoS), and enforce charging policies for various services. More details: PCRF (Policy and Charging Enforcement Function) (telecomtrainer.com)

- Policy Control Function **PCF** - provides a centralized control mechanism that enables network operators to define, enforce, and manage policies related to network resources, service quality, and user behavior. More details: PCF (Policy control function) (telecomtrainer.com).

Modularity of the network functions enabling another feature called Network Slicing.
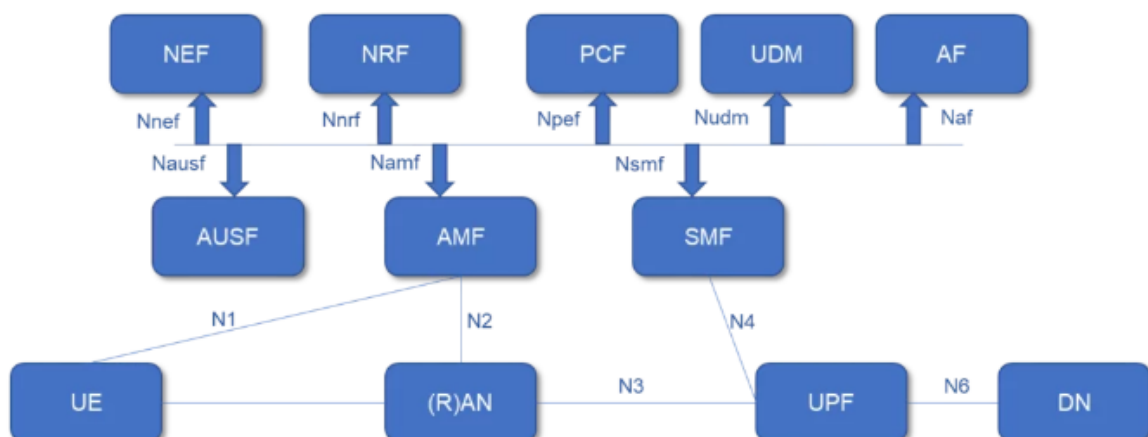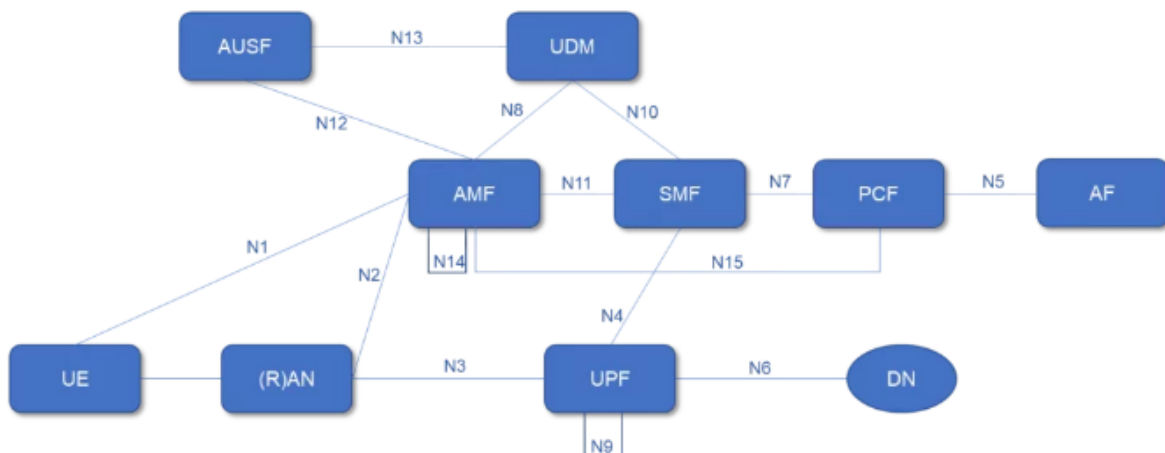
Interaction between network functions can be one of:

1. **Service-based** representation in which one network function (e.g. AMF) within CP allows other network functions (which have been authorized) to access its services.This representation also includes point-to-point reference between the NFs where necessary.

I'm

3GPP TS 23.501 V0.4.0 (2017-04)

2. **Non-Roaming** 5G System Architecture focuses on the interactions between pairs of network functions defined by point-to-point reference point (e.g. N7) between any two network functions (e.g. SMF and PCF).

3GPP TS 23.501 V0.4.0 (2017-04)

As we can see from the description of the individual NFs, some of them are modified, split, or merged versions of the good old EPC functions (like MME, SGW, PGW, HSS & PCRF) namely, AMF, SMF, PCF, UDM, AF, UPF or AUSF, but unlike EPC functions, AMF, SMF, and UPF **should be access independent.**

On the other hand, there are some functions that are new, related either to the concept of slicing (i.e., NSSF), to support handling multiple slices, or to the SBA itself (i.e., NEF & NRF) to support the concept of services subscription, exposure, and access.

Another thing is that in this architecture, we have a full CP & UP split in the core network, i.e. UPF supports UP data processing, while all other nodes act as CP functions (this is a bit different compared to EPC, where, e.g. PGW was acting a bit as UP and CP node, having some DHCP functionality and IP address allocation and PCEF functionality). This allows for independent scaling of CP and UP functions for the operators and for handling network slices efficiently to tailor them to support different services.

There are four possible levels of statelessness of NFs than an operator can implement:
- **No state**: no UE state information stored in the NF (e.g. the UDM Front End);
- **Stateless**: the relevant UE state information is pulled by the NF from the UDSF for the duration of the transaction only (e.g. PCF);
- **State efficient**: the relevant UE state information is pulled by the NF from the UDSF and kept there during periods of high UE activity, cached for a few seconds or minutes, with the stable UE state information stored by the NF in the UDSF at the end of a certain procedure (e.g. AMF or SMF);
- **Stateful**: the UE state information is stored permanently in the NF (e.g. UDR).

Research Part 2

Network functions

5G System architecture consists of the following network functions (NF):

- Authentication Server Function **AUSF** - acts as an authentication server.
- Core Access and Mobility Management Function **AMF** - supports the termination of NAS signaling, NAS ciphering & integrity protection, registration management, connection management, mobility management, access authentication and authorization, and security context management.
- Data Network **DN** operator services, Internet access or 3rd party services
- Structured Data Storage network function **SDSF** used to store data in a structured way within a network. It relies on a predefined schema for efficient storage, retrieval, and analysis of data. In the context of 5G networks, it improves reliability by storing structured and unstructured data related to network functions.
- Unstructured Data Storage network function **UDSF** responsible for storing unstructured data generated or consumed by various 5G services and applications. This data might include multimedia content, documents, or any other form of unstructured information.
- Unstructured Data Storage network function **NSSF** - supports selecting the Network Slice instances to serve the UE, determining the allowed NSSAI, and determining the AMF set to be used to serve the UE.
- NF Repository Function **NRF** - supports service discovery function, maintains NF profile and available NF instances;
- Network Exposure Function **NEF** - supports exposure of capabilities and events, secure provision of information from external applications to the 3GPP network, and translation of internal/external information;
- Policy Control Function **PCF** - supports a unified policy framework, providing policy rules to CP functions, and access to subscription information for policy decisions in UDR.
- Session Management Function **SMF** - supports session management (session establishment, modification, release), UE IP address allocation & management, DHCP functions, termination of NAS signaling related to session management, DL data notification, traffic steering configuration for UPF for proper traffic routing.
- Unified Data Management **UDM** - supports application influence on traffic routing, accessing NEF, and interaction with a policy framework for policy control.
- User Plane Function **UPF** - supports packet routing & forwarding, packet inspection, QoS handling, acts as an external PDU session point of interconnecting to Data Network (DN) and is an anchor point for intra- & inter-RAT mobility.
- Application Function **AF** resides in the control plane of the 5G Service-Based Architecture (SBA), and its main responsibilities include: accessing the NEF for retrieving resources; interacting with the Policy Control Function (PCF), enabling

policy control; traffic routing for applications; provides application services to subscribers. ([Exploring the 3GPP AF – Application Function - Emblasoft](#))

- Short Message Service Function **SMSF** provides the capability to handle Short Message Service (SMS) traffic. While SMS has been traditionally associated with older generation networks like 2G, 3G, and 4G, the 5G SMSF ensures that SMS services are still supported and integrated within the 5G ecosystem. More details on implementation: [5g Short Message Service Function (SMSF) (telecomtrainer.com)](#)
- Session Management Function **SMF** primarily responsible for interacting with the decoupled data plane, creating, updating and removing Protocol Data Unit (PDU) sessions and managing session context with the User Plane Function (UPF). More details: [What is the 5G Session Management Function (SMF)? - Microsoft Community Hub](#)
- Service Capability Exposure Function **SCEF** enabling secure and controlled access to network services by third-party applications, allowing them to utilize the capabilities provided by the underlying network infrastructure. More details: [SCEF (Service Capability Exposure Function) (telecomtrainer.com)](#)
- Policy and Charging Rules Function **PCRF** ensuring policy control and charging functionalities, allowing service providers to effectively manage network resources, control quality of service (QoS), and enforce charging policies for various services. More details: [PCRF (Policy and Charging Enforcement Function) (telecomtrainer.com)](#)
- Policy Control Function **PCF** provides a centralized control mechanism that enables network operators to define, enforce, and manage policies related to network resources, service quality, and user behavior. More details: [PCF (Policy control function) (telecomtrainer.com)](#).

Open5GS

Open5GS is a C-language Open Source implementation of 5GC and EPC, i.e. the core network of NR/LTE network.

Supported Network function:

TBD

Supported features:

- Release-17 compliant
- AES, Snow3G, ZUC algorithms for encryption
- Support for USIM cards using Milenage
- IPv6 support
- Multiple PDU session
- Handover(5GC Xn/N2 and EPC S1/X2)
- CSFB(Circuit Switched Fall Back) and SMSos(SMS over SGs)

- Support ePDG Interface(SWx, S6b, S2b)
- VoLTE(Voice over LTE) with HSS-Cx interface
- VoNR(Voice over NR)
- 5G Roaming

Known limitations:

- No Interworking with EPC
- No NB-IoT
- No OCS/OFCS
- No eMBMS
- No SRVCC
- No Emergency Call

Introduction to Open5GS

4G/5G NSA Core

The Open5GS 4G/ 5G NSA Core contains the following components:

- MME - Mobility Management Entity
- HSS - Home Subscriber Server
- PCRF - Policy and Charging Rules Function
- SGWC - Serving Gateway Control Plane

- SGWU - Serving Gateway User Plane
- PGWC/SMF - Packet Gateway Control Plane / (component contained in Open5GS SMF)
- PGWU/UPF - Packet Gateway User Plane / (component contained in Open5GS UPF)

Core → 2 main planes: control and user plane → physically separated as CUPS (control user plane separation)

MME → main control plane hub → manages sessions, mobility, paging and bearers.

MME link to the HSS (subscriber profile + SIM authentication), SGWC and PGWC/SMF (control planes of the gateway servers).

All eNB nodes in the network (4G basestations) → connected to MME.

PCRF sits in-between the PGWC/SMF and the HSS → handles charging + enforces subscriber policies.

User control plane carries user bata between the eNB/NSA gNB (5G NSA basestations)and the external WAN.

Core components of the user plane → SGWU and PGWU/UPF → connect to the control plane counterparts.

eNBs/NSA gNBs → SGWU → PGWU/UPF → WAN.

By having the control and user planes physically separated like this, it means you can deploy multiple user plane servers in the field (eg somewhere with a high speed Internet connection), whilst keeping control functionality centralised. This enables support of MEC use cases, for example.

ALL OF THOSE CoMPONENTS HAVE CONFIG FILES (contains the component's IP bind addresses/ local Interface names **and** the IP addresses/ DNS names of the other components it needs to connect to).

5G SA Core

The Open5GS 5G SA Core contains the following functions:

- NRF - NF Repository Function
- SCP - Service Communication Proxy
- SEPP - Security Edge Protection Proxy
- AMF - Access and Mobility Management Function
- SMF - Session Management Function
- UPF - User Plane Function
- AUSF - Authentication Server Function
- UDM - Unified Data Management
- UDR - Unified Data Repository

- PCF - Policy and Charging Function
- NSSF - Network Slice Selection Function
- BSF - Binding Support Function

5G SA core VS 4G Core → 1st one uses Service Based Architecture (SBA).

Control plane functions → register with the NRF → NRF helps them discover the other core functions.

AMF handles connection and mobility management (subset of what the 4G MME is tasked with).

gNBs connect to the AMF.

The UDM, AUSF and UDR → carry out similar operations as the 4G HSS → generating SIM authentication vectors and holding the subscriber profile.

SMF → handles session management (as the 4G MME/SGWC/PGWC previously).

NSSF → provides a way to select a network slice;

PCF → used for charging + enforcing subscriber policies;

SEPP → part of the roaming security architecture.

SCP → enables indirect communication.

The 5G SA core **user plane** is much simpler, as it only **contains a single function**. The UPF carries user data packets between the gNB and the external WAN. It connects back to the SMF too.

With the exception of the SMF and UPF, all config files for the 5G SA core functions only contain the function's IP bind addresses/ local Interface names and the IP address/ DNS name of the NRF.

Free5GCore

Specification:

- 3GPP TS 23.501/23.502-Rel-15

- 5G Standalone (SA) Supported

- Service-based Interface (SBI) supported

  - Namf, Nsmf, Nausf, Nudm, Nudr, Nnssf, Nnrf, Npcf

- N1, N2, N3, N4, N6, N9 interfaces supported

- 5G SA Network functions suported:

  - AMF: Access and Mobility Management Function
    - Registration Management, Connection Management, Reachability Management, Mobility Management, and Authentication
  - SMF: Session Management Function
    - Session Management, IP Assigning/Management
  - UPF: User Plane Function
    - Support multiple UPF and ULCL (uplink classifier)
    - Session and Service Continuity (SCC) mode 1
    - Packet Routing/Forwarding
  - CHF: Charging Function (will be supported in release v3.3.1)
    - Online/Offline Charging
    - Webconsole acts as BD (Billing Domain)
    - Flow-based Charging on PDU Session
  - AUSF: Authentication Server Function
  - NRF: NF Repository Function
  - UDM: Unified Data Management
  - UDR: Unified Data Repository
  - PCF: Policy and Charging Function
  - NSSF: Network Slice Selection Function
  - N3IWF: Non-3GPP Interworking Function
  - N3IWUE: Non-3GPP Interworking User Equipment
- Supported features:

  - Registration
    - Initial/Periodic/Mobility/Without authentication, due to RAN did the AMF reselection
  - NAS Reroute when serving AMF can not handle UE registration with unmatch NSSAI
  - Authentication
    - 5G-AKA
    - EAP-AKA'
  - NAS Security
    - Ciphering: NEA0, NEA1, NEA2, NEA3
    - Integrity: NIA0, NIA1, NIA2, NIA3
  - Deregistration
    - UE-initiated deregistration
  - Service request:
    - UE triggered Service Request
    - Network Triggered Service Request
  - AN Release

- PDU Session Establishment
- PDU Session Modification (v3.3.0)
- Converged Charging (CHF has been published, all of the functions will be enabled in the incoming release)
  - Billing domain (webconsole)
  - ABMF, RF, and CGF built-in CHF
  - Flow-based Charging (FBC)
- PDU Session Release
- Handover
  - N2 Handover (Indirect mode not supported)
  - Xn Handover
- QoS
  - Control Plane only:
    - 5QI, ARP, GBR, MBR of QoS Flow (v3.3.0)
    - Session-AMBR supported
- Collection and reporting of usage data over N4 interface
  - Volume measurement periodically
- UP Security
- Multiple UPFs and ULCL (Uplink Classifier)
- Multiple Slice and DNN
- Dynamic/Static IPv4 address allocation
- OAuth2 on SBI

Comparison of the Free5GS and Open5GCore

The 5G specification considers three main use case categories: E**nhanced Mobile Broadband** (eMBB, aims to serve more densely populated urban centers with downlink speeds approaching 1 Gbps indoors and 300 Mbps outdoors.), **Ultra-Reliable LowLatency Communication** (URLLC, would address critical communication needs where bandwidth is not as important as speed, i.e., end-to-end latency of 1 ms or less) and **Massive Machine Type Communications** (mMTC, enables machine-to-machine (M2M) and Internet of Things (IoT) applications that a new wave of mobile customers could expect from their network without burdening the other classes of service). The 5G system will support 4C, which is communication, computing, control and content delivery.

With the introduction of 5G, new applications such as real-time online gaming, virtual reality (VR), ultra-high definition (UHD), autonomous vehicles, tactile Internet (with millisecond latency), Internet of Things (IoT), and Industrial Internet of Things (IIoT) are emerging.

Section III presents a comparison between the analyzed core network platforms in terms of (A)infrastructure, (B)documentation, (C)Community & Code Maturity, (D)Base Projects, and (E)Management.

Open5GS:

The Open5GS platform consists of two core architecture segments - Open5GS 4G/5G NSA Core and Open5GS 5G SA Core. Core physically divided into two main levels: control level and the user level.

Open5GS 4G/5G NSA contains:

- MME, Mobility Management Entity - the main component of the control plane axis in the core; responsible for managing mobility paging, and carrier sessions; connects to HSS; all eNBs of the mobile network are connected to it;
- HSS, Home Subscriber Server - generates SIM authentication vectors and manages the subscriber profile; connects to the getaway server control planes - SGWC and PGWC/SMF.
- PCRF, Policy and Charging Rules - last component of the control plane; works between the PGWC/SMF and the HSS to calculate and enforce subscriber policies;
- SGWC, Serving Gateway Control Plane
- SGWU, Server Gateway User Plane
- PGWC, Gateway Control Plane
- PGWU, Gateway User Plane

User plane - responsible for transporting user data packets between the eNB/NSA gNB (5G NSA base station) and the external WAN;
SGWU and PGWU/UPF - main components of the user plane; both connected to their control plane counterparts (eNBs/NSA gNBs connects to SGWU -> connects to PGWU/UPF and WAN);

All these components have config files that contain IP/local interface names of the component + IP addresses/DNS names of other components to which each component must connect;

Open5GS 5G SA Core contains:

- AMF, Access and Mobility Management Function - acts as mobility and connectivity manager; the gNBs (5G base stations) connect to it;
- SMF, Session Management Function - responsible for session management (was previously responsibility of the 4G MME/SGWC/PGWC);
- UPF, User Plane Function - connects to the SMF and transports user data packets between gNB and the external WAN;
- AUSF, Authentication Server Function
- NRF, Repository Function - functions are configured to be registered here; it helps in detecting other core functions;
- UDM, Unified Data Management
- UDR, Unified Data Repository
- PCF, Policy and Charging Function - responsible for charging and subscriber policy enforcement;
- NSSF, Network Slice Selection Function - provides a way to select parts of the network;

- BSF, Binding Support Function

UDM, AUSF, UDR -> perform similar operations as 4G HSS, generate SIM authentication vectors, maintain subscriber profile;

Except for SMF and UPF -> all config files for the 5G SA main functions contain only the IP binding address/local interface names of the function + the IP address/DNS names of the NRF;

Free5GCore:

Free5GCore implementation is based on the NextEPC; Free5GCore uses 4G protocols to communicate with the 4G UE and 4G base station (eNB);

The authentication protocol for this platform -> still based on 4G;

Free5GCore implements some of the 5GCore features required for its use:

The comparison between those two platforms was based on mobility, collection of KPIs, scalability, resilience, CUPS, capacity and management of each of the platforms.

Infrastructure:

For Open5GS we can use both Virtual Machine for set up or Docker/Container;

For Free5GCore we can only use Virtual Machine;

Documentation:

Open5GS documentation provide enough instructions to perform the process of deployment, configuration and upgrade in an organized and chronological way, but does not provide details of each function;

In Free5GCore the documentation does not show a chronological order of the execution process, making the deployment not so straightforward (unordered flowchart of the commands)l;

Community & Code Maturity:Open5GS is more advanced in this development and has ery active community members of the platform; The maturity of the code is directly related to the activity of the community with respect to the functionality of each code.

Base Projects:

Both Open5GS and Free5GC platforms are based on technology provided by NextEPC Inc. NextEPC Inc. has developed software solutions for the LTE/5G/ NB -IoT core network that are compatible with the latest 3GPP specifications and provide commercial support.

CUPS:

Both platforms, Open5GS and Free5GC have in its architecture with control/user plane separation implemented. This allows operations to deploy and scale the network with more flexibility and agility.

Turtle format:

```
<tag:stardog:designer:5GNetworkBuilder:model:3rd_party_services> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "3rd party services" ;
  <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Capability_exposure> .
<tag:stardog:designer:5GNetworkBuilder:model:4G/5G_NSA_Core> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "4G/5G NSA Core" ;
  <tag:stardog:designer:colorId> "sd-qb-light-orange" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Open5GS> .
<tag:stardog:designer:5GNetworkBuilder:model:5G_Platform> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "5G Platform" ;
  <tag:stardog:designer:colorId> "sd-qb-cream" .
<tag:stardog:designer:5GNetworkBuilder:model:5G_SA_Core> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "5G SA Core" ;
  <tag:stardog:designer:colorId> "sd-qb-light-orange" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Open5GS> .
<tag:stardog:designer:5GNetworkBuilder:model:Access_Management> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Access Management" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Management the initial access of user devices to the 5G network;" ;
  <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Fuctionality> .
<tag:stardog:designer:5GNetworkBuilder:model:Acess_authentication_and_authorization> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Access authentication and authorization" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Verification of the identity of the device; ensuring that device has the necessary credentials to access the network;" ;
  <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
```

```
    <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Fuctionality>,
<tag:stardog:designer:5GNetworkBuilder:model:Access_Management> .
<tag:stardog:designer:5GNetworkBuilder:model:AF> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "AF" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Application Function" ;
  <tag:stardog:designer:colorId> "sd-qb-teal" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Network_Function> .
<tag:stardog:designer:5GNetworkBuilder:model:AMF> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "AMF" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Core Access and Mobility
Management Function" ;
  <tag:stardog:designer:colorId> "sd-qb-teal" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Network_Function> .
<tag:stardog:designer:5GNetworkBuilder:model:AUSF> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "AUSF" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Authentication Server Function" ;
  <tag:stardog:designer:colorId> "sd-qb-teal" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Network_Function> .
<tag:stardog:designer:5GNetworkBuilder:model:Authentication_server> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Authentication" ;
  <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Acess_authentication_and_authorization> .
<tag:stardog:designer:5GNetworkBuilder:model:Bearer_Management> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Bearer Management" ;
  <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:QoS> .
<tag:stardog:designer:5GNetworkBuilder:model:BSF> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "BSF" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Binding Support Function" ;
  <tag:stardog:designer:colorId> "sd-qb-teal" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Network_Function> .
<tag:stardog:designer:5GNetworkBuilder:model:Capability_exposure> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Capability exposure" ;
```

<http://www.w3.org/2000/01/rdf-schema#comment> "Exposure of various network capabilities to external applications in a standardized and controlled manner; capabilities can include service discovery, network coverage information, network slicing, Quality of Service (QoS) management, policy control, and more;" ;
 <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
 <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Fuctionality> .
<tag:stardog:designer:5GNetworkBuilder:model:Charging> a
<http://www.w3.org/2002/07/owl#Class> ;
 <http://www.w3.org/2000/01/rdf-schema#label> "Charging management" ;
 <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
 <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Fuctionality> .
<tag:stardog:designer:5GNetworkBuilder:model:Compression_and_Acceleration> a
<http://www.w3.org/2002/07/owl#Class> ;
 <http://www.w3.org/2000/01/rdf-schema#label> "Compression and Acceleration" ;
 <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
 <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Data_Processing> .
<tag:stardog:designer:5GNetworkBuilder:model:Connection_management> a
<http://www.w3.org/2002/07/owl#Class> ;
 <http://www.w3.org/2000/01/rdf-schema#label> "Connection management" ;
 <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
 <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Fuctionality> .
<tag:stardog:designer:5GNetworkBuilder:model:Context_management> a
<http://www.w3.org/2002/07/owl#Class> ;
 <http://www.w3.org/2000/01/rdf-schema#label> "Context management" ;
 <http://www.w3.org/2000/01/rdf-schema#comment> "Maintenance of the context information about the user device, including its location, capabilities, and current communication sessions; context information is crucial for efficient mobility management and handover procedures;" ;
 <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
 <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Fuctionality> .
<tag:stardog:designer:5GNetworkBuilder:model:Data_Processing> a
<http://www.w3.org/2002/07/owl#Class> ;
 <http://www.w3.org/2000/01/rdf-schema#label> "Data Processing" ;
 <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
 <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Fuctionality> .
<tag:stardog:designer:5GNetworkBuilder:model:Data_Routing_and_Forwarding> a
<http://www.w3.org/2002/07/owl#Class> ;
 <http://www.w3.org/2000/01/rdf-schema#label> "Data Routing and Forwarding" ;
 <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
 <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Fuctionality> .

```
<tag:stardog:designer:5GNetworkBuilder:model:Discovering_network_functions> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Discovering network functions" ;
  <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Fuctionality> .
<tag:stardog:designer:5GNetworkBuilder:model:DN> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "DN" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Data Network" ;
  <tag:stardog:designer:colorId> "sd-qb-light-purple-1" .
<tag:stardog:designer:5GNetworkBuilder:model:Dynamic_Policy_adaptation> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Dynamic Policy adaptation" ;
  <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Policy_enforcement> .
<tag:stardog:designer:5GNetworkBuilder:model:Dynamic_Updates> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Dynamic Updates" ;
  <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Capability_exposure> .
<tag:stardog:designer:5GNetworkBuilder:model:Free5GCore> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Free5GCore" ;
  <tag:stardog:designer:colorId> "sd-qb-gold" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:5G_Platform> .
<tag:stardog:designer:5GNetworkBuilder:model:Fuctionality> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Functionality" ;
  <tag:stardog:designer:colorId> "sd-qb-gold" .
<tag:stardog:designer:5GNetworkBuilder:model:gNB> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "gNB" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Base Station" ;
  <tag:stardog:designer:colorId> "sd-qb-red" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Physical_Device> .
<tag:stardog:designer:5GNetworkBuilder:model:Gx> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Gx" ;
  <tag:stardog:designer:colorId> "sd-qb-green" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Interface> .
<tag:stardog:designer:5GNetworkBuilder:model:Handover_support> a
<http://www.w3.org/2002/07/owl#Class> ;
```

<http://www.w3.org/2000/01/rdf-schema#label> "Handover support" ;
 <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
 <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Mobility> .
<tag:stardog:designer:5GNetworkBuilder:model:Header_Processing> a
<http://www.w3.org/2002/07/owl#Class> ;
 <http://www.w3.org/2000/01/rdf-schema#label> "Header Processing" ;
 <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
 <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Data_Processing> .
<tag:stardog:designer:5GNetworkBuilder:model:HSS> a
<http://www.w3.org/2002/07/owl#Class> ;
 <http://www.w3.org/2000/01/rdf-schema#label> "HSS" ;
 <http://www.w3.org/2000/01/rdf-schema#comment> "Home Subscriber Server" ;
 <tag:stardog:designer:colorId> "sd-qb-orange" .
<tag:stardog:designer:5GNetworkBuilder:model:indirect_communication> a
<http://www.w3.org/2002/07/owl#Class> ;
 <http://www.w3.org/2000/01/rdf-schema#label> "indirect communication" ;
 <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
 <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Fuctionality> .
<tag:stardog:designer:5GNetworkBuilder:model:Integrity_protection> a
<http://www.w3.org/2002/07/owl#Class> ;
 <http://www.w3.org/2000/01/rdf-schema#label> "Integrity protection" ;
 <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
 <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Fuctionality> .
<tag:stardog:designer:5GNetworkBuilder:model:Interface> a
<http://www.w3.org/2002/07/owl#Class> ;
 <http://www.w3.org/2000/01/rdf-schema#label> "Interface" ;
 <http://www.w3.org/2000/01/rdf-schema#comment> "Type of the interface used to ensure connection between nodes/element sof the system" ;
 <tag:stardog:designer:colorId> "sd-qb-gold" .
<tag:stardog:designer:5GNetworkBuilder:model:Internet_services> a
<http://www.w3.org/2002/07/owl#Class> ;
 <http://www.w3.org/2000/01/rdf-schema#label> "Internet services" ;
 <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
 <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Capability_exposure> .
<tag:stardog:designer:5GNetworkBuilder:model:Interworking_with_NFs> a
<http://www.w3.org/2002/07/owl#Class> ;
 <http://www.w3.org/2000/01/rdf-schema#label> "Interworking with NFs" ;
 <http://www.w3.org/2000/01/rdf-schema#comment> "Seamless communication and coordination between basic (SMF, UPF, AUSF) NFs to ensure the delivery of reliable and efficient services;" ;
 <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
 <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Fuctionality> .

```
<tag:stardog:designer:5GNetworkBuilder:model:Lifecycle_management> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Lifecycle management" ;
  <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Fuctionality> .
<tag:stardog:designer:5GNetworkBuilder:model:Location-based_services> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Location-based services" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Enabling of location-based services,
allowing applications and services to make use of the user's location information for specific
functionalities" ;
  <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Capability_exposure>,
<tag:stardog:designer:5GNetworkBuilder:model:Location_management> .
<tag:stardog:designer:5GNetworkBuilder:model:Location_management> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Location management" ;
  <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Fuctionality> .
<tag:stardog:designer:5GNetworkBuilder:model:Location_Updates> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Location Updates" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Tracking location of the connected
UEs; location updates and providing information to other network functions for efficient
routing of data;" ;
  <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Location_management> .
<tag:stardog:designer:5GNetworkBuilder:model:MME> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "MME" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Mobility Management Entity" ;
  <tag:stardog:designer:colorId> "sd-qb-orange" .
<tag:stardog:designer:5GNetworkBuilder:model:Mobility> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Mobility management" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Mobility of user devices as they move
within the network coverage area, It is involved in the handover process, ensuring a
seamless transition as a device moves from one cell to another." ;
  <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Fuctionality> .
<tag:stardog:designer:5GNetworkBuilder:model:N1> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "N1" ;
```

```
  <tag:stardog:designer:colorId> "sd-qb-green" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Interface> .
<tag:stardog:designer:5GNetworkBuilder:model:N10> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "N10" ;
  <tag:stardog:designer:colorId> "sd-qb-green" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Interface> .
<tag:stardog:designer:5GNetworkBuilder:model:N11> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "N11" ;
  <tag:stardog:designer:colorId> "sd-qb-green" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Interface> .
<tag:stardog:designer:5GNetworkBuilder:model:N12> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "N12" ;
  <tag:stardog:designer:colorId> "sd-qb-green" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Interface> .
<tag:stardog:designer:5GNetworkBuilder:model:N13> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "N13" ;
  <tag:stardog:designer:colorId> "sd-qb-green" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Interface> .
<tag:stardog:designer:5GNetworkBuilder:model:N15> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "N15" ;
  <tag:stardog:designer:colorId> "sd-qb-green" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Interface> .
<tag:stardog:designer:5GNetworkBuilder:model:N2> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "N2" ;
  <tag:stardog:designer:colorId> "sd-qb-green" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Interface> .
<tag:stardog:designer:5GNetworkBuilder:model:N3> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "N3" ;
  <tag:stardog:designer:colorId> "sd-qb-green" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Interface> .
<tag:stardog:designer:5GNetworkBuilder:model:N35> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "N35" ;
```

```
  <tag:stardog:designer:colorId> "sd-qb-green" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Interface> .
<tag:stardog:designer:5GNetworkBuilder:model:N36> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "N36" ;
  <tag:stardog:designer:colorId> "sd-qb-green" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Interface> .
<tag:stardog:designer:5GNetworkBuilder:model:N4> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "N4" ;
  <tag:stardog:designer:colorId> "sd-qb-green" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Interface> .
<tag:stardog:designer:5GNetworkBuilder:model:N5> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "N5" ;
  <tag:stardog:designer:colorId> "sd-qb-green" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Interface> .
<tag:stardog:designer:5GNetworkBuilder:model:N6> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "N6" ;
  <tag:stardog:designer:colorId> "sd-qb-green" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Interface> .
<tag:stardog:designer:5GNetworkBuilder:model:N7> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "N7" ;
  <tag:stardog:designer:colorId> "sd-qb-green" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Interface> .
<tag:stardog:designer:5GNetworkBuilder:model:N8> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "N8" ;
  <tag:stardog:designer:colorId> "sd-qb-green" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Interface> .
<tag:stardog:designer:5GNetworkBuilder:model:NEF> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "NEF" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Network Exposure Function" ;
  <tag:stardog:designer:colorId> "sd-qb-teal" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Network_Function> .
<tag:stardog:designer:5GNetworkBuilder:model:Network_Function> a
<http://www.w3.org/2002/07/owl#Class> ;
```

```
  <http://www.w3.org/2000/01/rdf-schema#label> "Network Function" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "This class represents basic function of
the 5G Network Core" ;
  <tag:stardog:designer:colorId> "sd-qb-red" .
<tag:stardog:designer:5GNetworkBuilder:model:network_slice_selection> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "network slice selection" ;
  <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Support_for_Network_Slicing> .
<tag:stardog:designer:5GNetworkBuilder:model:NF_Registration_management> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "NF Registration management" ;
  <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Fuctionality> .
<tag:stardog:designer:5GNetworkBuilder:model:NRF> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "NRF" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "NF Repository Function; acts as a
repository for information about the available Network Functions (NFs) and their capabilities
within the network;" ;
  <tag:stardog:designer:colorId> "sd-qb-teal" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Network_Function> .
<tag:stardog:designer:5GNetworkBuilder:model:NSSF> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "NSSF" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Unstructured Data Storage network
function" ;
  <tag:stardog:designer:colorId> "sd-qb-teal" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Network_Function> .
<tag:stardog:designer:5GNetworkBuilder:model:Open5GS> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Open5GS" ;
  <tag:stardog:designer:colorId> "sd-qb-gold" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:5G_Platform> .
<tag:stardog:designer:5GNetworkBuilder:model:Operator_services> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Operator services" ;
  <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Fuctionality> .
<tag:stardog:designer:5GNetworkBuilder:model:Packet_Inspection_and_Filtering> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Packet Inspection and Filtering" ;
```

<tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Data_Processing> .
<tag:stardog:designer:5GNetworkBuilder:model:Paging> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Paging" ;
  <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Fuctionality> .
<tag:stardog:designer:5GNetworkBuilder:model:PCF> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "PCF" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Policy Control Function" ;
  <tag:stardog:designer:colorId> "sd-qb-teal" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Network_Function> .
<tag:stardog:designer:5GNetworkBuilder:model:PCRF> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "PCRF" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Policy and Charging Rules Function" ;
  <tag:stardog:designer:colorId> "sd-qb-teal" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Network_Function> .
<tag:stardog:designer:5GNetworkBuilder:model:Physical_Device> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Physical Device" ;
  <tag:stardog:designer:colorId> "sd-qb-gold" .
<tag:stardog:designer:5GNetworkBuilder:model:Policy_Binding_Discovery> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Policy Binding Discovery" ;
  <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Policy_enforcement> .
<tag:stardog:designer:5GNetworkBuilder:model:Policy_Control_and_Eforcement> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Policy Control and Eforcement" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "In scenarios involving dual
connectivity (e.g., simultaneous connections to both 4G and 5G networks), enforces policies
to manage the dual connectivity efficiently; enforces policies related to user access, mobility,
and quality of service (QoS) based on the operator's network policies;" ;
  <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Policy_enforcement> .
<tag:stardog:designer:5GNetworkBuilder:model:Policy_enforcement> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Policy management" ;
  <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;

```
    <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Fuctionality> .
<tag:stardog:designer:5GNetworkBuilder:model:Proxy> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Proxy" ;
  <tag:stardog:designer:colorId> "sd-qb-gold" .
<tag:stardog:designer:5GNetworkBuilder:model:QoS> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "QoS" ;
  <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Service_management> .
<tag:stardog:designer:5GNetworkBuilder:model:Registration_management> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Registration management" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Handling the registration and
authentication procedures when a device seeks to connect to the 5G network;" ;
  <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Fuctionality> .
<tag:stardog:designer:5GNetworkBuilder:model:Repository_of_NF_capabilities> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Repository of NF capabilities" ;
  <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Capability_exposure> .
<tag:stardog:designer:5GNetworkBuilder:model:roaming_security> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "roaming security" ;
  <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Security_management> .
<tag:stardog:designer:5GNetworkBuilder:model:S1-MME> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "S1-MME" ;
  <tag:stardog:designer:colorId> "sd-qb-green" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Interface> .
<tag:stardog:designer:5GNetworkBuilder:model:S11> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "S11" ;
  <tag:stardog:designer:colorId> "sd-qb-green" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Interface> .
<tag:stardog:designer:5GNetworkBuilder:model:S5c> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "S5c" ;
  <tag:stardog:designer:colorId> "sd-qb-green" ;
```

<http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Interface> .
<tag:stardog:designer:5GNetworkBuilder:model:S5u> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "S5u" ;
  <tag:stardog:designer:colorId> "sd-qb-green" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Interface> .
<tag:stardog:designer:5GNetworkBuilder:model:S6a> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "S6a" ;
  <tag:stardog:designer:colorId> "sd-qb-green" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Interface> .
<tag:stardog:designer:5GNetworkBuilder:model:SBI_connection> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "SBI connection" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Connection which uses RESTful
APIs" ;
  <tag:stardog:designer:colorId> "sd-qb-cream" .
<tag:stardog:designer:5GNetworkBuilder:model:SCEF> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "SCEF" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Service Capability Exposure
Function" ;
  <tag:stardog:designer:colorId> "sd-qb-teal" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Network_Function> .
<tag:stardog:designer:5GNetworkBuilder:model:SCP> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "SCP" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Service Communication Proxy" ;
  <tag:stardog:designer:colorId> "sd-qb-yellow-green" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Proxy> .
<tag:stardog:designer:5GNetworkBuilder:model:SDSF> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "SDSF" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Structured Data Storage network
function" ;
  <tag:stardog:designer:colorId> "sd-qb-teal" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Network_Function> .
<tag:stardog:designer:5GNetworkBuilder:model:Security_Functions> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Security Functions" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Participation in security-related
procedures, including key management and encryption;" ;

<tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Security_management> .
<tag:stardog:designer:5GNetworkBuilder:model:Security_Key_Management> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Security Key Management" ;
  <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Security_management> .
<tag:stardog:designer:5GNetworkBuilder:model:Security_management> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Security management" ;
  <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Fuctionality> .
<tag:stardog:designer:5GNetworkBuilder:model:SEPP> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "SEPP" ;
  <tag:stardog:designer:colorId> "sd-qb-yellow-green" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Proxy> .
<tag:stardog:designer:5GNetworkBuilder:model:Service_Discovery> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Service Discovery" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Enables applications to identify the
available services and their corresponding endpoints within the network; allows applications
to dynamically adapt their behavior based on the network's capabilities and availability;" ;
  <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Fuctionality> .
<tag:stardog:designer:5GNetworkBuilder:model:Service_management> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Service management" ;
  <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Fuctionality> .
<tag:stardog:designer:5GNetworkBuilder:model:Session_Context_Handling> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Session Context Handling" ;
  <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Session_management> .
<tag:stardog:designer:5GNetworkBuilder:model:Session_Establishment_and_Release> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Session Establishment and Release" ;
  <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Session_management> .

<tag:stardog:designer:5GNetworkBuilder:model:Session_management> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Session management" ;
  <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Fuctionality> .
<tag:stardog:designer:5GNetworkBuilder:model:Session_Management> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Session Management" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Management of the establishment,
modification, and termination of sessions for user devices; involved in setting up and
maintaining communication sessions between the user equipment and the network;" ;
  <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Fuctionality> .
<tag:stardog:designer:5GNetworkBuilder:model:SGWC> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "SGWC" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Serving Gateway Control Plane" ;
  <tag:stardog:designer:colorId> "sd-qb-orange" .
<tag:stardog:designer:5GNetworkBuilder:model:SGWU> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "SGWU" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Serving Gateway User Plane" ;
  <tag:stardog:designer:colorId> "sd-qb-orange" .
<tag:stardog:designer:5GNetworkBuilder:model:SIM_Auth> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "SIM Auth" ;
  <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Fuctionality> .
<tag:stardog:designer:5GNetworkBuilder:model:Slice_instance_identification> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Slice instance identification" ;
  <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Support_for_Network_Slicing> .
<tag:stardog:designer:5GNetworkBuilder:model:SMF> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "SMF" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Session Management Function" ;
  <tag:stardog:designer:colorId> "sd-qb-teal" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Network_Function> .
<tag:stardog:designer:5GNetworkBuilder:model:SMSF> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "SMSF" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Short Message Service Function" ;

```
  <tag:stardog:designer:colorId> "sd-qb-teal" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Network_Function> .
<tag:stardog:designer:5GNetworkBuilder:model:structured_data_storage> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Data storage" ;
  <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Fuctionality> .
<tag:stardog:designer:5GNetworkBuilder:model:Sub_DB> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Sub DB" ;
  <tag:stardog:designer:colorId> "sd-qb-light-purple-1" .
<tag:stardog:designer:5GNetworkBuilder:model:Sub_policies> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Sub policies" ;
  <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Fuctionality> .
<tag:stardog:designer:5GNetworkBuilder:model:Sub_profile> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Subscriber profile" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Subscriber profile" ;
  <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Fuctionality> .
<tag:stardog:designer:5GNetworkBuilder:model:Subscription_data_management> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Subscription data management" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Responsible for managing
subscription-related information, including user profiles, service plans, and contextual data
required for service delivery" ;
  <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Fuctionality> .
<tag:stardog:designer:5GNetworkBuilder:model:Support_for_Network_Slicing> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Network Slicing" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Allowing the network to be logically
divided into multiple slices with customized characteristics to meet the diverse requirements
of different services and applications;" ;
  <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Fuctionality>,
<tag:stardog:designer:5GNetworkBuilder:model:Service_management> .
<tag:stardog:designer:5GNetworkBuilder:model:Traffic_Policing_and_Shaping> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Traffic Policing and Shaping" ;
```

<tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:QoS> .
<tag:stardog:designer:5GNetworkBuilder:model:UDM> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "UDM" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Unified Data Management" ;
  <tag:stardog:designer:colorId> "sd-qb-teal" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Network_Function> .
<tag:stardog:designer:5GNetworkBuilder:model:UDR> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "UDR" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Unified Data Repository; Centralized
repository that stores subscription-related data and policies, facilitating the management of
user profiles and charging information in a 5G network;" ;
  <tag:stardog:designer:colorId> "sd-qb-teal" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Network_Function> .
<tag:stardog:designer:5GNetworkBuilder:model:UDSF> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "UDSF" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Unstructured Data Storage network
function" ;
  <tag:stardog:designer:colorId> "sd-qb-teal" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Network_Function> .
<tag:stardog:designer:5GNetworkBuilder:model:UE> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "UE" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Device which has SIM card and can
be connected to the Network as the end device" ;
  <tag:stardog:designer:colorId> "sd-qb-red" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Physical_Device> .
<tag:stardog:designer:5GNetworkBuilder:model:UPF> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "UPF" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "User Plane Function" ;
  <tag:stardog:designer:colorId> "sd-qb-teal" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Network_Function> .
<tag:stardog:designer:5GNetworkBuilder:model:User_Plane_Protocol_Termination> a
<http://www.w3.org/2002/07/owl#Class> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "User Plane Protocol Termination" ;
  <tag:stardog:designer:colorId> "sd-qb-light-blue-1" ;
  <http://www.w3.org/2000/01/rdf-schema#subClassOf>
<tag:stardog:designer:5GNetworkBuilder:model:Data_Processing> .

```
<tag:stardog:designer:5GNetworkBuilder:model:collaboartes_with> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "collaboartes with" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:PCF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:UDR>
.
<tag:stardog:designer:5GNetworkBuilder:model:collaborates_with> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "collaborates with" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:SMSF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:AMF>,
<tag:stardog:designer:5GNetworkBuilder:model:UPF> .
<tag:stardog:designer:5GNetworkBuilder:model:collaborates_with_1> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "collaborates with" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:PCF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:UPF>
.
<tag:stardog:designer:5GNetworkBuilder:model:collaborates_with_10> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "collaborates with" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "interacts for user authentication,
mobility-related information exchange, and context transfer during handovers" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:SMF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:AMF>
.
<tag:stardog:designer:5GNetworkBuilder:model:collaborates_with_11> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "collaborates with" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "interacts to retrieve and enforce
policies related to QoS, charging, and data handling based on subscription profiles and
service requirements" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:SMF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:PCF>
.
<tag:stardog:designer:5GNetworkBuilder:model:collaborates_with_12> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "collaborates with" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "enables PCF binding discovery" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:BSF> ;
```

<https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:AF> .
<tag:stardog:designer:5GNetworkBuilder:model:collaborates_with_13> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "collaborates with" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "interacts in order to gather
user-related information" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:NRF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:UDM>
.
<tag:stardog:designer:5GNetworkBuilder:model:collaborates_with_14> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "collaborates with" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "interacts in order to use policy-related
functions" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:NRF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:PCF>
.
<tag:stardog:designer:5GNetworkBuilder:model:collaborates_with_15> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "collaborates with" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "handles authentication functions,
including verifying user credentials" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:UDM> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:AUSF> .
<tag:stardog:designer:5GNetworkBuilder:model:collaborates_with_16> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "collaborates with" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "manages subscription-related
information, including policy and charging rules" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:UDM> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:SMF>
.
<tag:stardog:designer:5GNetworkBuilder:model:collaborates_with_17> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "collaborates with" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:UDM> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:AMF>,
<tag:stardog:designer:5GNetworkBuilder:model:NSSF>,
<tag:stardog:designer:5GNetworkBuilder:model:SMF> .
<tag:stardog:designer:5GNetworkBuilder:model:collaborates_with_2> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;

<http://www.w3.org/2000/01/rdf-schema#label> "collaborates with" ;
<http://www.w3.org/2000/01/rdf-schema#comment> "Interacts to expose policy-related functionalities to external applications, allowing them to influence network behavior;" ;
<https://schema.org/domainIncludes> <tag:stardog:designer:5GNetworkBuilder:model:PCF> ;
<https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:NEF> .

<tag:stardog:designer:5GNetworkBuilder:model:collaborates_with_3> a <http://www.w3.org/2002/07/owl#ObjectProperty> ;
<http://www.w3.org/2000/01/rdf-schema#label> "collaborates with" ;
<http://www.w3.org/2000/01/rdf-schema#comment> "ensuring that policies are applied to the session establishment, modification, and release procedures;" ;
<https://schema.org/domainIncludes> <tag:stardog:designer:5GNetworkBuilder:model:PCF> ;
<https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:BSF> .

<tag:stardog:designer:5GNetworkBuilder:model:collaborates_with_4> a <http://www.w3.org/2002/07/owl#ObjectProperty> ;
<http://www.w3.org/2000/01/rdf-schema#label> "collaborates with" ;
<http://www.w3.org/2000/01/rdf-schema#comment> "to ensure consistent policy application" ;
<https://schema.org/domainIncludes> <tag:stardog:designer:5GNetworkBuilder:model:PCF> ;
<https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:PCRF> .

<tag:stardog:designer:5GNetworkBuilder:model:collaborates_with_5> a <http://www.w3.org/2002/07/owl#ObjectProperty> ;
<http://www.w3.org/2000/01/rdf-schema#label> "collaborates with" ;
<http://www.w3.org/2000/01/rdf-schema#comment> "facilitate seamless authentication and security operations" ;
<https://schema.org/domainIncludes> <tag:stardog:designer:5GNetworkBuilder:model:AUSF> ;
<https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:AMF> .

<tag:stardog:designer:5GNetworkBuilder:model:collaborates_with_6> a <http://www.w3.org/2002/07/owl#ObjectProperty> ;
<http://www.w3.org/2000/01/rdf-schema#label> "collaborates with" ;
<http://www.w3.org/2000/01/rdf-schema#comment> "interfaces to enforce policies that ensure optimal performance and resource utilization for different applications" ;
<https://schema.org/domainIncludes> <tag:stardog:designer:5GNetworkBuilder:model:AF> ;
<https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:PCF> .

<tag:stardog:designer:5GNetworkBuilder:model:collaborates_with_7> a <http://www.w3.org/2002/07/owl#ObjectProperty> ;
<http://www.w3.org/2000/01/rdf-schema#label> "collaborates with" ;
<http://www.w3.org/2000/01/rdf-schema#comment> "to establish and control sessions, ensuring efficient data flow for application services" ;

<https://schema.org/domainIncludes> <tag:stardog:designer:5GNetworkBuilder:model:AF>
;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:BSF>
.
<tag:stardog:designer:5GNetworkBuilder:model:collaborates_with_8> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "collaborates with" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:NSSF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:NRF>,
<tag:stardog:designer:5GNetworkBuilder:model:SMF> .
<tag:stardog:designer:5GNetworkBuilder:model:collaborates_with_9> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "collaborates with" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "selects the appropriate User Plane
Function (UPF), which responsible for packet routing and forwarding, based on the
established session requirements;" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:SMF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:UPF>
.
<tag:stardog:designer:5GNetworkBuilder:model:connects_to> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "connects to" ;
  <https://schema.org/domainIncludes> <tag:stardog:designer:5GNetworkBuilder:model:UE>
;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:gNB>
.
<tag:stardog:designer:5GNetworkBuilder:model:connects_to_1> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "connects to" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:HSS>,
<tag:stardog:designer:5GNetworkBuilder:model:PCRF>,
<tag:stardog:designer:5GNetworkBuilder:model:UDR> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Sub_DB> .
<tag:stardog:designer:5GNetworkBuilder:model:contains> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "contains" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:4G/5G_NSA_Core> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:HSS>,
<tag:stardog:designer:5GNetworkBuilder:model:MME>,
<tag:stardog:designer:5GNetworkBuilder:model:SGWC>,
<tag:stardog:designer:5GNetworkBuilder:model:SGWU>,

```
<tag:stardog:designer:5GNetworkBuilder:model:SMF>,
<tag:stardog:designer:5GNetworkBuilder:model:UPF> .
<tag:stardog:designer:5GNetworkBuilder:model:contains_1> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "contains" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:5G_SA_Core> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:AMF>,
<tag:stardog:designer:5GNetworkBuilder:model:AUSF>,
<tag:stardog:designer:5GNetworkBuilder:model:BSF>,
<tag:stardog:designer:5GNetworkBuilder:model:NRF>,
<tag:stardog:designer:5GNetworkBuilder:model:NSSF>,
<tag:stardog:designer:5GNetworkBuilder:model:PCF>,
<tag:stardog:designer:5GNetworkBuilder:model:SCP>,
<tag:stardog:designer:5GNetworkBuilder:model:SEPP>,
<tag:stardog:designer:5GNetworkBuilder:model:SMF>,
<tag:stardog:designer:5GNetworkBuilder:model:UDM>,
<tag:stardog:designer:5GNetworkBuilder:model:UDR>,
<tag:stardog:designer:5GNetworkBuilder:model:UPF> .
<tag:stardog:designer:5GNetworkBuilder:model:enables> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:MME> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Mobility>,
<tag:stardog:designer:5GNetworkBuilder:model:Paging>,
<tag:stardog:designer:5GNetworkBuilder:model:Session_management> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_1> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:HSS> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:SIM_Auth>,
<tag:stardog:designer:5GNetworkBuilder:model:Sub_profile> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_10> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:AUSF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Authentication_server> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_11> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
```

```
    <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:AMF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Context_management>,
<tag:stardog:designer:5GNetworkBuilder:model:Interworking_with_NFs>,
<tag:stardog:designer:5GNetworkBuilder:model:Policy_Control_and_Eforcement>,
<tag:stardog:designer:5GNetworkBuilder:model:Security_Functions>,
<tag:stardog:designer:5GNetworkBuilder:model:Session_Management>,
<tag:stardog:designer:5GNetworkBuilder:model:Session_management>,
<tag:stardog:designer:5GNetworkBuilder:model:Support_for_Network_Slicing> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_12> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:AMF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Access_Management> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_13> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:AMF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Acess_authentication_and_authorization>,
<tag:stardog:designer:5GNetworkBuilder:model:Connection_management>,
<tag:stardog:designer:5GNetworkBuilder:model:Context_management>,
<tag:stardog:designer:5GNetworkBuilder:model:Integrity_protection>,
<tag:stardog:designer:5GNetworkBuilder:model:Registration_management> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_14> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <https://schema.org/domainIncludes> <tag:stardog:designer:5GNetworkBuilder:model:DN>
;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:3rd_party_services>,
<tag:stardog:designer:5GNetworkBuilder:model:Internet_services>,
<tag:stardog:designer:5GNetworkBuilder:model:Operator_services> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_15> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "used to store data in a structured way
within a network; relies on a predefined schema for efficient storage, retrieval, and analysis
of data;" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:SDSF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:structured_data_storage> .
```

<tag:stardog:designer:5GNetworkBuilder:model:enables_16> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:SCEF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Capability_exposure> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_17> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:SCEF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Service_Discovery> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_18> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:SCEF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Policy_Control_and_Eforcement> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_19> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "incorporates robust security
mechanisms to ensure the confidentiality, integrity, and authenticity of network interactions;
provides authentication and authorization services for external applications, allowing only
authorized entities to access network resources;" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:SCEF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Authentication_server> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_2> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:PCRF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Charging>,
<tag:stardog:designer:5GNetworkBuilder:model:Sub_policies> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_20> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "facilitates charging and billing
functions for the services utilized by third-party applications; enables the measurement,
collection, and reporting of network resource usage, ensuring that appropriate charges are
applied based on predefined billing models;" ;

<https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:SCEF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Charging> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_21> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Assists in the management of the
lifecycle of network services exposed to external applications; enables service providers to
introduce new services, modify existing ones, and retire services as required;" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:SCEF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Lifecycle_management> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_22> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Handles handover management
(oversees the mobility of devices as they move across different cells or areas within the
network); handles session continuity (ensures that the ongoing sessions of a user, such as a
video call or a file download, are not interrupted during handovers);" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:SMSF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Mobility> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_23> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Ensuring low latency, high data rates,
and reliability for applications like augmented reality, virtual reality, and IoT (Internet of
Things);" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:SMSF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:QoS>
.
<tag:stardog:designer:5GNetworkBuilder:model:enables_24> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Involved in the creation and
management of network slices;" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:SMSF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Support_for_Network_Slicing> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_25> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;

<https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:SMSF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Location_Updates> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_26> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:SMSF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Location-based_services> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_27> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Involved in enforcing policies related
to service quality, security, and resource allocation; ensures that the network resources are
utilized efficiently and in accordance with the operator's policies;" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:SMSF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Policy_Control_and_Eforcement> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_28> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:SMSF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Dynamic_Policy_adaptation> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_29> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Involved in the authentication and
authorization of UEs to ensure that only legitimate devices can access the network" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:SMSF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Authentication_server> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_3> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:AMF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Mobility> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_30> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;

<http://www.w3.org/2000/01/rdf-schema#comment> "Provides third-party applications with controlled access to network capabilities and services" ;
  <https://schema.org/domainIncludes> <tag:stardog:designer:5GNetworkBuilder:model:NEF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:3rd_party_services> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_31> a <http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "responsible for authenticating and authorizing third-party applications before granting them access to network services" ;
  <https://schema.org/domainIncludes> <tag:stardog:designer:5GNetworkBuilder:model:NEF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:Acess_authentication_and_authorization> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_32> a <http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Enforces policies defined by the network operator or service provider; they dictate how resources are accessed, utilized, and managed by third-party applications; at the NEF level, operators can maintain control over network resources and ensure optimal performance and security;" ;
  <https://schema.org/domainIncludes> <tag:stardog:designer:5GNetworkBuilder:model:NEF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:Policy_enforcement> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_33> a <http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "facilitates the exposure of specific network services, capabilities, and functions to authorized third-party applications;" ;
  <https://schema.org/domainIncludes> <tag:stardog:designer:5GNetworkBuilder:model:NEF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:Capability_exposure> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_34> a <http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "By implementing robust authentication, authorization, and encryption mechanisms, NEF ensures that sensitive network functionalities are accessed and utilized securely" ;
  <https://schema.org/domainIncludes> <tag:stardog:designer:5GNetworkBuilder:model:NEF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:Security_Functions> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_35> a <http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;

<http://www.w3.org/2000/01/rdf-schema#comment> "plays a crucial role in orchestrating and managing network slices; enables dynamic allocation, optimization, and management of network resources based on user requirements, traffic patterns, and service-level agreements (SLAs);" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:NEF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Support_for_Network_Slicing> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_36> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Stores policy rules and enforces them to manage the quality of service, resource allocation, and charging aspects of the network;" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:UDR> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Policy_Control_and_Eforcement> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_37> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Acts as a repository for charging-related information, facilitating accurate billing and charging for network services;" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:UDR> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Charging> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_38> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "stores data in databases, and the schema is designed to accommodate various subscription-related information, policies, and charging data; schema includes fields for user identity, subscription details, policy rules, charging information, and other contextual data;" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:UDR> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:structured_data_storage> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_39> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Manages user profiles that include information such as user identity, subscription type, authorized services, and preferences; data may include user-specific settings, service plans, and information necessary for service provisioning and user authentication;" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:UDR> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Subscription_data_management> .

<tag:stardog:designer:5GNetworkBuilder:model:enables_4> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:NRF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Discovering_network_functions> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_40> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Stores policy rules that dictate how
network resources are allocated, access is controlled, and quality of service is maintained;" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:UDR> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Policy_enforcement> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_41> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "maintains records related to user data
usage, session durations, and other charging-related information;" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:UDR> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Charging> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_42> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Adheres to data protection and
privacy regulations, implementing measures to secure user data;" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:UDR> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Security_management> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_43> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "responsible for controlling and
ensuring the desired Quality of Service for various services and applications running over
the 5G network" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:PCF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:QoS>
.
<tag:stardog:designer:5GNetworkBuilder:model:enables_44> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;

<http://www.w3.org/2000/01/rdf-schema#comment> "enforces policies that define how network resources are allocated, how traffic is treated, and what level of service quality is provided for different communication sessions" ;
  <https://schema.org/domainIncludes> <tag:stardog:designer:5GNetworkBuilder:model:PCF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:Policy_Control_and_Eforcement> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_45> a <http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Dynamically manages policies based on real-time network conditions, user requirements, and service-specific needs;" ;
  <https://schema.org/domainIncludes> <tag:stardog:designer:5GNetworkBuilder:model:PCF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:Dynamic_Policy_adaptation> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_46> a <http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "may interact to align policy decisions with charging and billing mechanisms;" ;
  <https://schema.org/domainIncludes> <tag:stardog:designer:5GNetworkBuilder:model:PCF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:Charging> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_47> a <http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "involves making decisions about how network resources should be allocated based on operator policies, service plans, and subscriber preferences" ;
  <https://schema.org/domainIncludes> <tag:stardog:designer:5GNetworkBuilder:model:PCRF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:Policy_enforcement> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_48> a <http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "interacts with the Online Charging System (OCS) and Offline Charging System (OFCS) to gather information about subscriber usage, apply charging policies, and generate charging records for billing purposes." ;
  <https://schema.org/domainIncludes> <tag:stardog:designer:5GNetworkBuilder:model:PCRF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:Charging> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_49> a <http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;

<http://www.w3.org/2000/01/rdf-schema#comment> "makes dynamic policy decisions in real-time based on factors such as network conditions, user preferences, and service requirements" ;
  <https://schema.org/domainIncludes> <tag:stardog:designer:5GNetworkBuilder:model:PCRF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:Dynamic_Policy_adaptation> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_5> a <http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <https://schema.org/domainIncludes> <tag:stardog:designer:5GNetworkBuilder:model:PCF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:Charging>, <tag:stardog:designer:5GNetworkBuilder:model:Sub_policies> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_50> a <http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "storing unstructured data generated or consumed by various 5G services and applications; data might include multimedia content, documents, or any other form of unstructured information;" ;
  <https://schema.org/domainIncludes> <tag:stardog:designer:5GNetworkBuilder:model:UDSF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:structured_data_storage> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_51> a <http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "handles the generation, distribution, and updating of the security keys;" ;
  <https://schema.org/domainIncludes> <tag:stardog:designer:5GNetworkBuilder:model:AUSF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:Security_Key_Management> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_52> a <http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "provides a standardized and well-defined interface for external applications to communicate with the 5G network;" ;
  <https://schema.org/domainIncludes> <tag:stardog:designer:5GNetworkBuilder:model:AF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:3rd_party_services>, <tag:stardog:designer:5GNetworkBuilder:model:Internet_services> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_53> a <http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;

<http://www.w3.org/2000/01/rdf-schema#comment> "responsible for managing policies related to specific applications or services;" ;
  <https://schema.org/domainIncludes> <tag:stardog:designer:5GNetworkBuilder:model:AF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:Policy_enforcement> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_54> a <http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "involved in the setup, modification, and termination of sessions related to specific applications;" ;
  <https://schema.org/domainIncludes> <tag:stardog:designer:5GNetworkBuilder:model:AF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:Session_management> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_55> a <http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "contributes to service orchestration by coordinating the activation, modification, and deactivation of services based on application demand" ;
  <https://schema.org/domainIncludes> <tag:stardog:designer:5GNetworkBuilder:model:AF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:Lifecycle_management> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_56> a <http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "determines the appropriate network slice instance that best matches the requirements of the service or application" ;
  <https://schema.org/domainIncludes> <tag:stardog:designer:5GNetworkBuilder:model:NSSF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:network_slice_selection> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_57> a <http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "identifying and selecting the appropriate instance of a network slice from potentially multiple instances of a particular slice type" ;
  <https://schema.org/domainIncludes> <tag:stardog:designer:5GNetworkBuilder:model:NSSF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:Slice_instance_identification> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_58> a <http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;

<http://www.w3.org/2000/01/rdf-schema#comment> "enforces policies related to data flow handling, QoS, and charging; ensures that data sessions adhere to the defined network policies and service level agreements (SLAs) for various services offered over the 5G network;" ;
  <https://schema.org/domainIncludes> <tag:stardog:designer:5GNetworkBuilder:model:SMF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:Policy_Control_and_Eforcement> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_59> a <http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "ensures seamless handovers between different network cells or access points while maintaining ongoing sessions without interruption" ;
  <https://schema.org/domainIncludes> <tag:stardog:designer:5GNetworkBuilder:model:SMF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:Mobility> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_6> a <http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <https://schema.org/domainIncludes> <tag:stardog:designer:5GNetworkBuilder:model:SCP> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:indirect_communication> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_60> a <http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "manages QoS parameters such as latency, bandwidth, and reliability for different types of services;" ;
  <https://schema.org/domainIncludes> <tag:stardog:designer:5GNetworkBuilder:model:SMF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:QoS> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_61> a <http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "responsible for routing and forwarding user data packets between the 5G Radio Access Network (RAN) and the core network" ;
  <https://schema.org/domainIncludes> <tag:stardog:designer:5GNetworkBuilder:model:UPF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:Data_Routing_and_Forwarding> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_62> a <http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "terminates the user plane protocols, such as GTP-U, and processes the encapsulated user data;" ;

<https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:UPF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:User_Plane_Protocol_Termination> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_63> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Performs packet inspection for quality
of service (QoS) enforcement, and it can filter or modify packets based on policies;" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:UPF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Packet_Inspection_and_Filtering> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_64> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Processes the headers of user data
packets, including encapsulation and decapsulation of protocol headers;" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:UPF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Header_Processing> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_65> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Involved in the establishment and
release of user sessions, managing the data flow for each connected device" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:UPF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Session_Establishment_and_Release> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_66> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "maintains session context information,
which includes parameters like IP addresses, QoS policies, and security context" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:UPF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Session_Context_Handling> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_67> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "enforces QoS policies by performing
traffic policing and shaping to ensure that the network resources are utilized efficiently" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:UPF> ;

<https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Traffic_Policing_and_Shaping> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_68> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "manages bearers, which are logical
channels established for a specific service or application, each with its own QoS
characteristics" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:UPF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Bearer_Management> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_69> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "facilitates seamless mobility by
supporting handovers between different cells or network nodes; ensures the transfer of user
context and ongoing sessions to the target UPF to maintain connectivity;" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:UPF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Handover_support> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_7> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:SEPP> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:roaming_security> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_70> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "may employ techniques such as data
compression and acceleration to optimize the transmission of user data, enhancing
efficiency and reducing latency" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:UPF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Compression_and_Acceleration> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_71> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "allows network PCFs to register new
Mobile Device session bindings thus providing a method for other NFs to find associated
policy functions when working with specific Mobile Device data sessions;" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:BSF> ;

<https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Policy_Control_and_Eforcement> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_72> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "allows finding policy functions for
specific data sessions that they are working with based on specific discovery criteria;" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:BSF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Policy_Binding_Discovery> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_73> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:NRF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:NF_Registration_management> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_74> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Maintains a repository of NF
capabilities; exposes this information to other network functions, allowing them to discover
and interact with the registered NF instances;" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:NRF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Repository_of_NF_capabilities> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_75> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "plays a role in network slicing by
providing information about the available network slices and their characteristics" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:NRF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Support_for_Network_Slicing> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_76> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "capable of handling dynamic updates
to NF capabilities and network slice information;" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:NRF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Dynamic_Updates> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_77> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;

<http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "incorporates security mechanisms to ensure the integrity and confidentiality of the information it manages; participates in secure interactions with NFs during registration and information retrieval;" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:NRF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Security_management> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_78> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "storing and managing user-related information, including subscriber profiles, authentication data, and service-related information" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:UDM> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:structured_data_storage> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_79> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "performs authentication and authorization functions to ensure that users have valid access to the network and services" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:UDM> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Authentication_server> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_8> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:NSSF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:network_slice_selection> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_80> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "manages subscriber profiles, subscription information, and contextual data required for network services" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:UDM> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Sub_profile> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_81> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "service discovery by maintaining information about available network functions" ;

<https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:UDM> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:NRF>
.
<tag:stardog:designer:5GNetworkBuilder:model:enables_82> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "Manages security keys used for
securing communication between the user equipment (UE) and the networ;" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:UDM> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Security_Key_Management> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_83> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "UDM, in coordination with the SMF,
enforces policies related to service quality, data usage, and charging; implements policy
rules that dictate how network resources are allocated and how charging is applied based on
user behavior and service requirements;" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:UDM> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Policy_Control_and_Eforcement> .
<tag:stardog:designer:5GNetworkBuilder:model:enables_9> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "enables" ;
  <http://www.w3.org/2000/01/rdf-schema#comment> "primarily responsible for creating,
managing, and terminating data sessions for user devices connected to the 5G network;
controls the establishment and release of sessions, allocating and managing resources for
these sessions, and handling Quality of Service (QoS) requirements;" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:SMF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:Session_management> .
<tag:stardog:designer:5GNetworkBuilder:model:type_of> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "type of" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:N10>,
<tag:stardog:designer:5GNetworkBuilder:model:N11>,
<tag:stardog:designer:5GNetworkBuilder:model:N12>,
<tag:stardog:designer:5GNetworkBuilder:model:N13>,
<tag:stardog:designer:5GNetworkBuilder:model:N15>,
<tag:stardog:designer:5GNetworkBuilder:model:N35>,
<tag:stardog:designer:5GNetworkBuilder:model:N36>,
<tag:stardog:designer:5GNetworkBuilder:model:N7>,
<tag:stardog:designer:5GNetworkBuilder:model:N8> ;

```
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:SBI_connection> .
<tag:stardog:designer:5GNetworkBuilder:model:use4s> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "uses" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:NRF>,
<tag:stardog:designer:5GNetworkBuilder:model:NSSF> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:SBI_connection> .
<tag:stardog:designer:5GNetworkBuilder:model:uses> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "uses" ;
  <https://schema.org/domainIncludes> <tag:stardog:designer:5GNetworkBuilder:model:UE>
;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:N1>,
<tag:stardog:designer:5GNetworkBuilder:model:N6> .
<tag:stardog:designer:5GNetworkBuilder:model:uses_1> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "uses" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:gNB> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:N2>,
<tag:stardog:designer:5GNetworkBuilder:model:N3>,
<tag:stardog:designer:5GNetworkBuilder:model:N6> .
<tag:stardog:designer:5GNetworkBuilder:model:uses_10> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "uses" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:HSS>,
<tag:stardog:designer:5GNetworkBuilder:model:MME>,
<tag:stardog:designer:5GNetworkBuilder:model:SGWC> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:S11> .
<tag:stardog:designer:5GNetworkBuilder:model:uses_11> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "uses" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:SGWC>,
<tag:stardog:designer:5GNetworkBuilder:model:SMF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:S5c> .
<tag:stardog:designer:5GNetworkBuilder:model:uses_12> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "uses" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:SGWU>,
<tag:stardog:designer:5GNetworkBuilder:model:UPF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:S5u>
.
```

```
<tag:stardog:designer:5GNetworkBuilder:model:uses_13> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "uses" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:gNB>,
<tag:stardog:designer:5GNetworkBuilder:model:MME> ;
  <https://schema.org/rangeIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:S1-MME> .
<tag:stardog:designer:5GNetworkBuilder:model:uses_14> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "uses" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:PCRF>,
<tag:stardog:designer:5GNetworkBuilder:model:SMF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:Gx> .
<tag:stardog:designer:5GNetworkBuilder:model:uses_15> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "uses" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:UDR> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:N35>,
<tag:stardog:designer:5GNetworkBuilder:model:N36> .
<tag:stardog:designer:5GNetworkBuilder:model:uses_16> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "uses" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:PCF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:N35>
.
<tag:stardog:designer:5GNetworkBuilder:model:uses_2> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "uses" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:UPF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:N3>,
<tag:stardog:designer:5GNetworkBuilder:model:N4>,
<tag:stardog:designer:5GNetworkBuilder:model:N6> .
<tag:stardog:designer:5GNetworkBuilder:model:uses_3> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "uses" ;
  <https://schema.org/domainIncludes> <tag:stardog:designer:5GNetworkBuilder:model:DN>
;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:N6> .
<tag:stardog:designer:5GNetworkBuilder:model:uses_4> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "uses" ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:N11>,
<tag:stardog:designer:5GNetworkBuilder:model:N12>,
```

<tag:stardog:designer:5GNetworkBuilder:model:N15>,
<tag:stardog:designer:5GNetworkBuilder:model:N1>,
<tag:stardog:designer:5GNetworkBuilder:model:N2>,
<tag:stardog:designer:5GNetworkBuilder:model:N8> .
<tag:stardog:designer:5GNetworkBuilder:model:uses_5> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "uses" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:SMF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:N10>,
<tag:stardog:designer:5GNetworkBuilder:model:N11>,
<tag:stardog:designer:5GNetworkBuilder:model:N4>,
<tag:stardog:designer:5GNetworkBuilder:model:N7> .
<tag:stardog:designer:5GNetworkBuilder:model:uses_6> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "uses" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:AUSF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:N12>,
<tag:stardog:designer:5GNetworkBuilder:model:N13> .
<tag:stardog:designer:5GNetworkBuilder:model:uses_7> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "uses" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:UDM> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:N10>,
<tag:stardog:designer:5GNetworkBuilder:model:N13>,
<tag:stardog:designer:5GNetworkBuilder:model:N8> .
<tag:stardog:designer:5GNetworkBuilder:model:uses_8> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "uses" ;
  <https://schema.org/domainIncludes>
<tag:stardog:designer:5GNetworkBuilder:model:PCF> ;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:N15>,
<tag:stardog:designer:5GNetworkBuilder:model:N7> .
<tag:stardog:designer:5GNetworkBuilder:model:uses_9> a
<http://www.w3.org/2002/07/owl#ObjectProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "uses" ;
  <https://schema.org/domainIncludes> <tag:stardog:designer:5GNetworkBuilder:model:AF>
;
  <https://schema.org/rangeIncludes> <tag:stardog:designer:5GNetworkBuilder:model:N5> .

<tag:stardog:designer:5GNetworkBuilder:model:Required> a
<http://www.w3.org/2002/07/owl#DatatypeProperty> ;
  <http://www.w3.org/2000/01/rdf-schema#label> "Required" ;
  <https://schema.org/domainIncludes> <tag:stardog:designer:5GNetworkBuilder:model:AF>,
<tag:stardog:designer:5GNetworkBuilder:model:AMF>,
<tag:stardog:designer:5GNetworkBuilder:model:AUSF>,

```
<tag:stardog:designer:5GNetworkBuilder:model:BSF>,
<tag:stardog:designer:5GNetworkBuilder:model:NEF>,
<tag:stardog:designer:5GNetworkBuilder:model:NRF>,
<tag:stardog:designer:5GNetworkBuilder:model:NSSF>,
<tag:stardog:designer:5GNetworkBuilder:model:PCF>,
<tag:stardog:designer:5GNetworkBuilder:model:PCRF>,
<tag:stardog:designer:5GNetworkBuilder:model:SCEF>,
<tag:stardog:designer:5GNetworkBuilder:model:SDSF>,
<tag:stardog:designer:5GNetworkBuilder:model:SMF>,
<tag:stardog:designer:5GNetworkBuilder:model:SMSF>,
<tag:stardog:designer:5GNetworkBuilder:model:UDM>,
<tag:stardog:designer:5GNetworkBuilder:model:UDR>,
<tag:stardog:designer:5GNetworkBuilder:model:UDSF>,
<tag:stardog:designer:5GNetworkBuilder:model:UPF> ;
  <https://schema.org/rangeIncludes> <http://www.w3.org/2001/XMLSchema#boolean> .
```