

Network Slicing in 5G – 1 day

CONTENTS

This course presents the 5G Network Slicing feature, as currently defined in the R17 3GPP standards. It starts with presenting the reasons to introduce Network Slicing in the modern telecommunication service environment, with the bulk of the course focused on the support of Network Slicing in the 5G System.

Slice-related aspects in the Core Network, Access Network, Transport Network and in the UE are covered, as well as slice-specific aspects of network management (service/customer/MANO). Designed as a technology course, it presents information at the level of procedures and parameters. The 3GPP approach to the operator's business offering enabled by network slicing (Network Slice as a Service, Non-Public Networks) is also presented, with the supporting parameters and procedures' definitions. A number of GSMA guidelines and Network Slicing Association's suggestions are also included.

This course also has as a one-hour overview variant.

PREREQUISITES

Technical knowledge of the 5G network architecture is necessary in order to follow this course. One of the Apis' 5G Core Network Architecture courses (i.e. the One Day version), or equivalent knowledge, is strongly recommended.

NOTE: This course is not delivered with the FoldOut methodology.

Introduction of the Network Slicing concept

- Services and service requirements in present day telecommunication
- Benefits of overlay logical networks on the physical infrastructure
- Dedicated Core Networks (DECOR) in the 4G networks
- Standardized 5G Use Cases
- NFV as an enabler for Network Slicing
- Network Slice Instance and Network Slice Subnet Instance
- Slice Level Classification

Support for the Network Slicing feature in the 5GC and the UE

- Network Slice Identifiers: S-NSSAI, NSSAI, NSI Id
- Definitions and usage of various NSSIs (Configured, Allowed, Requested, Pending)
- Slice-specific Network Functions (NSSF, NSSAAF, NSACF)
- Slice-specific OAM functionalities: NSMF, NSSMF
- Slice-specific subscription information in the UDR (Subscription Data, Policy Data)
- Slice-specific parameters in the PCF (Policy Information, Request Triggers, URSP)
- Network Slice Selection for the UE at UE 5G Registration
- Slice-specific procedures and parameters exchanged during a UE 5G Registration
- Definitions and usage of slice-specific parameters (NSSRG, NSSP)
- Network Slice Selection for a PDU Session
- Slice-specific procedures and parameters exchanged at a 5G PDU Session establishment
- Slice-related information in the UE Route Selection Policy (URSP)

Support for the Network Slicing feature in the NG-RAN

- Virtualization options for the NG-RAN with the RAN Functional Split
- Slice-related requirements on the NG-RAN

- RAN Slice Isolation technologies
- Slice-aware Intra-NR Handover

Support for the Network Slicing feature in the Transport Network

- Transport Network Isolation technologies

Security for Network Slices

- Types of Authentication and Authorization procedures in 5G (Primary, Secondary, Network Slice Specific, Application level)
- Functionality of the NSSAAF
- NSSAA procedure during the 5G Registration
- Isolation as a security mechanism
- Slice Security Levels

Roaming aspects

- Handling of non-standard HPLMN and Serving PLMN definitions of slices: S-NSSAI mapping
- The respective functionalities of the V-NRF/H-NRF, V-NSSF/H-NSSF, V-NSACF/H-NSACF
- Roaming considerations at the 5G UE Registration

Interworking with EPC: Network Slicing and DECOR

- Combined 4G/5G Core Network Architecture option
- Mapping of the 4G Dedicated Core Network and 5G Network Slice identifiers
- The role of the SMF-PGW/C
- UE Mobility between a 4G Dedicated Core Network and a 5G Network Slice

OAM of the Network Slices

- The overall Network Slice creation process
- Network Slice Attributes (GST, NEST), with some slice attribute examples
- The 3GPP model for slice management
- Slice Management and MANO cooperation
- Coordination of management aspects of 3GPP and non-3GPP (AN options, O-RAN, Transport) parts of a PLMN
- Slice Level Management options for Network Slice Customer (NSC)

Network Slice as a service offer

- Network Slice Customer and Network Slice Provider roles
- Non-Public Networks, NPN (Stand-Alone NPN, Public Network Integrated NPN)
- Network Slice as a Service (NSaaS)
- Communicating the slice requirements from the NSC to the NSP
- Getting the NSC's Use Case Description and mapping into GST/NEST: an example