

Recommendation

ITU-T Q.5006 (07/2023)

SERIES Q: Switching and signalling, and associated measurements and tests

Signalling requirements and protocols for IMT-2020 –
Signalling requirements and architecture of IMT-2020

Signalling requirements for hierarchical network slicing service

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Switching and signalling, and associated measurements and tests

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For further details, please refer to the list of ITU-T Recommendations.

Recommendation ITU-T Q.5006

Signalling requirements for hierarchical network slicing service

Summary

Recommendation ITU-T Q.5006 specifies the signalling requirements for hierarchical network slicing services. This signalling is used for hierarchically and automatically slicing the network for the customers and their applications.

History *

Edition	Recommendation	Approval	Study Group	Unique ID
1.0	ITU-T Q.5006	2023-07-14	11	11.1002/1000/15586

Keywords

Hierarchical network slicing, signalling requirements.

* To access the Recommendation, type the URL <https://handle.itu.int/> in the address field of your web browser, followed by the Recommendation's unique ID.

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Recommendation ITU-T Q.5006

Signalling requirements for hierarchical network slicing service

1 Scope

The scope of this Recommendation consists of:

- Overview for hierarchical network slicing service;
- Framework for hierarchical network slicing service;
- Interfaces reference model for hierarchical network slicing service;
- Signalling procedures for hierarchical network slicing service;
- Signalling requirements for interfaces.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

None.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following term defined elsewhere:

3.1.1 network slice [b-ITU-T Y.3100]: A logical network that provides specific network capabilities and network characteristics.

NOTE 1 – Network slices enable the creation of customized networks to provide flexible solutions for different market scenarios which have diverse requirements, with respect to functionalities, performance and resource allocation.

NOTE 2 – A network slice may have the ability to expose its capabilities.

NOTE 3 – The behaviour of a network slice is realized via network slice instance(s).

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 hierarchical network slicing: A layering logical networking technology that hierarchically provides specific network capabilities and network characteristics.

3.2.2 slice controller: A component (virtual or physical) provides the capabilities of generating, allocating, and managing network slice and sub-network slice.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

SIG Slice ID Generation

SPG	Slice Path Generation
SRC	Slice Resource Calculation
SRDA	Slice Resource Demand Acquisition
S-SIG	Sub-Slice ID Generation
S-SPG	Sub-Slice Path Generation
S-SRC	Sub-Slice Resource Calculation
S-SRDA	Sub-slice Resource Demand Acquisition
TC	Topology Collection

5 Conventions

{A}: indicates that the parameter A is mandatory.

6 Overview for hierarchical network slicing service

Different from the IMT-2020 use cases described in [b-ITU-T Y.3103], Figure 6-1 depicts the hierarchical network slicing scenario in a broadband network.

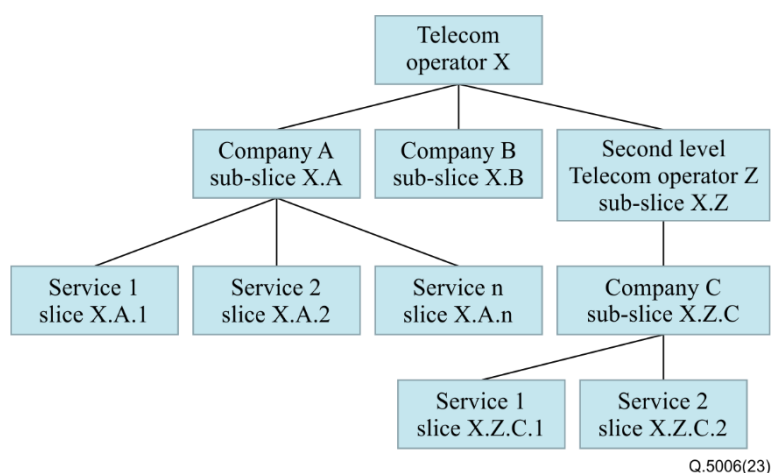


Figure 6-1 – A hierarchical network slicing scenario in a broadband network

The broadband network operator X is the first level broadband network operator. Customer A, customer B and the second level broadband network operator Z subscribe the sub-network slices X.A, X.B and X.Z from the broadband network operator X. Customer A further slices the X.A into sub-slices X.A.1, X.A.2 until X.A.n for multiple different services. Customer C subscribes network slice X.Z.C from network operator Z. Customer C further slices the X.Z.C.1 and X.Z.C.2 for two different services.

The depth of the hierarchical network slice is ranged from 1 to n. The framework and the interface reference model of any depth of the hierarchical network slicing services is similar to the network slicing service of depth 2.

7 Framework for a hierarchical network slicing service

7.1 General framework for a hierarchical network slicing service

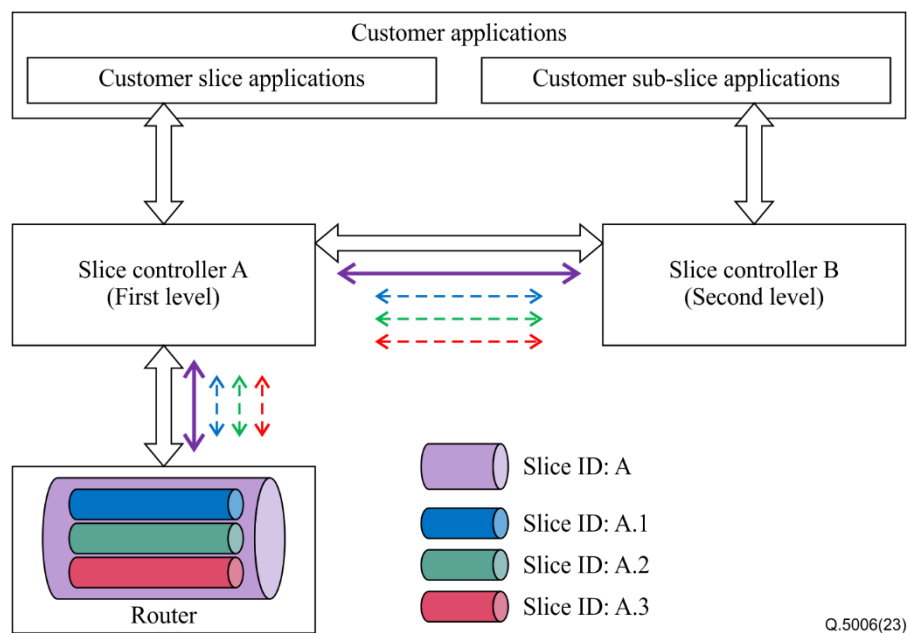


Figure 7-1 – General framework of a hierarchical network slicing service

As shown in Figure 7-1, the hierarchical network slicing service is fulfilled by the components, including customer slice applications component, customer sub-slice applications component, first level slice controller component, second level slice controller component, and router component cooperatively.

The hierarchical network slicing service is implemented in five phases as follows:

- 1) Phase 1: Network resource obtaining;
- 2) Phase 2: Customer slice application registration;
- 3) Phase 3: Customer slice application service deployment;
- 4) Phase 4: Customer sub-slice application registration;
- 5) Phase 5: Customer sub-slice application service deployment.

The customer slice applications component and the first level controller component are responsible for creating a specific network slice through phase 1, phase 2 and phase 3.

The customer sub-slice applications component, the first level controller component and the second level controller component are responsible for creating a specific sub-network slice through phase 1, phase 4 and phase 5.

The signalling procedure for these five phases is illustrated in clause 9.

The examples for creating network slice and sub-network slice are illustrated as follows:

Network slice creation example

A customer slice application registers itself to the first level slice controller component. The first level slice controller component creates the customer's ID (for example A). The customer rents a network slice (colour="purple") from the network operator by sending the service request, involving the resource demand to the first level slice controller component. The first level slice controller component calculates the network configuration parameters based on the slice resource demands and the current network resource, and then allocates the configurations to the routers.