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Draft new Recommendation ITU-T Y.IMT2020-NFC-req

Use cases and requirements for network function communication between 5G Public Networks and Non Public Networks in IMT-2020

1. Scope

This Recommendation specifies the use cases and requirements for network function communication between 5G Public Networks and Non Public Networks [3GPP TS 22.261] in IMT-2020.

The scope of this Recommendation includes:

- Use cases of communication between 5G Public Networks and Non Public Networks in IMT-2020
- Requirements for network function communication between 5G Public Networks and Non Public Networks in IMT-2020

NOTE - The Non Public Networks addressed in the Recommendation refer to one type of non-public network, with some network functions deployed on the customer side, and others in public network.

2. References

Editor's note: This Clause is for future update according to the progress of the Recommendation.

[ITU-T Y.3101] Recommendation ITU-T Y.3101 (2018), *Requirements of the IMT-2020 network.*

[ITU-T Y.3102] Recommendation ITU-T Y.3102 (2018)), *Framework of the IMT-2020 network*

[3GPP TS.22.261] 3GPP TS.22.261, *Service requirements for the 5G system; Stage 1*

[3GPP TS 23.501] 3GPP TS 23.501, *System architecture for the 5G System (5GS); Stage 2*

3. Definitions

3.1. Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

Non Public Network [3GPP TS.22.261]: A network that is intended for non-public use.

3.2. Terms defined in this Recommendation

This Recommendation defines the following terms:

TBD

4. Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

TBD

5. Conventions

In this Recommendation:

The keywords "is required to" indicate a requirement which must be strictly followed and from which no deviation is permitted, if conformance to this Recommendation is to be claimed.

The keywords "is recommended" indicate a requirement which is recommended but which is not absolutely required. Thus, this requirement need not be present to claim conformance.

The keywords "can optionally" indicate an optional requirement which is permissible, without implying any sense of being recommended. This term is not intended to imply that the vendor's implementation must provide the option, and the feature can be optionally enabled by the network operator/service provider. Rather, it means the vendor may optionally provide the feature and still claim conformance with this Recommendation.

6. Overview

Editor's note: this section introduces the non public network for vertical services in relation with current standardization status.

With 5G enablement of vertical industries, more and more vertical industry customers are interested in using Non-Public Network (NPN) technology to construct their private networks, and at the same time, they have stronger requirements for NPN's low latency, reliability, controllability, and flexibility.

3GPP defines two NPNs, including Stand-alone Non-Public Network (SNPN) and Public Network Integrated NPN (PNI-NPN) [3GPP TS 22.261] [3GPP TS 23.501]. SNPN is operated by an NPN operator and does not rely on network functions provided by a PLMN. PNI-NPN are NPNs made available via PLMNs, e.g., by means of dedicated DNNs, or by one (or more) Network Slice instances allocated for the NPN. Up to now, 5G network and mobile devices can't support SNPN technology, while PNI-NPN is the easy and rapid way for operators to provide private service by Closed Access Group (CAG), network slicing, Data Network Name (DNN) and QoS in public network. So, based on considerations such as cost and network maintenance capabilities, PNI-NPN may be more suitable for some companies, especially small and medium-sized enterprises.

The standard PNI-NPN is illustrated in Figure 1 [ITU-T Y.3102]:

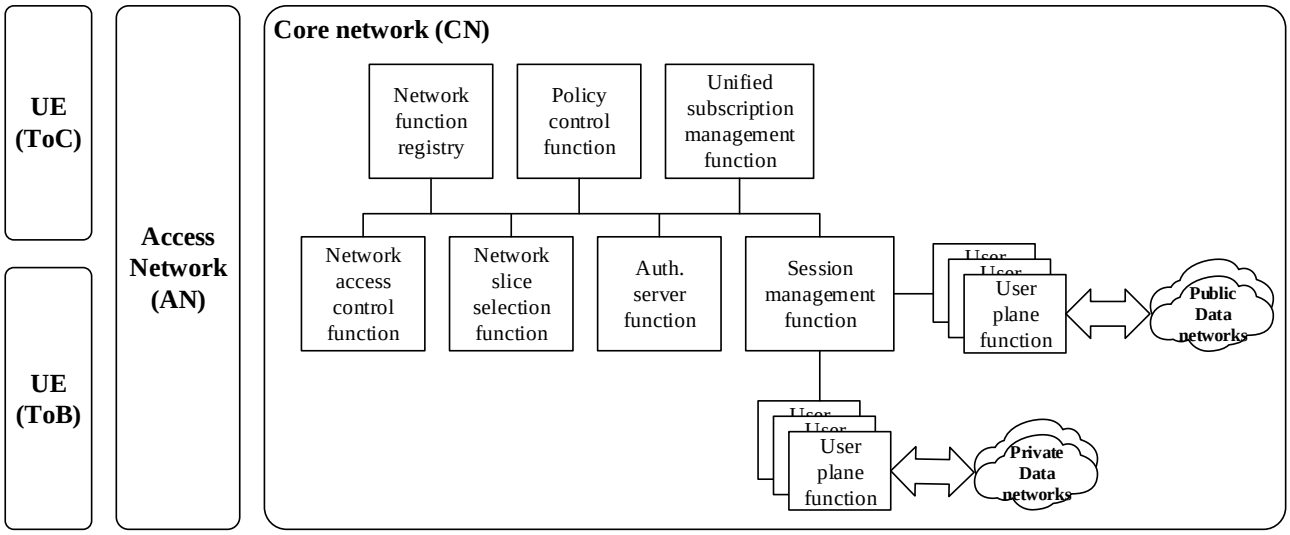

Figure 1 PNI-NPN, all NFs deployed in trusted domain

The PLMN operator can provide access to an NPN by using network slicing mechanisms. PNI-NPN services can be supported in addition to public network services, e.g. based on different S-NSSAI/DNN for different services. All the NFs are deployed in trusted domain, in other words, the vertical customers have less control over the network and services.

In order to meet the individual needs of vertical services in terms of low latency and controllability, some dedicated network functions may be deployed on the customer side.

7. Requirements for network function communication between 5G Public Networks and Non Public Networks in IMT-2020

Editor's note: the requirements of network function communication between 5G Public Networks and Non Public Networks in IMT-2020 will be addressed in this section.

TBD

Appendix I

Use cases of communication between 5G Public Networks and Non Public Networks in IMT-2020

Editor's note: this Appendix presents the use cases.

a) use case 1: UPF deployed in untrusted domain

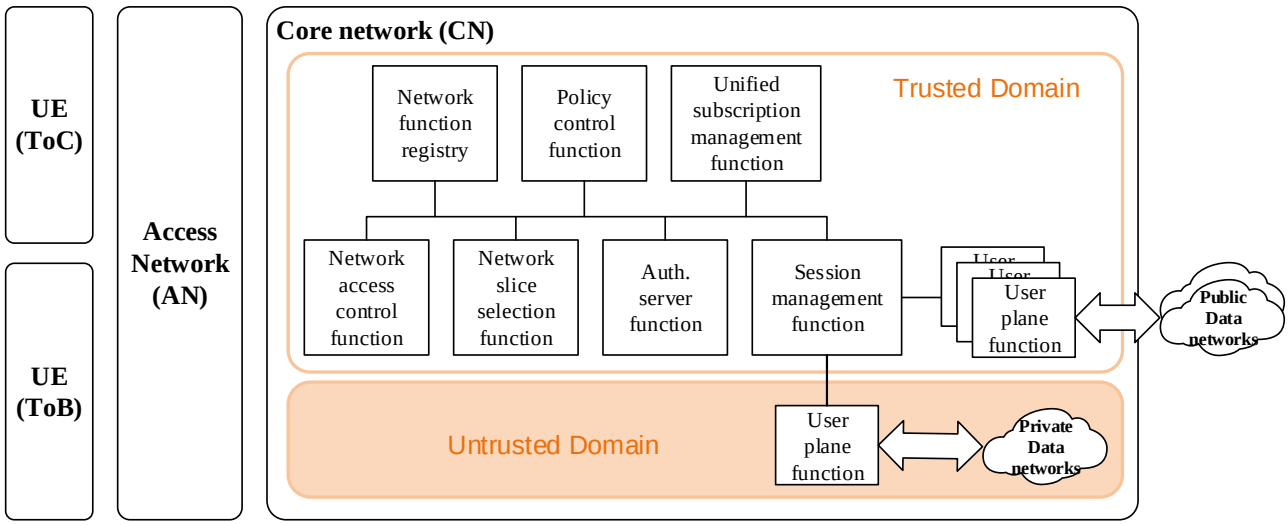

Figure 2 UPF deployed in untrusted domain

In order to meet the industry's requirements for low latency and to keep the user data in campus, UPF will be deployed in untrusted domain of customer side. The untrusted domain's UPF communicates with SMF deployed in trusted domain.

b) use case 2: NACF, SMF, PCF, UPF deployed in untrusted domain

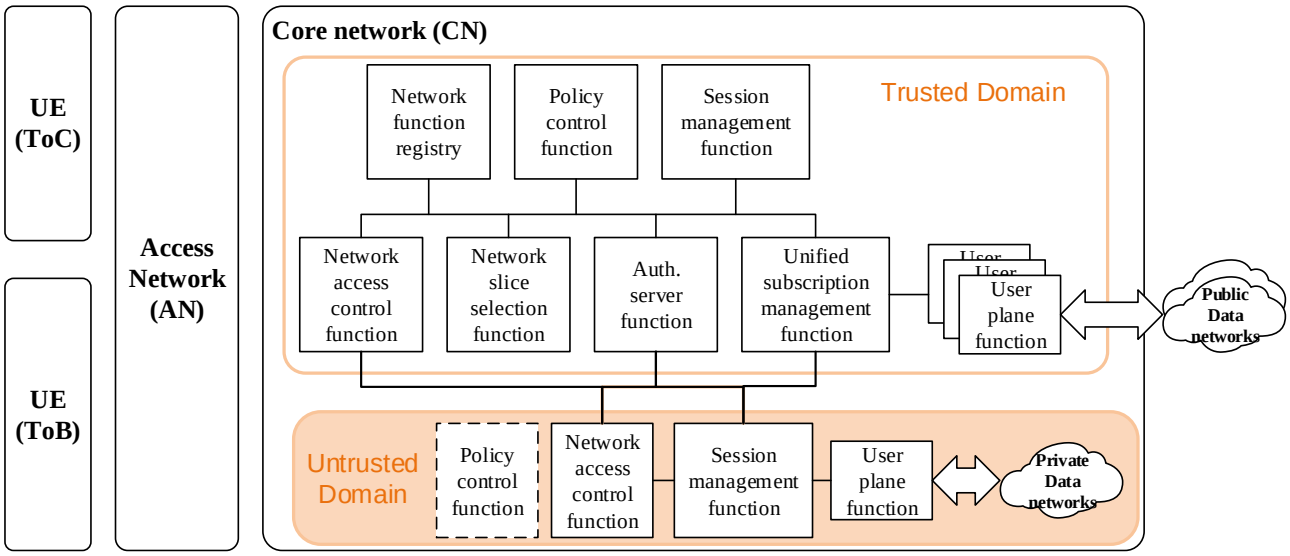

Figure 3 NACF, SMF, PCF, UPF deployed in untrusted domain

In addition to the low latency requirement, some industries also want to apply some customized access control policies and session management policies to their users, so NACF, SMF, PCF, UPF will be deployed in untrusted domain.

In this case, there are some interfaces used for communication between trusted domain and untrusted domain. The interfaces between NACF/SMF and USM are for achieving and subscribing user data from USM. The interface between NACF and ASF is for user authentication. The interface between NACFs is for NACF re-allocation procedure mainly. If the UE of an industry customer does initial registration to the private network without the S-NSSAI, the NG-RAN selects the NACF in the public network by default. Then the NACF will initiate the NACF re-allocation procedure for NACF in untrusted domain.

c) use case 3: SMF, PCF, UPF deployed in untrusted domain

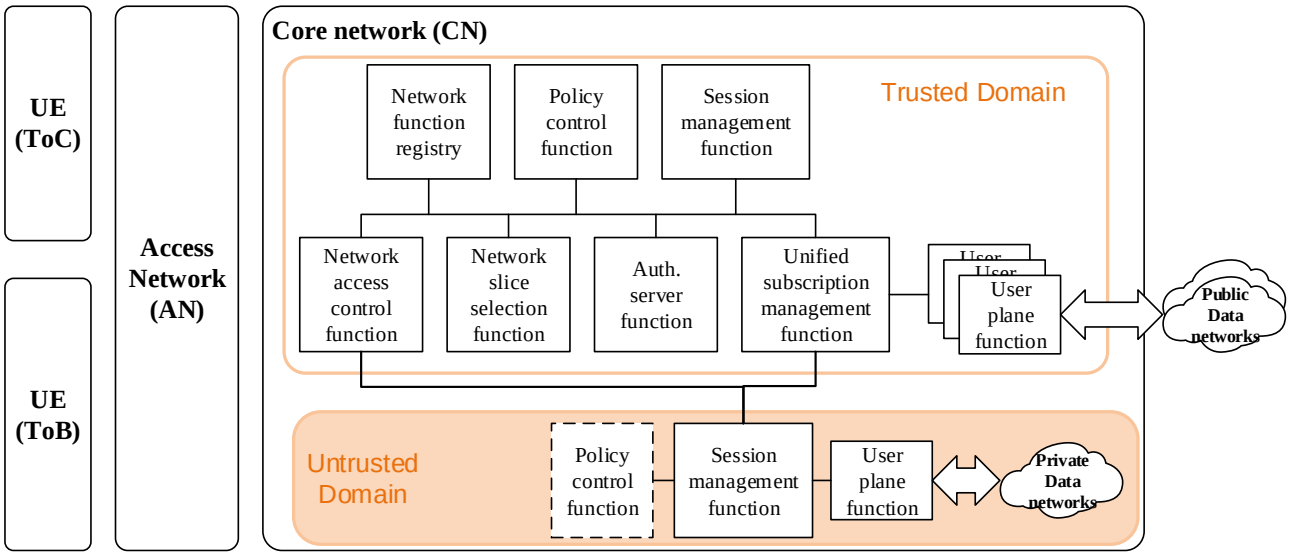

Figure 4 SMF, PCF, UPF deployed in untrusted domain

Some vertical industry customers mainly concern with the session management policy control, low latency, and keeping the user data in campus, so only SMF, PCF, UPF will be deployed in untrusted domain.

SMF gets user data from USM and communicates with NACF while establishing PDU sessions.

Annex 1

A.1 justification for proposed draft new Recommendation Y.IMT2020-NFC-req

Question:	20/13	**Proposed new ITU-T Recommendation**	Geneva, 4-15 July 2022	
Reference and title:	Y.IMT2020-NFC-req "Use cases and requirements for network function communication between 5G Public Networks and Non Public Networks in IMT-2020"			
Base text:	SG13-TD85/WP1		**Timing:**	2023.12
Editor(s):	Xuexin Li, China Telecom, Email: lixuex@chinatelecom.cn; Aipeng Guo, China Unicom, Email: guoap7@chinaunicom.com; Wenyi Li, China Telecom, Email: liwenyi@chinatelecom.cn; Sihan Li, China Telecom, Email: lish9@chinatelecom.cn		**Approval process:**	AAP

Scope (defines the intent or object of the Recommendation and the aspects covered, thereby indicating the limits of its applicability):

This Recommendation specifies the use cases and requirements for network function communication between 5G Public Networks and Non Public Networks in IMT-2020. The Non Public Networks addressed in the Recommendation refer to one type of non public network, with some network functions deployed on the customer side, and others in public network.

The scope of this Recommendation includes:

- Use cases of communication between 5G Public Networks and Non Public Networks in IMT-2020
- Requirements for network function communication between 5G Public Networks and Non Public Networks in IMT-2020

Summary (provides a brief overview of the purpose and contents of the Recommendation, thus permitting readers to judge its usefulness for their work):

With 5G enablement of vertical industries, more and more vertical industry customers are interested in using Non-Public Network (NPN) technology to construct their private networks.

Based on considerations such as cost and network maintenance capabilities, Non Public Network may be more suitable for some companies, especially small and medium-sized enterprises, than stand-alone Non Public Network (SNPN).

The Recommendation will study use cases and requirements for network function communication between 5G Public Networks and Non Public Networks in IMT-2020.

Relations to ITU-T Recommendations or to other standards (approved or under development):

ITU-T Y.3101, ITU-T Y.3102

Liaisons with other study groups or with other standards bodies:

3GPP, ITU-T SG16, ITU-T SG20

Supporting members that are committing to contributing actively to the work item:

China Telecom, China Unicom, Huawei, ZTE