



**5G;
Study on 5G NR User Equipment (UE) full stack testing for
Network Slicing
(3GPP TR 38.918 version 18.4.0 Release 18)**



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650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - APE 7112B
Association à but non lucratif enregistrée à la
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Foreword

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- shall** indicates a mandatory requirement to do something
- shall not** indicates an interdiction (prohibition) to do something

The constructions "shall" and "shall not" are confined to the context of normative provisions, and do not appear in Technical Reports.

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- should** indicates a recommendation to do something
- should not** indicates a recommendation not to do something
- may** indicates permission to do something
- need not** indicates permission not to do something

The construction "may not" is ambiguous and is not used in normative elements. The unambiguous constructions "might not" or "shall not" are used instead, depending upon the meaning intended.

- can** indicates that something is possible
- cannot** indicates that something is impossible

The constructions "can" and "cannot" are not substitutes for "may" and "need not".

- will** indicates that something is certain or expected to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document
- will not** indicates that something is certain or expected not to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document
- might** indicates a likelihood that something will happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

might not indicates a likelihood that something will not happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

In addition:

is (or any other verb in the indicative mood) indicates a statement of fact

is not (or any other negative verb in the indicative mood) indicates a statement of fact

The constructions "is" and "is not" do not indicate requirements.

1 Scope

The present document contains the findings of the Study on 5G NR UE full stack testing of network slicing and the proposed test procedures.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
- [2] 3GPP TS 38.323: "NR; Packet Data Convergence Protocol (PDCP) specification".
- [3] 3GPP TS 38.321: "NR; Medium Access Control (MAC) protocol specification".
- [4] 3GPP TS 38.322: "NR; Radio Link Control (RLC) protocol specification".
- [5] 3GPP TS 38.331: "NR; Radio Resource Control (RRC); Protocol Specification".
- [6] 3GPP TS 38.508-1: "5GS; User Equipment (UE) conformance specification; Part 1: Common test environment".
- [7] 3GPP TS 23.501: "System Architecture for the 5G System; Stage 2".
- [8] 3GPP TS 23.503: "Policy and Charging Control Framework for the 5G System; Stage 2".
- [9] 3GPP TS 24.501: "Non-Access-Stratum (NAS) protocol for 5G System (5GS); stage 3".
- [10] 3GPP TS 24.526: "UE policies for 5G System (5GS); Stage 3".
- [11] 3GPP TS 23.003: "Numbering, addressing and identification".
- [12] 3GPP TS 38.521-4: "NR; User Equipment (UE) conformance specification; Radio transmission and reception; Part 4: Performance requirements".
- [13] 3GPP TS 38.521-1: "NR; User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: Range 1 Standalone".

3 Definitions of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1].

3.2 Symbols

Void

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

4 General

4.1 Background

5G Network Slicing is one of the most distinctive features provided by 5G NR and is key to meet diversified services requirements in 5G era. With the introduction of 5G network slicing technology, operators will be able to provide network capabilities with different functional characteristics, which will provide e.g. "exclusive" network for users with different KPI requirements to ensure a high-quality of service and meet differentiated scenario requirements. 5G network slicing can also help to achieve the goal of improving the efficiency of network resource utilization, optimizing the network construction investment of operators, and building a flexible and agile 5G network.

The user experience resulting from the use of 5G network slicing is critical for commercial success, and therefore testing the operation of 5G network slicing is necessary to ensure consistent predictable behaviour. To enable testing the 5G UEs supporting network slicing as they are used in the field the application layer at the device side needs to be included in the testing, as URSP based network slice selection and traffic routing procedures are based on traffic descriptor components (see TS 24.526) passed on by the application layer to the UE protocol stack. The traffic descriptor components that are passed onto the UE protocol stack to be used as a base for the network slice selection when a specific application requests a PDU session are configured within the device. There is a strong industry demand to define the test methods and test procedures that include the full related UE application layer in the testing of the network slice selection functionality for 5G UE supporting network slicing.

4.2 Study Item Objective

The technical objectives of this study item are:

- To study how to define test procedures that will allow the full protocol stack testing of a 5G NR UE supporting network slicing. The test procedures for full protocol stack testing of the network slicing functionality, e.g. how the UE uses configurations matching UE application to traffic descriptor components to select S-NSSAI, will be provided.
- To study how to define test procedures that will allow the service performance testing of a 5G NR UE supporting network slicing. The test procedures for performance testing of the network slicing service, e.g. application layer throughput and latency, will be provided.

NOTE 1: The Study Item should take into account industry recommendation from relevant organizations such as GSMA, NGMN and GTI pending on RAN5's decision on a case by case basis.

NOTE 2: The Study Item should take into account the User Privacy and/or implementation confidentiality.

NOTE 3: The Study Item will not define the specific traffic descriptor or related mapping mechanism.

5 Study on 5G NR UE Full Stack Testing for Network Slicing

5.1 Definition of 5G NR UE Full Stack Testing for Network Slicing

5.1.1 Definition of Full Stack

The test procedures defined will allow the full stack testing of a 5G NR UE supporting network slicing. The term "full stack" means multilayer combined performance of the following layers:

- 1 UE's Radio link protocol data processing performance (PHY, MAC, RLC, PDCP)
- 2 UE's Radio link protocol signalling processing capability (RRC, NAS)
- 3 UE's TCP/IP processing performance
- 4 UE's Internet Application processing performance

5.2 Test Configurations

5.2.1 UE Full Stack Network Slicing Test Equipment

The test equipment utilized for 5G NR UE Full Stack Testing for Network Slicing should consist of the following items:

- System Simulator(s) is used to simulate the 5G network for network slicing testing. System simulator(s) could receive network slice configuration scheme from main controller and send network slicing related configuration to UE via signalling. System simulator(s) could receive application data from UE and send application data to application server simulator(s).
- Application Server Simulator(s) is used to simulate the service in application layer for receiving application data from UE via system simulator(s) and handling the received application data. Application Server Simulator(s) could be either implemented in Main Controller or implemented as an independent unit.
- Main Controller is used to get and configure the type of traffic descriptor to be tested to Application Client Simulator, generate network slice configuration scheme and configure the network slice configuration scheme to System Simulator(s).
- Application Client Simulator(s) suitable for generating Traffic Descriptor of application(s) and corresponding application data on UE side.

5.2.2 UE Full Stack Network Slicing Test Equipment Connection Diagrams

The UE Full Stack Network Slicing Test Equipment connection diagram is shown in Figure 5.2.2-1.

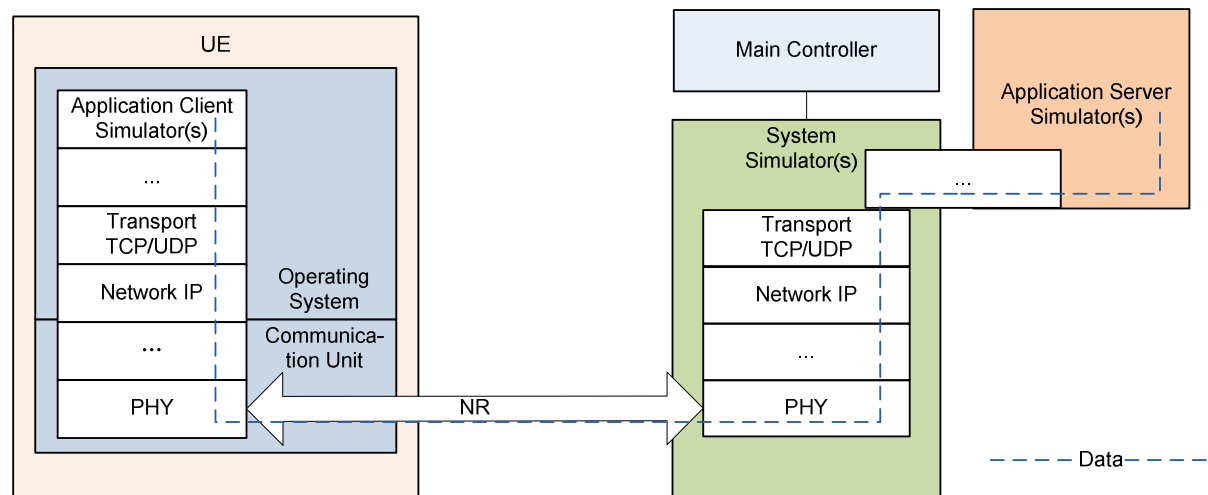


Figure 5.2.2-1: UE Full Stack Network Slicing Test Equipment Connection Diagram

5.2.3 Network Slicing Configurations

Unless otherwise stated, following application information and corresponding S-NSSAI will be used as default network slicing configurations.

Table 5.2.3-1: Network Slicing Configurations

Application	OS App id	DNN	FQDN	IP 3 Tuples	S-NSSAI	
					SST	SD
APP A	pc_OS_App_ID	pc_APN_ID_Specific	pc_Des_FQDN	pc_IP_Address, pc_Protocol_ID, pc_Single_Remote_Port	'00000001'B	0x000001
APP B	pc_OS_App_ID_2nd	pc_APN_ID_Specific_2nd	Void	Void	'00000010'B	0x000001

5.2.4 Message and Information Elements Contents

The common message and information elements contents are defined in TS 38.508-1 [6] clause 4. In addition, the following message and information elements contents apply:

MANAGE UE POLICY COMMAND

Table 5.2.4-1: MANAGE UE POLICY COMMAND

Derivation Path: TS 24.501 Table D.5.1.1.1			
Information Element	Value/remark	Comment	Condition
PTI	Any value from 1 to 254		
MANAGE UE POLICY COMMAND message identity	'0000 0001'B		
UE policy section management list	See Table 5.2.4-2		

UE policy section management list

Table 5.2.4-2: UE policy section management list

Derivation Path: TS 24.501 Figure D.6.2.1			
Information Element	Value/remark	Comment	Condition
UE policy section management list IEI			
Length of UE policy section management list contents	Set to the actual length of 'UE policy section management list contents' in bytes		
UE policy section management list contents			
UE policy section management sublist (PLMN-1)			
Length of UE policy section management sublist	Set to the actual length of 'UE policy section management sublist' in bytes		
PLMN ID	Set to the PLMN value used in the test procedure		
UE policy section management sublist contents			
Instruction contents length	Set to the actual length of 'Instruction contents' in bytes		
UE policy section contents			
UE policy part	See Table 5.2.4-3		

UE policy part

Table 5.2.4-3: UE policy part with UE policy part type = {URSP}

Derivation Path: TS 24.501 Figure D.6.2.7			
Information Element	Value/remark	Comment	Condition
UE policy part contents length	Set to the actual length of 'UE policy part contents' in bytes		
Spare	'0000'B		
UE policy part type	'0001'B		URSP
UE policy part contents			
URSP rule 1	See Table 4.8.5.2-1 in TS 38.508-1		
URSP rule 2	See Table 4.8.5.2-1 in TS 38.508-1		

5.2.5 UE Specific Items

The following parameters are recommended to be provided by UE or application supplier to indicate the information of application using network slicing during test.

Table 5.2.5-1: UE specific Items

Parameter Name	Parameter Type	Description
pc_APN_ID_Specific	charstring	APN/DNN value of the simulation application client defined in clause 5.3.1 The APN/DNN Network Identifier portion of the Access Point / Data Network Name, as defined in TS 23.003 [11], subclause 9.1
pc_OS_App_ID	charstring	OS App Id value of the simulation application client defined in clause 5.3.1 The coding of OS App Id is up to UE implementation
pc_Des_FQDN	charstring	The destination FQDN value of Application Server Simulator(s) defined in clause 5.2.1 The destination FQDN as defined in subclause 28.3.2.1 in TS 23.003 [11]
pc_IP_Address	charstring	The IP address of Application Server Simulator(s) defined in clause 5.2.1 The coding of IP address is four octet IPv4 address and 4 octet IPv4 address mask for IPv4 or sixteen octet IPv6 address and one octet prefix length for IPv6
pc_Protocol_ID	charstring	The IPv4 protocol identifier or IPv6 next header of Application Server Simulator(s) defined in clause 5.2.1
pc_Sinlge_Remote_Port	charstring	The port number of Application Server Simulator(s) defined in clause 5.2.1
pc_APN_ID_Specific_2nd	charstring	APN/DNN value of the second application simulated by simulation application client in the scenario of two applications running in parallel The APN/DNN Network Identifier portion of the Access Point / Data Network Name, as defined in TS 23.003 [11], subclause 9.1
pc_OS_App_ID_2nd	charstring	OS App Id value of the second application simulated by simulation application client in the scenario of two applications running in parallel The coding of OS App Id is up to UE implementation

5.3 Application Simulation

5.3.1 Application Client Simulator

To enable testing an Application Client Simulator on device is used to simulate the application which configured with network slicing. The following functionality is recommended for the Application Client Simulator to support.

- The Application Client Simulator is installed on device.
- The Application Client Simulator may start automatically on device power-up or manually be started by the operator at the beginning of the test campaign.
- The Application Client Simulator could receive the type of traffic descriptor to be tested and generate the corresponding traffic descriptor which conform to Network Slicing Configurations defined in clause 5.2.3.
- The Application Client Simulator could generate data packets matching the traffic descriptor in Network Slicing Configurations and transfer data packets to operating system and communication unit on device.
- The Application Client Simulator could directly send the generated data packets to application server simulator via cable connection.

5.3.2 Test Models

There is no specific Test Models identified at this time.

5.4 Statistical Analysis

5.4.1 Overview of Mapping Application to Network Slicing

When the mapping of applications to network slicing is tested, the fundamental goal is to verify the procedure of associating applications to PDU sessions based on URSP rules. URSP rules contain Traffic Descriptors determining which URSP rule is applicable for the specific application and a list of Route Selection Descriptors determining the corresponding PDU session.

With this knowledge, the following aspects are recommended to be checked to verify the procedure of mapping application to Network Slicing:

- The selection of applicable URSP rule according to the Traffic descriptors in UE Route Selection Policy Rule within URSP rules and information from the specific application.
- The selection of existing PDU session or establishment of new PDU session for specific application based on the selected Route Selection Descriptors within the applicable URSP rule.

The way to trigger URSP rule selection is UE implementation specific and driven by application. To enable testing then the UE is recommended to be equipped with the application simulation client defined in clause 5.3.1 to trigger the required selection procedures

5.4.2 Overview of Application Layer Throughput With Network Slicing

In general, the application layer throughput is impacted by variations mainly at the physical layer and MAC layer. Thus, a variety of test points should be picked across different physical layer conditions (doppler, signal-to-noise ratio, antenna configurations, etc.).

There can be multiple usages of network slicing with different needs such as mission critical ultra-reliable low latency slice, massive machine to machine type communication slice, extreme high throughput mobile broadband slice. Depending on the use case, channel requirements will be different and accordingly the application layer performance will also be benchmarked.

During the application layer throughput measurement, ACK, NACK and DTX can also be recorded in order to calculate the L1 payload bit throughput, although this is not the main target of the test procedure. The measured throughput and its comparison to an expected throughput value can be evaluated. However, the parameters for this measurement are not as controlled as in the case of L1 throughput.

For fixed reference channel testing, the UE is compared against a predefined limit at the physical layer. Therefore, statistics can be derived to determine the minimum number of samples for a given confidence level for the pass/fail decision. While the application layer data throughput is of a statistical nature, in case of fixed reference channel testing, it is possible to set a lower bound for the achievable throughput by computing the overhead due to upper layer payload headers.

5.4.3 Overview of Application Layer Latency With Network Slicing

In order to measure the application layer latency for a Standardized Slice Type (SST) or a non-standardized slice type, some important factors which needs to be considered may involve network node delay in time, jitter experienced based on channel bandwidth and network propagation conditions. Each such conditions can be evaluated against the QoS requirements and delay sensitivity of the data being transmitted. The end goal here is to optimize the utilization of the allocation of network resources and the quality of service metrics.

For fixed or variable reference channel and an SST, the UE latency for each data traffic session per slice needs to be captured and evaluated against the required maximum delay in reception of the desired data packet. Based on the measured packet delay and jitter experienced e2e evaluation of the layer latency can be derived and benchmarked. Important aspect here to consider would be to adjust the tolerance +/- of the latency and jitter in percentage terms to define a final evaluation criterion as per testing needs and network traffic type usage.

5.5 Test System Uncertainty and Test Tolerance

5.5.1 Test System Uncertainty and Test Tolerance for FR1 testing

5.5.1.1 Recommended Uncertainty of Test System

For service performance test procedure in Annex A, the test system should fulfil the 3GPP test system uncertainty values specified in Annex F of TS 38.521-4 [12]. If a test system cannot fulfil the 3GPP test system uncertainty requirements, then the test system vendor shall declare its test system uncertainty values.

5.5.1.2 Test Tolerances

Since there are no absolute minimum requirements nor PASS/FAIL requirements in tests specified in the present TR the test tolerances are not defined which should be understood as the applicable test tolerance being set to zero in all tests. If PASS/FAIL requirements are recommended, appropriate analysis of test tolerance shall be considered.

5.5.1.3 Impact of Test System Uncertainty on Test Results

Test system uncertainties play a big role in application layer throughput results. The tighter the uncertainty requirements are the more re-producible and comparable the results are.

In TS 38.521-4 [12] applicable test system uncertainty has been specified. Test System Uncertainty is a measure how accurately tester can setup the certain parameter/signal level to the specified level. In 5G NR UE Full Stack Testing for Network Slicing, for service performance test procedure the most meaningful test system uncertainties are listed in Annex F of 38.521-4[12].

These specified test system uncertainties are very tight requirements for test systems. Typically the specified uncertainty values are the best that test system vendors can achieve when their test systems are fully calibrated. Full calibration means that each individual device, signal route and cable has to be calibrated. Hence the calibration costs take quite a big share of total costs of 3GPP compliant test systems.

6 Conclusions

The UE full stack testing for network slicing study item was initiated by RAN5 to include UE full stack network slicing capability. The following aspects were included as part of the present document:

- Definition of UE Full Stack Testing for Network Slicing

- Test configurations

- Application Simulation

- Statistical analysis

- Test uncertainty and test tolerance

The following items have been identified at the conclusion of the study item:

- Definition of UE Full Stack Testing for Network Slicing and identification

- Identification of the test configuration to include test equipment, test equipment connection diagrams, network slicing configurations, message and information elements and UE specific items

Identification of the application client simulator

Completion of the analysis for mapping between application to network slicing, application throughput and application latency with network slicing

Consideration about the impact of test system uncertainty on test results and confirmation of the Test System Uncertainty Recommendations

Identification of the test procedures for URSP Configuration and application mapping to network slicing

Identification of the test procedure for service performance testing with network slicing

The present document includes a set of recommended test procedures for UE supporting network slicing that is in-line with the study item objectives identified in clause 4.

The test procedures are contained in Annex A.

Annex A: Test Procedures

A.1 Purpose of annex

This annex specifies the test procedures for 5G NR UE Full Stack Testing for Network Slicing. The test procedures are the result of the study item and are the recommended test procedures to be used when evaluating UE capability of supporting network slicing. The use of "shall" in the test procedures listed herein is only used to indicate that the test purpose, procedure, and/or result may not be as expected if the specified "shall" or "must" item is not used or followed. As the Technical Report is informative in nature, the use of "shall" or "must" in the test procedures is not meant to imply a specific requirement. Their use is meant to indicate instances where the test objectives of the recommended test procedures may not be achieved.

A.2 5G NR /URSP Configuration and Application Mapping

A.2.1 5G NR /URSP Configuration

A.2.1.1 5G NR / URSP Configuration / Signalling

A.2.1.1.1 Definition

The provisioning of URSP rules from network to UE is one of the fundamental functional requirements for network slicing.

A.2.1.1.2 Test Purpose

To verify that UE could support the provisioning of URSP rules from network to UE over NAS messages.

A.2.1.1.3 Test Parameters

Void.

A.2.1.1.4 Test Description

A.2.1.1.4.1 Initial Conditions

System Simulator:

- NGC Cell A is configured according to Table 6.3.2.2-1 and Table 6.3.2.2-3 in TS 38.508-1 [6].

UE:

- Empty URSP Configuration

Preamble:

- The UE is in state Switched OFF (state 0N-B) according to TS 38.508-1 [6].

A.2.1.1.4.2 Test Procedure

1. UE is switched on.
2. Steps 2 to 13 of the generic procedure for NR RRC_IDLE specified in TS 38.508-1 subclause 4.5.2 are performed.

3. The SS transmits a REGISTRATION ACCEPT message including Allowed NSSAI and Configured NSSAI.
4. The UE transmits an ULInformationTransfer message and a REGISTRATION COMPLETE message.
5. The SS transmits a DL NAS TRANSPORT message including UE Policy Container and MANAGE UE POLICY COMMAND message to configure URSP rules.
6. The UE transmits an UL NAS TRANSPORT message including UE Policy Container and a MANAGE UE POLICY COMPLETE message is included.
7. The SS transmits an RRC Release message.

Table A.2.1.1.4.2-1: REGISTRATION ACCEPT (step 3)

Derivation path: TS 38.508-1 Table 4.7.1-7			
Information Element	Value/remark	Comment	Condition
5GS registration result value	'001'B	3GPP access	
Allowed NSSAI			
S-NSSAI IEI		S-NSSAI value 1	
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000001		
Mapped configured SST	Not Present		
Mapped configured SD	Not Present		
S-NSSAI IEI		S-NSSAI value 2	
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000002		
Mapped configured SST	Not Present		
Mapped configured SD	Not Present		
Configured NSSAI			
S-NSSAI IEI		S-NSSAI value 1	
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000001'B	eMBB	
SD	0x000001		
Mapped configured SST	Not Present		
Mapped configured SD	Not Present		
S-NSSAI IEI		S-NSSAI value 2	
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000002		
Mapped configured SST	Not Present		
Mapped configured SD	Not Present		

Table A.2.1.1.4.2-2: DL NAS TRANSPORT (step 5)

Derivation path: TS 38.508-1 [4], Table 4.7.1-11			
Information Element	Value/remark	Comment	Condition
Payload container type	'0101'B	UE policy container	
Payload container	See Table A.2.1.1.4.2-3		

Table A.2.1.1.4.2-3: MANAGE UE POLICY COMMAND (step 5)

Derivation Path: Table 5.2.4-1			
Information Element	Value/remark	Comment	Condition
UE policy part			
URSP rule 1			
Precedence value of URSP rule	0		
Traffic descriptor			
Traffic descriptor component type identifier	'10001000'B		DNN Type
Traffic descriptor component			
DNN length	Set to the actual length of 'DNN value' in bytes		
DNN value	pc_APN_ID_Specific		
Route selection descriptor list			
Route selection descriptor 1			
Precedence value of route selection descriptor	0		
Route selection descriptor contents			
Route selection descriptor component type	'00000010'B		S-NSSAI type
Route selection descriptor component			
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000001		
Route selection descriptor 2			
Precedence value of route selection descriptor	1		
Route selection descriptor contents			
Route selection descriptor component type	'00000100'B		DNN type
Route selection descriptor component			
DNN length	Set to the actual length of 'DNN value' in bytes		
DNN value	pc_APN_ID_Specific		
URSP rule 2			
Precedence value of URSP rule	1		
Traffic descriptor			
Traffic descriptor component type identifier	'10100000'B		OS App Id type
Traffic descriptor component			
OS App Id length	Set to the actual length of 'OS App Id' in bytes		
OS App Id	pc_OS_App_ID		
Route selection descriptor list			
Route selection descriptor 1			
Precedence value of route selection descriptor	0		
Route selection descriptor contents			
Route selection descriptor component type	'00000010'B		S-NSSAI type
Route selection descriptor component			
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000002		
Route selection descriptor 2			
Precedence value of route selection descriptor	1		
Route selection descriptor contents			
Route selection descriptor component type	'00000100'B		DNN type
Route selection descriptor component			
DNN length	Set to the actual length of 'DNN value' in bytes		
DNN value	pc_APN_ID_Specific		

A.2.2 5G NR / Mapping Application to Network Slicing

A.2.2.1 5G NR / Mapping Application to Network Slicing / DNN

A.2.2.1.1 Definition

The UE procedure for associating applications to PDU sessions based on URSP rules is one of the fundamental functional requirements for network slicing.

A.2.2.1.2 Test Purpose

To verify that UE could support the mapping of applications to URSP rules and the establishment of PDU sessions based on the Traffic Descriptor of DNN.

A.2.2.1.3 Test Parameters

Unless otherwise stated, refer to the test frequency and common test parameters for signalling conformance testing defined in TS 38.508-1 [6].

A.2.2.1.4 Test Description

A.2.2.1.4.1 Initial Conditions

System Simulator:

- NGC Cell A is configured according to Table 6.3.2.2-1 and Table 6.3.2.2-3 in TS 38.508-1 [6].

UE:

- Empty URSP Configuration

Preamble:

- The UE is in state Switched OFF (state 0N-B) according to TS 38.508-1 [6].

A.2.2.1.4.2 Test Procedure

1. Steps 1 to 6 of the test procedure specified in subclause A.2.1.1.4.2 are performed, except the MANAGE UE POLICY COMMAND message is defined in Table A.2.2.1.4.2-1.
2. Using the Application Client Simulator, generate traffic matching DNN value in Traffic descriptor in URSP rule provisioned to the UE in step 1.
3. The UE transmits an UL NAS TRANSPORT message and PDU SESSION ESTABLISHMENT REQUEST message. Observe the right S-NSSAI and DNN value are selected.
4. The SS transmits a DL NAS TRANSPORT message and PDU SESSION ESTABLISHMENT ACCEPT message.
5. Using the Application Client Simulator, begin uplink data transfer from UE to the Application Server Simulator.
6. Observe that the data received in Application Server Simulator via PDU session is consistent with the data generated by Application Client Simulator.

Table A.2.2.1.4.2-1: MANAGE UE POLICY COMMAND (step 1)

Derivation Path: Table 5.2.4-1			
Information Element	Value/remark	Comment	Condition
UE policy part			
URSP rule 1			
Precedence value of URSP rule	0		
Traffic descriptor			
Traffic descriptor component type identifier	'10001000'B		DNN Type
Traffic descriptor component			
DNN length	Set to the actual length of 'DNN value' in bytes		
DNN value	pc_APN_ID_Specific		
Route selection descriptor list			
Route selection descriptor 1			
Precedence value of route selection descriptor	0		
Route selection descriptor contents			
Route selection descriptor component type	'00000010'B		S-NSSAI type
Route selection descriptor component			
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000001		
Route selection descriptor 2			
Precedence value of route selection descriptor	1		
Route selection descriptor contents			
Route selection descriptor component type	'00000100'B		DNN type
Route selection descriptor component			
DNN length	Set to the actual length of 'DNN value' in bytes		
DNN value	pc_APN_ID_Specific		
URSP rule 2			
Precedence value of URSP rule	1		
Traffic descriptor			
Traffic descriptor component type identifier	'00000001'B		Match-all type
Route selection descriptor list			
Route selection descriptor 1			
Precedence value of route selection descriptor	0		
Route selection descriptor contents			
Route selection descriptor component type	'00000010'B		S-NSSAI type
Route selection descriptor component			
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000002		

Table A.2.2.1.4.2-2: UL NAS Transport (step 3)

Derivation path: TS 38.508-1 [4], Table 4.7.1-10			
Information Element	Value/remark	Comment	Condition
Payload container type	'0001'B	N1 SM information	
PDU session ID	PSI-1		
Request type	'001'B	Initial request	
S-NSSAI	Not Present		
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000001		
DNN			
DNN length	Set to the actual length of 'DNN value' in bytes		
DNN value	pc_APN_ID_Specific		

Table A.2.2.1.4.2-3: PDU SESSION ESTABLISHMENT ACCEPT (step 4)

Derivation path: TS 38.508-1 clause 4.7.2-2			
Information Element	Value/remark	Comment	Condition
S-NSSAI			
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000001		
DNN			
DNN length	Set to the actual length of 'DNN value' in bytes		
DNN value	pc_APN_ID_Specific		

A.2.2.2 5G NR / Mapping Application to Network Slicing / APP ID

A.2.2.2.1 Definition

The UE procedure for associating applications to PDU sessions based on URSP rules is one of the fundamental functional requirements for network slicing.

A.2.2.2.2 Test Purpose

To verify that UE could support the mapping of applications to URSP rules and the establishment of PDU sessions based on the Traffic Descriptor of OS App Id.

A.2.2.2.3 Test Parameters

Unless otherwise stated, refer to the test frequency and common test parameters for signalling conformance testing defined in TS 38.508-1 [6].

A.2.2.2.4 Test Description

A.2.2.2.4.1 Initial Conditions

System Simulator:

- NGC Cell A is configured according to Table 6.3.2.2-1 and Table 6.3.2.2-3 in TS 38.508-1 [6].

UE:

- Empty URSP Configuration

Preamble:

- The UE is in state Switched OFF (state 0N-B) according to TS 38.508-1 [6].

A.2.2.2.4.2 Test Procedure

1. Steps 1 to 6 of the test procedure specified in subclause A.2.1.1.4.2 are performed, except the MANAGE UE POLICY COMMAND message is defined in Table A.2.2.4.2-1.
2. Using the Application Client Simulator, generate traffic matching OS App Id value in Traffic descriptor in URSP rule provisioned to the UE in step 1.
3. The UE transmits an UL NAS TRANSPORT message and PDU SESSION ESTABLISHMENT REQUEST message. Observe the right S-NSSAI is selected.
4. The SS transmits a DL NAS TRANSPORT message and PDU SESSION ESTABLISHMENT ACCEPT message.

5. Using the Application Client Simulator, begin uplink data transfer from UE to the Application Server Simulator.
6. Observe that the data received in Application Server Simulator via PDU session is consistent with the data generated by Application Client Simulator.

Table A.2.2.2.4.2-1: MANAGE UE POLICY COMMAND (step 1)

Derivation Path: Table 5.2.4-1			
Information Element	Value/remark	Comment	Condition
UE policy part			
URSP rule 1			
Precedence value of URSP rule	0		
Traffic descriptor			
Traffic descriptor component type identifier	'10100000'B		OS App Id type
Traffic descriptor component			
OS App Id length	Set to the actual length of 'OS App Id value' in bytes		
OS App Id value	pc_OS_App_ID		
Route selection descriptor list			
Route selection descriptor 1			
Precedence value of route selection descriptor	0		
Route selection descriptor contents			
Route selection descriptor component type	'00000010'B		S-NSSAI type
Route selection descriptor component			
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000001		
URSP rule 2			
Precedence value of URSP rule	1		
Traffic descriptor			
Traffic descriptor component type identifier	'00000001'B		Match-all type
Route selection descriptor list			
Route selection descriptor 1			
Precedence value of route selection descriptor	0		
Route selection descriptor contents			
Route selection descriptor component type	'00000010'B		S-NSSAI type
Route selection descriptor component			
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000002		

Table A.2.2.2.4.2-2: UL NAS Transport (step 3)

Derivation path: TS 38.508-1 [4], Table 4.7.1-10			
Information Element	Value/remark	Comment	Condition
Payload container type	'0001'B	N1 SM information	
PDU session ID	PSI-1		
Request type	'001'B	Initial request	
S-NSSAI	Not Present		
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000001		

Table A.2.2.2.4.2-3: PDU SESSION ESTABLISHMENT ACCEPT (step 4)

Derivation path: TS 38.508-1 clause 4.7.2-2			
Information Element	Value/remark	Comment	Condition
S-NSSAI			
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000001		

A.2.2.3 5G NR / Mapping Application to Network Slicing / FQDN

A.2.2.3.1 Definition

The UE procedure for associating applications to PDU sessions based on URSP rules is one of the fundamental functional requirements for network slicing.

A.2.2.3.2 Test Purpose

To verify that UE could support the mapping of applications to URSP rules and the establishment of PDU sessions based on the Traffic Descriptor of destination FQDN.

A.2.2.3.3 Test Parameters

Unless otherwise stated, refer to the test frequency and common test parameters for signalling conformance testing defined in TS 38.508-1 [6].

A.2.2.3.4 Test Description

A.2.2.3.4.1 Initial Conditions

System Simulator:

- NGC Cell A is configured according to Table 6.3.2.2-1 and Table 6.3.2.2-3 in TS 38.508-1 [6].

UE:

- Empty URSP Configuration.

Preamble:

- The UE is in state Switched OFF (state 0N-B) according to TS 38.508-1 [6].

A.2.2.3.4.2 Test Procedure

1. Steps 1 to 6 of the test procedure specified in subclause A.2.1.1.4.2 are performed, except the MANAGE UE POLICY COMMAND message is defined in Table A.2.2.3.4.2-1.
2. Using the Application Client Simulator, generate traffic matching destination FQDN value in Traffic descriptor in URSP rule provisioned to the UE in step 1.
3. The UE transmits an UL NAS TRANSPORT message and PDU SESSION ESTABLISHMENT REQUEST message. Observe the right S-NSSAI is selected.
4. The SS transmits a DL NAS TRANSPORT message and PDU SESSION ESTABLISHMENT ACCEPT message.
5. Using the Application Client Simulator, begin uplink data transfer from UE to the Application Server Simulator.
6. Observe that the data received in Application Server Simulator via PDU session is consistent with the data generated by Application Client Simulator.

Table A.2.2.3.4.2-1: MANAGE UE POLICY COMMAND (step 1)

Derivation Path: Table 5.2.4-1			
Information Element	Value/remark	Comment	Condition
UE policy part			
URSP rule 1			
Precedence value of URSP rule	0		
Traffic descriptor			
Traffic descriptor component type identifier	'10010001'B		Destination FQDN
Traffic descriptor component destination FQDN length	Set to the actual length of 'destination FQDN value' in bytes		
destination FQDN value	pc_Des_FQDN		
Route selection descriptor list			
Route selection descriptor 1			
Precedence value of route selection descriptor	0		
Route selection descriptor contents			
Route selection descriptor component type	'00000010'B		S-NSSAI type
Route selection descriptor component			
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000001		
URSP rule 2			
Precedence value of URSP rule	1		
Traffic descriptor			
Traffic descriptor component type identifier	'00000001'B		Match-all type
Route selection descriptor list			
Route selection descriptor 1			
Precedence value of route selection descriptor	0		
Route selection descriptor contents			
Route selection descriptor component type	'00000010'B		S-NSSAI type
Route selection descriptor component			
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000002		

Table A.2.2.3.4.2-2: UL NAS Transport (step 3)

Derivation path: TS 38.508-1 [4], Table 4.7.1-10			
Information Element	Value/remark	Comment	Condition
Payload container type	'0001'B	N1 SM information	
PDU session ID	PSI-1		
Request type	'001'B	Initial request	
S-NSSAI	Not Present		
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000001		

Table A.2.2.3.4.2-3: PDU SESSION ESTABLISHMENT ACCEPT (step 4)

Derivation path: TS 38.508-1 clause 4.7.2-2			
Information Element	Value/remark	Comment	Condition
S-NSSAI			
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000001		

A.2.2.4 5G NR / Mapping Application to Network Slicing / IP 3 Tuples

A.2.2.4.1 Definition

The UE procedure for associating applications to PDU sessions based on URSP rules is one of the fundamental functional requirements for network slicing.

A.2.2.4.2 Test Purpose

To verify that UE could support the mapping of applications to URSP rules and the establishment of PDU sessions based on the Traffic Descriptor of IP 3 Tuples.

A.2.2.4.3 Test Parameters

Unless otherwise stated, refer to the test frequency and common test parameters for signalling conformance testing defined in TS 38.508-1 [6].

A.2.2.4.4 Test Description

A.2.2.4.4.1 Initial Conditions

System Simulator:

- NGC Cell A is configured according to Table 6.3.2.2-1 and Table 6.3.2.2-3 in TS 38.508-1 [6].

UE:

- Empty URSP Configuration

Preamble:

- The UE is in state Switched OFF (state 0N-B) according to TS 38.508-1 [6].

A.2.2.4.4.2 Test Procedure

1. Steps 1 to 6 of the test procedure specified in subclause A.2.1.1.4.2 are performed, except the MANAGE UE POLICY COMMAND message is defined in Table A.2.2.4.4.2-1.
2. Using the Application Client Simulator, generate traffic matching IP 3 tuples value in Traffic descriptor in URSP rule provisioned to the UE in step 1.
3. The UE transmits an UL NAS TRANSPORT message and PDU SESSION ESTABLISHMENT REQUEST message. Observe the right S-NSSAI is selected.
4. The SS transmits a DL NAS TRANSPORT message and PDU SESSION ESTABLISHMENT ACCEPT message.
5. Using the Application Client Simulator, begin uplink data transfer from UE to the Application Server Simulator.
6. Observe that the data received in Application Server Simulator via PDU session is consistent with the data generated by Application Client Simulator.

Table A.2.2.4.4.2-1: MANAGE UE POLICY COMMAND (step 1)

Derivation Path: Table 5.2.4-1			
Information Element	Value/remark	Comment	Condition
UE policy part			
URSP rule 1			
Precedence value of URSP rule	0		
Traffic descriptor			
Traffic descriptor component type identifier	'01010010'B		IP 3 tuple type
Traffic descriptor component			
Information Bitmap	'00001101'B		IPv4
	'00001110'B		IPv6
IP Address	pc_IP_Address		
Protocol identifier/next header type	pc_Protocol_ID		
Single remote port	pc_Sinlge_Remote_Port		
Route selection descriptor list			
Route selection descriptor 1			
Precedence value of route selection descriptor	0		
Route selection descriptor contents			
Route selection descriptor component type	'00000010'B		S-NSSAI type
Route selection descriptor component			
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000001		
URSP rule 2			
Precedence value of URSP rule	1		
Traffic descriptor			
Traffic descriptor component type identifier	'00000001'B		Match-all type
Route selection descriptor list			
Route selection descriptor 1			
Precedence value of route selection descriptor	0		
Route selection descriptor contents			
Route selection descriptor component type	'00000010'B		S-NSSAI type
Route selection descriptor component			
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000002		

Table A.2.2.4.4.2-2: UL NAS Transport (step 3)

Derivation path: TS 38.508-1 [4], Table 4.7.1-10			
Information Element	Value/remark	Comment	Condition
Payload container type	'0001'B	N1 SM information	
PDU session ID	PSI-1		
Request type	'001'B	Initial request	
S-NSSAI	Not Present		
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000001		

Table A.2.2.4.4.2-3: PDU SESSION ESTABLISHMENT ACCEPT (step 4)

Derivation path: TS 38.508-1 clause 4.7.2-2			
Information Element	Value/remark	Comment	Condition
S-NSSAI			
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000001		

A.2.2.5 5G NR / Mapping Application to Network Slicing / Connection Capabilities

A.2.2.5.1 Definition

The UE procedure for associating applications to PDU sessions based on URSP rules is one of the fundamental functional requirements for network slicing.

A.2.2.5.2 Test Purpose

To verify that UE could support the mapping of applications to URSP rules and the establishment of PDU sessions based on the Traffic Descriptor of Connection Capabilities.

A.2.2.5.3 Test Parameters

Unless otherwise stated, refer to the test frequency and common test parameters for signalling conformance testing defined in TS 38.508-1 [6].

A.2.2.5.4 Test Description

A.2.2.5.4.1 Initial Conditions

System Simulator:

- NGC Cell A is configured according to Table 6.3.2.2-1 and Table 6.3.2.2-3 in TS 38.508-1 [6].

UE:

- Empty URSP Configuration

Preamble:

- The UE is in state Switched OFF (state 0N-B) according to TS 38.508-1 [6].

A.2.2.5.4.2 Test Procedure

1. Steps 1 to 6 of the test procedure specified in subclause A.2.1.1.4.2 are performed, except the MANAGE UE POLICY COMMAND message is defined in Table A.2.2.5.4.2-1.
2. Using the Application Client Simulator, generate data traffic.
3. The UE transmits an UL NAS TRANSPORT message and PDU SESSION ESTABLISHMENT REQUEST message. Observe the right S-NSSAI is selected.
4. The SS transmits a DL NAS TRANSPORT message and PDU SESSION ESTABLISHMENT ACCEPT message.
5. Using the Application Client Simulator, begin uplink data transfer from UE to the Application Server Simulator.
6. Observe that the data received in Application Server Simulator via PDU session is consistent with the data generated by Application Client Simulator.

Table A.2.2.5.4.2-1: MANAGE UE POLICY COMMAND (step 1)

Derivation Path: Table 5.2.4-1			
Information Element	Value/remark	Comment	Condition
UE policy part			
URSP rule 1			
Precedence value of URSP rule	0		
Traffic descriptor			
Traffic descriptor component type identifier	'10010000'B	Connection capabilities type	
Traffic descriptor component			
Connection capabilities	'00001000'B	Internet	
Route selection descriptor list			
Route selection descriptor 1			
Precedence value of route selection descriptor	0		
Route selection descriptor contents			
Route selection descriptor component type	'00000010'B	S-NSSAI type	
Route selection descriptor component			
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000001		
URSP rule 2			
Precedence value of URSP rule	1		
Traffic descriptor			
Traffic descriptor component type identifier	'00000001'B	Match-all type	
Route selection descriptor list			
Route selection descriptor 1			
Precedence value of route selection descriptor	0		
Route selection descriptor contents			
Route selection descriptor component type	'00000010'B	S-NSSAI type	
Route selection descriptor component			
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000002		

Table A.2.2.5.4.2-2: UL NAS Transport (step 3)

Derivation path: TS 38.508-1 [4], Table 4.7.1-10			
Information Element	Value/remark	Comment	Condition
Payload container type	'0001'B	N1 SM information	
PDU session ID	PSI-1		
Request type	'001'B	Initial request	
S-NSSAI	Not Present		
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000001		

Table A.2.2.5.4.2-3: PDU SESSION ESTABLISHMENT ACCEPT (step 4)

Derivation path: TS 38.508-1 clause 4.7.2-2			
Information Element	Value/remark	Comment	Condition
S-NSSAI			
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000001		

A.2.2.6 5G NR / Mapping Application to Network Slicing / URSP Update

A.2.2.6.1 Definition

The UE procedure for receiving and utilizing updated URSP rules is one of the fundamental functional requirements for network slicing.

A.2.2.6.2 Test Purpose

To verify that UE could support the update of URSP rules and the mapping of applications to right network slicing based on the updated URSP rules.

A.2.2.6.3 Test Parameters

Unless otherwise stated, refer to the test frequency and common test parameters for signalling conformance testing defined in TS 38.508-1 [6].

A.2.2.6.4 Test Description

A.2.2.6.4.1 Initial Conditions

System Simulator:

- NGC Cell A is configured according to Table 6.3.2.2-1 and Table 6.3.2.2-3 in TS 38.508-1 [6].

UE:

- Empty URSP Configuration.

Preamble:

- The UE is in state Switched OFF (state 0N-B) according to TS 38.508-1 [6].

A.2.2.6.4.2 Test Procedure

1. Steps 1 to 6 of the test procedure specified in subclause A.2.1.1.4.2 are performed, except the MANAGE UE POLICY COMMAND message is defined in Table A.2.2.1.4.2-1.
2. Using the Application Client Simulator, generate traffic matching DNN value in Traffic descriptor in URSP rule provisioned to the UE in step 1.
3. The UE transmits an UL NAS TRANSPORT message and PDU SESSION ESTABLISHMENT REQUEST message. Observe the right S-NSSAI and DNN value are selected.
4. The SS transmits a DL NAS TRANSPORT message and PDU SESSION ESTABLISHMENT ACCEPT message.
5. Using the Application Client Simulator, begin uplink data transfer from UE to the Application Server Simulator.
6. Observe that the data received in Application Server Simulator via PDU session is consistent with the data generated by Application Client Simulator.
7. The SS transmits a DL NAS TRANSPORT message including UE Policy Container and MANAGE UE POLICY COMMAND message to update URSP rules.
8. The UE transmits an UL NAS TRANSPORT message including a MANAGE UE POLICY COMPLETE message.
9. The UE transmits an UL NAS TRANSPORT message and PDU SESSION ESTABLISHMENT REQUEST message. Observe the right S-NSSAI and DNN value are selected.
10. The SS transmits a DL NAS TRANSPORT message and PDU SESSION ESTABLISHMENT ACCEPT message.

11. Observe that the data received in Application Server Simulator via PDU session is consistent with the data generated by Application Client Simulator.

Table A.2.2.6.4.2-1: UL NAS Transport (step 3)

Derivation path: TS 38.508-1 [4], Table 4.7.1-10			
Information Element	Value/remark	Comment	Condition
Payload container type	'0001'B	N1 SM information	
PDU session ID	PSI-1		
Request type	'001'B	Initial request	
S-NSSAI	Not Present		
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000001		
DNN			
DNN length	Set to the actual length of 'DNN value' in bytes		
DNN value	pc_APN_ID_Specific		

Table A.2.2.6.4.2-2: PDU SESSION ESTABLISHMENT ACCEPT (step 4, step 10)

Derivation path: TS 38.508-1 clause 4.7.2-2			
Information Element	Value/remark	Comment	Condition
S-NSSAI			
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000001		step 4
	0x000003		step 19
DNN			
DNN length	Set to the actual length of 'DNN value' in bytes		
DNN value	pc_APN_ID_Specific		

Table A.2.2.6.4.2-3: MANAGE UE POLICY COMMAND (step 7)

Derivation Path: Table 5.2.4-1			
Information Element	Value/remark	Comment	Condition
UE policy part			
URSP rule 1			
Precedence value of URSP rule	0		
Traffic descriptor			
Traffic descriptor component type identifier	'10001000'B		DNN Type
Traffic descriptor component			
DNN length	Set to the actual length of 'DNN value' in bytes		
DNN value	pc_APN_ID_Specific		
Route selection descriptor list			
Route selection descriptor 1			
Precedence value of route selection descriptor	0		
Route selection descriptor contents			
Route selection descriptor component type	'00000010'B		S-NSSAI type
Route selection descriptor component			
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000003		
Route selection descriptor 2			
Precedence value of route selection descriptor	1		
Route selection descriptor contents			
Route selection descriptor component type	'00000100'B		DNN type
Route selection descriptor component			
DNN length	Set to the actual length of 'DNN value' in bytes		

DNN value	pc_APN_ID_Specific		
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Table A.2.2.6.4.2-4: UL NAS Transport (step 9)

Derivation path: TS 38.508-1 [4], Table 4.7.1-10			
Information Element	Value/remark	Comment	Condition
Payload container type	'0001'B	N1 SM information	
PDU session ID	PSI-1		
Request type	'001'B	Initial request	
S-NSSAI	Not Present		
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000003		
DNN			
DNN length	Set to the actual length of 'DNN value' in bytes		
DNN value	pc_APN_ID_Specific		

A.3 5G NR / Service Performance Testing with Network Slicing

A.3.1 5G NR / Service Performance / Single Network Slicing

A.3.1.1 5G NR / Service Performance / Single Application with Single Network Slicing

A.3.1.1.1 Definition

The service performance of 5G NR UE with network slicing is determined by the UE operating system and communication unit.

A.3.1.1.2 Test Purpose

To measure the performance of single service in application layer of the 5G NR UE with single network slicing.

A.3.1.1.3 Test Parameters

The common test parameters are defined in TS 38.521-4 [12] Table 5.5.1.3-1. The parameters specified in TS 38.521-4 [12] Table 5.5.1.3-2 are applicable for tests on FDD bands and parameters specified in TS 38.521-4 [12] Table 5.5.1.3-3 are applicable for tests on TDD bands.

Configurations of PUSCH and PUCCH are specified in TS 38.521-1 [13] Annex G. Configure the TBSIZE, UL RMC, PDCP size from TS 38.521-4 [12] Annex A.2 for UL.

Frequencies to be tested: Mid Range, as defined in TS 38.508-1 [6] clause 4.3.1.1.

A.3.1.1.4 Test Description

A.3.1.1.4.1 Initial Conditions

System Simulator:

- NGC Cell A is configured according to Table 6.3.2.2-1 and Table 6.3.2.2-3 in TS 38.508-1 [6].

UE:

- Empty URSP Configuration.

Preamble:

- The UE is in state Switched OFF (state ON-B) according to TS 38.508-1 [6].

A.3.1.1.4.2 Test Procedure

1. UE is switched on.
2. Steps 2 to 15 of the generic procedure for NR RRC_IDLE specified in TS 38.508-1 subclause 4.5.2 are performed.
3. Using the Application Client Simulator, begin uplink data transfer. Wait for 15 seconds and then start to measure the throughput result and latency in transport layer. (This is iteration 1) Continue data transfer for 1 minutes.
4. Repeat step 3 for 3 iterations within the same call as the first iteration. Wait for at least 5 seconds between each iteration of the data transfer.
5. Calculate and record the average application layer data throughput and latency across three iterations.
6. Switch off procedure in RRC_IDLE specified in TS 38.508-1 subclause 4.9.6.1 is performed.
7. UE is brought back to operation.
8. Steps 1 to 6 of the test procedure specified in subclause A.2.1.1.4.2 are performed except the MANAGE UE POLICY COMMAND message is defined in Table A.3.1.1.4.2-1.
9. Using the Application Client Simulator, generate traffic matching DNN value in Traffic descriptor in URSP rule provisioned to the UE in step 8.
10. The UE transmits an UL NAS TRANSPORT message and PDU SESSION ESTABLISHMENT REQUEST message. Observe the right S-NSSAI and DNN value are selected.
11. The SS transmits a DL NAS TRANSPORT message and PDU SESSION ESTABLISHMENT ACCEPT message.
12. Using the Application Client Simulator, begin uplink data transfer from UE to the Application Server Simulator.
13. Wait for 15 seconds and then start to measure the throughput result and latency in [transport layer] in parallel (This is iteration 1). Continue data transfer for 1 minute.
14. Repeat step 3 for 3 iterations within the same call as the first iteration. Wait for at least 5 seconds between each iteration of the data transfer.
15. Calculate and record the average application layer data throughput and latency across three iterations.
16. Observe that the throughput in step 15 is higher than the throughput benchmark in step 5 and the latency in step 15 is lower than the latency benchmark in step 5.

Table A.3.1.1.4.2-1: MANAGE UE POLICY COMMAND (step 8)

Derivation Path: Table 5.2.4-1			
Information Element	Value/remark	Comment	Condition
UE policy part			
URSP rule 1			
Precedence value of URSP rule	0		
Traffic descriptor			
Traffic descriptor component type identifier	'10001000'B		DNN Type
Traffic descriptor component			
DNN length	Set to the actual length of 'DNN value' in bytes		
DNN value	pc_APN_ID_Specific		
Route selection descriptor list			
Route selection descriptor 1			
Precedence value of route selection descriptor	0		
Route selection descriptor contents			
Route selection descriptor component type	'00000010'B		S-NSSAI type
Route selection descriptor component			
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000001		
Route selection descriptor 2			
Precedence value of route selection descriptor	1		
Route selection descriptor contents			
Route selection descriptor component type	'00000100'B		DNN type
Route selection descriptor component			
DNN length	Set to the actual length of 'DNN value' in bytes		
DNN value	pc_APN_ID_Specific		

A.3.1.2 5G NR / Service Performance / Multiple Applications with Single Network Slicing

A.3.1.2.1 Definition

The service performance of 5G NR UE with network slicing is determined by the UE operating system and communication unit.

A.3.1.2.2 Test Purpose

To measure the performance of multiple services in application layer of the 5G NR UE with single network slicing.

A.3.1.2.3 Test Parameters

The common test parameters are defined in TS 38.521-4 [12] Table 5.5.1.3-1. The parameters specified in TS 38.521-4 [12] Table 5.5.1.3-2 are applicable for tests on FDD bands and parameters specified in TS 38.521-4 [12] Table 5.5.1.3-3 are applicable for tests on TDD bands.

Configurations of PUSCH and PUCCH are specified in TS 38.521-1 [13] Annex G. For single APP A at step 5-8 configure the TBsize, UL RMC, PDCP size from TS 38.521-4 [12] Annex A.2 with the exception of using half of the allocated resource block. For APP A and APP B running simultaneously at step 9-11 configure the TBsize, UL RMC, PDCP size from TS 38.521-4 [12] Annex A.2.

Frequencies to be tested: Mid Range, as defined in TS 38.508-1 [6] clause 4.3.1.1.

A.3.1.2.4 Test Description

A.3.1.2.4.1 Initial Conditions

System Simulator:

- NGC Cell A is configured according to Table 6.3.2.2-1 and Table 6.3.2.2-3 in TS 38.508-1 [6].

UE:

- Empty URSP Configuration

Preamble:

- The UE is in state Switched OFF (state 0N-B) according to TS 38.508-1 [6].

A.3.1.2.4.2 Test Procedure

1. Steps 1 to 6 of the test procedure specified in subclause A.2.1.1.4.2 are performed except the MANAGE UE POLICY COMMAND message is defined in Table A.3.1.1.4.2-1.
2. Using the Application Client Simulator to simulate APP A, generate traffic matching OS App Id value in Traffic descriptor in URSP rule 1 provisioned to the UE in step 1.
3. The UE transmits an UL NAS TRANSPORT message and PDU SESSION ESTABLISHMENT REQUEST message. Observe the right S-NSSAI is selected.
4. The SS transmits a DL NAS TRANSPORT message and PDU SESSION ESTABLISHMENT ACCEPT message.
5. Using the simulated APP A, begin uplink data transfer from UE to the Application Server Simulator.
6. Wait for 15 seconds and then start to measure the throughput result in application layer (This is iteration 1). Continue data transfer for 1 minute.
7. Repeat step 6 for 3 iterations within the same call as the first iteration. Wait for at least 5 seconds between each iteration of the data transfer.
8. Calculate and record the average application layer data throughput across three iterations.
9. Using the Application Client Simulator to simulate APP B, generate traffic matching OS App Id value in Traffic descriptor in URSP rule 2 provisioned to the UE in step 1.
10. Using the simulated APP B, begin uplink data transfer from UE to the Application Server Simulator.
11. Repeat steps 6-8 to get the average application layer data throughput of the data traffic of simulated APP A.
12. Observe that the throughput in step 11 is not lower than the throughput benchmark in step 8.

Table A.3.1.2.4.2-1: MANAGE UE POLICY COMMAND (step 1)

Derivation Path: Table 5.2.4-1			
Information Element	Value/remark	Comment	Condition
UE policy part			
URSP rule 1			
Precedence value of URSP rule	0		
Traffic descriptor			
Traffic descriptor component type identifier	'10100000'B	OS App Id type	
Traffic descriptor component			
OS App Id length	Set to the actual length of 'OS App Id value' in bytes		
OS App Id value	pc_OS_App_ID		
Route selection descriptor list			
Route selection descriptor 1			
Precedence value of route selection descriptor	0		

Route selection descriptor contents			
Route selection descriptor component type	'00000010'B	S-NSSAI type	
Route selection descriptor component			
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000001		
URSP rule 2			
Precedence value of URSP rule	1		
Traffic descriptor			
Traffic descriptor component type identifier	'10100000'B	OS App Id type	
Traffic descriptor component			
OS App Id length	Set to the actual length of 'OS App Id value ' in bytes		
OS App Id value	pc_OS_App_ID_2nd		
Route selection descriptor list			
Route selection descriptor 1			
Precedence value of route selection descriptor	0		
Route selection descriptor contents			
Route selection descriptor component type	'00000010'B	S-NSSAI type	
Route selection descriptor component			
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000001		
URSP rule 3			
Precedence value of URSP rule	2		
Traffic descriptor			
Traffic descriptor component type identifier	'00000001'B	Match-all type	
Route selection descriptor list			
Route selection descriptor 1			
Precedence value of route selection descriptor	0		
Route selection descriptor contents			
Route selection descriptor component type	'00000010'B	S-NSSAI type	
Route selection descriptor component			
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000002		

Table A.3.1.2.4.2-2: UL NAS Transport (step 3)

Derivation path: TS 38.508-1 [4], Table 4.7.1-10			
Information Element	Value/remark	Comment	Condition
Payload container type	'0001'B	N1 SM information	
PDU session ID	PSI-1		
Request type	'001'B	Initial request	
S-NSSAI	Not Present		
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000001		

Table A.3.1.2.4.2-3: PDU SESSION ESTABLISHMENT ACCEPT (step 4)

Derivation path: TS 38.508-1 clause 4.7.2-2			
Information Element	Value/remark	Comment	Condition
S-NSSAI			
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000001		

A.3.2 5G NR / Service Performance / Multiple Network Slicing

A.3.2.1 5G NR / Service Performance / Multiple Applications with Multiple Network Slicing

A.3.2.1.1 Definition

The service performance of 5G NR UE with network slicing is determined by the UE operating system and communication unit.

A.3.2.1.2 Test Purpose

To measure the performance of multiple services in application layer of the 5G NR UE with multiple network slicing.

A.3.2.1.3 Test Parameters

The common test parameters are defined in TS 38.521-4 [12] Table 5.5.1.3-1. The parameters specified in TS 38.521-4 [12] Table 5.5.1.3-2 are applicable for tests on FDD bands and parameters specified in TS 38.521-4 [12] Table 5.5.1.3-3 are applicable for tests on TDD bands.

Configurations of PUSCH and PUCCH are specified in TS 38.521-1 [13] Annex G. For single APP A or APP B at step 8-15 configure the TBsize, UL RMC, PDCP size from TS 38.521-4 [12] Annex A.2 with the exception of using half of the allocated resource block. For APP A and APP B running simultaneously at step 16-19 configure the TBsize, UL RMC, PDCP size from TS 38.521-4 [12] Annex A.2.

Frequencies to be tested: Mid Range, as defined in TS 38.508-1 [6] clause 4.3.1.1.

A.3.2.1.4 Test Description

A.3.2.1.4.1 Initial Conditions

System Simulator:

- NGC Cell A is configured according to Table 6.3.2.2-1 and Table 6.3.2.2-3 in TS 38.508-1 [6].

UE:

- Empty URSP Configuration

Preamble:

- The UE is in state Switched OFF (state 0N-B) according to TS 38.508-1 [6].

A.3.2.1.4.2 Test Procedure

1. Steps 1 to 6 of the test procedure specified in subclause A.2.1.1.4.2 are performed except the REGISTRATION ACCEPT message is defined in Table A.3.2.1.4.2-1 and MANAGE UE POLICY COMMAND message is defined in Table A.3.2.1.4.2-2.
2. Using the Application Client Simulator to simulate APP A, generate traffic matching DNN value in Traffic descriptor in URSP rule 1 provisioned to the UE in step 1.
3. The UE transmits an UL NAS TRANSPORT message and PDU SESSION ESTABLISHMENT REQUEST message. Observe the right S-NSSAI and DNN value are selected.
4. The SS transmits a DL NAS TRANSPORT message and PDU SESSION ESTABLISHMENT ACCEPT message.
5. Using the Application Client Simulator to simulate APP B, generate traffic matching DNN value in Traffic descriptor in URSP rule 2 provisioned to the UE in step 1.

6. The UE transmits an UL NAS TRANSPORT message and PDU SESSION ESTABLISHMENT REQUEST message. Observe the right S-NSSAI and DNN value are selected.
7. The SS transmits a DL NAS TRANSPORT message and PDU SESSION ESTABLISHMENT ACCEPT message.
8. Using the simulated APP A, begin uplink data transfer from UE to the Application Server Simulator.
9. Wait for 15 seconds and then start to measure the throughput result in application layer (This is iteration 1). Continue data transfer for 1 minute.
10. Repeat step 9 for 3 iterations within the same call as the first iteration. Wait for at least 5 seconds between each iteration of the data transfer.
11. Calculate and record the average application layer data throughput across three iterations.
12. Stop the data transfer with simulated APP A.
13. Using the simulated APP B, begin uplink data transfer from UE to the Application Server Simulator.
14. Wait for 15 seconds and then start to measure the latency in application layer (This is iteration 1). Continue data transfer for 1 minute.
15. Repeat step 14 for 3 iterations within the same call as the first iteration. Wait for at least 5 seconds between each iteration of the data transfer.
16. Calculate and record the average application layer latency across three iterations.
17. Restart the data traffic of APP A. APP A and APP B generate data traffic simultaneously.
18. Repeat steps 9 to 11 to get the average application layer data throughput of the data traffic of simulated APP A
19. Repeat steps 14 to 16 to get the average application layer latency of the data traffic of simulated APP B in parallel with step 18.
20. Observe that the throughput in step 18 is not lower than the throughput benchmark in step 11 and the latency in step 19 is not higher than the latency benchmark in step 16.

Table A.3.2.1.4.2-1: REGISTRATION ACCEPT (step 1)

Derivation path: TS 38.508-1 Table 4.7.1-7			
Information Element	Value/remark	Comment	Condition
5GS registration result value	'001'B	3GPP access	
Allowed NSSAI			
S-NSSAI IEI		S-NSSAI value 1	
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000001'B	eMBB	
SD	0x000001		
S-NSSAI IEI		S-NSSAI value 2	
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000001		
S-NSSAI IEI		default S-NSSAI	
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000001'B	eMBB	
SD	0x000002		
Configured NSSAI			
S-NSSAI IEI		S-NSSAI value 1	
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000001'B	eMBB	
SD	0x000001		
S-NSSAI IEI		S-NSSAI value 2	
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000001		
S-NSSAI IEI		default S-NSSAI	
Length of S-NSSAI contents	'00000100'B		

SST	'00000001'B	eMBB	
SD	0x000002		

Table A.3.2.1.4.2-2: MANAGE UE POLICY COMMAND (step 1)

Derivation Path: Table 5.2.4-1			
Information Element	Value/remark	Comment	Condition
UE policy part			
URSP rule 1			
Precedence value of URSP rule	0		
Traffic descriptor			
Traffic descriptor component type identifier	'10001000'B	DNN Type	
Traffic descriptor component			
DNN length	Set to the actual length of 'DNN value' in bytes		
DNN value	pc_APN_ID_Specific		
Route selection descriptor list			
Route selection descriptor 1			
Precedence value of route selection descriptor	0		
Route selection descriptor contents			
Route selection descriptor component type	'00000010'B	S-NSSAI type	
Route selection descriptor component			
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000001'B	eMBB	
SD	0x000001		
URSP rule 2			
Precedence value of URSP rule	1		
Traffic descriptor			
Traffic descriptor component type identifier	'10001000'B	DNN Type	
Traffic descriptor component			
DNN length	Set to the actual length of 'DNN value' in bytes		
DNN value	pc_APN_ID_Specific_2nd		
Route selection descriptor list			
Route selection descriptor 1			
Precedence value of route selection descriptor	0		
Route selection descriptor contents			
Route selection descriptor component type	'00000010'B	S-NSSAI type	
Route selection descriptor component			
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000001		
URSP rule 3			
Precedence value of URSP rule	2		
Traffic descriptor			
Traffic descriptor component type identifier	'00000001'B	Match-all type	
Route selection descriptor list			
Route selection descriptor 1			
Precedence value of route selection descriptor	0		
Route selection descriptor contents			
Route selection descriptor component type	'00000010'B	S-NSSAI type	
Route selection descriptor component			
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000001'B	eMBB	
SD	0x000002		

Table A.3.2.1.4.2-3: UL NAS Transport (step 3)

Derivation path: TS 38.508-1 [4], Table 4.7.1-10			
Information Element	Value/remark	Comment	Condition
Payload container type	'0001'B	N1 SM information	
PDU session ID	PSI-1		
Request type	'001'B	Initial request	
S-NSSAI	Not Present		
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000001'B	eMBB	
SD	0x000001		
DNN			
DNN length	Set to the actual length of 'DNN value' in bytes		
DNN value	pc_APN_ID_Specific		

Table A.3.2.1.4.2-4: PDU SESSION ESTABLISHMENT ACCEPT (step 4)

Derivation path: TS 38.508-1 clause 4.7.2-2			
Information Element	Value/remark	Comment	Condition
S-NSSAI			
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000001'B	eMBB	
SD	0x000001		
DNN			
DNN length	Set to the actual length of 'DNN value' in bytes		
DNN value	pc_APN_ID_Specific		

Table A.3.2.1.4.2-5: UL NAS Transport (step 6)

Derivation path: TS 38.508-1 [4], Table 4.7.1-10			
Information Element	Value/remark	Comment	Condition
Payload container type	'0001'B	N1 SM information	
PDU session ID	PSI-2		
Request type	'001'B	Initial request	
S-NSSAI	Not Present		
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000001		
DNN			
DNN length	Set to the actual length of 'DNN value' in bytes		
DNN value	pc_APN_ID_Specific_2nd		

Table A.3.2.1.4.2-6: PDU SESSION ESTABLISHMENT ACCEPT (step 7)

Derivation path: TS 38.508-1 clause 4.7.2-2			
Information Element	Value/remark	Comment	Condition
S-NSSAI			
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000001		
DNN			
DNN length	Set to the actual length of 'DNN value' in bytes		
DNN value	pc_APN_ID_Specific_2nd		

A.3.3 5G NR / Service Performance / URSP Update

A.3.3.1 5G NR / Service Performance / Single Network Slicing / URSP update

A.3.3.1.1 Definition

The UE procedure for receiving and utilizing updated URSP rules is one of the fundamental functional requirements for network slicing.

A.3.3.1.2 Test Purpose

To measure the performance of single services in application layer of the 5G NR UE with the change of network slicing.

A.3.3.1.3 Test Parameters

The common test parameters are defined in TS 38.521-4 [12] Table 5.5.1.3-1. The parameters specified in TS 38.521-4 [12] Table 5.5.1.3-2 are applicable for tests on FDD bands and parameters specified in TS 38.521-4 [12] Table 5.5.1.3-3 are applicable for tests on TDD bands.

Configurations of PUSCH and PUCCH are specified in TS 38.521-1 [13] Annex G. Configure the TBSsize, UL RMC, PDCP size from TS 38.521-4 [12] Annex A.2 for UL.

Frequencies to be tested: Mid Range, as defined in TS 38.508-1 [6] clause 4.3.1.1.

A.3.3.1.4 Test Description

A.3.3.1.4.1 Initial Conditions

System Simulator:

- NGC Cell A is configured according to Table 6.3.2.2-1 and Table 6.3.2.2-3 in TS 38.508-1 [6].

UE:

- Empty URSP Configuration.

Preamble:

- The UE is in state Switched OFF (state 0N-B) according to TS 38.508-1 [6].

A.3.3.1.4.2 Test Procedure

1. Steps 1 to 6 of the test procedure specified in subclause A.2.1.1.4.2 are performed, except the MANAGE UE POLICY COMMAND message is defined in Table A.2.2.2.4.2-1.
2. Using the Application Client Simulator to simulate APP A, generate traffic matching OS App Id in Traffic descriptor in URSP rule provisioned to the UE in step 1.
3. The UE transmits an UL NAS TRANSPORT message and PDU SESSION ESTABLISHMENT REQUEST message. Observe the right S-NSSAI value is selected.
4. The SS transmits a DL NAS TRANSPORT message and PDU SESSION ESTABLISHMENT ACCEPT message.
5. Using the Application Client Simulator to simulate APP A, begin uplink data transfer from UE to the Application Server Simulator.

6. Wait for 15 seconds and then start to measure the throughput result in transport layer (This is iteration 1). Continue data transfer for 1 minute.
7. Repeat step 6 for 3 iterations within the same call as the first iteration. Wait for at least 5 seconds between each iteration of the data transfer.
8. Calculate and record the average application layer data throughput across three iterations.
9. The SS transmits a DL NAS TRANSPORT message including UE Policy Container and MANAGE UE POLICY COMMAND message to update URSP rules.
10. The UE transmits an UL NAS TRANSPORT message and PDU SESSION ESTABLISHMENT REQUEST message. Observe the right S-NSSAI is selected.
11. The SS transmits a DL NAS TRANSPORT message and PDU SESSION ESTABLISHMENT ACCEPT message.
12. Using the Application Client Simulator to simulate APP A, begin uplink data transfer from UE to the Application Server Simulator.
13. Repeat steps 6-8 to get the average application layer data throughput of the data traffic of simulated APP A.
14. Observe that the throughput in step 13 is not lower than the throughput benchmark in step 8.

Table A.3.3.1.4.2-1: UL NAS Transport (step 3, 10)

Derivation path: TS 38.508-1 [4], Table 4.7.1-10			
Information Element	Value/remark	Comment	Condition
Payload container type	'0001'B	N1 SM information	
PDU session ID	PSI-1		
Request type	'001'B	Initial request	
S-NSSAI	Not Present		
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000001		step 3
	0x000003		step 10

Table A.3.3.1.4.2-2: PDU SESSION ESTABLISHMENT ACCEPT (step 4, step 11)

Derivation path: TS 38.508-1 clause 4.7.2-2			
Information Element	Value/remark	Comment	Condition
S-NSSAI			
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000001		step 4
	0x000003		step 11

Table A.3.3.1.4.2-3: MANAGE UE POLICY COMMAND (step 9)

Derivation Path: Table 5.2.4-1			
Information Element	Value/remark	Comment	Condition
UE policy part			
URSP rule 1			
Precedence value of URSP rule	0		
Traffic descriptor			
Traffic descriptor component type identifier	'10001000'B		DNN Type
Traffic descriptor component			
DNN length	Set to the actual length of 'DNN value' in bytes		
DNN value	pc APN ID_Specific		
Route selection descriptor list			
Route selection descriptor 1			
Precedence value of route selection descriptor	0		
Route selection descriptor contents			

Route selection descriptor component type	'00000010'B		S-NSSAI type
Route selection descriptor component			
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000003		

A.3.3.1A 5G NR / Service Performance / Single Network Slicing / URSP update / Different Resource Allocation

A.3.3.1A.1 Definition

The UE procedure for receiving and utilizing updated URSP rules is one of the fundamental functional requirements for network slicing.

A.3.3.1A.2 Test Purpose

To measure the performance of single services in application layer of the 5G NR UE with the different resource allocation of the same slice.

A.3.3.1A.3 Test Parameters

The common test parameters are defined in TS 38.521-4 [12] Table 5.5.1.3-1. The parameters specified in TS 38.521-4 [12] Table 5.5.1.3-2 are applicable for tests on FDD bands and parameters specified in TS 38.521-4 [12] Table 5.5.1.3-3 are applicable for tests on TDD bands.

Configurations of PUSCH and PUCCH are specified in TS 38.521-1 [13] Annex G. Configure the TBsize, UL RMC, PDCP size from TS 38.521-4 [12] Annex A.2 with the exception of using half of the allocated resource block at step 5-7. Configure the TBsize, UL RMC, PDCP size from TS 38.521-4 [12] Annex A.2 at step 9-13.

Frequencies to be tested: Mid Range, as defined in TS 38.508-1 [6] clause 4.3.1.1.

A.3.3.1A.4 Test Description

A.3.3.1A.4.1 Initial Conditions

System Simulator:

- NGC Cell A is configured according to Table 6.3.2.2-1 and Table 6.3.2.2-3 in TS 38.508-1 [6].

UE:

- Empty URSP Configuration.

Preamble:

- The UE is in state Switched OFF (state 0N-B) according to TS 38.508-1 [6].

A.3.3.1A.4.2 Test Procedure

1. Steps 1 to 6 of the test procedure specified in subclause A.2.1.1.4.2 are performed, except the MANAGE UE POLICY COMMAND message is defined in Table A.2.2.4.2-1.
2. Using the Application Client Simulator to simulate APP A, generate traffic matching OS App Id in Traffic descriptor in URSP rule provisioned to the UE in step 1.
3. The UE transmits an UL NAS TRANSPORT message and PDU SESSION ESTABLISHMENT REQUEST message. Observe the right S-NSSAI value is selected.
4. The SS transmits a DL NAS TRANSPORT message and PDU SESSION ESTABLISHMENT ACCEPT message.

5. Using the Application Client Simulator to simulate APP A, begin uplink data transfer from UE to the Application Server Simulator.
6. Wait for 15 seconds and then start to measure the throughput result in transport layer (This is iteration 1). Continue data transfer for 1 minute.
7. Repeat step 6 for 3 iterations within the same call as the first iteration. Wait for at least 5 seconds between each iteration of the data transfer.
8. Calculate and record the average application layer data throughput across three iterations.
9. The SS transmits a DL NAS TRANSPORT message including UE Policy Container and MANAGE UE POLICY COMMAND message to update URSP rules.
10. The UE transmits an UL NAS TRANSPORT message and PDU SESSION ESTABLISHMENT REQUEST message. Observe the right S-NSSAI is selected.
11. The SS transmits a DL NAS TRANSPORT message and PDU SESSION ESTABLISHMENT ACCEPT message.
12. Using the Application Client Simulator to simulate APP A, begin uplink data transfer from UE to the Application Server Simulator.
13. Repeat steps 6-8 to get the average application layer data throughput of the data traffic of simulated APP A.
14. Observe that the throughput in step 13 is two times of the throughput benchmark in step 8.

Table A.3.3.1A.4.2-1: UL NAS Transport (step 3, 10)

Derivation path: TS 38.508-1 [4], Table 4.7.1-10			
Information Element	Value/remark	Comment	Condition
Payload container type	'0001'B	N1 SM information	
PDU session ID	PSI-1		
Request type	'001'B	Initial request	
S-NSSAI	Not Present		
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000001'B	eMBB	
SD	0x000001		step 3
	0x000003		step 10

Table A.3.3.1A.4.2-2: PDU SESSION ESTABLISHMENT ACCEPT (step 4, step 11)

Derivation path: TS 38.508-1 clause 4.7.2-2			
Information Element	Value/remark	Comment	Condition
S-NSSAI			
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000001'B	eMBB	
SD	0x000001		step 4
	0x000003		step 11

Table A.3.3.1A.4.2-3: MANAGE UE POLICY COMMAND (step 9)

Derivation Path: Table 5.2.4-1			
Information Element	Value/remark	Comment	Condition
UE policy part			
URSP rule 1			
Precedence value of URSP rule	0		
Traffic descriptor			
Traffic descriptor component type identifier	'10001000'B		DNN Type
Traffic descriptor component			
DNN length	Set to the actual length of 'DNN value' in bytes		
DNN value	pc_APN_ID_Specific		
Route selection descriptor list			

Route selection descriptor 1			
Precedence value of route selection descriptor	0		
Route selection descriptor contents			
Route selection descriptor component type	'00000010'B		S-NSSAI type
Route selection descriptor component			
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000003		

A.3.3.2 5G NR / Service Performance / Multiple Network Slicing / URSP update

A.3.3.2.1 Definition

The UE procedure for receiving and utilizing updated URSP rules is one of the fundamental functional requirements for network slicing.

A.3.3.2.2 Test Purpose

To measure the performance of multiple services in application layer of the 5G NR UE with the change of network slicing.

A.3.3.2.3 Test Parameters

The common test parameters are defined in TS 38.521-4 [12] Table 5.5.1.3-1. The parameters specified in TS 38.521-4 [12] Table 5.5.1.3-2 are applicable for tests on FDD bands and parameters specified in TS 38.521-4 [12] Table 5.5.1.3-3 are applicable for tests on TDD bands.

Configurations of PUSCH and PUCCH are specified in TS 38.521-1 [13] Annex G. Configure the TBsize, UL RMC, PDCP size from TS 38.521-4 [12] Annex A.2 for UL.

Frequencies to be tested: Mid Range, as defined in TS 38.508-1 [6] clause 4.3.1.1.

A.3.3.2.4 Test Description

A.3.3.2.4.1 Initial Conditions

System Simulator:

- NGC Cell A is configured according to Table 6.3.2.2-1 and Table 6.3.2.2-3 in TS 38.508-1 [6].

UE:

- Empty URSP Configuration.

Preamble:

- The UE is in state Switched OFF (state 0N-B) according to TS 38.508-1 [6].

A.3.3.2.4.2 Test Procedure

1. Steps 1 to 6 of the test procedure specified in subclause A.2.1.1.4.2 are performed except the REGISTRATION ACCEPT message is defined in Table A.3.2.1.4.2-1 and MANAGE UE POLICY COMMAND message is defined in Table A.3.2.2.4.2-1.
2. Using the Application Client Simulator to simulate APP A, generate traffic matching OS App Id value in Traffic descriptor in URSP rule 1 provisioned to the UE in step 1.

3. The UE transmits an UL NAS TRANSPORT message and PDU SESSION ESTABLISHMENT REQUEST message. Observe the right S-NSSAI value are selected.
4. The SS transmits a DL NAS TRANSPORT message and PDU SESSION ESTABLISHMENT ACCEPT message.
5. Using the Application Client Simulator to simulate APP B, generate traffic matching OS App Id value in Traffic descriptor in URSP rule 2 provisioned to the UE in step 1.
6. The UE transmits an UL NAS TRANSPORT message and PDU SESSION ESTABLISHMENT REQUEST message. Observe the right S-NSSAI value are selected.
7. The SS transmits a DL NAS TRANSPORT message and PDU SESSION ESTABLISHMENT ACCEPT message.
8. Using the simulated APP A and APP B, begin uplink data transfer from UE to the Application Server Simulator.
9. Wait for 15 seconds and then start to measure the throughput result of simulated APP A and latency result of simulated APP B in application layer (This is iteration 1). Continue data transfer for 1 minute.
10. Repeat step 6 for 3 iterations within the same call as the first iteration. Wait for at least 5 seconds between each iteration of the data transfer.
11. Calculate and record the average application layer data throughput of simulated APP A and latency of simulated APP B across three iterations.
12. The SS transmits a DL NAS TRANSPORT message including UE Policy Container and MANAGE UE POLICY COMMAND message to update URSP rules.
13. Repeat step 2-4 with the message exception defined in Table A.3.2.2.4.2-5 and A.3.2.2.4.2-6
14. Repeat step 5-7 with the message exception defined in Table A.3.2.2.4.2-5 and A.3.2.2.4.2-6
15. Repeat step 8-11 to get the average application layer data throughput of simulated APP A and latency of simulated APP B in parallel.
16. Observe that the throughput in step 15 is not lower than the throughput benchmark in step 11 and the latency in step 15 is not higher than the latency benchmark in step 11.

Table A.3.3.2.4.2-1: MANAGE UE POLICY COMMAND (step 1)

Derivation Path: Table 5.2.4-1			
Information Element	Value/remark	Comment	Condition
UE policy part			
URSP rule 1			
Precedence value of URSP rule	0		
Traffic descriptor			
Traffic descriptor component type identifier	'10100000'B	OS App Id type	
Traffic descriptor component			
OS App Id length	Set to the actual length of 'OS App Id value' in bytes		
OS App Id value	pc_OS_App_ID		

Route selection descriptor list			
Route selection descriptor 1			
Precedence value of route selection descriptor	0		
Route selection descriptor contents			
Route selection descriptor component type	'00000010'B	S-NSSAI type	
Route selection descriptor component			
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000001'B	eMBB	
SD	0x000001		
URSP rule 2			
Precedence value of URSP rule	1		
Traffic descriptor			
Traffic descriptor component type identifier	'10100000'B	OS App Id type	
Traffic descriptor component			
OS App Id length	Set to the actual length of ' OS App Id value ' in bytes		
OS App Id value	pc OS App ID 2nd		
Route selection descriptor list			
Route selection descriptor 1			
Precedence value of route selection descriptor	0		
Route selection descriptor contents			
Route selection descriptor component type	'00000010'B	S-NSSAI type	
Route selection descriptor component			
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000010'B	URLLC	
SD	0x000001		
URSP rule 3			
Precedence value of URSP rule	2		
Traffic descriptor			
Traffic descriptor component type identifier	'00000001'B	Match-all type	
Route selection descriptor list			
Route selection descriptor 1			
Precedence value of route selection descriptor	0		
Route selection descriptor contents			
Route selection descriptor component type	'00000010'B	S-NSSAI type	
Route selection descriptor component			
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000001'B	eMBB	
SD	0x000002		

Table A.3.3.2.4.2-2: UL NAS Transport (step 3, step 6)

Derivation path: TS 38.508-1 [4], Table 4.7.1-10			
Information Element	Value/remark	Comment	Condition
Payload container type	'0001'B	N1 SM information	
PDU session ID	PSI-1		
Request type	'001'B	Initial request	
S-NSSAI	Not Present		
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000001'B	eMBB	step 3
	'00000010'B	URLLC	step 6
SD	0x000001		

Table A.3.3.2.4.2-3: PDU SESSION ESTABLISHMENT ACCEPT (step 4, step 7)

Derivation path: TS 38.508-1 clause 4.7.2-2			
Information Element	Value/remark	Comment	Condition
S-NSSAI			
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000001'B	eMBB	step 4
	'00000010'B	URLLC	step 7
SD	0x000001		

Table A.3.3.2.4.2-4: MANAGE UE POLICY COMMAND (step 12)

Derivation Path: Table 5.2.4-1			
Information Element	Value/remark	Comment	Condition
UE policy part			
URSP rule 1			
Precedence value of URSP rule	0		
Traffic descriptor			
Traffic descriptor component type identifier	'10100000'B	OS App Id type	
Traffic descriptor component			
OS App Id length	Set to the actual length of 'OS App Id value ' in bytes		
OS App Id value	pc_OS_App_ID		
Route selection descriptor list			
Route selection descriptor 1			
Precedence value of route selection descriptor	0		
Route selection descriptor contents			
Route selection descriptor component type	'00000010'B	S-NSSAI type	
Route selection descriptor component			
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000001'B	eMBB	
SD	0x000002		
URSP rule 2			
Precedence value of URSP rule	1		
Traffic descriptor			
Traffic descriptor component type identifier	'10100000'B	OS App Id type	
Traffic descriptor component			
OS App Id length	Set to the actual length of 'OS App Id value ' in bytes		
OS App Id value	pc_OS_App_ID_2nd		
Route selection descriptor list			
Route selection descriptor 1			
Precedence value of route selection descriptor	0		
Route selection descriptor contents			
Route selection descriptor component type	'00000010'B	S-NSSAI type	
Route selection descriptor component			
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000001'B	eMBB	
SD	0x000001		

Table A.3.3.2.4.2-5: UL NAS Transport (step 13, step 14)

Derivation path: TS 38.508-1 [4], Table 4.7.1-10			
Information Element	Value/remark	Comment	Condition
Payload container type	'0001'B	N1 SM information	
PDU session ID	PSI-1		
Request type	'001'B	Initial request	
S-NSSAI	Not Present		
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000001'B	eMBB	
SD	0x000002		step 13
	0x000001		step 14

Table A.3.3.2.4.2-6: PDU SESSION ESTABLISHMENT ACCEPT (step 13, step 14)

Derivation path: TS 38.508-1 clause 4.7.2-2			
Information Element	Value/remark	Comment	Condition
S-NSSAI			
Length of S-NSSAI contents	'00000100'B	SST and SD	
SST	'00000001'B	eMBB	
SD	0x000002		step 13
	0x000001		step 14

Annex B: Applicability

Void

Annex C:

Change history

Date	TSG #	TSG Doc.	CR	Re v	Subject/Comment	New
2021-05	RAN5#91e	R5-213433	-	-	Draft skeleton	0.1.0
2021-05	RAN5#91e	R5-213433	-	-	Text Proposal for TR 38.918 on Definition of Full Stack Testing for Network Slicing	0.1.0
2021-05	RAN5#91e	R5-213434	-	-	Text Proposal for TR 38.918 on Test Equipment	0.1.0
2021-05	RAN5#91e	R5-213435	-	-	Text Proposal for TR 38.918 on Test Equipment Connection Diagrams	0.1.0
2021-08	RAN5#92e	R5-216352	-	-	Text Proposal on Test Configuration	0.2.0
2021-08	RAN5#92e	R5-215247	-	-	Text Proposal on Application Simulation	0.2.0
2021-08	RAN5#92e	R5-215248	-	-	Text Proposal on Analysis of mapping application to network slicing	0.2.0
2021-08	RAN5#92e	R5-215249	-	-	Text Proposal on Test Procedure A.2.1.1	0.2.0
2021-08	RAN5#92e	R5-215250	-	-	Text Proposal on Test Procedure A.2.2.1	0.2.0
2021-08	RAN5#92e	R5-215251	-	-	Text Proposal to Update References	0.2.0
2021-08	RAN5#92e	R5-215252	-	-	Editorial changes on wording	0.2.0
2021-08	RAN5#92e	R5-215283	-	-	Text Proposal on Test Procedure A.3.1.1	0.2.0
2021-11	RAN5#93e	R5-217264	-	-	Text Proposal on Test Procedure A.2.2.2	0.3.0
2021-11	RAN5#93e	R5-217265	-	-	Text Proposal to Update Message Contents	0.3.0
2021-11	RAN5#93e	R5-217266	-	-	Text Proposal to Update Network Slicing Configurations	0.3.0
2021-11	RAN5#93e	R5-217267	-	-	Editorial changes on wording	0.3.0
2022-03	RAN5#94e	R5-220177	-	-	Text Proposal on Test Procedure A.2.2.3	0.4.0
2022-03	RAN5#94e	R5-220178	-	-	Text Proposal on Test Procedure A.2.2.4	0.4.0
2022-03	RAN5#94e	R5-220179	-	-	Updates to Test Configurations	0.4.0
2022-03	RAN5#94e	R5-220180	-	-	Updates to message contents in A.2.1.1	0.4.0
2022-03	RAN5#94e	R5-220181	-	-	Addition of default URSP rule to Test Procedure A.2.2.1	0.4.0
2022-03	RAN5#94e	R5-220182	-	-	Addition of default URSP rule to Test Procedure A.2.2.2	0.4.0
2022-03	RAN5#94e	R5-221035	-	-	Text Proposal to update 5.4.2 and 5.4.3	0.4.0
2022-05	RAN5#95e	R5-222860	-	-	Updates to Test Configurations	0.5.0
2022-05	RAN5#95e	R5-222861	-	-	Updates to Uncertainty and TT Analysis	0.5.0
2022-05	RAN5#95e	R5-222862	-	-	Updates to References	0.5.0
2022-05	RAN5#95e	R5-222863	-	-	Updates to Test Model	0.5.0
2022-05	RAN5#95e	R5-222864	-	-	Updates to Test Parameters	0.5.0
2022-05	RAN5#95e	R5-222865	-	-	Text Proposal on Test Procedure A.2.2.5	0.5.0
2022-05	RAN5#95e	R5-222866	-	-	Text Proposal on Test Procedure A.2.2.6	0.5.0
2022-05	RAN5#95e	R5-222867	-	-	Text Proposal on Test Procedure A.3.1.2	0.5.0
2022-05	RAN5#95e	R5-222868	-	-	Text Proposal on Test Procedure A.3.2.1	0.5.0
2022-06	RAN5#96	RP-221383	-	-	Presentation of Specification/Report to TSG: TR 38.918 Version 1.0.0	1.0.0
2022-06	RAN5#96	-	-	-	upgrade to v18.0.0 with editorial changes	18.0.0
2022-09	RAN5#97	R5-225017	0001	-	Updates to TR 38.918	18.1.0
2024-09	RAN5#104	R5-244521	0002	-	Update of A.3.1.2.4.2 in TR 38.918	18.2.0
2024-09	RAN5#104	R5-244522	0003	-	Update of A.3.1.1.4.2 in TR 38.918	18.2.0
2024-12	RAN5#105	R5-250146	0004	-	Update of A.3.3.2 in TR 38.918	18.3.0
2024-12	RAN5#105	R5-250147	0005	-	Update of A.3.3.1 in TR 38.918	18.3.0
2024-12	RAN5#105	R5-250148	0006	-	Addition of new TC A.3.3.1A in TR 38.918	18.3.0
2025-06	RAN5#107	R5-252112	0007	-	Update of typo in TR 38.918	18.4.0

History

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