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# Foreword

This Technical Report has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

In the present document, modal verbs have the following meanings:

**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.

The constructions "must" and "must not" are not used as substitutes for "shall" and "shall not". Their use is avoided insofar as possible, and they are not used in a normative context except in a direct citation from an external, referenced, non-3GPP document, or so as to maintain continuity of style when extending or modifying the provisions of such a referenced document.

**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 studies the potential use cases, requirements, and enhancements for the management (e.g. performance measurement and related new KPIs regarding VN group communication) to support 5G-LAN capabilities defined by TS 23.501 [2]. The present document provides conclusions and recommendations on standardization phase.

# 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 23.501 "System architecture for the 5G System (5GS)".

[3] 3GPP TS 22.261: "Service requirements for next generation new services and markets; Stage 1".

[4] 3GPP TS 23.502: "Procedures for the 5G System; Stage 2".

[5] 3GPP TS 28.541: "Management and orchestration; 5G Network Resource Model (NRM); Stage 2 and stage 3".

[6] 3GPP TS 28.552: "Management and orchestration; 5G performance measurements".

[7] 3GPP TS 28.554: "Management and orchestration; 5G end to end Key Performance Indicators (KPI)"3 Definitions of terms, symbols and abbreviations.

# 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] apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1].

The following definitions are taken from TS 23.501 [2]:

**5G LAN-type Service:** A service over the 5G system offering private communication using IP and/or non-IP type communications.

**5G VN Group:** A set of UEs using private communication for 5G LAN-type service.

## 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].

5G LAN 5G Local Area Network

AF Application Function

AMF Access and Mobility Management Function

DN Data Network

DNN Data Network Name

I-UPF Intermediate UPF

NEF Network Exposure Function

PDU Protocol Data Unit

PSA PDU Session Anchor

(R)AN (Radio) Access Network

SMF Session Management Function

S-NSSAI Single Network Slice Selection Assistance Information

UDM Unified Data Management

UL Uplink

UL CL Uplink Classifier

UPF User Plane Function

VLAN Virtual Local Area Network

VN Virtual Network

# 4 Concepts and background

4.1 General description

As defined in TS 23.501 [2], A 5G Virtual Network (VN) group consists of a set of UEs using private communication for 5G LAN-type services. The service requirements for 5G LAN-type service are specified in TS 22.261 [3].

5G VN Group is a set of UEs using private communication for 5G LAN-type service.

4.2 User plane architecture to support 5G LAN-type Services

There are two types of user plane architecture to allow 5G LAN-type services:

- Local switch, where traffic is locally forwarded by a single UPF if this UPF is the common PSA UPF of different PDU Sessions for the same 5G VN group. Figure 4.2-2 depicts the non-roaming user plane architecture to support 5G LAN-type service using local switch.



Figure 4.2-1: Local-switch based user plane architecture in non-roaming scenario

- N19-based, where the UL/DL traffic for the 5G VN group communication is forwarded between PSA UPFs of different PDU sessions via N19. N19 is a reference point between two UPFs for direct routing of traffic between different PDU Sessions without using N6. It has a per 5G VN group granularity. Figure 4.2-2 depicts the non-roaming user plane architecture to support 5G LAN-type service using N19 tunnel.



Figure 4.2-2: N19-based user plane architecture in non-roaming scenario

4.3 5G VN group management

5G System supports management of 5G VN Group identification and membership (i.e. definition of 5G VN group identifiers and membership) and 5G VN Group data (i.e. definition of 5G VN group data). The 5G VN Group management can be configured by a network administrator or can be managed dynamically by AF.

A 5G VN group is characterized by the following:

- 5G VN group identities: External Group ID and Internal Group ID are used to identify the 5G VN group.

- 5G VN group membership: The 5G VN group members are uniquely identified by GPSI. The group as described in clause 5.2.3.3.1 of TS 23.502 [4] is applicable to 5G LAN-type services.

- 5G VN group data. The 5G VN group data may include the following parameters: PDU session type, DNN, S‑NSSAI and Application descriptor, Information related with secondary authentication / authorization (e.g. to enable IP address assignment by the DN-AAA).

The Information related with secondary authentication / authorization corresponds to the procedures described in clause 5.6.6 of TS 23.501 [2]; it allows e.g. the AF to provide DN-AAA server addressing information and possibly to request the SMF to get the UE IP address from the DN-AAA server.

In order to support dynamic management of 5G VN Group identification and membership, the NEF exposes a set of services to manage (e.g. add/delete/modify) 5G VN groups and 5G VN members. The NEF also exposes services to dynamically manage 5G VN group data.

The support of 5G VN group management configured by a network administrator (OAM-based 5G VN group management) is described in clause 5.25.2 of TS 23.501 [2].

# 5 Topics

## 5.1 Topic 1: 5G VN group data management

### 5.1.1 Use case

5G LAN-type services are provided for the customers who request services with similar functionalities to Local Area Networks (LANs) and VPN's but improved with 5G capabilities (e.g. high performance, long distance access, mobility and security). To support 5G LAN-type services, 3GPP management system may need to support the management of 5G VN group (e.g. configuration of service area where 5G VN group communication is applicable to the UEs).

As defined in TS 23.501 [2], the 5G VN group configuration is either provided by OAM or provided by an AF to the NEF. It means the 5G VN group parameters about a UE may be configured in subscription data of the UE and delivered together with other subscription data by the UDM for supporting 5G LAN service. For the configuration for 5G VN group data management, the 3GPP management system can support the 5G VN group data management, including:

- The configuration for 5G VN group data creation based on External Group ID.

- The configuration for 5G VN group data modification based on External Group ID.

- The configuration for 5G VN group data deletion based on External Group ID.

### 5.1.2 Potential requirements

**REQ-LAN-GDM-01** The 3GPP management system should have the capability to manage the 5G VN group data creation.

**REQ-LAN-GDM-02** The 3GPP management system should have the capability to manage the 5G VN group data modification.

**REQ-LAN-GDM-03** The 3GPP management system should have the capability to manage the 5G VN group data deletion.

**REQ-LAN-GDM-04** The 3GPP management system should have the capability to manage the 5G VN group membership update, UE addition and removal based on External Group ID.

### 5.1.3 Key Issues

This key issue is for investigating how to support the 5G LAN-type service considering REQ-LAN-GDM-01, REQ-LAN-GDM-02, REQ-LAN-GDM-03 and REQ-LAN-GDM-04. This investigation covers the following:

- determination of which NF in the 5G system are suitable to maintain the related information to support the 5G VN group management;

- Member management of 5G LAN-type services customer, e.g. membership update, UE addition and removal based on External Group ID.

### 5.1.4 Solutions

This clause describes briefly the potential solution for supporting the 5G VN group data management.

As per the TS 23.501 [2], in order to support the 5G VN Group management configured by OAM, the following configuration are allocated to UDM:

- 5G VN Group identification and membership:

- the UDM allocates the Internal Group ID for a newly created 5G VN Group and maps the External Group ID from OAM to Internal Group ID.

- the UDM updates the Internal Group ID-list of the corresponding UE's subscription data in UDR, if needed.

- The UDM updates the Group Identifier translation in the Group Subscription data with the Internal Group ID, External Group ID and list of group members, if needed.

- 5G VN Group data: The UDM stores/updates the 5G VN group data (PDU session type, DNN and S-NSSAI, Application descriptor, Information related with secondary authentication / authorization) in UDR.

In this solution, the 5G LAN-type services can be provided by operator for a set of UEs using private communication as a 5G VN group. These configuration information interactions between OAM and UDM is present as the following:

- Addition of 5G VN group;

- Modification of 5G VN group;

- Deletion of 5G VN group;

### 5.1.5 Evaluation

The solution #5.1.4 addresses Key issue #5.1.3, describes how to configure the 5G VN group data creation based on External Group ID. Currently, the configuration can be allocated to the NRM IOC of UDMFunction, which can allocate the Internal Group ID for a newly created 5G VN Group and maps the External Group ID from OAM to Internal Group ID.

This solution with no impact on the OAM configuration procedure, and operation. New parameters for 5G VN Group service are required to be added to the NRM IOC of UDMFunction.

### 5.1.6 Conclusion

It is concluded to use the solution #5.1.4, that the OAM may require to allocate the 5G VN group management configuration to the NRM IOC of UDMFunction directly, including the 5G VN group addition/modification/deletion.

## 5.2 Topic 2: PDU Session management

### 5.2.1 Use case

The session management is applicable to 5G LAN-type services with clarification and enhancement. For example, SMF may support PDU Sessions for a 5G VN group, which offers a virtual data network capable of supporting 5G LAN-type service over the 5G system. The whole PDU sessions belonging to the 5G VN group need to select the same SMF based on network configuration. But how to configure to select the same SMF based on network configuration has not been defined yet. The 3GPP management system should have the capability to manage the PDU Session for providing 5G LAN-type services, including:

- A UE gets access to 5G LAN-type services via a PDU Session of IP PDU Session type or Ethernet PDU Session type.

- A PDU Session provides access to one and only one 5G VN group.

- A dedicated SMF is responsible for all the PDU Sessions for communication of a certain 5G VN group.

- A PDU Session provides unicast, broadcast and multicast communication for the DNN and S-NSSAI associated with a 5G VN group.

### 5.2.2 Potential requirements

**REQ-LAN-PDU-01** The 3GPP management system should have the capability to manage the PDU Session for providing 5G LAN-type services.

### 5.2.3 Key Issues

#### 5.2.3.1 Description

This key issue is for investigating how to support the 5G LAN-type service considering REQ-LAN-PDU-01. This investigation covers the following:

- which types of PDU session will be supported for 5G LAN-type services by 5G network.

- identification and classification of the PDU sessions for communication of a certain 5G VN group;

- determination of which and how NF in the 5G system are suitable to perform and maintain the related information of the PDU session management to support 5G LAN-type service;

- how management configuration(s) can keep the same SMF selected during PDU session establishment for a 5G VN group.

### 5.2.4 Solutions

#### 5.2.4.1 Potential solution on Information model for DNN/S-NSSAI of SMF

As described in clause 5.29.3 of TS 23.501 [2], a UE gets access to 5G LAN-type services via a PDU Session established by a dedicated SMF. And, the network is configured so that the SMF is selected for a certain 5G VN group, which the SMF will register on the NRM with DNN/S-NSSAI. So, a DNN and S-NSSAI is associated with a 5G VN group. This certain SMF is identified during PDU session establishment process with the DNN/S-NSSAI used for a given 5G VN group. The PDU session establishment procedure for a UE to access the 5G LAN-type service is described in TS 23.502 [4].

Session management as defined for 5GS in clause 5.6 of TS 23.501 [2] is applicable to 5G-VN-type services with the following clarification and enhancement:

- A UE gets access to 5G LAN-type services via a PDU Session of IP PDU Session type or Ethernet PDU Session type.

- A PDU Session provides access to one and only one 5G VN group. The PDU Sessions accessing to a certain 5G VN group should all anchor at the same network, i.e. the common home network of 5G VN group members.

- The SM level subscription data for a DNN and S-NSSAI available in UDM, as described in clause 5.6.1 of TS 23.501 [1], applies to the DNN and S-NSSAI associated to a 5G VN group.

- Session management related policy control for a DNN and S-NSSAI as described in TS 23.502 [3], is applicable to the DNN and S-NSSAI associated to a 5G VN group. This includes also usage of URSP, for the UE to determine how to route outgoing traffic to a PDU Session for the DNN and S-NSSAI associated to a 5G VN group.

- Session and service continuity SSC mode 1, SSC mode 2, and SSC mode 3 as described in clause 5.6.9 are applicable to N6-based traffic forwarding of 5G VN communication within the associated 5G VN group.

- A PDU Session provides unicast, broadcast and multicast communication for the DNN and S-NSSAI associated to a 5G VN group. The PSA UPF determines whether the communication is for unicast, broadcast or multicast based on the destination address of the received data, and performs unicast, broadcast or multicast communication handling.

- During the PDU Session Establishment procedure, the SMF retrieves SM subscription data related to 5G-VN type service from the UDM as part of the UE subscription data for the DNN and S-NSSAI.

- In order to realize N19 traffic routing, the SMF correlates PDU sessions established to the same 5G VN group and uses this to configure the UPF with the group level N4-session including packet detection and forwarding rules for N19 tunnelling forwarding.

User Plane management as defined for 5GS in clause 5.8 of TS 23.501 [2] is applicable to 5G LAN-type services with the following clarifications:

- There are three types of traffic forwarding methods allowed for 5G VN communication:

- N6-based, where the UL/DL traffic for the 5G VN communication is forwarded to/from the DN;

- N19-based, where the UL/DL traffic for the 5G VN group communication is forwarded between PSA UPFs of different PDU sessions via N19. N19 is based on a shared User Plane tunnel connecting PSA UPFs of a single 5G VN group.

- Local switch, where traffic is locally forwarded by a single UPF if this UPF is the common PSA UPF of different PDU Sessions for the same 5G VN group.

- The SMF handles the user plane paths of the 5G VN group, including:

- The SMF may prefer to select a single PSA UPF for as many PDU sessions (targeting the same 5G VN group) as possible, in order to implement local switch on the UPF.

- (if needed) Establishing N19 tunnels between PSA UPFs to support N19-based traffic forwarding.

- For Ethernet PDU Session, the SMF may instruct the UPF(s) to classify frames based on VLAN tags, and to add and remove VLAN tags, on frames received and sent on N6 or N19 or internal interface ("5G VN internal"), as described in clause 5.6.10.2 of TS 23.501[2].

The NRM IOC of SMFFunction is specified in clause 5.3.2 of TS 28.541 [5]. The attributes of managedNFProfile in SMFFunction IOC can include smfinfo of the configured SMF to serve a 5G VN group communication. So as the DNN/S-NSSAI for the SMF serving a 5G LAN-type communication service can be provided based on current definition of NRM IOC for SMFFunction.

#### 5.2.4.2 Procedure description

In order to support the 5G VN Group management configurated by OAM, the procedure of management of the PDU session of 5G VN Group configuration for network function is following.

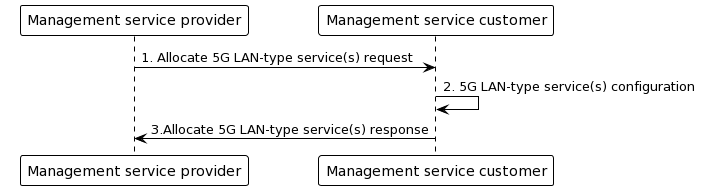


Figure 5.2.4.2-1: Procedure of management of the PDU session of 5G VN Group configuration for network functions

1. The management service provider after received the 5G LAN-type service requirements from customers can allocate the 5G LAN-type service request to the management service provider, which may be the management function of network functions, including External Group Id and 5G VN group configurations.

2. The management service customer allocates the 5G LAN-type service configuration to the specific network functions (e.g. AMF/SMF/NRF/UDM). The attributes of managedNFProfile in network functions' IOC can include the information of 5G VN group related information and the correspondence between the 5G VN group ID and the supported SMFs.

3. The management service customer sends respond to the management service provider.

### 5.2.5 Evaluation

The solution #5.2.4 address Key issue #5.2.3 with no impact on the OAM configuration procedure, operation. The parameters to SMF function based on current NRM model for SMF. Some clarification of SMF on use of those parameters may be needed for 5G VN group communication service when this SMF instance is selected to serve this 5G VN group communication. For example, the attributes of managedNFProfile in SMF IOC can add a new attribute as an option information of 5G VN group to serve a 5G VN group communication defined in TS 28.541 [5].

Since the DNN/S-NSSAI can be used by SMF to completely identify the PDU session establishment for 5G VN group communication, the identifiers can be also used for classification of the PDU sessions for communication of a certain 5G VN group.

No other parameters are identified to support 5G VN group communication for SMF function and UPF function in NRM model.

### 5.2.6 Conclusion

It is concluded that the identification of 5G VN group maintained by SMF function should be a configurable parameter in NRM IOC.

## 5.3 Topic 3: for 5G VN group performance measurement management

### 5.3.1 Use case

The performance of 5G LAN-type services need to be monitored at the 5G VN group level by the operator since it is relevant to whether the end users can use the service of 5G LAN and scale up/down a 5G VN based on capacity for efficient consumption of network resources.

The performance measurement of 5G LAN-type services may include the measurements of 5G VN group status, the number of subscribers in 5G VN groups, the duration of 5G VN group communication which information can be gathered from NEF/UDM/SMF/UPF/PCF supporting 5G LAN-type services.

Therefore, the 3GPP management system needs to be enhanced to support request for 5G VN group performance measurement management as it impacts on end user experience, and can be used for the optimization which may be required according to the performance.

### 5.3.2 Potential requirements

**REQ-LAN-PMM-01** The 3GPP management system shall have the capability to measure 5G LAN-type services performance (e.g. UE throughput, Performance measurements for NEF/UDM/SMF/UPF/PCF) to be assured in 5G VN group level.

### 5.3.3 Key Issues

#### 5.3.3.1 Description

TS 28.552 [6] describes the performance measurements for AMF, SMF, UPF, UDM, PCF and NEF.

Some performance measurements can be meaningful to be provided to a 5G VN group communication, for example:

- Performance measurement for SMF: Number of successful PDU session creations,

- Performance measurement for UPF: Number of incoming GTP data packets on the N3 interface, from (R)AN to UPF,

- Performance measurement for NEF: Number of application trigger requests accepted for delivery.

According to the use case described in clause 5.3.1, the following issue should be investigated in this study.

- Which performance measurements are feasible to be provided by 3GPP management system for a 5G VN group communication?

### 5.3.4 Solutions

#### 5.3.4.1 Description

Performance indicators at 5G VN group level can be derived from the performance measurements via the corresponding performance management service consumed by a 5G LAN-type service. External Group ID and Internal Group ID are used to identify the 5G VN group. The UDM allocates the Internal Group ID for a newly created 5G VN Group and maps the External Group ID from OAM to Internal Group ID. The performance indicators are split into subcounters per Internal Group ID for 5G VN group.

In case a performance measurement is defined for more than one sub-counter, it is convenient to use *Filter* to define the performance measurement of interest (see TS 23.552[6]). Therefore, a new *Filter* value Internal Group ID is added.

The DNN/S-NSSAI for the SMF serving a 5G LAN-type communication service which is already provided based on current definition of NRM IOC for SMFFunction. Therefore, the *Filter* value can also use DNN/S-NSSAI associated with a 5G VN group.

#### 5.3.4.2 Performance measurement for SMF

Performance measurements for SMF include the mean number of PDU sessions, the max number of PDU sessions, number of PDU session creation requests, number of successful PDU session creations, number of failed PDU session creations, PDU session modifications, number of released PDU sessions, number of PDU session creation requests in HR roaming scenario, number of successful PDU session creations in HR roaming scenario, number of failed PDU session creations in HR roaming scenario, mean time of PDU session establishment, and max time of PDU session establishment.

For example, number of successful PDU session creations is the number of PDU sessions that are associated with a 5G VN group and successfully created by the SMF. On transmission by the SMF to AMF of Nsmf\_PDUSession\_CreateSMContext Response that indicates a successful PDU session creation (see TS 23.502 [4]). Each PDU session successfully created is added to the relevant subcounter per Internal Group ID.

#### 5.3.4.3 Performance measurement for UPF

Performance measurements for UPF include number of incoming and outgoing GTP data packets, number of octets of incoming and outgoing GTP data packets, Data volume of incoming and outgoing GTP data packets per QoS level, incoming and outgoing GTP Data Packet Loss, round-trip GTP Data Packet Delay, and number of incoming GTP data packets out-of-order on the N3 interface, from (R)AN to UPF.

For example, number of incoming GTP data packets on the N3 interface, from (R)AN to UPF is the number of GTP data PDUs associated with a 5G VN group on the N3 interface which have been accepted and processed by the GTP-U protocol entity in UPF on the N3 interface. The measurement can be split into subcounters per Internal Group ID.

#### 5.3.4.4 Performance measurement for NEF

Performance measurements for NEF include number of application trigger requests, number of application trigger requests accepted for delivery, number of application trigger requests rejected for delivery and number of application trigger delivery reports.

For the number of application trigger requests accepted for delivery, transmission of Nnef\_Trigger\_Delivery response by the NEF to AF indicating the application trigger request associated with a 5G VN group has been accepted for delivery to the UE (see TS 23.502 [4]). Each response increments the relevant subcounter per Internal Group ID by1.

### 5.3.5 Evaluation

The solution described in clause 5.3.4.2 provides the method to provide the performance measurements of SMF by filter value Internal Group ID or DNN/S-NSSAI.

The solution described in clause 5.3.4.3 provides the method to provide the performance measurements UPF by filter value Internal Group ID or DNN/S-NSSAI.

The solution described in clause 5.3.4.4 provides the method to provide the performance measurements NEF by filter value Internal Group ID or DNN/S-NSSAI.

### 5.3.6 Conclusion

Based on the operator's requirement to manage the 5G VN group communication service, SA5 may have to enhance definition performance measurement for a 5G VN group communication in addition to current performance measurements for SMF, UPF and NEF.

The specific set of performance measurements for SMF, UPF and NEF to be enhanced should be based on the operator's requirement and needs to monitor communication service performance KPIs for a 5G VN group.

## 5.4 Topic 4: for 5G VN group end-to-end network KPIs management

### 5.4.1 Use case

It is necessary to evaluate the end-to-end network KPIs in 5G VN group level to evaluate the performance of 5G LAN-type services for provided consistence of group UE experience.

The KPIs as followed can be used to describe some performance requirement for 5G LAN-type services, for examples:

- The 5G VN group status can be calculated by group member registration/de-registration success rate of 5G VN group.

- The duration of 5G VN group communication can be counted by the sum of duration of individual PDU sessions within the 5G VN group communication.

- The 5G VN group communication could be identified by DNN/S-NSSAI by the SMF.

### 5.4.2 Potential requirements

**REQ-LAN-KPIs-01** The 3GPP management system should have the capability to measure end-to-end network KPIs in 5G VN group level to evaluate the performance of 5G LAN-type services.

### 5.4.3 Key Issues

#### 5.4.3.1 Description

This key issue is for investigating how to support 5G LAN-type service management considering REQ-LAN-KPIs-01. This investigation covers the following:

- identification and clarification of related KPIs for monitoring the network performance to evaluate 5G LAN-type services

- determination of which and how NF in the 5G system or management system to re-configure the network for 5G LAN-type services when performance degrades

### 5.4.4 Solutions

As a potential application for 5G VN group communication, the end to end performance KPI can provide some key service performance indicators used by 3GPP management system.

The typical 5G VN group communication service performance KPIs are shown as following:

- The mean/max number of PDU session for a 5G VN group communication service.

- The PDU session Establishment success rate for a 5G VN group communication service.

- The upstream throughput for a 5G VN group communication service.

- The downstream throughput for a 5G VN group communication service.

Since TS 28.554 [7] provides a number of end to end performance KPIs for 5G network and network slicing, the end to end performance KPI practically for 5G LAN communication service is needed in addition.

### 5.4.5 Evaluation

The key issue identified in clause 5.4.3 requires the management capability to support evaluate the 5G VN group communication performance KPIs.

A number of service level performance KPIs are listed and proposed in clause 5.4.4, and those are proposed to support in normative work.

### 5.4.6 Conclusion

Based on the operator's requirements, it is recommended to include a group of end to end service performance KPI for 5G VN group communication service. The recommended SA5 specification to include those end to end service performance KPI is TS 28.554 [7].

# 6 Conclusion and recommendation

The present document investigated a number of management issues and enhancement for 5G VN group communication based on the standardized solution in TS 23.501 [2] and TS 23.502 [4].

In t The present document, the configuration of 5G NF is investigated. The SMF serving 5G VN group communication is required to support 5G VN group identify in NRM IOC.

In the present document, the 5G VN group member management is proposed to be supported by OAM. The adding, updating and deleting management operations are considered as the management capability for OAM to support the 5G VN group member management.

In the present document, the performance measurements for SMF, UPF and NEF are investigated based on current description of TS 23.501 [2] and TS 23.502 [4]. The sub-counters for a 5G VN group communication should be added for those performance measurements according to the operator's requirements.

In the present document, 5G VN communication service performance KPI is considered as a need to monitor and show as an end-to-end service performance KPI in addition to those end-to-end KPIs described in TS 28.554 [7].

Annex A:  
Plant UML source code

# A.1 Procedure for Topic1: 5G VN group data management

@startuml

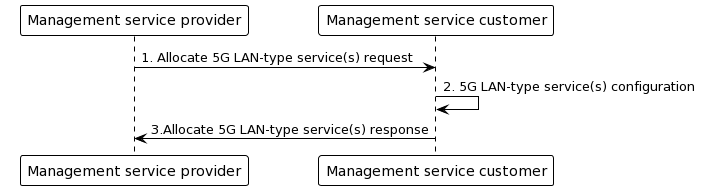
!theme plain

"Management service provider" -> "Management service customer": 1. Allocate 5G LAN-type service(s) request

"Management service customer" -> "Management service customer":2. 5G LAN-type service(s) configuration

"Management service customer" -> "Management service provider":3.Allocate 5G LAN-type service(s) response

@enduml



# A.2 Procedure for Topic 2: PDU Session management

@startuml

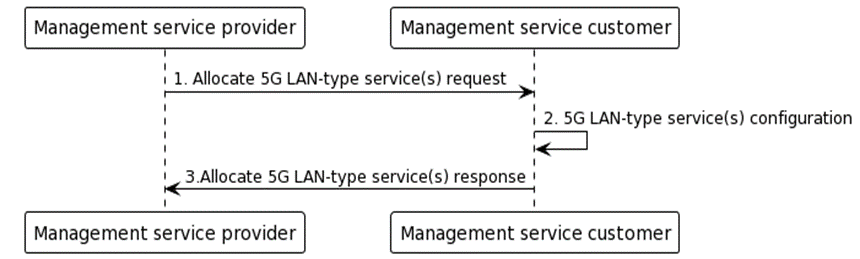
!theme plain

"Management service provider" -> "Management service customer": 1. Allocate 5G LAN-type service(s) request

"Management service customer" -> "Management service customer":2. 5G LAN-type service(s) configuration

"Management service customer" -> "Management service provider":3.Allocate 5G LAN-type service(s) response

@enduml



Annex B:  
Change history

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Change history** | | | | | | | |
| **Date** | **Meeting** | **TDoc** | **CR** | **Rev** | **Cat** | **Subject/Comment** | **New version** |
|  |  |  |  |  |  |  |  |
| 05-2022 | SA5#143e | S5-223594  S5-223595  S5-223596  S5-223597  S5-223598  S5-223599 |  |  |  | Update to implement the agreed pCRs in SA5#143e:  1) S5-223594 pCR TR 28.833 Change TR structure  2) S5-223595 Add use case1 for 5G VN group data management of FS\_5GLAN\_Mgt  3) S5-223596 Add use case2 for PDU Session management of FS\_5GLAN\_Mgt  4) S5-223597 Add use case3 for user plane handing of FS\_5GLAN\_Mgt  5) S5-223598 Add use case4 for 5G VN performance measurement management of FS\_5GLAN\_Mgt  6) S5-223599 Add use case5 for 5G VN group end-to-end network KPIS management of FS\_5GLAN\_Mgt | 0.2.0 |
| 07-2022 | SA5#144e | S5-224117  S5-224118  S5-224261  S5-224264 |  |  |  | Update to implement the agreed pCRs in SA5#144e:  1) S5-224117 pCR Add key issue for PDU session management  2) S5-224118 pCR Add key issue for performance measurement per 5G VN group  3) S5-224261 pCR TR 28.833 Change TR structure  4) S5-224264 pCR TR 28.833 Add key issue and potential solutions for 5G VN group data management of FS\_5GLAN\_Mgt | 0.3.0 |
| 08-2022 | SA5#145e | S5-225809  S5-225811  S5-225875  S5-225876  S5-225877  S5-225810 |  |  |  | Update to implement the agreed pCRs in SA5#145e:  1) S5-225809 pCR TR 28.833 Add potential solutions for topic 3  2) S5-225811 pCR TR 28.833 Add key issue for topic 4  3) S5-225875 pCR TR 28.833 Add procedure of management of the PDU session of FS\_5GLAN\_Mgt  4) S5-225876 pCR TR 28.833 Add evaluation and conclusion for Topic 1 of FS\_5GLAN\_Mgt  5) S5-225877 pCR TR 28.833 Add Annex A of UML code of FS\_5GLAN\_Mgt  6) S5-225810 pCR TR 28.833 add potential solution of SMF configuration | 0.4.0 |
| 11-2022 | SA5#146 | S5-226407  S5-226409  S5-226403 |  |  |  | Update to implement the agreed pCRs in SA5#146:  1) S5-226407 pCR TR 28.833 Update potential solutions and evaluations for Topic 1 and Topic 2 of FS\_5GLAN\_Mgt  2) S5-226409 pCR TR 28.833 Update potential solutions and evaluations for Topic 3 of FS\_5GLAN\_Mgt  3) S5-226403 pCR TR 28.833 Add potential solutions and evaluations for 5G VN group communication KPIs of FS\_5GLAN\_Mgt | 0.5.0 |
| 03-2023 | SA5#147 | S5-233003 |  |  |  | Update to implement the agreed pCRs in SA5#147:  1) S5-233003 pCR TR28.833 Adding editorial and technical changes | 0.6.0 |
| 2023-03 | SA#99 | SP-230188 |  |  |  | Presented for information and approval | 1.0.0 |
| 2023-03 | SA#99 |  |  |  |  | Upgrade to change control version | 18.0.0 |
| 2023-03 | SA#99 |  |  |  |  | EditHelp review | 18.0.1 |