**3GPP TSG-WG SA2 Meeting #153E e-meeting *S2-220XXXX***

**Elbonia, October 10 – 17, 2022 (revision of S2-2206630)**

**Source: Huawei, HiSilicon**

**Title: KI#5 Sol#29 Update: Policy and Authorization for Multi-path Transmission**

**Document for: Approval**

**Agenda Item: 9.26**

**Work Item / Release: FS\_5G\_ProSe\_Ph2 / Rel-18**

*Abstract: Update of solution #29 on policy and authorization for Multi-path Transmission via Layer-3 UE-to-Network Relay without N3IWF.*

# 1. Introduction/Discussion

This proposes to update solution#29 and remove all ENs:

Editor's note: The details for how to provision the authorization and policy parameters for multi-path transmission service is FFS.

For Multi-path Transmission via Layer-3 UE-to-Network Relay without N3IWF, it proposes to use the similar mechanism as Rel-17 ProSe to enhance URSP with the RSD including a new item "Multi-Path ProSe Layer-3 UE-to-Network Relay Offload indication" alongside the existing "ProSe Layer-3 UE-to-Network Relay Offload" keeping them separate.

Both cannot be present in the same a Route Selection Descriptor, as per NOTE 4 for the existing indication in Rel-17:

NOTE 4: If this indication is present in a Route Selection Descriptor, no other components shall be included in the Route Selection Descriptor.

This solution is different from Sol#25. In Sol#25, Multi-Path preference in RSD not only indicates the Multi-Path via direct Uu and Layer-2 UE-to-Network Relay, but also indicates the Multi-Path via direct Uu and Layer-3 UE-to-Network Relay and allows the new added Multi-Path preference indication to be present with ProSe Layer-3 UE-to-Network Relay Offload indication in a Route Selection Descriptor.

Editor's note: Whether this solution applies L2 is FFS.

To clarify that this solution only applies to Layer-3 UE-to-Network Relay without N3IWF.

Editor's note: How to subscribe to the multi-path transmission service is FFS.

Multi-path transmission service is regarded as subscription data as authorization and policy parameters for a UE. How to subscribe to the multi-path transmission service is not specified.

# 2. Text Proposal

It is proposed to capture the following changes vs. TR 23.700-33.

\* \* \* \* First change \* \* \* \*

## 6.29 Solution #29: multi-path transmission for Layer-3 UE-to-Network Relay without N3IWF

### 6.29.1 Description

#### 6.29.1.1 Overview

In this solution, it proposes to reuse existing procedure as much as possible. The network can provision the authorization and policy parameters for multi-path transmission service to UE as existing mechanism specified in TS 23.304 [3]. This solution applies to Layer-3 UE-to-Network Relay without N3IWF.

#### 6.29.1.2 Policy for Multi-path Transmission via Layer-3 UE-to-Network Relay without N3IWF

In the clause 6.5.4 of TS 23.304 [4] (5G ProSe Remote UE traffic handling for 5G ProSe UE-to-Network Relay support), the application traffic on the 5G ProSe Remote UE is managed by URSP rules, and the URSP rule is enhanced with the RSD including "5G ProSe Layer 3 UE-to-Network Relay Offload indication".

Using the similar mechanism, the multi-path transmission of application traffic on 5G ProSe Layer-3 Remote UE is also managed by URSP rules, where the URSP rule is enhanced with the RSD including a new item "Multi-Path ProSe Layer-3 UE-to-Network Relay Offload indication".

6.29.2 Procedures

Table 6.29.2-1: (Table 6.6.2.1-3 in TS 23.503 [13]) Route Selection Descriptor with Multipath

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Information name | Description | Category | PCF permitted to modify in URSP | Scope |
| Route Selection Descriptor Precedence  | Determines the order in which the Route Selection Descriptors are to be applied.  | Mandatory(NOTE 1) | Yes | UE context |
| **Route selection components** | *This part defines the route selection components* | Mandatory(NOTE 2) |  |  |
| SSC Mode Selection | One single value of SSC mode.(NOTE 5) | Optional | Yes | UE context |
| Network Slice Selection | Either a single value or a list of values of S-NSSAI(s). | Optional(NOTE 3) | Yes | UE context |
| DNN Selection | Either a single value or a list of values of DNN(s). | Optional | Yes | UE context |
| PDU Session Type Selection | One single value of PDU Session Type | Optional(NOTE 8) | Yes | UE context |
| Non-Seamless Offload indication | Indicates if the traffic of the matching application is to be offloaded to non-3GPP access outside of a PDU Session. | Optional(NOTE 4) | Yes | UE context |
| ProSe Layer-3 UE-to-Network Relay Offload indication | Indicates if the traffic of the matching application is to be sent via a ProSe Layer-3 UE-to-Network Relay outside of a PDU session. | Optional(NOTE 4) | Yes | UE context |
| ***Multi-Path ProSe Layer-3 UE-to-Network Relay Offload indication*** | ***Indicates if the traffic of the matching application is to be sent using Multi-Path via direct Uu path and a Layer-3 UE-to-Network Relay path.*** | ***Optional*** | ***Yes*** | ***UE context*** |
| Access Type preference | Indicates the preferred Access Type (3GPP or non-3GPP or Multi-Access) when the UE establishes a PDU Session for the matching application. | Optional | Yes | UE context |
| PDU Session Pair ID | An indication shared by redundant PDU Sessions as described in clause 5.33.2.1 of TS 23.501 [2]. | Optional | Yes | UE context |
| RSN | The RSN as described in clause 5.33.2.1 of TS 23.501 [2]. | Optional | Yes | UE context |
| **Route Selection Validation Criteria**(NOTE 6) | *This part defines the Route Validation Criteria components* | Optional |  |  |
| Time Window | The time window when the matching traffic is allowed. The RSD is not considered to be valid if the current time is not in the time window. | Optional | Yes | UE context |
| Location Criteria | The UE location where the matching traffic is allowed. The RSD rule is not considered to be valid if the UE location does not match the location criteria. | Optional | Yes | UE context |
| NOTE 1: Every Route Selection Descriptor in the list shall have a different precedence value.NOTE 2: At least one of the route selection components shall be present.NOTE 3: When the Subscription Information contains only one S-NSSAI in UDR, the PCF needs not provision the UE with S-NSSAI in the Network Slice Selection information. The "match all" URSP rule has one S-NSSAI at most.NOTE 4: If this indication is present in a Route Selection Descriptor, no other components shall be included in the Route Selection Descriptor.NOTE 5: The SSC Mode 3 shall only be used when the PDU Session Type is IP.NOTE 6: The Route Selection Descriptor is not considered valid unless all the provided Validation Criteria are met.NOTE 7: In this Release of specification, inclusion of the Validation Criteria in Roaming scenarios is not considered.NOTE 8: When the PDU Session Type is "Ethernet" or "Unstructured", this component shall be present. |

The ProSe Layer-3 UE-to-Network Relay Offload indication and Multi-Path ProSe Layer-3 UE-to-Network Relay Offload indication are separated indications. ProSe Layer-3 UE-to-Network Relay Offload indication is used for only one path via a ProSe Layer-3 UE-to-Network Relay, and if present no other components shall be included. The Multi-Path ProSe Layer-3 UE-to-Network Relay Offload indication acts in a similar way to the existing indication, except it is an additional indication that can be present with other components and indicates that the traffic can be sent via direct Uu and outside of a PDU Session via a Layer-3 UE-to-Network Relay.

- ProSe Layer-3 UE-to-Network Relay Offload indication (existing Rel-17 component): Indicates that the traffic of the matching application is to be sent via a ProSe Layer-3 UE-to-Network Relay outside of a PDU Session when the rule is applied. If this indication is absent then the traffic matching of the URSP rule shall not be sent via a ProSe Layer-3 UE-to-Network Relay outside of a PDU Session. If this component is present in a Route Selection Descriptor, no other components shall be included in the Route Selection Descriptor.

- Multi-Path ProSe Layer-3 UE-to-Network Relay Offload indication (new indication for Rel-18): Indicates that the traffic of the matching application is to be sent using Multi-Paths of direct via a Uu path (as determined by the other components in the RSD) and sent outside of a PDU Session using a Layer-3 UE-to-Network Relay. If this indication is absent then the traffic matching of the URSP rule shall not be sent using the multiple of directly via Uu and outside of a PDU Session using a Layer-3 UE-to-Network Relay. If this component is present in a Route Selection Descriptor, other components can be included in the Route Selection Descriptor.

When the UE evaluates URSP rule for application traffic:

- If the selected RSD contains "Multi-Path ProSe Layer-3 UE-to-Network Relay Offload indication":

- The 5G ProSe Remote UE can route the traffic over an existing PC5 connection with 5G ProSe Layer-3 UE-to-Network Relay and existing PDU Session matched to other components (e.g., Network Slice Selection) in the selected RSD, when such connections are available.

- If the PC5 connection with 5G ProSe Layer-3 UE-to-Network Relay is not available, this may trigger the 5G ProSe Remote UE to start 5G ProSe UE-to-Network Relay discovery and connection establishment, controlled by the ProSe Policy configured on the 5G ProSe Remote UE.

- If the PDU Session matched to other components is not available, this will trigger to establish a new PDU Session using the values specified by the selected RSD.

The Route Selection Descriptor of a URSP rule shall be only considered valid if Multi-Path ProSe Layer-3 UE-to-Network Relay Offload indication is present and the UE supports the ProSe capability of 5G ProSe Layer-3 Remote UE.

6.29.2.2 Procedure for Multi-path connection establishment via Layer-3 UE-to-Network Relay without N3IWF

There following cases are described, depending upon what connections are existing:

- Case A, UE has established Uu connection to deliver traffic to the target DN. When UE is authorized to use the multi-path transmission service for a specific traffic based on URSP, the UE triggers discovery of a UE-to-Network Relay and tries to establish a connection to the same target for data traffic as existing mechanism specified in TS 23.304 [3].

- Case B, UE has established 3GPP connection to the target DN via UE-to-Network Relay. When UE is authorized to use the multi-path transmission service for a specific traffic based on URSP, the UE triggers the establishment of a 3GPP connection via Uu as specified in TS 23.502 [8], e.g. establishing a PDU Session to deliver the traffic to the same DN.

- Case C, UE has not established Uu connection to deliver traffic to the target DN and has not established 3GPP connection to the target DN via UE-to-Network Relay. When the UE is authorized to use the multi-path transmission service for a specific traffic based on URSP, the UE perform the actions in case A and case B, i.e. triggers discovery and connection via a UE-to-Network Relay, and establish a Uu connection and/or a PDU Session over Uu to deliver the traffic to the same target DN.

For all the cases how to integrate the traffic from both the Uu connection and the connection via UE-to-Network Relay is up to the application layer.

### 6.29.3 Impacts on services, entities and interfaces

No impact on 3GPP for Multi-path connection establishment via Layer-3 UE-to-Network Relay without N3IWF.

URSP enhancement for Multi-path Transmission via Layer-3 UE-to-Network Relay without N3IWF.

\* \* \* \* End of changes \* \* \* \*