**3GPP TSG-CT WG1 Meeting #141eC1-232145**

**Online 17– 21 April 2023**

**Source: Nokia, Nokia Shanghai Bell, Ericsson**

**Title: Pseudo-CR on** **A2X PC5 unicast link modification procedure**

**Spec: 3GPP TS 24.577 v0.0.0**

**Agenda item: 18.2.21**

**Document for: Approval**

**1. Introduction**

This p-CR provides content of A2X PC5 unicast link modification procedure (Section 6.1.2.3) in 3GPP TS 24.577 specification related to the UAS\_Ph2 work item.

**2. Reason for Change**

A2X PC5 unicast link modification procedure (Section 6.1.2.3) in 3GPP TS 24.577 specification needs to be defined based on SA2 requirements in clause 4.2.1.2.1 and clause 5.4.4 in 3GPP TS 23.256.

**3. Proposal**

It is proposed to agree the following changes to 3GPP TS 24.577 v0.0.0.

\* \* \* First Change \* \* \* \*

#### 6.1.2.3 A2X PC5 unicast link modification procedure

##### 6.1.2.3.1 General

The purpose of the A2X PC5 unicast link modification procedure is to modify the existing A2X PC5 unicast link to:

a) add new PC5 QoS flow(s) to the existing A2X PC5 unicast link;

b) modify existing PC5 QoS flow(s) for updating PC5 QoS parameters of the existing PC5 QoS flow(s);

c) modify existing PC5 QoS flow(s) for associating new A2X service(s) with the existing PC5 QoS flow(s);

d) modify existing PC5 QoS flow(s) for removing the associated A2X service(s) from the existing PC5 QoS flow(s); or

e) remove existing PC5 QoS flow(s) from the existing A2X PC5 unicast link.

In this procedure, the UE sending the A2X DIRECT LINK MODIFICATION REQUEST message is called the "initiating UE" and the other UE is called the "target UE".

##### 6.1.2.3.2 A2X PC5 unicast link modification procedure initiated by initiating UE

The initiating UE shall meet the following pre-conditions before initiating this procedure for adding a new A2X service to the existing A2X PC5 unicast link:

a) there is an A2X PC5 unicast link between the initiating UE and the target UE; and

b) the pair of application layer IDs and the network layer protocol of this A2X PC5 unicast link are identical to those required by the application layer in the initiating UE for this A2X service.

c) the security policy corresponding to the A2X service identifier(s) (e.g. ITS-AID of the new A2X service) is aligned with the security policy of the existing A2X PC5 unicast link.

After receiving the service data or request from the upper layers, the initiating UE shall perform the PC5 QoS flow match as specified in clause 6.1.2.13. If there is no matched PC5 QoS flow, the initiating UE shall derive the PC5 QoS parameters and assign the PQFI(s) for the PC5 QoS flows(s) to be established as specified in clause 6.1.2.12.

If the A2X PC5 unicast link modification procedure is to add new PC5 QoS flow(s) to the existing A2X PC5 unicast link, the initiating UE shall create an A2X DIRECT LINK MODIFICATION REQUEST message. In this message, initiating UE:

a) shall include the PQFI(s) and the corresponding PC5 QoS parameters, including the A2X service identifier(s); and

b) shall include the link modification operation code set to "Add new PC5 QoS flow(s) to the existing A2X PC5 unicast link ".

If the A2X PC5 unicast link modification procedure is to modify the PC5 QoS parameters for existing PC5 QoS flow(s) in the existing A2X PC5 unicast link, the initiating UE shall create an A2X DIRECT LINK MODIFICATION REQUEST message. In this message, the initiating UE:

a) shall include the PQFI(s) and the corresponding PC5 QoS parameters, including the A2X service identifier(s); and

b) shall include the link modification operation code set to "Modify PC5 QoS parameters of the existing PC5 QoS flow(s)".

If the A2X PC5 unicast link modification procedure is to associate new A2X service(s) with existing PC5 QoS flow(s), the initiating UE shall create an A2X DIRECT LINK MODIFICATION REQUEST message. In this message, the initiating UE:

a) shall include the PQFI(s) and the corresponding PC5 QoS parameters, including the A2X service identifier(s); and

b) shall include the link modification operation code set to "Associate new A2X service(s) with existing PC5 QoS flow(s)".

If the A2X PC5 unicast link modification procedure is to remove the associated A2X service(s) from existing PC5 QoS flow(s), the initiating UE shall create an A2X DIRECT LINK MODIFICATION REQUEST message. In this message, the initiating UE:

a) shall include the PQFI(s) and the corresponding PC5 QoS parameters including the A2X service identifier(s); and

b) shall include the link modification operation code set to "Remove A2X service(s) from existing PC5 QoS flow(s)".

If the A2X PC5 unicast link modification procedure is to remove any PC5 QoS flow(s) from the existing A2X PC5 unicast link, the initiating UE shall create an A2X DIRECT LINK MODIFICATION REQUEST message. In this message, the initiating UE:

a) shall include the PQFI(s); and

b) shall include the link modification operation code set to "Remove existing PC5 QoS flow(s) from the existing A2X PC5 unicast link".

After the A2X DIRECT LINK MODIFICATION REQUEST message is generated, the initiating UE shall pass this message to the lower layers for transmission along with the initiating UE's layer-2 ID for unicast communication and the target UE's layer-2 ID for unicast communication, and start timer Taaaa. The UE shall not send a new A2X DIRECT LINK MODIFICATION REQUEST message to the same target UE while timer Taaaa is running.



Figure 6.1.2.3.2: A2X PC5 unicast link modification procedure

##### 6.1.2.3.3 A2X PC5 unicast link modification procedure accepted by the target UE

If the A2X DIRECT LINK MODIFICATION REQUEST message is accepted, the target UE shall respond with the A2X DIRECT LINK MODIFICATION ACCEPT message.

If the A2X DIRECT LINK MODIFICATION REQUEST message is to add a new A2X service, add new PC5 QoS flow(s) or modify any existing PC5 QoS flow(s) in the A2X PC5 unicast link, the target UE shall include in the A2X DIRECT LINK MODIFICATION ACCEPT message:

a) the PQFI(s), the corresponding PC5 QoS parameters and the A2X service identifier(s) that the target UE accepts.

If the A2X DIRECT LINK MODIFICATION REQUEST message is to remove an existing A2X service from the A2X PC5 unicast link, the target UE shall delete the A2X service identifier received in the A2X DIRECT LINK MODIFICATION REQUEST message and the corresponding PQFI(s) and PC5 QoS parameters from the profile associated with the A2X PC5 unicast link.

If the A2X DIRECT LINK MODIFICATION REQUEST message is to remove existing PC5 QoS flow(s) from the A2X PC5 unicast link, the target UE shall delete the PQFI(s) and the corresponding PC5 QoS parameters from the profile associated with the A2X PC5 unicast link.

If the A2X DIRECT LINK MODIFICATION REQUEST message is to add a new A2X service, add new PC5 QoS flow(s) or modify any existing PC5 QoS flow(s) in the A2X PC5 unicast link, after sending the A2X DIRECT LINK MODIFICATION ACCEPT message, the target UE shall provide the added or modified PQFI(s) and corresponding PC5 QoS parameters along with PC5 link identifier to the lower layer.

If the A2X DIRECT LINK MODIFICATION REQUEST message is to remove an existing A2X service or to remove the existing PC5 QoS flow(s) from the A2X PC5 unicast link, after sending the A2X DIRECT LINK MODIFICATION ACCEPT message, the target UE shall provide the removed PQFI(s) along with the PC5 link identifier to the lower layer.

If the target UE accepts the A2X PC5 unicast link modification request, then the target UE may perform the PC5 QoS flow establishment over A2X PC5 unicast link as specified in clause 6.1.2.12 and perform the PC5 QoS flow match over A2X PC5 unicast link as specified in clause 6.1.2.13.

##### 6.1.2.3.4 A2X PC5 unicast link modification procedure completion by the initiating UE

Upon receipt of the A2X DIRECT LINK MODIFICATION ACCEPT message, the initiating UE shall stop timer Taaaa.

Upon receipt of the A2X DIRECT LINK MODIFICATION ACCEPT message, if the A2X DIRECT LINK MODIFICATION REQUEST message is to add a new A2X service, add new PC5 QoS flow(s) or modify any existing PC5 QoS flow(s) in the A2X PC5 unicast link, the initiating UE shall provide the added or modified PQFI(s) and corresponding PC5 QoS parameters along with PC5 link identifier to the lower layer.

Upon receipt of the A2X DIRECT LINK MODIFICATION ACCEPT message, if the A2X DIRECT LINK MODIFICATION REQUEST message is to remove an existing A2X service or to remove the existing PC5 QoS flow(s) from the A2X PC5 unicast link, the initiating UE shall provide the removed PQFI(s) along with the PC5 link identifier to the lower layer.

In addition, the initiating UE may perform the PC5 QoS flow establishment over A2X PC5 unicast link as specified in clause 6.1.2.12.

##### 6.1.2.3.5 A2X PC5 unicast link modification procedure not accepted by the target UE

If the A2X PC5 unicast link modification request cannot be accepted, the target UE shall send an A2X DIRECT LINK MODIFICATION REJECT message. The A2X DIRECT LINK MODIFICATION REJECT message contains a PC5 signalling protocol cause IE set to one of the following cause values:

#5 lack of resources for A2X PC5 unicast link;

#11 required service not allowed;

#12 security policy not aligned; or

#111 protocol error, unspecified.

If the target UE is not allowed to accept this request, .e.g. because the A2X service to be added is not allowed per the operator policy or configuration parameters for A2X communication over PC5 as specified in clause 5.2.3, the target UE shall send an A2X DIRECT LINK MODIFICATION REJECT message with PC5 signalling protocol cause value #11 "required service not allowed".

If the A2X PC5 unicast link modification fails due to the congestion problems or other temporary lower layer problems causing resource constraints, the target UE shall send an A2X DIRECT LINK MODIFICATION REJECT message with PC5 signalling protocol cause value #5 "lack of resources for A2X PC5 unicast link".

If the link modification operation code is set to "Associate new A2X service(s) with existing PC5 QoS flow(s)", and the security policy corresponding to the A2X service identifier(s) (e.g. ITS-AID of the new A2X service) is not aligned with the security policy applied to the existing A2X PC5 unicast link, then the target UE shall send an A2X DIRECT LINK MODIFICATION REJECT message with PC5 signalling protocol cause value #12 "security policy not aligned".

For other reasons causing the failure of link modification, the target UE shall send an A2X DIRECT LINK MODIFICATION REJECT message with PC5 signalling protocol cause value #111 "protocol error, unspecified".

Upon receipt of the A2X DIRECT LINK MODIFICATION REJECT message, the initiating UE shall stop timer Taaaa and abort the A2X PC5 unicast link modification procedure. If the PC5 signalling protocol cause value in the A2X DIRECT LINK MODIFICATION REJECT message is #11 "required service not allowed" or #5 "lack of resources for A2X PC5 unicast link" or #12 "security policy not aligned", then the initiating UE shall not attempt to start A2X PC5 unicast link modification with the same target UE to add the same A2X service, or to add or modify the same PC5 QoS flow(s) at least for a time period T.

NOTE: The length of time period T is UE implementation specific and can be different for the case when the UE receives PC5 signalling protocol cause value #11 "required service not allowed" or when the UE receives PC5 signalling protocol cause value #5 "lack of resources for A2X PC5 unicast link" or when the UE receives PC5 signalling protocol cause value #12 "security policy not aligned". The length of time period T is not less than 30 minutes.

##### 6.1.2.3.6 Abnormal cases at the initiating UE

The following abnormal cases can be identified:

a) If timer Taaaa expires, the initiating UE shall retransmit the A2X DIRECT LINK MODIFICATION REQUEST message and restart timer Taaaa. After reaching the maximum number of allowed retransmissions, the initiating UE shall abort the A2X PC5 unicast link modification procedure and may notify the upper layer that the target UE is unreachable.

NOTE 1: The maximum number of allowed retransmissions is UE implementation specific.

NOTE 2: After reaching the maximum number of allowed retransmissions, whether the initiating UE releases this A2X PC5 unicast link depends on its implementation.

b) For the same A2X PC5 unicast link, if the initiating UE receives an A2X DIRECT LINK RELEASE message after the initiation of UE-requested A2X PC5 unicast link modification procedure, the initiating UE shall stop the timer Taaaa and abort the A2X PC5 unicast link modification procedure and proceed with the A2X PC5 unicast link release procedure.

c) For the same A2X PC5 unicast link, if the initiating UE receives an A2X DIRECT LINK MODIFICATION REQUEST message during the A2X PC5 unicast link modification procedure, the initiating UE shall stop the timer Taaaa and abort the A2X PC5 unicast link modification procedure. Following handling is implementation dependent, e.g., the initiating UE waits for an implementation dependent time for initiating a new A2X PC5 unicast link modification procedure, if still needed.

NOTE 3: The implementation dependent timer value needs to be set to avoid further collisions (e.g. random timer value).

\* \* \* End of Changes \* \* \* \*