

5G

SL Relay Enhancement in Rel-19

Agenda Item: 8A.2.13.2

Source: Lenovo

Document for: Discussion

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+ Rel-19 Sidelink Relay Overview

❖ Sidelink relay for L2 U2N relay

❖ Multi-path Enhancement

- More indirect paths can be supported for Multi-path.

❖ Mobility with Multi-path

- Multi-path can be configured by target gNB.

❖ Path Switching Enhancement

- Condition based path switching
- DAPS based path switching

❖ Group based Mobility

❖ Sidelink relay for L2 U2U relay

❖ Multiple U2U relay UEs

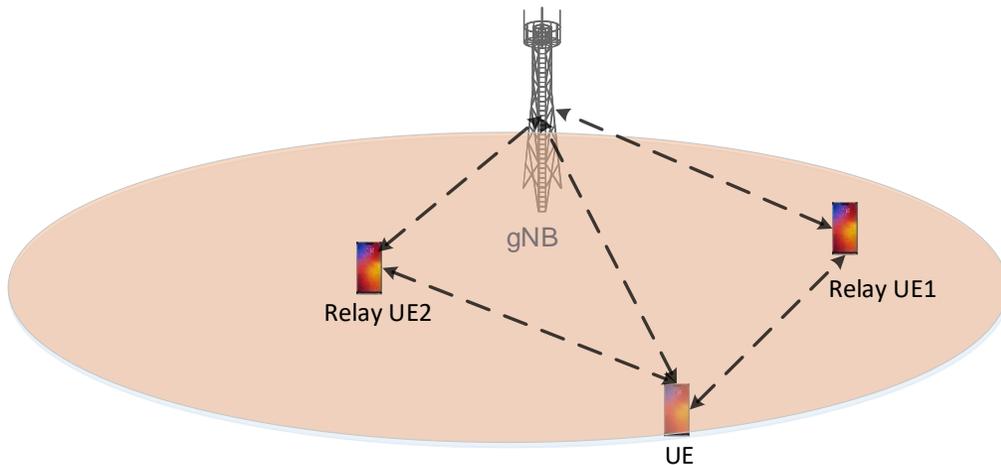
+ Rel-19: Sidelink Relay

- **Multi-path Enhancement for single-hop L2 U2N relay**

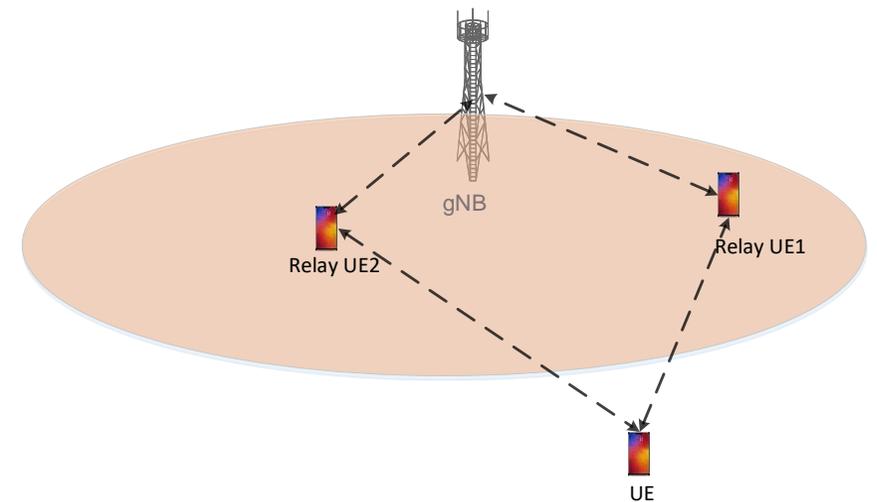
- Background: Intra-gNB based Multi-path is supported in Rel-18. Namely, A UE is connected to the same gNB using one direct path and one indirect path.

- **Proposals:**

- Proposal 1: More indirect paths can be configured in multi-path case.
 - Case 1: A UE is connected to the serving gNB using one direct path and multiple indirect paths.
 - Case 2: A UE is connected to the serving gNB using multiple indirect paths (without direct path).



Case 1



Case 2

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- **Multi-path Enhancement for single-hop L2 U2N relay**

Background: Intra-gNB based Multi-path is supported in Rel-18. Namely, A UE is connected to the same gNB using one direct path and one indirect path. Path addition/switching/release will be supported in Rel-18. However, Inter-gNB mobility with multi-path may not be supported according to the current RAN2 progress.

- **Proposals:**

- Inter-gNB mobility with multi-path should be supported in Rel-19 as follows.
 - Case A: Direct path in source gNB#1 -> Multi-path in target gNB#2
 - Case B: Indirect path in source gNB#1 -> Multi-path in target gNB#2
 - Case C: Multi-path in source gNB#1 -> Multi-path in target gNB#2

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- **Legacy Mobility for single-hop L2 U2N relay**

The following path switching for remote UE has been supported in Rel-18 via L3 path switching command.

A. Intra-gNB/Inter-gNB indirect-to-direct (i2d) path switching

B. Intra-gNB/Inter-gNB direct-to-indirect (d2i) path switching

C. Intra-gNB/Inter-gNB indirect-to-indirect(i2i) path switching

In legacy, condition based handover e.g CHO or CPAC is supported to ensure robustness. DAPS handover is supported to achieve almost 0 interruption time.

- **Proposals:**

- Condition based mobility for remote UE can be supported for i2d/d2i/i2i path switching.
- DAPS mechanism can be extended to the inter-gNB for i2d/d2i/i2i path switching.

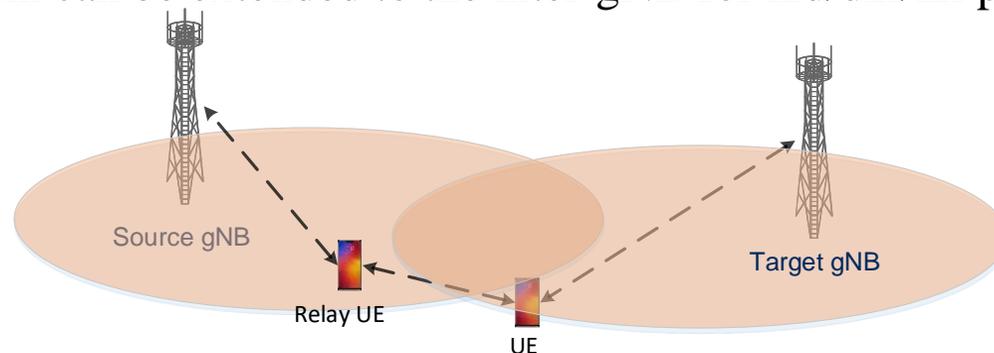


Fig. DAPS based i2d path switching

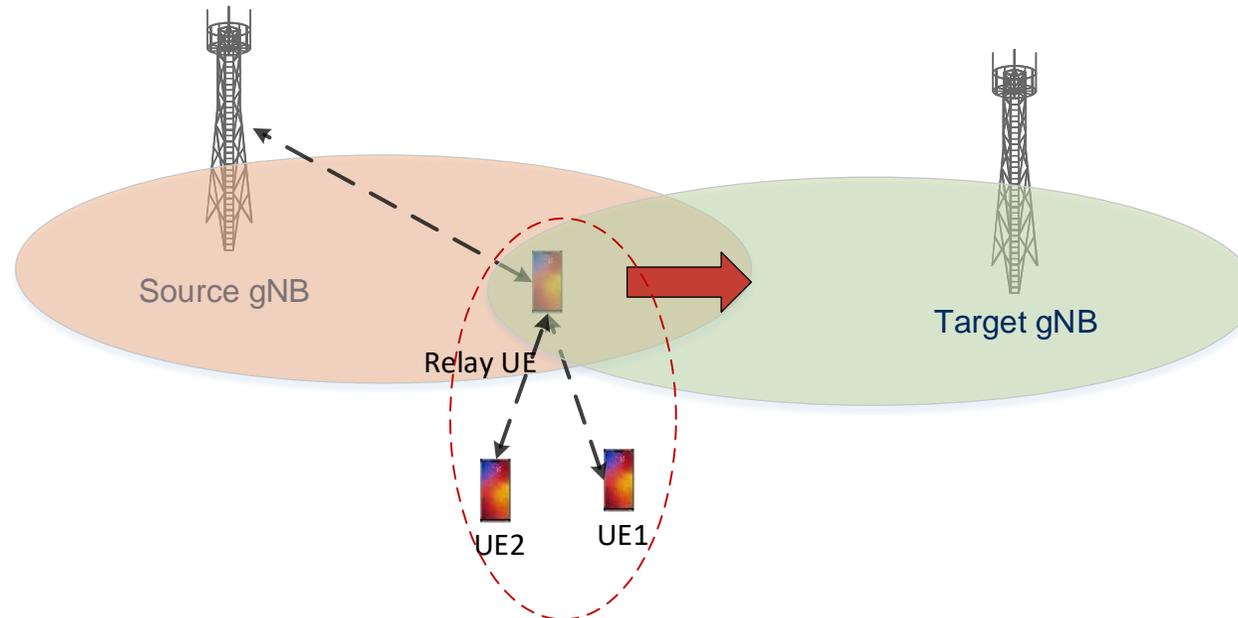
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- **Mobility enhancement for single-hop L2 U2N relay**

Background: In Rel-17/18, we consider the case that a remote UE accesses the serving cell via indirect path. If the relay UE performs handover, relay UE will indicate to the served remote UE(s). Then, the remote UE has to perform re-establishment procedure which will result in service interruption due to re-establishment. Therefore, if the mobility for combination of relay UE and the serving remote UE(s) can be supported, service continuation can be ensured.

- **Proposals:**

- Group based mobility e.g combination of relay UE and remote UE(s) can be supported.



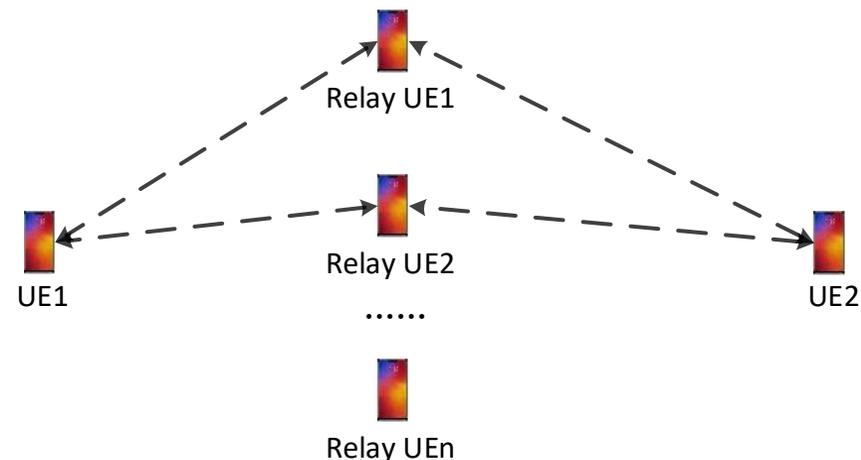
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- **Enhancement for single-hop L2 U2U relay**

In Rel-18 L2 U2U relay, a remote UE can communicate with another remote UE via a single L2 U2U relay UE. There is an end-to-end RRC connection between two remote UEs. In this case, once there is a problem in any hop e.g. failure of PC5 link, both remote UEs will perform relay reselection. A new end-to-end RRC connection should be established after completing relay reselection in which a long interruption may happen. Therefore, we can consider the remote UE communicates with each other via more than one relay UE which can improve the reliability. In this way, UE can select one relay for communication or transmit/receive the data via multiple U2U relay in parallel.

- **Proposals:**

- **To support that a remote UE communicates with another remote UE via multiple L2 U2U relay UEs.**



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