



# Background

- 3GPP specified NR sidelink technology in R16 for V2X-related service, which covers broadcast, groupcast and unicast communication between vehicles.
- Based on the NR sidelink air interface, 3GPP specified U2N and U2U sidelink relays in R17/R18, for network and sidelink coverage extension, where the Remote UE can select an appropriate Relay UE to ensure service continuity when the link quality deteriorates.
- Specifically, NR R17 supports single-hop and single-path U2N relaying, and NR R18 further supports multi-path U2N relaying and single-hop and single-path U2U relaying.
- In RAN#102, RAN agrees to do NR SL multi-hop Relay work in R19:

## Way Forward

- 📶 RAN agrees to do NR SL multi-hop Relay work in Rel-19
- 📶 WID will be submitted for approval in RAN#104. TBD when it will be approved.
- 📶 The work will be completed in 6 TUs
- 📶 NR SL multi-hop Relay work in RAN2 will focus on the following:
  - L2 U2N SL Relay
  - RAN2 will start with specifying one additional hop relay and see if it can be easily extended to two additional hops relays. Aim to have a forward compatible solution for future extension for additional relays.
  - Only limited service continuity scenarios will be considered. TBD which scenarios will be supported in the WID

# Justification

- R17 and R18 NR sidelink relay work item only included limited features, e.g. single-hop relaying for U2N and U2U. According to TS22.261, for public safety and commercial scenarios, more than one hops relaying are required:

Scenario	Estimated number of hops
InHome Scenario	2 to 3
Factory Sensors	2 to 3
Smart Metering	2 to 5
Containers	3 to 9
Freight Wagons	10 to 15
Public Safety	2 to 4
Wearables	1 to 2

- Especially, public safety has been identified as one of scenarios which is eager to support multi-hop relaying. With support of multi-hop relaying, additional coverage over R18 single-hop relaying will be provided and public safety can benefit from the extended network coverage.

# Proposed objectives for R19 WI

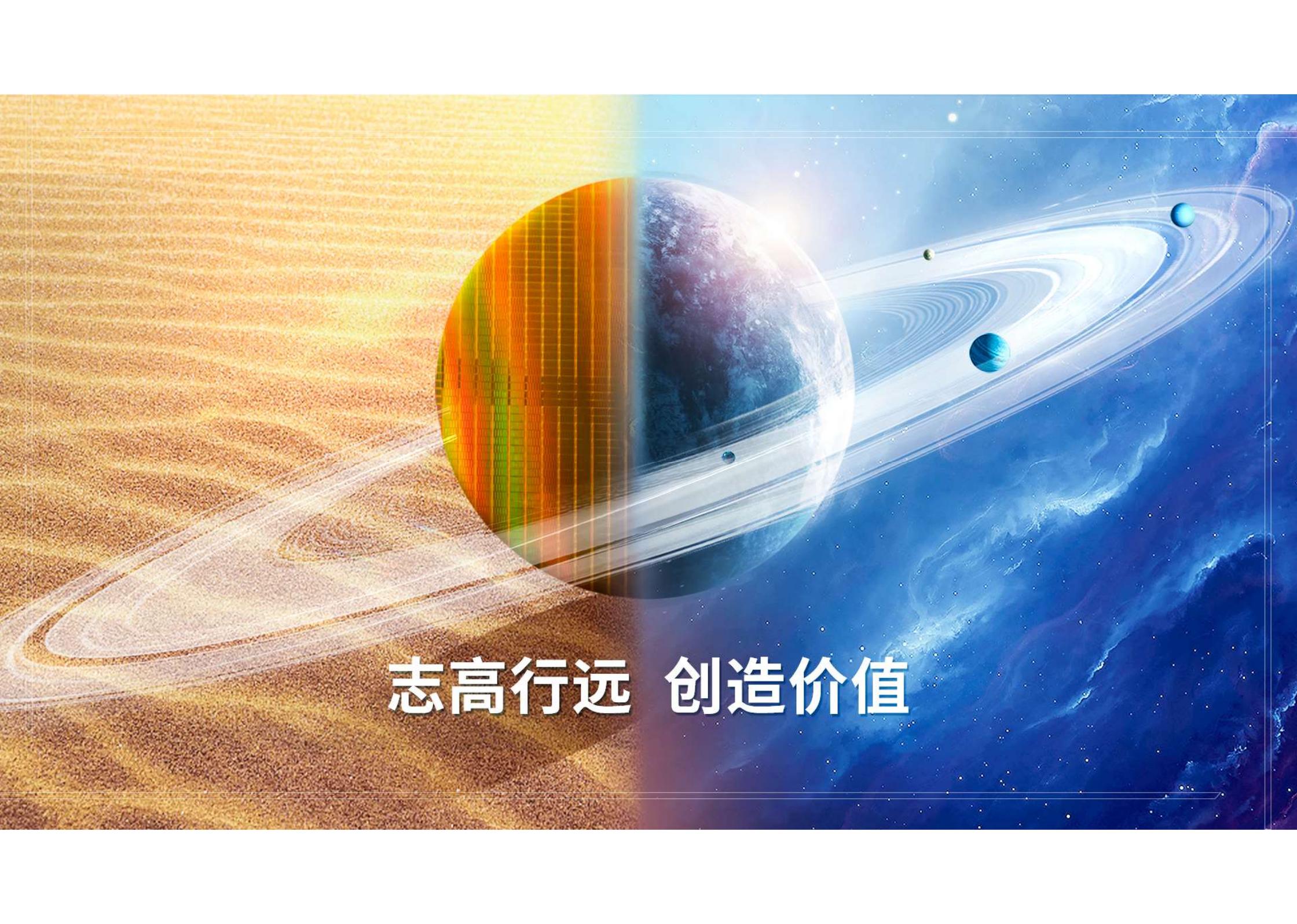
- The following objectives are proposed for Rel-19 NR SL multi-hop relay WI:

The objective of this work item is to specify solutions that are needed to enhance NR Sidelink Relay for the public safety use case.

Specify two-hop Layer-2 UE-to-Network relay for unicast (i.e., remote UE  $\leftrightarrow$  relay UE A  $\leftrightarrow$  relay UE B  $\leftrightarrow$  gNB) [RAN2, RAN3]

1. Relay discovery and (re)selection [RAN2]
2. Signalling support for Relay and remote UE authorization if SA2 concludes it is needed [RAN3]
3. SRAP layer design to enable two-hop routing [RAN2]
4. QoS management, e.g., fairness, latency and congestion control [RAN2]
5. Service continuity enhancement for the following scenarios [RAN2]:
  - A. Intra-gNB direct-to-indirect path switching (i.e., “remote UE  $\leftrightarrow$  gNB X” to “remote UE  $\leftrightarrow$  relay UE A  $\leftrightarrow$  relay UE B  $\leftrightarrow$  gNB X” )
  - B. Intra-gNB indirect-to-direct path switching (i.e., “remote UE  $\leftrightarrow$  relay UE A  $\leftrightarrow$  relay UE B  $\leftrightarrow$  gNB X” to “remote UE  $\leftrightarrow$  gNB X”)

Note: Two-hop relay design should strive for forward compatibility for future extension for additional relays.



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