

**3GPP TSG RAN Rel-19 workshop**

**Taipei, June 15 - 16, 2023**

**TDOC: RWS-230399**

# **NTN Enhancements Proposal for Rel-19**

**Source: Rakuten Mobile**

**Rakuten Mobile**

# NTN support for UE's without GPS capabilities

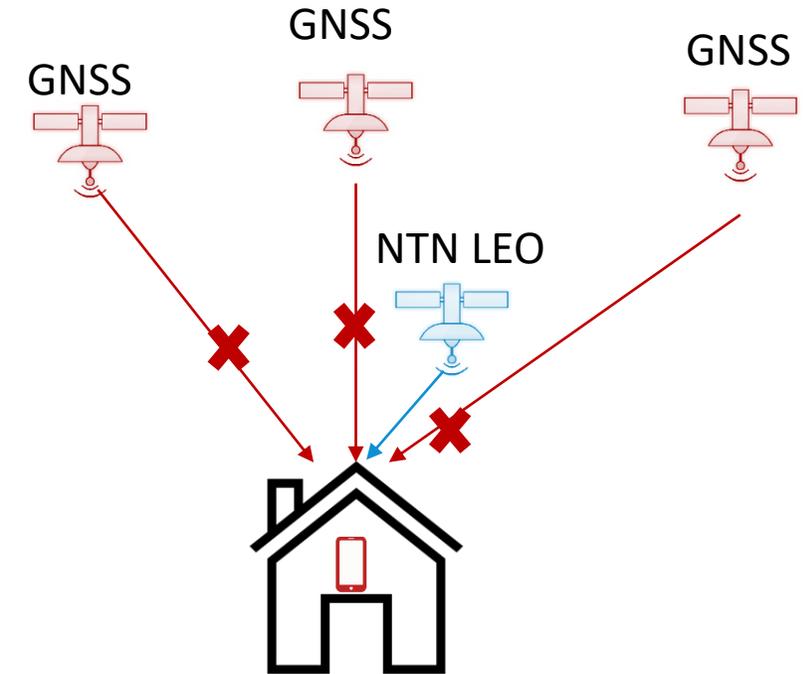
In current releases, NTN based 5G access can only be provided to UE's that have already acquired GNSS location.

GNSS capabilities are required to perform delay and Doppler compensation for Time and Frequency Synchronization.

Due to this limitation, NTN coverage is virtually limited to outdoor users.

## Release 19 – Proposal

- Compare GNSS Link budget required for Location information (For comparison with LEO Satellites)
- Further investigate on how the UE without GNSS Capabilities/location info can compensate delay and Doppler.



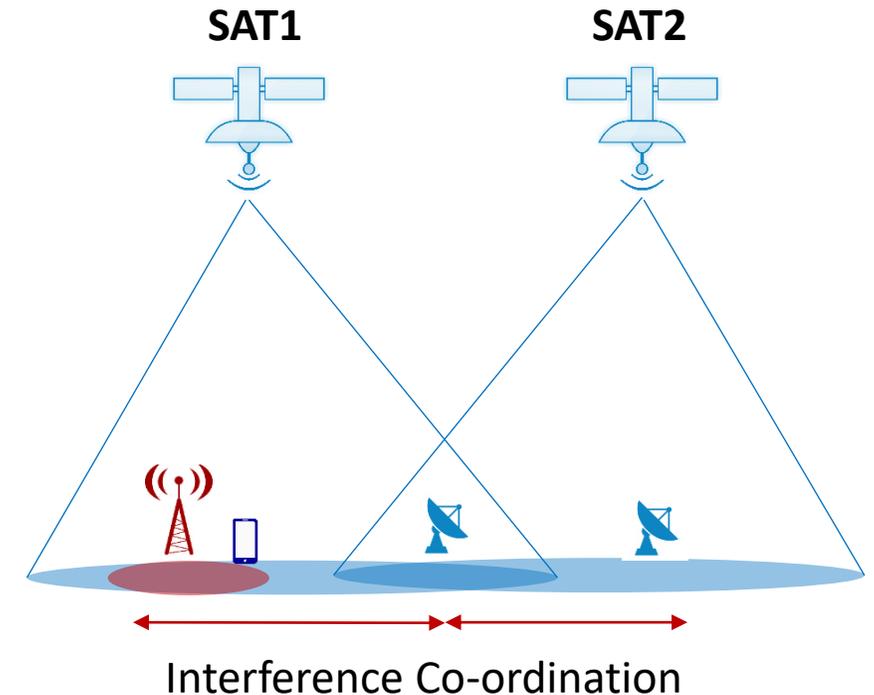
# Interference co-ordination enhancements for NTN to NTN and NTN to TN Case

In few countries, operators may launch NTN based NR services using the same spectrum as already allocated Terrestrial network.

LTE based Schemes like eICIC , ABS need to be enhanced for interference co-ordination and mitigation between NR NTN and TN networks.

## Release 19 – Proposal (RAN3,RAN1)

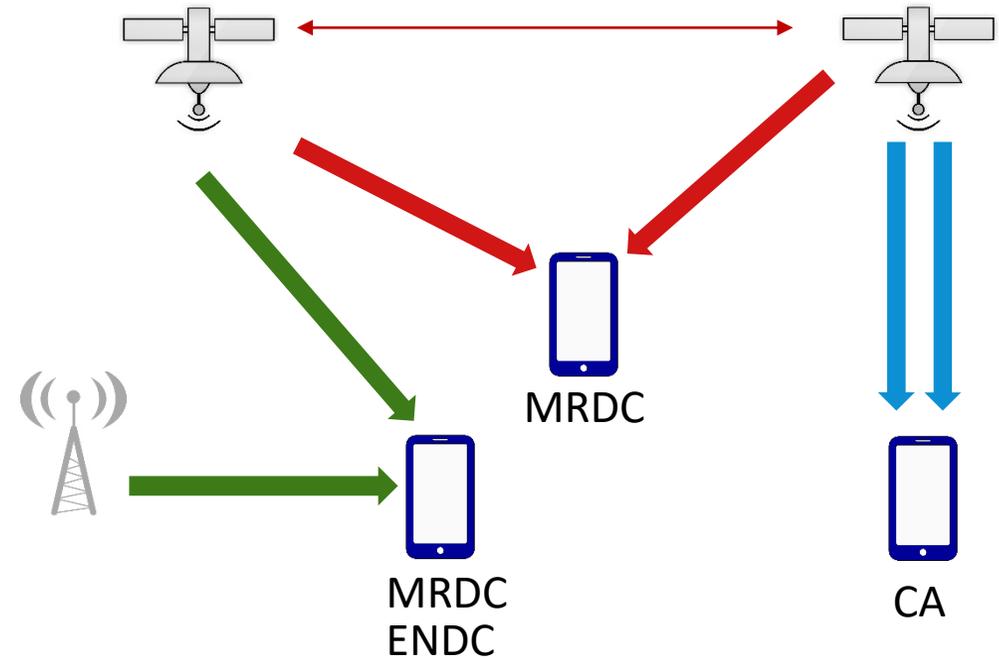
- Study potential Interference avoidance mechanisms between Terrestrial to NTN and NTN to NTN. [RAN3,RAN1]
- Scope of Study should include both Transparent and regenerative satellites.



# ENDC , MRDC and CA-Support for NTN

## Release 19 – Proposal

- Support multi-connectivity for NTN in release 18
  - MR-DC, EN-DC and CA



#	Aggregation Type	Applicable Scenarios	High Priority Architecture type	X2 Link	Use Case
1	MR DC	Inter/Intra Satellite	Transparent	Terrestrial	Throughput, Reliability
2	MR DC	Inter Satellite	On Board CU	Inter satellite Link	Throughput, Reliability
3	MR DC	Inter NTN - TN	Transparent	Terrestrial	Reliability
4	EN DC	Inter NTN - TN	Transparent	Terrestrial	Reliability
5	CA	Intra Satellite	Transparent or On Board CU	On Board	Throughput

# Proposals

1. Current interference Co-ordination and mitigation schemes for LTE like eICIC and ABS are not suitable for “NTN to Terrestrial Network” we propose RAN1 Study Item to investigate co-channel Interference suppression and avoidance techniques for NR NTN to TN.
3. In Rel-17/Rel-18 only GNSS capable UE’s can access the NTN. We propose a possibility to support a user without GNSS capability in Rel-19.
4. Multi-connectivity -ENDC & MRDC should be supported in Rel-19.
5. Study Inter-Satellite MIMO feasibility during Rel-19 Timeline.