3GPP TSG RAN Rel-18 workshop RWS-210284

Electronic Meeting, June 28 – July 2, 2021

Agenda Item:	4.2
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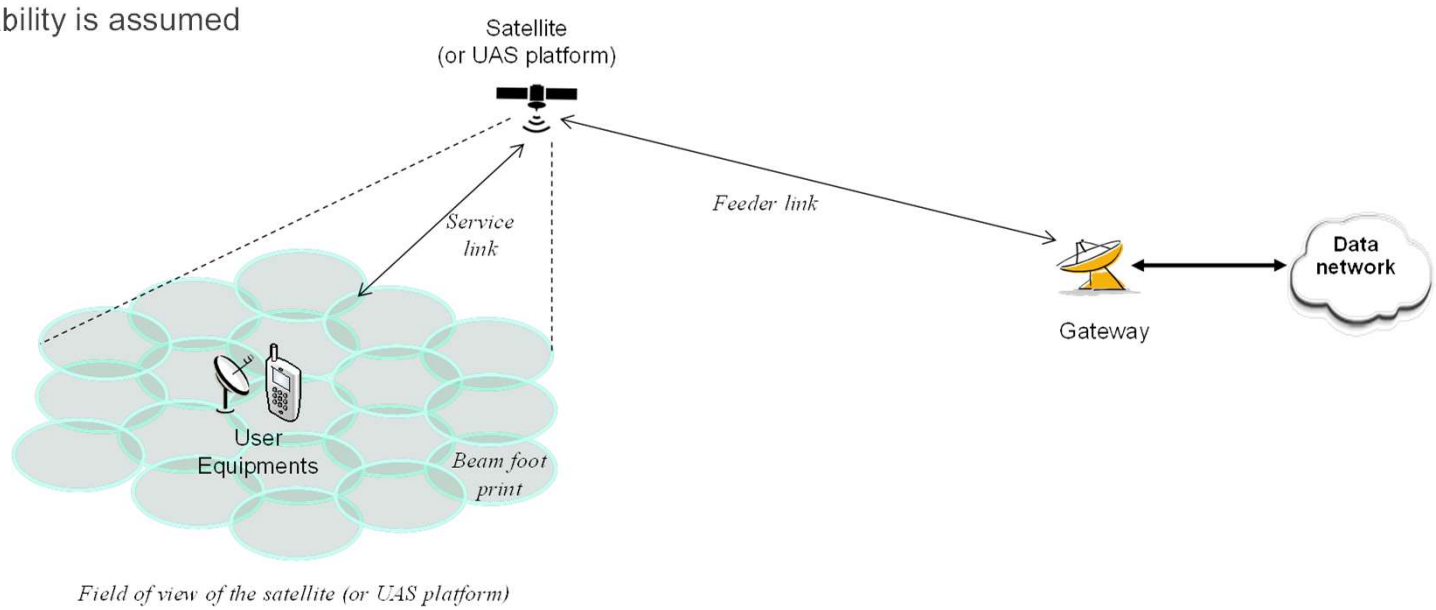
NTN enhancement in Rel-18

Outline

- Rel-17 NTN overview
- Rel-18 eNTN proposals

Background: Rel-17 scenario

- NTN and IoT NTN WI/SI are approved in Rel-17 phase
- Typical scenario [TR 38.821]
  - FDD is assumed
  - LEO/MEO/GEO with earth fixed or moving beam can be supported
  - Transparent payload is assumed
  - IoT/Handheld/VSAT UE types are assumed
  - GNSS capability is assumed



Outline

- Rel-17 NTN overview
- Rel-18 eNTN proposals

eNTN proposals

- The essential deign for supporting satellite communication is specified in Rel-17
- Performance enhancement is needed in Rel-18

• Video/photo based Surveillance that requires high data rate	→	Data rate enhancement
• Users in a deep fading area that is hard to acquire the GNSS capability	→	Positioning enhancement
• Support of smart phone	→	Coverage enhancement
• Users in a multi-connectivity area that requires a high data rate service	→	Mobility enhancement

Data rate enhancement

■Application scenarios

— Video/photo based Surveillance that requires high data rate

- DL: 1 Mbps
- UL: up to [25] Mbps

■Potential Challenges

— The Rel-17 NTN design may not meet the data rate requirement for the video/photo based surveillance service especially on the UL

■Proposals:

- Evaluate the air interface capability and identify the potential performance gap (RAN1)
- Specify the potential solutions supporting higher date rate to meet the service requirement (RAN1, RAN2, RAN4)

  — Enhanced beam management schemes to support multi-beam operation e.g, by CA-like scheme within a Satellite.

  — Coordinated transmissions using multiple beams from different satellites

Positioning enhancement

■Application scenarios

－Users in a deep fading area that is hard to acquire the GNSS capability

■Potential Challenges

－Unreliable UE-generated location information

－GNSS availability/performance cannot be guaranteed in some scenarios

■Proposals:

- Study the feasibility of Rel-16 RAT dependent positioning for NTN and specify the necessary changes to support positioning for NTN (RAN1, RAN2, RAN3, RAN4)

  －Positioning with single/multiple satellite(s)

  －Multi-RTT/RSTD with single node in different time

  －Enhance positioning architecture

Coverage enhancement

■Application scenario:

- Support of smart phone in NTN

■Potential challenges:

- The Tx/Rx antenna gain assumed for smart phone is around -5dbi which is 5 dB lower than the assumption for the handheld devices

■ Proposals

- Identify the target channel(s) that have coverage issues and evaluate the coverage gap (RAN1)
- Specify the potential solutions to improve the coverage performance. (RAN1, RAN2, RAN4)
  - Support enhanced transmission schemes such as repetition/aggregated transmission to fill the coverage gap
  - Evaluate the feasibility to support high power UE for some NTN bands

Mobility enhancement

■Application scenario

- Users in a multi-connectivity area
  - —It is important to guarantee the service quality and reduce UE power consumption for UE mobility between TN and NTN

■Potential challenge

- The Rel-17 mechanism for service continuity between TN and NTN will lead much handover interruption and UE power consumption

■Proposals

- Specify the potential solutions to support mobility enhancements between TN and NTN(RAN1, RAN2, RAN3,)
  - —Reduce handover interruption, for example, introduce DC-like handover, CHO and DAPS enhancements for handover between TN and NTN [RAN2,RAN1,RAN3]
  - —Enhancements on Cell selection/reselection between NTN and TN to reduce UE power consumption[RAN2,RAN1]

Thanks