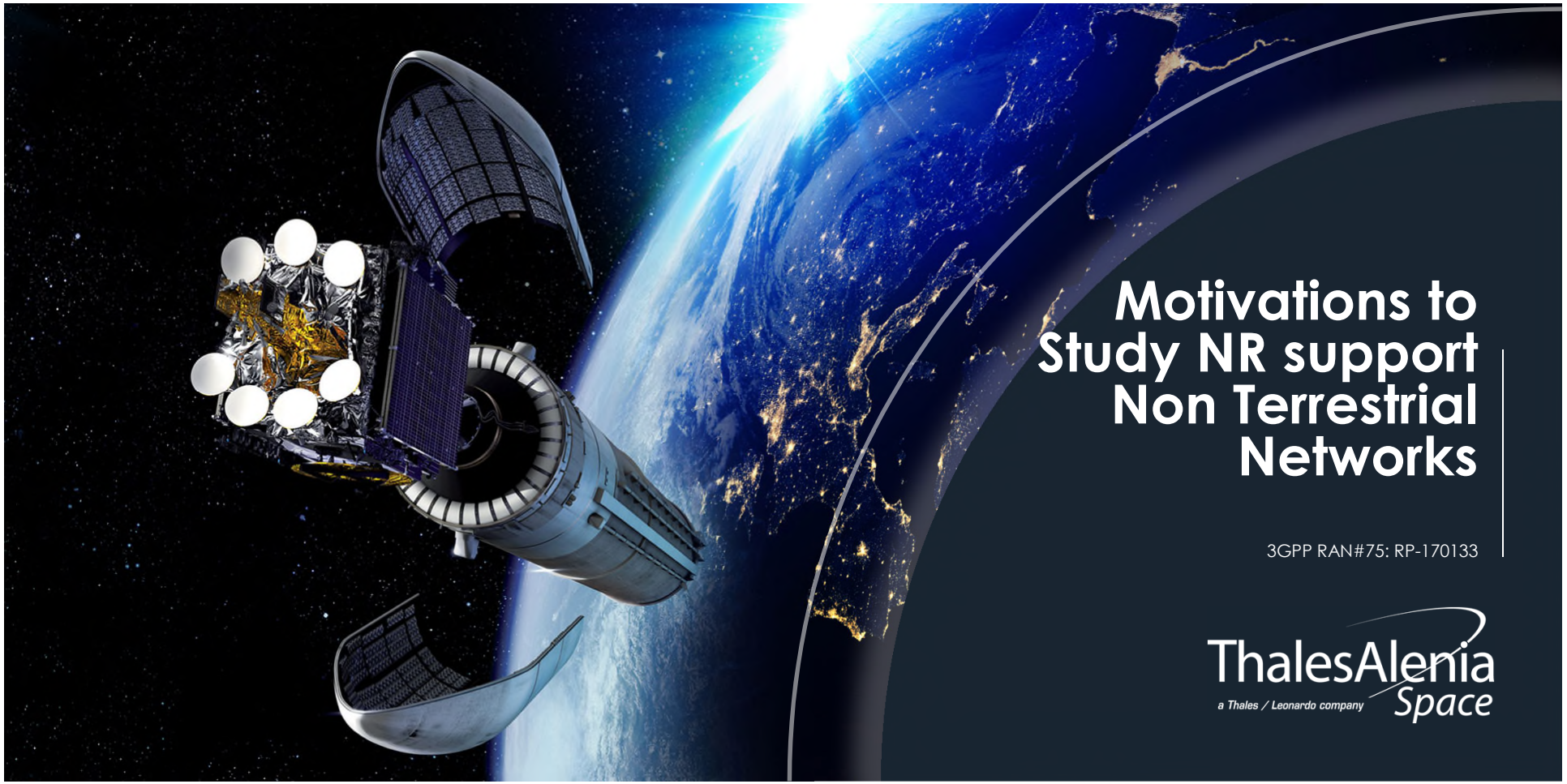

Motivations to Study NR support Non Terrestrial Networks

3GPP RAN#75: RP-170133

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22/02/2017

Ref. = 3GPP RP-170133
Ref. Modèle = 83230347-DOC-TAS-EN-004

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Non-terrestrial networks

3GPP RAN#75: RP-170133

Networks, or segments of networks

- A relay node or base station on board airborne or spaceborne vehicles
- Addressing user equipment on the earth, on board moving platforms (Trains, vessels, aircrafts, drones)

Spaceborne vehicles

- Satellites (including Low Earth Orbiting (LEO) satellites, Medium Earth Orbiting (MEO) satellites, Geostationary Earth Orbiting (GEO) satellites as well as Highly Elliptical Orbiting (HEO) satellites)
- Spectrum allocated to Satellite Services: e.g. S band (2 GHz), Ka band (20/30 GHz)

Airborne vehicles

- High Altitude Platform Station (HAPS); Unmanned Aircraft Systems (UAS) including tethered UAS and Lighter than Air UAS (LTA), Heavier than Air UAS (HTA),
- Spectrum: bands identified for mobile service (without aeronautical exclusion) or identified for High Altitude Platform Station (HAPS).

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Non-terrestrial networks: added values in 5G

3GPP RAN#75: RP-170133

foster the roll out of 5G service

- unserved areas (isolated/remote areas, on board aircrafts or vessels)
- underserved areas (e.g. sub-urban/rural areas) to upgrade the performance of limited terrestrial networks

reinforce the 5G service reliability

- E.g. service continuity for M2M/IoT devices or for passengers on board moving platforms (e.g. fast trains, bus)
- E.g. for critical communications, future railway communications or maritime communications

enable 5G network scalability

- providing efficient multicast/broadcast resources for data delivery towards the network edges

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Non-terrestrial networks integration scenarios in 5G

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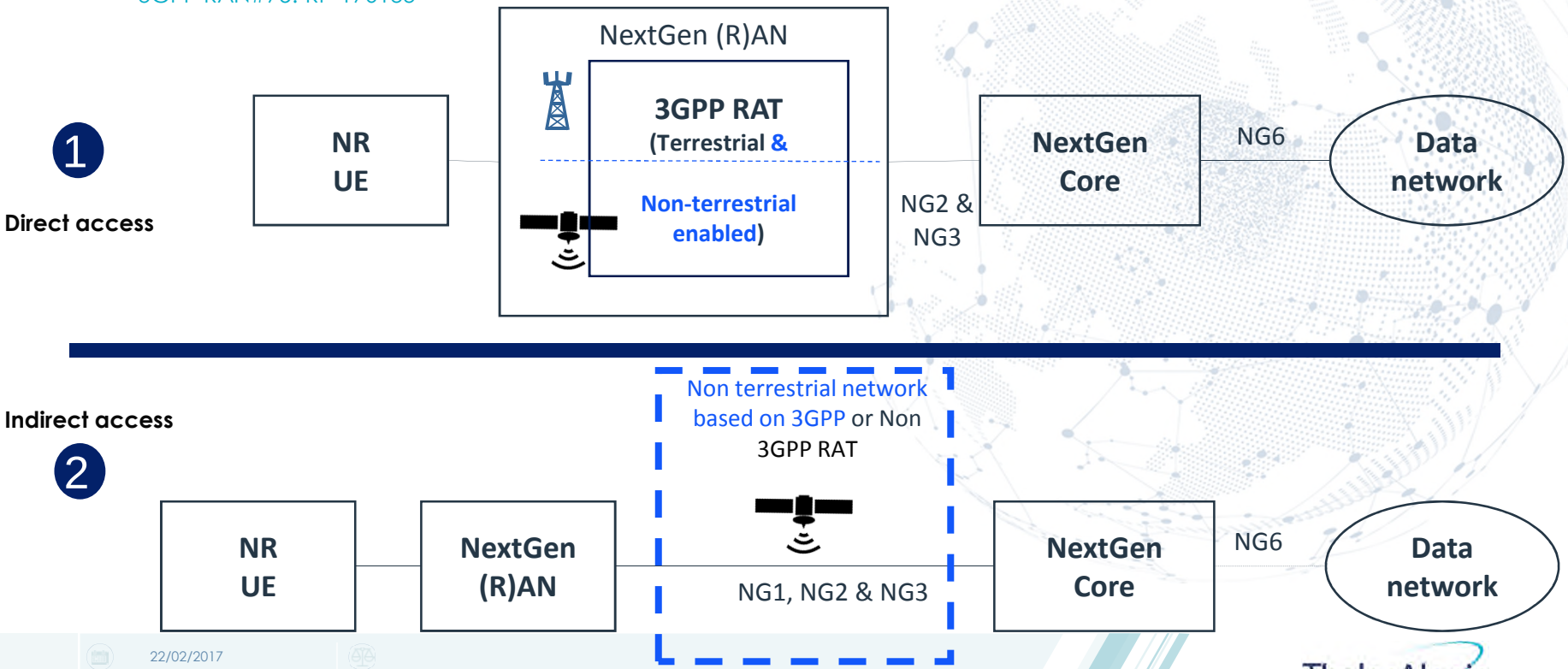

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The proposed study in 3GPP

Rational: To maximise the NTN added value/benefits for 5G

- high degree of radio interface commonality and tighter operational integration between non-terrestrial networks and 5G radio access technologies

Goal: use NR protocols/chipset and NRAT in non-terrestrial network context

- Expected marginal modifications of the NR physical layer considering solutions proposed for other deployment scenarios
- Features possible subject to adapations: synchronization, initial access, random access, data channels, channel estimation, low PAPR modulation, link establishment/maintenance

Scope:

- Impact on physical layer
  - Channel modelling in 3GPP format
  - Characterisation of delay, Doppler, Interference
- Impact on Layer 2 and Above, and RAN architecture
  - Control protocols due to extended delay, Inter RAT hand-over
  - RAN Architecture

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