



A comprehensive view on the 3GPP work on Non-Terrestrial Network: 3GPP-Release 17/18 and beyond

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ThalesAlenia
a Thales / Leonardo company **Space**



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Agenda

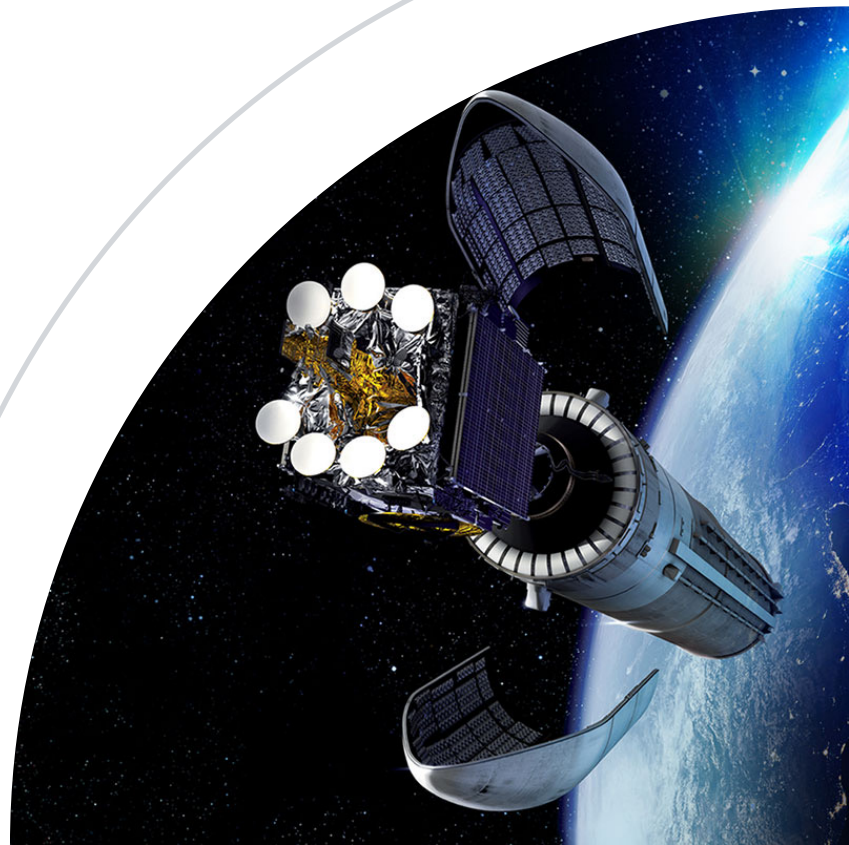
3GPP WORK ON NTN IN RELEASE-17 ONWARD

HELENA

EAGER



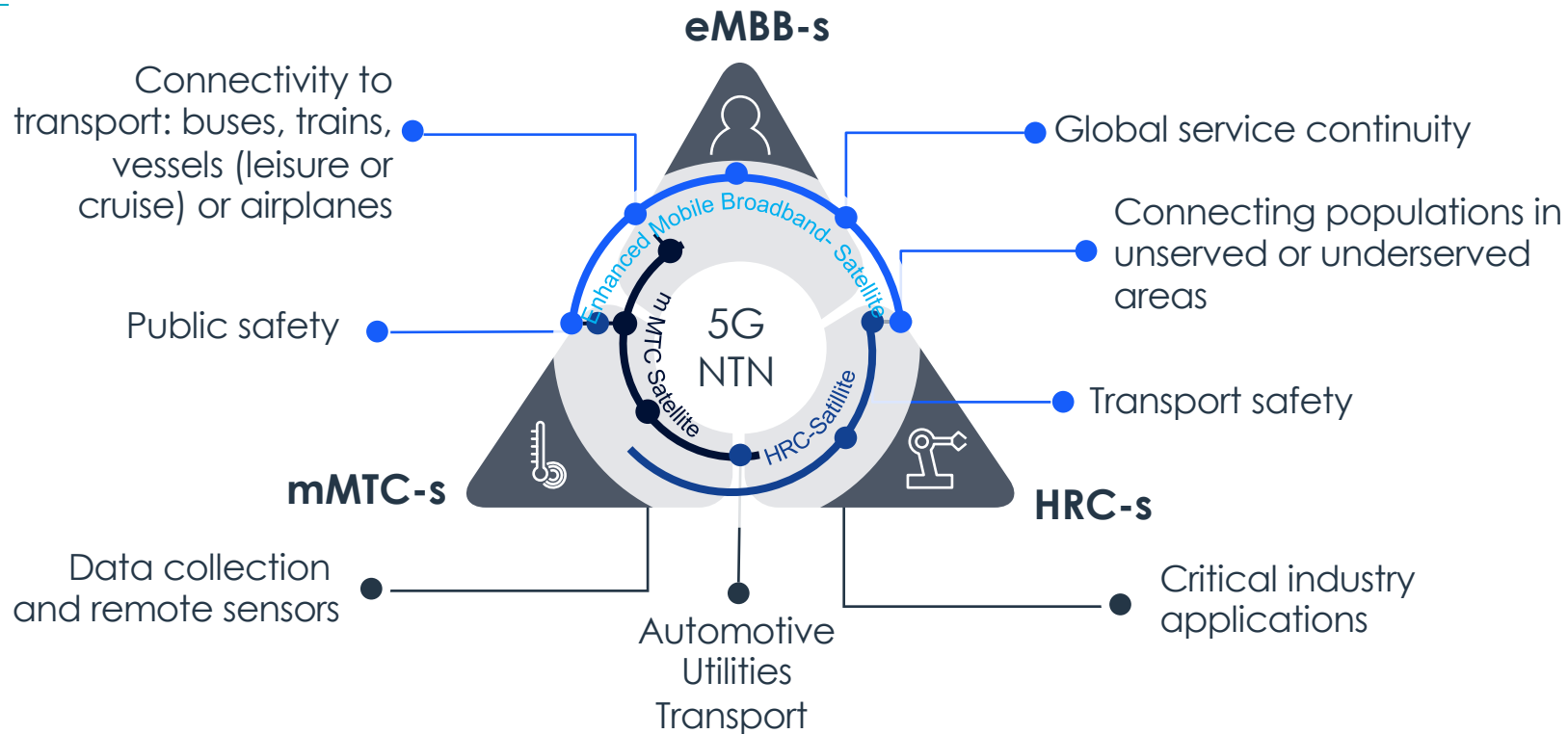
3GPP WORK ON NTN IN RELEASE-17 ONWARD



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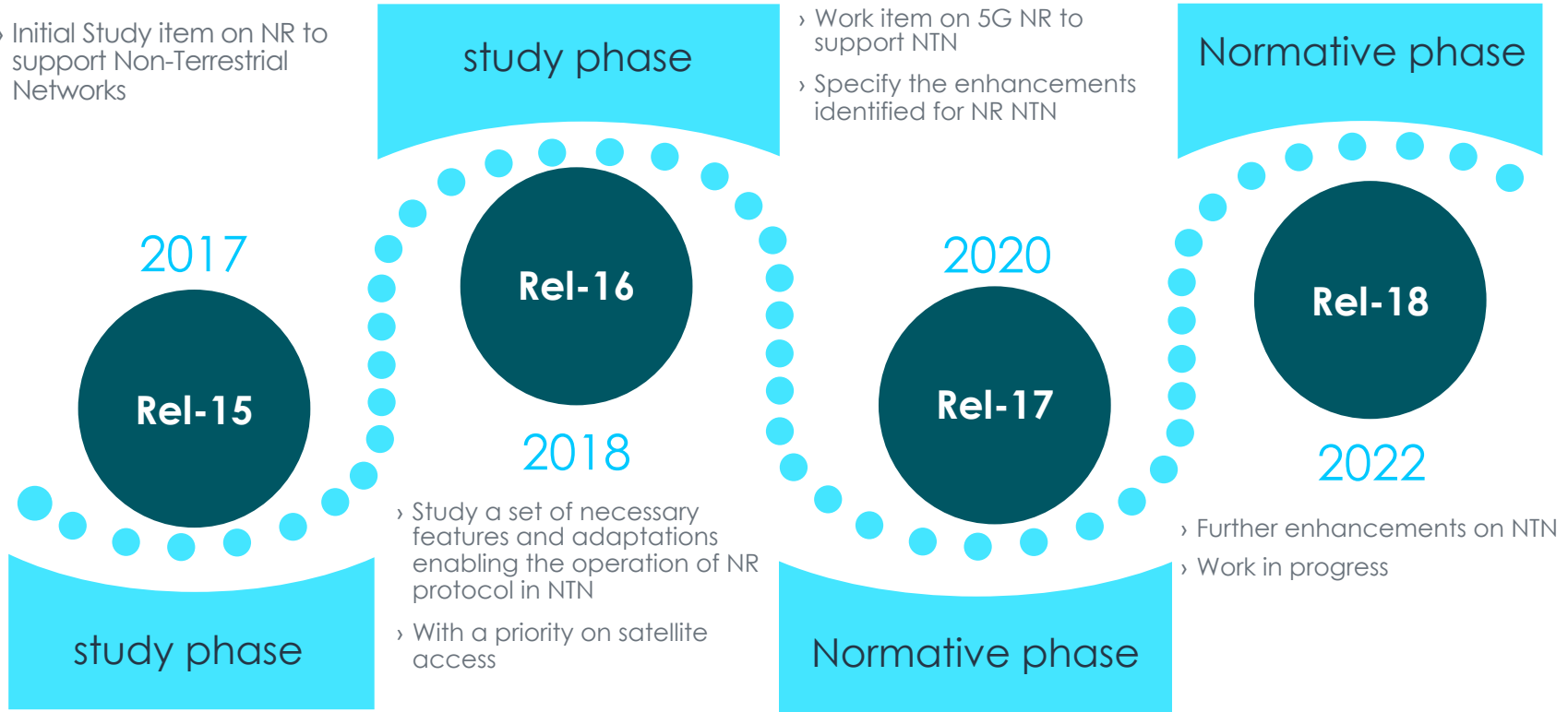
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ITU-R Vision on the satellite component of IMT-2020



3GPP work on NTN

- › Initial Study item on NR to support Non-Terrestrial Networks



Overview on 3GPP NTN normative work in Release 17

- (Non) Geostationary Earth orbiting satellites
- Transparent payload architecture

- Addressing identified issues
 - Extended & variable propagation delays & Doppler
 - Wide and/or moving radio cells in NTN.
 - Service continuity between Terrestrial Network and NTN.
 - Spectrum below 6GHz and above 10 GHz

Implicit compatibility to support HAPS (High Altitude Platform Station) and ATG (Air To Ground) scenarios

UEs with
GNSS
capabilities

FDD

Earth fixed
Tracking area



Overview on NTN enhancements in Release 18

	NR-NTN	IoT NTN
RAN WGs	<ul style="list-style-type: none">▪ NR-NTN deployment in above 10 GHz bands and support for VSAT NTN UE▪ Network verified UE location to support regulatory services▪ Coverage enhancements▪ NTN-TN and NTN-NTN mobility and service continuity enhancements	<ul style="list-style-type: none">▪ Disabling of HARQ feedback for IoT NTN▪ Improved GNSS operations for IoT NTN▪ Mobility enhancements▪ Further enhancement to discontinuous coverage

Rel-17/18 NTN impacts on 5G NR/NG-RAN specifications

RAN1: Physical layer

- Timing relationship
- UL time and frequency synchronization
- Enhancements on HARQ
- Polarization signaling for VSAT/ESIM

RAN3: Access network architecture

- Network Identity handling
- Registration Update and Paging Handling
- Cell Relation Handling
- Feeder Link Switch-Over (NGSO)
- Aspects Related to Country-Specific Routing

SA2: System level

- Mobility management with huge cell size
- UE location and support of regulated service
- QoS class for GEO satellite links
- Impact of satellite backhauling

RAN2: Higher layers

- User Plane: RACH aspects, Other MAC aspects (e.g. HARQ), UP: RLC, PDCP
- System information broadcast
- Control Plane: Tracking Area Management, Idle/connected mode mobility, UE Location Service

RAN4: RF & RRM performance

- New bands
 - TN/NTN coexistence
 - Satellite Access Node, UE
- RRM: e.g. timing compensation (idle, connected mode), GNSS accuracy

CT1: Network protocols

- PLMN (re)selection
- NAS timers



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Project Overview



HELENA: Highly skillEd sateLLite community mEmbers to drive 3GPP Non-Terrestrial Network stAndardization

- **ESA funded project**



Project Coordinator: Nicolas Chuberre (Thales Alenia Space)



HELENA Consortium:



HELENA's key objectives



Objective:

- **HELENA** aims at a continued support of the standardization effort on NTN within the 3GPP.



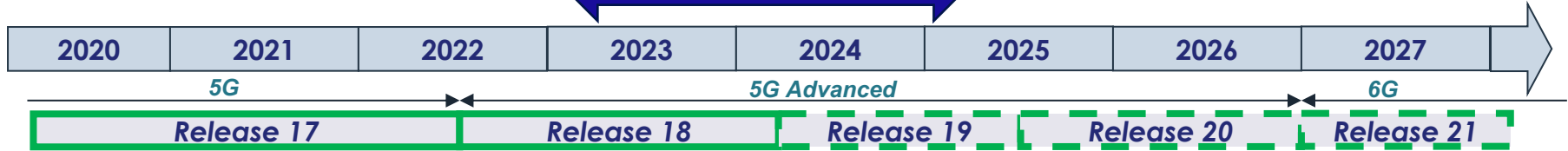
HELENA's key objectives:

- to capitalize on the investments made to date and secure the native integration of Satcom within the next generation of mobile networks.
- The project encompasses the support to the NTN-related work items agreed for Release-18 as well as the preparation of NTN-related items for Release-19 and beyond.
- The consortium plans to steer the “3GPP defined NTN standard” towards the most relevant use cases, deployment scenarios and solutions for the European satellite communication eco system while meeting the requirements of user groups (e.g., mobile network operators and verticals) through selected technical contributions and networking activities.



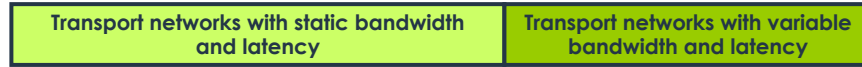
Roadmap

HELENA



Satellite backhaul

Assuming 18 months releases



Satellite connectivity to smart phones



Satellite connectivity to IoT devices



Satellite connectivity to "VSAT"





EAGER



**INNOVATIVE
TECHNOLOGIES &
TECHNIQUES FOR SATCOM
BEYOND 5G**

Project Overview



EAGER: tEchnologies And techniques for satcom beyond 5G nEtwoRks
(www.eagerproject.eu)

- **ESA funded project**



Consortium:



ALMA MATER STUDIORUM
UNIVERSITA DI BOLOGNA



Project Coordinator (UniBo): Alessandro Guidotti, **Technical Manager** (TAS-F):
Nicolas Chuberre

EAGER's objectives



Objective:

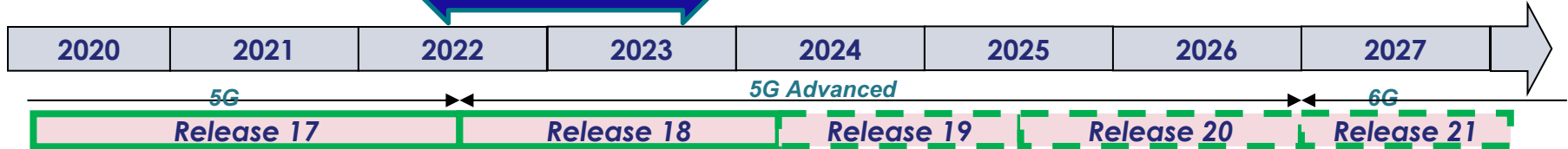
- Leverage the Release-17 NTN standardization framework to research innovative technologies and techniques targeting highly efficient and deeply integrated satellite networks in 5G-Advanced, and in beyond 5G cellular systems



EAGER's key objectives:

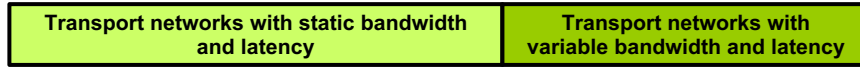
- to evaluate and adopt discarded solutions or use cases, including, e.g., Multiple-Input Multiple-Output (MIMO) techniques, advanced payload with digital beamforming and active antennas, etc.;
- to identify and evaluate novel concepts both in the waveform and in the network domain, as well as in the space and ground segment technologies
- to develop the necessary software or analytical tools in order to properly assess the performance of the most promising techniques and technologies.

Roadmap



Satellite backhaul

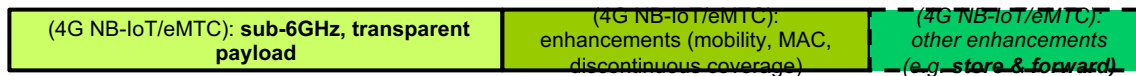
Assuming 18 months releases



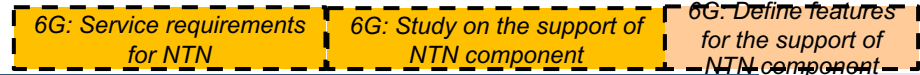
Satellite connectivity to smart phones



Satellite connectivity to IoT devices



Satellite connectivity to "VSAT"



GET IN TOUCH



Website: www.eagerproject.eu



LinkedIn

<https://www.linkedin.com/company/85875469/admin/>



Twitter

<https://twitter.com/eagersatcom>



EAGER (tEchnologies And techniques for satcom beyond 5G nEtwoRks) has been carried under a programme of, and funded by the European Space Agency (ESA).

The views expressed in this document can in no way be taken to reflect the official opinion of the European Space Agency.



THANKS FOR YOUR ATTENTION