5G-NTN: from standardization to deployment

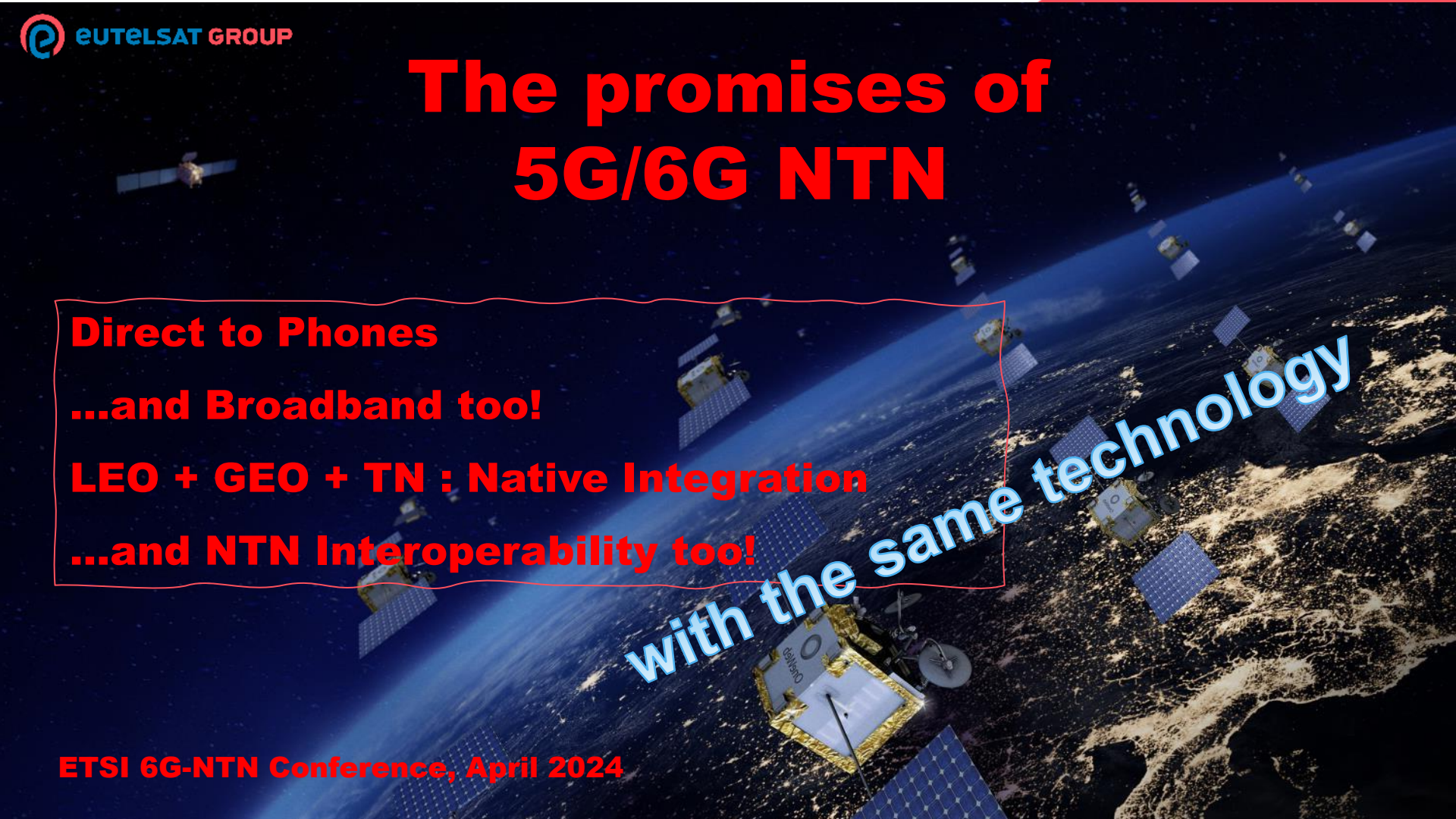
Daniele V. Finocchiaro

ASMS/SCPC Conference, February 27th, 2025

5G/6G NTN

A giant leap for Sat-kind

ETSI 6G-NTN Conference, April 2024


eutelsat GROUP
The promises of 5G/6G NTN
Direct to Phones
...and Broadband too!
LEO + GEO + TN : Native Integration
...and NTN Interoperability too!
with the same technology
ETSI 6G-NTN Conference, April 2024

EUTELSAT GROUP

Eutelsat and OneWeb combine to become Eutelsat Group.

A global leader in satellite connectivity and the world's first integrated GEO-LEO operator.

The network

Satellites

36 +4 in Sept '23
Geostationary

634
Low Earth Orbit

Spectrum

Diversified resources in

C, Ku- and Ka-bands

>3.5Ghz of globally harmonized premium spectrum rights for

Ku- and Ka-band

Operations centres

6
Teleports in Rambouillet (France), Turin and Cagliari (Italy), Madeira (Portugal) and Iztapalapa and Hermosillo Sonora (Mexico)

2
Network and Satellite Operations Centres in London (England) and Virginia (USA)

One team

Staff

1100+
based all over the world (mainly in France, Italy and Mexico)

600+
based all over the world

Nationalities

c.47

c.50

Gender

Female **34%** Male **66%**

Female **22%** Male **78%**

Offices

21
Amman, Beijing, Cologne, Dubai, Istanbul, Johannesburg, London, Madaba, Madrid, Mexico, Miami, Moscow, Panama, Paris (HQ), Rio de Janeiro, Rome, Singapore, Tampa, Turin, Warsaw and Washington D.C.

6
Alaska, London, Florida, Virginia, Toulouse and Sydney Australia

EUTELSAT AMERICA CORP
Team based Washington D.C.

US Gov
OneWeb Technologies
team based in Texas

Network capabilities

Space Core Value

Responsible & sustainable

Responsible & sustainable

Innovation

Eutelsat Konnect VHTS
Pioneering VHTS technology to deliver high-speed broadband

GEN 1
Innovative satellite design with **>7Gbps per satellite** and **revolutionary beam technology**

Roadmap

Eutelsat Quantum
Spearheading a new generation of software driven satellites

GEN 2
Satellite constellation in design and planned to enable **faster speeds and denser coverage for less cost**

Customer focus

Route to market

B2B
Business to business

B2B
Business to business

Key products

Video Eutelsat satellites deliver more than 6,500 TV channels to over 274 million homes with over 2,000 HD channels and 22 Ultra HD channels

GEO Connectivity

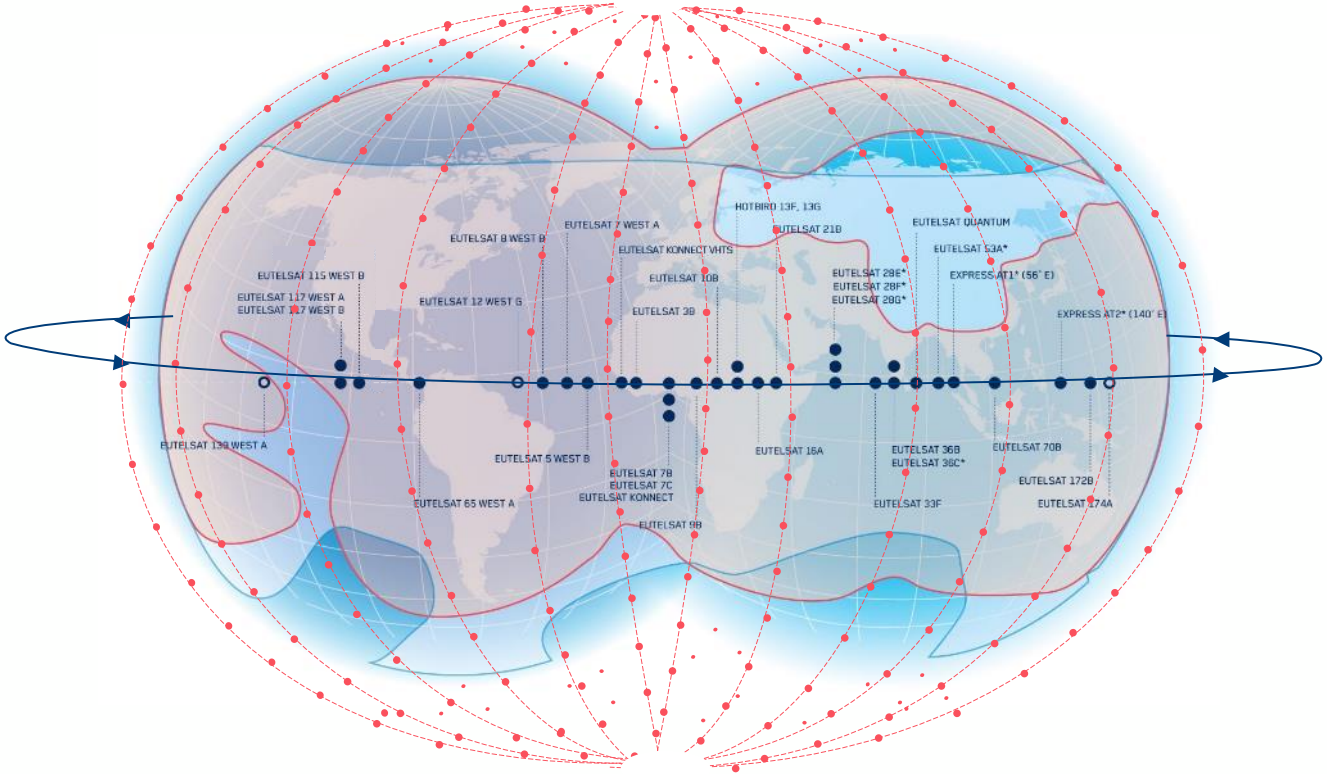
LEO Connectivity

Key markets

Enterprise, Government, Maritime, Aviation, Telecoms (Cellular backhaul)

Enterprise (Cellular backhaul and community broadband)
Government, Mobility
Aviation, Maritimeand Land)

A UNIQUE CONNECTIVITY OFFER: GEO+LEO FOR RELIABLE GLOBAL PERFORMANCE



The Eutelsat OneWeb fleet

GEO

LEO

Stable orbit

Inclined orbit

Capacity on third-party satellites

Polar orbit

UNDER REDEPLOYMENT

EUTELSAT HOTBIRD 13E

EUTELSAT 33E
EUTELSAT 3B

FUTURE SATELLITES

FLEXSAT

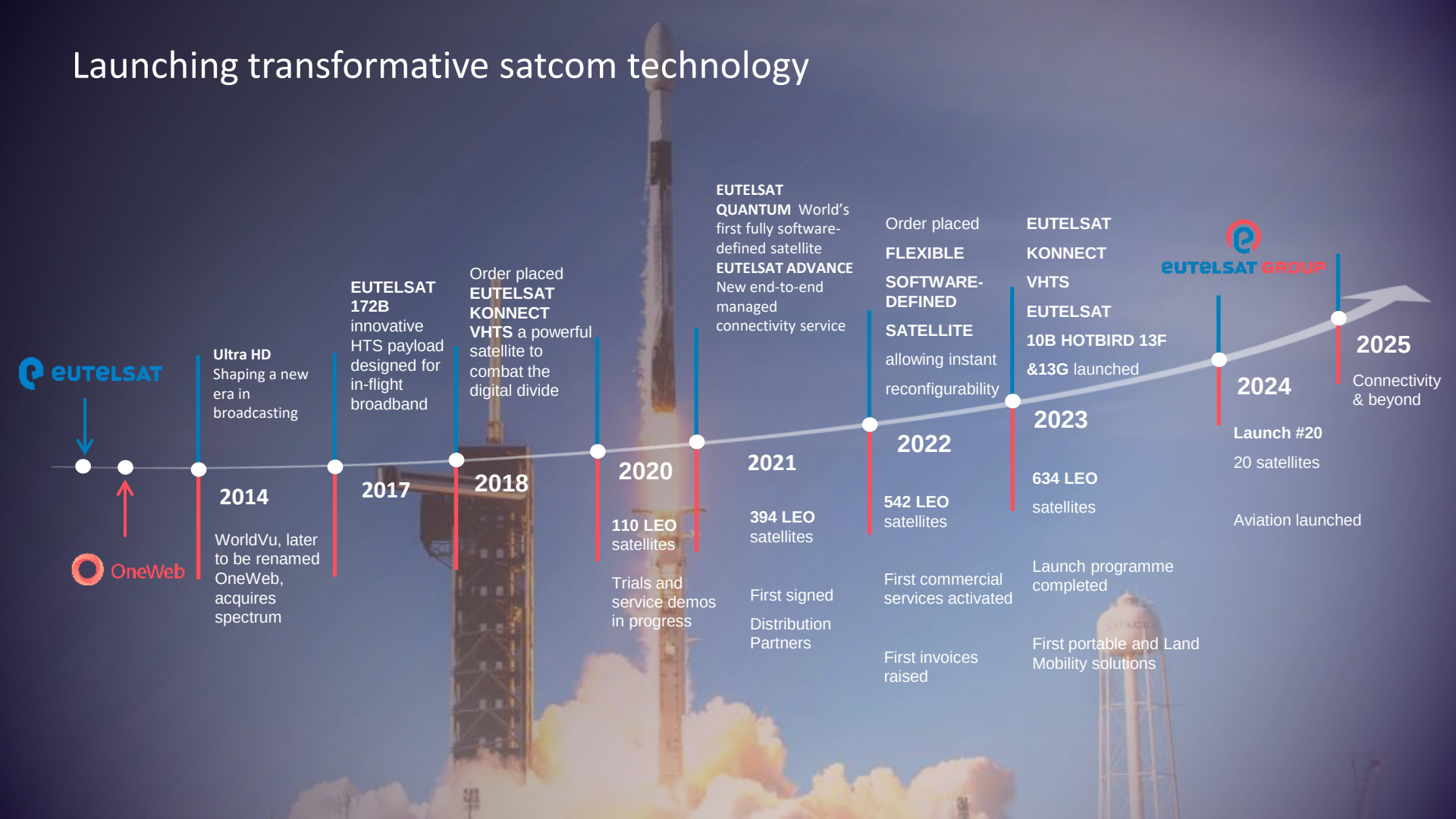
FLEXSAT AMERICAS

THE BEST OF BOTH WORLDS

WE COMBINE GEO AND LEO NETWORK SERVICE SOLUTIONS THAT DELIVER SIGNIFICANT BENEFITS FOR OUR CUSTOMERS

GEO		LEO
Capacity density: ability to focus capacity over-high demand regions	+	**Full global coverage:** rapid scale up
Low-cost sellable capacity: higher fill-rates than NGSO systems, longer lifetime		**Low latency:** critical for real time applications and enhanced quality of experience for many others
Large installed base: well established relationships		**Enabling partners with access** to untapped market pockets

Launching transformative satcom technology



IRIS² – A FEDERATING PROGRAM AROUND 5G-NTN

IRIS²

LEO CONSTELLATION

~256 INCLINED KU-KA SATELLITES (SHARED INFRASTRUCTURE)

COMPLETED BY ~72 POLAR KU SATELLITES (COMMERCIAL INFRASTRUCTURE)

~2.0 TBPS SELLABLE CAPACITY IN TOTAL (1.5 TBPS FROM SHARED INFRA PLUS 0.5 FROM PURELY C'L INFRA)

COMPATIBLE WITH NEXTGEN UT*

CAPACITY COST COMPETITIVE

STATE OF THE ART TECHNOLOGICAL FEATURES

OPTICAL INTERSATELLITE LINKS (100 GBPS)

REGENERATIVE PAYLOAD

DIGITAL BEAM FORMING

5G

OPTIMAL QOS WORLDWIDE

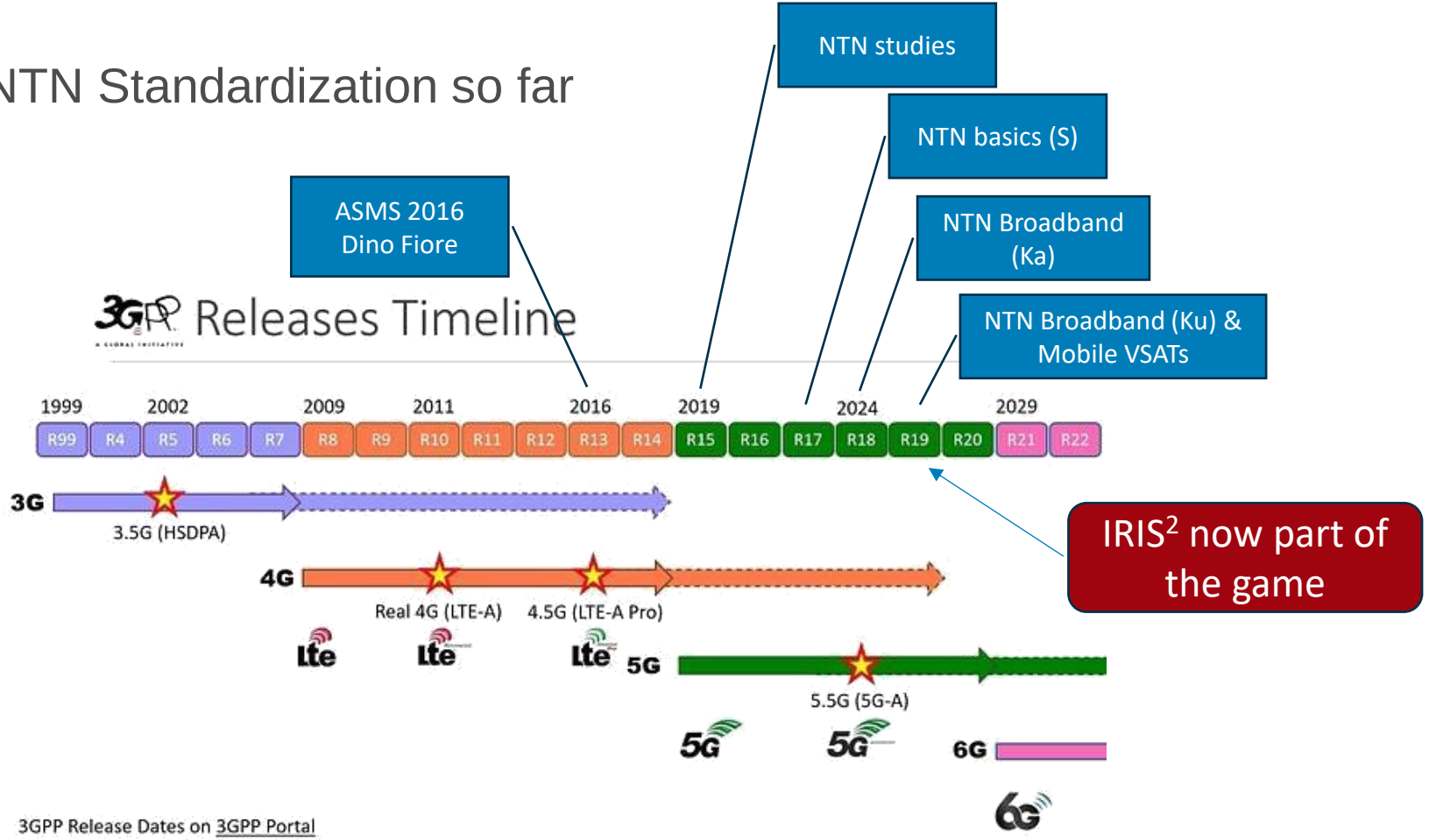
UP TO 9 YEARS OF SERVICE

TECHNOLOGY-WISE COMPETITIVE

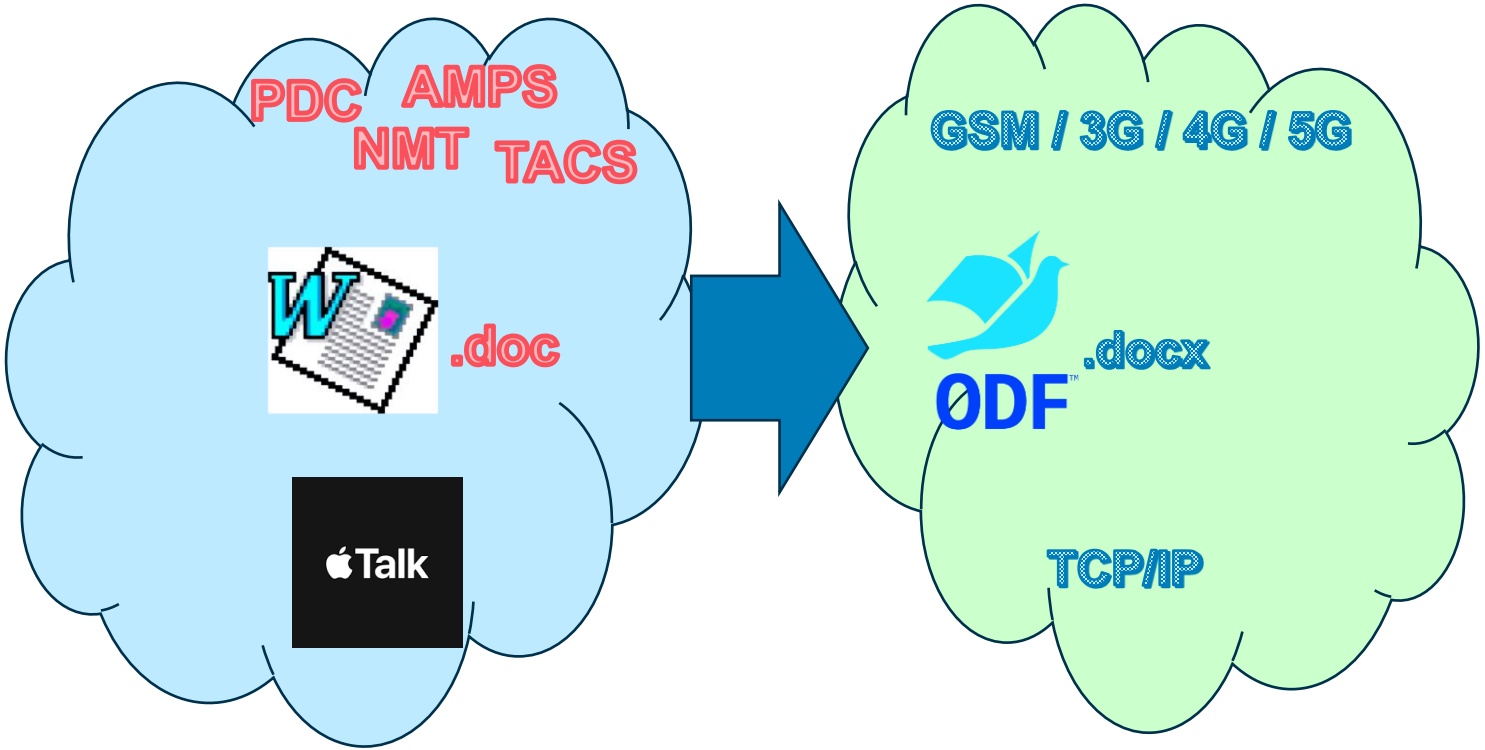
+18x IRIS² MEO Ka (IRIS² only)

EC explicitly requires adoption of 5G-NTN standard

5G-NTN Standardization so far



Standards ultimately win – but they do not come for free…



…the price to pay must be reasonable

What’s next – requirements for 5G-Advanced & 6G

Need to ensure optimal 5G-NTN performance

- Spectral efficiency, implementation costs

Need to ensure that most satellite use cases are covered

Need to have a strong voice at 3GPP

Examples:

- FR1 for Ka (?)
- Carrier aggregation for Ku and Ka
- 6G-NTN from day 1
- GNSS-free operation
  - “PNT Light”
  - or “5G stronger”
- Mobile VSATs (wider support)
- GEO + LEO + TN smooth integration

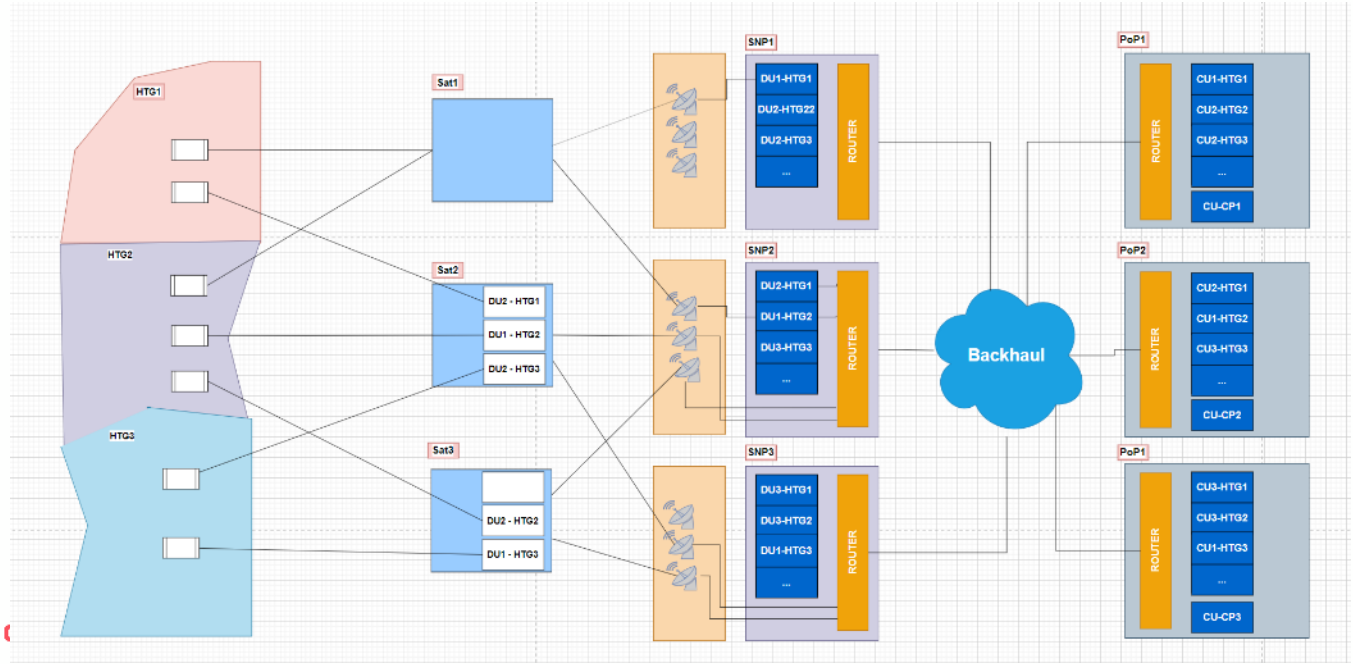
Some important implementation choices

5G configuration options: HARQ/ARQ, …

gNB onboard or CU/DU Split 2

5G numerology: FR1 (30kHz SCS) or FR2 (120kHz SCS)

Multi-orbit unified architecture: GEO / LEO transparent / LEO regenerative with ISL



First trials – 5G NR-NTN on a laboratory satellite

- Presentation this afternoon !
- Or look for the paper in the Proceedings

Experimentation of 5G NR-NTN waveform in Ku-band on a laboratory satellite

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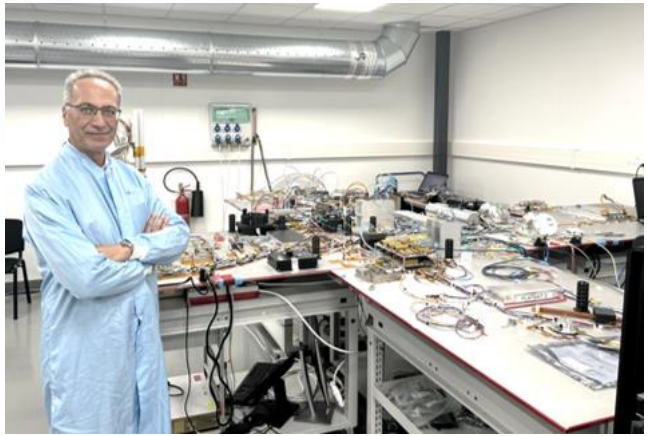

5G NR-NTN trials over commercial OneWeb satellites

ZDNET

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Carrières IT Informatique Cybersécurité Réseaux et télécoms Transformation Numérique

5G depuis l'espace, Eutelsat vient concurrencer Starlink

Associé à Airbus et Mediatek, l'opérateur européen
satellites est le premier à faire fonctionner une lia
terrestre. Cette démonstration laisse entrevoir la
pour tout appareil connecté de bénéficier d'une c
haut débit par satellite accessible dans le monde

Reuters

Eutelsat succeeds in world's first 5G network trial from space with Airbus, MediaTek

By Reuters

February 24, 2025 12:25 PM GMT+1 · Updated a day ago

LE FIGARO

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AUTHOR :Véronique Guiller...

25 February 2025 - Economie

ENTREPRISES

Spatial : Eutelsat prend une avance technologique sur Starlink

Véronique Guillermard

Associé à Airbus et à MediaTek, l'opérateur de satellites français a fait fonctionner la 5G entre l'espace et la Terre.

Dans la bataille de l'internet spatial, avantage aux Européens. Deux acteurs de la filière spatiale du Vieux Continent, premier opérateur

mées, aux entreprises ainsi qu'aux citoyens mal ou peu connectés, des services d'internet haut débit sécurisés. Iris² doit aussi servir de réseau de secours en cas de défaillance ou de sabotage des réseaux d'internet terrestre, et l'interconnexion entre les

Terriens (sur 8,2 milliards de personnes) n'ont toujours pas accès à internet.

Pour Airbus, ces tests concluants démontrent le savoir-faire de sa filiale spatiale en matière de satellites innovants. Cela, malgré les difficultés de cette dernière, qui a accumulé des pertes en 2024. Et alors qu'Airbus a entamé des discussions « exploratoires » avec Thales Alenia Space et l'italien Leonardo, en vue de former un champion européen des satellites. Ces essais « té-

PRESS RELEASE - 24 FEBRUARY 2025 08:59

Eutelsat, MediaTek and A
announce world's first
terrestrial network co
leveraging OneWeb

- Eutelsat becomes the first sa
air interface working on a c
- Paving the way for depl
between terrestrial an
- Placing Eutelsat at
of the future IRIS²

SPACENEWS

> 25 février 2025 à 20:54

PAYS: USA
TYPE: web
EAE: $1160.56
AUDIENCE: 45978

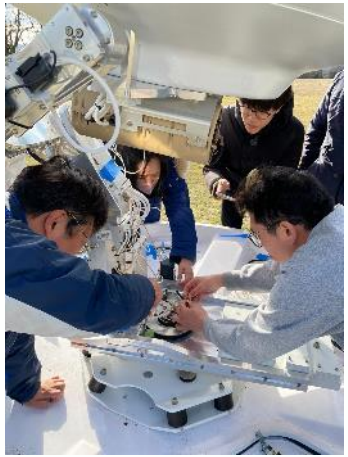
Eutelsat hails pioneering 5G test over LEO

Amid growing efforts to bridge satellites and mobile networks, E
employed its OneWeb constellation to connect a broadb
next-...

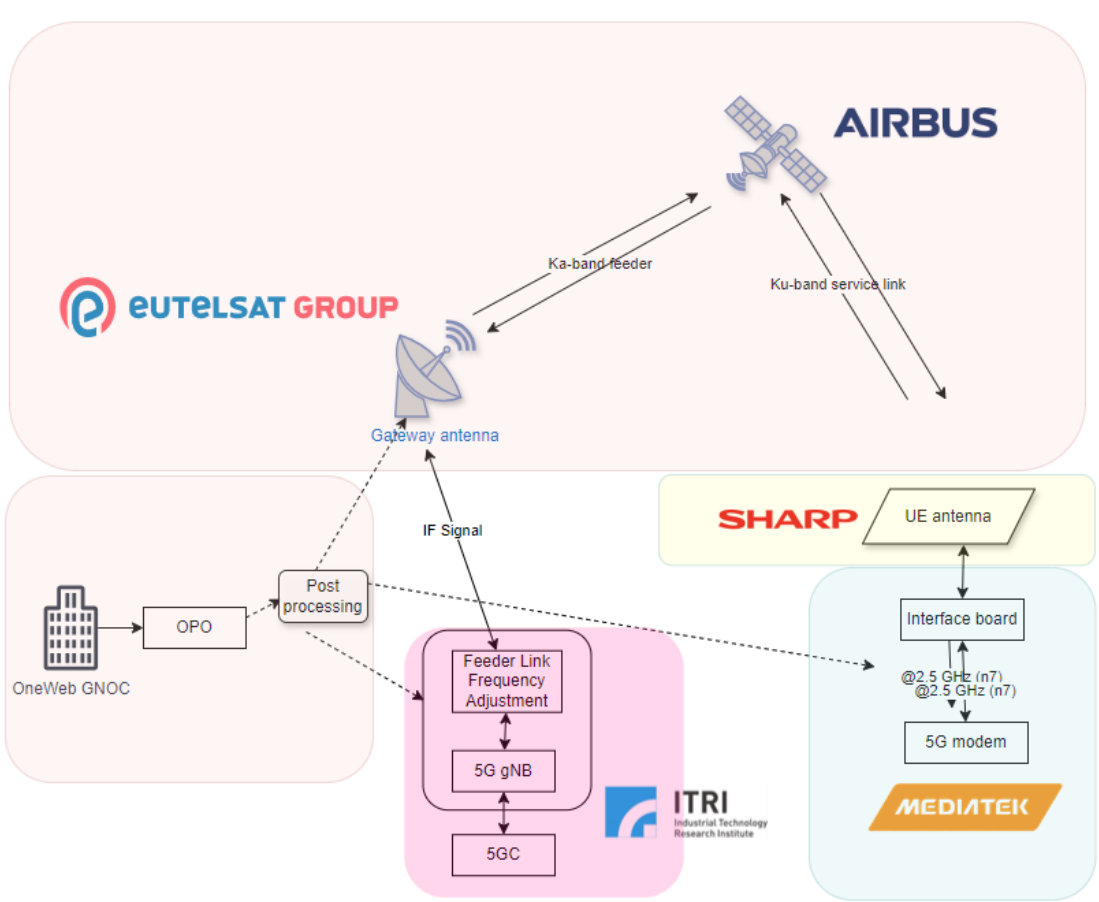
TYPOLOGIE DU SITE WEB: News and Media
VISITES MENSUELLES: 1397746.23
JOURNALISTE: Jason Rainbow
URL: spacenews.com

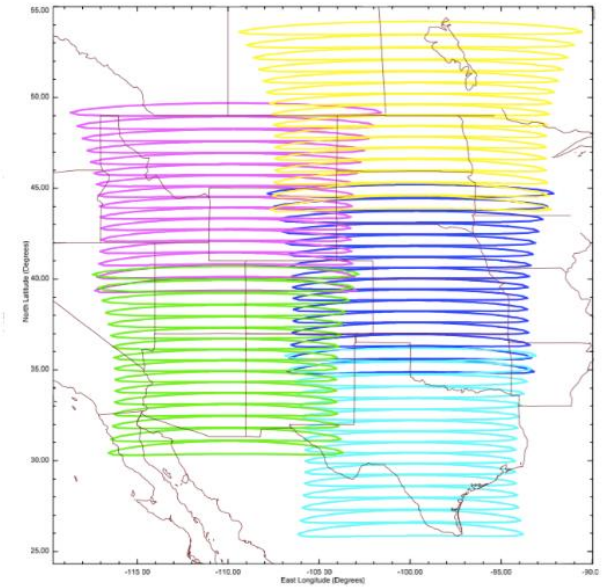
> Version en ligne

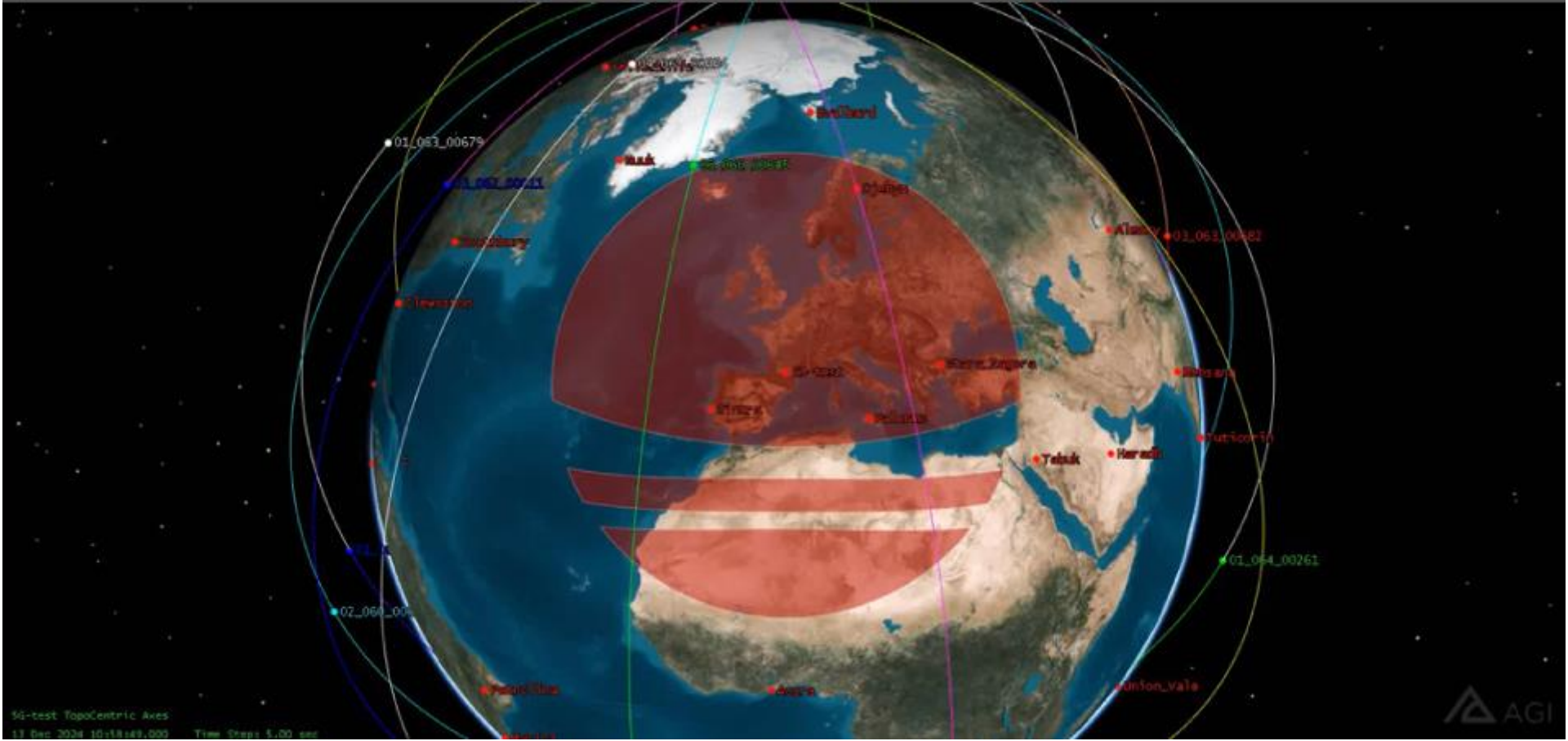
A great international collaboration!



5G NR-NTN trials over commercial OneWeb satellites: with a real chipset, a commercial antenna, in Ka/Ku-band







Thank you!

Contact: dfinocchiaro@eutelsat.com