

Software defined Satellites Pave the way for 3GPP-NTN Implementation

October, 2026



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Arabsat in Numbers



1976

Arabsat was initiated by 21 member nations of the League of Arab States to address the increasing demands in the region for satellite communications.



21

Arab nations benefit from the satellite broadcasting and internet services that Arabsat offers to its clientele.



8

Arabsat operates a fleet of Eight satellites positioned in Four orbital slots.



3

Arabsat owned private data centers in Riyadh, Cyprus, and Athens.



4

Sales offices in Riyadh, Dubai, Cairo, and Paris.



300

Millions of viewers in the Arab world tune in to Arabsat



160+

Expert employees and engineers.



8

Arabsat owned and operated teleports in Riyadh, Tunis, Cyprus, Athens, Germany, UK, Finland, and Norway.



7G

Recently launched by Arabsat, Badr 8 is recognized as the first seventh-generation satellite in the Middle East.



1

Arabsat is the sole satellite communications and broadcasting provider in the Middle East and North Africa region offering a comprehensive range of radio, television, telecommunications, and broadband solutions.



100

Arabsat offers broadcast, communication, and internet services to 100 nations spanning the Middle East, Africa, Europe, and Central Asia.

Unparalleled Orbital Resources

With state-of-the-art in-orbit satellites, operating in different orbital locations, and full range of spectrum on different frequency bands, enabling Arabsat to deliver cutting-edge technologies to all its customers in satellite telecommunication or Video services, in compliance with international standards and supreme quality levels.

8 state of the Art in-orbit Satellites



@20° E

Arabsat-5C

Coverage: EMEA, Ka
Multi Spots Capacity:
Ka-band, C-band &
C-band Extended

@26° E

Badr-5

Coverage: MENA,
W.Africa (Steerable),
C.Asia
Capacity: Ku-band,
Ka/Ku-band

Badr-7

Coverage: East MENA,
MENA, N.West Africa,
S.Africa, C.Asia,
Ka Multi Spots
Capacity: Ku-band,
Ka/Ku-band, Ka-band

Badr-8

Coverage:
MENA,EMENA, NWA
C.A, MEA
Capacity: Ku-band, C-
band

@30.5° E

Arabsat-5A

Coverage: East MENA,
MENA, N. West Africa,
EMEA, C.Asia
Capacity: Ku-band,
C-band

Arabsat-6A

Coverage: MENA, Ka
Multi Spots Capacity:
Ku-band, Ka-band

@39° E

HellasSat-3

Coverage: Europe,
Steerable over
S. Africa & ME
Capacity: Ku-band

HellasSat-4

Coverage: Europe, ME,
S. Africa Ka Multi Spots
Capacity: Ku-band,
Ka-band

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3GPP NTN Implementation and challenges

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Satellites Serving Global Cellular Ecosystem

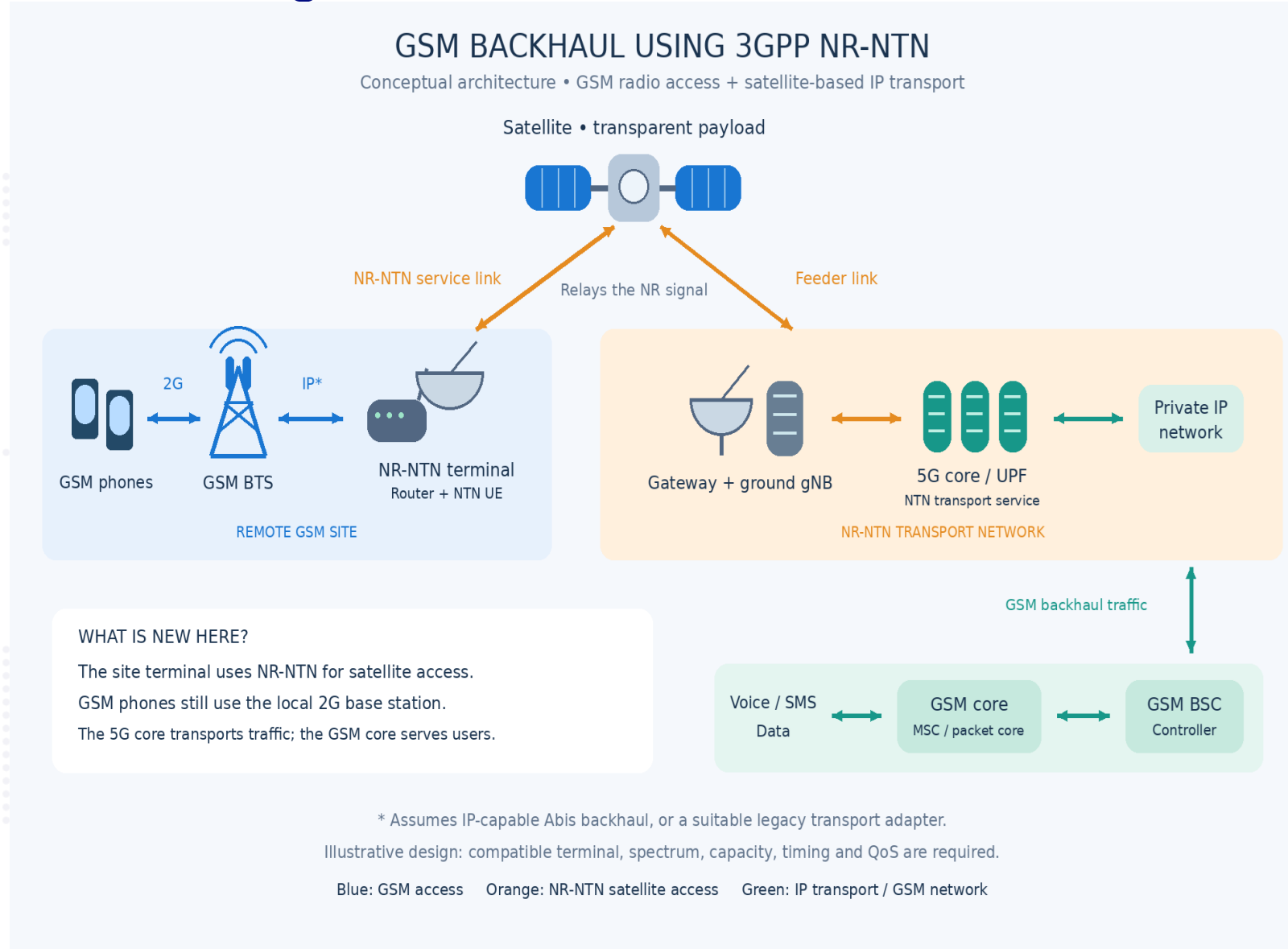
- Satellite connectivity supports a broad range of services, including broadcasting, broadband access, enterprise and government networks, maritime and aviation connectivity, and mobile backhaul.
- Within this portfolio, 3GPP NTN represents a major strategic opportunity, bringing satellite connectivity into the global cellular ecosystem through standardized technologies.
- NTN-enabled backhaul and direct connectivity to compatible devices are essential building blocks for extending coverage, strengthening network resilience and enabling new services.
- Future GEO satellites should therefore be designed with 3GPP NTN as a core capability, alongside the flexibility required to support established satellite services.



3GPP NTN Implementation and challenges

Four Key Challenges

- Link budget and terminal capability: Small antennas and limited device transmit power make the GEO uplink difficult.
- Capacity follows changing demand: Fixed beam coverage and resource allocation can leave some regions congested while capacity elsewhere remains unused. Coverage and bandwidth allocation adapt capacity to demand.
- Power allocation and beam hopping add flexibility where the payload supports them.
- Standardized NTN carriers require adaptation to capacity allocation based on changing demands



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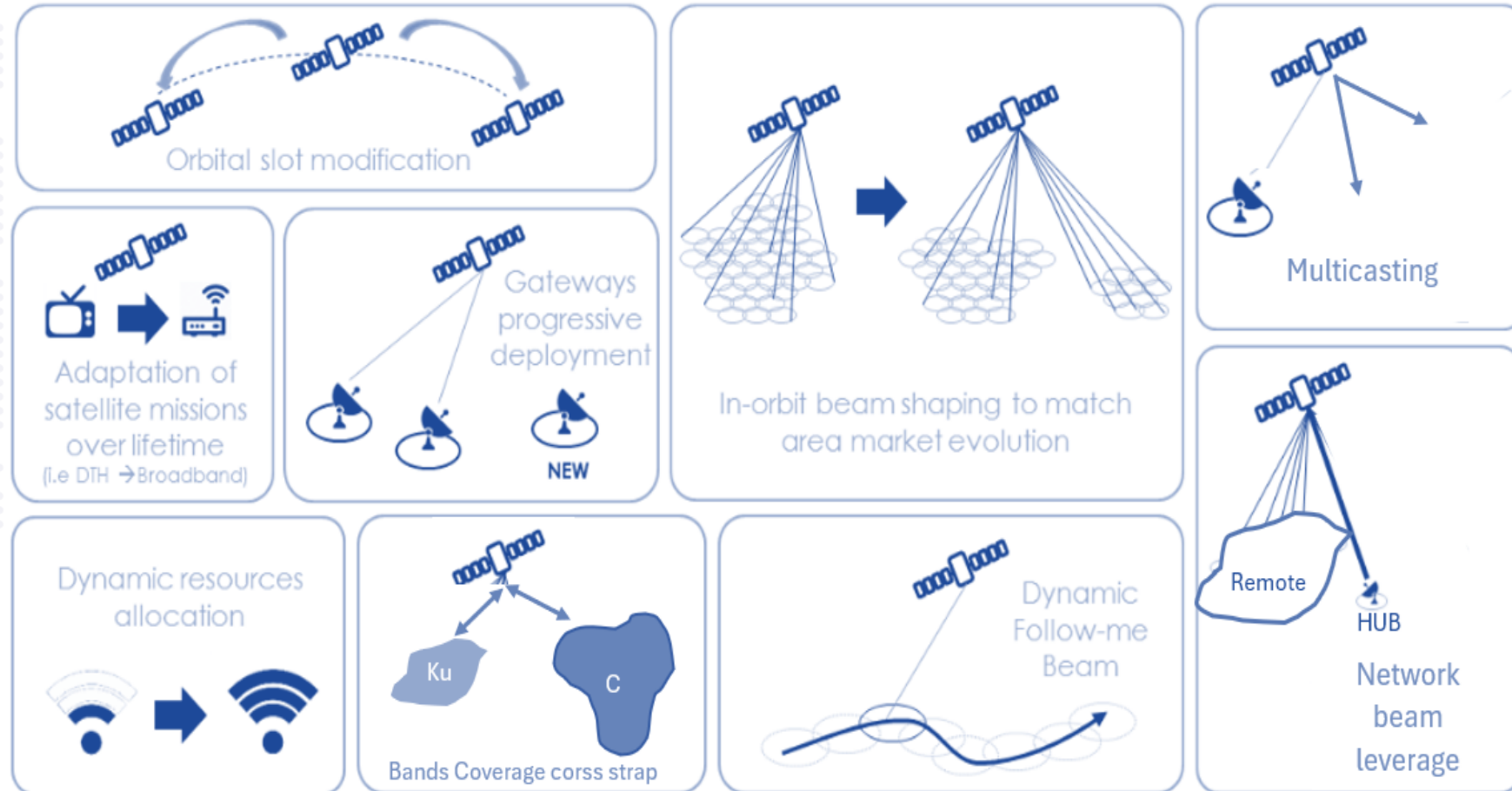


Future Satellites Technologies Addressing NTN Challenges

Software Defined Satellites

The future of the satellite telecommunication industry

- They provide total market agility by delivering capacity where and when it is needed. The fill rate of the satellites is drastically increased, maximizing the sellable capacity.
- They enable the mission configuration to be controlled in near real-time with software on the ground. Applying optimization and automation techniques inherited from the telecom industry maximizes the yield of space assets.
- It is designed to deliver full in-orbit coverage, power, and frequency plan flexibility



Software Defined Satellites

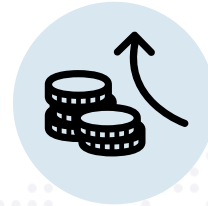
Ensure continuity and yet benefit from flexibility



Uplink and downlink frequency plans can be modified while in orbit
No limitation to channel size or the connectivity between bands



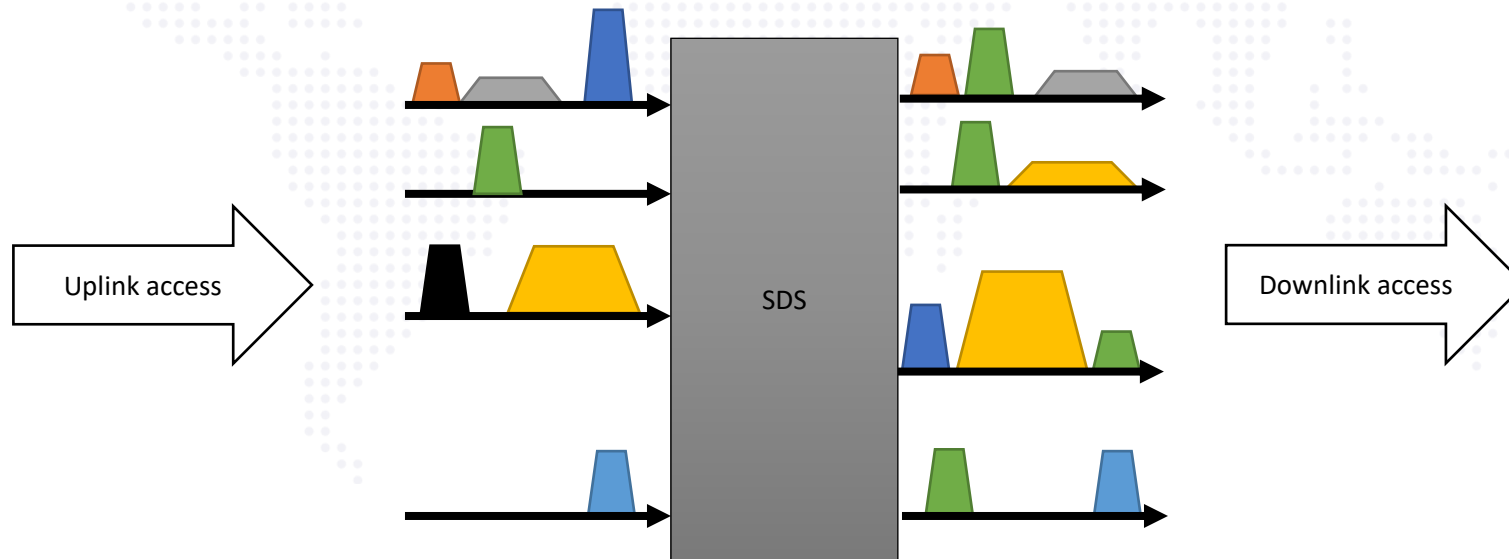
Full flexibility of power allocation to adapt QoS allocation on a channel-by-channel basis, only limited by the available power on board.



Additional usable bandwidth is accessible.
Typically, 10% of free bandwidth increased capacity compared to standard bent pipe satellite. Achieved by reduction of guard bands thanks to the digital payload.



Uplink frequency flexibility providing anti-jamming escape solutions while keeping the downlink frequency unchanged

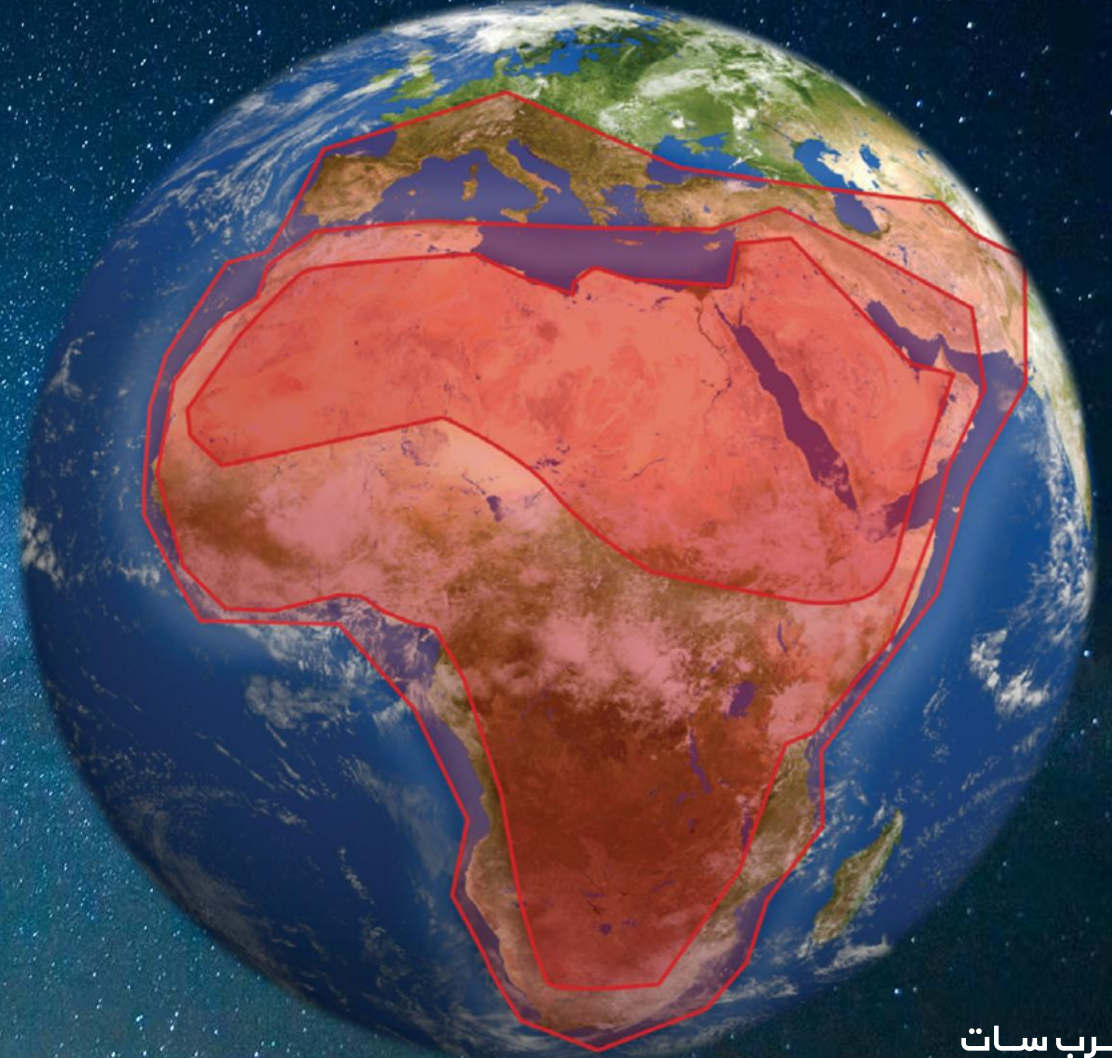


Payload Coverages' Flexibility

- Flexible Routing through Digital Processor between Ku, Q/V and C-band in Frequency and power



Ku-band HTS Coverage



C-band Coverage

Ku HTS Mission

Allowing Focused Market HTS

A use case could be focused countries HTS operation which could start with single Gateway serving both countries while operating the wide coverage MENA.

The capacity computation has been performed based on 630Mhz spectrum allocated for MENA operation while remaining spectrum been reused over multiple beams within the two countries.

The beam layout is composed of 294 beams . Achieved throughput computation is 30 Gbps.





Network Carrier Plan leverage

Thanks for the graduality control offered by the DTP both BW down to 1.7Mhz can be controlled by gain allowing better SFD/Gain control between different type of carriers Downstream/Upstream



RESILIENCE TO INTERFERENCES, JAMMERS AND PIRACY

Minimizing interference impacts in nulling interfering uplink frequencies .With the possibility to uplink any channel in any frequency, keeping the same



BETTER MANAGEMENT OF REGULATORY MATTERS

Enabling to change the frequency plans while the satellite is in-orbit, easing Regulatory coordination's, also introducing better coverage definition for meeting broadcast content restriction limited to national viewer area

SDS Features Vs Conventional Satellites

Flexibility – Control – Interconnect

Technical Aspect	Conventional (Legacy)	Software Defined Satellite (SDS)
Coverage Definition	The Mission Coverage is defined by the Antenna design and shaping at the manufacturing phase and frozen over the satellite Operational lifetime . [i.e., MENA coverage fixed all over the satellite lifetime]	Thanks For Active Antennas Beam Forming (DBFN) the satellite will have Coverage Definition Flexibility during the satellite lifetime . [i.e., starting MENA then changing it to Multi-Spots or More country specific coverage]
Amplifiers, Power & Gain Allocation	The Satellite Design is based on defining single of multiple Channels on a single Amplifier for a maximum EIRP value and gain control limited to the amplifier level .	More of Power Pool (Mini-TWT-based Power Bank Concept) allowing full power Pooling and flexibility to the Sub-channel & Carriers level
Transponders & Channels BW	A fixed Frequency Plan definition	More Controlling Capabilities on Channels BW definition (Increasing or Decreasing BW as needed to fulfill network or service level BW requirement without being restricted by fixed transponder BW)
Interconnectivity	Limited interconnection capability	Full connectivity and replication capabilities Thanks to the DTP capabilities

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Our Future Satellites Contribution

Upcoming Satellite: **ARABSAT-7A** @30.5°E

ARABSAT-7A is an upcoming Satellite which will be placed at 30.5°E is manufactured by Thales Alenia Space.

It consist of Software defined flexible payload with digital processing technology. Beam forming technology allows complete flexibility in Uplink and Downlink coverages.

ARABSAT-7A is planned for launch by SpaceX (Falocn-9).

ARABSAT-7A, a HTS & Software defined satellite, will replace ARABSAT-5A and provide true expansion at 30.5 E.

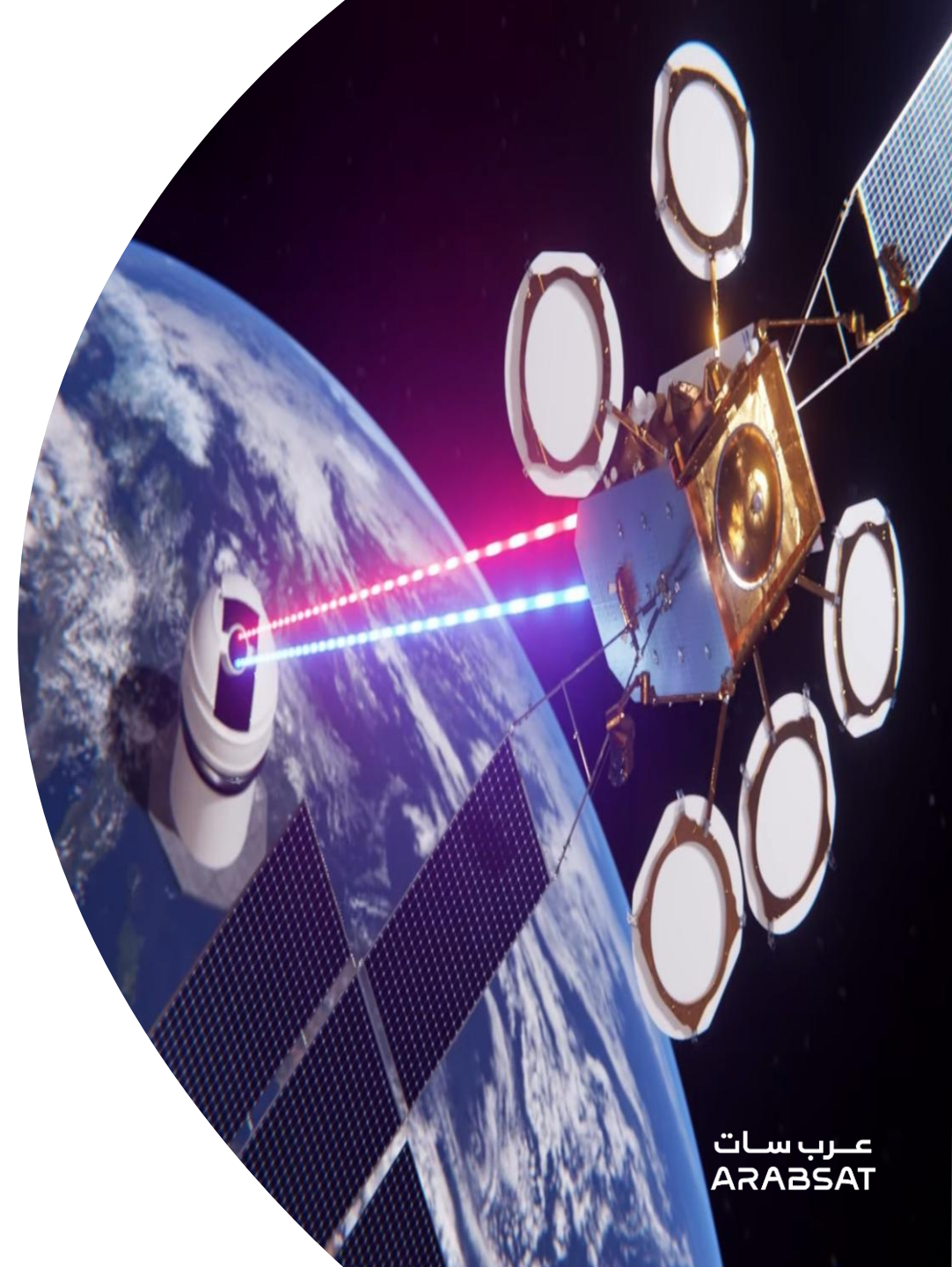
Operational Life	15 Years
Signed Date	Q2 2022
Launch Date	2029
On ground Delivery	2028
Coverage	Ku Band HTS C-band Global consisting of digital payload



Optical Payload onboard BADR-8

Telecoms on all Earth Orbits [TELEO]

- ❑ TELEO is hosted on ARABSAT's Satellites BADR-8 features a world first Airbus' innovative space demonstrator to provide space to ground optical communications at gigabit speeds.
- ❑ A demonstrator for high-speed optical communication.
- ❑ TELEO is a key enabler for unprecedented internet data rates from space
- ❑ Airbus' relationship with Arabsat stretches back 20 years, and BADR-8 is the eighth satellite built by AIRBUS, therefore paving the way for hosting on ARABSAT Satellite.
- ❑ The Airbus TELEO demonstrator will be used to validate technical scenarios and innovations for GEO to ground communications of the order of one terabit per second.
- ❑ This TELEO demonstrator will also enable very high-capacity optical feeder link communications, by nature highly robust against jamming, as part of the development by Airbus of a new generation of optical communications technology in space.

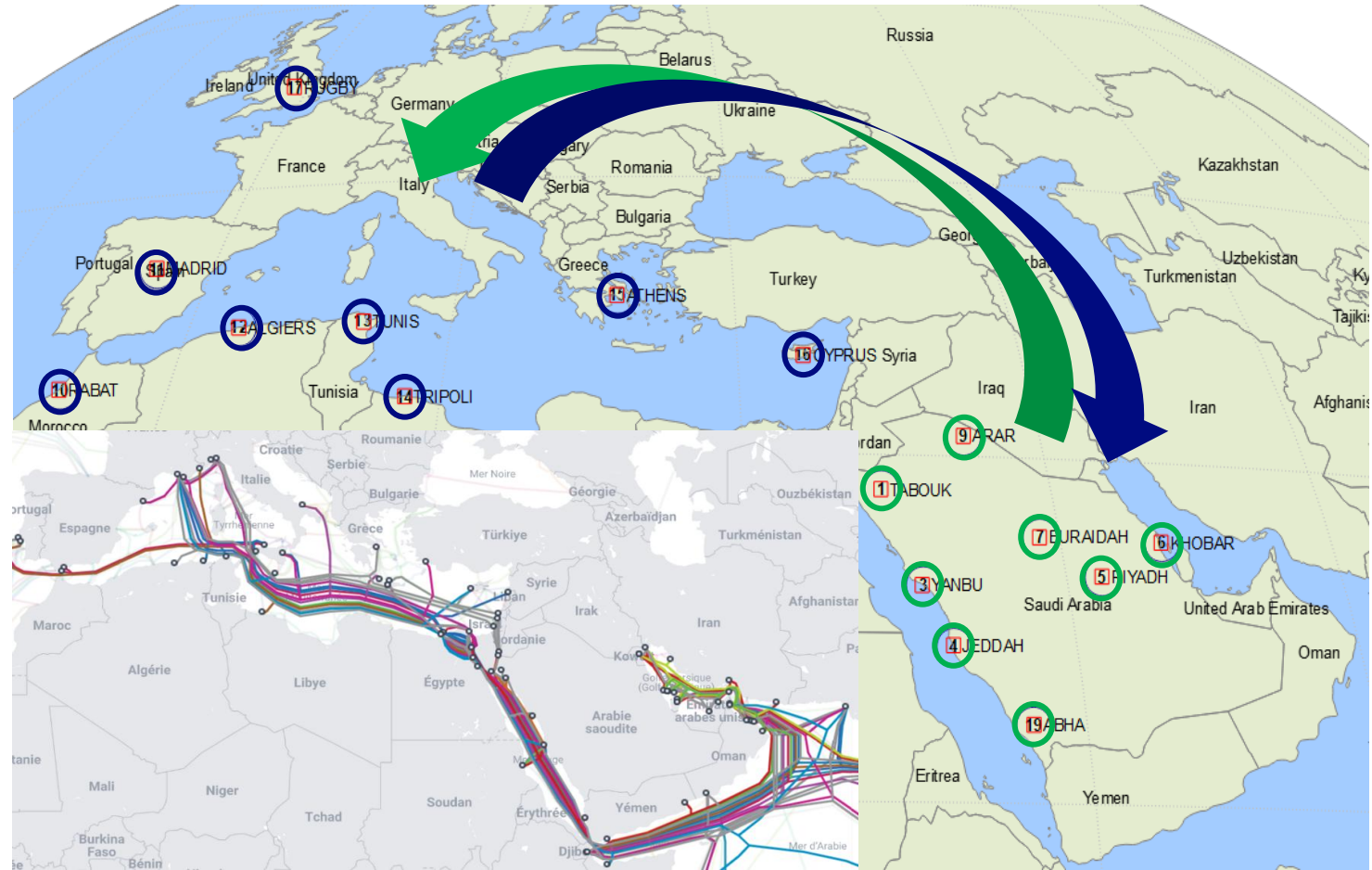


عرب سات
ARABSAT

Suitability and Business Continuity

Enabling On-board big data Trunking

- ❑ Optical communications can complement software-defined satellites and 3GPP NTN, providing high-capacity inter-satellite and feeder links.
- ❑ Improved power and mass efficiency can support more resource-efficient satellite infrastructure. Alternative space-based routes and geographically diverse gateways can strengthen business continuity and disaster recovery.
- ❑ Hybrid RF–optical architectures combine optical capacity with complementary connectivity paths to improve service resilience



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Key Takeaways and the Way Forward

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Key Takeaways

- ❑ 3GPP NTN is a strategic growth opportunity, integrating satellite capabilities into the broader mobile ecosystem.
- ❑ Software-defined GEO satellites can address key capacity and coverage challenges through flexible allocation of beams, bandwidth and power.
- ❑ Payload flexibility is one part of the solution—successful NTN implementation also requires compatible terminals, ground infrastructure, spectrum and network integration. Optical links offer further opportunities to improve network efficiency and resilience.

Way Forward

- ❑ Prioritize viable use cases, starting with clearly defined customer needs and service requirements.
- ❑ Validate through joint trials with mobile operators, satellite manufacturers, chipset and terminal providers.
- ❑ Translate trial results into a phased deployment roadmap, aligning satellite investment with ecosystem readiness and commercial demand.

Thank You

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