



Future of satellite communications

DEFENCE AND SPACE

Antonio Castillo
Technology Development Manager - Connectivity

AIRBUS

We pioneer sustainable aerospace for a safe and united world.



Military Air Systems

Partnering with armed forces to deliver mission-ready aircraft



Space Systems

Reaching for the stars to protect, serve and explore



Connected Intelligence

Providing secured communications and intelligence for better decisions

~34,300

2022 employees

€11.2 bn

2022 revenues

€38.4 bn

2022 order book

Europe's #1

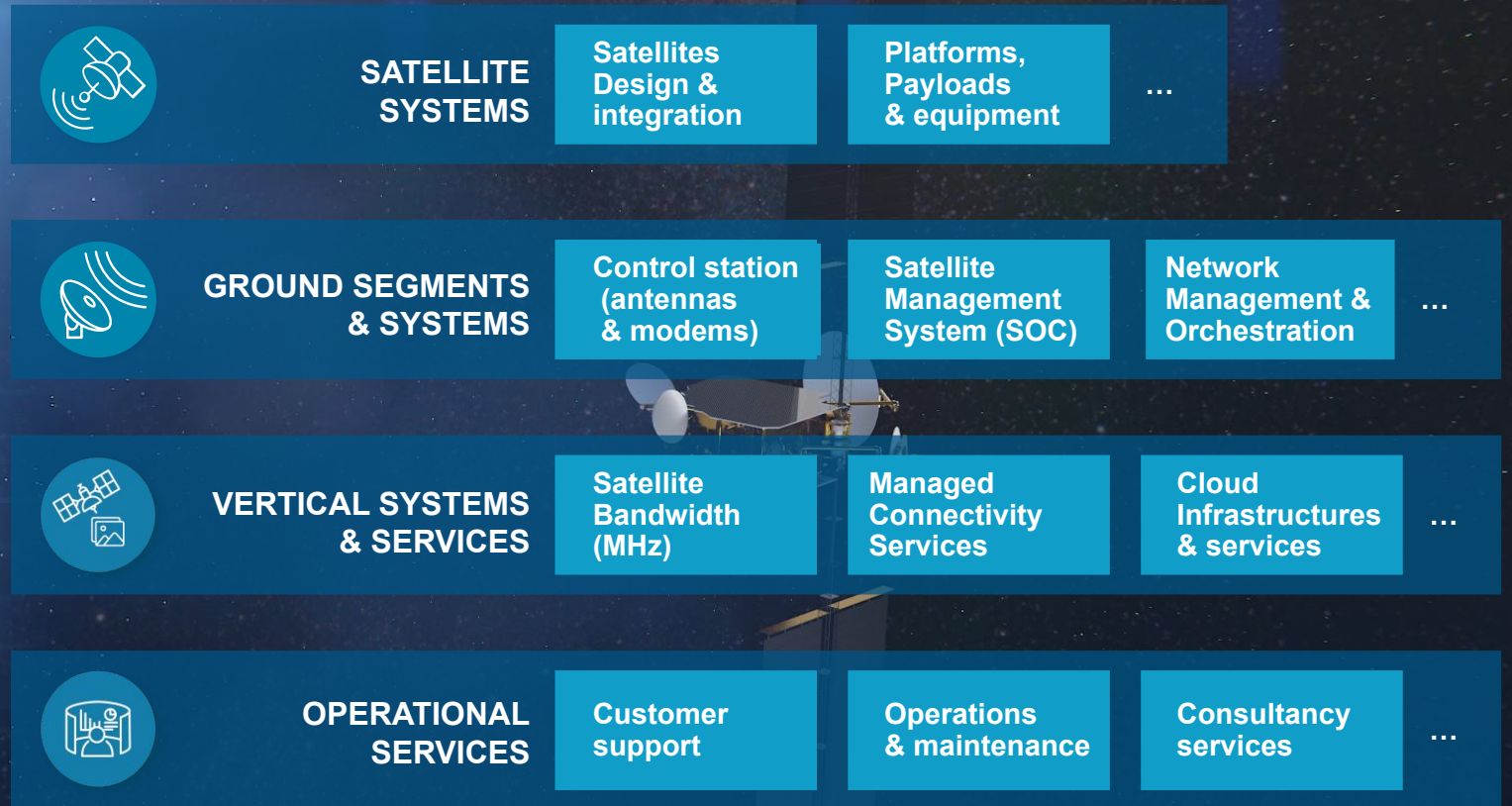
in defence and space

Space Systems: End-to-end systems provider



Space Systems

Reaching for the stars
to protect, serve and
explore



The satellite revolution

Reference status and information on key NGSO constellations (March 2022)

	TELESAT	SES ⁺ O3b mPOWER	SPACEX STARLINK	OneWeb	amazon
Planned Constellation Size	298 satellites (0% launched)	11 satellites (0% launched)	4,408 satellites (>50% launched)	650 satellites (66% launched)	3,236 satellites (0% launched)
Total Capacity	~15 Tbps (50 Gbps per sat.)	~2.7 Tbps (200-315 Gbps/sat.)	~88 Tbps (~20 Gbps/sat.)	~5 Tbps (~7.5 Gbps/sat.)	164 Tbps (50 Gbps/sat)
Usable Capacity (est.)	~7 Tbps	~1.9 Tbps	~22 Tbps	~1.2 Tbps	~40 Tbps
Frequency band (user)	Ka-band	Ka-band	Ku-band	Ku-band	Ka-band
Orbit	LEO (1,000-1,350 km)	MEO (8,062 km)	LEO (550 km)	LEO (~1,200 km)	LEO (~600 km)
Satellite Mass	~700 kg	~1,700 kg	~260 kg	~150 kg	~650 kg
Satellite Life	~10 years	>10 years	~5 years	~5 years	5 to 7 years
Latency	< 50 ms	~150 ms	< 50 ms	< 50 ms	< 50 ms
Payload flexibility	Beam-hopping/forming, optical ISLs, OBP	Dynamic beam-forming, steering, sizing	Steerable beams, ISLs (as of Q3 2021)	None	Beams: flexible shape, steering, capacity
Funding	Internal, equity, debt, U.S./Can. C-band,	Fully funded (internal)	\$6.7b raised since 2015 (not only Starlink)	\$3.4b raised pre-bankruptcy, \$2.7b post-	Likely internal (from operating cashflows)
Service start	>2025	late 2022 / early 2023	2021	2022 (polar)	TBD (likely >2026)

Euroconsult. Quarterly Briefing NGSO Constellations.

GSO / NGSO Transparent

Rel.16 / Rel.17

- ☐ 5G NR NTN (3GPP SatCom access)
- ☐ Below 7GHz (S-band / L-band)
- ☐ **Direct to handheld from Satcom**
- ☐ NTN-IoT specifications completed

Rel.18

- ☐ 5G NR NTN enhancements
- ☐ Above 10GHz (Ku / Ka band)
- ☐ **Legacy Satellites integration** in 5G networks
- ☐ Direct/Indirect access Use cases

Rel.19/...

- ☐ **Regenerative NTN scenarios**
- ☐ Optimal RAN functional split
- ☐ Open-RAN philosophy supports interoperability and user ground segment agnostic approach



Today

2023 2024 2025 2026 2027 2028 2029 2030

5G-Advanced – B5G (Rel.18/19)

B5G / 6G Pre-Std (Rel.20/21/...)



In 2020 Legacy Satellite industry capacity equals ~2 Tbps in Ka & Ku bands.

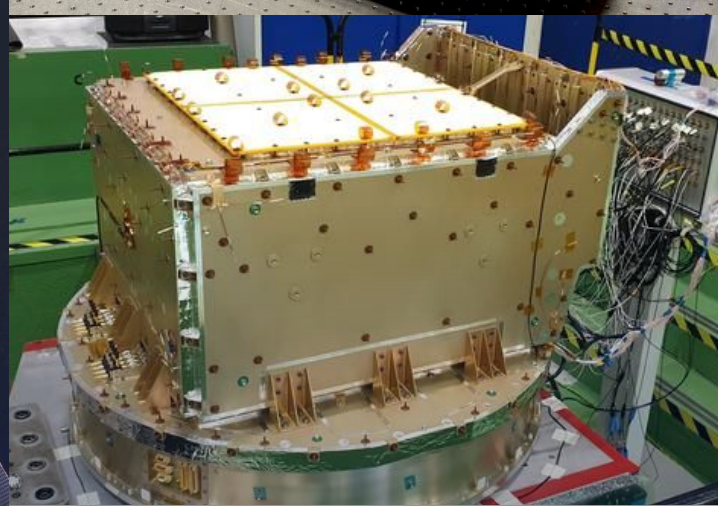
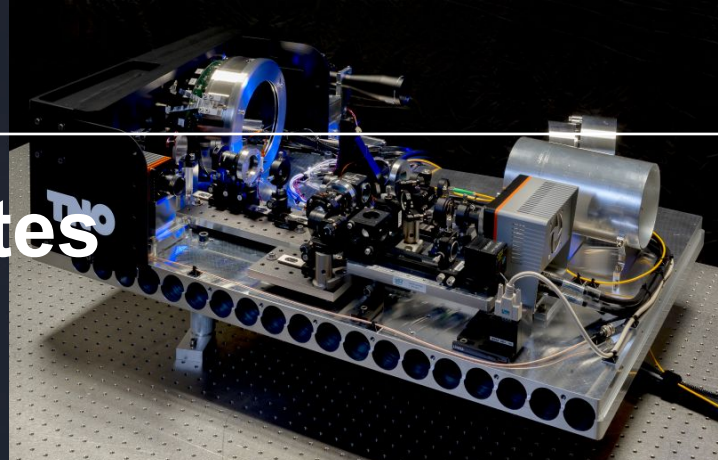
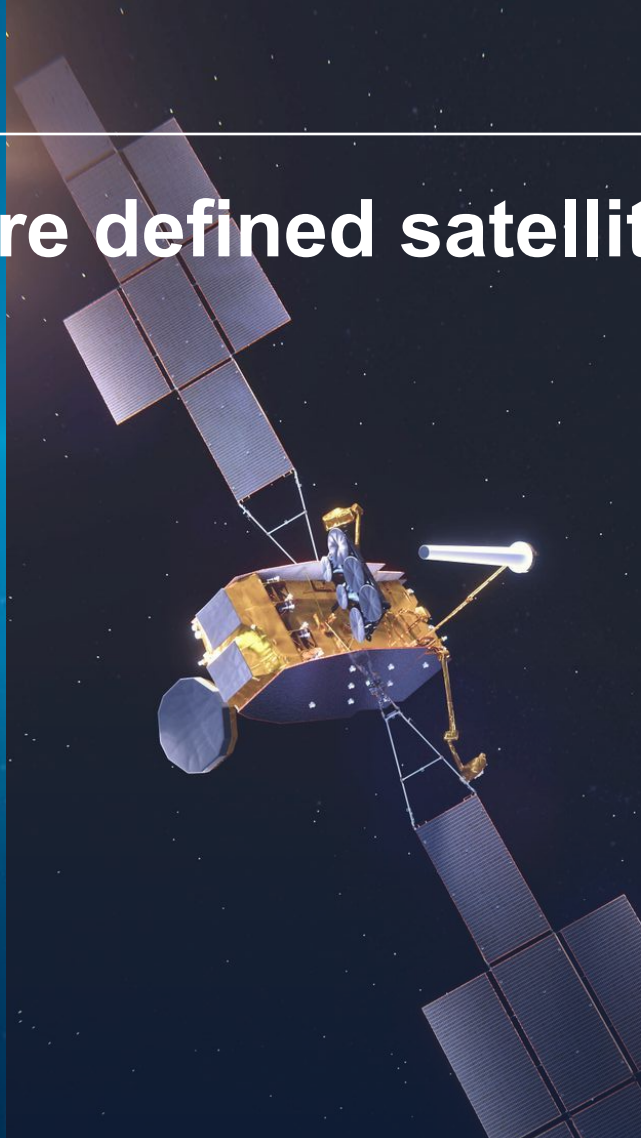


Satellite capacity expected to grow at a very high pace reaching 50Tbps in the near future.



65% of Satcom traffic expected to be 5G in 2030 according to NSR.

Flexible architectures: software defined satellites



Fully reconfigurable broadband capacity wherever needed on Earth.



Software Defined
Satellite / Fully
reconfigurable in orbit



Modularity
for serial
production



Photonic
architectures



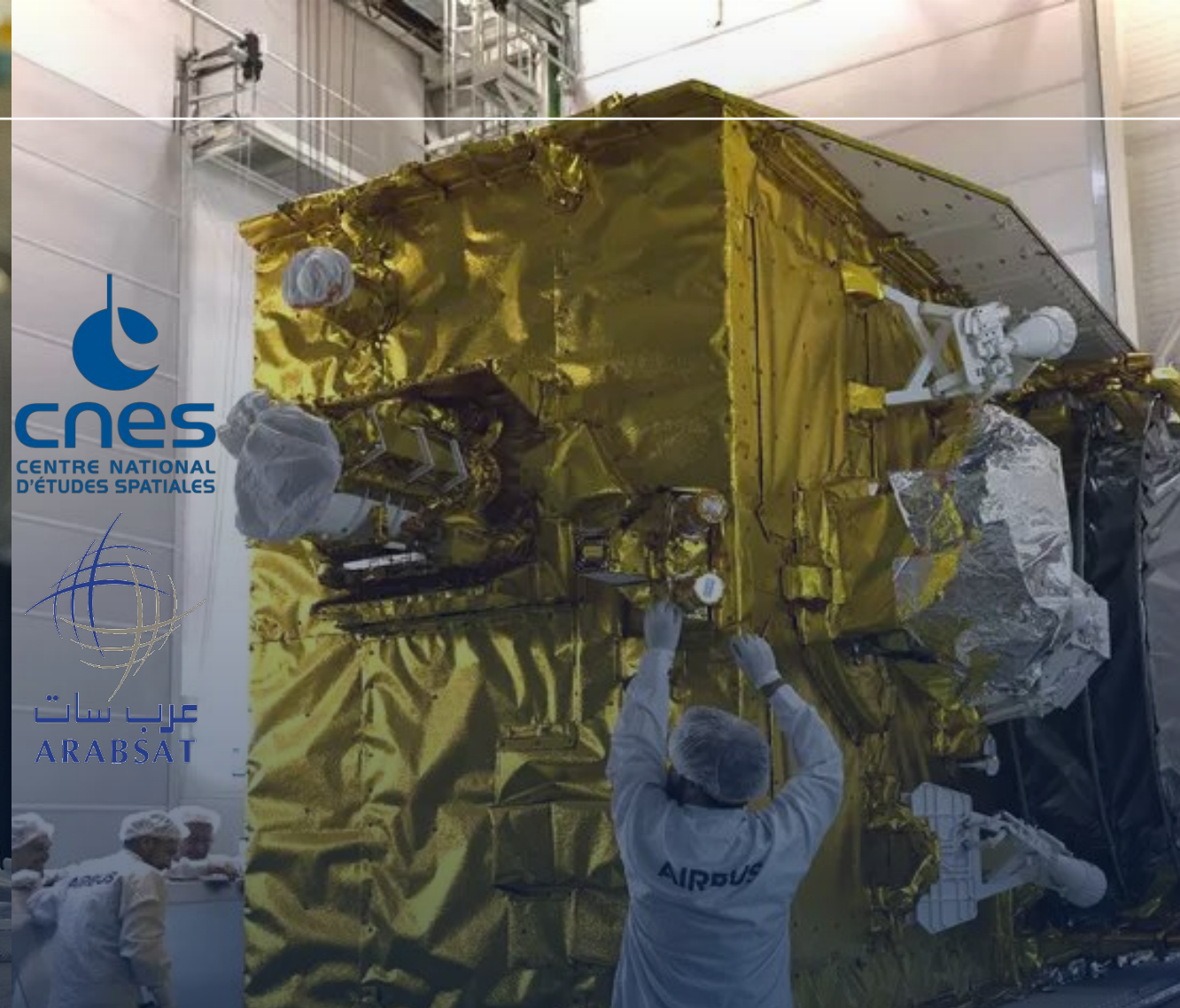
Full steerable
beams in Ku,
Ka, Q and V
bands



Next
Generation
Processors



Optical Communications



100x Gbps transmissions.



Large data volumes



Robust to eavesdropping, tampering, geolocation and jamming



Pioneer in the sector



Worldwide 1st with Teleo on BADR-8

No connectivity is not an option



Customers

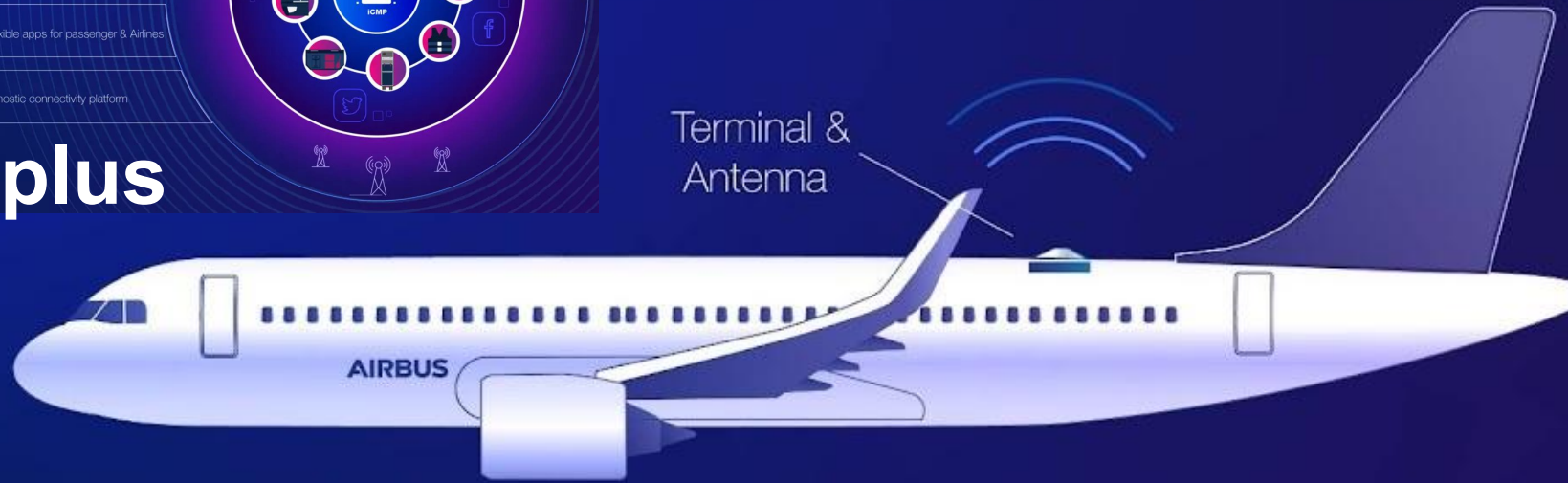
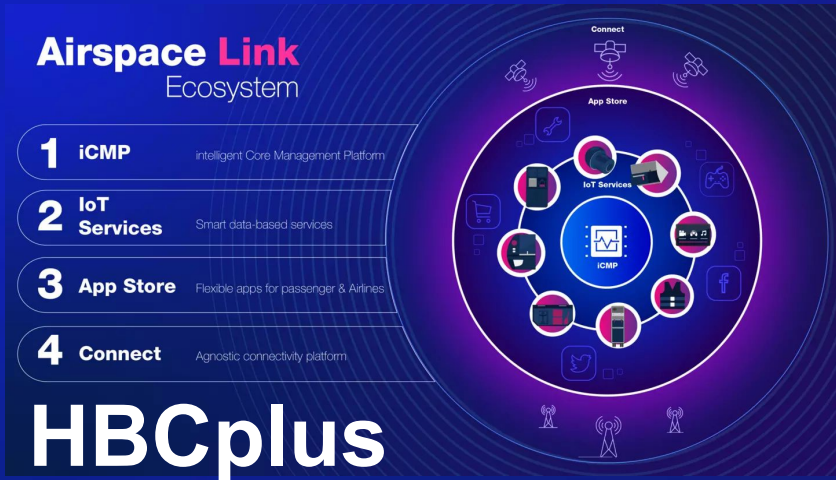


Operators



Governments

Commercial aircraft connectivity



Enhanced
in-flight experience

Streamlined
flight operations

Optimised aircraft
availability



Shaping Europe's largest defence programme: Future Combat Air System (FCAS)

Massive Constellations
x1000s

Early Warning
& Space situational
awareness

Position
Navigation
Timing (PNT)

Communication
Layers (RF + Optical)

Connectivity resilience, very high
bandwidth, flexible and generic



High throughput
capacity



Variety
of frequency bands
UHF / X / Ka
Optical Comms



Anti Jamming
capability



Multi-layer systems



Comms, sensing
and PNT



Software defined
satellites and
networks



Military Secure
TT&C



Connectivity Standards NTN
(5G/6G)

Thank you

© Copyright Airbus Defence and Space 2023 / Airbus Defence and Space presentation

Confidential and proprietary document.

This document and all information contained herein is the sole property of Airbus. No intellectual property rights are granted by the delivery of this document or the disclosure of its content. This document shall not be reproduced or disclosed to a third party without the expressed written consent of Airbus. This document and its content shall not be used for any purpose other than that for which it is supplied. Airbus, its logo and product names are registered trademarks.