



**On-Orbit Satellite Servicing Panel
May 30-31, 2012**



Commercial Bus Provider's Perspective - Thales Alenia Space

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THALES

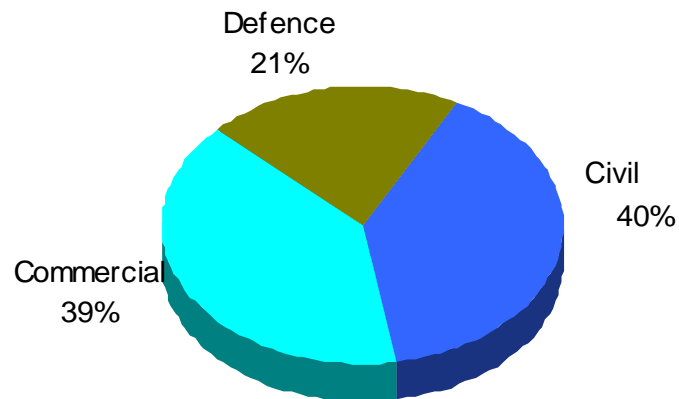
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- Employees 7,200
- Presence Main facilities in France and Italy
- Subsidiaries ... In 4 countries including USA
- Sales 2011..... Approx. 2.1 Bn Euros (\$2.7 bn)

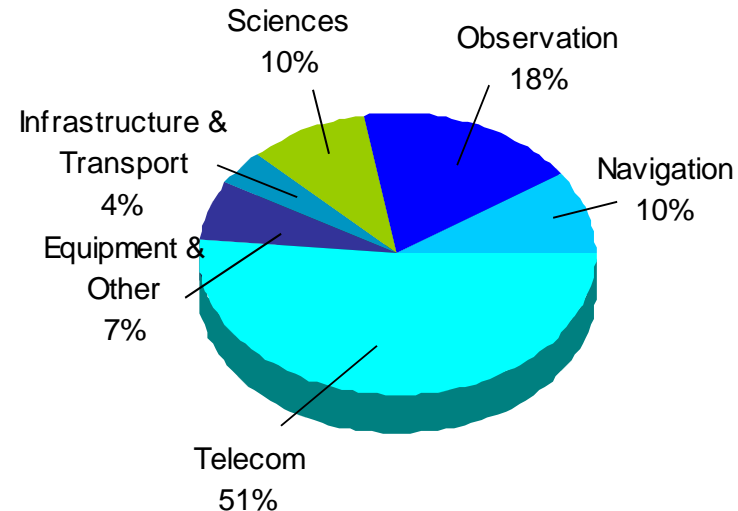


Headquarters in Cannes, France

Sales by Customer



Sales by Application

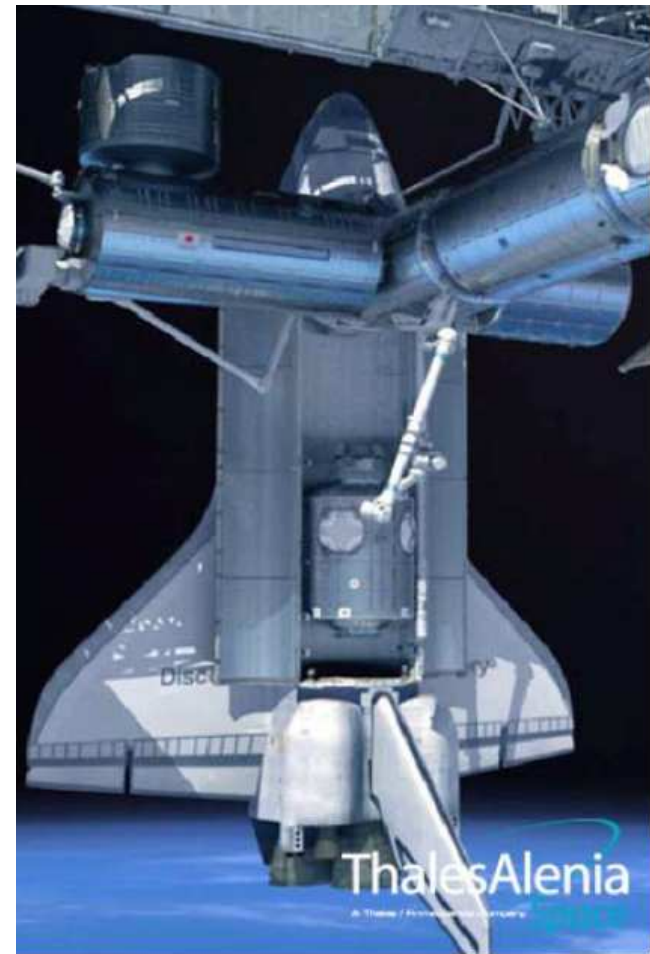


Well Balanced Portfolio – Good Mix of Commercial, Civil and Defense Businesses

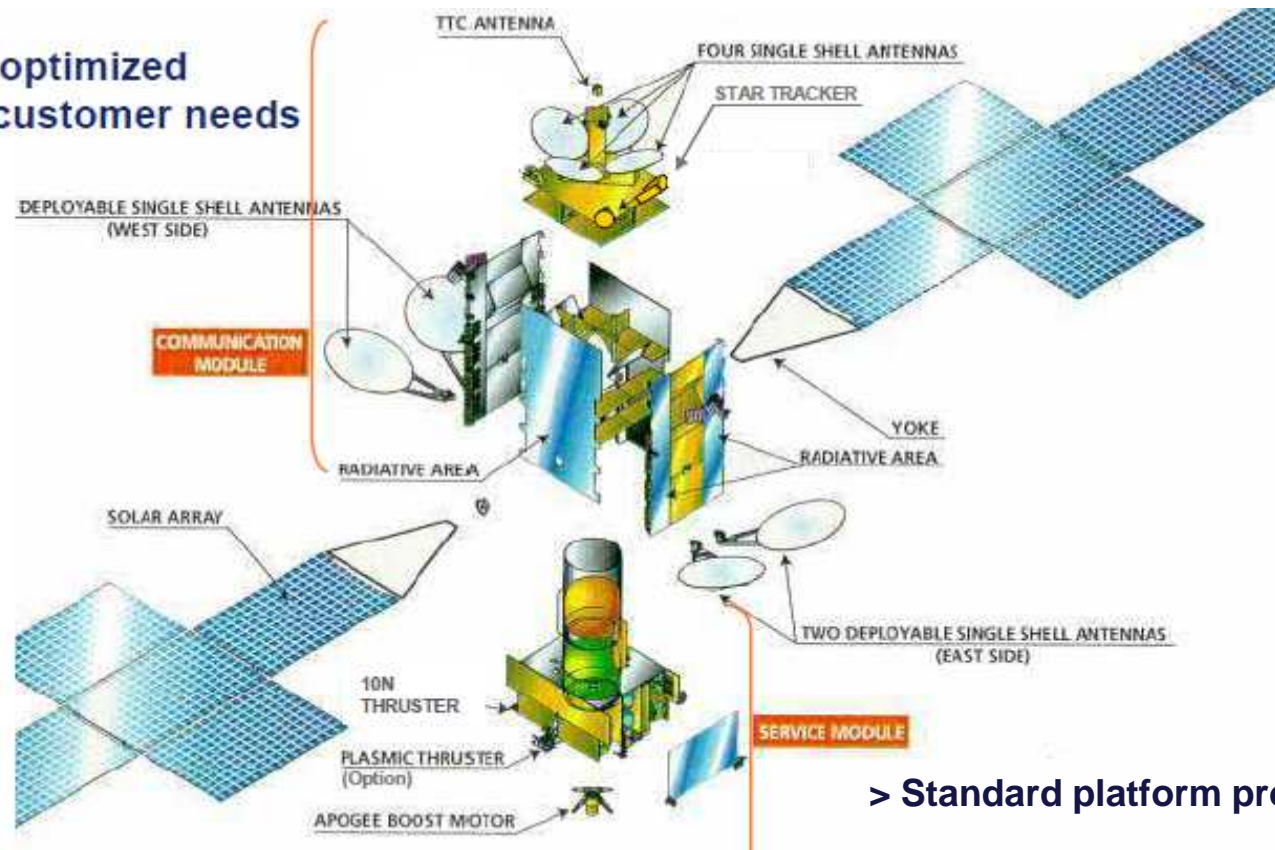
Telecommunications	Observation	Navigation	Exploration/Science
			
Fixed / Mobile Broadband Dual / Military Secured	Climate Change Meteorology Oceanography Intelligence Surveillance	Localization Aeronautical Communications Data collect	Planetology Fundamental physics Astronomy Human spaceflights Space transportation systems
AMC 21, Amos 4/5, Arabsat, Arsat-1, Athena-Fidus, Ciel 2, EuropaSat, Express MD1/MD2, Globalstar, Hispasat, Iridium Next Kazsat 2, Koreasat 6, Lute 5/6, Nilesat 201, O3B, OverHorizon 1, Palapa-D1, RascomStar-Qaf 1R, Satcom BW 2a/2b, Sicral 1B, Sicral 2, Syracuse 1/2/3, Thor 6, Turksat 3A, W2A, W3B, W7, W6A, Yahsat 1A/1B, Yamal 401/402....	Meteosat/MSG, Jason, Calipso, COSMO-SkyMed, Sentinel 1&3, Envisat, ERS, GOCE, Helios, IASI, Pleiades, SPOT...	EGNOS, Galileo, MTSat...	Herschel, Planck, Exomars, Alma, Corot, Cassini-Huygens, Node 2&3, Columbus, Cupola, MPLM, Automated Transfer Vehicle (ATV), ...

TAS Designs and Builds Space Systems for Various Applications

- **Major supplier for Columbus**
- **Prime contractor for Cupola**
- **The largest industrial provider after Boeing in ISS**
 - 50% of pressurized volume
- **ESA's ATV Cargo**
- **9 pressurized modules for Cygnus (Orbital)**

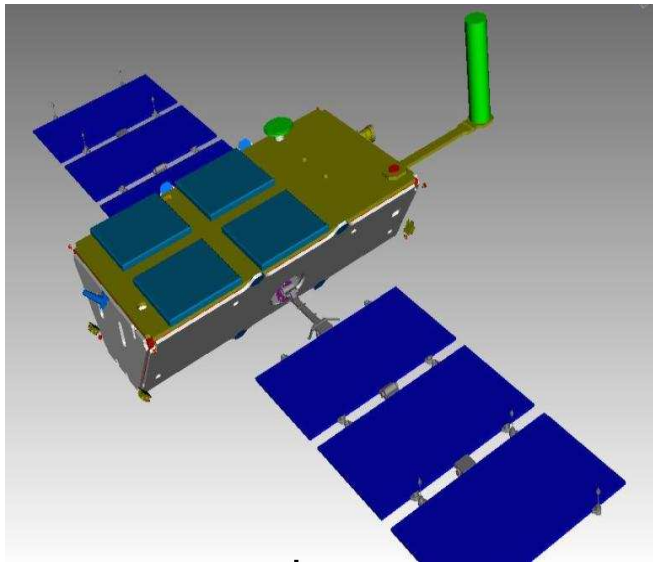


> Mission optimized
to each customer needs



> Standard platform product

SpaceBus Can Handle ~14kW Payload Power (~120 transponders) by Its Modular Structure and Is Compatible with All of Commercially Available Launchers



Extended LifeTime Bus

❑ **ELiTeBUS FEATURES**

Bus Dry Mass.....	< 450 kg
Earth Panel dimensions.....	3000*1600 mm
Bus Reliability	> 0.925 @ 12.5 yrs
Orbit.....	LEO-MEO
Mission Life.....	up to 12.5 Years
Delivery.....	18 months

❑ **PAYLOAD HOSTING FEATURES**

Average Payload power	>1000 W
Payload Mass.....	>300 kg

❑ **POWER SUB-SYSTEM**

Bus Voltage	28V / 38V
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❑ **ATTITUDE CONTROL SUBSYSTEM**

Attitude Control.....	3 axis
Pointing Knowledge.....	0.007° typically

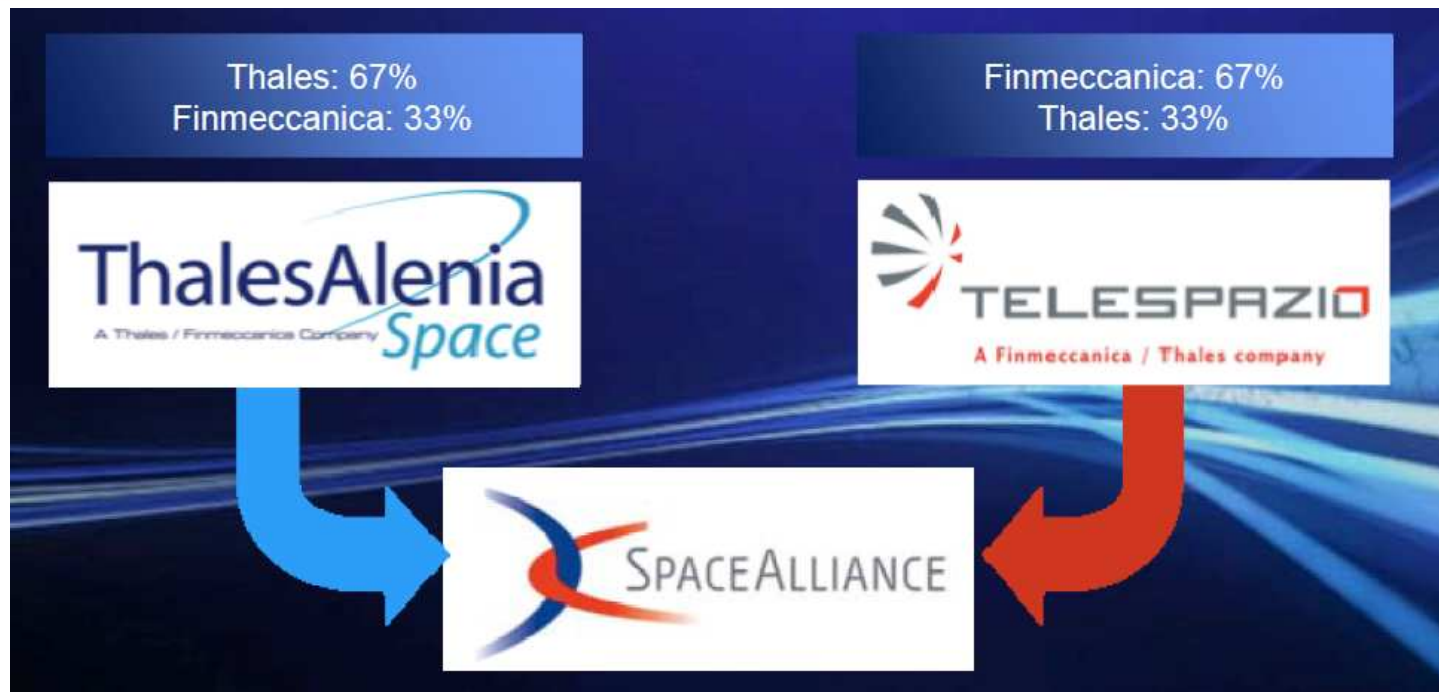
❑ **COMMAND & DATA HANDLING**

Flight Processor.....	LEON 3
Interface.....	1553B

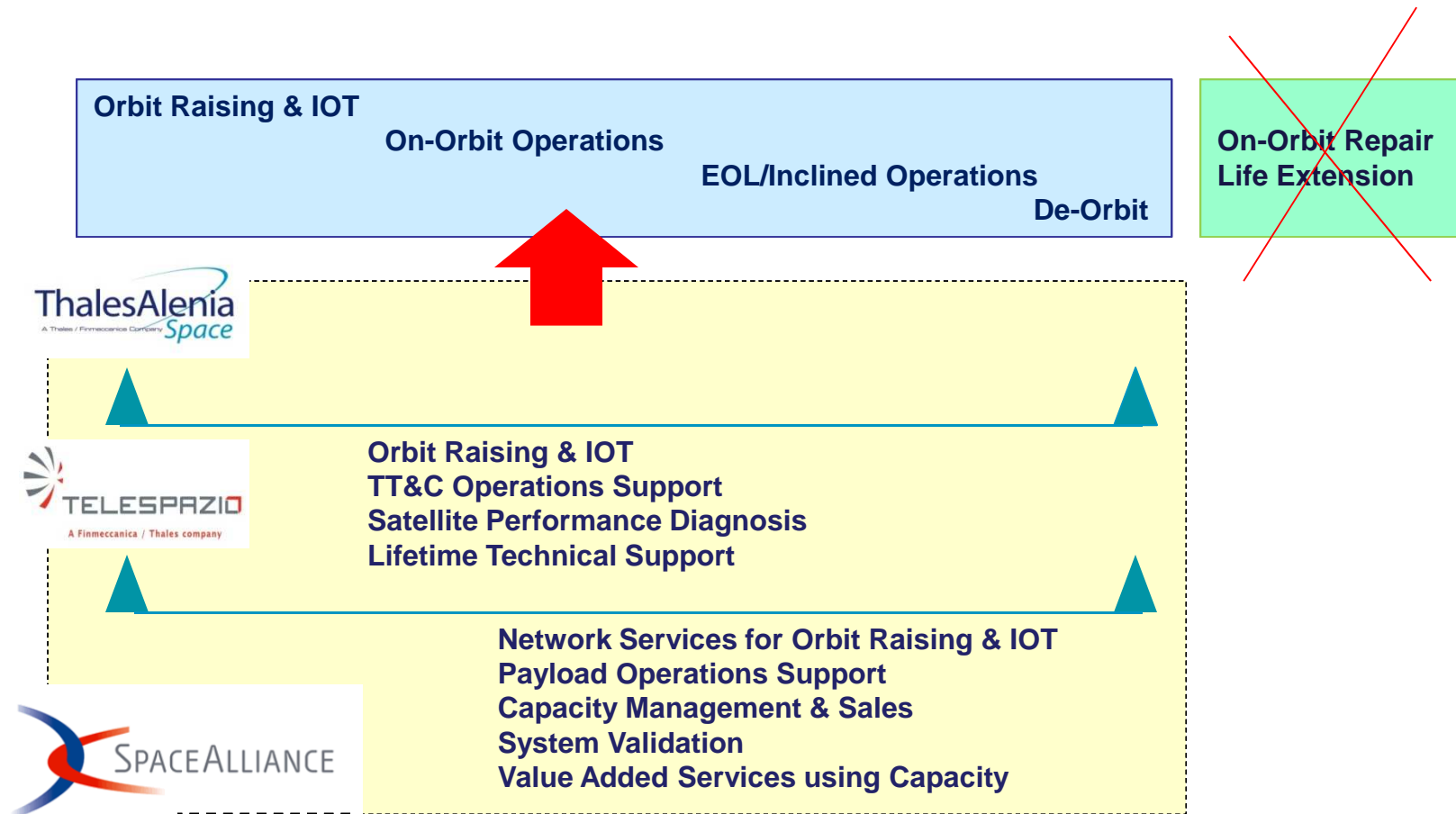
❑ **TTC COMMUNICATION SUBSYSTEM OPTIONS**

S-band, C-band, Ka-band

***Driven by More Than 110 Satellites Built for Globalstar-2, O3b and Iridium NEXT.
ELiTe Bus Offers A Better, Cheaper and Faster Ride Opportunities for Various Payloads***



***TAS and Telespazio Cover Wide Spectrum of Space Businesses
– from Equipment to Services***



Space Alliance Is Involved in Various Kinds of On-Orbit Satellite Servicing

- **Thales Alenia Space, together with its sister company Telespazio (Space Alliance), provides wide range of on-orbit satellite services**
- **Many of those services have been integrated in satellite manufacturing contracts as standard practices and routine services – Orbit raising, IOT, lifetime support, etc.**
- **Satellite manufacturer's business today is focusing on mastering a “better, cheaper and faster” principle**
 - High reliability with low price (to support customers' business cases) is a virtue, thus “standardization” is the main focus
 - Evolutionary technical improvements are carefully adopted within this principle
 - Platform designs have become fairly mature except for certain areas – electric propulsions, etc.
 - Payload designs are evolving to achieve more flexibility, but high reliability and price are once again the constraints
 - On-Orbit Services are value added services of such satellite production
- **Space Alliance is not pursuing services, such as life extension or on-orbit repairing. These services belong to “a different regime”, and we are not necessarily convinced that these are technically and/or commercially viable today.**