

## Part 1: Strategic Issues & Forecasts for the Satellite and Launch Industry

### Current trends in satellite manufacturing & launch services

Past decade of space activity measured in units of satellites, in tons to orbit and in \$ of industry revenues  
2008 slightly behind 2007

Variability in launch tempo driven by satellite orders and launch vehicles' availability

Replacement drives the 4th demand cycle in commercial GEO comsat

Future satellite demand strongly driven by governments, especially civilian

Growth of demand for commercial satellites now driven by non geostationary orbits

Almost 50% growth in number of satellites to be launched over 2009-2018

41% growth in mass to be orbited over 2009-2018

Almost 50% growth in industry revenues to be generated over 2009-2018

- GEO satellites dominate the launch market
- LEO satellites dominate the manufacturing market

### Market drivers for future satellite demand

#### The upstream and downstream satellite markets

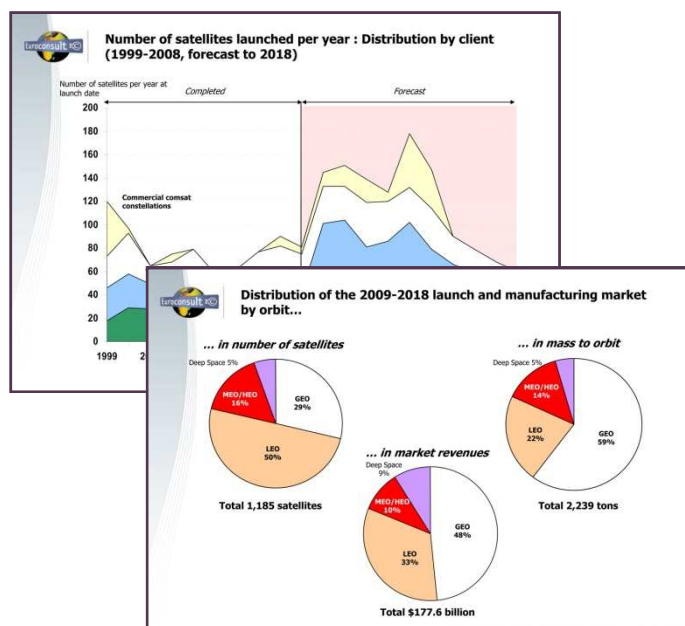
- Three orbits used by three types of satellite customers
- The value chain in satellite services provided by government and commercial satellite operators
- Future demand not the sum of sat projects known today

#### Innovation is a satellite market driver

- Technology advances permit always more capable GEO satellites
- Elasticity in LEO sat. market drives down launch mass
- Innovation in satellite financing to maintain market shares and to support new satellite projects

#### Insurance as a satellite market enabler

- In-orbit risk covered through self insurance and commercial insurance
- Launch insurance price driven by launch vehicle differentiation and capacity on the insurance market



### Full Page Graphs & Tables – Strategic Issues & Forecasts for the Satellite and Launch Industry

#### □ Distribution by client, 1999-2008 & forecasts to 2018

- Number of satellites launched per year
- Mass of satellites launched per year
- Satellite manufacturing and launch market value

#### □ Distribution by orbit, 1999-2008 & forecasts to 2018

- Number of satellites launched per year
- Mass of satellites launched per year
- Satellite manufacturing and launch market value
- Number of commercial satellites launched per year
- Mass of commercial satellites launched per year
- Satellite manufacturing & launch: market value (comm satellites)
- Number of government satellites launched per year
- Mass of government satellites launched per year
- Satellite manufacturing and launch: market value (govt satellites)

#### □ Distribution by orbit x client, 2009-2018

- Satellite manufacturing market by market accessibility
- Launch market by market accessibility
- Satellite manufacturing & launch market in number & total mass
- Satellite manufacturing market in value
- Launch market in value

#### □ Trends in commercial space

- Two decades of GEO satellite markets distributed by client: 1999-2008 and 2009-2018
- Launch and order rates for commercial GEO satellites, 1995-2008
- The three value chains in commercial satellite applications (2008)
- Trend in launch mass of commercial GEO satellites, 1998-2010
- Satellite losses in the past three years

## Part 2: Competitive Environment & Performances of Market Players

### The satellite manufacturing industry

#### Structure of the satellite manufacturing industry

- More manufacturers of GEO comsat compete internationally
- A number of aspiring manufacturers for non geostationary satellites

#### Trends in industry financial performance

- Revenues growth of the industry
- Profitability of the industry

#### Market shares for the commercial satellite market

- Market shares for the commercial GEO market
- Positioning of market players in the LEO/MEO market
- Positioning of market players for new generation of GEO satellite systems

#### Strategic initiatives in the satellite manufacturing industry

- Partnerships between satellite manufacturers
- Competition between manufacturers is not just on technology terms
- Public-Private Partnerships and hosted payloads to support government investment in satellite systems
- Positioning in the value chain: strategies for value added services

#### Key issues for the short term

- Ability to deliver backlog of orders on time
- Political & regulatory environment impacting the competitive landscape
- Exchange rates as a factor of instability
- Adverse financing environment may cut certain satellite projects

### The launch service industry

#### Launch capability development driven by government needs

#### Launch market size and growth

- 2008 revenues of the industry
- Revenues growth of the industry

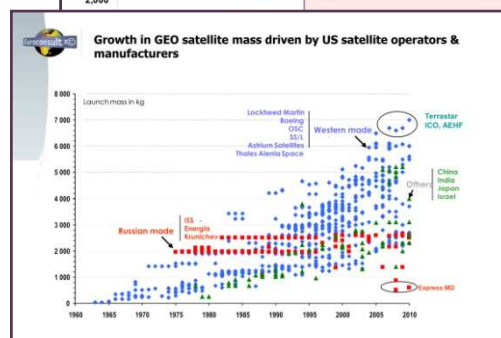
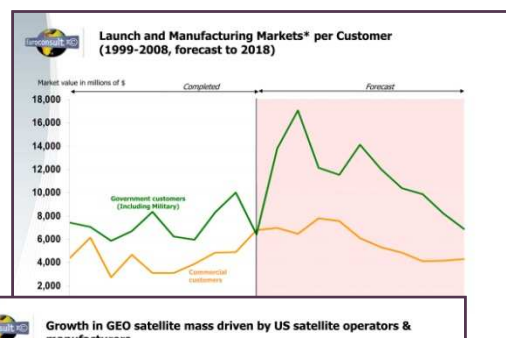
#### Launch market by orbit

- Geostationary orbit remains the largest launch market
- Low Earth orbit predominantly a government launch market

#### Market shares for the commercial GTO launch market

#### Key issues for the short term

- Ability to deliver the backlog of orders while maintaining reliability
- Technological innovations for higher competitiveness



#### Full Page Graphs & Tables - Competitive Environment & Performances of Market Players

- GEO satellite platforms excluding Russian-made
- Accessibility of satellite manufacturing market by orbit: 2009-2018
- Accessibility of the launch market by orbit: 2009-2019
- Current & future comm. expendable launch vehicles: 1960-2010
- Launch rates: GTO-capable comm. launch vehicles: 1996-2008
- Total mass launched per GTO-capable launch vehicles 1978-2008
- Distribution by launch vehicle (small satellites launched): 2000-8

- 1999-2008 & forecasts to 2018
- Satellite manufacturing & launch market value for commercial & government customers
- Satellite manufacturing vs launch market value
- Market shares for GEO/HEO commercial satellite manufacturing
- Market shares for commercial launches to all orbits

#### □ Growth in launch mass of GEO satellites, 1999-2011

- ... launched by Ariane
- ... launched by Sea Launch and Land Launch
- ... launched by Atlas
- ... launched by Proton
- ... launched by Asian launch vehicles (GSLV, H2, Long March)

## Part 3: Commercial Satellite Demand

### Demand context for commercial satellites

Four market drivers for commercial satellite applications

Scalability drives orbit choice of comsat systems

### Assumptions for commercial demand

Number of satellites to be launched

Satellite launch mass

Specific prices (\$ per kg)

### The commercial market by orbit

GEO is the primary destination of commercial satellites

The commercial GEO comsat industry is now in its fourth demand cycle

The fourth demand cycle for commercial GEO comsat is driven by replacement

Future demand for commercial GEO comsat driven by a double trade-off

- Several factors in the economic equation of increasingly productive satellites
- The trade-off between concentration of the operators and new entrants

The peak of the fourth demand cycle in 2011/12 marginally affected by the ongoing crisis

The low in the fourth demand cycle at the end of the 2010s

Highly elliptical orbit (HEO), a niche market for commercial satellites

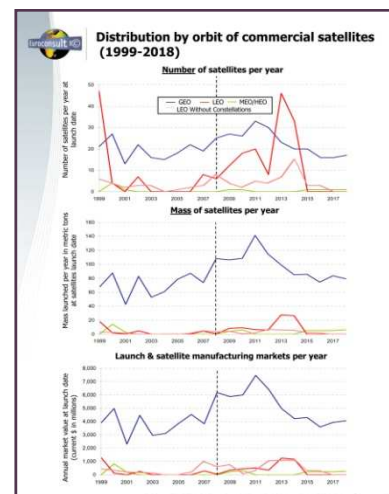
MEO becoming a commercial market with O3b

More Earth observation satellites in LEO in addition to second generation of comsat constellations

All three first generation comsat constellations replaced

Optical Earth observation increasingly commercial

Radar imagery emerges as a commercial market



#### Full Page Graphs & Tables – Commercial Satellite Demand

##### □ Market drivers

- Four decades of new services for communications & broadcasting
- The cyclicity of the commercial GEO/HEO comsat market 1999-2008 and forecasts to 2018
- Range in commercial GEO comsat masses: 1999-2012
- Range in commercial FSS/BSS GEO comsat power: 1996-2008
- Growth in avg design lifetime Western-made GEO comsat: 1967-2006
- Growth in comsat productivity (more bandwidth + longer lifetime)
- Cumulated capex for the top 10 largest commercial comsat operators: 1990-2009
- Average launch mass per year of commercial GEO comsat per category of manufacturers: 1967-2006
- Growth in the avg n° of transponders per GEO comsat: 1967-2006
- Transponders of commercial GEO comsat launched and retired per year: 1967-2008
- Firm orders per year for commercial GEO comsat: 1996-2006
- The pros & cons in growing launch mass of commercial GEO satellite
- Launch mass distribution of the order book of civilian GEO comsat under construction (As of April 2009)
- The 50 commercial comsat operators in activity
- Concentration of GEO satellite demand : the top ten operators

- Demand model by yr commercial GEO/HEO satellites: 2009-18
- Two decades of commercial LEO satellites
- The three commercial constellations of LEO comsat
- Demand model per year for commercial LEO satellites (comsat and Earth observation): 2009-2018
- Commercial satellite Earth observation companies

##### □ Distribution by application, 1999-2008 & forecasts to 2018

- Number and mass of commercial GEO comsat
- Satellite manufacturing market for GEO comsat
- Launch market for GEO comsat

##### □ Distribution by client region, 1999-2008 & forecasts to 2018

- Number and mass of commercial GEO comsat
- Satellite manufacturing market for GEO comsat
- Launch market for GEO comsat

##### □ Distribution by orbit, 1999-2008 & forecasts to 2018

- Number and mass of commercial satellites
- Satellite manufacturing market for commercial satellites
- Launch market for commercial satellites

## Part 4: Government Satellite Demand

### Assumptions for government demand

- Number of satellites to be launched
- Satellite launch mass
- Specific prices (\$ per kg)

### The Government Market

#### Market hierarchy between customers, applications and regions

- Growth in future government market driven by civilian satellites
- Earth observation dominant for civilian satellites and navigation for military satellites
- Europe and Asia dominate for civilian satellites while military satellites remain concentrated in the USA and Russia

### Market dynamics by orbit

**A significant growth in government demand for GEO satellites....**

**...Driven by civilian government agencies rather than by military users**

**Military satellites in geostationary orbit exclusively for satcom services**

**MEO/HEO satellites historically used by the US DOD and the CIS**

**The MEO market enlarges with the replacement of GPS and Glonass and two new constellations**

**Quasi-zenith satellites to optimize national navigational service**

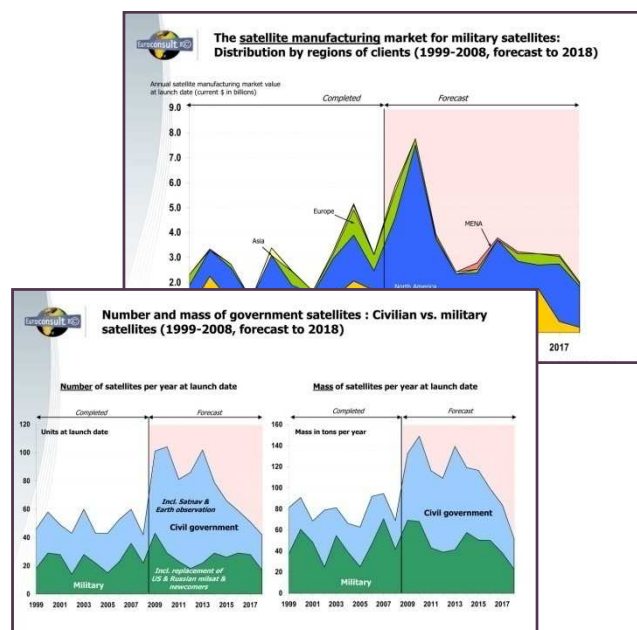
**The strong growth of the LEO government satellite market is driven by civilian agencies**

**Earth observation is still the dominant application in low Earth orbit (LEO)**

**Governments drive the requirements for multimission small satellite platforms**

**More space agencies launch minisat**

**Deep space missions for space science & exploration**



#### Full Page Graphs & Tables – Government Satellite Demand

##### Market drivers

- Demand model in number of civilian and military government satellites per year by orbit: 2009-2018
- Two decades of civilian & military government satellites
  - By application
  - By customer region
- World government spending for civil & military space: 1980-2016
- Trend in launch mass of government GEO satellites: 1998-2014
- Trend in launch mass of MEO/HEO satellites: 1996-2017
- Trend in launch mass of civilian LEO satellites: 1996-2014

##### Distribution by region, 1999-2008 & forecasts to 2018

- Number and mass of civilian government satellites
- Satellite manufacturing market for civilian government satellites
- Launch market for civilian government satellites
- Number and mass of military government satellites
- Satellite manufacturing market for military government satellites
- Launch market for military government satellites

##### Distribution by client, 1999-2008 & forecasts to 2018

- Number and mass of government satellites
- Satellite manufacturing market for government satellites
- Launch market for government satellites

##### Distribution by orbit, 1999-2008 & forecasts to 2018

- Number of civilian and military government satellites
- Mass of civilian and military government satellites
- Satellite manufacturing market for civilian & military govt satellites
- Launch market for civilian and military government satellites

##### Distribution by application, 1999-2008 & forecasts to 2018

- Number of civilian and military government satellites
- Mass of civilian and military government satellites
- Satellite manufacturing market for civilian & military govt satellites
- Launch market for civilian and military government satellites

# Part 5: Company Profile

This part is made of **six company profiles exclusive** to Euroconsult:

- EADS Astrium
- Thales Alenia Space
- Orbital Science Corp.
- Boeing
- Lockheed Martin
- Space Systems/Loral

The space activity of each company is analyzed according to the same structure:

- Company history
- Shareholders and subsidiaries
- Financial data of the space division(s)
- Product/service offering in satellite manufacturing and /or launch service
- Commercial performance in satellite manufacturing and /or launch service

Company Profile		EADS Astrium			
<b>3. Financial performances</b>					
<b>Astrium financial data, 2005-2008</b>					
€ in million	2005	2006	2007	2008	
Revenues	2,700	3,212	3,550	4,289	
of which civilian	26.9%	68.9%	65%	65%	
EBIT	29	729	174	234	
R&D	29	729	78	69	
Backlog	10,900	12,200	12,900	11,000	
Employees	11,000	12,000	12,000	12,000	
Astrium revenues increased by 21% in 2008 to €4.3 billion with contributions from all three business units. The main drivers were a sales increase in commercial comsat, a ramp-up in Astrium's production and in Paradigm services.					
Astrium delivered a fifth consecutive year of profitable growth. An EBIT margin of 5.5% was achieved in 2008 despite the negative impact of the declining British £ against the € that affected Paradigm. EADS continues to call for improved profitability to reach 10% between 2010-2015 depending on the value of the euro-dollar exchange rates and the development of the commercial satellite cycle. Astrium targets 25% of revenues from services by 2020.					
<b>4. Satellite Manufacturing</b>					
Astrium Satellites has a balanced portfolio of satellite activities between telecom and Earth observation. Its strategy is to gain an average of 3 to 4 comsat per year to sustain competitiveness and certainty to push for the development of integrated services through Astrium Services and dual-use systems.					
The high industrial verticalization of the company and its wide geographic footprint provide it access to large budgets of the European Space Agency (ESA). In 2007, Astrium captured 65% of total ESA satellite market, of which UK & Germany represented 36%.					
The company's satellite manufacturing facilities in Toulouse, France includes a minority interest in Interspace (35% stake), a specialist of environmental testing with facilities connected to those of Astrium. The facilities include class 100,000 clean rooms (22,000 sq. ft.), a bus and payload integration bay, an environmental test area, and an anechoic RF chamber.					
<b>Astrium Satellites financial data, 2005-2008</b>					
Revenues in billions of €	1.2	1.3	1.3	1.5	
Revenues growth	-46%	+9%	+9%	+13%	
In % of Astrium	44%	40%	37%	35%	

# Part 6: Satellite Backlog & Forecast

This part is made of **two databases exclusive** to Euroconsult:

- The first database is a backlog of the 75 commercial satellites under construction (as of May 2009) for launch up to 2012. It is a complement to the market forecasts established by Euroconsult on the number and types of commercial satellites to be manufactured and launched this decade.
- The second is Euroconsult's forecast of 770 government satellites to be launched during 2009-2018, including the nominative satellites under construction as of May 2009, and those that are planned to be launched by 2018 as follow-up of existing systems or as new systems.

For each satellite, the following information is provided:

- Name of satellite
- Year of launch
- Name & country of registration of the operator
- Application of satellite
- Orbit of satellite
- Satellite manufacturer
- Satellite bus
- Design lifetime of satellite
- Launch mass of satellite
- Launch service provider
- Launch vehicle

Launch year	Satellite	Operator	Operator country of registration	Application	Specific Application	Satellite manufacturer	Satellite Bus	Mass at launch (kg)	Design lifetime (years)	Orbit	Launch service provider	Launcher	Launcher version
2009	Ariane 2	Hesast	ESP	Telecom	FSS	Astrium Satellites	Estimote 3000	5400	15	GTO	Artemispace	Ariane 2	ECA
2009	Arabsat 5A	ArabSat	SAU	Telecom	BSS	Astrium Satellites/FAE	Estimote 3000	4800	15	GTO	ILR	Proton	M/Breeze M
2009	Arabsat 5B	ArabSat	SAU	Telecom	BSS	Astrium Satellites/FAE	Estimote 3000	4800	15	GTO	ILR	Proton	M/Breeze M
2009	Arabsat 5C	ArabSat	SAU	Telecom	BSS	Astrium Satellites/FAE	Estimote 3000	4800	15	GTO	ILR	Proton	M/Breeze M
2009	Arabsat 5D	ArabSat	SAU	Telecom	BSS	Astrium Satellites/FAE	Estimote 3000	4800	15	GTO	ILR	Proton	M/Breeze M
2009	Arabsat 5E	ArabSat	SAU	Telecom	BSS	Astrium Satellites/FAE	Estimote 3000	4800	15	GTO	ILR	Proton	M/Breeze M
2009	Arabsat 5F	ArabSat	SAU	Telecom	BSS	Astrium Satellites/FAE	Estimote 3000	4800	15	GTO	ILR	Proton	M/Breeze M
2009	Arabsat 5G	ArabSat	SAU	Telecom	BSS	Astrium Satellites/FAE	Estimote 3000	4800	15	GTO	ILR	Proton	M/Breeze M
2009	Arabsat 5H	ArabSat	SAU	Telecom	BSS	Astrium Satellites/FAE	Estimote 3000	4800	15	GTO	ILR	Proton	M/Breeze M
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2009	Arabsat 5BQ	ArabSat	SAU	Telecom	BSS	Astrium Satellites/FAE	Estimote 3000	4800	15	GTO	ILR	Proton	M/Breeze M
2009	Arabsat 5BR	ArabSat	SAU	Telecom	BSS	Astrium Satellites/FAE	Estimote 3000	4800	15	GTO	ILR	Proton	M/Breeze M
2009	Arabsat 5BS	ArabSat	SAU	Telecom	BSS	Astrium Satellites/FAE	Estimote 3000	4800	15	GTO	ILR	Proton	M/Breeze M
2009	Arabsat 5BT	ArabSat	SAU	Telecom	BSS	Astrium Satellites/FAE	Estimote 3000	4800	15	GTO	ILR	Proton	M/Breeze M
2009	Arabsat 5BU	ArabSat	SAU	Telecom	BSS	Astri							