

Plenary Session A

Impact of Communications Satellites on Information Infrastructure

16 April 2003 (10:45-12:30)

Chaired by: Y. Suzuki, Communications Research Laboratory, Tokyo, Japan

Moderator: H. Misuno

Panelists :

N.Helm –Deputy Director, Space & Advanced Communications Research Institute - Geoage Washington University, Speaker from NASA

J. Rigley –Vice-President - Communications Research Center Canada

C. Allemand – Director for Programs and Industrial Policy - CNES

Y. Furuhama -Executive Director - National Space Development Agency of Japan

**Jean-Yves Le Gall (in return of P. Bertolucci – Senior Vice President)
Arianospace CEO**

N. Helm - Deputy Director, Space & Advanced Communications Research Institute -
Geoage Washington University, Speaker from NASA

PETER DRUCKER'S NEXT SOCIETY

- **KNOWLEDGE WILL BE KEY RESOURCE**
- Borderless - Mobile - Precarious
- **INFORMATION REVOLUTION - INTERNET**
- **E-COMMERCE WILL TRANSFORM ECONOMY**
- **CORPORATIONS WILL LARGELY VANISH**
- **EDUCATION ESSENTIAL AGES 2-82**
- **OLDER PEOPLE WILL BECOME DOMINANT**

Mr. Helm showed in his lecture that there will be a revolution in society in which Internet will be a large part of it as well as necessity for satellite technology.

The growth of Internet is doubling every 18 months. In 2003 there are 180 million people using Internet. Also the e-commerce shall be growing. Currently the e-commerce is about 2% of all commerce. But there is prediction that in 10 to 20 years it will be 50%.

In 1980, 75% of all people employees worked for large corporations, but it will totally reverse until 2020 with the number of people working in medium or small companies.

Education from ages 2 to 82 and e-commerce's growth shall be essential. Moreover personal data as passports, driver licenses, medical records etc. shall be written in chips and the government will be able to control the citizen's position.

INTERNET GROWTH

- **1ST GEN: TEXT, DATA, E-MAIL, FTP**
- **2ND GEN: WEB NETWORK, INFO/VIDEO**
- **3RD GEN: WEB SERVICES, ADVANCED APPLICATIONS –**
 - **GRID COMPUTING**
 - **OPTICAL NETWORKS**
 - **KNOWLEDGE SYSTEMS**
 - **NEXT GEN. MANAGEMENT**
 - **OPEN SOURCE SOFTWARE**
 - **PEER TO PEER SERVICES**

The Internet growth in the first generation it was used text, letter data but in the second generation there is video, in near future will come the third generation and new services will appear. It is possible that the grid computing and knowledge systems will expand.

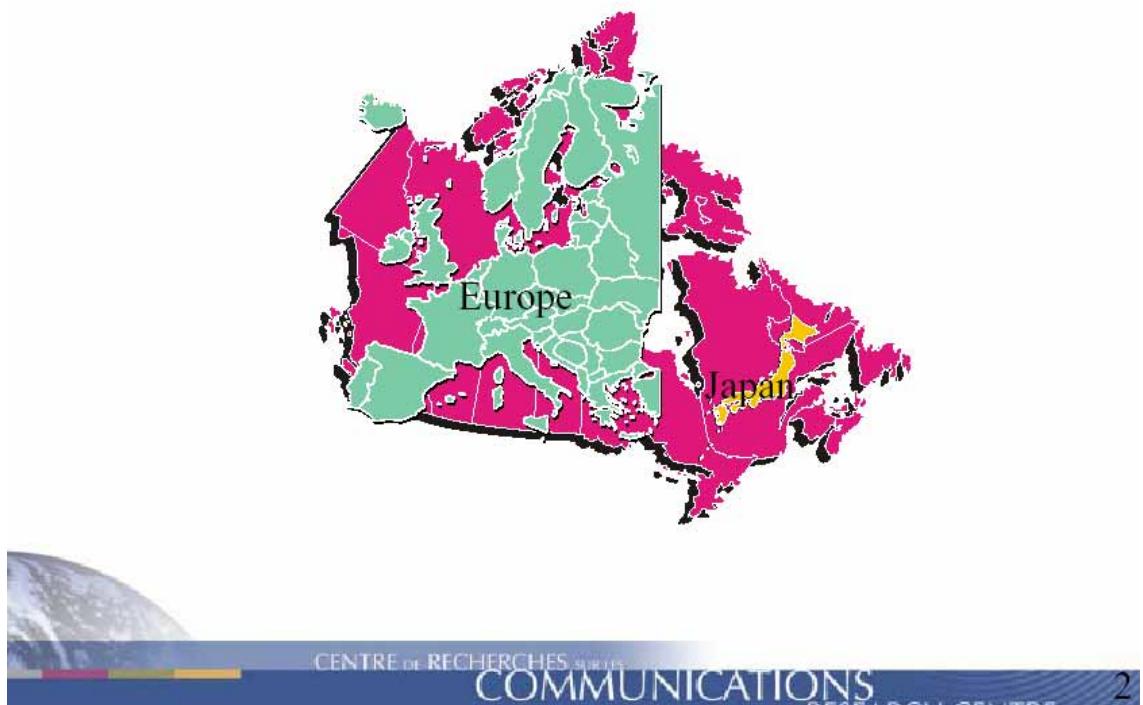
SATELLITE & TERRESTRIAL WIRELESS SYNERGY

- **MSS TERRESTRIAL EXTENSION (INTEGRATE ANCILLARY TERRESTRIAL COMPONENTS)**
- **FUTURE STANDARDS & PROTOCOLS**
- **FUTURE USER TERMINAL CHOOSES WiFi, CELL, HAP OR SATELLITE**

In this, satellite communication shall be necessary. For example future international travelers will have the telephone and in places where wireless LAN will be available it will send signals through wireless LAN. If it does not find wireless LAN it will look for high altitude platforms and if it does not find that it will look for satellites. In every stage it will be probably able to complete communications whichever technology will be used.

Finally communications shall be used more often than transportation.

J. Rigley –Vice-President - Communications Research Center Canada



Canada is large destination, which has bigger territory than whole Europe. However it is country with population density from 1 man to 70 men per km^2 what is small comparing to the territory area. That is the reason why it is country suitable for satellite.

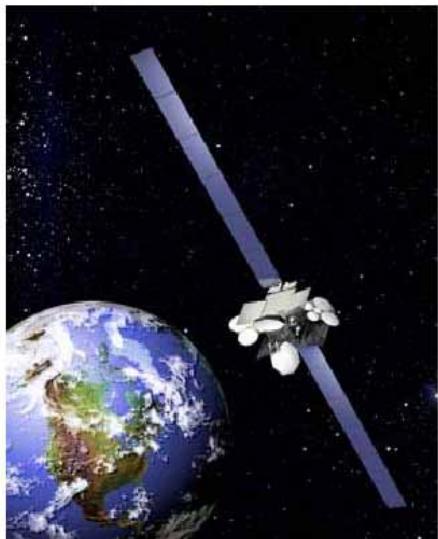
Government Goal: By 2005

**Make the broadband information and
knowledge infrastructure accessible to all
Canadians, thereby making Canada the
most connected nation in the world.**



The goal of Canadian Government for 21 Century is to pursue hand in hand economic and social goals. To realize that by 2005, it is necessary to ensure broadband communication ways and to have environment for connecting with the world.

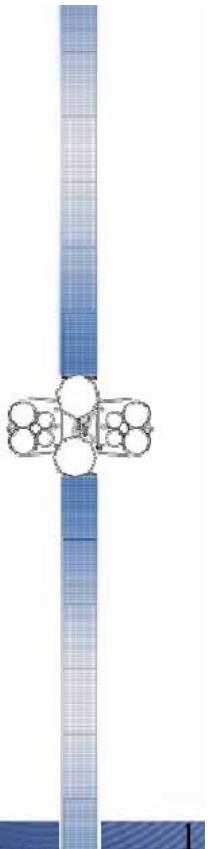
Anik F2 specifications



Launch 2003 - Ariane
Orbital Slot 111.1 west
Boeing 702

5910 kg (3805 kg in orbit)
EOL 15kw
length - 47.9m
width 8.2m

Antennas:
1 C and 1 Ku - 85"
4 Ka Tx (55")
4 Ka Rx (36")
2 Ku Track reflector's
1 Ka Band Beacon
Ka Band TWTs
38 active (12 spare) 90W



As the first step of that realization, the Canadian Government decided to launch Anik F2 in 2003. Specification of it is shown in the picture and its characteristic is that it has Ka-band transponder. There are companies in Canada, which may bring this into fruition (Telesat, Comdev, EMS) and support R&D. This satellite has ability to cover also United States by the system of 45 beam 6 gateways. Anik F2 may also open new future possibilities.



Summary Anik F2 Payload Flight Demonstration Program

- Partnership -
 - Unique public / private partnership which includes space agency, R&D institute, satellite operator, and space technology companies (Team Canada approach)
- Commercial satellite payload-
 - economy,
 - demanding schedule,
 - visibility



The aim of Anik F2 is partnership. Not only for government but also for technological development and space industry. By this satellite the development of programs such as tele-health or tele-education is possible as well as using high speed internet in suburbs.

All technologies are open.

Positioning of the Satellite in the Information Infrastructure

Well known avenues for satellite :

- Transport and Access : **early deployment, flexibility, versatility, global coverage**
 - “commercial” : **“surf the wave of economic development”**
 - for quickly growing regions, with high economic potential
 - for low density/isolated regions of developed countries
 - “institutional” : **coverage & immune to disasters**
 - political willingness to establish back-up / global coverage capacity for disaster management / recovery systems
- Advanced Services to Mobile terminals : **broadcasting**
 - broadcasting sound or multimedia programs to mobile travelers
 - Radio or TV-like models (free, pay-TV, interactive) applied to mobility
 - Satellite as a component of UMTS/IMT-2000 networks
- Location-based services and Global coverage services :
 - **merging positioning and communication capabilities**



Three main points were described: satellite positioning, France development situation and future development. This year the sale of satellite operator's reached the peak and there is need to think about future from the long-term point of view. However it is necessary to solve the digital divide and to provide backup communication systems as characteristic for satellite.

Positioning of the Satellite in the Information Infrastructure

■ Recently, encouraging events and trends :

- aggressive moves in the U.S. :
 - Wild Blue, re-plugged...
 - SES Americom, with Americom@home
 - Echostar, with Echostar-9 and its renting of AMC-15's capacity
 - not to speak about SIRIUS and XM Radio...
- determined players in Asia :
 - for 2-way BB : IP-STAR, NSS-6, ...
 - for advanced services : QZS project in Japan



There are aggressive moves in United States like Wild Blue, Echostar, Sirius or Xm Radio, which can assure success. In Asia there are expectations put on IP-STAR, NSS-6 etc. and in Japan on QZS.

European Manufacturers have grabbed the share of world market from 25% to 50%.

France's programs in the field of Satellite Communications and Broadcasting

■ Priorities (1/2) :

- Complementing Satellite Bus' product range available in Europe :

- Alphabus :

- 12-18 kW, payload power, extendable to 25 kW

- Developing new technologies for future Payload and Missions :

- at the equipment level

- at the mission level :

- mobile com & broadcasting, internet access

- in flight demonstration : Alphasat



In France there is need for advanced payloads, and in Alphasat the spec to be shown is being developed. However there is also hard social mood and in its restrictions the development of telecommunications must be continued.

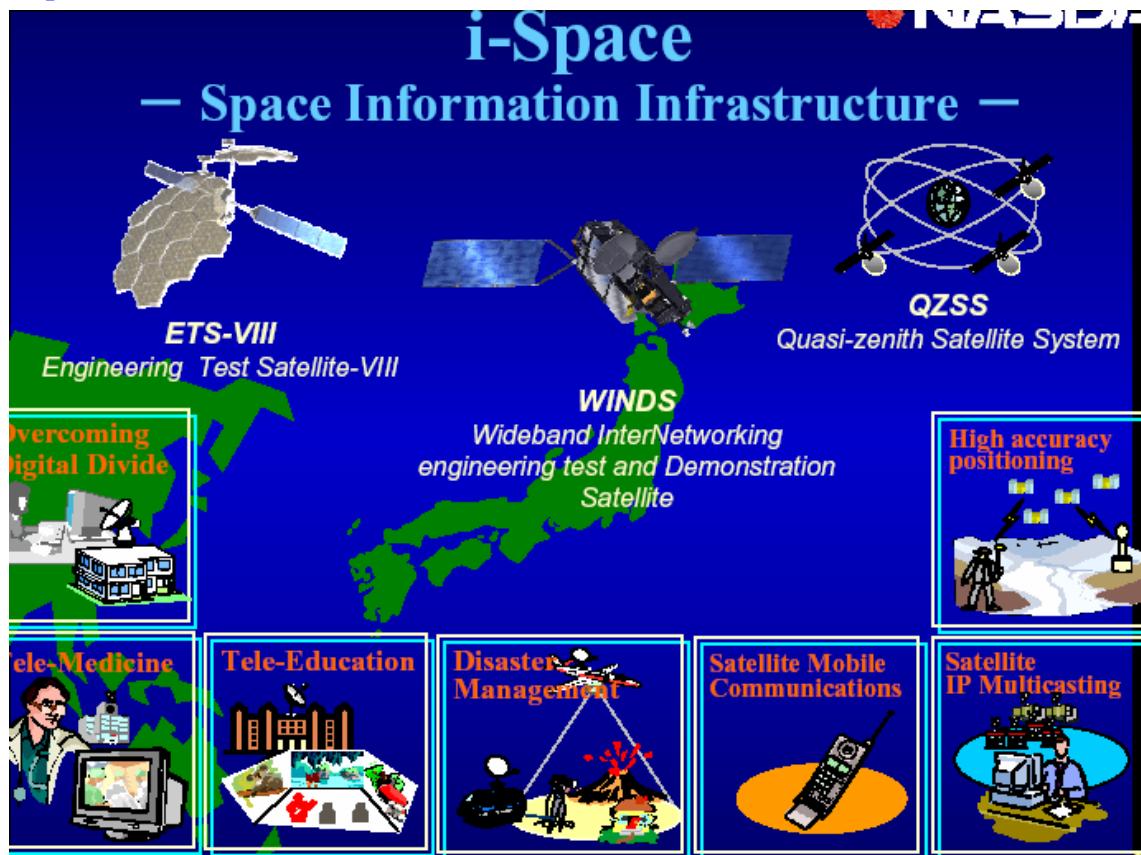
How to improve the competitiveness of Satellite offerings ?

- Improving satellite offerings requires new leaps in satellite technology while maintaining reliability
- But constrained public budgets and “kill’ em all” competition limit :
 - investment in R & D...
 - in projects providing new / advanced services as well...
- Increased international cooperation as a solution ?
 - to share non-recurring costs between constrained public R & D budgets
 - to decrease recurring costs through industrial partnerships
 - to develop partnerships for deployments of similar regional infrastructures in the different regions



20 years ago Japan, United States and Europe were developing by them own, but in future it is very important to have international cooperation system. Not technology just for technology but for timely application of developed technology.

Y. Furuhama -Executive Director - National Space Development Agency of Japan



The program I-Space has been presented. It is comprehensive concept of three satellite experiments. Namely Engineering Test Satellite VIII – ETS VIII, Wideband Internet Working Test and Demonstration Satellite – WINDS and finally Quasi-zenith Satellite System – QZSS. ETS VIII is a program for mobile communication, WINDS for fixed communication and QZSS for navigation.

Beam Coverage

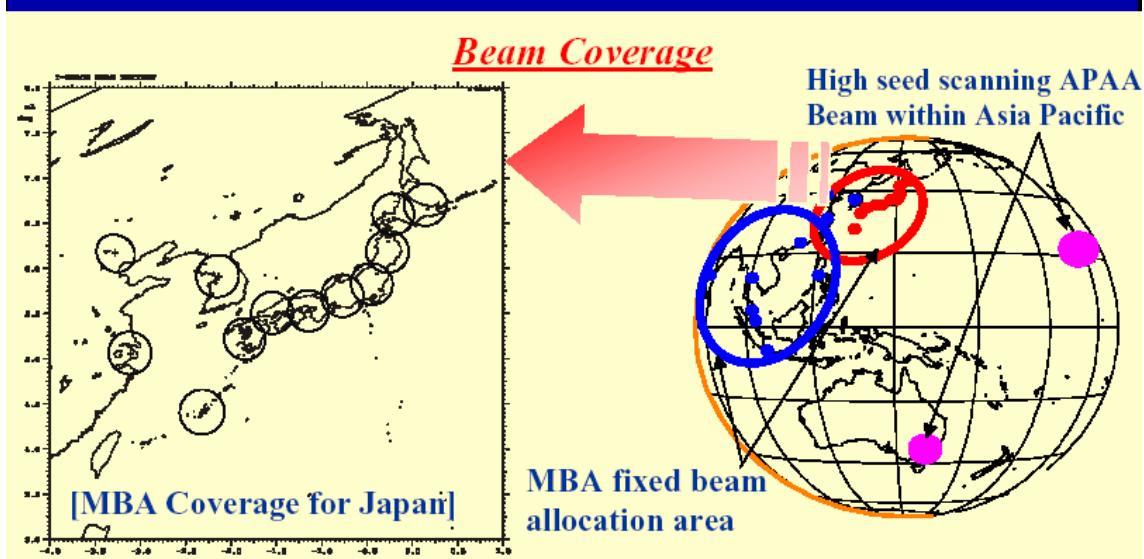
● High Data Rate Communication in Asia Pacific

① Fixed Multi-Beam Antennas (MBA);

- with high EIRP and G/T performance

② Active Phased Array Antennas (APAA);

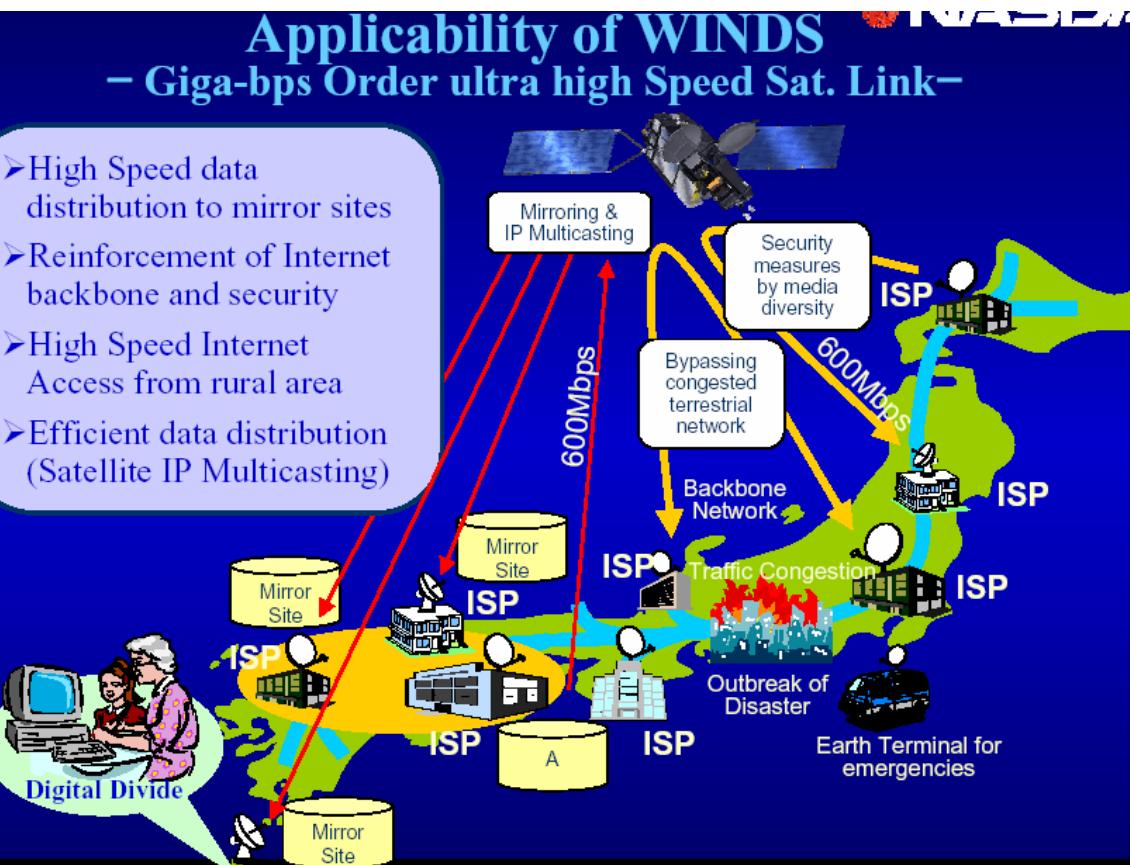
- with high-speed scanning capability up to ± 8 degrees



From those three, WINDS program has been explained:

The main characteristics of WINDS are: it is Ka-band satellite with onboard ATM switch to realize the efficient connection. Secondly: high-speed transmission capability with satellite switching on TDMA up to giga bps. Thirdly: high-speed access of 155 MBPS with relatively small antenna (25 cm in diameter). Fourthly: the satellite has APAA with high speed scanning capability.

The satellite has above functions and it is designed to cover Japan and Asia and Pacific Ocean countries.

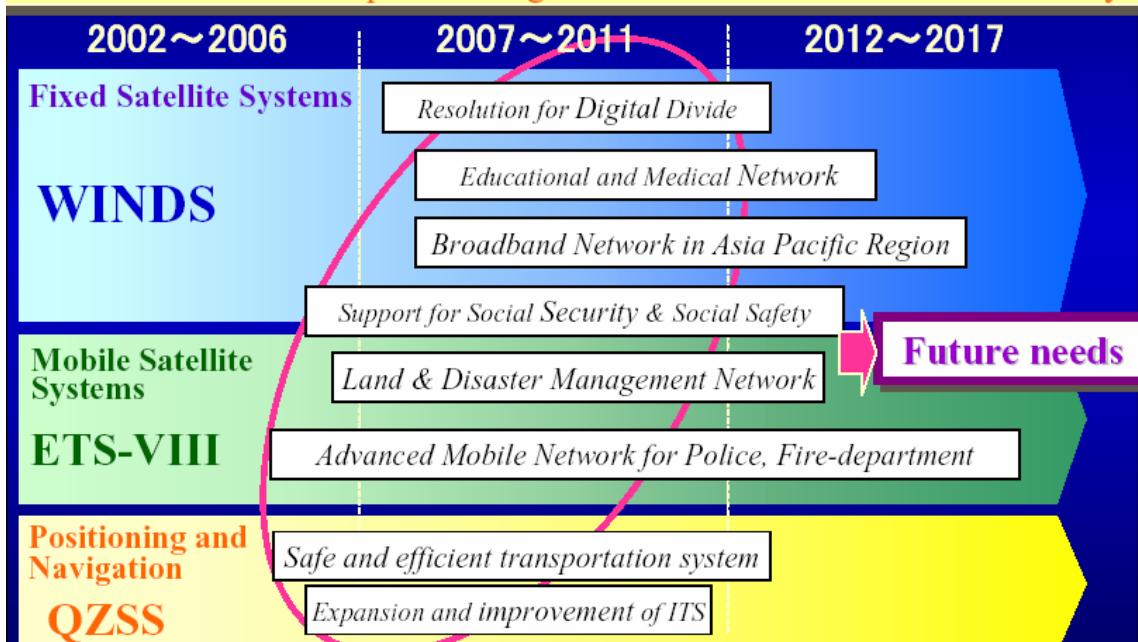


By using WINDS it is possible to speedily realize shown above purposes.

Namely, satellite-based Internet service and terrestrial communication such as high-speed data distribution to mirror sites, providing high speed Internet to rural areas and IP multicast.

NASDA R&D Space Program

Establish space infrastructure for information, communications and positioning to realize a safe and reliable society



Above there is a slide concluding key points of I-Space program.

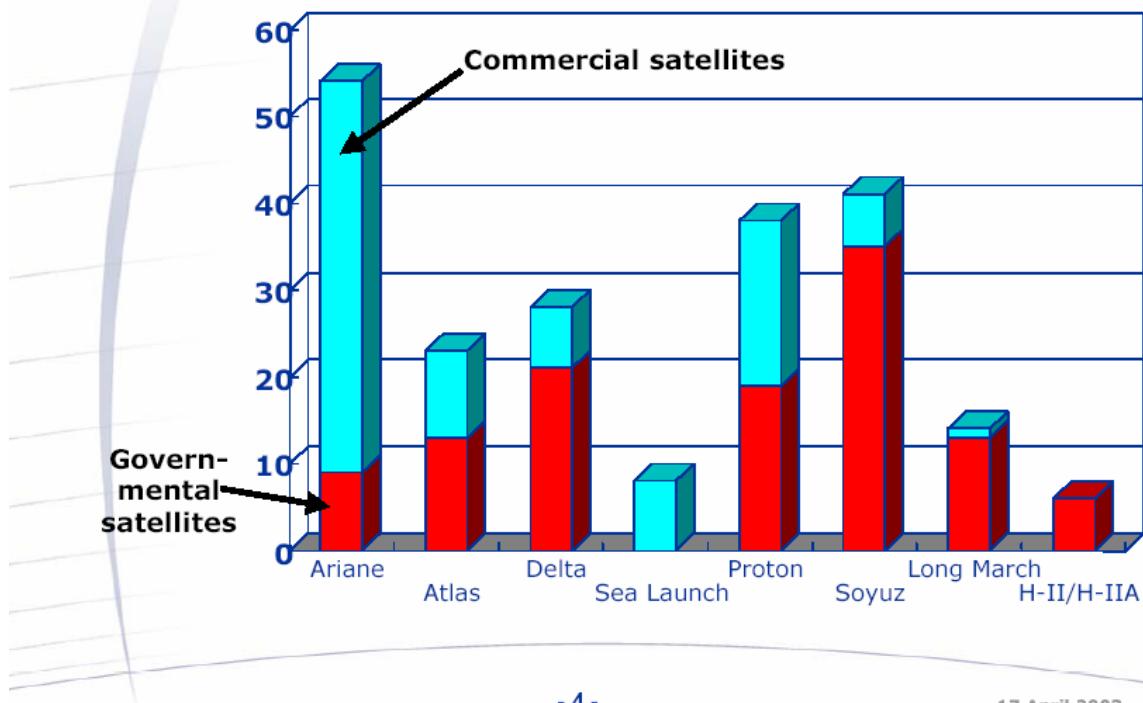
As main goal of I-Space program is aggressive contribution of save and reliable society in Asia, Pacific region by extensive use of space infrastructure via satellite.

For that, those three experimental satellites WINDS, ETS VIII and QZSS are developed. And through this space technology development NASDA contributes possibility to create save and reliable society in near future.

Jean-Yves Le Gall (in return of P. Bertolucci – Senior Vice President)
 Arianespace CEO



Satellites launched from 1999 to 2002



- 4 -

17 April 2003

Above there is described analysis of launch service providers.

There are many launch systems: in Europe Ariane, in America Atlas, Delta, Sea launch, Russian Proton, Soyuz, Chinese Long March, Japanese H-II and H-IIA. In this breakdown, the biggest part of business belonged to Ariane in 1999 - 2002. Red is for government investments, light blue for commercial.

Peculiarities of launch services

- **Very costly technological developments**
- **Technologies difficult, not established**
- **Very long cycle of return on investment**
- **A long way from a launcher to a service**
- **A risky business in the marketplace**
- **Commercial users prefer gov't launchers**
- **Responsibilities for national security**

- 7 -

17 April 2003

Thinking of launches there are some problems, summarized above. There are troubles like extremely cheap launch for commercial, period of agreement, which becomes shorter if the program is late.

Arianespace as a commercial company

Incorporated in 1980

Joint stock: 317,362,320 Euros

44 corporate shareholders

**The First Commercial
Launch Service Company**

23 years of launch experience

More than 250 launch contracts

159 launches

Over 40 s/c in order book 1.3t to 6.7t

- 11 -

17 April 2003

However, Arian has 23 years of launch experience from the opening commercial services and performed 159 launches till today. They have 40 satellites from 1.3 t. to 6.7 t and it will surely continue the launch business.

Arianespace's strategy

- **Blended and balanced market basis:
governmental and commercial customers**
- **Concentrate on few launcher versions
(ultimately only one at a time)**
- **Dual launches**

- 14 -

17 April 2003

The strategy of Arian is

Satisfying customer, both commercial and government on bases of harmony and balance

Concentrating the launch activities on few launcher versions

According to dual launches there is possibility of decreasing costs.

The key is to provide high quality on services and technology to user from all around the world including governments as well as international cooperation.