State of The Satellite Industry

David Cavossa, Executive Director, SIA

Satellite Manufacturing
- Satellite Manufacturing
- Component and Subsystem Manufacturing

Satellite Services
- DBS/DARS
- Fixed Satellite Services
  - Voice, Video, Data
  - VSATs
  - Remote Sensing
    - Transponder Agreements
- Mobile Satellite Services
  - Mobile Phone
  - Mobile Data

Ground Equipment
- Mobile Terminals
- Gateways
- Control Stations
- VSATs
- DBS Dishes
- Handheld Phones
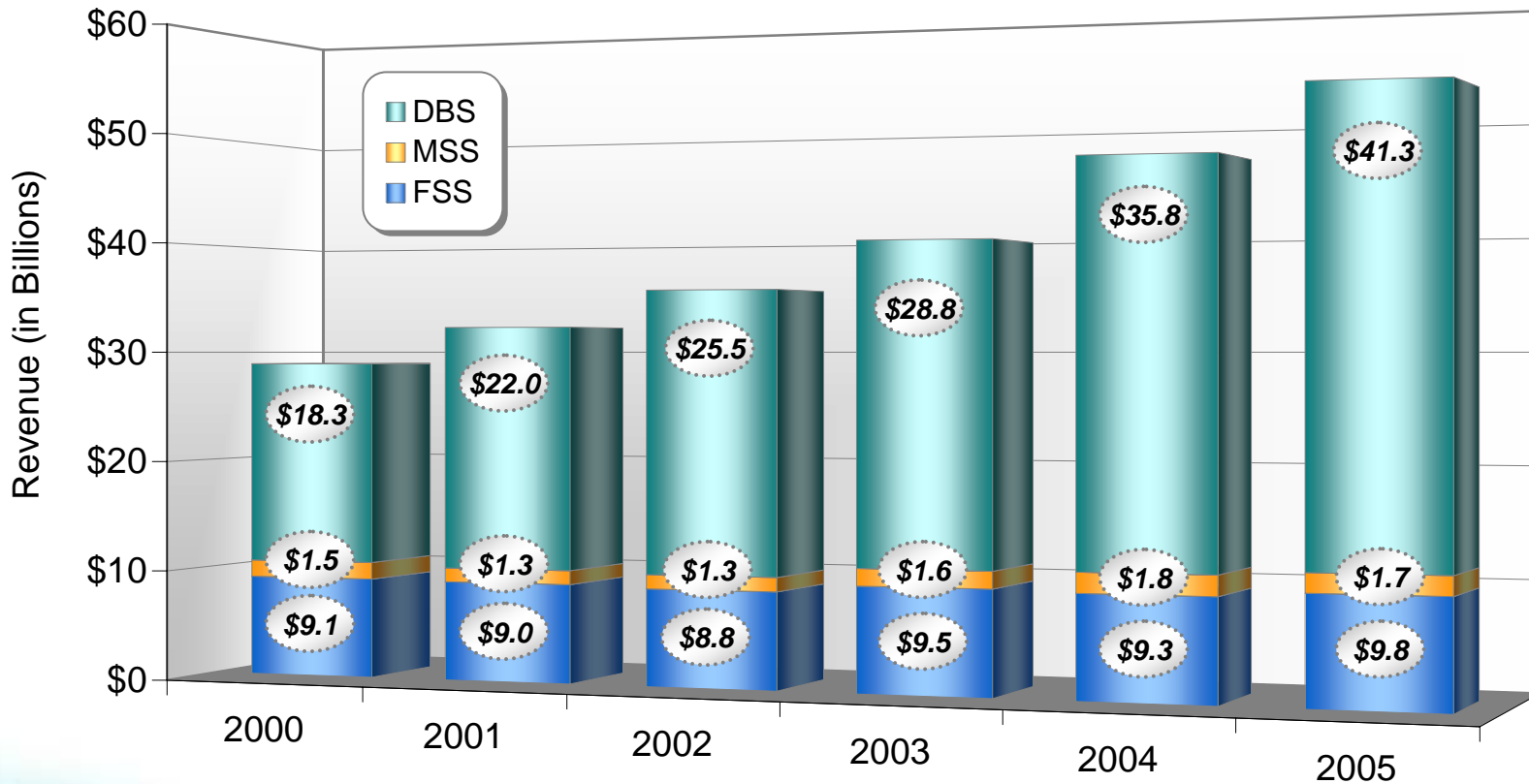- DARS Equipment

Launch Industry
- Launch Services
- Vehicle Manufacturing
- Component and Subsystem Manufacturing

World Satellite Industry Revenues
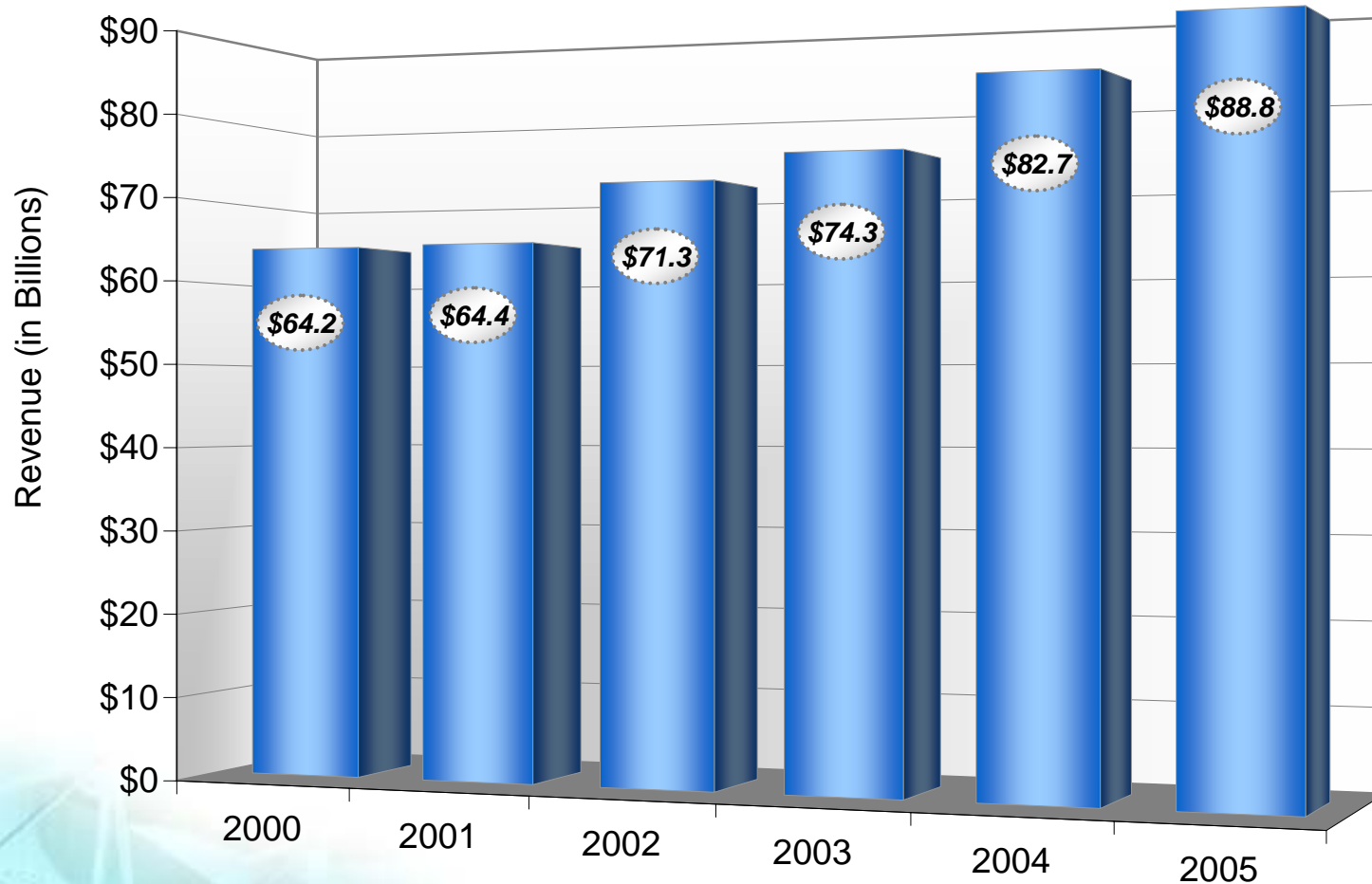
World satellite industry revenues had average annual growth of 6.7% for the period 2000-2005

World Satellite Services Revenue

	2000	2001	2002	2003	2004	2005	
FSS	$9.1	$9.0	$8.8	$9.5	$9.3	$9.8	FSS=VSAT services, remote sensing, and transponder agreements
DBS	$18.3	$22.0	$25.5	$28.8	$35.8	$41.3	DBS/DARS=DTH TV, DARS, and Broadband
MSS	$1.5	$1.3	$1.3	$1.6	$1.8	$1.7	MSS=Mobile telephone and mobile data
Total	$28.9	$32.3	$35.6	$39.8	$46.9	$52.8	

- **Diverse market-base**
  - Media Distribution
  - Telecom Infrastructure
  - Enterprise Networks
  - Government Networks & Apps

- **Geosynchronous Spacecraft**
  - ~22,000 miles in orbit

- **C, Ku and Ka Frequencies**

- **Terrestrial Infrastructures**
  - Teleports
  - TT&C Centers
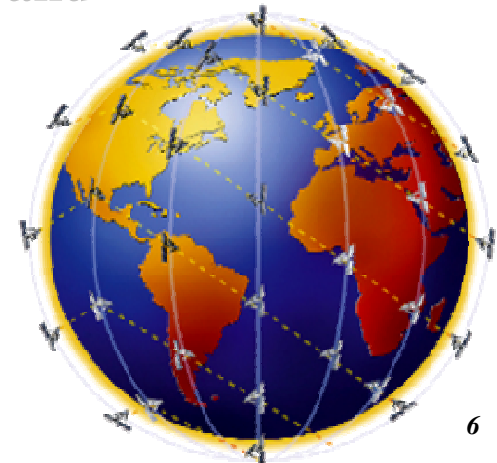 - Service Platforms
  - Fiber Interconnects

- **~ 250 operational commercial GEO satellites in use today**
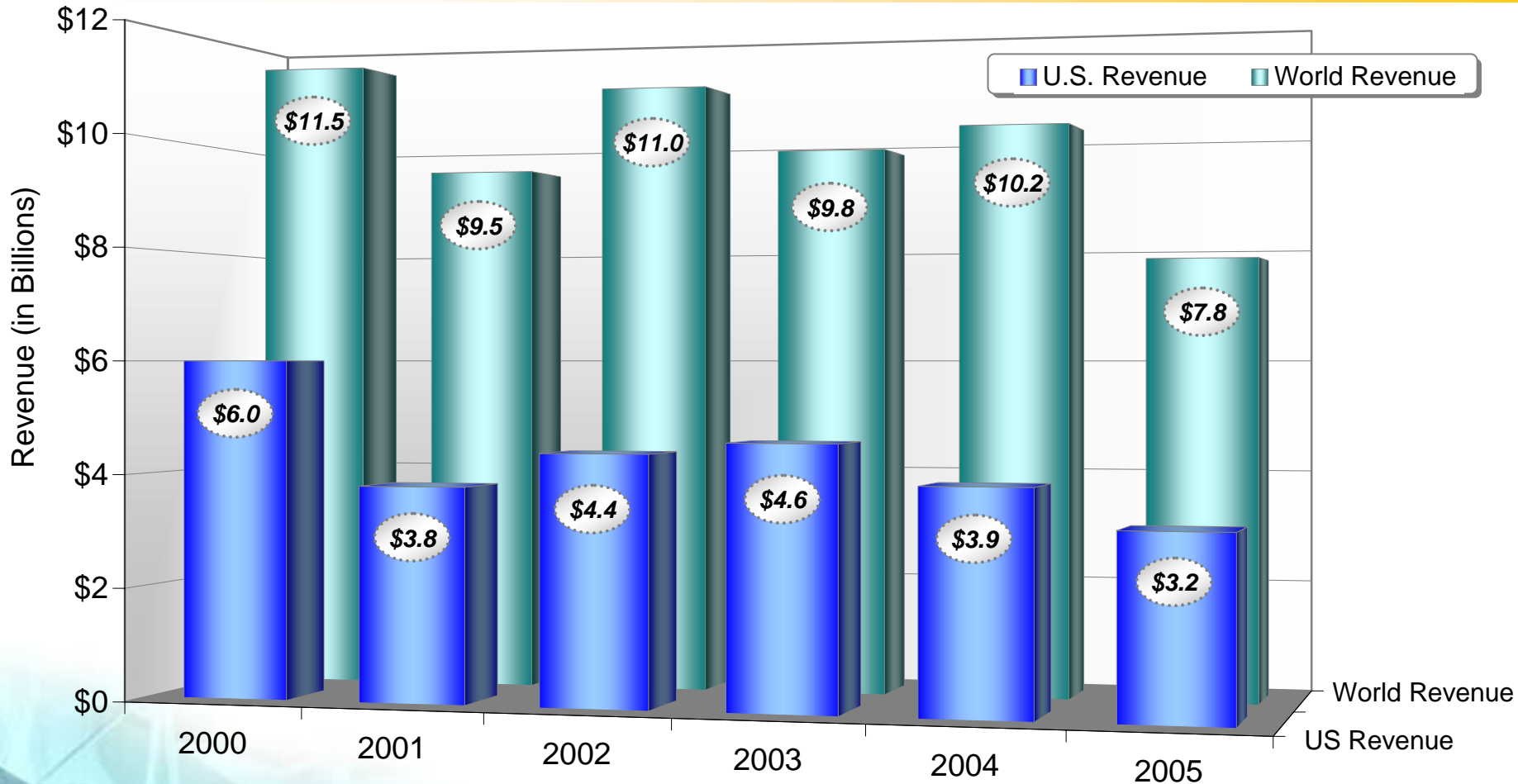 - 59 to be launched over next 3 years

- **Function like terrestrial wireless system with ubiquitous reach**
- **Use a mix of orbit types**
  - **Geosynchronous (GEO)**
  - **Non-geosynchronous (LEO and MEO)**
- **System sizes range from (1) GEO satellite to (66) LEO Satellites**
- **Use a mix of frequencies**
  - **Mostly L-Band / Some S-Band, UHF/VHF**
  - **Feeder links and some services use C, Ka, and Ku-Band**
- **Applications**
  - **Aeronautical**
  - **Maritime**
  - **Land**

Satellite Manufacturing Revenues

Revenue (in Billions)

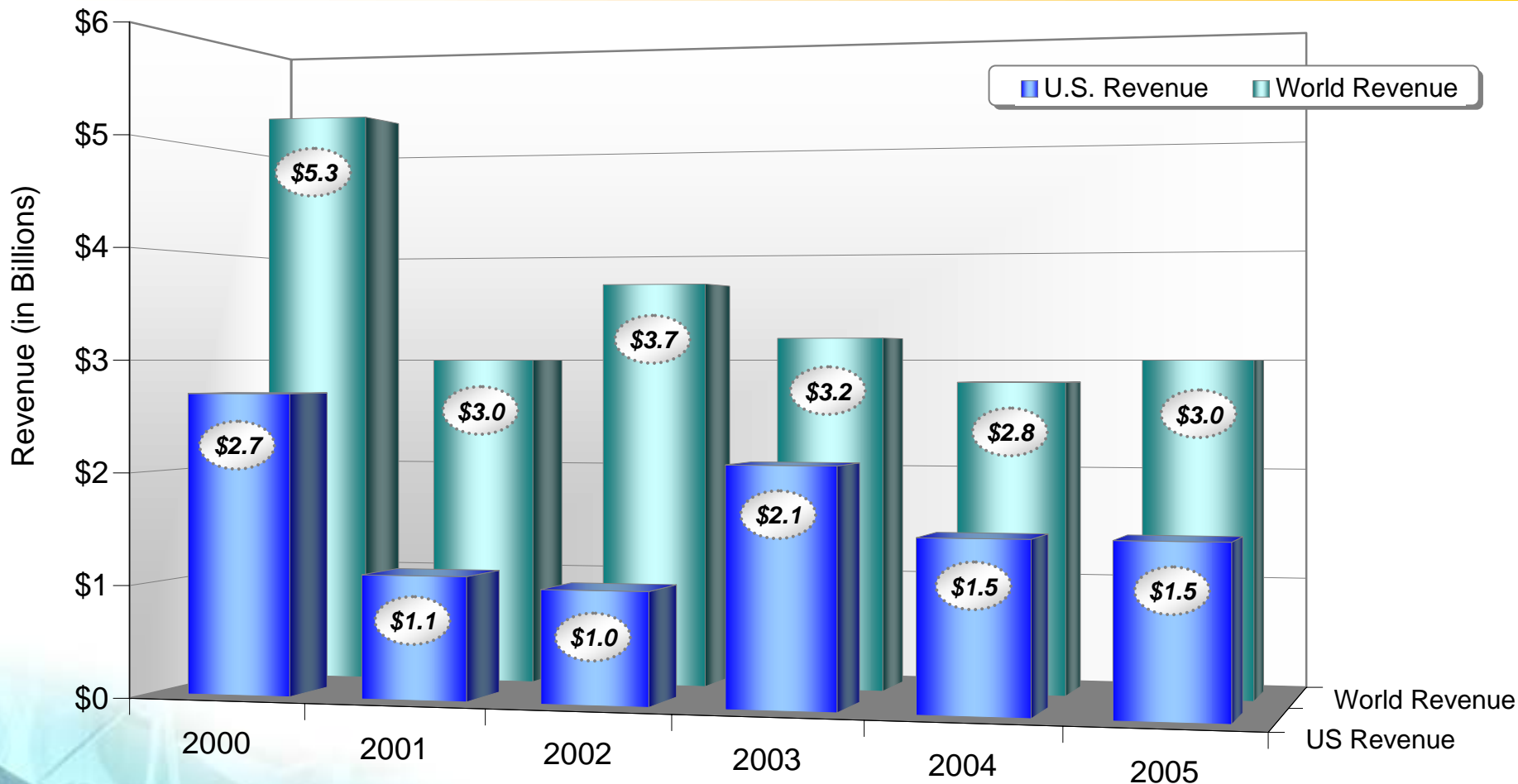| Year	U.S. Revenue	World Revenue
2000	$6.0	$11.5
2001	$3.8	$9.5
2002	$4.4	$11.0
2003	$4.6	$9.8
2004	$3.9	$10.2
2005	$3.2	$7.8

N.B. – Satellite Manufacturing revenues are recorded in the year the satellite is delivered/launched, not when contract is awarded. World revenue includes the US revenue

Launch Industry Revenues

N.B. - Launch Industry revenues are recorded in the year the launch occurs, not when contract is awarded.

- After a few difficult years, the satellite industry has begun to rebound.
  - New technologies are being funded
  - New applications are driving services demand
  - New markets are opening worldwide as regulations change

- The key factors are:
  - Consumer demand – especially video
  - Government demand and investment in technology
  - Financial market interest and investment in both existing and new businesses
  - Consolidation and rationalization of capacity

- These factors flow through the industry as new user solutions drive demand for more innovative satellites.

- **First Responders and Public Safety need a non-terrestrial back-up communications infrastructure that is;**
  - **Independent of the Public Infrastructure**
  - **Pre-positioned**
  - **Included in First Responder Training Programs**

- **The Department of Homeland Security is currently examining a range of emergency communication proposals, including proposals to ensure interoperability. Satellite systems should be emphasized and included in the early planning of these initiatives.**

- The required capacity and equipment is available <u>today</u> from commercial satellite operators to corporations, first responders, and consumers across the globe.

Recommendations

- Satellites must be included in emergency response communications to ensure redundancy.

- Satellite capacity and equipment must be pre-purchased and pre-positioned.

- Satellite operators and personnel must be credentialed as first responders.

- Satellite must be included in education and training programs for first responders.

SATELLITE = OPERABILITY

→ SATELLITE COMMUNICATIONS ARE:

>> Highly Survivable (Physical Survivability and Robustness)

>> Independent of Terrestrial Infrastructure

>> Able to Provide The Load Sharing and Surge Capacity Solution for Larger Sites

>> Best for Redundancy: They add a Layer of Path Diversity and Link Availability

→ SATELLITE SYSTEMS PERFORM EFFECTIVELY WHEN:

>> Terrestrial infrastructure is damaged, destroyed, or overloaded

>> Interconnecting widely distributed networks

>> Providing interoperability between disparate systems and networks

>> Providing broadcasting services over very wide areas such as a country, region, or entire hemisphere

>> Providing connectivity for the "last mile" in cases where fiber networks are simply not available

>> Providing mobile/transportable wideband and narrow-band communications

>> Natural disasters or terrorist attacks occur. Satellites are the best and most reliable platform for communications in such situations — fiber networks or even terrestrial wireless can be disrupted by tsunamis, earthquakes, or hurricanes. Satellites are instant infrastructure.

→ BENEFITS OF USING SATELLITE:

>> Ubiquitous Coverage: A group of satellites can cover virtually all of the Earth's surface.

>> Instant Infrastructure: Satellite service can be offered in areas where there is no terrestrial infrastructure and the costs of deploying a fiber or microwave network are prohibitive. It can also support services in areas where existing infrastructure is outdated, insufficient, or damaged.

>> Independent Of Terrestrial Infrastructure: Satellite service can provide additional bandwidth to divert traffic from congested areas, provide overflow during peak usage periods, and provide redundancy in the case of terrestrial network outages.

>> Temporary Network Solutions: For applications such as news gathering, homeland security, or military activities, satellite can often provide the only practical, short-term solution for getting necessary information in and out.

>> Rapid Provisioning Of Services: Since satellite solutions can be set up quickly, communications networks and new services can be quickly recovered and reconfigured. In addition, you can expand services electronically without traditional terrestrial networks. As a result, you can achieve a high level of communications rapidly without high budget expenditures.
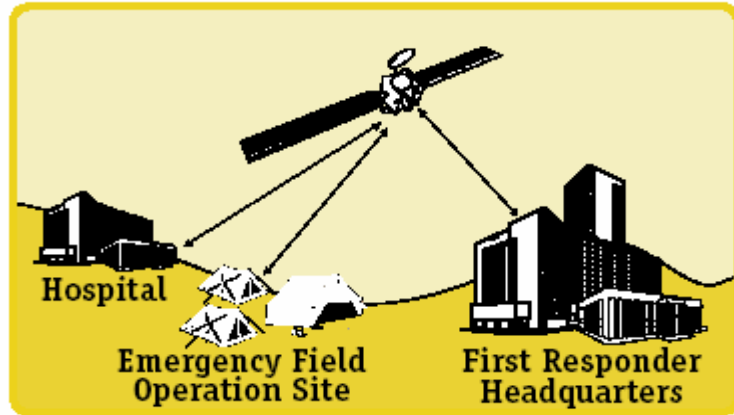

In times of disaster recovery, solutions provided via satellite are more reliable than communications utilizing land-based connections.
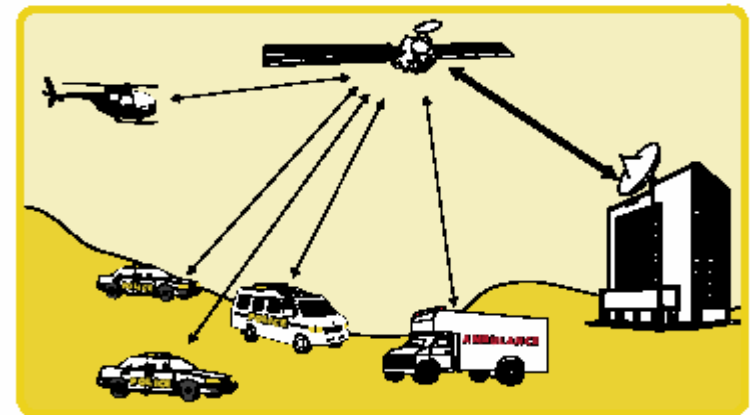
CAPABILITIES

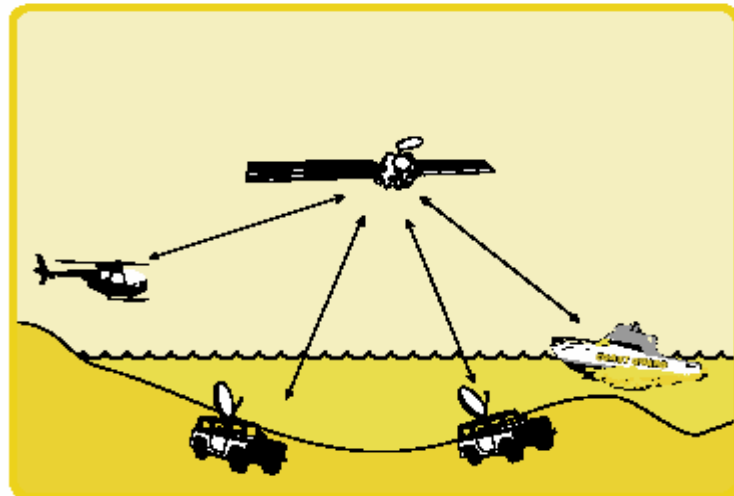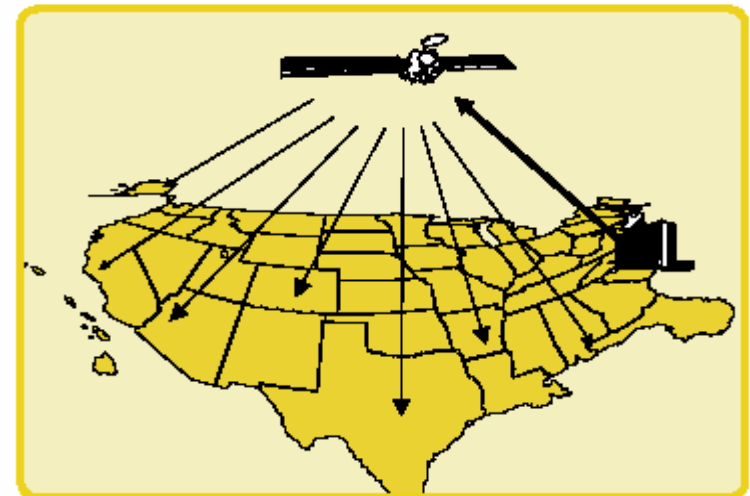SATELLITES = UBIQUITY + RELIABILITY + OPERABILITY

FIXED-TO-FIXED

Hospital

Emergency Field
Operation Site

First Responder
Headquarters

FIXED-TO-MOBILE

MOBILE-TO-MOBILE

POINT-TO-MULTIPOINT

First Responder's Guide To Satellite Communications
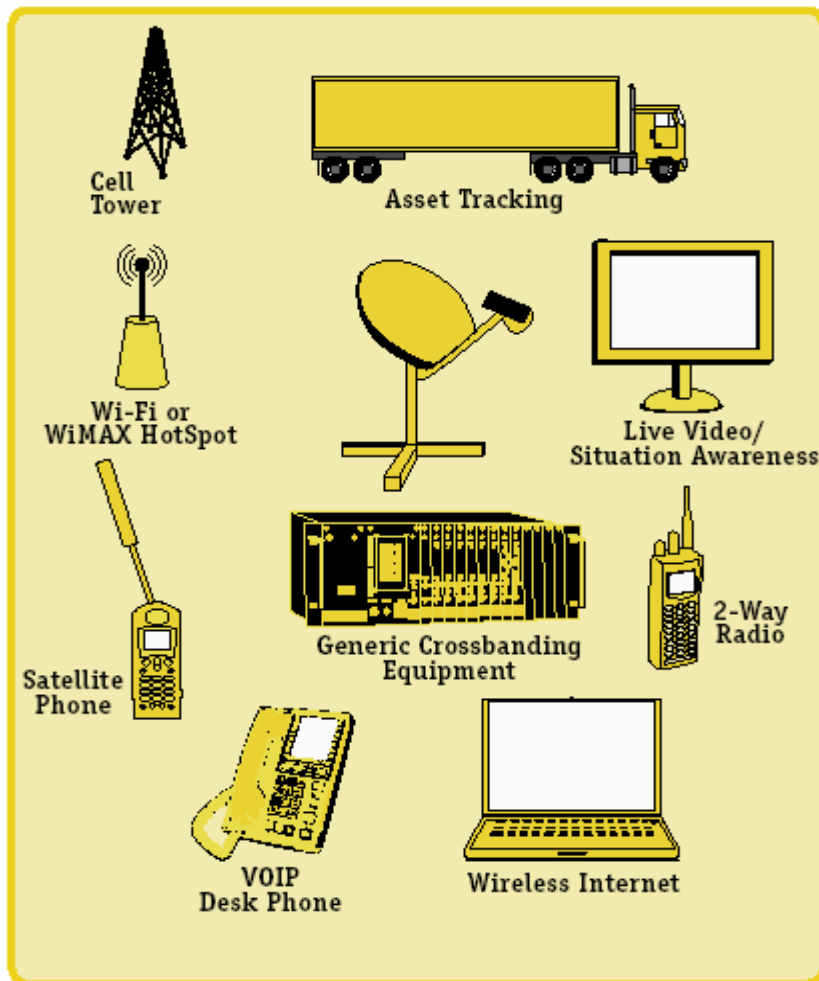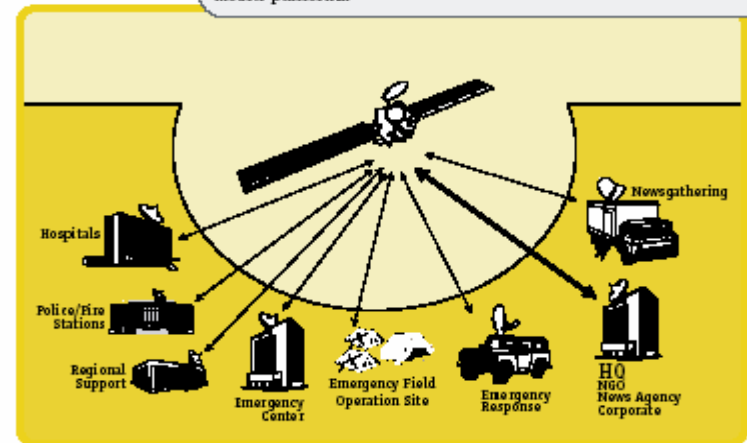
INTEROPERABILITY

›› Satellite communications can interconnect with any other communications solution (i.e. LMR, Cellular, WiFi, etc.) via generic crossbanding equipment.

- Cell Tower
- Asset Tracking
- Wi-Fi or WiMAX HotSpot
- Live Video/ Situation Awareness
- Satellite Phone
- Generic Crossbanding Equipment
- 2-Way Radio
- VOIP Desk Phone
- Wireless Internet

VIDEO/DATA

FSS

Fixed Satellite Service (FSS) has traditionally referred to a satellite service that uses terrestrial terminals communicating with satellites in geosynchronous orbit. New technologies allow FSS to communicate with mobile platforms.

- Newsgathering
- Hospitals
- Police/Fire Stations
- Regional Support
- Emergency Center
- Emergency Field Operation Site
- Emergency Response
- HQ NGO News Agency Corporate

→ FSS APPLICATIONS:

- Cellular Restoration
- Wi-Fi Restoral
- Emergency Phone Bank
- Communications On The Move
- PSTN Backhaul
- Voice-over-IP
- Broadband Internet Access
- Live Video
- Telemedicine
- Video Conferencing

Mobile Telephony

➔ QUICK FACTS
Mobile Telephony

➔ Water, shock & dust resistant for rugged environments

➔ One-touch dialing

➔ Use phone to transmit and receive data

➔ Headset/hands-free capability
➔ Provides up to 30 hours of standby time
➔ Provides up to 3.6 hours of talk time

➔ Call forwarding capability
➔ Two-way SMS capability
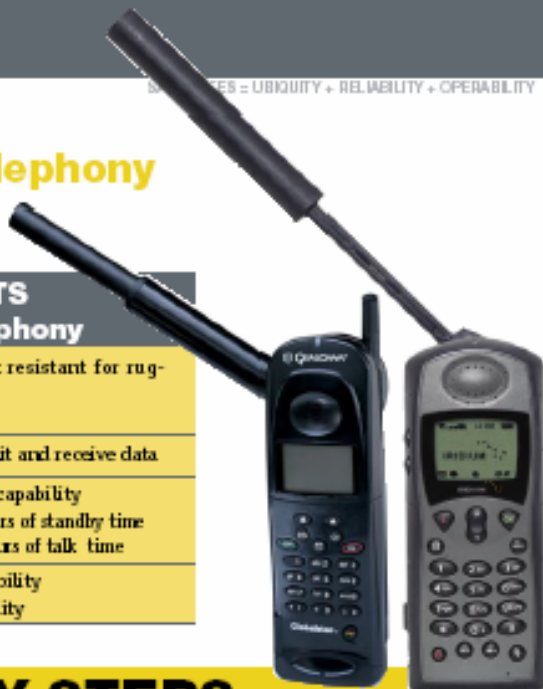
4 EASY STEPS TO CONNECT

STEP 1: MEASURING BATTERY LIFE
➔ Most satellite phones display the battery level on the main menu. Read the battery life specifications provided by the phone manufacturer. Be aware that the battery life will vary depending on the use. Talk time ranges from 2 to 3.5 hours on average, stand-by time ranges from 20 to 40 hours depending on the phone.

STEP 2: FINDING LINE OF SITE
➔ You need to be outside when using a satellite phone. Make sure you have a clear view of the sky and that you are away from buildings and obstacles. Rotate and extend the antenna and point it straight up to the sky. Talk with the antenna above your head and vertical to the ground.

STEP 3: PLACING A CALL
➔ Some satellite phones require that you dial 00 before the country code, some others that you dial a 1 before the area code if you are dialing inside the United States, or that you dial a particular code before calling to another satellite phone on the same service. Make sure to read carefully the instructions given by your service provider.

STEP 4: SENDING A 911 CALL
➔ Most satellite phones make 911 calls available.

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Mobile Voice/Data

ABOUT
Broadband Global Area Network

➔ Capable of e-mail, Internet, VPN, and telephone applications

➔ Offers broadband data up to 492kbps

➔ Offers streaming data rates on demand up to 256kbps

➔ Responders can speak to off-site leadership, while sending a live video update

➔ No technical expertise required

➔ Easily carried in a backpack for quick mobility

➔ Coverage available across U.S., Central and Eastern Canada

➔ Encrypted Air Interface

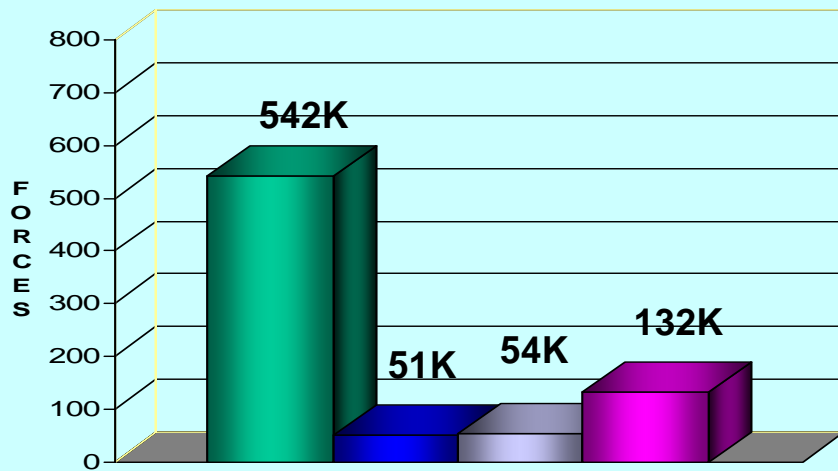➔ Communications-on-the-move terminals are available for vehicles
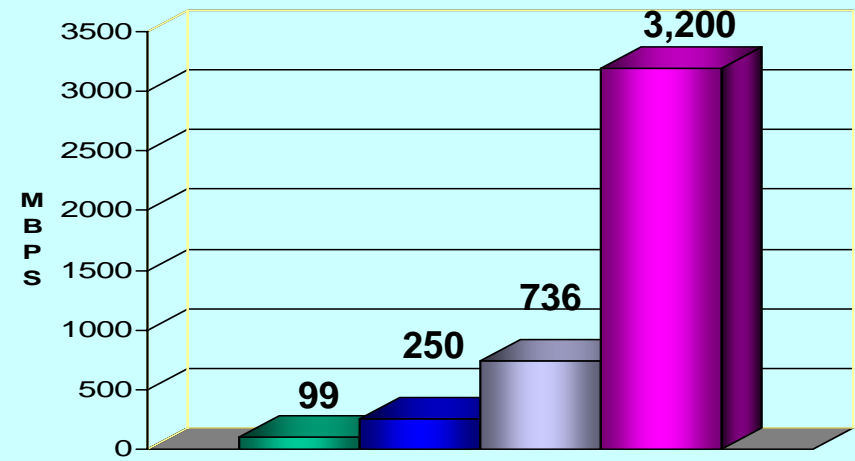
➔ QUICK FACTS
Satellite Two-Way Radio/Telephone

➔ Seamless Coverage: Satellites act as one big radio tower for all of North America. Users don't have to worry about service interruptions associated with roaming, because it is all one network.

➔ Interoperability: Talk groups can be configured to allow for interagency communications between local, regional, and national emergency response organizations, including terrestrial-based two-way radio systems and two-way cellular networks.

➔ Network Flexibility: Two-way radios can be interfaced with existing terrestrial fleet communications infrastructures or make a telephone call.

➔ Secure Communications: The network employs the IMBE (Improved Multi-Band Excitation) voice codec compatible with Project 25 digital voice coder. Digital coding and scrambling prevents casual eavesdropping or monitoring of calls.

➔ Satellite Two-Way Radios can be installed in a fixed location or can be used in mobile environment while driving.

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## Critical To National Security "Network Centric Warfare"

Deployed Forces

FORCES (in thousands): 542K (Desert Storm), 51K (Kosovo), 54K (Enduring Freedom), 132K (Iraqi Freedom)

Commercial Satellite Services

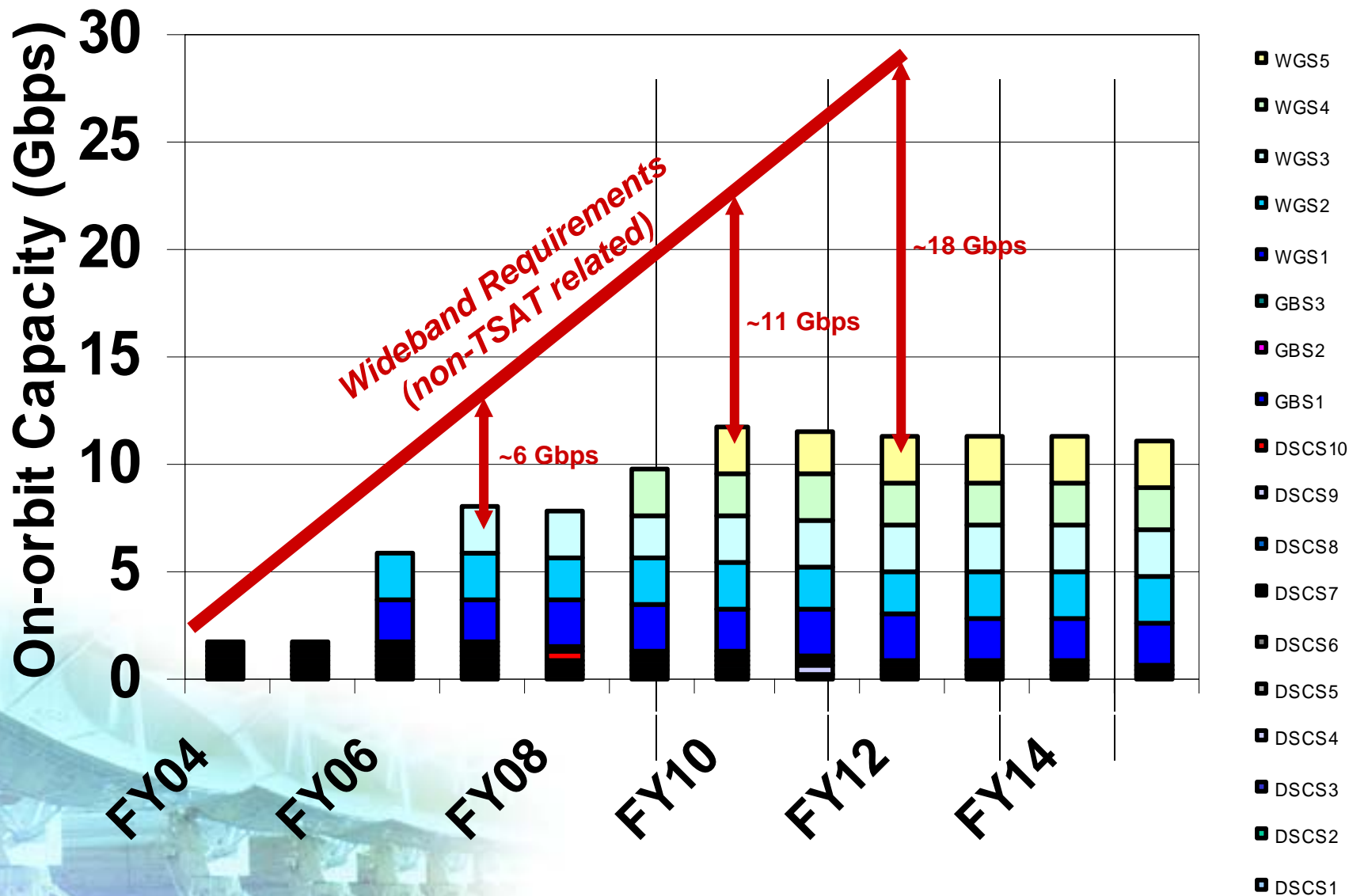MBPS: 99 (Desert Storm), 250 (Kosovo), 736 (Enduring Freedom), 3,200 (Iraqi Freedom)

Legend:
- DESERT STORM (1991)
- KOSOVO (1999)
- ENDURING FREEDOM (2002)
- IRAQI FREEDOM (2003)

Source: Defense Information Systems Agency (DISA)

- Commercial Satellite B/W — 80%
- Military Satellite B/W — 20%

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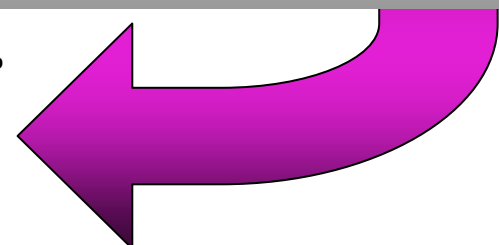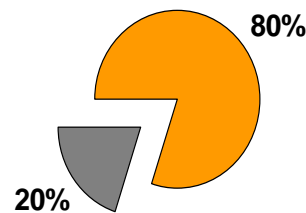
- **Information sharing and analysis**
  - **Open dialogue on vulnerability, protection and operational issues**

- **Terrestrial physical security**
  - **Site backup, protection posture and contingency plans**

- **Personnel security**
  - **Background investigations and access controls**

- **Cyber/Network security**
  - **Detect and respond to intrusions; guarantee secure connectivity**

- **TT&C information assurance**
  - **Encrypted connectivity**

- **Space situational awareness**
  - **System baseline, location, TT&C and mission status**

- **RFI incident management**
  - **Timely detection, notification, characterization and response**

Virtuous Circle of Long-Term Commercial FSS Contracts

DISA receives lower cost for bandwidth

DISA is cheaper (passes on cost savings to end users)

DISA has satellite capacity on hand

DISA is faster (because capacity is already on hand)

DISA can begin to influence commercial fleet design

Cheaper and faster, DISA is more attractive source of SATCOM

START: DISA engages in longer-term FSS contracts

More DoD commercial SATCOM is processed through DISA

With better understanding of its future SATCOM requirements, DoD can
- engage in longer-term contracts
- leverage its power to influence future commercial FSS fleet design

DoD can
- better monitor current SATCOM use
- better predict future commercial SATCOM requirements

Source: Frost & Sullivan
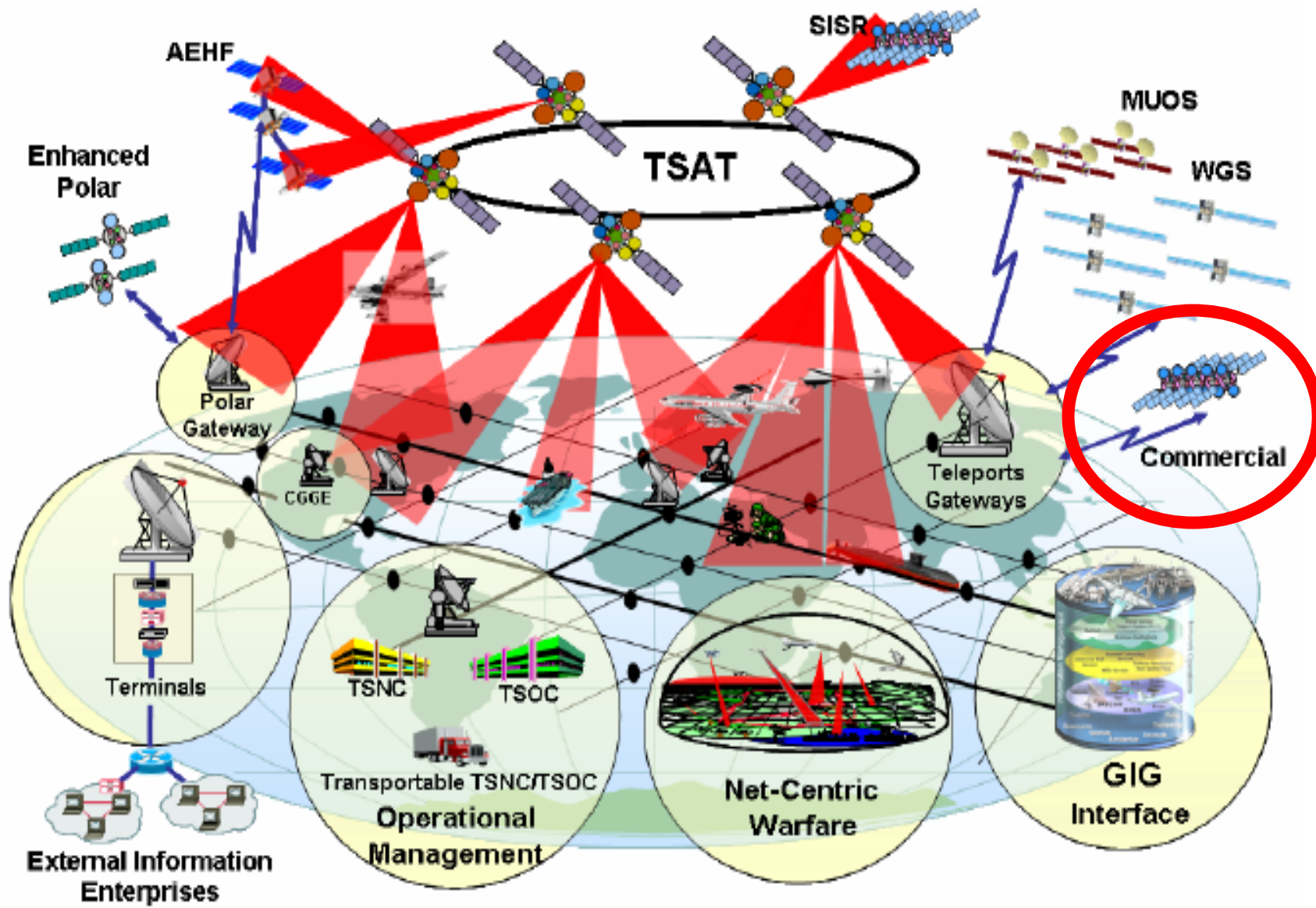
- The goals of ORS to produce satellites that are less costly, at a faster rate, and in greater numbers; and provide niche capabilities, new technologies, and surge capacity; are not restricted to just small satellites and quick launch technologies.

- The DoD, industry, and Congress should embrace the operationally responsive space movement as an obvious next step toward transformation.

- Next step that includes, not only small satellites and cheap launch vehicles, but also encourages;

  - Shared Payloads/Hosted Payloads
  - Multiyear Commercial Transponder Leases
  - Pre-Positioned Capacity and Transponder Portability
  - Repositionable Spot Beams and/or Satellites

- The United States considers space systems to have the rights of passage through and operations in space without interference. Consistent with this principle, the United States will view purposeful interference with its space systems as an infringement on its rights;

- The United States considers space capabilities -- including the ground and space segments and supporting links -- vital to its national interests. Consistent with this policy, the United States will: preserve its rights, capabilities, and freedom of action in space; dissuade or deter others from either impeding those rights or developing capabilities intended to do so; take those actions necessary to protect its space capabilities; respond to interference; and deny, if necessary, adversaries the use of space capabilities hostile to U.S. national interests;

- To maintain and expand our capabilities, we recommend that the US Government develop a national commercial satellite communications policy that:
  - Relies to the maximum extent possible, on commercial satellite systems to meet the unclassified, non-sensitive communications needs of the US Government;
  - Maintains robust satellite technology development programs, such as the Transformational Communication Architecture and Operationally Responsive Space programs;
  - Takes maximum advantage of the flexibility of current procurements laws which allow multiyear procurement and the aggregation of government demand to build long-term stable relationships with the commercial industry;
  - Improves current satellite export control regime;
  - Maintains a strong national technological leadership through sponsorship of satellite education programs, career opportunities, and the education of key Government personnel;
  - Preserves and protects satellite spectrum from harmful interference;