

Data Sharing for Space Situational Awareness:

Government Responsibility under Article VI of the Outer Space Treaty



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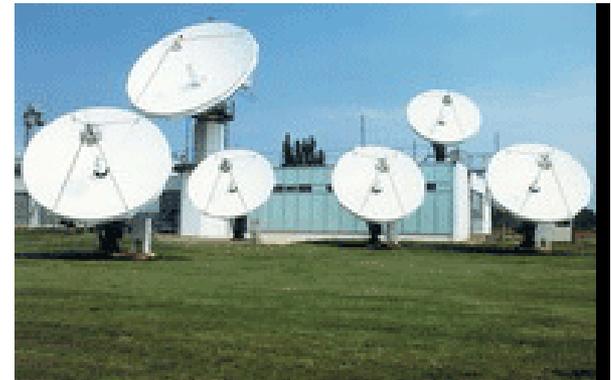
Managing the Space Environment

- Space Environment becoming increasingly congested
- Protecting high value assets is a priority for government and commercial actors
- Better coordination between industry and government could:
 - Provide new awareness of the GEO orbit
 - Allow commercial fleets to be flown in a safer manner
 - Ensure sustainable use of key orbits
 - Reduce likelihood of an accidental crisis



Collision Monitoring Today

- Operators rely on the Two Line Elements (TLE) publicly available on the Air Force Commercial and Foreign Entity (CFE) Program Website
- Informal agreements exist that allow the routine exchange orbital element and maneuver information between operators
- During special operations, such as satellite relocations and transfer orbit operations, special notification is provided which typically includes:
 - Latest orbital information
 - Near-term maneuver plans
 - Frequency information
 - Company contact information



Today's CFE Program

- **Congress authorized in November 2003**

“The Secretary of Defense may carry out a pilot program to determine the feasibility and desirability of providing to non-United States Government entities space surveillance data support described in subsection”

- **October 2004, Secretary of Defense delegated to the Secretary of The Air Force**

- **January 2005, Air Force Space Command initiated the CFE Pilot Program**

- Space Track Website: “www.space-track.org”

Shortcomings of Current Approach

- The TLE does not contain the maneuver information necessary to predict the ephemeris of active satellites
- No common protocols for exchanging information on orbital elements
- The TLE does not accurately predict the close approach of non-operational space objects (drifters)
- Inter-operator coordination can be time consuming and data may not be available when needed
- Not all operators participate in close approach monitoring



The Result?

- *Collision margins are increased*
- *A wider range of threats must be evaluated through inter-operator coordination*
- *Greater demands are placed on government for information and assistance*

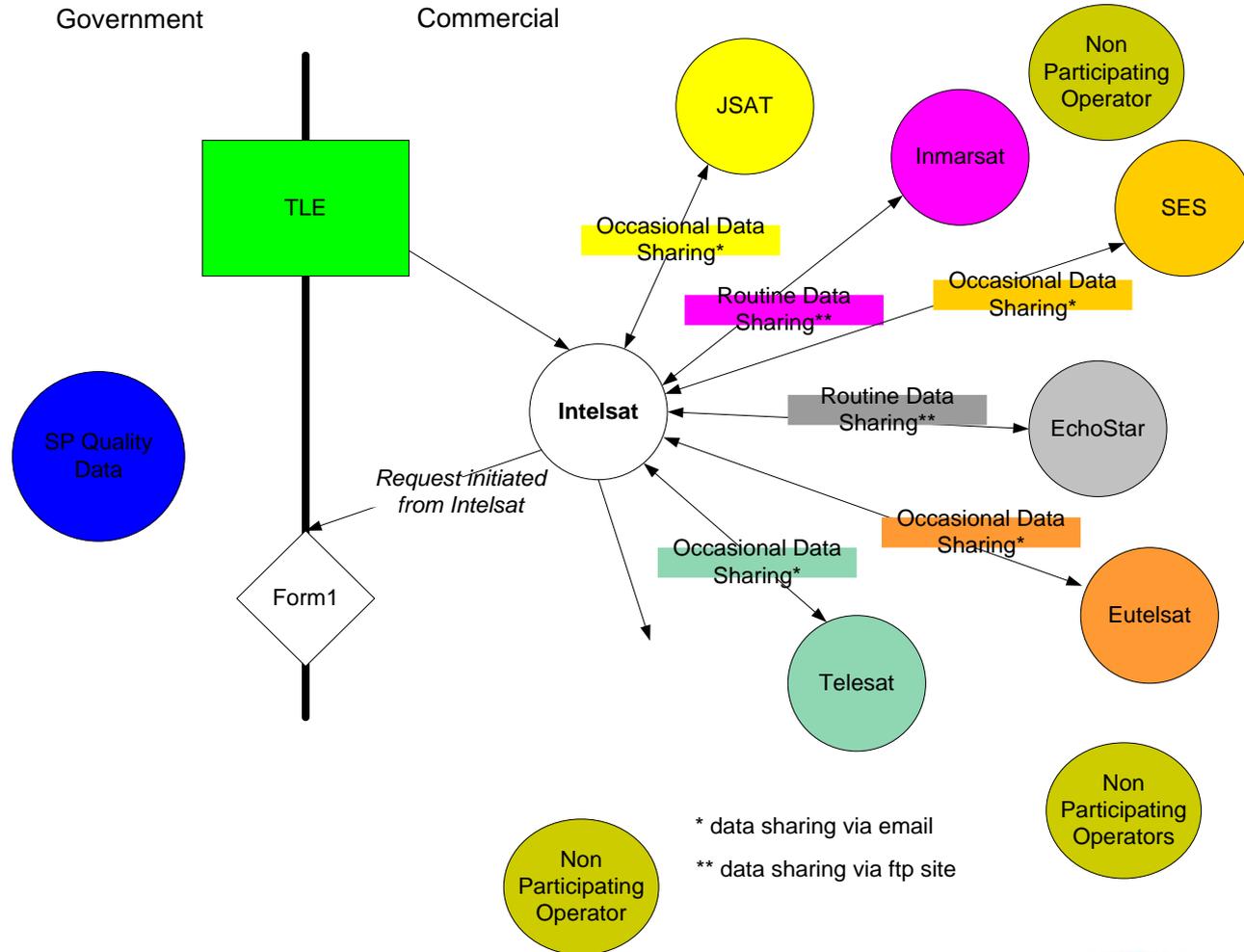


Cooperation Between Satellite Operators

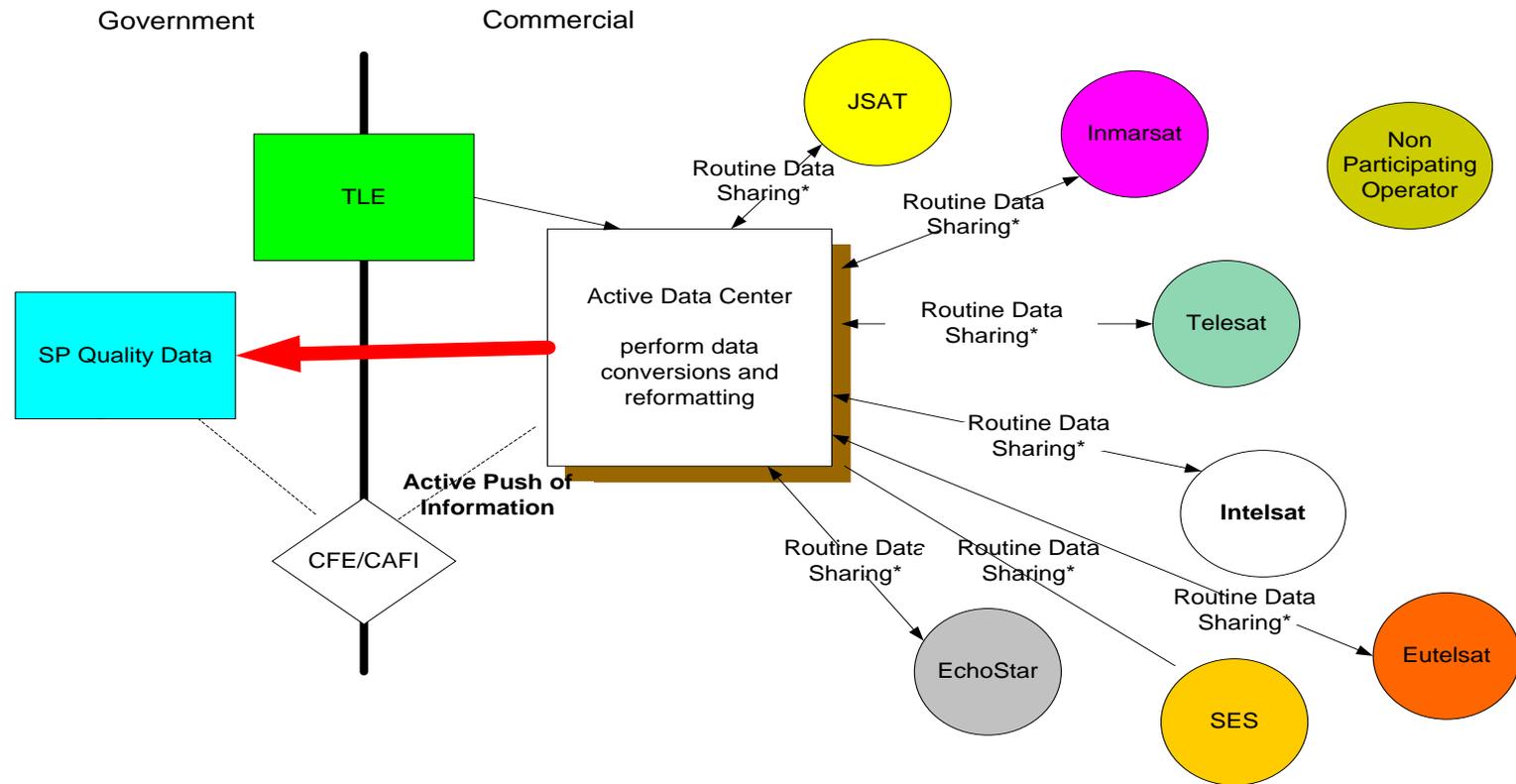
- Data center concept:
 - Consortium supported by international satellite operators
 - Focal point for data exchange
 - Active processing center – conjunction monitoring and reporting
 - Established rules and protocol based on different levels of conjunction alerts
 - Member data are protected and secured
 - Technical support available for close approach mitigation



Current Intelsat Monitoring



Future Owner/Operator Monitoring



Article VI Responsibilities

- “States Parties to the Treaty shall bear international responsibility for national activities in outer space ...”
- “The activities of non-governmental entities ...shall require authorization and continuing supervision ...”

Questions related space traffic control

- **Potential Government responsibilities and liabilities**
 - Obligation to provide space traffic information
 - Potential liability
 - Role of indemnification

Changing nature of authorization and supervision

Article 28 of the 1944 Chicago Convention

- Each contracting State undertakes, so far as it may find practicable, to:
 - (a) Provide, in its territory, airports, radio services, meteorological services and other air navigation facilities to facilitate international air navigation, in accordance with the standards and practices recommended or established from time to time, pursuant to this Convention;

Redefining Authorization and Supervision

- The duty to "supervise" under the Outer Space Treaty is broad in intent
 - Possible to argue that the duty to supervise assumes a continuing obligation to improve based on best available technology
 - Private sector Data Center establishes an industry "best practice"
 - Government conduct that deviates from "best practice" could be suspect
- *Could failure to meet minimum level of "continual supervision" be regarded as negligence, thereby invoking the strict liability provisions of the Liability Convention?*

Possible Government liability

- Under the Federal Tort Claims Act, the US government waives immunity for claims where loss was caused by the negligence or wrongful acts of a government employee
 - Under US law, discretionary acts cannot be compelled, but once taken must be executed in a reasonable manner
 - *Ingham v. Easter Airlines*
 - Government liable for failure of an air-traffic controller to provide accurate, current weather forecasts
 - *Indian Towing Company v. United States*
 - Government liable for an accident caused by Coast Guard negligence in allowing a lighthouse light to go out

Liability under the Liability Convention

- Launching states are absolutely liable to pay compensation for damage caused on the surface of the earth or to aircraft in flight
- Where damage is caused to a space object by another launching state, the latter shall be liable only after a finding of fault
 - *Could a state be found to be absolutely liable as a result of the fact that it did not exercise effective “authorization and continuing supervision”?*

Limitations on government liability

- Possible application of indemnification clauses
 - US Courts have been reluctant to honor indemnification clauses that seek to protect the government from its own negligence
 - McCormick v. United States
 - » Court declines to enforce indemnity provision holding government harmless for injury resulting, in part, from government negligence
 - Motors Ins v Aviation Specialties
 - » Court declines to enforce indemnity provision holding government harmless for property damage resulting, in part, from government negligence

Conclusion and Observations

- As space has become more congested, the demand for new ways to share orbital information has grown
- The satellite operator's "Data Center" concept is, at present, the most comprehensive proposal on information sharing
- Of all the space fairing nations, only the US government has instituted a formal program to share orbital data
- To date, the CFE program is only a pilot and no commitment has been made to making this program permanent
- Absent a Data Center - type global effort, government's cannot meet their obligations under Article VI of the Outer Space Treaty
- Accidents resulting from failure of governments to exercise effective "authorization and continuing supervision" could result in liability