

# The Space Data Association

Space Enterprise Council and the  
George Marshall Institute

23 February 2012

# Space Data Association

## Executive Members:

**SES**<sup>▲</sup>



INTELSAT

**inmarsat**



**eutelsat**  
COMMUNICATIONS

- **Chief Technology Advisor**



- **Space Data Center**

- Verified, normalized data; automated analysis/reporting
- Open to all satellite operators in all orbital regimes

- **Additional members:**

- AMOS, Avanti, EchoStar, GeoEye, GE Satellite, Optus,
- Paradigm, Spacecom, Space Systems/Loral, StarOne, Telesat Canada

- **SDA activities fully consistent with U.S. national space policy (PPD-4) and DoD/DNI National Security Space Strategy (NSSS)**

# Bottom Line Up Front

- **US Government depends on many SDA member satellites**
  - Threat environment evolving / closer operational alignment beneficial
- **Active USG – operator collaboration required for effective operations:**
  - Conjunction analysis and safety of flight
  - EMI/RFI Geolocation and Mitigation
  - Point of contact database
  - SDA advancing Combined Space Operation Center (CSpOC) objectives, paving way for true SSA
- **JSpOC not currently integrating owner-operator data or maneuvers**
  - CSM product 'not actionable'
- **Significant differences found in Joint Space Operational Center (JSpOC) Conjunction Summary Messages (CSM) analytic products versus SDC alerts**

# SDA – A Tool for Mission Assurance

- **Enhance “Safety of flight”**
  - Preserve the operational viability of our satellites and their orbital regime
- **Efficient, timely, accurate conjunction assessments / ops**
  - Consolidate and use best available data from operators, including planned maneuvers
  - Reduce false alarms, missed events
  - Minimize member time and resources devoted to CA
- **SSA / Format Conversions / Information Repository**
  - Minimize confusion, potential for conflicting decisions
- **EM/RFI Geolocation and Resolution Support**
  - More rapidly find and address interference sources
- **Encourage evolution of best practices for satellite operators**

*SDA Enhances Satellite Operations & Lowers Operational Costs*

# SDA – Key Missions / Status

- **Collision Avoidance monitoring, maneuver planning & flight safety**
- **Radio Frequency Interference mitigation & geo-location support**
- **Authoritative contact information (operations center & POCs) for SDA member satellites**

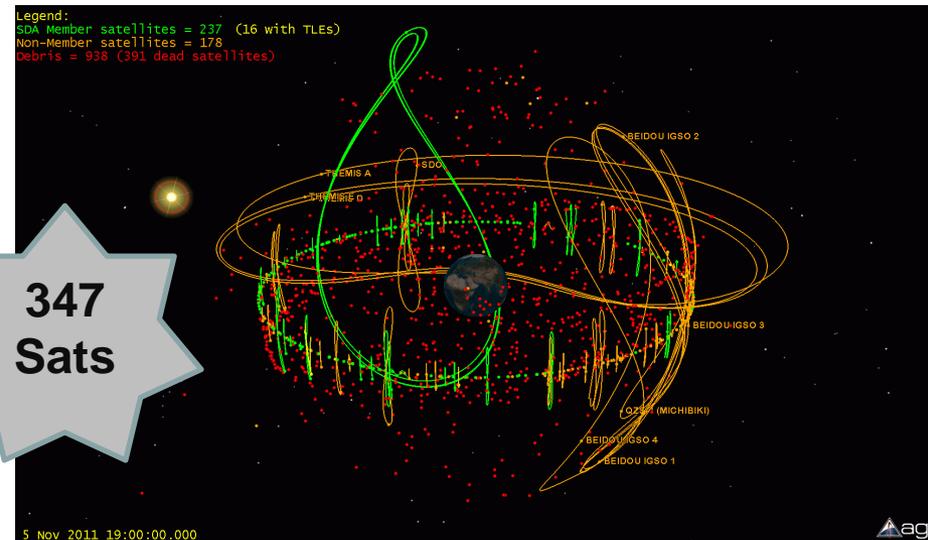
Initial Operational Capability  
(27 July 2010)

Full Operational Capability  
(22 September 2011)

Space Data Center (SDC) currently performing Collision Avoidance monitoring for 237 satellites from 15 GEO operators and 110 satellites from 7 LEO operators

As of 9 Nov 2011

347  
Sats



# 2011 Analysis Raises Safety Concerns

- **Active-on-active Intelsat conjunctions in September 2011**
- **Missed Conjunctions**
  - No CSM warning issued for most of the active-on-active Intelsat conjunctions
- **False Warnings**
  - Majority of CSMs issued for active-on-active Intelsat conjunctions were false alarms
- **JSpOC CA products are inadequate for safety of flight and degrade operator confidence**
  - JSpOC has cautioned that CSM warnings are not “actionable”

# Industry Trend: Radio Frequency Interference

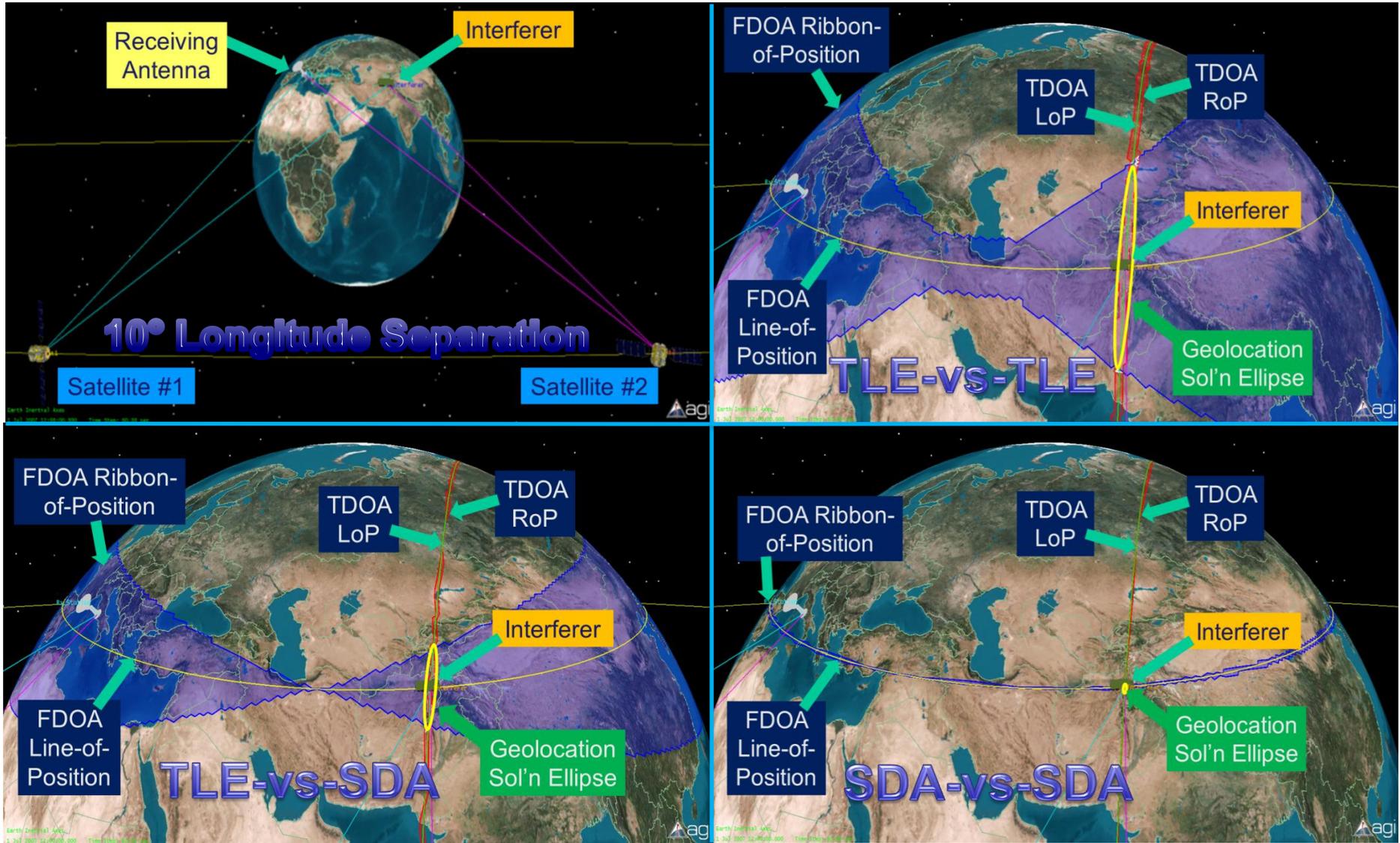
- **Trends are consistent:**
  - Adjacent Satellite Interference (ASI), cross-pol, and unauthorized carriers are major causes of interference
  - Majority of problems caused by improper installation and operation, particularly VSATs and auto peak/pol systems
- **ASI and cross-pol difficult to mitigate, especially in large VSAT networks. Hard to identify or fix faulty uplink site**
- **Because of ASI and the need for payload configurations to perform geolocation, there is more Operator-Operator communication and data sharing**
- **The impact of RFI is a larger cost for Operators, in manpower, tools, un-useable capacity, and customer dissatisfaction**

# SDC As Geolocation Tool

- **Without SDC**
    - Multiple phone calls required to adjacent Operators
    - Hours/days required to locate viable solution sets and data
    - Data formats = anyone's guess
  - **With SDC**
    - Solution sets immediately available
    - All necessary data centralized and in consistent format
    - Better data = more accurate results
- **Geolocation error reduced by two orders of magnitude using SDA-on-SDA quality ephemeris**

***SDC enables faster, more accurate geolocation results***

# RFI Geolocation Sensitivity to Ephemeris Accuracy



\* "Out-of-the-box" accuracy estimate w/o incorporation of reference emitters

# Conclusions

- In order to operate in the evolving operational environment, especially operating “through” stressed conditions, we need to move away from information ‘exchange’ and move to developing an accurate, shared, current and common operational picture. Seconds count.
- Provided appropriate procedures and agreements are in place, tools like the SDC can enhance space operations and service delivery.