Introduction to the
Space Data Association

Secure World Foundation

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The world’s pre-eminent satellite group

- 45 satellites: global fleet with optimal look angles and comprehensive landmass coverage, operated through our
  - fully-owned operating companies SES ASTRA, SES WORLD SKIES
  - Partially-owned CIEL, QuetzSat, O3b Networks

Premier provider of transmission capacity

- media distribution
- connectivity

Advanced satellite-based platforms and services for

- media and government organisations

Created in 1985 and based in Luxembourg, Europe

1,269 staff around the world

Traded on Euronext Paris and Luxembourg stock exchanges (SESG)
The SES fleet: an infrastructure to protect...

2014: available capacity to increase by 23% compared to YE 2010
... which gives SES unrivalled global coverage...
Global reach, regional market focus

- **SES ASTRA** is Europe’s #1 DTH satellite service provider reaching 135 million households (incl. cable).

- **SES WORLD SKIES** is a major player in broadcasting for US cable services reaching some 80 million US households.

- **SES WORLD SKIES** is also the premier provider of satellite communications services with more than 250 customers based in 80 countries. SES WORLD SKIES reaches 145 million DTH/cable households in the world.
What is the Space Data Association?

▲ The Space Data Association (SDA) is a not-for-profit association formed by and for satellite operators to provide reliable and efficient data-sharing critical to the safety and integrity of the space environment and the Radio Frequency spectrum.

▲ The SDA was founded by Inmarsat, Intelsat and SES — three of the leading global satellite communications companies. These three companies, plus Eutelsat, now form the Executive Board of the SDA.
In-Orbit objects as of March 2011

Legend:
SDA Member satellites = 197 (12 with TLEs).
Non-Member satellites = 195
Debris = 970 (398 dead satellites)

Earth Inertial Axes
1 Mar 2011 04:00:00.000
Shared Motivations for SDA’s Creation

▲ Enhance “Safety of flight”
  • Definition: The condition where satellites are positioned and operated in a manner that preserves their long-term operational viability and the preservation of the orbital regime's involved

▲ Efficient, timely, accurate conjunction assessments
  • Reduce false alarms, missed events
  • Minimize Member time and resources devoted to Conjunction Assessment

▲ Common SSA / Format Conversions / Data Repository
  • Minimize confusion, potential for conflicting decisions

▲ RFI Geolocation and Resolution Support
  • More rapidly find and address interference sources

▲ Encourage evolution of best practices for Members

Conclusion: SDA Enhances its Members’ Satellite Operations
SDA and Geolocation

▲ Without SDA
- Multiple phone calls required
- Hours/days required to locate viable solution set and data
- Data formats = anyone’s guess

▲ With SDA
- Solution sets immediately available
- All necessary data centralized and in consistent format
- Better data = more accurate results

Geolocation error reduced two orders of magnitude using SDA-on-SDA quality ephemeris

SDA enables faster, more accurate geolocation results
Seek and facilitate improvements in the safety and integrity of satellite operations through wider and improved coordination between satellite operators.

Seek and facilitate improved management of the shared resources of the Space Environment and the Radio Frequency Spectrum.
SDA Status

▲ SDA established as a legal entity in the Isle of Man
  • Provides necessary legal framework for sharing and protection of data

▲ Space Data Center (SDC) system built by Analytical Graphics, Inc. (AGI)
  • System has now achieved Full Operations Capability, providing Conjunction Assessment service to its members

▲ Growing membership of
  • Approximately a dozen satellite operators from Geosynchronous and LEO orbital regimes
  • Conjunction Assessment Processing for more than 65% of all GEO satellites

Multinational, open to all space operators
Space Data Center (SDC)

▲ SDC – Three Key Mission Areas:
  • Collision avoidance monitoring (Conjunction Assessment)/Manoeuvre Planning Validation / Flight Safety
  • Radio Frequency Interference mitigation / Geolocation support
  • Contact information (operations center) for SDA Member objects

▲ SDC reliable and secure operation:
  • Tertiary, geographically separated redundancy
  • High level data security and encryption
  • Best practice Information Assurance (IA) based on standards for high level computing systems
How does SDA Protect Member Data?

▲ Strict legal agreements between Members and SDA
  • Defines permitted uses for SDC data/products
  • Prohibits misuse of SDC data/products
    – Retransmission to third parties prohibited
    – Obligations for member data contribution
  • Legal liability issues are addressed by enforceable contract

▲ Multiple technical / security controls within SDC
Potential Future SDA Capabilities

- Collect, process, store & disseminate RF Interference (RFI) details to support investigation
- Automatically provide solution sets for performance of geolocation measurements
- Develop & maintain RFI mitigation capabilities, procedures and techniques to ensure continuity of operations
- Collate and disseminate Space Weather data
- Host databases of deployed equipment for industry’s RFI ‘Carrier ID’ project
Contacts – Directors of the SDA

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Visit www.ses.com
BACK UP SLIDES
Permitted & Prohibited Uses

▲ Permitted Uses:
- Operational support, including Safety of Flight
- RFI resolution of actual harmful interference, including at ITU
- Support for insurance underwriting
- As legally required by national regulatory authorities

▲ Prohibited Uses:
- Any commercial purposes (sales, planning, marketing, etc.)
- Securing orbital-spectrum rights
- Transmittal to 3rd parties (except for Safety of Flight)
- Any other use that is not a Permitted Use

*These conditions are enforced through the legally binding agreements*
Why is data sharing through the SDA important?

▲ Data from other sources has proven to be unreliable
  • TLEs for conjunction assessment are insufficient
▲ Operators’ own data is one of the best sources
  • Facilitate operator-to-operator sharing
▲ SDC can ensure common data formats/data is current
  • Automated conversion of ephemerides to common format
▲ SDA can help operators validate data
  • Periodic calibration of data
▲ Data automatically available
  • Checks on data validity
  • Available on system, no manual intervention
How is the SDA funded?

▲ Until recently, the founding members (SES, Intelsat and Inmarsat) have supported all costs

▲ Now that Full Operations Capability has been reached, each member is being charged an annual fee
   • Fees are maintained low to attract members and in any case, are only intended to cover costs
   • Short fall will likely continue to be covered by Executive Members

▲ Funding will be at a level to ensure a cash-positive balance though not-for-profit and will anticipate future development
What data will be shared?

▲ Data sharing will be defined by the type of service:
   • **Points of Contact**: Operations points of contact
   • **Conjunction Assessment (CA)**: Orbital data and manoeuvre plans
   • **RF Data Sharing**: RF data including sat. config., ref. carriers, etc.
   • **RFI Alert**: RFI event reports
   • **Enhanced Services**: All of above plus agreement to share data with approved 3rd parties in return for access to enhanced services (geolocations, other data sources)

▲ Third party access to data (Enhanced Services only) will be strictly controlled and determined by the SDA

▲ All members must participate in Points of Contact and Conjunction Assessment but can choose whether to participate in other services

▲ Participation in a service requires Member to provide associated data