Future Prospects for Privately-Operated Remote Sensing Satellite Systems

Dr. Rick Heidner and Mr. Michael Leon
Strategic Awareness and Policy Directorate
Ms Janna Feeley
Integrated Sensor Design and Analysis Directorate

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Review of Aerospace ACCRES Briefings on 5/15/2014
Aspects of Privately-Operated Land Remote Sensing System Licensing

• License Challenges for Current RS Law & Policy (Heidner)

• Resolution Metrics for Space-Based Imagery (Heidner)

• **Shutter Control**: An Approach to Regulating Imagery from Privately-Operated RS Satellites (Heidner)

• Small Satellite Technology: Industry Update (Venturini)

These briefings can be found on the ACCRES website: http://www.nesdis.noaa.gov/CRSRA/accresMinutes.html;
Mandate to the NOAA ACCRES
Re: U.S. COMMERCIAL SPACE LAUNCH COMPETITIVENESS ACT

Not later than 1 year after the date of enactment of this Act, the Secretary of Commerce, in consultation with the heads of other appropriate Federal agencies and the National Oceanic and Atmospheric Administration’s Advisory Committee on Commercial Remote Sensing, shall submit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives a report on statutory updates necessary to license private remote sensing space systems. In preparing the report, the Secretary shall take into account the need to protect national security while maintaining United States private sector leadership in the field, and reflect the current state of the art of remote sensing systems, instruments, or technologies. [signed as P.L. 114-90 on 11/25/2015]

• The equities of the U.S. commercial remote sensing industry are now receiving heightened Congressional and Executive Branch attention
• NOAA/CRSRA has tasked Aerospace to help coordinate a balanced response to Congress
Response to the Congressional Mandate
Points of Discussion for the ACCRES

• Are updates to P.L. 111-314\(^1\) necessary?
  – Scope of Subtitle VI\(^2\), Chapter 601\(^3\), Subchapter III\(^4\)
  – Clarification of terms

• What is the impact of plausible statutory updates?
  – On NOAA administrative law (i.e., 15 CFR 960)
  – On the process for future license submissions
  – On the current Interagency license review process
  – On CRSRA regulatory oversight for NOAA licensees
  – On U.S. industrial base competitiveness in satellite remote sensing

• How will an eventual follow-on to NSPD-27\(^5\) be affected?
  – Its Scope, Goals, Licensing Guidelines, USG use of CRS imagery,
    Foreign Access to U.S. CRS, G-to-G Relationships, ...

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1 P.L. 111-314 - The National and Commercial Space Programs Act of 2010
2 Subtitle VI - Earth Observations
3 Chapter 601 - Land Remote Sensing Policy
4 Subchapter III - Licensing of Private Remote Sensing Space Systems
5 NSPD-27 - U.S. Commercial Remote Sensing Space Policy
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Statutory Law Issues: Satellite Remote Sensing
The Secretary’s Authorities and Responsibilities

• NOAA has interpreted its statutory authority as the licensing and regulating of privately-operated “land remote sensing” satellite systems

• USG oversight of private**/commercial satellite remote sensing
  – Adherence to binding international treaty obligations
    • The Outer Space Treaty (1967)
    • The Liability Convention (1972)
  – FAA (safety of flight operations)
  – FCC (proper use of uplink/downlink spectrum)
  – DoC/NOAA/CRSRAO (adherence to P.L. 111-314 and 15 CFR 960)

• Unlike commercial Satcom, remote sensing satellites collect data; the USG chooses to impose capability-based license regulations

• The Secretary’s authority is over the operation of these systems

** Includes universities, NGOs, not-for-profits, individuals, etc.
Any changes to CRS imagery laws & policies must recognize their relationship to the export of the “means of production”
- Turn-key systems
- Sub-systems and components
- Technology transfer

Motivations for satellite remote sensing vary by country
- Non-traditional value-metrics are emerging in the U.S. and elsewhere

U.S. efforts to slow technology proliferation through law and Executive policy have had mixed results at best
- Often results in “design-out” of U.S. technology
- Other advanced space-faring nations anxious to export
- Restrictive export laws influence an emerging nation’s choice of collaborators for system development
Very few nations have a single motivation for developing or acquiring “remote sensing systems, instruments or technologies.”
Satellite Remote Sensing: Tech Transfer/Data Policy

It's Now an Integrated Global Enterprise

Foreign RS Data Dissemination Policy

Foreign Operators

Foreign Manufacturers

Domestic RS Data Dissemination Policy

Domestic Operators

Domestic Manufacturers

Technology Transfer & Tech Data Sharing

Foreign Civil Data

USML

USG Regulatory Sensitivity

High

Medium

Low

Foreign

Domestic

NSS

NSS

Foreign

Domestic

Manufacturers

Manufacturers

Competition

Cooperation

Competition

Cooperation

Export Equities

CCL

USML

USML

CCL

U.S. Space Industrial Base
International Satellite Remote Sensing

The Changing Landscape: 2016 -

• Issues raised by constellations of nanosats, including Cubesats
  – Space traffic management, orbital debris, & frequency management
  – Rapid revisit at moderate GSD (ca. 4m VNIR) feasible with Cubesats

• High resolution (≤ 1m GSD/IPR) satellites are proliferating
  – Ca. 27 operational electro-optical satellites (acknowledged)
  – Ca. 16 operational SAR satellites (acknowledged)

• Rapid increase in “emerging nations”\(^1\) operating RS satellites
  – First Gen: 8 satellites launched by 8 nations (1996 – 2005)\(^1\)
  – Second Gen: 14 satellites launched by 8 new nations (2006 – 2015)\(^1\)
  – Third Gen (est.): 70 satellites (total); 31 nations (7 new) (2016 – 2025)\(^1\)
  – Total Earth Observation RS satellites this next decade: ≥ 400 (est.)

• Turn-key export, tech transfer, & training underlie growth rates
  – Motivations of recipient nations & satellite capabilities vary greatly
  – Turn-key export dominated by France, So. Korea, UK, Germany, Israel

\(^1\) Emerging nations defined as launching first > 50 kg EO satellite after 1996.

Euroconsult: Trends & Prospects for Emerging Space Programs, 2\(^{nd}\) Ed. (July 2016)
Observations and Conclusions
Privately-Operated U.S. Land Remote Sensing Satellites

• U.S. law and policy for privately-operated satellite remote sensing are due for thoughtful updates
  – Current law is traceable to The Land Remote Sensing Policy Act of 1992**
  – Current Executive policy is NSPD-27 (2003)
  – Any changes in the current U.S. national strategy for satellite remote sensing must map to achievable implementation steps

• Congress appears willing to entertain updates to statutory law
  – Input requested as part of P.L. 114-90

• Executive branch agencies are revisiting NSPD-27
  – Must deal with “quality metrics” other than spatial resolution
  – Must deal with risk management rather than risk avoidance

• Foreign competition may not be inhibited by current budgetary climate within advanced space-faring national allies
  – Remote sensing technology proliferation may appear attractive

** Now incorporated into The National and Commercial Space Programs Act of 2010