Strategic (Military) Implications of Active Debris Removal (ADR) and On-Orbit Satellite Servicing (OOS)

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United States Space Policy Documents Applicable to ADR & OOS

- National Space Policy of 2010
- National Security Space Strategy of 2011
- U. S. Space Transportation Policy of 2005

National Space Policy of 2010

Preserve the Space Environment. For the purposes of minimizing debris and preserving the space environment for the responsible, peaceful, and safe use of all users, the United States shall

- **Pursue research & development of technologies and techniques**, through the Administrator of the National Aeronautics and Space Administration (NASA) and the Secretary of Defense, **to mitigate and remove on-orbit debris**, reduce hazards, and increase understanding of the current and future debris environment

National Security Space Strategy of 2011

- Shared awareness of spaceflight activity must improve in order to foster global spaceflight safety and help prevent mishaps, misperceptions, and mistrust

NSSS of 2011 (cont.)

- The United States will support development of data standards, best practices, transparency and confidence building measures, and norms of behavior for responsible space operations. We will consider proposals and concepts for arms control measures if they are **equitable, verifiable, and enhance the security of the United States and its allies.**

U.S. Space Transportation Policy of 2005

The United States shall… pursue research and development of in-space transportation capabilities… including but not limited to: **automated rendezvous and docking, and the ability to deploy, service, and retrieve payloads or spacecraft in orbit.**

Potential ADR Technology

- Ground-based and space-based lasers
- Robotics
- Space sails
- Solar concentrators
- Electrodynamic tethers
- Drag augmentation devices
- Orbital transfer vehicles
- Ultrashort optical pulses

Military Implications of ADR

- Theoretical at present
- No ADR systems exist
- No significant attempts to develop ADR
- No political will by states to fund ADR
  Question of priorities in a constrained fiscal environment
- Challenge is to develop cost-effective means of ADR

Military Implications of OOS

- Increases flexibility
- Can respond to changes in requirements and objectives by servicing satellites in a cost-effective way
- Can replenish consumables, repair, maintain on-orbit assets, thus extending life of the satellite
- Increased maneuverability makes it more difficult for adversaries to avoid detection or interfere with the OOS satellite

Military Implication of ADR and OOS Satellites as Anti-Satellite (ASAT) Systems

- ADR and OOS satellites could be used for ASAT
  - Capabilities, not intent, is the issue
- Autonomous rendezvous and proximity operations capability enables intelligence gathering, surveillance, reconnaissance, docking
- Attractiveness relates to little or no orbital debris
- Reduced or no collateral damage is consistent with law of armed conflict
- Satellites can be parked in orbit until needed

Military Implication of ADR and OOS Satellites as Anti-Satellite (ASAT) Systems (cont.)

HOWEVER

- Better ASAT capabilities exist or may be developed
- Potentially more costly than with other ASAT capabilities
- Could compromise ADR and OOS missions
- Attribution easily established if ADR and OOS systems are used as ASATs

Recommendations

- TCBM will have significant role in reducing mistrust and misperceptions in ADR and OOS operations
- Focus initial ADR missions on noncontroversial debris, e.g. rocket bodies, dead satellites, unattributed debris
- For attributed debris, state that created the debris responsible for removing its debris, either directly conducting ADR or authorizing others to perform ADR
- For unattributed debris, remove tracked debris that poses significant safety hazards

Recommendations (cont.)

- This approach minimizes military, diplomatic, and political concerns
- Enables success, development of best practices, and attainment of goal of reduced orbital debris

Questions?