

# Commercial In-Orbit Servicing Perspectives

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Life Extension  
Mission Recovery  
Inspection  
Towing

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# No Longer Science Fiction

- Robots and Space Robots are NOT a new idea
- Servicing of Geosynchronous satellites has long been considered the “Holy Grail” of space robotics
- 2005: NASA “Dart” mission indicated in-orbit rendezvous complex
- 2007: DARPA “Orbital Express” mission showed success possible
- 2007: Intelsat and MDA begin discussions
- 2010: ATK/US Space create Vivisat and announce intention to provide “mission extension services”
- 2011: Intelsat announces contract with MDA
- 2011: NASA launches robotic servicing “demo” for ISS
- 2011: DARPA RFIs/BAAAs for in-orbit servicing

# Value Proposition for Refueling Spacecraft

- NOT too risky – it's risky NOT to embrace innovation
- NOT too expensive – but business case demanding
- NOT too difficult – but challenging
- NOT too late - older spacecraft are not “obsolete”

**IT'S ALL ABOUT THE BUSINESS CASE**

# Tug versus Refueler

- Towing -  Mission Extension Vehicle (MEV)
  - Tug remains attached to “client”
  - Replaces attitude control subsystem (cg challenges)
  - Launch a spacecraft to operate a spacecraft (1:1)
  - Xenon propulsion → efficient but long time to change orbits
  - Advantage for highly-inclined spacecraft (lighter)
  - Can move to another spacecraft if business case dictates
- Refueling -  Satellite Infrastructure Servicer (SIS)
  - Adds propellant / pressurant (but needs intact propulsion S/S)
  - 2000 kg / (40 kg/year) = 50 years distributed lifetime
  - Other servicing missions “enabled”
  - Possibly less efficient to service highly-inclined clients (weight)
  - Much more responsive to urgent needs (mobile)  INTELSAT.

# Intelsat Plans / Strategy

- Refueling and/or life-extension demonstration on devalued spacecraft planned to be performed in graveyard supersync in 2015/2016
- Intelsat will identify high-value, propellant-depleted spacecraft following successful demonstration
- Will evaluate results to determine if refueling/life-extension can be counted upon to smooth our capital expenditures for new procurements
- Provides real alternatives in case of launch failures, budget challenges, or on-orbit anomalies
- Goal is to ensure that end users have affordable service