Top-Level Global Satellite Industry Findings

• Satellite industry revenue was $268.6 billion in 2017
• Overall industry growth of 3% worldwide
• Three of four satellite industry segments posted growth

Satellite services: the largest segment; 1% growth
Consumer services continue to dominate the overall satellite industry

Satellite manufacturing revenues increased by 10%
More satellites launched in 2017

Launch industry revenues declined by 16%
Number of launches consistent with previous years, more launches using less expensive launch vehicles

Ground equipment revenues grew by 5.6%
Growth in GNSS and network equipment, consumer equipment remaining flat
The Satellite Network in Context

Operational Satellites by Function and Mass Class

- Estimated as of December 31, 2017
- Number of satellites increased 49% over 5 years (from 1,167 in 2013)
  - Satellites launched 2013—2017 increased 147% over previous 5 years
    - Average 272/year
    - Due mostly to small/very small satellites in LEO (<1,200 kg)
  - Total satellite mass in orbit about 3,000 metric tons
  - Average operational lives of larger (mostly communications) satellites becoming longer, exceeding 15 years; 272 active satellites launched before 2003
    - 531 active satellites in GEO (mostly communications)
- 1,738 satellites operated by entities from 62 countries (some in regional consortia)
  - Cumulatively, organizations from 81 countries have deployed at least one satellite since 1957
- U.S. entities operate 803 satellites, some in partnership with other nations
Case Study: On-Orbit Satellite Servicing

- On-orbit capability to conduct maintenance, augment propulsion, and/or refuel spacecraft using autonomous vehicles. Segments include satellite life extension, salvage operations, robotic maintenance, and deorbiting, with focus on high revenue-generating GEO assets.
- Problem needing a solution: 10% of anomalies occur within the first two months after launch—yet account for 36% of cases with full loss of capability*.
- Major programs:
  - Commercial efforts: Northrop Grumman Innovative Solutions (formerly Orbital ATK) Mission Extension Vehicle (MEV), Maxar Space Infrastructure Servicing (SIS), Effective Space SPACE DRONE.
- Market projections:
  - Northrop Grumman Innovative Solutions projects revenue of $400M to $500M per year.
  - First Northrop Grumman commercial MEV to launch in 2018; contracts to service two Intelsat satellites.
  - One analysis firm projects $3B in revenue through 2027.
- Related emerging markets: on-orbit manufacturing, assembly, and debris removal.