

**VIRTUAL GROUND STATION TECHNOLOGY
DEVELOPMENT PLANNING**

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VIRTUAL GROUND STATION TECHNOLOGY DEVELOPMENT PLANNING (cont)

OVERVIEW

- JPL Technology Applications Program and NRO Advanced Systems & Technology have signed a MOU to share technology advances associated with spacecraft, instruments, and ground support systems.
- NRO wishes to transition from ground stations with systems- and mission-specific components to a more open architecture that capitalizes on technology developments from a variety of sources.
- JPL's Telecommunications and Mission Operations Directorate (TMOD) will be supporting 3-7 times the number of deep space missions in the next decade. This requires infusions of new communications and automated ground systems technologies.

**VIRTUAL GROUND STATION TECHNOLOGY
DEVELOPMENT PLANNING (cont)
TMOD TECHNOLOGY CONSIDERATIONS**

- **Architecture transition from co-located to distributed components**
- **Technology supports a “virtual location” of functional components that can be re-assessed with each mission.**
- **JPL’s design considerations being incorporated:**
 - Choices at spacecraft design phase assessed for effect on operations and ground data processing & dissemination costs
 - Autonomous operations approaches incorporated to lower costs
 - Adoption of Web technology to reduce ground data processing & dissemination costs

**VIRTUAL GROUND STATION TECHNOLOGY
DEVELOPMENT PLANNING (cont)
KEY TMOD TECHNOLOGY COMPONENTS**

- **Efficient Communications Links**
 - Ka Band & Optical
 - Coding & Compression
- **Autonomous Navigation & OD**
 - Beacon Technology & ARTISN automated navigation
- **Autonomous Deep Space Network**
- **Miniaturized Flight Systems**
- **Precision GPS Positioning**
- **Service-Based Architecture**
 - End-to-End Service Delivery
 - On-Board Services, Migration from Ground
 - Virtual Presence Technology