NASA Ground Network Evolution
Designing for Best Value

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- Introduction to the “GN”
- Challenges and opportunities
- Experience with best value management
- Evolution options
Ground Network (GN) Project overview

- **GN is customer driven**
  - Provides ground-based space communications for NASA missions
  - Provides reliable services to meet customer requirements

- **GN evolution goal is to provide best value service**
  - Manage costs to avoid large capitalization
  - Maintain minimum GN Project civil servant staffing
  - Balance long-term stability and flexibility of ground network capacity
  - Maintain high performance and reduce risk

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**GN Project Overview**

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<td>Lead Center</td>
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The GN provides services to a diverse customer set

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The GN has developed into a complex heterogeneous system

- 50 ground station antennas; 30 unique antenna systems
- 7 geographic antenna locations
- 4 different owner/operator models
- Numerous IDIQ contracts for additional commercial services as needed
- Scheduling of all orbital-support antennas performed from one location
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GN risk and cost challenges influence evolution options

- **Challenges to GN system performance**
  - Aging systems increase risk to service performance
  - Mission-driven non-standard interfaces and hardware limit interoperability
  - Flat budget limits options for upgrades or new systems

- **Challenges to GN system cost**
  - Maintenance needs for aging and heterogeneous systems
  - Manually intensive systems
  - Mission unique equipment
  - Systems with low utilization
Customer trends motivate and challenge evolution planning

- Future customer need predicted to change
  - GN S-band missions “flying out” with few new customers in short term
  - X-band requirement through 2010 for Earth Observing System (EOS)
  - Other mid-term high-rate missions planning to use other networks

- GN usage level uncertain beyond ~2007
  - Far-term mission plans not yet developed
  - Potential for large fluctuations due to possible constellations

- GN cannot afford overcapacity
- Must obtain flexibility in capacity

**GN Currently has Capacity to Support:**
- More than 275 passes/day on NASA owned antennas
- 40 passes/day minimum on commercial contracts
Community trends may enable opportunities for coordination

- **NASA**
  - Shared support between NASA Space Network and GN will probably increase
  - Some overlap in functionality between GN and DSN on Earth-orbit support

- **NOAA**
  - Ample X- and S-band contingency capacity
  - SafetyNet (NPOESS Ka-band architecture) planned to be operational in 2009

- **DoD**
  - Exploring interoperability with other government satellite control systems
  - Exploring Transformational Communications for the long term

- **Commercial**
  - Some providers maintain business viability in niche markets
  - Other providers rely on NASA as their cornerstone customer while they seek to develop a broader market

- **Partners**
  - Some NASA missions will continue to receive ground network services from University and International partners
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Experience with best value management

- NASA will continue to rely on GN services
  - Space based systems do not fulfill all needs
  - GN can be preferable in certain tradeoffs of cost, mass, and power

- Commercial services can provide benefits
  - Utilization of commercial services enables evolution while maintaining flat budget
  - Commercial services can allow the GN to only pay for what it uses

- Commercial services can be effective, but active risk management is crucial
  - Government visibility into contractor processes is needed for effective risk management
  - Performance metrics should evaluate contractor risk management and mitigation processes in addition to past performance
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Architecture Vision: Flexible, reliable, and competitive

- **GN provides core capacity**
  - Multi-mission shared capacity
  - Focus on mission requirements
  - Heavy reliance on commercially owned/operated systems

- **GN coordinates on custom capacity**
  - Mission-unique capabilities that GN cannot effectively provide

- **GN diversifies with supplemental capacity**
  - Partner with NOAA, DOD, commercial, etc.
  - Provides contingency, launch and early orbit support, and backup
GN evolution options will focus on best value

- NASA will play an active role in managing the GN
  - Manage contracts and budget
  - Insight into contractor processes to enable risk management

- General shift from NASA assets to commercial and cooperative
  - Implementation decisions based on business case merit
  - Performance metrics to assess “future preparation” in addition to past performance
Conclusion

- The GN is a heterogeneous system that supports many diverse customers
- Evolution planning is addressing GN risk and cost challenges
- With specific contract rules, commercial services can be effective and beneficial
- GN evolution planning will examine cooperation with commercial and government entities
- GN evolution implementation will be based on best value business cases