

# Architectural Approaches for Multi-Mission Ground Systems

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**Session 10D**  
**Breakout Group**

# Agenda

- Introduction – Mike Hogan, The Aerospace Corporation
- Multi-mission Considerations for the NASA JPL Deep Space Network – Susan Kurtik, Jet Propulsion Laboratory
- Ground Control System Issues for Multi-Mission Operations – Tina Arechiga, PanAmSat
- An Ops Concept Driven Architecture for Satellite Command and Control – David Allen, L-3 Communications/Storm Control Systems
- Applying A Distributed Architecture to Real Time Hardware Control and Status – Robert Andzik, RT Logic
- Multi-Mission Ground Systems: A Commercial Approach – Pete Gaffney, Integral Systems, Inc.

# Definition of Multi-Mission GCS

***A Satellite Ground Control System (GCS) for operating multiple space vehicles (SVs) of differing manufacture or design i.e. different families.***

***All SVs in family have common TT&C/bus architecture/design***

***“Multi-mission” implies different families of SVs differ by mission.***

# Goals of this Session

- **Identify key elements of a cost effective Multi-Mission GCS**
  - Architectural parameters
  - Standards
  - Components
  - Acquisition/sustainment strategies
- **Understand how these elements support the Multi-Mission capability**

# Key Drivers: System Acquisition

- 1 family/ 1 GCS ↔ multiple families/ 1 GCS
- 1 SV family ↔ 2-4 families ↔ More than 4 families
- High risk/Low redundancy ↔ Low Risk/High redundancy
- Custom GCS ↔ COTS Core w/ MUS ↔ All COTS GCS
- GCS Commonality:  
Ant→Comm→FEP→H/W→DB→S/W→HMI
- Few internal interfaces ↔ Many internal interfaces
- Few external interfaces ↔ Many external interfaces
- Few mission specific interfaces ↔ Many mission interfaces

# Key Drivers: Operations

- 1 family/ 1 GCS ↔ multiple families/ 1 GCS
- 1 SV family ↔ 2-4 families ↔ More than 4 families
- On-orbit ops only ↔ w/ anomaly ops ↔ w/launch ops
- High risk/low cost ops ↔ Low risk/high cost ops
- Multiple SVs/opr ↔ 1 SV/opr ↔ 1 SV/multiple oprs/engrs
- Little Operator Training ↔ Extensive Opr Training
- Little automation ↔ Total automation

# Key Drivers: Maintenance

- 1 SV family ↔ 2-4 families ↔ More than 4 families
- Maintenance Risk vs. Cost trades
- Organic Maintenance ↔ Vendor COTS only ↔ Vendor Maintenance
- Little upgrade ops testing ↔ Extensive ops testing
- No on-site spares ↔ Extensive on-site spares
- 24 hrs vendor response ↔ 2 hrs vendor response
- Shared test/dev system ↔ Dedicated test/dev system