Mobile CubeSat Command & Control (MC3) Ground Stations

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This Brief is Classified:
UNCLASSIFIED
The Mobile CubeSat Command and Control (MC3) System is a network of fully autonomous ground stations which support the NRO’s Colony Program.
Objectives

• Geographically distributed ground stations provide continuous coverage for up to 30+ CubeSats
• Provide “hands on” educational opportunities in satellite communications, networking, and coding
• Ground station hosts adapt their government furnished hardware to further their own research in small satellites

• Foster government and civilian institutional partnerships in the Small Satellite community
MC3 Node Locations:
Hardware

- **UHF**
  - 450 MHz TX
  - 915 MHz RX

- **S-BAND**
  - 2.1 GHz TX
  - 2.2 GHz RX
Ground stations run a GOTS Linux-based software program developed over the last 30 years by the NRL. Software is enables stations to run fully autonomously with either remote or local control.

<table>
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<tr>
<th>Software Capabilities</th>
<th>Description</th>
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<tr>
<td>Ground Station Equipment Control</td>
<td>Provides control and status of ground station equipment.</td>
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<td>Ground Control</td>
<td>Provides a GUI that allows for modification of ground site parameters, equipment priorities and availability.</td>
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<td>Operations and Control</td>
<td>Supports and provides automatic scheduling and control of MC3 nodes. Determines satellite contacts based on ephemeris, or time based events.</td>
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<td>Automated Ground Operations</td>
<td>Decision-based control of satellite in support of a Contact Support Plan, a high-level operational plan for satellite contacts.</td>
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• **Colony II Program:**
  - Bus Provider: Boeing
  - 20 buses over 3 years
  - Features: flight processor, EPS with 70W peak power (20 min), high-performance ADACS with star cameras, TT&C Radio, AES 256-bit software encryption

• **STARE Launch:**
  - September 2012
  - Space-based Telescopes for Actionable Refinement of Ephemeris (STARE)
    - First Colony II to orbit
Access to LEO, MEO, and GEO CubeSats

Increased Coverage

Better Pointing

Optimized Scheduling/Performance
MC3 Path Forward

M2 AZEL1000 Servo Motor 10’ Dish System

Max speed: 3° / Sec

To be used for:
- S-Band next-gen Colony II radios
- NPSAT1
- NPS-SCAT

M2 Datasheet Link
QUESTIONS?

Contact Information
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