NAVAL
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Mobile CubeSat Command & Control (MC3) Ground Stations

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This Brief is Classified:
UNCLASSIFIED

Excellence Through Knowledge

What is MC3?

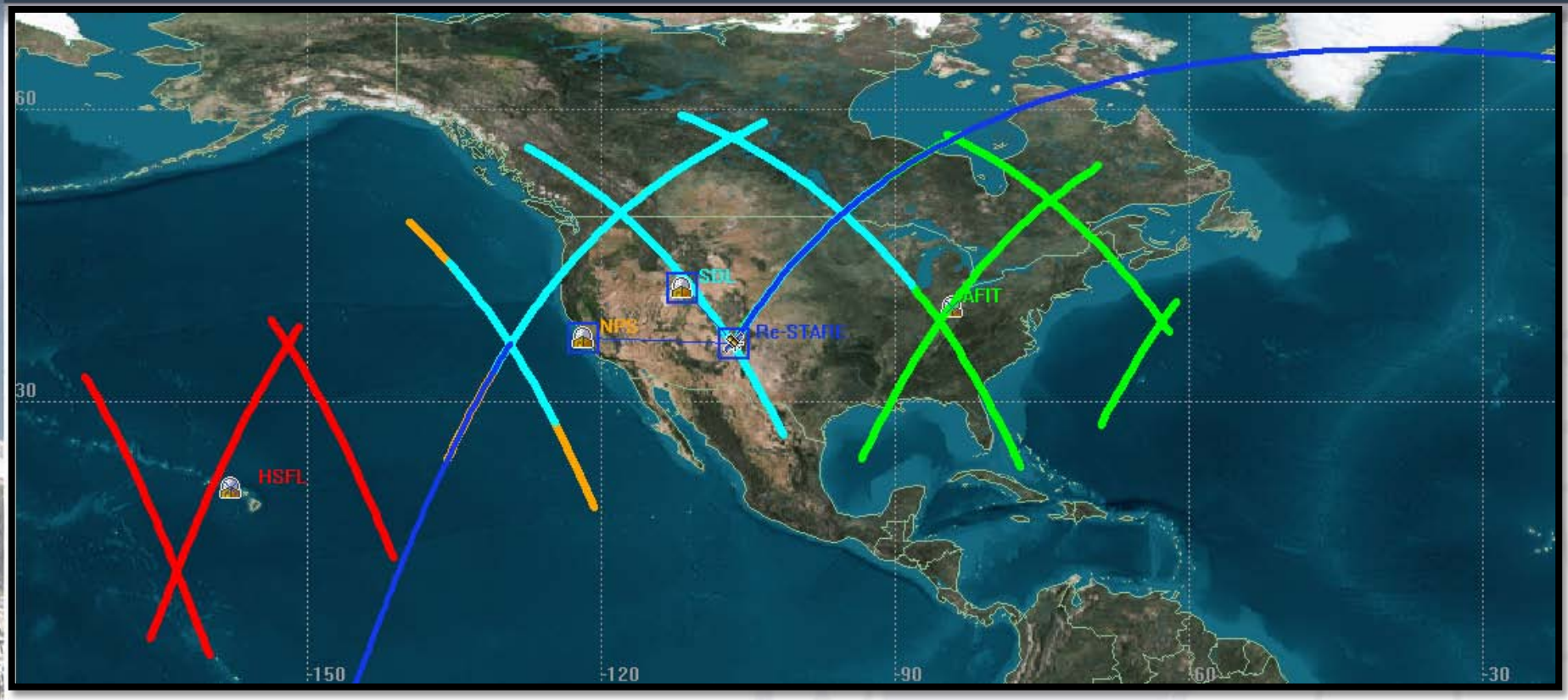
The Mobile CubeSat Command and Control (MC3) System is a network of fully autonomous ground stations which support the NRO's Colony Program.

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**

Coverage



MC3 Node Locations:

Hardware

UHF
450 MHz TX
915 MHz RX

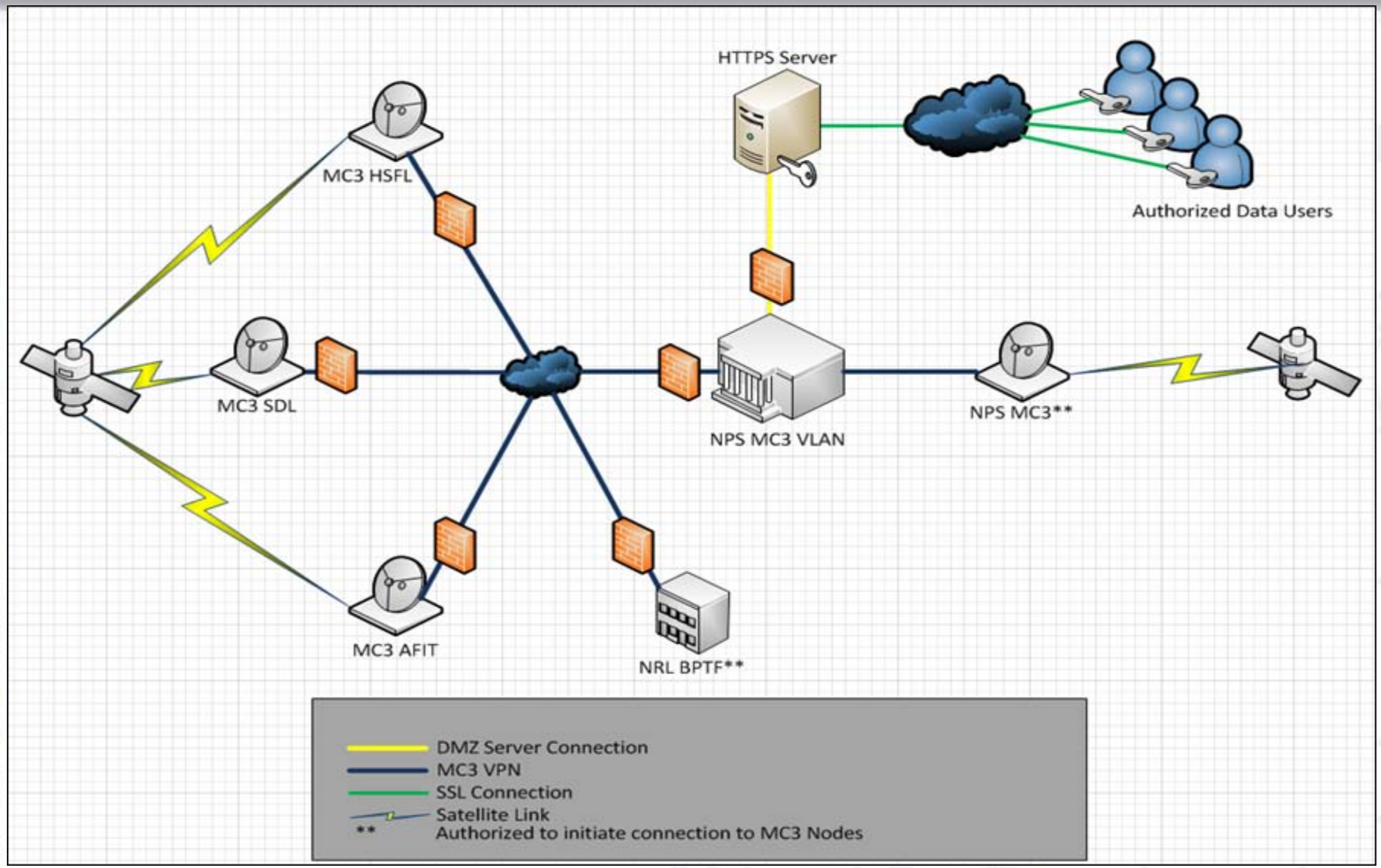
S-BAND
2.1 GHz TX
2.2 GHz RX

Ground Station Software

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.

Software Capabilities	Description
Ground Station Equipment Control	*Provides control and status of ground station equipment.*
Ground Control	*Provides a GUI that allows for modification of ground site parameters, equipment priorities and availability.*
Operations and Control	*Supports and provides automatic scheduling and control of MC3 nodes. Determines satellite contacts based on ephemeris, or time based events.*
Automated Ground Operations	*Decision-based control of satellite in support of a Contact Support Plan, a high-level operational plan for satellite contacts.*

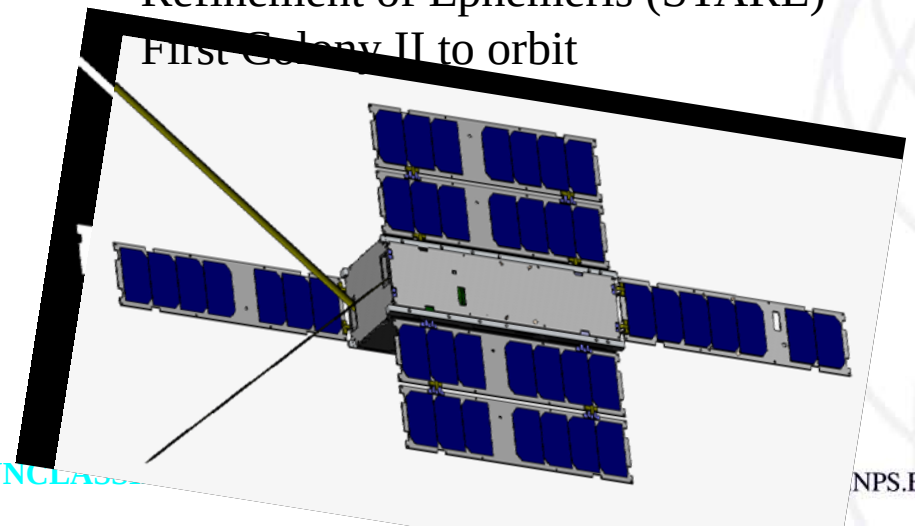
MC3 VPN CONOPS

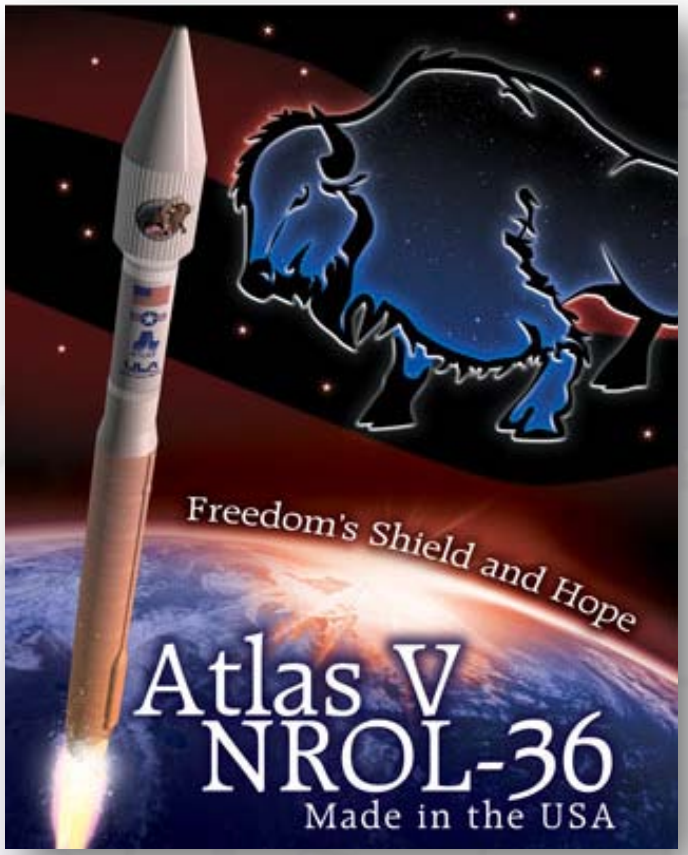


STARE (RE)

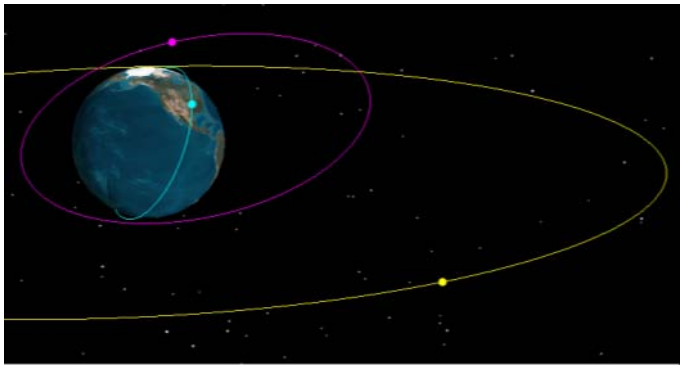
- **Colony II Program:**
  - Bus Provider: Boeing
  - 20 buses over 3 years
  - Features: flight processor, EPS with 70W peak power (20 min), high-performance ADACS with star cameras, TT&C Radio, AES 256-bit software encryption

- **STARE Launch:**
  - September 2012
  - Space-based Telescopes for Actionable Refinement of Ephemeris (STARE)
  - First Colony II to orbit





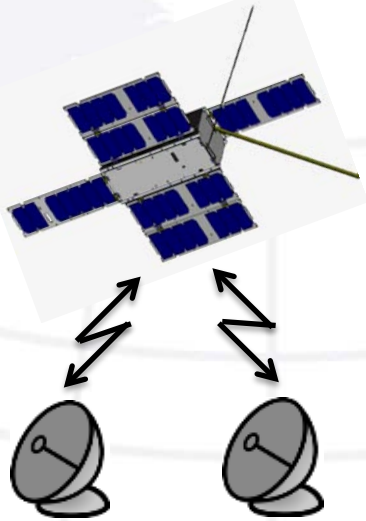
MC3 Path Forward



Access to LEO, MEO, and GEO CubeSats

Better Pointing

Increased Coverage



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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