



# TacSat 4 Overview

26 April 2007



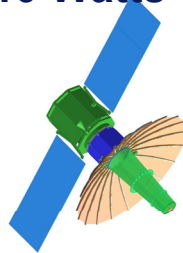
OFFICE OF FORCE TRANSFORMATION

# TacSat-4 Mission Summary



## Spacecraft and Payload Highlights

- Satellite [Space Vehicle]:
  - ~ 450 kg
  - Payload Power: 200 - 610 Watts
  - Low HEO (4 hr) Orbit
  - 1 Year Life
- Payload Capability:
  - Data-X and BFT
  - COTM
    - Legacy Radio & IP Netted Support
    - MOUS-Like Wideband Capability



## Objectives

- Demo High Dwell ORS Capability via a HEO Orbit
  - Augment Poor/No Coverage Areas
- Evaluate & Mature Phase 3, System Level Bus Standards in Realistic I&T, Launch, and Flight Operations Environment
- Provide TACSAT/ORS Comms-on-the-Move Capability (Legacy, Netted, and MOUS-Like)
- Collect BFT Devices in Underserved Areas
- Perform Buoy/Sensor Data-X on Moderate-to-High Power Transmissions

## Ground Equipment

- BFT Devices: MTX, Grenadier Brat, Others
- COTM: Legacy Radios and MOUS Compatible UHF Wideband Radios
- Data-X Buoys and Gnd Sensors
- Ground Terminal: One Per 2000 nm Theater Spacecraft Cmd & Cntrl: Blossom Point, Maryland
  - Additional Coverage From AFSCN
  - Payload Tasking on SIPRNET VMOC

## Programmatics

- ONR Payload, Flt Ops, Test Bed Sponsor
- OFT Bus Sponsor – “Phase 3” Bus
- AFSPC, SMC-12 Provided Launch
  - Minotaur-IV
  - Launch Targeting Q4 of 2008
- NRL Program Manager
- STRATCOM to Assign Lead COCOMs as Experiments and Exercises Mature
- Multi-Service Participation

Navy Led for Joint Community



# TacSat-4 Bus and Payload Relationship

## Bus Standards Documents

- ISET Developed

- Launch Vehicle I/F
- General Bus Requirements
- Payload Development Guide

## COMMX Payload

- SRDR Jan 2006
- PDR Apr 2006
- CDR Aug 30,31 2006
- Payload Complete November 2007

**ONR Funded**

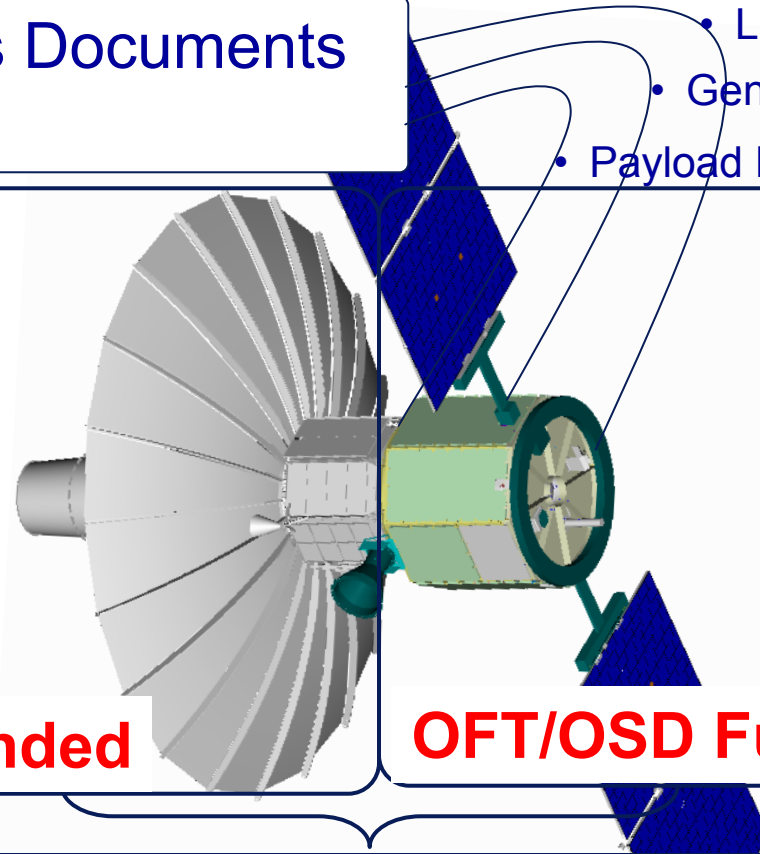
## Phase 3 Bus Prototype

- CoDR Feb 2006
- PDR July 2006
- CDR Dec 2006
- Bus Complete November 2007

**OFT/OSD Funded**

## TacSat-4 Space Vehicle

- SV TRR Nov/Dec 2007
- PSR March 2008
- ILC April 2008





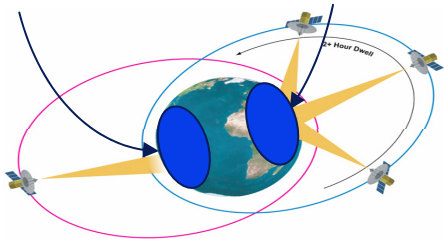
# TacSat-4 Example of HEO Orbital Coverage: Minimizes Number of Spacecraft & Launches



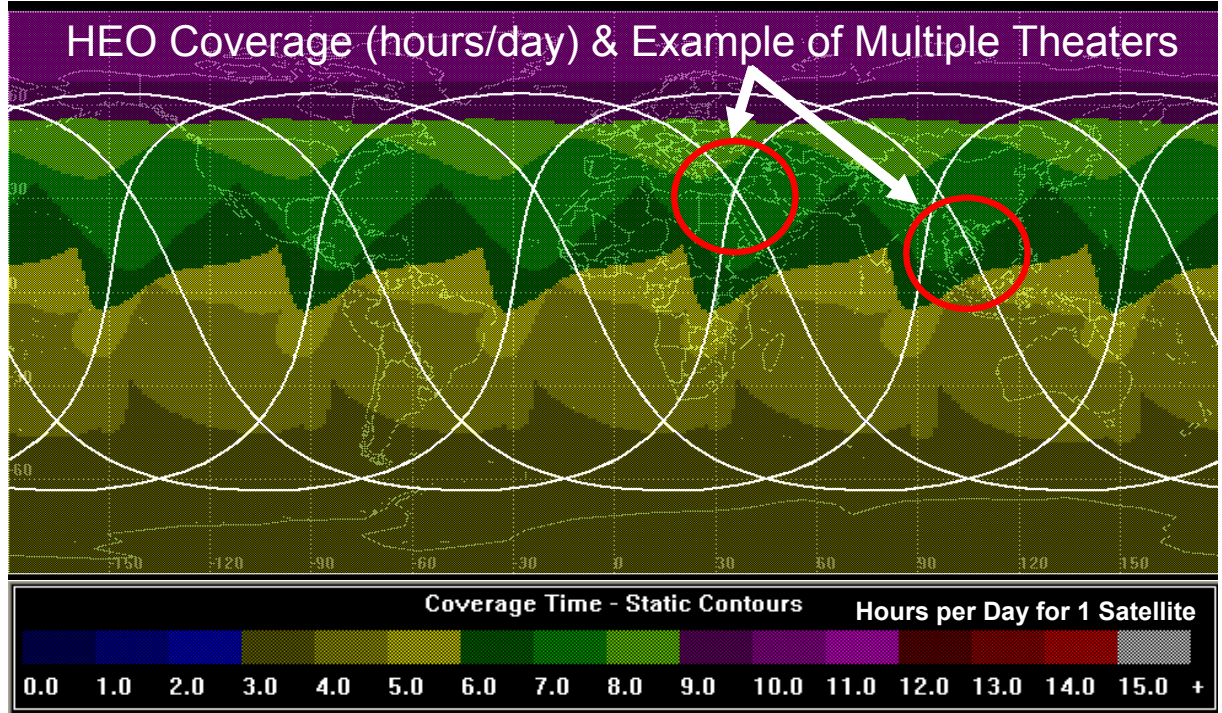
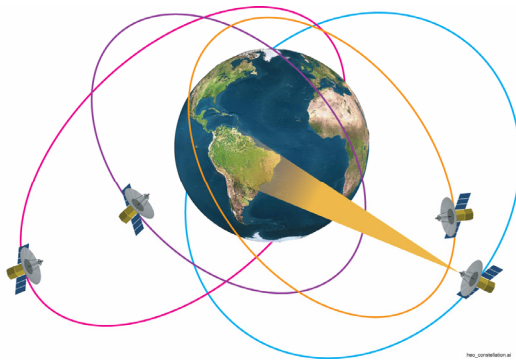
## Demo High Dwell Orbits

- 2+ Hours of Coverage per Pass
- ~3 Passes/Day
- Add Coverage Where Needed w/ Minimal Spacecraft & Launches

Pick Your High-Dwell Area Here (for example) or Here



Operational: 24/7 Coverage with Minimal Launches & Satellites (~4)



Note: Orbit 300x6600 nm, 63.4 degrees inclination, Apogee at 30 deg Latitude, Single Satellite

4 Hour Orbit Period

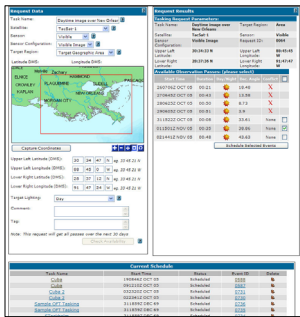
Challenge is Radiation Tolerance with this Low Cost Class of Satellites



# Primary Command and Control Operations Concept



VMOC Tasking Request\*



• 1+ Day Scheduling



VMOC

- "As-Run" Cmd Files
- Tasking Files
- Flight S/W Uploads
- Ephemeris



air

## Ground Segment & MOC

NRL Blossom Point Ground Station  
Blossom Point, MD

Primary RF Front End

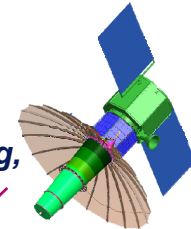


Backup RF Front End



S/C and P/L State of Health Monitoring  
Command Generation and Uplink  
SOH Archive

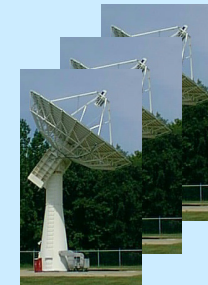
SGLS  
Telemetry, Tracking,  
and Commands



TacSat-4

AFSCN

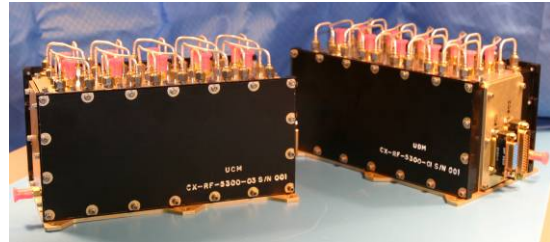
Antennas



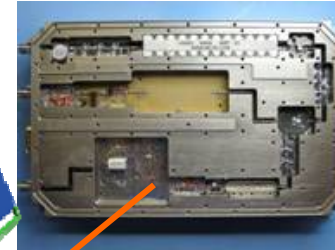
\* User Priorities Assigned by STRATCOM/JSPOC



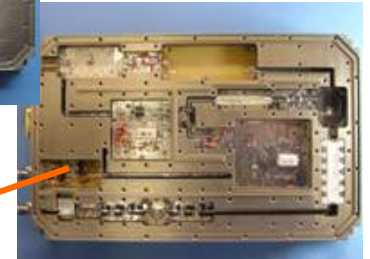
# TacSat-4 Spacecraft with ONR's "COMMx" Payload Components Highlighted



UHF Combiner and Divider Matrices

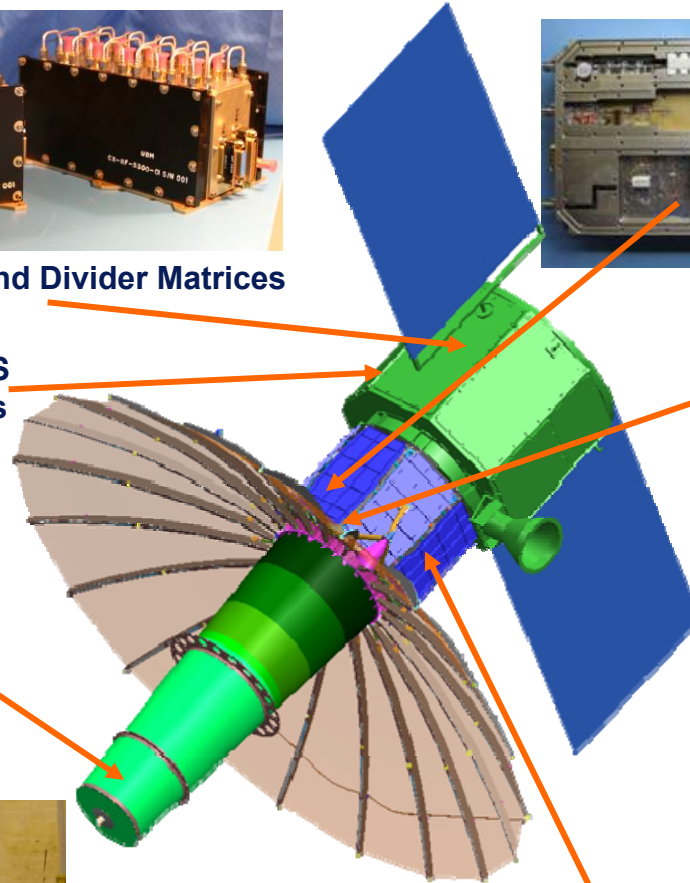


X-band Up & Down Converters



UHF Antenna Feed

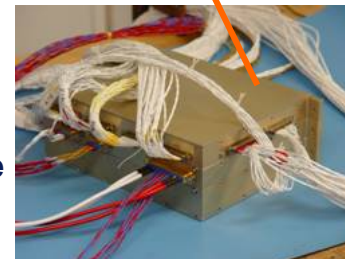
"Phase 3" ORS Bus Standards Prototype



Synthesizer EM



Transponder EM



Payload Interface Unit

Antenna Feed Structure

UHF Antenna "Dish"

