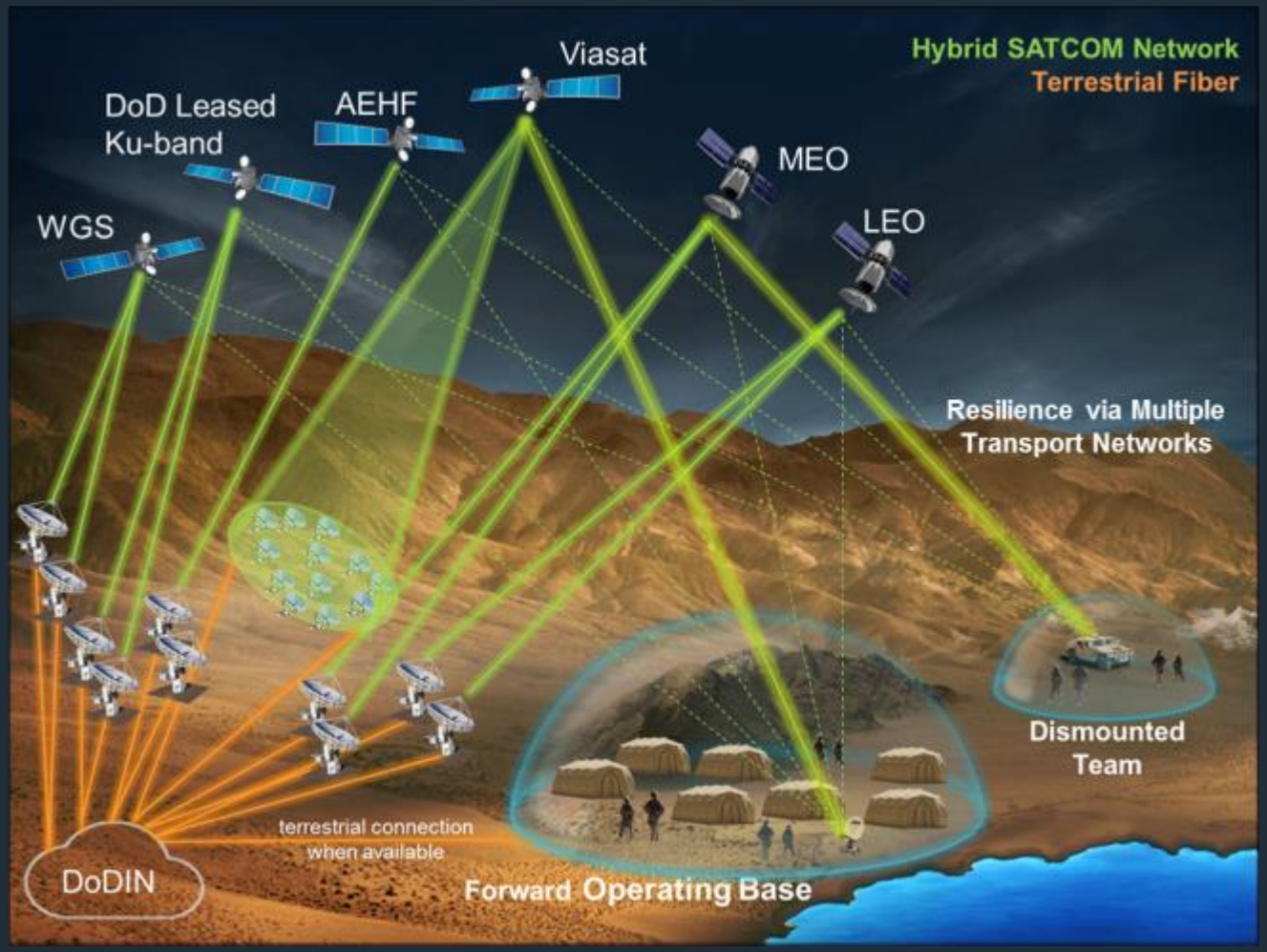
Resilient Communications with Hybrid Adaptive Networking



Mr. Craig Miller

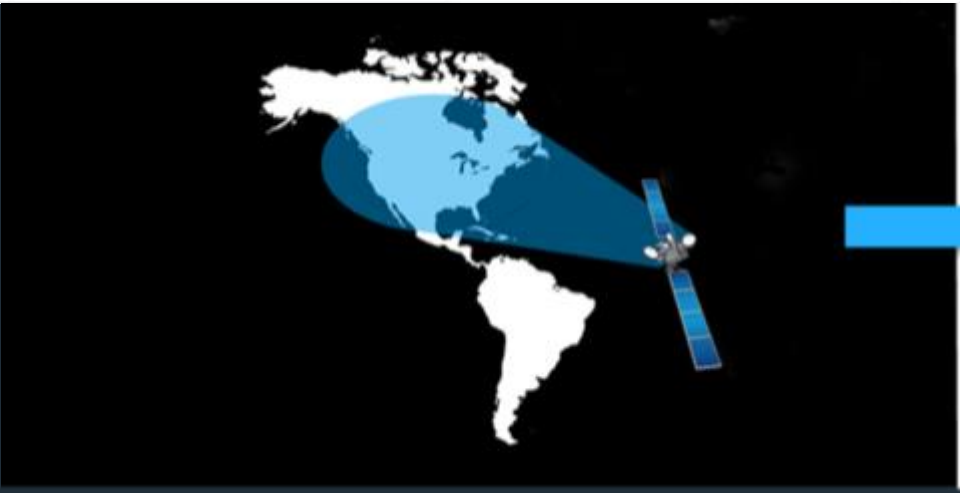
Vice President & Chief Technology Officer

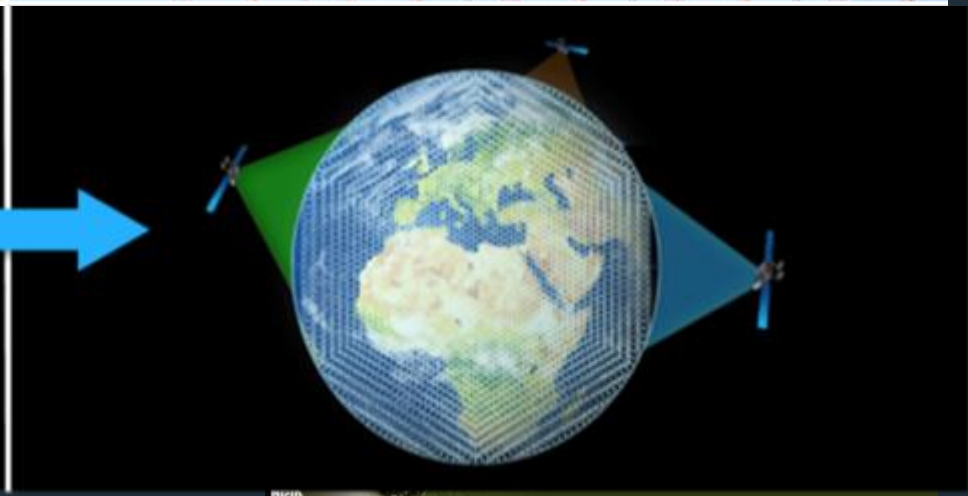
21 August 2018

ARMY SCIENCE & TECHNOLOGY
SYMPOSIUM AND SHOWCASE

Transition from Broadcast to Interactive Broadband

Revolutionized Wireless Communications … a 2nd Time



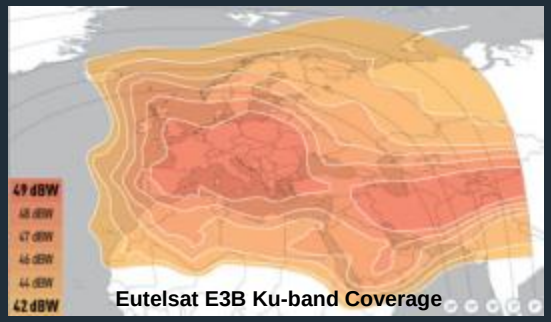


Broadcast to Interactive Broadband

Systems the Army employs

Ka-band Spot Beams -3 & -30dB contours

Ku-band with -6dB over the entire Continent



Eutelsat E3B Ku-band Coverage

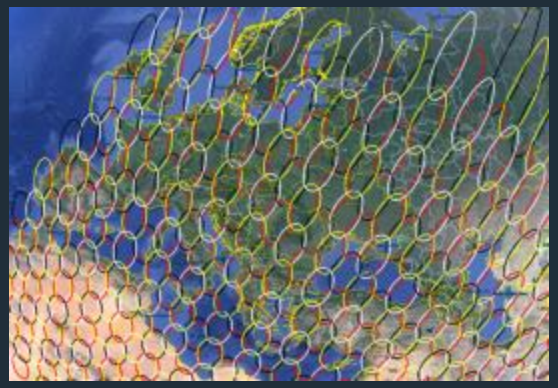
Only One Transmitter using the same frequency at the same time

(Thus, they are susceptible to Interference)

Commercial Data/Broadband Satcom

Eutelsat KaSat Beam Counters

Notional ViaSat-3 Beam Counters



1000s of Transmitters using the same frequency at the same time

(Thus, they are hardened for Interference)

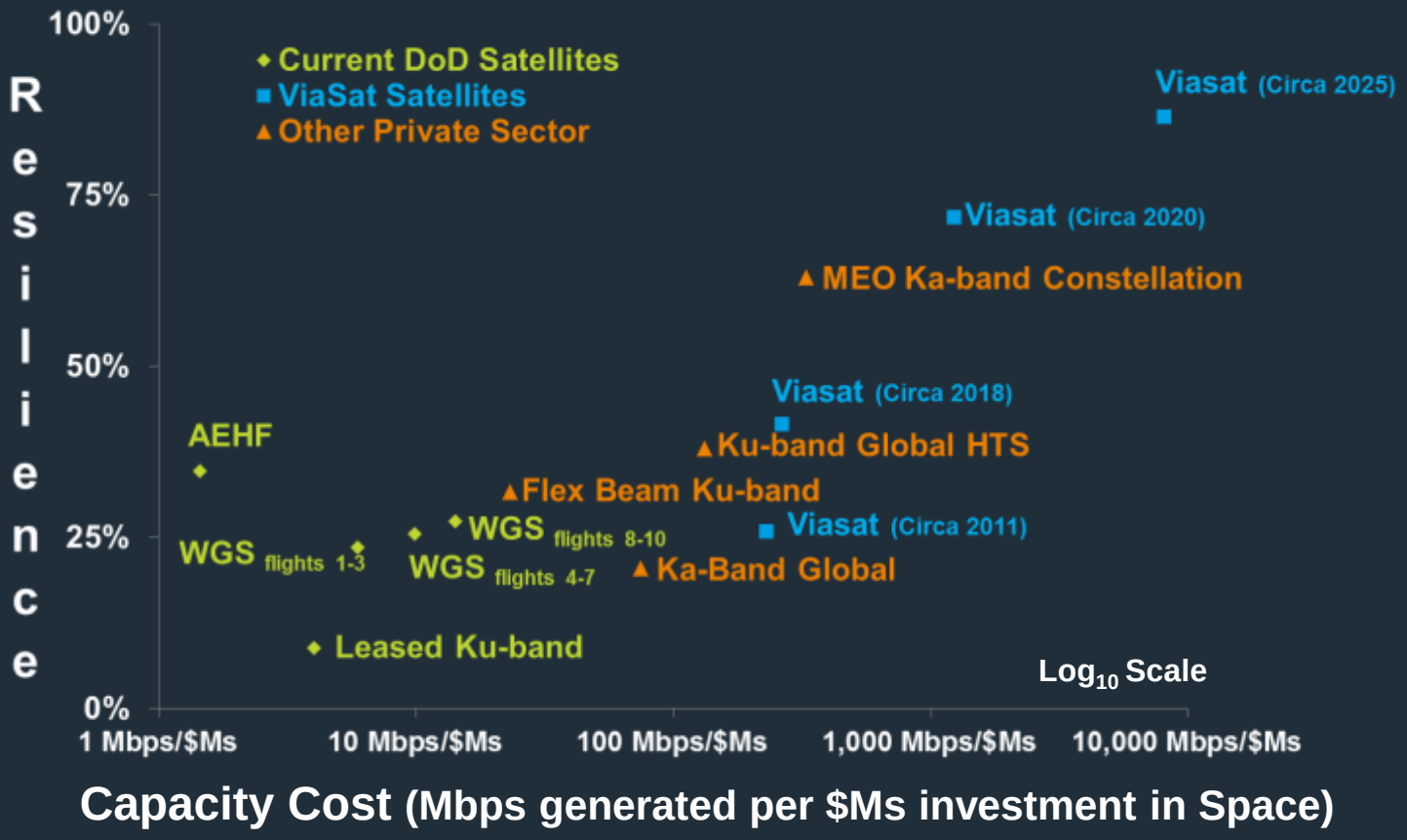
Viasat

Viasat's AoA – Resilience and Affordability Assessment

Current DoD & Private Sector Satcom Systems

Resilience Score:

- Beam Roll-off distance to -30dB
- Nulling/Processing Rejection
- Bandwidth Rejection
- GPS Independence
- Cyber Defense
- Immunity to Monitoring
- Kinetic (Multi-path)
- LPI/LPD modes
- Scintillation modes
- High Density Deployments
- Emitter Geolocation
- Protection against future threats



Layering dramatically increases Resilience & Deterrence

Resilience improvements in the European Theater

Hybrid Network (Circa 2018)	Network Resilience Score
European Ka-band HCS	26%
Ka-band Global HCS	20%
WGS (8-9)	27%
Overall Hybrid Network Resilience	56.97%

Hybrid Network (Circa 2022)	Network Resilience Score
AEHF	35%
Ka-band Global HCS	20%
WGS (8-9)	27%
ViaSat-3 Constellation	86%
MEO Ka-band Constellation	63%
Overall Hybrid Network Resilience	94.71%

Achieves immediate Resilience & Deterrence improvements with Legacy & without costly investments in New Systems

Viasat's AoA Recommendation - Deter Aggression and Warfighting in Space/Cyber* by Leveraging DoD & Commercial Layers

Enhance Deterrence with each new layer:

- Imposes significant new cost on Targeting & Developing effective attack vectors in all Satcom Network Domains
- Reduces likelihood of successful attack (including A/J, PNT denied environments, Cyber attacks, Kinetic-Space/Ground, Teleport Exploitation, Scintillation, etc.)
- Informs the market (and Adversary) of their use

Eliminate Adversary Effects & Serve Growing Wideband Demand

Notional Army Exercise Circa 2022

WGS-2 & 3 KASAT Inmarsat GX Intelsat EPIC^{NG} SES Network O3b ViaSat-3

Viasat

* US STRATCOM Commander Gen. Hyten: http://secure.afa.org/events/Conference/2017/recordings/Wednesday-340-COCOM.asp

3 Major shifts in Satcom Market create Opportunity to:

Improve Performance, Resilience, Deterrence, & Affordability

1. Adversaries are preparing to deny Satcom (purpose-built and commercial)
2. Commercial Satcom Service Providers now employ Data or Broadband Satellite Networks (Internet Broadband Constellations for Commercial Air, Maritime, Business Enterprise & Gov't/Military customers)
   - Order-of-Magnitude better Performance (throughput)
   - With Protected Satcom Capabilities – Limited Jamming effects to under 25nm & Scintillation effects to the localized area.
   - Order-of-Magnitude better Affordability
3. Multiple Global Satcom Data Services are Operational Today & more are in Deployment
   - Today: Inmarsat GX, Intelsat EPIC, SES Networks, EchoStar, Viasat
   - New Entrants: OneWeb, LeoSat, TeleSat, SpaceX, etc.

Army can now layer Satcom Services for:
Higher Performance, Enhanced Protected Satcom, & Increased Deterrence