Space and Missile Systems Center

Over-the-Air Distribution (OTAD) Update

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Informational Briefing

- OTAD Overview
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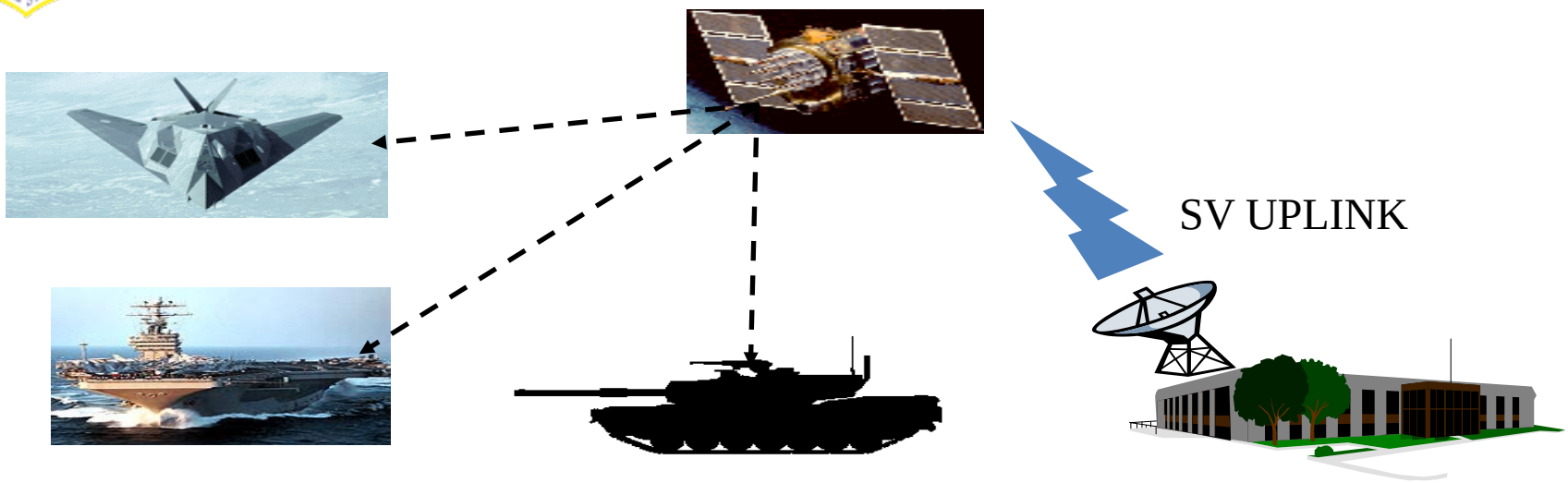
OTAD Overview



- OTAD/OTAR are alternative methods of key distribution
  - OTAD Next black key sent to user via the GPS navigation message
  - OTAR Superset of OTAD key sent via the navigation message
- Receiver must be on and have a good daily key
- If receiver is off or out of keys user obtains next key from COMSEC custodian

Not all SAASM users can benefit from OTAD/OTAR

OTAR/OTAD Background

- Many users rely on OTAD for distribution of cryptokeys
  - DAGR S/W update released to take full advantage of OTAD and mission constellation operations
  - 4+ years of successful US OTAD broadcasts

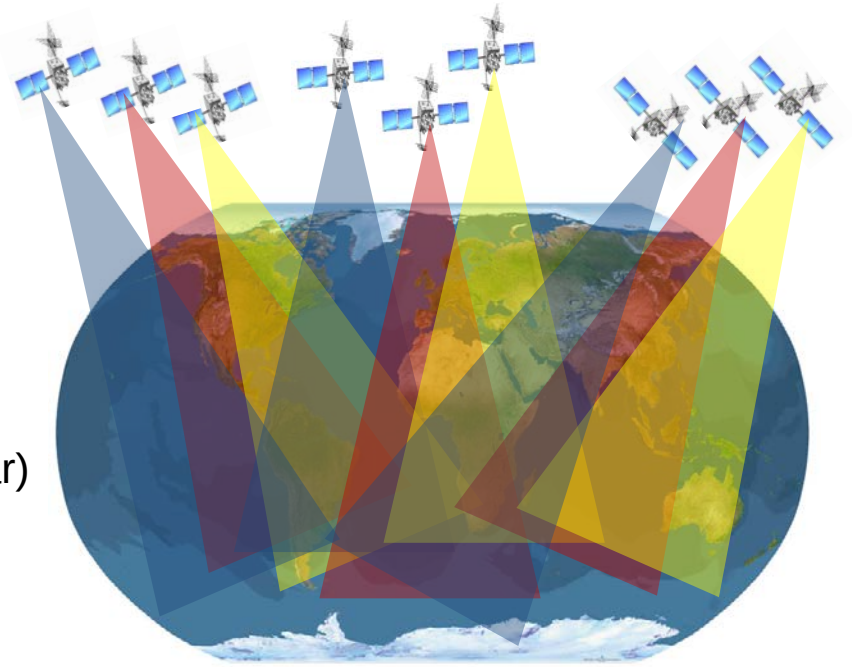
- Mission constellations allow simultaneous broadcast of multiple OTAD messages
  - The SAASM Mission Planning System (SMPS) at the JSpOC performs constellation optimization and assigns OTAR/OTAD keys to be broadcast from each SV

Benefits of OTAD

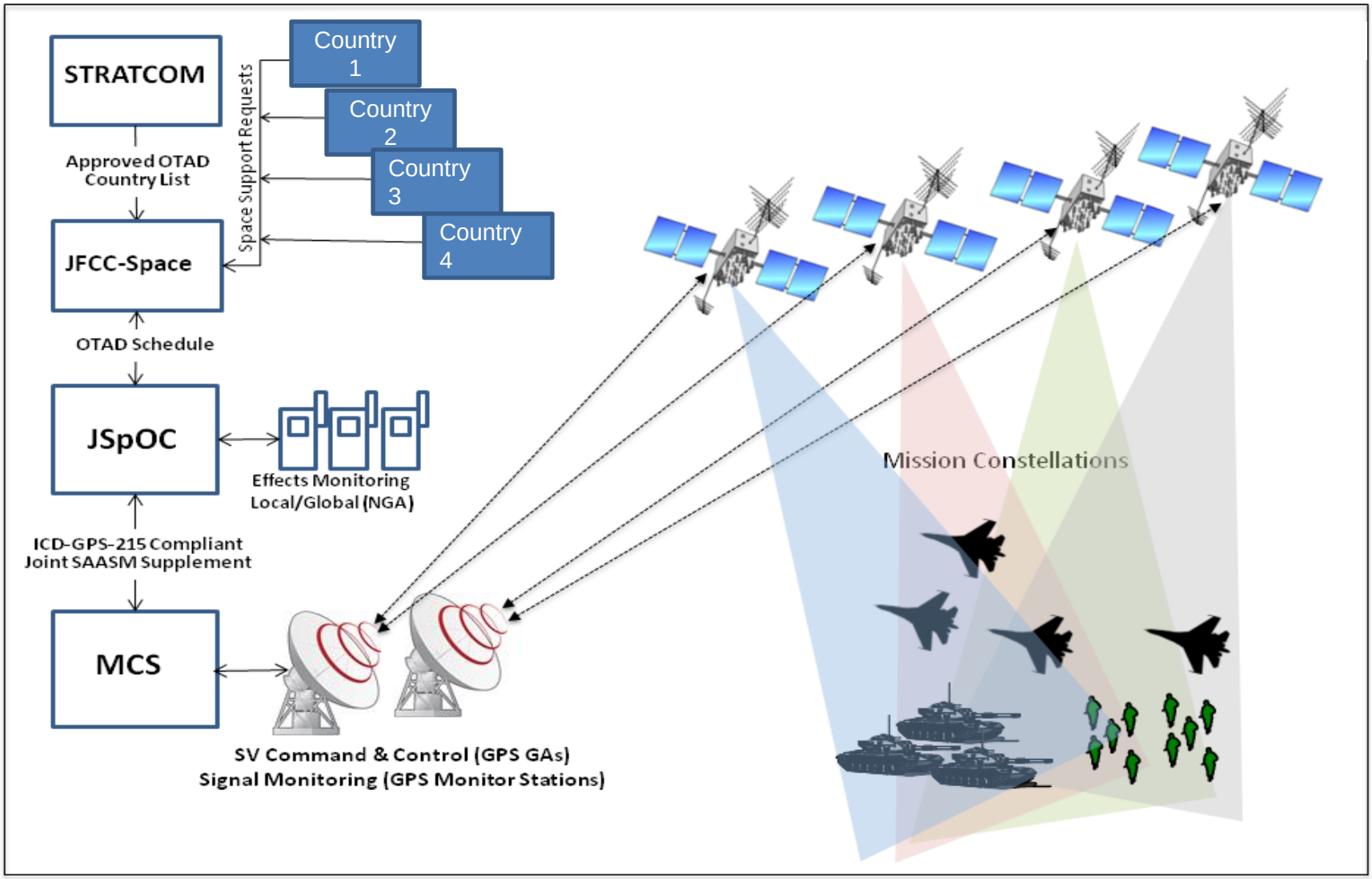
- SAASM-enabled Over-The-Air cryptokey distribution provides a means to keep users keyed and protected
  - Receivers are significantly more resilient to attack when they are keyed and operating with the PPS
  - More reliable cryptography distribution for GPS PPS to coalition warfighters
  - Decreased COMSEC maintenance burden on coalition warfighters
    - Re-key time decreased to 12.5 minutes once a month with no need for paper tape, COMSEC storage, or physical touch
  - Mission constellations enables system to support US and Allied users simultaneously

OTAD/R Events

- 2005 - 4 phases of OTAR testing
- 2009 - Transition Exercises 4 and 5 (Oct-Dec)
  - (Test Key) OTAR/OTAD capabilities were tested
- 2010 - Transition Exercise 7 (Oct-Nov)
  - On-orbit OTAD broadcast of a coalition key on all SVs for approximately 28 days
- 2011 - Start of on-orbit operational US OTAD broadcasts on all SVs continuously (Mar - present)
- 2011 - Multi-Service Operational Test & Eval (Aug)
- 2012 - AEP v5.8 deployed (Jun)
- 2013 - On-Orbit Mission Constellation Test (Feb-Mar)
- 2014 - Allied OTAD Demo
- 2014 - Block II EP IOC (Oct)
- 2015 - Allied Operational OTAD Broadcasts
- 2015 - SMPS version 5a install at JSpOC (Nov)



OTAD Demonstration Overview



Notional OTAD Broadcast Schedule

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Mission Constellation 1 US OTAD	Country 1	Country 1	Country 1	Country 1	Country 1	Country 1	Country 1
Mission Constellation 2 Allied OTAD	Coalition		Country 2	Coalition		Country 2	Coalition
Mission Constellation 3 Allied OTAD	Coalition		Coalition	Coalition		Coalition	Coalition
Mission Constellation 4 OTAR Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved

Keys broadcast to multiple users worldwide simultaneously

Summary

- OTAD ensures warfighter remains keyed and protected
  - More secure and flexible cryptography
  - Reduced crypto key management burden
  - Receivers more resilient to attack
  - Mission constellations enables GPS to support US and Allied users simultaneously