Space and Missile Systems Center

GPS Control Segment

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Chief, GPS Control Segment Division
29 Apr 15
### GPS Control Segment

**Report Documentation Page**

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<td>Air Force Space Command, Space and Missile Systems Center, GPS Control Segment Division, Los Angeles AFB, El Segundo, CA, 90245</td>
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<td>Presented at the GPS Partnership Council 2015 (GPSPC15), held April 29 to May 1, 2015, at the Los Angeles AFB, CA.</td>
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*Standard Form 298 (Rev. 8-98)*

Prescribed by ANSI Std Z39-18
Agenda

- Next Generation Operational Control System (OCX)
- Contingency Operations
OCX Overview

- Master/Alternate Control Stations
  - Launch and Checkout System (LCS)
    - Launch and Checkout of GPS IIIs
    - Command & Control (C2) for GPS IIIs in launch / checkout
  - Mission Planning & Scheduling
  - Mission Situational Awareness
  - Constellation & Satellite C2
  - Position, Navigation, and Timing
  - Integrity & Continuity Assurance

- Global Monitoring Station Network
  - 17 globally dispersed sites
  - Monitor quality of broadcast signals and provide input to navigation solution

- Legacy Ground Antennas (LGAs)
  - 4 globally dispersed sites
  - Support data links and signals between the ground and space vehicles

- GPS System Simulator (GSYS)
  - Test driver and anomaly resolution

Acronyms:
- AFSCN: Air Force Satellite Control Network
- DMZ: De-militarized Zone
- DSAS: Data Storage and Analysis System
- FAA: Federal Aviation Administration
- GCC: GPS Control Center
- GFE: Government Furnished equipment
- GIS: Global Information Grid
- GPS: Global Positioning System
- HANU: High Accuracy Navigation User
- I/F: Interface
- ICADS: Integration & Correlation display system
- ICADS-NDS: Mission
- LCS: Master Control Station
- Mgmt: Management
- NDS: Nuclear Detection System
- P2P: Point-to-point
- SAFB: Schriever Air Force Base
- UHF: Ultra-High Frequency
- USCG: U.S. Coast Guard
- VAFB: Vandenberg Air Force Base
- WAN: Wide-area Network
Block 0 Accomplishment/Status

- Block 0 (Launch & Checkout System, LCS) Baseline Integrated, Jun 2014
- LCS Launch Exercise 4, Oct 2014
- LCS Configuration Item Qualification Test Procedures (126) First Dry Run, Dec 2014
- LCS Consent to Ship, Apr 2015
- Schriever AFB Equipment Installed, May 2015
- LCS Configuration Item Qualification Test, Jul 2015
- Final LCS Hardware/Software Sell-off, Nov 2015
- LCS Site Acceptance Test, Mar 2016
Block 1 Accomplishments/Status

- Block 1 Strategic Pause, Dec 2013
  - Root cause and corrective action identification
  - Over-Target-Baseline foundations
- Iteration 1.6 Segment Design Walkthrough, Jan 2015
  - Requirements flow-down established for all configuration Items
- Segment/Element Engineering Freeze Review, Jan 2015
  - 13-month effort to re-baseline Block 1 systems engineering
- Iteration 1.6 Preliminary Design Walkthrough, May 2015
  - Nearing completion, leads to detailed design activities
- Iteration 1.6 Critical Design Review, Jul 2015
  - Culmination of detailed design leads to code and unit test activities
- Iteration 1.7 Segment Design Walkthrough, Nov 2015
  - Establishes requirements flow-down for all configuration Items
Recent Program Activities

• Rebaselined Program:
  – Over Target Baseline (OTB), Jul 2014
  – AF Service Cost Position (SCP), Nov 2014
  – Block 0 (LCS) acceptance now May 2016
  – Block 1 (with core M-Code) Ready for Transition to Operations (RTO) in Jul 2019

• AT&L Deep Dive held with Mr Kendall, Feb 2015
  – Air Force and Raytheon detailed cost, schedule and performance assessments
  – Established Cost/Schedule Tripwires against SCP baseline
  – Implement GPS III Contingency Operations
Why Contingency Operations?

- GPS III SV01 needed operational by Sep 2019
- GPS III healthy operations dependent on delivery of OCX Block 1
  - Current control system cannot fly the GPS III
- OCX schedule puts constellation sustainment at risk
  - Jul 2019 projected OCX RTO
What is Contingency Operations?

- Provides GPS III SV command and control
- NAV capability equivalent to GPS IIF (legacy and modern signals)
  - No L1C or GPS III enhanced message types
  - No modern signal monitoring until OCX Block 1
- Includes the Nuclear Detonation Detection System (NDS)
- Requires delivery of OCX Block 0 for launch
Contingency Ops Architecture (Notional)

- L-Band NAV
- GSS
- AFSCN/GA
- Commands NAV Upload
- AFSCN/GA
- TL
- SV
- MS
- GPS III Sim TL

AEP:
- L-Band Monitoring
- Telemetry
- Mission Planning
- Command Generation
- AFSCN and GA Interfaces
- Kalman Filter
- MODNAV
- VIPR Data Compile/Format
- UGT Create Upload

(VIPR, UGT may be stand alone or code may be used in AEP)
# Contingency Ops Timeline

**SPACE AND MISSILE SYSTEMS CENTER**

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**Today**

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Contingency Ops Status & Way Ahead

- 5 Feb – Air Force decision to implement

- 15 Mar – Phase 2 Special Study RFP

- Jun 15 – Phase 2 Study Authority To Proceed (ATP)

- Jun 15 – Implementation RFP

- Jan 16 – Implementation ATP

- Apr 19 – Ready for Transition to Operations
Summary

- **OCX**: Two steps forward, one step back
- **Contingency Operations**: Full speed ahead