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GPS OCX Update

14 October 2010

System Overview

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Space Segment — IIA, IIR/IIR-M, IIF, IIIA, IIIB/C

Civil Community — ATM

User Segment

MS — GA — GA — AGA — MS

Alternate MCS

Master Control Station (MCS)

GNOC
Mission/NAVWAR Planning & Scheduling
Mission Situational Awareness

GCC
Constellation C2
NAV PNT Solution/Management
SV Bus/Payload Management
Integrity & Continuity Assurance

Advanced Control Segment (OCX)

GIG-Enabled Existing ... | FAA | USCG | JSPOC | **GIG** | GCCS | AOC | DCGS | GIG-Enabled Future ...

Service Oriented Architecture

....Provides Enhanced Capabilities

- Plan and execute NAVWAR mission
- Additional signals: L5, L1C, L2C*, M-Code
- C2 and Navigation for GPS IIA, IIR, IIR-M, IIF and IIIA
- Robust IA counters emerging cyber-threats
- Improved accuracy inherent in design
- Integrity & Continuity using FAA-Certified WAAS Algorithms
- Operator Automation

...Supports Future Capabilities

- Flexible architecture to accommodate new functional capabilities, evolving CONOPS and additional automation
- Internal SOA enables new GIG / Net Centric Interfaces
- Re-programmable M-Code Receiver
- PSICA infrastructure in Block 1 lays foundation for future integrity requirements

*New signal in Block 1

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OCX Will Modernize GPS

- **GPS control stations**
  - New Master Control Station (MCS) hardware at Schriever AFB
  - New Alternate MCS hardware at Vandenberg AFB
  - Test and training simulators
  - New advanced ground antennas
- **GPS remote sites**
  - Upgrade of existing ground antennas
  - Addition of modernized monitor station receiver element
  - Upgrade receivers for new signals
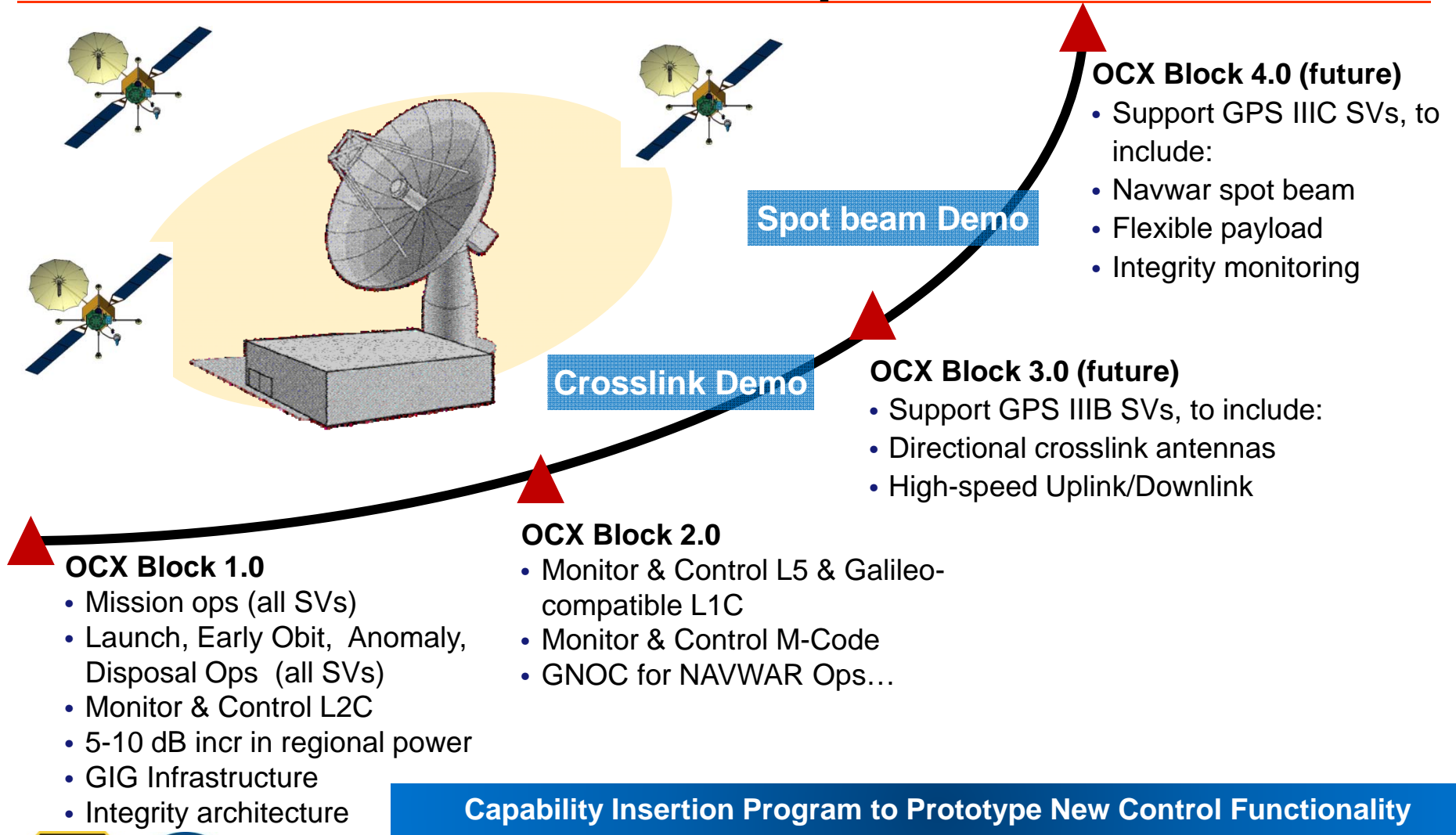- **New architecture with the following functionality**
  - Robust Information Assurance
  - TT&C and NAV for on-orbit SVs and for new SV's
  - Full modernization – SAASM, M-Code
  - New Civil signal monitor & control: L1 C/A, L1C, L2C, L5
  - Service Oriented Architecture enables net-centricity and Global Information Grid connectivity
  - Early support to Effects Based Ops: Flex Power, Over the Air Re-keying
  - Evolved GPS support to Effects Based Ops: Spot Beam, Crosslink C2
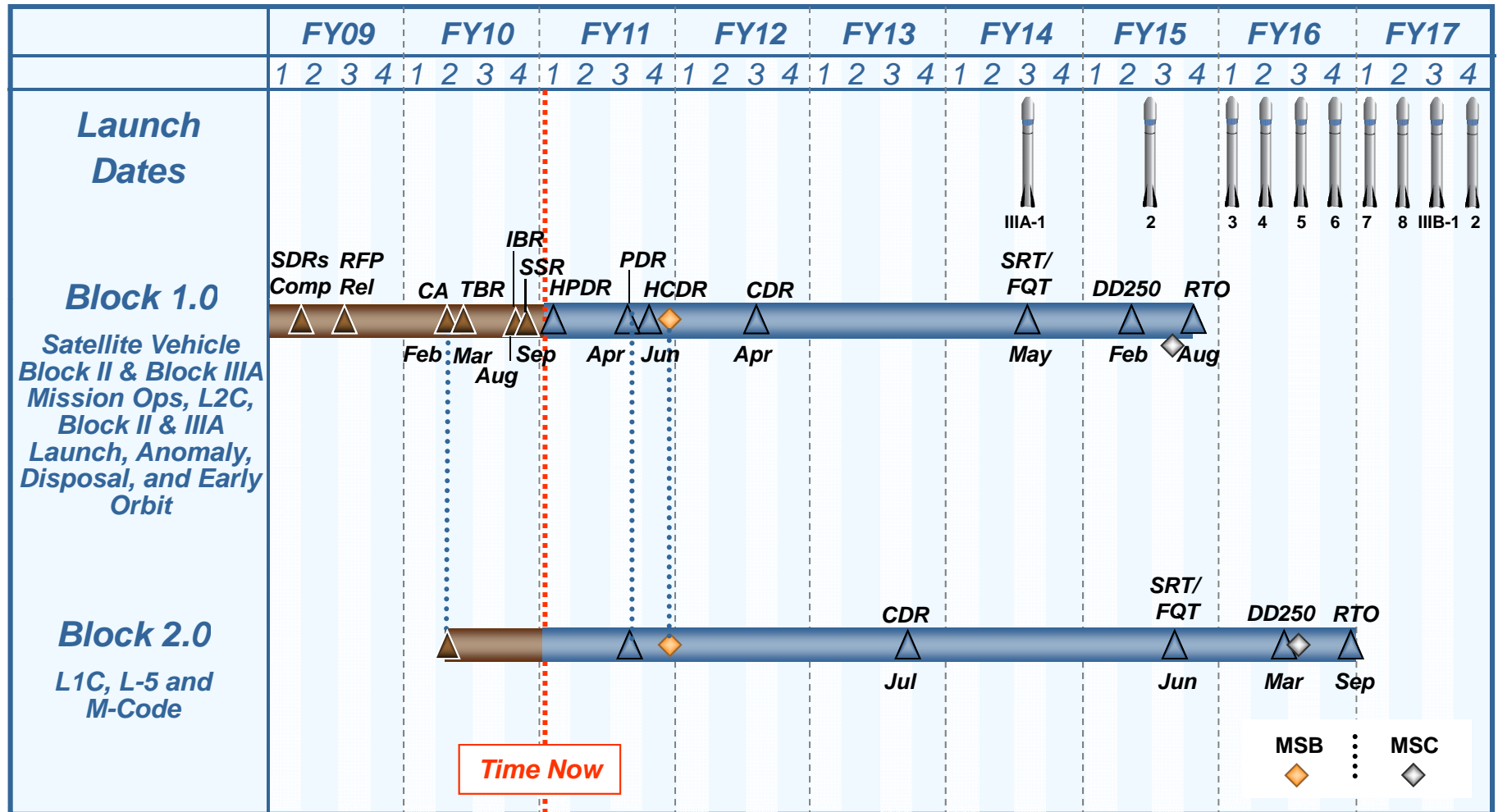
■ **OCX Blocks 1.0 and 2.0**   ■ **Future OCX Blocks**
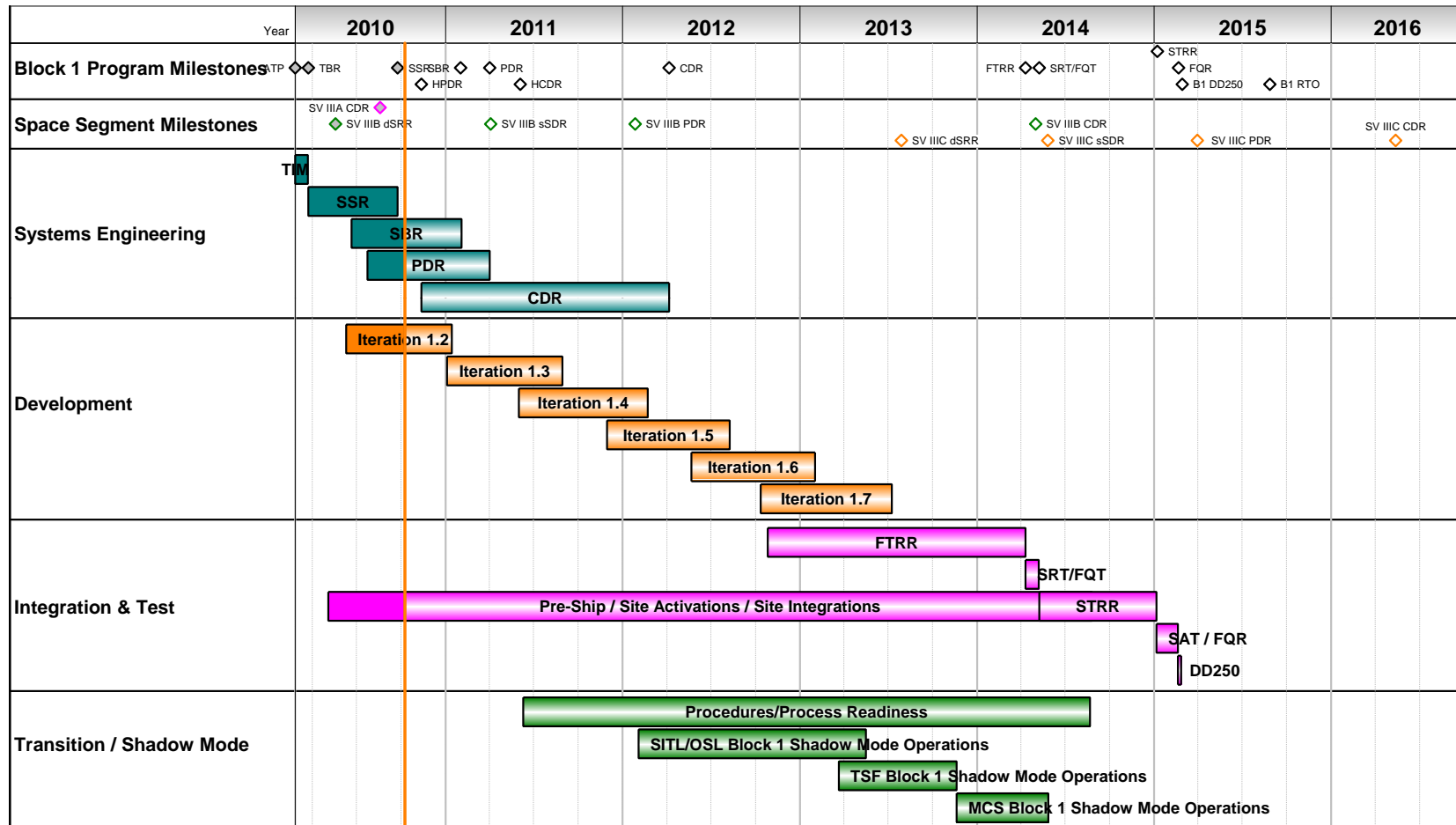
OCX Graceful Growth Path to Full CDD Requirements

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Spot beam Demo

OCX Block 4.0 (future)
- Support GPS IIIC SVs, to include:
- Navwar spot beam
- Flexible payload
- Integrity monitoring

Crosslink Demo

OCX Block 3.0 (future)
- Support GPS IIIB SVs, to include:
- Directional crosslink antennas
- High-speed Uplink/Downlink

OCX Block 2.0
- Monitor & Control L5 & Galileo-compatible L1C
- Monitor & Control M-Code
- GNOC for NAVWAR Ops…

OCX Block 1.0
- Mission ops (all SVs)
- Launch, Early Obit, Anomaly, Disposal Ops (all SVs)
- Monitor & Control L2C
- 5-10 dB incr in regional power
- GIG Infrastructure
- Integrity architecture

Capability Insertion Program to Prototype New Control Functionality

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OCX Summary Schedule

	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17
	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4

Launch Dates

IIIA-1   2   3 4 5 6   7 8 IIIB-1 2

Block 1.0

Satellite Vehicle Block II & Block IIIA Mission Ops, L2C, Block II & IIIA Launch, Anomaly, Disposal, and Early Orbit

SDRs Comp / RFP Rel / CA / TBR / IBR / SSR / HPDR / PDR / HCDR / CDR / SRT/FQT / DD250 / RTO

Feb / Mar / Aug / Sep / Apr / Jun / Apr / May / Feb / Aug

Block 2.0

L1C, L-5 and M-Code

CDR / SRT/FQT / DD250 / RTO

Jul / Jun / Mar / Sep

MSB   MSC

Time Now

GPS OCX Block 1 Summary View

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GPS OCX BLOCK 1 SUMMARY VIEW

Baseline: IBR Baseline
Status: 8 October 2010

Legend: Forecast | Program Milestone | Space Segment Milestone

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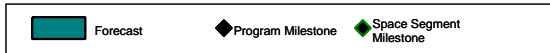
OCX Phase B Program Milestone Status

OCX Milestone	Baseline	Forecast	Actual	Status
Technical Baseline Review	**23 Mar 2010**		**23 Mar 2010**	🔵
Software Iteration 1.2 Start	**10 Jun 2010**		**10 Jun 2010**	🔵
Phase B IBR	**20 Aug 2010**		**20 Aug 2010**	🔵
Block 1 SSR	**3 Sep 2010**		**23 Sep 2010***	🔵
Block 1 HW PDR	**11 Nov 2010**	**17 Nov 2010***		🟢
Software Iteration 1.2 Complete	**14 Jan 2011**	**14 Jan 2011**		🟢
Block 1 SBR	**31 Jan 2011**	**31 Jan 2011**		🟢
Block 1 & 2 PDR	**1 Apr 2011**	**1 Apr 2011**		🟢
Block 1 HW CDR	**3 Jun 2011**	**3 Jun 2011**		🟢
Software Iteration 1.3 Complete	**29 Aug 2011**	**29 Aug 2011**		🟢

* Moved to accommodate GPSW's schedule

🔵 Complete   🟢 Forecast On Schedule   🟡 Forecast Late to Baseline, Potential Impacts   🔴 Forecast Late to Baseline, Impacts Likely

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Closing on Enterprise Integration

- Systems Integration Demonstration Plans Resynchronized
  - Successfully redefined and re-aligned the OCX/GPS IIIA demonstration plan to address the 18-month schedule gap

- OCX/GPS IIIA Requirements Baseline Established
  - Established OCX PDR baseline consistent with GPS IIIA CDR baseline
  - Successful dry run of the state vector phase 1 demonstration

- Working Site Integration and Transition Planning Upfront to Ensure Seamless Transition from AEP/LADO and each Subsequent Delivery
  - Transition requirements built into the architecture and deployment strategy
  - Completed multiple facilities site surveys and analysis
  - Created OCX-OCS ICD

- Developed GPS IIIA Launch and Checkout Approach
  - Enables early GPS IIIA launch with minimal impact to the OCX baseline
  - Significantly reduces OCX/GPS IIIA integration risk
  - Provides long term sustainment capability

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Summary

- OCX is responsive to today's system requirements while maintaining a vision and path to future system capabilities

- OCX is off to a solid start and on-track to delivery Block 1 on time

- Enterprise integration is resynchronized and requirement's baselines established

- Upfront site integration and transition planning significantly reduces the risk of backward compatibility and seamless transition