

Space and Missile Systems Center



Acquisition Strategy Next-Generation Overhead Persistent Infrared (Next-Gen OPIR) Space Block 0 Program

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Col Dennis O. Bythewood
System Program Director

Version 4



Agenda

- Strategy for a Capable, Resilient, Defendable Missile Warning Architecture
- Future Next-Gen OPIR Space and Ground Architecture
- Acquisition Strategy
- Schedule
- Funding
- FY18/19 Funding Detailed Breakout
- Contractor/Government Activities

**AF understands requirements and industry capabilities.
AF strategy will meet JROC mandate & make speed a strategic advantage**



Space as a Warfighting Domain

- **Adversaries recognize the advantage the U.S. gains from operating in space**
- **Responding by**
 - Fielding their own systems to exploit the domain
 - Holding our systems at risk to deny our ability to operate freely in a conflict
- **Strategically survivable missile warning is foundational to deterrence ... must protect and defend**
 - First alert of ballistic missile launch
 - Next-Gen OPIR key to attribution
 - Without it, USSTRATCOM would require heightened, resource-intensive posture



Our Historical Advantage is Under Threat
Requires change in mindset ... rapidly deliver capability,
continually adjust to threat, leverage enterprise capabilities

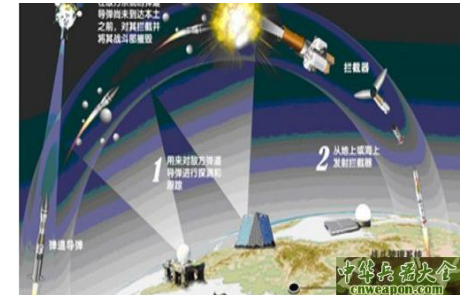


OPIR is Critical Capability

Must Protect and Operate Through

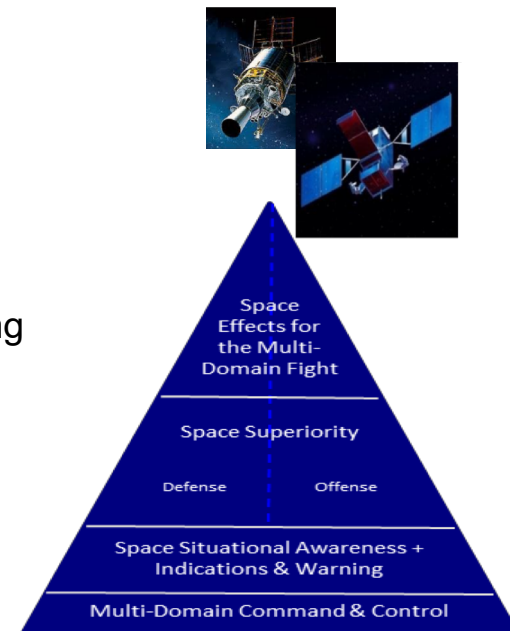
■ **Current SBIRS satellite design limits growth & resiliency**

- Current sensor design not adaptable to changing adversary threat environment
- Enterprise space defense requires satellites that can participate in their own defense
 - Maneuver, ability to host adjunct payloads critical... requires Size, Weight and Power (SWaP) margin to accommodate



■ **Modernized strategically survivable space layer sets new paradigm**

- Leverages production satellite buses (2 vendors); capitalizes on Gov't investments & establishes continuously competitive environment
- Competitively selected mission payload addresses all core Missile Warning requirements
 - As good as legacy plus SWaP/modularity needed for threat response
 - High technology readiness allows AF to simplify the mission payload
- Space Security & Defense Program analysis indicates a significant survivability improvement attainable





OPIR is Critical Capability

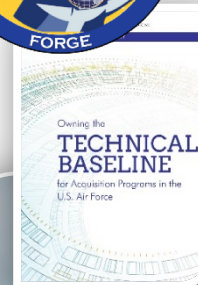
Must be Agile to the Threat

■ **Current SBIRS ground design limits growth & resiliency**

- Stove-piped solution promulgates vendor lock/reduced responsiveness to adversary threat

■ **Modernized ground sets new paradigm**

- Increased agility to meet emerging threats
 - System architecture that is modular & scalable
 - New missile warning capabilities more frequently and efficiently
- Rapid integration of new sensors
 - Sensor agnostic & extensible to other data sources
 - Common standards where applicable
- Automated satellite operations
- Competition via 3rd party applications
- Own the technical baseline





Program Requirements

Threat has Voted ... Schedule is Paramount

- **Block 0 requirement set validated by Joint Requirements Oversight Council (JROC) on 12 Dec 17, contained in JROC Memo 130-17 gave following priorities:**
 - “Schedule is paramount...Air Force shall return to JROC if the AF requests to delay the program past 2025”-- Support 1st GEO Space Vehicle initial launch capability by FY25 to meet early 2020’s threat
 - Sensor performance to counter emerging threats
 - Resiliency features to increase strategic survivability
- **Two JROC Key Performance Parameters: Missile launch detection & Survivability**
 - Peacetime probability of warning: Block 0 must accurately report launches of missiles with a range at a certain percentage by a specified time in a peacetime environment
 - Survivable/Endurable probability of warning : Block 0 must accurately report launches of missiles with a range at a certain percentage by a specified time in a trans-nuclear attack (survivable) and post-nuclear attack (endurable) environment
- **Inherent capability to augment Missile Defense, Battlespace Awareness, and Technical Intelligence mission areas**
- **Integration into Next-Gen OPIR Ground’s Future Operationally Resilient Ground Evolution Mission Data Processing & Enterprise Ground Services**
 - Off-ramp option to integrate into SBIRS Block 20 ground system

SECAF set aggressive goal for AF to deliver 1st GEO in 5 years

"As we develop these new systems, speed matters ... The next generation missile warning satellite will be a pacesetter." - Secretary of the Air Force Heather Wilson



Rapid Acq Authorities Essential

2016 NDAA Section 804

- **Middle Tier of Acquisition (Rapid Prototyping/Rapid Fielding)**
 - Rapid Prototyping: ... rapidly develop fieldable prototypes to demonstrate new capabilities and meet emerging military needs
 - Rapid Fielding: ... field production quantities of new or upgraded systems with minimal development required
- **Prototype priorities fully aligned to JROCM 130-17**
 - Speed – Threat relevant delivery
 - Capability – Mission performance against KPPs
 - Resilience – Defensible within space enterprise
- **Prototyping “mindset” aligned with JROCM direction**
 - Shortened chain of command for critical decisions
 - Small, fast-moving team with authority to make delegated decisions
 - Real-time acquisition/warfighter requirements trades
 - Rigid decision gates to control requirements/ensure focus on capability delivery
- **Focus on schedule paramount ... but not “5 years or bust”**
 - 5 years = Gold Medal
 - 7 years or less is a win

Must use Rapid Acquisition Authorities



Next-Gen OPIR Block 0 Acquisition Strategy (GEO)



- **Sole-Source Award for 3 Next-Gen GEO (NGG) Missile Warning satellites to LMS with a two-phase contracting strategy**
- **Phase 1: UCA ATP to CDR: Immediately start system design/critical path flight hardware procurement**
 - Leverage A2100TR design activities from SBIRS GEO-5/6
 - LMS-executes payload competition
 - 2 pronged strategy; highly incentivize spiral development for “faster” delivery
 - Objective: bus/payload delivery < 4 years & ready for launch in 5 years
 - Maintain up to 2 payload vendors through delivery
 - Select 3rd space vehicle’s payload vendor based on execution performance
 - Include integration requirements and design to host resilience payloads
 - Definitize contract within 6 months of qualified proposal
- **Phase 2: Release RFP post-NGG Preliminary Design Review; award mod to LMS for final build, assembly integration and test, and launch support**
 - Integration of secondary/resiliency payloads



Next-Gen OPIR Block 0 Acquisition Strategy (Polar)

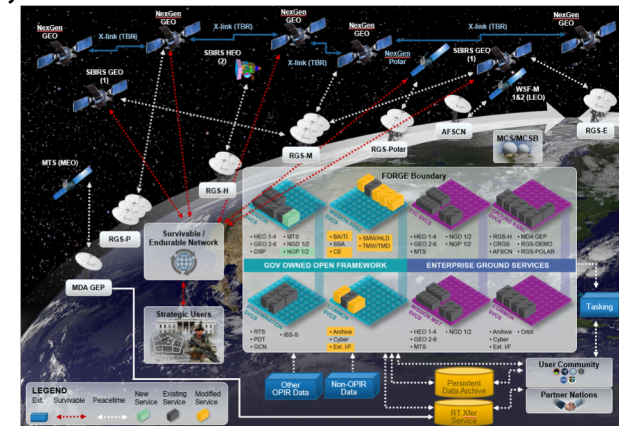
- **Sole-Source Award for 2 Next-Gen Polar (NGP) missile warning satellites to NGAS with a three-phase contracting strategy**
 - **Gov't assesses Molniya as optimal Polar orbit for cost and performance effectiveness and reduced programmatic risks**
 - **Phase 0: UCA for initial requirements study**
 - Leverages previous Eagle-3 designs
 - Requirements definition to meet System Requirements Review
 - **Phase 1: Complete design for production work from ATP to CDR**
 - Procurement of critical path flight hardware items to reduce schedule risks
 - Mature the designs for survivability modifications of Eagle-3 bus
 - Integration requirements and design to host secondary/resiliency payloads
 - **Phase 2: Build, integrate/test, launch, and transition to operations 2 fully integrated Next-Gen Polar SVs**
 - Integration of secondary/resiliency payloads





Next-Gen OPIR Block 0 Acquisition Strategy (Ground)

- **Government acts as “general contractor”**
 - Responsible for overall system delivery
 - Utilizes subject matter experts (government team or studies) to perform initial systems engineering
 - Utilizes other Gov organizations to ensure successful delivery
- **Multiple contacting strategy (FY18-19)**
 - Competitive and sole-source across activities
 - Utilization of OTAs for rapid prototyping, competition, and access to non-traditional industry partners
 - Kick-off mission processing framework prototype and down-select
 - Kick-off mission application and software architecture
 - Maximum utilization of existing contacts
 - Field initial SBIRS C2 on Enterprise Ground Services

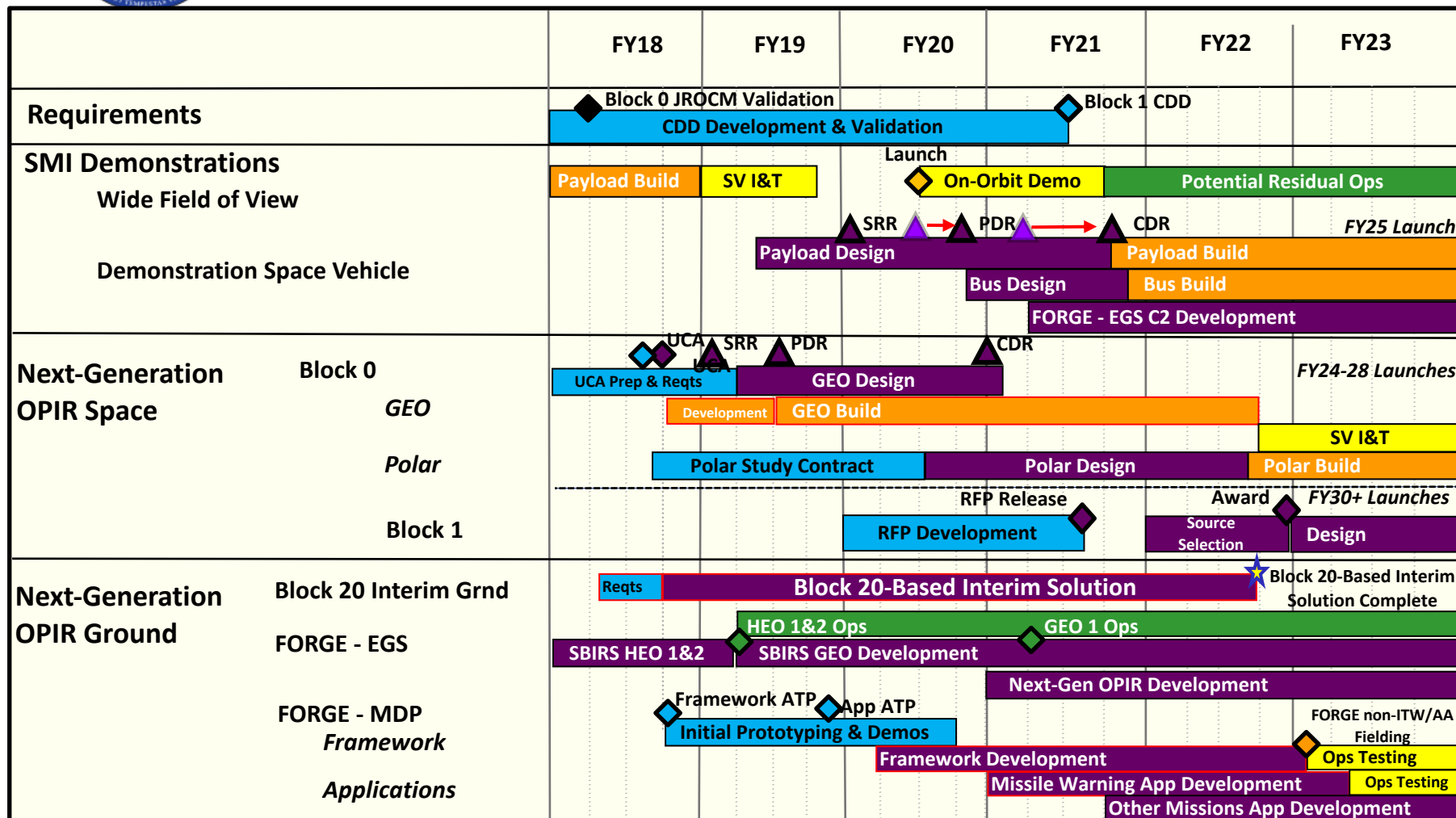




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Next-Gen OPIR

SECAF 5-Yr Goal Schedule



Concept activities
 Design / development
 Integration / test
 Production / fielding
 Operations / sustainment
 Key events

ATP: Authority to Proceed
 CDR: Critical Design Review
 PDR: Preliminary Design Review
 RFP: Request for Proposal
 SRR: System Requirements Review
 SV I&T: Space Vehicle Integration & Test

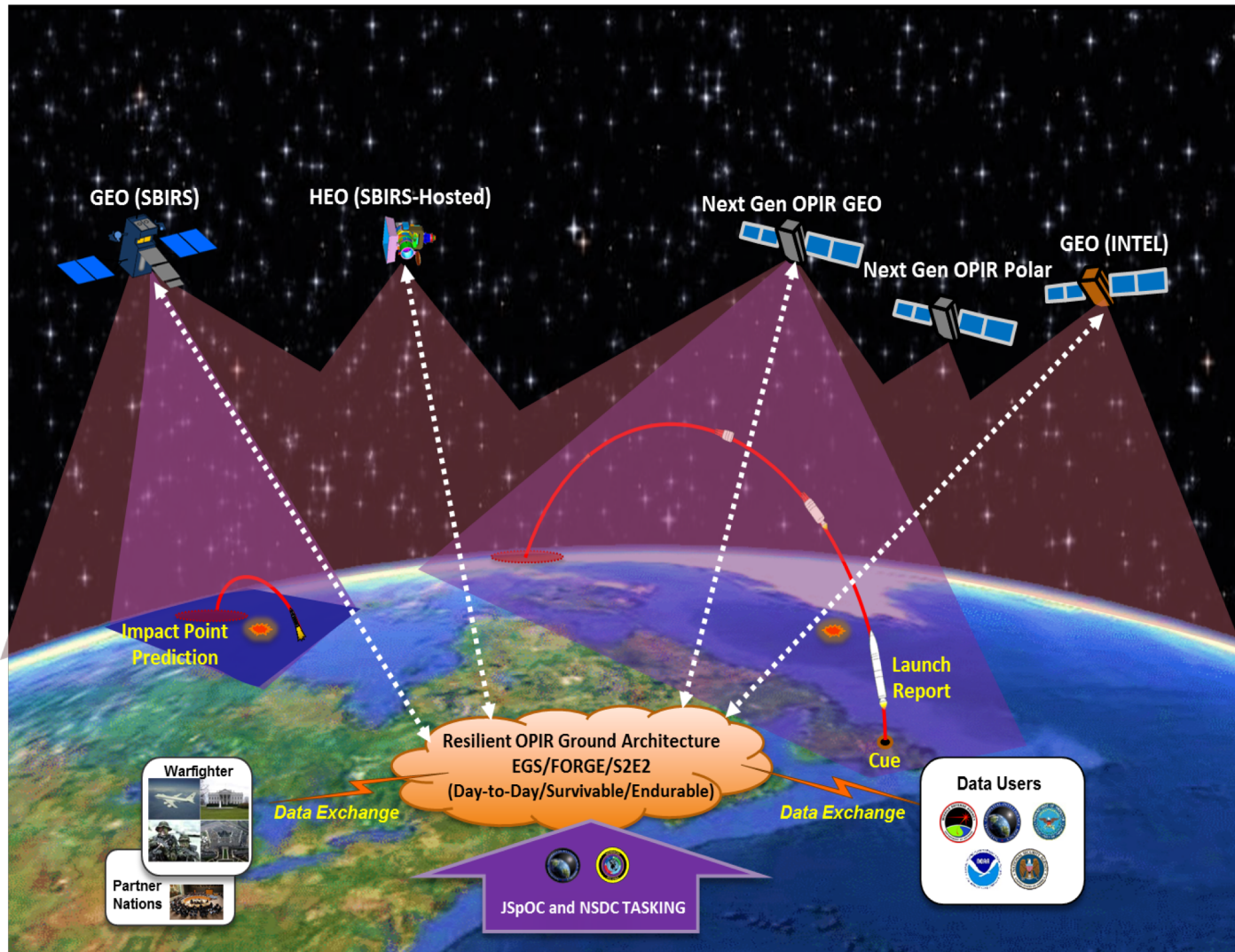
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Next-Gen OPIR Architecture

Capable, Resilient, Defensible



Next-Gen Polar free-flyer satellites

- High-latitude coverage

Next-Gen GEO satellites

- Mid-latitude global coverage

Future Operationally Resilient Ground Evolution (FORGE)

- Modular, open framework ground modernization effort for mission data processing and Command and Control

Relay Ground Stations (RGS)

- Relay downlinked satellite data; Europe and Pacific locations

Mobile Ground System (MGS)

- USSTRATCOM survivable/endurable requirements with SBIRS Survivable Endurable Evolution (S2E2)

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Funding Requirements

Requirement	FY18	FY19	FY20	FY21	FY22	FY23	FY24	Total
Product Development	634.9	1004.9	1266.1	1644.1	1880.9	1938.7	2127.6	10497.2
Space	428.7	568.3	794.2	921.5	1112.1	1332.9	1542.7	6700.4
Block 0 - GEO	414.0	524.7	676.4	599.4	694.4	584.9	454.5	3948.2
Block 0 - Polar	9.0	32.4	89.7	266.6	333.2	499.6	498.8	1729.4
Block 1 - GEO	0.0	0.0	0.0	0.0	0.0	166.6	513.3	679.8
CGR, SBIR, CC Cont Withhold	5.7	11.2	28.1	55.5	84.6	81.8	76.1	343.0
Ground	60.8	233.0	230.1	464.6	505.5	313.3	279.5	2087.0
SMI	127.1	171.4	179.2	186.3	180.6	200.6	216.8	1262.1
Technical Mission Analysis	11.9	8.9	30.7	29.2	36.2	33.9	28.8	179.6
SE&I	6.4	19.2	28.3	38.8	42.8	44.2	45.5	225.2
Product Support	0.0	4.1	3.5	3.6	3.7	13.8	14.2	43.0
Management Services	36.1	38.3	77.4	99.6	120.8	115.9	109.2	597.2
FFRDC	9.7	5.3	20.3	18.4	25.6	24.1	20.9	124.4
A&AS	11.6	18.4	29.3	38.8	43.2	43.6	44.9	229.8
Other Support	14.8	14.6	27.8	42.4	51.9	48.3	43.3	243.0
Total Requirement	671.0	1043.3	1343.5	1743.6	2001.7	2054.7	2236.7	11094.4
FY19 PB	327.0	643.3	911.5	1493.1	2257.8	2014.8	1843.9	9491.4
Delta	(344.0)	(400.0)	(432.0)	(250.5)	256.1	(39.9)	(392.8)	(1,603.1)

Downselect to one Payload Vendor at CDR – best mitigates payload detailed design risk, does not mitigate assembly, integration and test risk

Balances payload risk mitigation vs outyear funding spikes

Delivers 3 resilient satellites on orbit by FY28



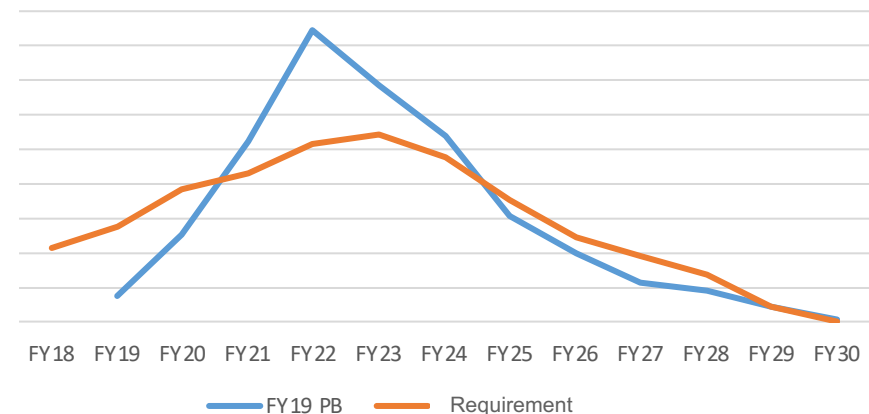
NEXT GEN BLOCK 0 GEO & POLAR

FY18 ATR JUSTIFICATION

Strategy Meets JROCM requirements—IJC25

- Both GEO and Polar Contracts in place (13 August)
- FY18 (\$344M) & FY19 (\$400M) Above Threshold Reprogramming fills gap in early funding
 - Begins critical path development/parts buys
 - Lowers program risk
 - Reduces inefficient funding spike in FY19 PB

Funding Profile Comparison (Block 0 GEO & Polar)





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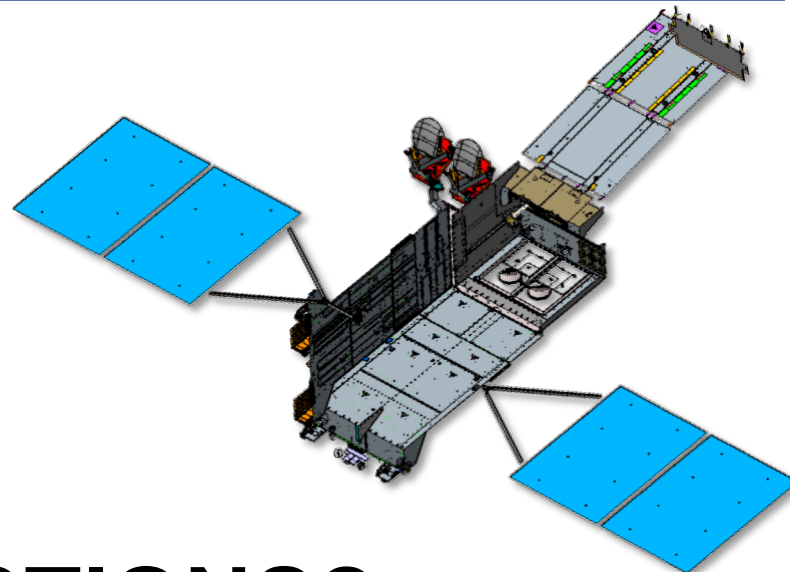
NGG contractor cost breakout

FY18/19 By Quarter

\$M	4QFY18	1QFY19	2QFY19	3QFY19	4QFY19
Mission Payload Materials & Labor 50-60%	<ul style="list-style-type: none"> - Award 2 Payload subcontracts - Start 2 Focal Plane Development - Requirements development for Optical/Mechanical/Electrical - Prepare for Long Lead Parts & Subcontractor awards - Analysis activity for Nov 18 Next Gen GEO (NGG) Systems Requirements Review (SRR) - Mission Payload onboard processing architecture study (includes long lead parts for signal chain demo) 	<ul style="list-style-type: none"> - Engineering Development Unit (EDU) material procurement - Initiate Procurement of long lead (focal plane, ROICs, cryo cooler, electronics & mechanisms to include motor drive electronic design, LOSC design, CDH design, Beryllium procurement, pointing and control assembly design work) - Engineering to Payload SRR - Start Preliminary design activity - Mission Signal Chain testbed development (x2) 	<ul style="list-style-type: none"> - Continue Preliminary design and start preparations for Payload Preliminary Design Review (PDR) - Pointing/Control Assembly design, EDU development - Mirror design/development - Electronics - Payload PDR (vendor A & B) - Fabricate EDU Focal Plane Wafers - Procure EDU parts/materials - Design & Develop Payload STE 	<ul style="list-style-type: none"> - Perform preliminary design for lower level components - EDU build and test EDU Focal Plane Assembly - Fabricate Opto-mech EDU parts - Assemble electronic EDUs 	<ul style="list-style-type: none"> - Perform detail design and analysis for flight CDR - Test EDU Focal Planes - Assemble Opto-mech EDU - Test electronics EDUs - Analyze estimated payload performance
Space Vehicle Labor 10-15%	<ul style="list-style-type: none"> - Requirements definition and SV analysis for Nov 18 NGG SRR - Evaluate Auxiliary Payloads & Integration - SV subsystem redesign initiation to accommodate resiliency rqmts (prop tank, comm subsystem, C&DH, FSW, GNC, Structures) 	<ul style="list-style-type: none"> - Design activity for new RF Boxes, Electronics (ASIC development) payload interfaces, Propulsion, Electrical systems integrations, Software Design requirements, Engineering through low level SV PDRs - Complete communication architecture design trades 	<ul style="list-style-type: none"> - Design activity for new RF Boxes, payload interfaces, Propulsion, Electrical systems integrations, Software Design requirements, Engineering through low level SV PDRs - Hold SV PDR - Develop STE for SV to Payload interface 	<ul style="list-style-type: none"> - Perform detail design and analysis leading upto component to support completion of EDUs - Fabricate and assemble EDUs and coupons - Support for subcontracts and procurements 	<ul style="list-style-type: none"> - Generate first iteration of analysis products to support upcoming CDRs - Test EDUs and Coupons - Support for subcontracts and procurements
SEPM/Ground Labor 10-15%	<ul style="list-style-type: none"> - Requirement analysis support to OPIR Enterprise SRR (Sep 18) - Requirements definition and mission analysis for Nov 18 NGG System SRR - Architectural and concept design studies (communications architecture, Crypto, cybersecurity, TT&C for aux payloads) 	<ul style="list-style-type: none"> - Engineering activity to development/modify CONOPS, Interface development, Integration and test planning, Cyber Assessment, Resiliency incorporation, and other specialty engineering through low level PDRs - Hold NGG System SRR and flow requirements for major subsystem 	<ul style="list-style-type: none"> - Engineering activity to development/modify CONOPS, Interface development, Integration and test planning - Cyber Assessment, Resiliency incorporation, and other specialty engineering through low level PDRs - Design Next Gen Interim Operations (NIO) ground system through CDR - Begin design of mission performance simulators 		
Bus Subcontracts, Parts & Materials 10-20%	<ul style="list-style-type: none"> - Initiation of subcontracts for COMSEC-TRANSEC processor, High Rate Transmitter (new design for NGG), Payload Data Formatter & GPS receiver 	<ul style="list-style-type: none"> - Incremental funding for initial subcontracts - Initiation of subcontracts for on-board computer, Guidance Navigation & Control components, 25lbs hydrazine biprop engines 	<ul style="list-style-type: none"> - Initiation of subcontracts for other Propulsion hardware, solar array & mechanisms - Other Bus subcontracts as required to meet the schedule 	<ul style="list-style-type: none"> - Subsystem PDRs - Incremental funding for parts/materials subcontracts 	<ul style="list-style-type: none"> - Subsystem PDRs - Incremental funding for parts/materials subcontracts

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Government estimates Contractor Estimates in work—Estimated Aug 18
Estimates are cost—OGCs and fee not included



QUESTIONS?

