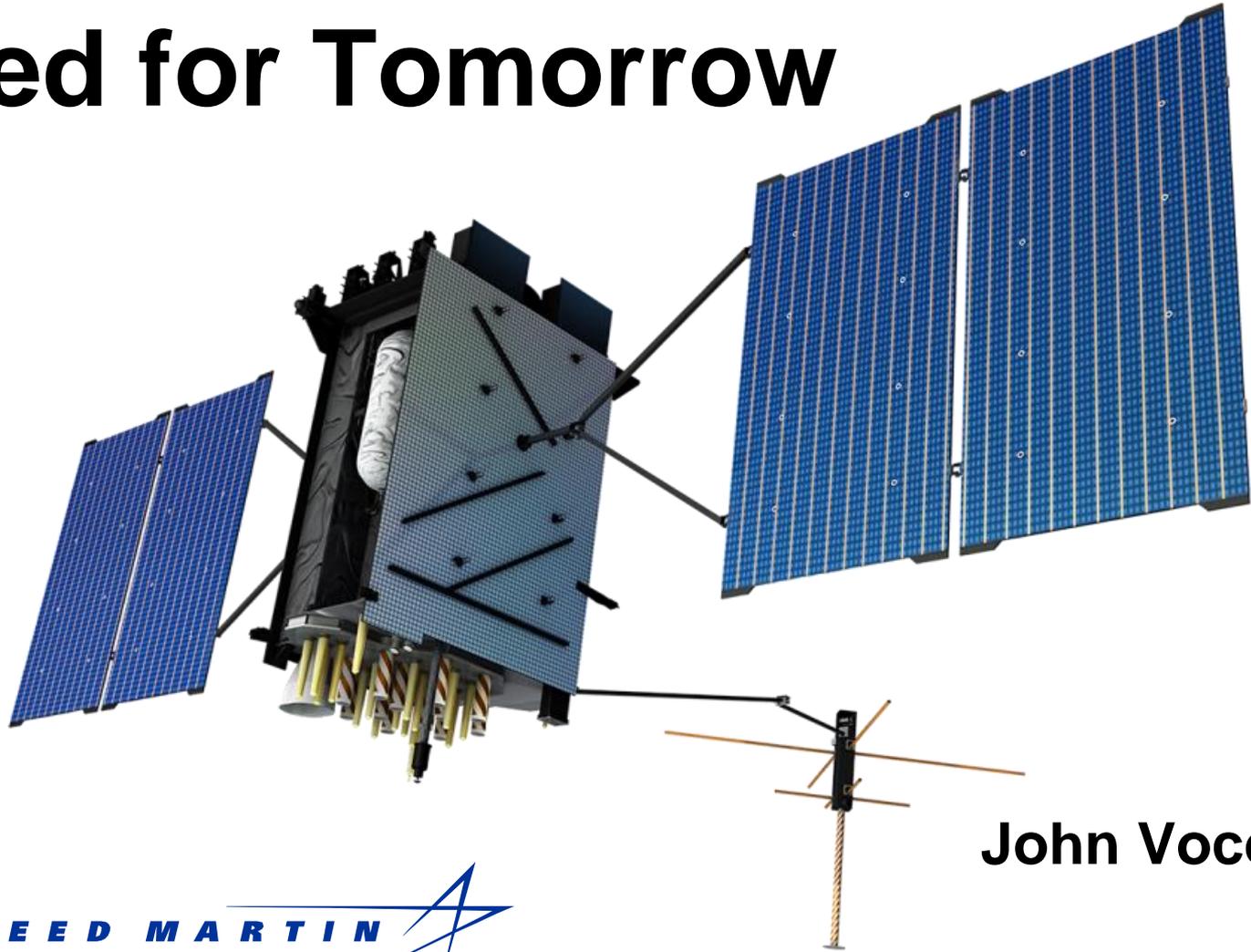


# GPS III Poised for Tomorrow



**John Voce**



**7<sup>th</sup> December 2016**

# GPS III - Ready for New Capabilities



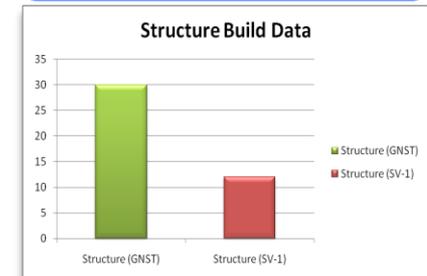
## SV11+ requirements baseline

- Inserts new payloads and capability
  - Regional Military Protection
  - Re-designed Nuclear Detonation Detection System
  - Search and Rescue payload
  - Laser Retro-Reflector Array

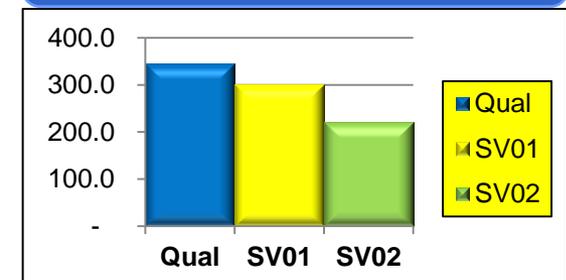
## SV11+ builds on Air Force's rigorous GPS III acquisition

- Strong Systems Engineering process, discipline and tools
  - Requirements flow-down, mission thread approach
- Comprehensive Mission Assurance standards
  - Technical Operating Requirements (TOR) and MIL-STD design reviews
- Low Risk Capability Insertion
- Simulators, pathfinders, and 'flight-like' engineering development units
  - Significant learning curve, reduced issues observed

Structure Build Non-Conformances:  
60% Reduction  
GNST → SV01



Avionics Design/Build/Test Labor Hours/Unit:  
36% Reduction  
Qualification → SV02



# Upgraded Navigation Payload



## **SV11 upgrades SV01-10 Mission Data Unit (MDU) for full digital benefits**

- Current payload is already 75% digital
- Full digitization for improved manufacturability and affordability
- Digital waveform generators offer superior GPS signal performance

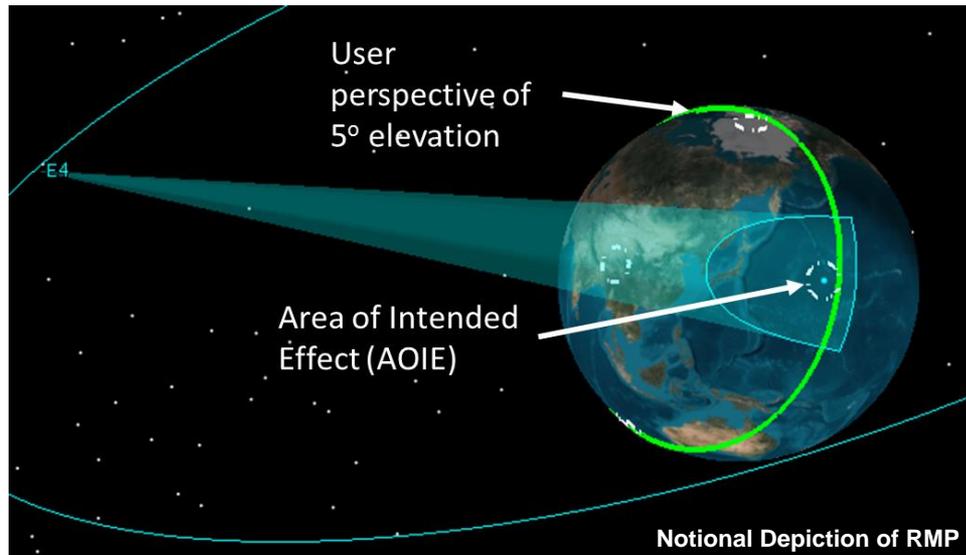
## **SV11 incorporates high-efficiency, high-power transmitters**

- New Linearized Traveling Wave Tube Amplifiers (LTWTAs)
- More efficient to generate needed SV11+ power



# Regional Military Protection (RMP)

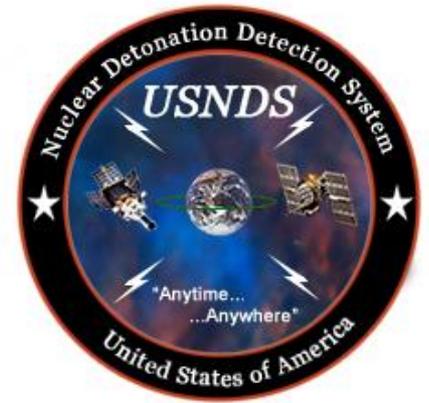
- **SV11 RMP design ready to fulfill pending Capability Development Document (CDD) update**
- **RMP offers the required steerable M-code power**
  - Covers a defined region on earth
- **SV11 RMP antenna is designed for reduced complexity and affordability**
  - Solution is stowed for launch and deployed on-orbit



# Re-designed NDS Payload



**SV11 re-design integrates updated NDS assemblies**



**SV11 NDS baseline interfaces identical to SV01-08**

**Low-risk NDS integration based on SV01-08 experience**

**GPS III fully supports improved NDS mission capabilities**



# Laser Retro-Reflector Array (LRA)



Technology enabling independent orbit determination better than 1 cm accuracy

## GPS III LRA Accommodations

- Integrate array of corner cubes that reflect low-power laser pulses off the SV
- Thermally isolated with clear field of view

## Benefits

- Compatible with GLONASS and Galileo
- Contributes to precise satellite error source identification

## Status

- PDR completed 2013
- Further review as part of SV11+ Phase 1
  - Interfaces and requirements understood

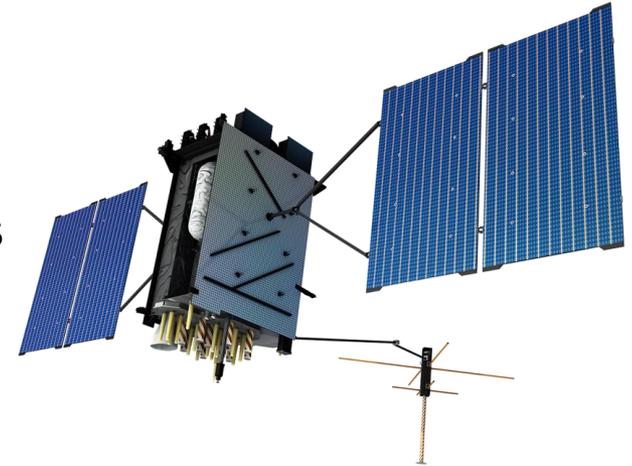


# Summary and Way Ahead



## GPS III is in full Production

- Benefitting from pathfinders, simulators, etc.
- MEO qualified, hardened to TOR requirements
- SV sized for additional SV11+ requirements



## Future requirements well understood

- SV11+ Hosted payloads through PDR in 2013
- Regional Military Protection adds further anti-jam protection