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# 2d Space Operations Squadron

The background of the slide is a composite image of five GPS satellites in orbit around Earth. The satellites are arranged in a semi-circle across the frame. Each satellite has a central body and two large, rectangular solar panel arrays extending outwards. The Earth's surface is visible below, showing blue oceans and white clouds. The text 'Home of the Global Positioning System' is overlaid on the lower half of the image.

*Home  
of the  
Global Positioning System*



# ***2nd Space Operations Squadron***

## **Mission**

**Provide combat-ready space warfighters delivering position, navigation, and timing to optimize the full range of Air Force, Joint Force and civilian operations, across all domains**

## **Vision**

**The dominant Global Navigation System provider innovating and accelerating positioning, navigation, and timing through modernization and integration**





# Who We Are

- **Largest DoD satellite system**
  - 36 satellites, 30 operational
  - Robust satellite system – IIA, IIR/IIR-M, IIF, III
- **Total Force Integration**
  - 2nd Space Operations Squadron (Active Duty)
  - 19th Space Operations Squadron (Reserve)
- **Master Control Station (MCS) utilizing dedicated ground segment:**
  - Dedicated Ground Antennas and Monitoring sites
  - Air Force Satellite Control Network (AFSCN)
  - National Geospatial Intelligence Agency (NGA)





# GPS Constellation

## IIR/R-M

### IIR

**9 Operational**  
**1 Experimental**  
**2 Residual**

### IIR-M

**7 Operational/1 in Test**

**Manufacturer: Lockheed**

**First Launch: July 1997 (IIR),  
September 2005 (IIR-M)**

**# of SVs: 20 satellites**

**Designed Life: 7.5 years**

**Dimension: 37 feet wide**

**Weight: 4,480 lbs at launch**

**Signals Added: L2C, L1M/L2M  
(M-Code)**

## IIF

**12 Operational**

**Manufacturer: Boeing**

**First Launch: May 2010**

**# of SVs: 12 satellites**

**Designed Life: 12 years**

**Dimension: 57 ½ feet wide**

**Weight: 3,400 lbs at launch**

**Signals Added: L5 Safety of  
Life, M-Code**

## III

**2 Operational**

**Manufacturer: Lockheed**

**First Launch: December 2018**

**# of SVs: 10 satellites (planned)**

**Designed Life: 15 years**

**Dimension: 17¼ feet wide**

**Weight: 4,000 lbs at launch**

**Signals Added: L1C GNSS  
Compatible, Spot Beam M-Code  
Capable**



# Where We are Going

## WARFIGHTER DEVELOPMENT

- Space Mission Force
- Culture & Trust
- Tactician...Ops + W&T
- Technician...Ops + Analyst
- PTF Relocation ETC: TBD \$6M
- GIN Simulator ETC: TBD \$9M

## WARFIGHTER COLLABORATION

- GWCC/User Operations
- Global Exercises
- Integrated Warfighting (JNWC, CCMDs, Coalition SpOCs)
- SAASM Taskings
- NAVWAR
- GPS Collaboration Node Certification



AFSPC/CC directed Jan 2017

## Innovation

- Navigation Uploads ETC: TBD
- NDS Data Dumps ETC: TBD
- ✓ Vehicle Health Checks ETC: Dec 20 \$2M
- ✓ Scheduling - CTR filled \$300K/yr
- FLEXPPOWER ETC: TBD \$690K
- SAASM TBD

Full Contact Automation

- Mission Transfers
- New Generation Vehicles
- New Capabilities
- New C2 Architecture
- Cyber Security

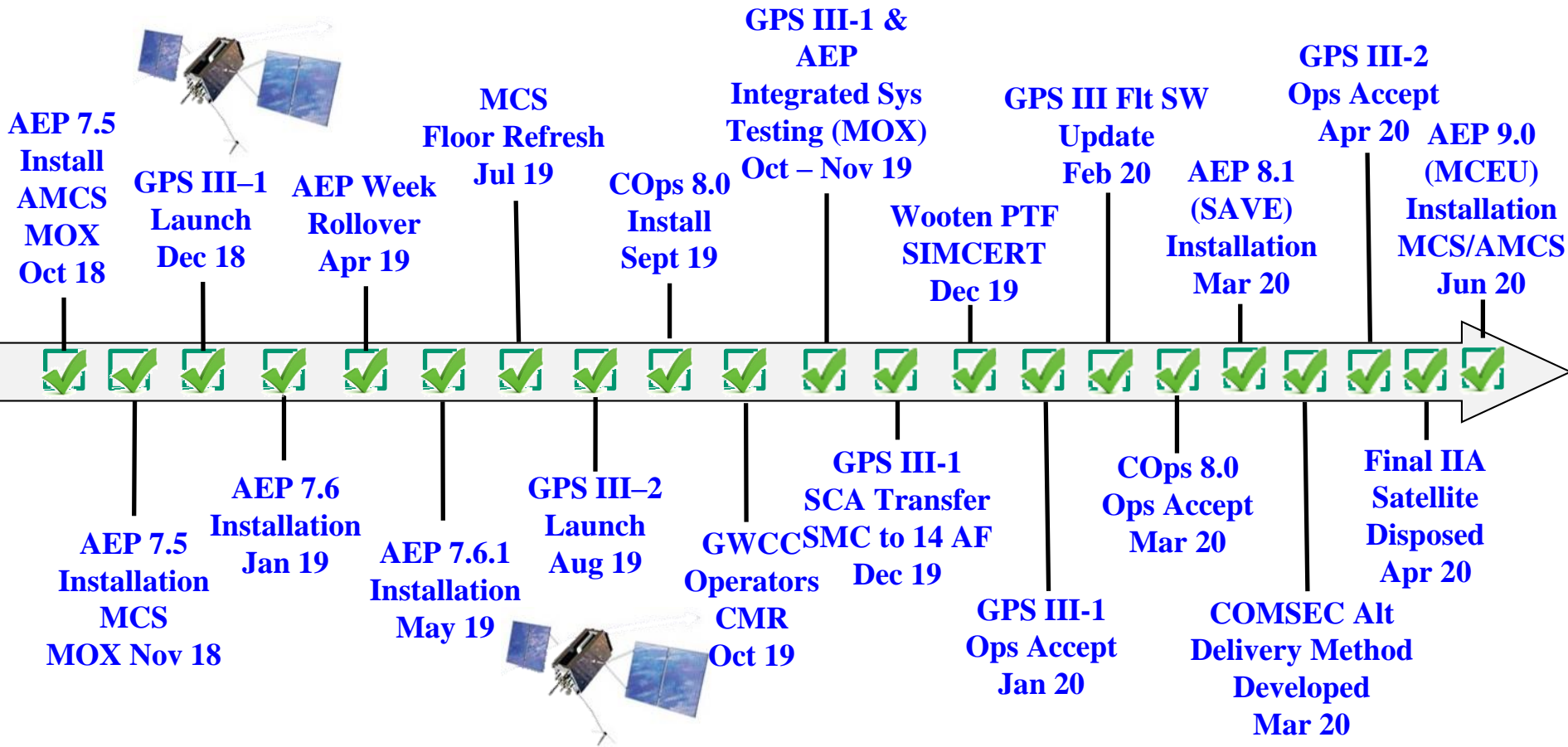
## AUTOMATION

## MODERNIZATION



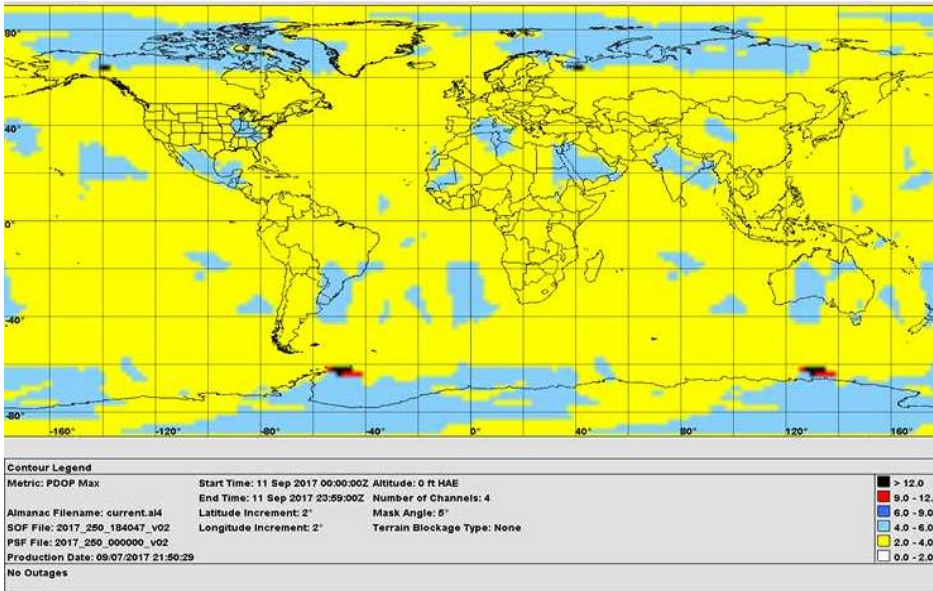
# GPS Squadron Accomplishments

- **BLUF – Busiest modernization period in GPS history and significant change in culture toward warfighting**





# Warfighter Collaboration - GWCC



- DoD's focal point for near real-time products to authorized users
- 24/7 Support
- Short-term tasking requests

## Products Delivered

- 451 Space Support Requests (SSR) for US and Coalition Forces
- 190 Requests for Anomaly Analysis (RAA) worldwide to civil and government users
- 206 Requests for Information (RFI) requiring technical GPS analysis

## Organizations Supported

- 35 Military Organizations
- 4 Main Civil Organizations

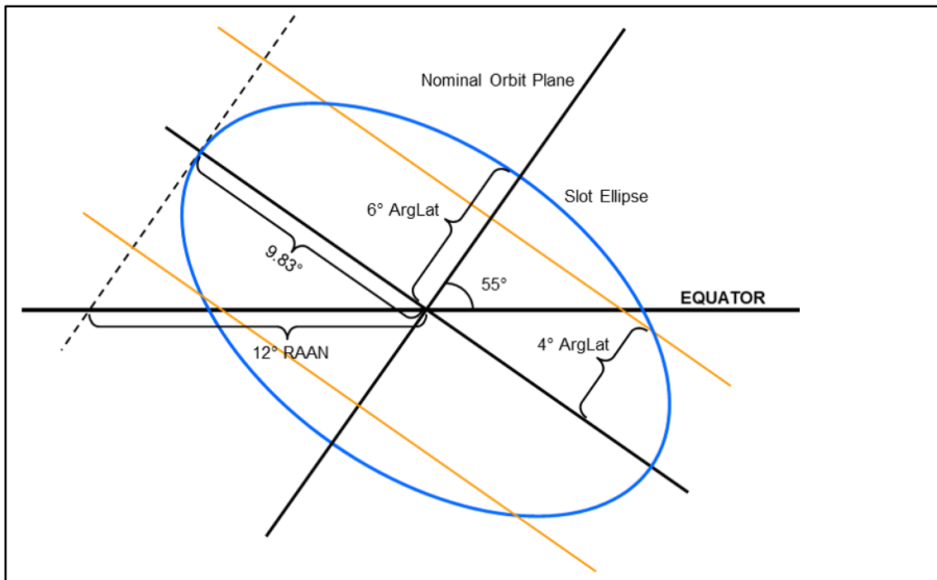
2019 – 2020 : 128,000+ products created for users



# GPS Standard Positioning Service (SPS) Performance Standard

- Updated levels of performance made available to users of the GPS Standard Positioning Service (April 2020)

## New Geographic Longitude of the Ascending Node (GLAN) tuning formula optimizes global GPS coverage



- The new formula now accounts for satellite inclination as well as RAAN drift to define a moving slot center for each GPS vehicle

$$\Delta\text{GLAN} = 0.713 \times \Delta\text{RAAN}$$

- Significant improvements in Position Dilution Of Precision (PDOP) seen worldwide





# *GPS Way Ahead*


- **GPS III-04**
  - SV04 Scheduled to Launch Sept 2020
  - Operational Oct 2020
- **AEP Contingency Operations**
  - Currently Operating in 2020
- **OCX**
  - Modernized Master Control System
  - L1C for Civilian Use



■ **3X better Accuracy ... 8X better Anti-Jam**

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# 2d Space Operations Squadron

A composite image showing five GPS satellites in orbit around Earth. The satellites are arranged in a semi-circle across the frame, each with its solar panels extended. The Earth's surface is visible below, showing blue oceans and white clouds. The background is the blackness of space.

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of the  
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