



Naval Aviation ATS Roadmap

JTEG Forum on ATE/ATS

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Introduction

- **Purpose:** To share select portions of the “Naval Aviation ATS Roadmap”
 - “Naval Aviation” encompasses US Navy and US Marine Corps aviation
- Although the focus is Naval Aviation, there are some surface and sub-surface Navy applications
- **Navy’s General ATS Strategy:**
 - Define a standard Family of ATE – the “CASS Family of Testers” (CASS FoT)
 - Rehost TPSs from the multiple legacy ATE onto the “CASS FoT”
 - TPSs from 30 legacy ATE have been rehosted to the CASS FoT
 - Design each new generation of CASS Family Member to easily “Migrate” the TPSs from an old Family Member to the new Family Member
 - US Navy is able to re-use its over \$2B investment in CASS FoT TPSs

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3 Generations of the CASS Family of Testers (FoT) (IOC dates)

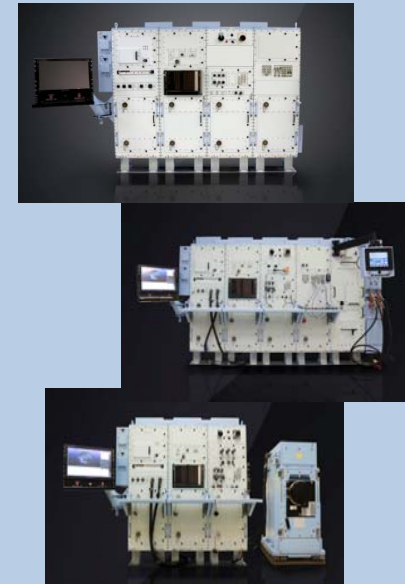
Mainframe CASS -- 1992



RTCASS -- 2008



eCASS -- 2017



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CASS FoT Operating Environments

Marine Aviation Logistics Ship



Aircraft Carriers



Assault Ships



Shore Intermediate Maint.



Depots



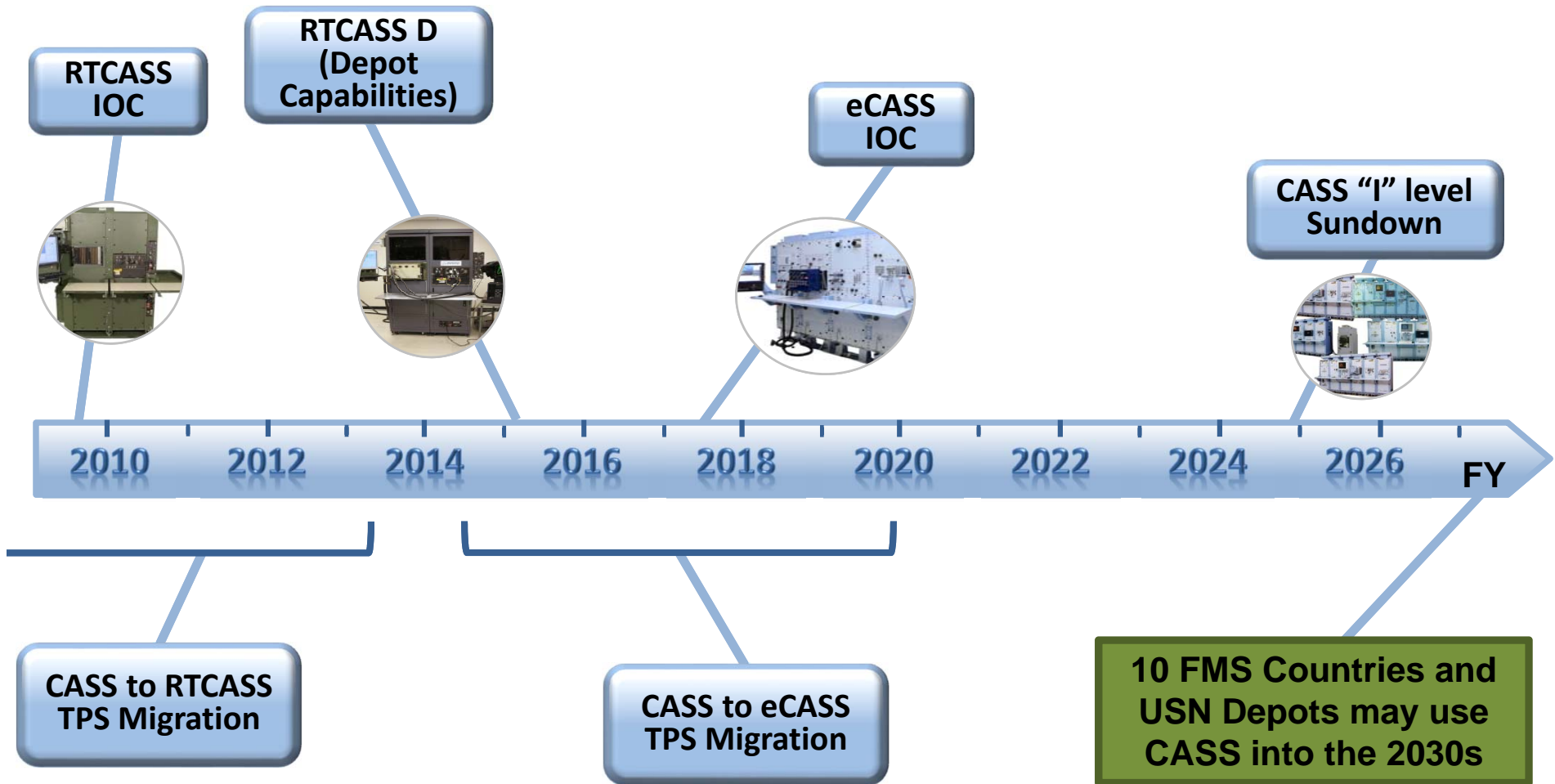
Marine Maint. Van Pads



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High Level Summary Roadmap

ATS



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CASS SUNDOWN

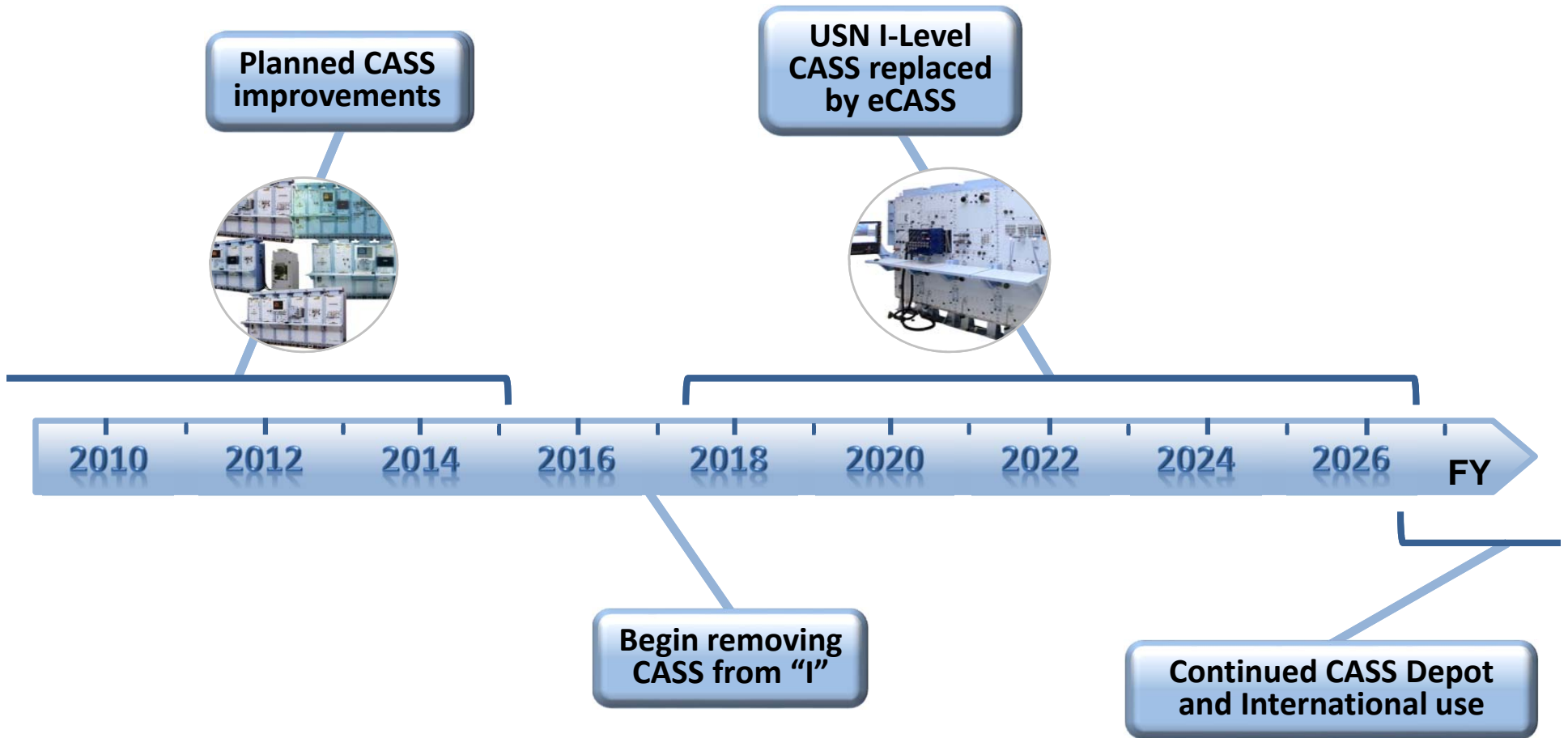
I-Level Sundown

2016 - 2026

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Mainframe CASS Sundown



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Planned Major CASS Improvement Changes



- Modernizing the CASS station's media and hard drives
 - Magneto Optical to DVD media and solid state drives
- Improving the CASS EO3 Module's reliability and calibration cycle
- Providing an alternate to the procurement obsolete Automatic Gyro/Gimbal Control System (AGCS)
- High Speed Subsystem (HSS) -- Adding an ancillary capable of addressing the emerging weapon system modern high speed buses and providing Real Time Testing leveraging FPGA technology

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RTCASS Status

RTCASS

- Computer Upgrade ECP in process (*field 2016*)
 - Improve performance while modernizing and aligning with eCASS computer
- Implementing some NxOMS functions (net-centric related functions)
 - Recently demonstrated with V-22 program
- Planning other H/W and S/W convergence with eCASS
- Modifying 10 RTCASS into a “depot variant” with a focus of providing greater circuit card test capability



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RTCASS, Depot (RTCASS-D)

RTCASS

- Targeted for depot testing of SRAs
- First Fielding Fall 2014
- Will operate all existing RTCASS TPSs



- ✓ RTCASS packaged in Commercial racks
- ✓ Enhanced analog (AI-760 added)
- ✓ Cross-point matrix that allows tester per pin technology on each digital pin
- ✓ Commercial PDU
- ✓ Enhanced digital (DI-050)
- ✓ Computer upgrade – Quad Core Win 7
- ✓ Adds National Instruments LabWindows/CVI based TPS development environment and Test Stand

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Still Making New CASS/RTCASS OTPSs

CASS

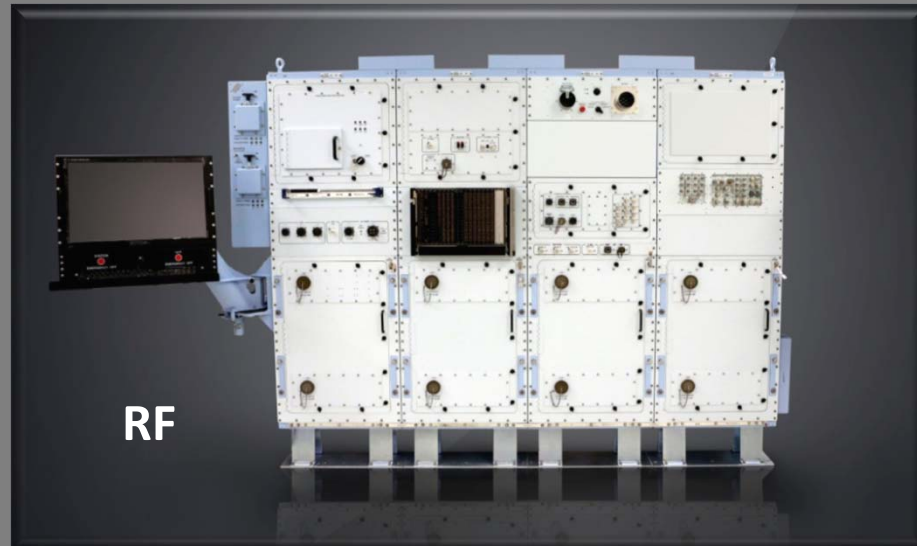
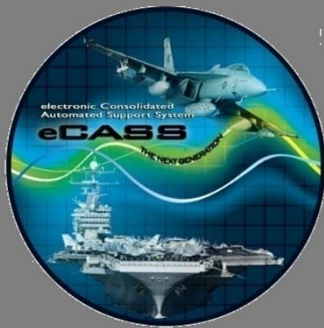
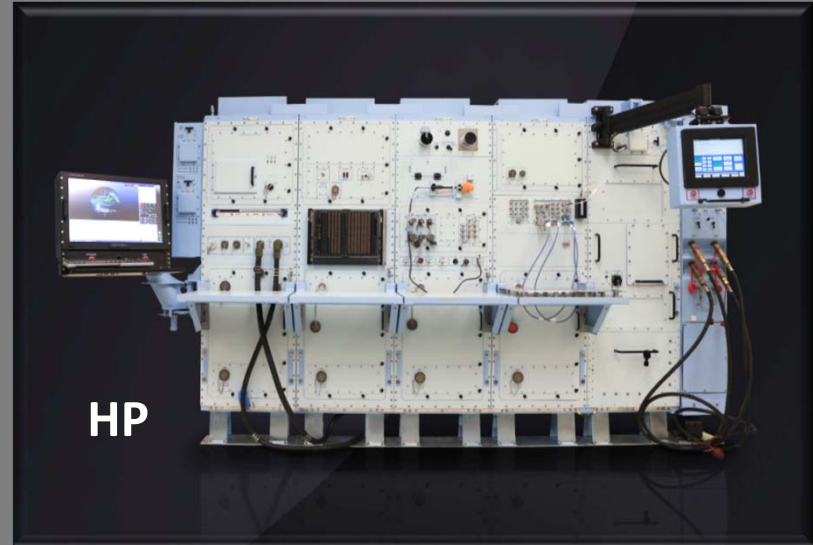
- ATS Lot 1 Offload to CASS Reliability Improvement Program
 - A complete hardware remake with improved test programs
- ALR 67v2 SRAs Offload to CASS (depot OTPS)
- H-53 AFCS Offload to CASS
- F-18 DTS Direct to CASS
- EA-18G ALQ 218 Direct to CASS
- P-8 ALQ 240, MAS, and SMS Direct to CASS
- H-60 MMR Radar, AAS-44C (FLIR), and ALFS ST/R Direct to CASS
- V-22 ABIU, NIU, WIU, RMU, DDMS, APU, ECU, IAP Direct to CASS
- H-/UH-1Y Mission Computer and HIAOC Direct to CASS
- T-45 EGI Direct to CASS
- MQ-4C Triton – In planning (may be Direct to eCASS)

F-18 International Partners Contributing

- ATS Depot OTPS Offload
- F-18 USSR and RMM
- AYK 14 Computer Offload to CASS
- F-18 Radar Altimeter (planned)

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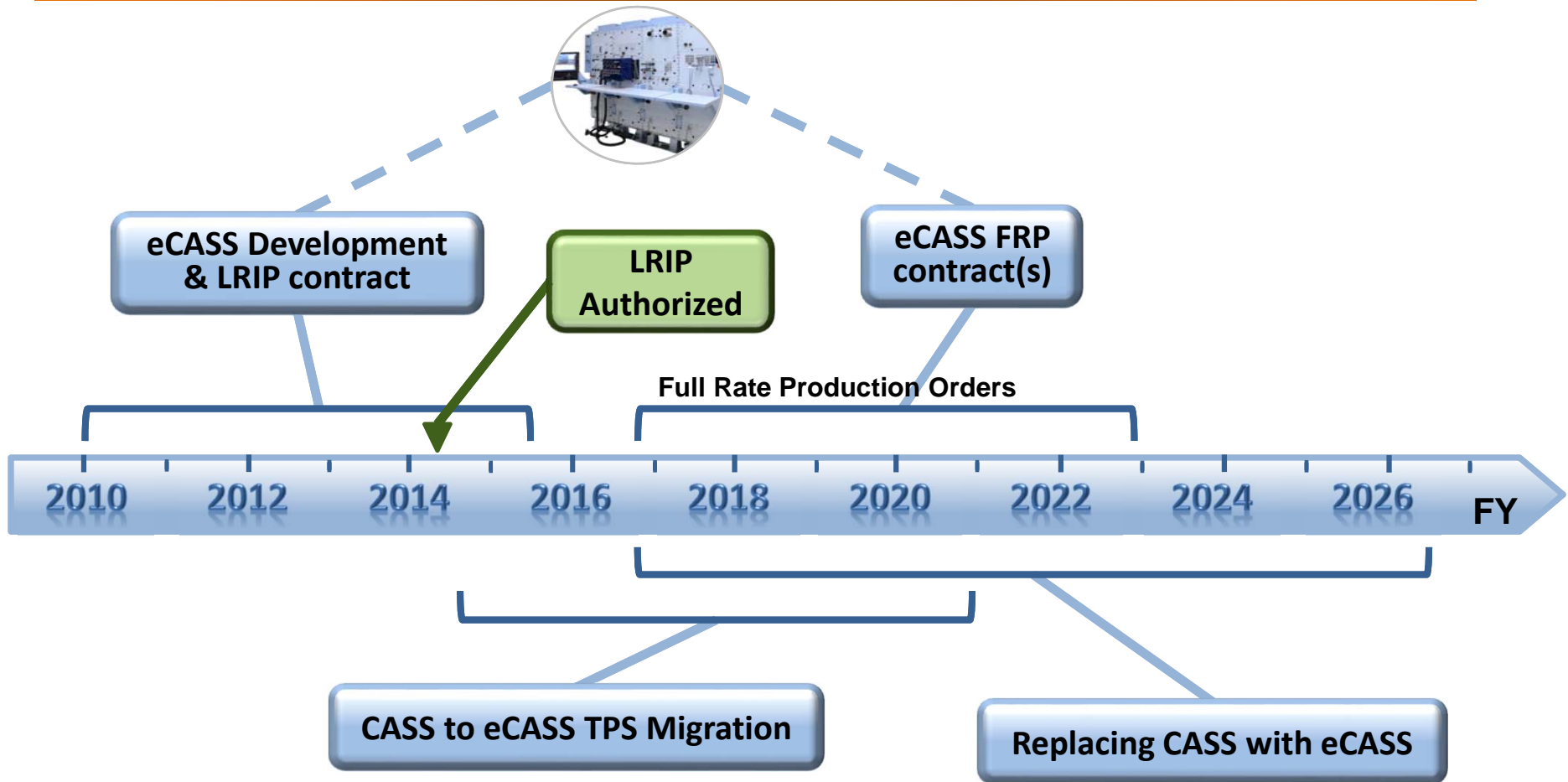
eCASS Systems



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Replacing Mainframe CASS with eCASS

eCASS



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eCASS Current Status

- In spite of all the DoD budget reductions, eCASS is doing well
- The eCASS RF Limited Rate Initial Production (LRIP) 1 and 2 Milestone Decision (MS “C”) was granted on 16 December 2013
 - LRIP 3 Decision anticipated November 2014 for eCASS EO and HP
- The next major acquisition Milestone will be the Full Rate Production decision in FY16
- 90% complete development – M-demo is a key upcoming development event
- Navy organic teams have begun the legacy CASS TPS “Migration” to eCASS
- On target for 2017 first eCASS Fleet fielding
- Originally planned to produce 338 eCASS with delivery through 2024
 - Total production eCASS quantity is increasing as new USN aircraft platforms and Foreign Military Sales requirements emerge

Some eCASS Key Features

- eCASS will reuse:
 - 550 CASS TPSs for about 1,300 aircraft UUTs
 - CASS High Power and Electro Optics module
 - CASS facilities interfaces
 - Electric
 - Air
 - Chilled water
 - Within the CASS Footprint
- Will use Ultracaps for power backup (an option)
- eCASS will include a “CASS ATLAS Test Program” environment but adds the more modern “LabWindows/CVI Test Program” environment
- eCASS and the F-35 LMSTAR are very similar systems
 - Planning a F-35 LMSTAR TPS “migration” to eCASS demonstration

eCASS Key Features

Ancillary Equipment

- eCASS will require only two Ancillary Subsystems:
 - ADTS (Air Data Test Set)
 - IDTS (Inertial Data Test Set)
- The emerging High Speed Subsystem (HSS) will likely be a third
 - May be an integral capability
- The equivalent capability for the following legacy CASS Ancillary items have all been integrated into eCASS:

- Air Flow Management (AFM) Ancillary Set
- Multi Analog Capability (MAC) Ancillary
- Universal Load Assembly (ULAS) Ancillary
- Multi Purpose Raster Stroke Display (MPSRD) Ancillary
- Automatic Gyro/Gimbal Control System (AGCS) Ancillary
- Enhanced External hard Drive (EEHD)
- Manchester Harpoon Card Ancillary
- Video Pattern Generator (VPG)

TPS Roadmap

ATS

About 2,800 CASS TPSs

- About 1,700 Re-hosted from 30 legacy ATE
- About 1,100 Direct to CASS



Direct to eCASS TPSs



1990

1995

2000

2005

2010

2015

2020

2025

2030

722 CASS TPSs "Migrated" to RTCASS



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About 550 CASS TPSs will be
"Migrated" to eCASS



Future Naval Aviation "I" ATE Family

ATE

eCASS

(Target: Ship and Shore Navy)
(14 per CV for POR Platforms)

Navy "I" – 338



- eCASS Hybrid
- eCASS RF
- eCASS HP
- eCASS EO

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Planned Support

F/A-18A-F
EA-18G
E-2D
AV-8B
V-22
H-1
H-60
C-2
H-53
T-45
Common Systems

eCASS POR

Candidates

P-8 (now participating)
UAV (now participating)
JSF (in process)
NGJ (in process)

RTCASS

(Target: Man Transportable & MMF)

Marine Air "I" - 143
Navy Depot - 10
Air Force - 9
FMS - 2



- RTCASS
- RTCASS HP
- RTCASS D

Planned CASS Family Technology Insertions

ATS

- **Improved use of net-centric functions**
 - NxOMS – Next Generation Operation Maintenance System -- Joint Services initiatives
- **Improved board level testing**
 - RTCASS D adds new test technologies
- **Electro Optic Module Replacement (2020 and beyond)**
- **Addressing high speed avionics systems buses and real time testing**
 - High Speed Subsystem (HSS) CASS Family Ancillary
- **Common Development Environment for TPSs (CDET)**
 - A standard modern Integrated Development Environment (IDE)
- **Hybrid Test Language (HTL)**
 - ATLAS like constructs but written in “C” programming language
- **H/W and S/W convergence of RTCASS, eCASS, and LMSTAR**

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CASS Family Science & Technology Projects

(S&T source)

ATS

- Electronic Root Cause Failure Analysis (219 BAR)
- Acoustic Measurement for Electronics Prognostics (219 BAR)
- Automatic Test Sequence Generator (219 BAR)
- Reactive Near Field Prober (219 TT)
- Pinless Connector (219 TT)
- V-22 Improved Support via NxOMS & Reasoning (219 TT)
- Automated Support System for the Development and Maintenance of TPSs (SBIR)
- Improved Electronics Maintenance Through Tester Prognostics (SBIR)
- Automated Test Program Set Analysis for Maintenance Data Metrics Generation (SBIR)
- Automated Generation of Advanced Test Diagrams to Reduce Test Program Set Life-Cycle Costs (SBIR)
- Formalizing Accommodation of Transitory Path Intrinsic Characteristics (SBIR)
- Real-Time Remote Electronics Test Capability (SBIR)
- Rapid SRA Test Capability for RTCASS (RIF)
 - Reactive Near-Field Prober to enhance effectiveness of electromagnetic evaluation (EME)

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- CASS Test Systems will be replaced by eCASS Test Systems by the end of 2024 at the I-Level of Maintenance
- All known Naval Aviation immediate ATE test capability or test technology needs are currently being met with formal Navy Programs Of Record
- Today's budget reality could modify or stretch out current Roadmap plans or eliminate elements altogether
- Navy will continue to leverage test technology investments with the other Services and embrace the new DoD ATS Framework interface standards as they are defined

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Thank You.

Any Questions?