

# NAS Enterprise Architecture

## Infrastructure Roadmaps Version 5.0

Aircraft—Air-Ground—Automation—Airport—Weather—  
Communication—Navigation—Surveillance—Airspace &  
Procedures—Enterprise Services—Facilities—Human  
Systems Integration—Information Systems Security—Safety

Approved

January 19, 2011



Federal Aviation  
Administration



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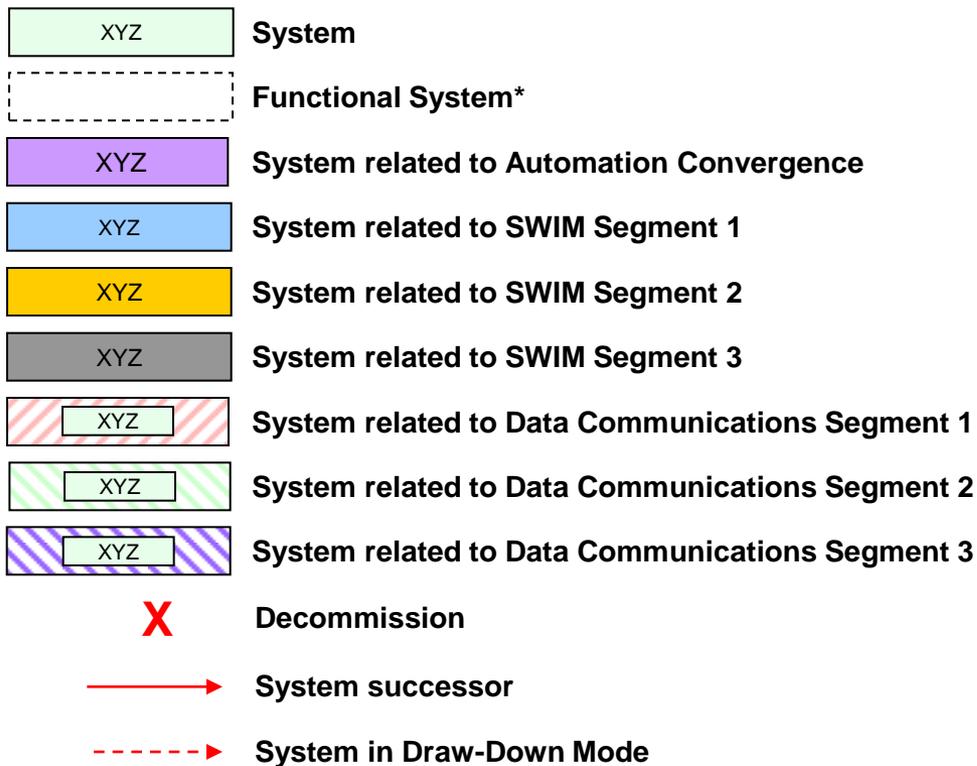
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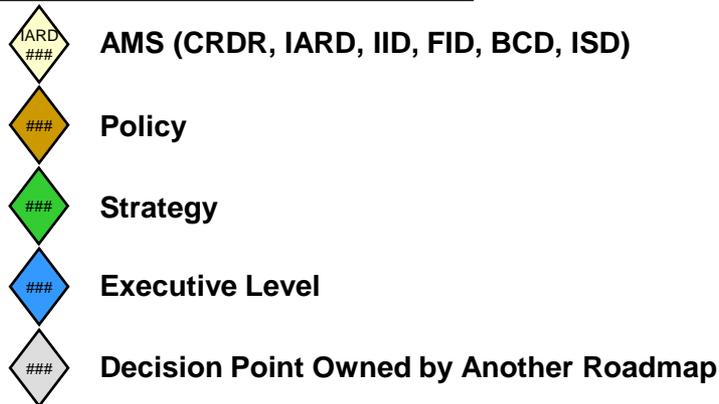
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# Infrastructure Roadmap Legend

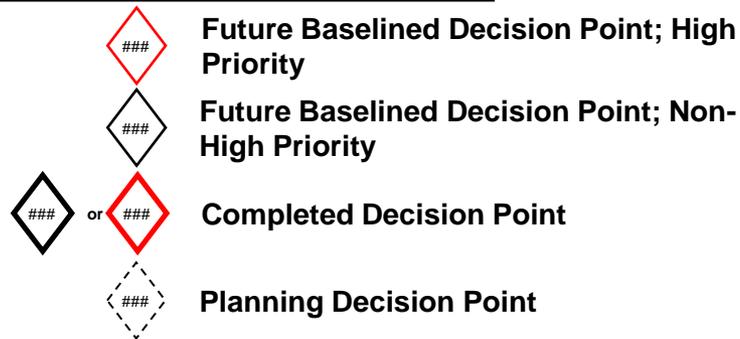
2009 2010 2011 Timeline



## Decision Point Fill Colors



## Decision Point Borders\*\*



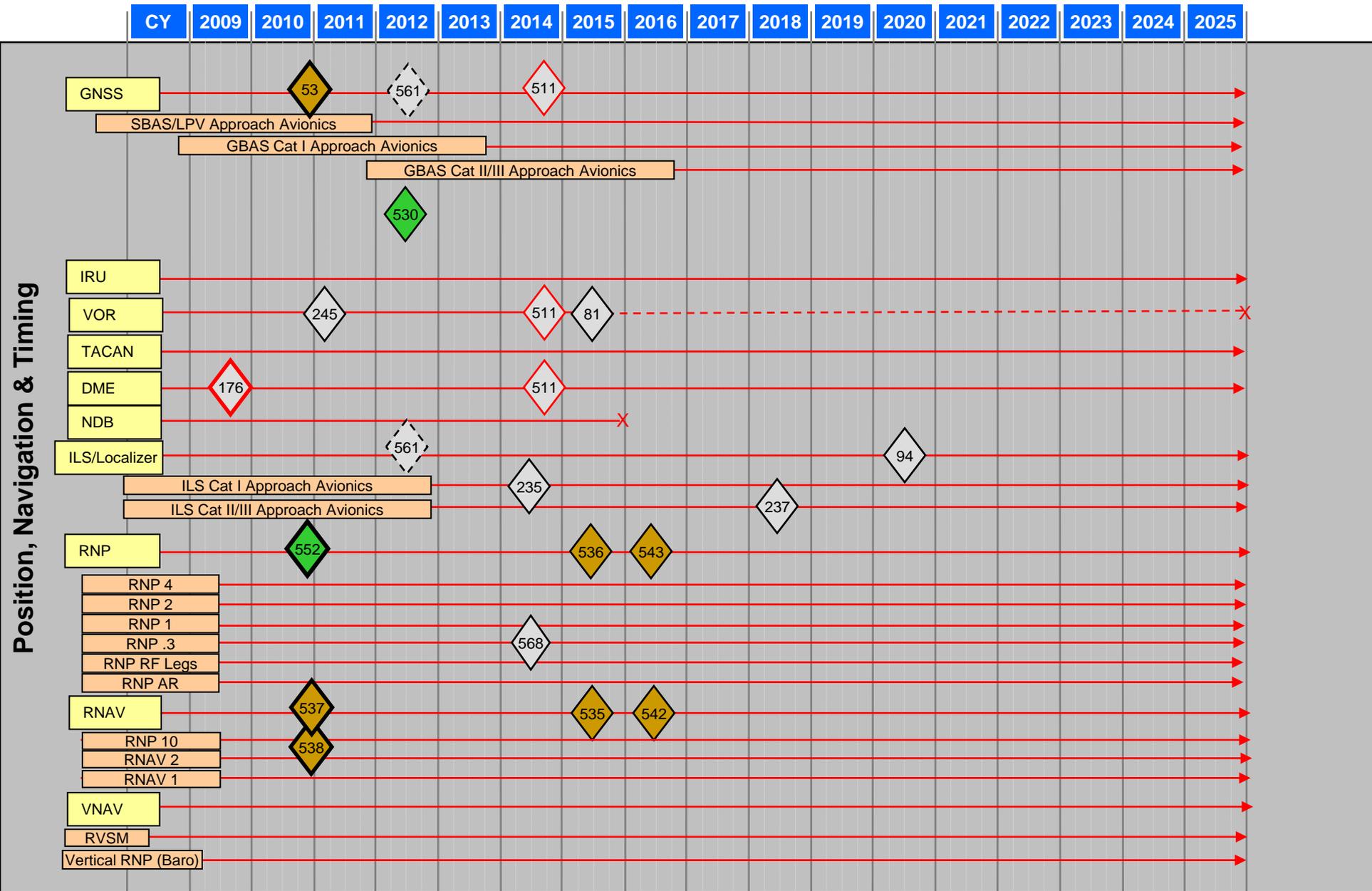
\* Applies to any System fill color type

\*\* Applies to any Decision Point fill color type

# Aircraft

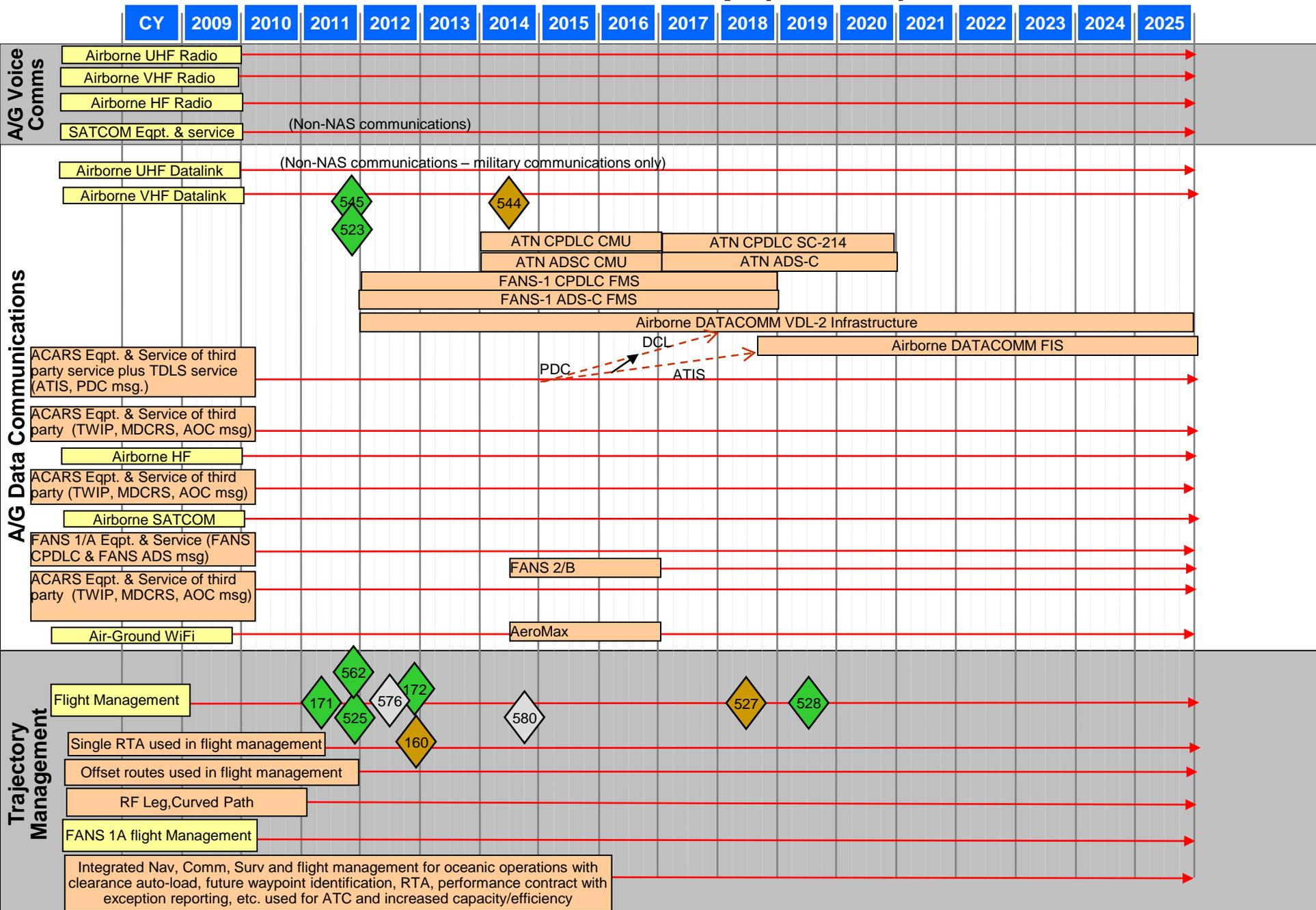
**APPROVED**

# Aircraft Roadmap (1 of 11)

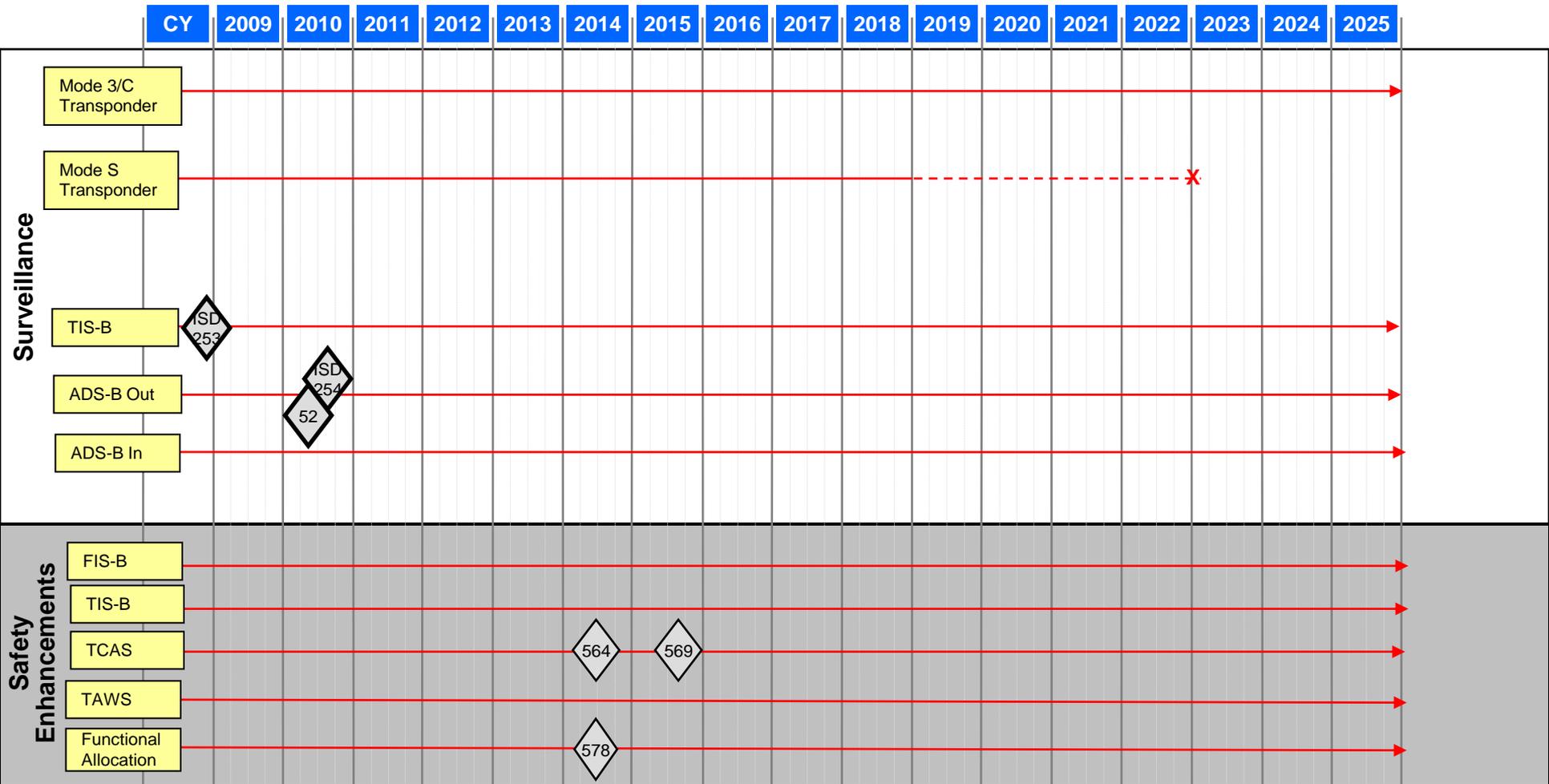


APPROVED

# Aircraft Roadmap (2 of 11)

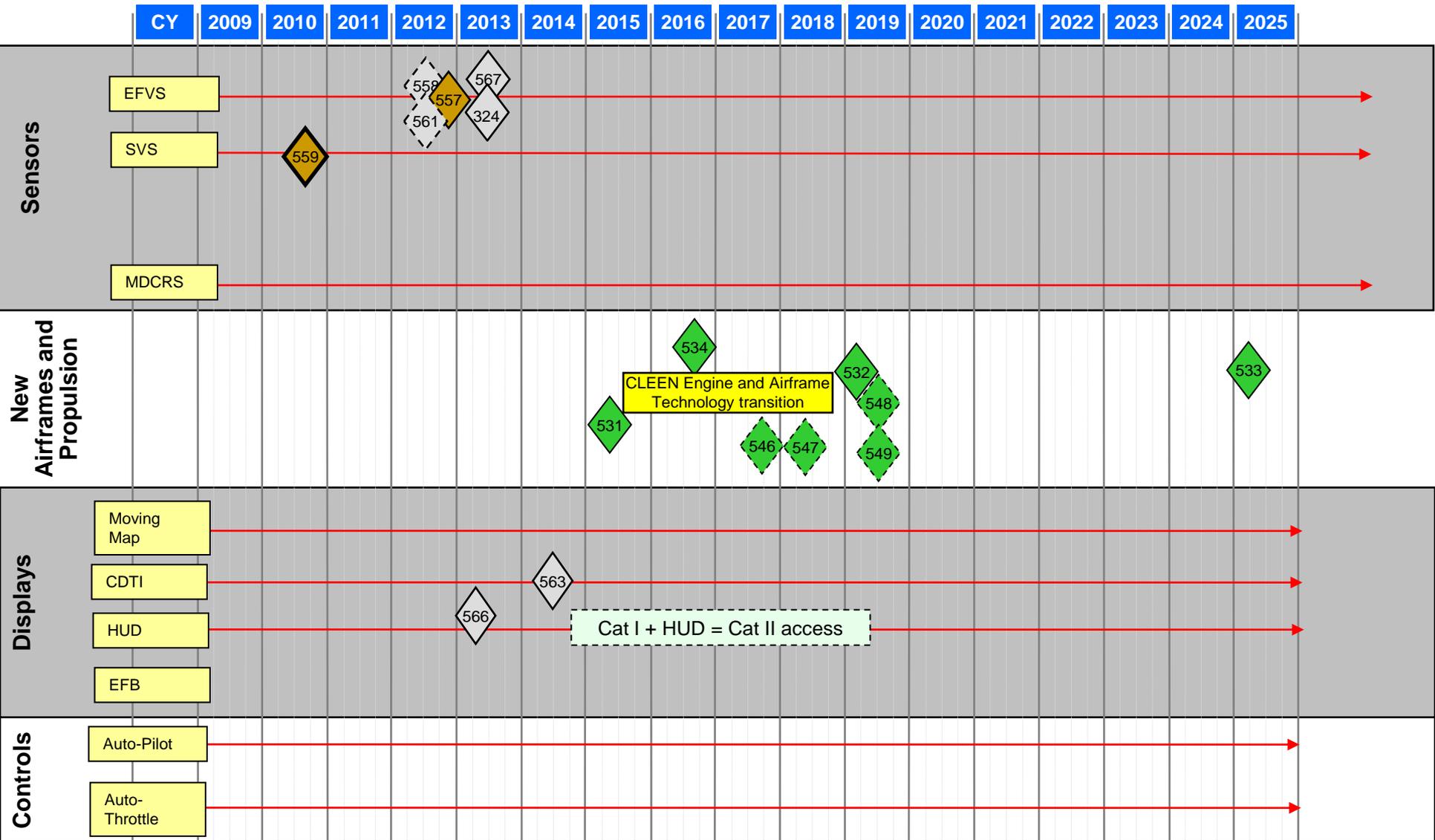


# Aircraft Roadmap (3 of 11)



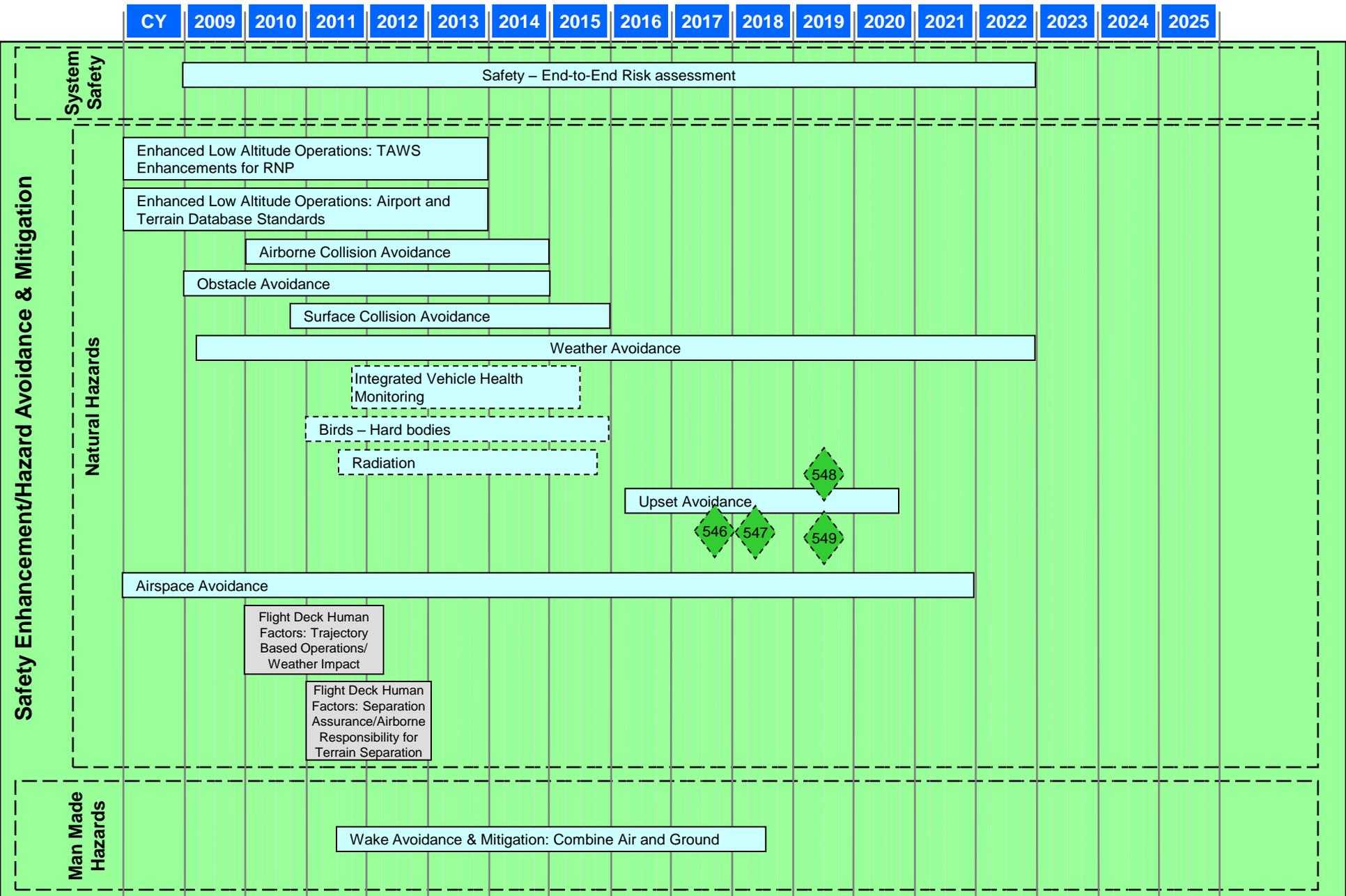
**APPROVED**

# Aircraft Roadmap (4 of 11)



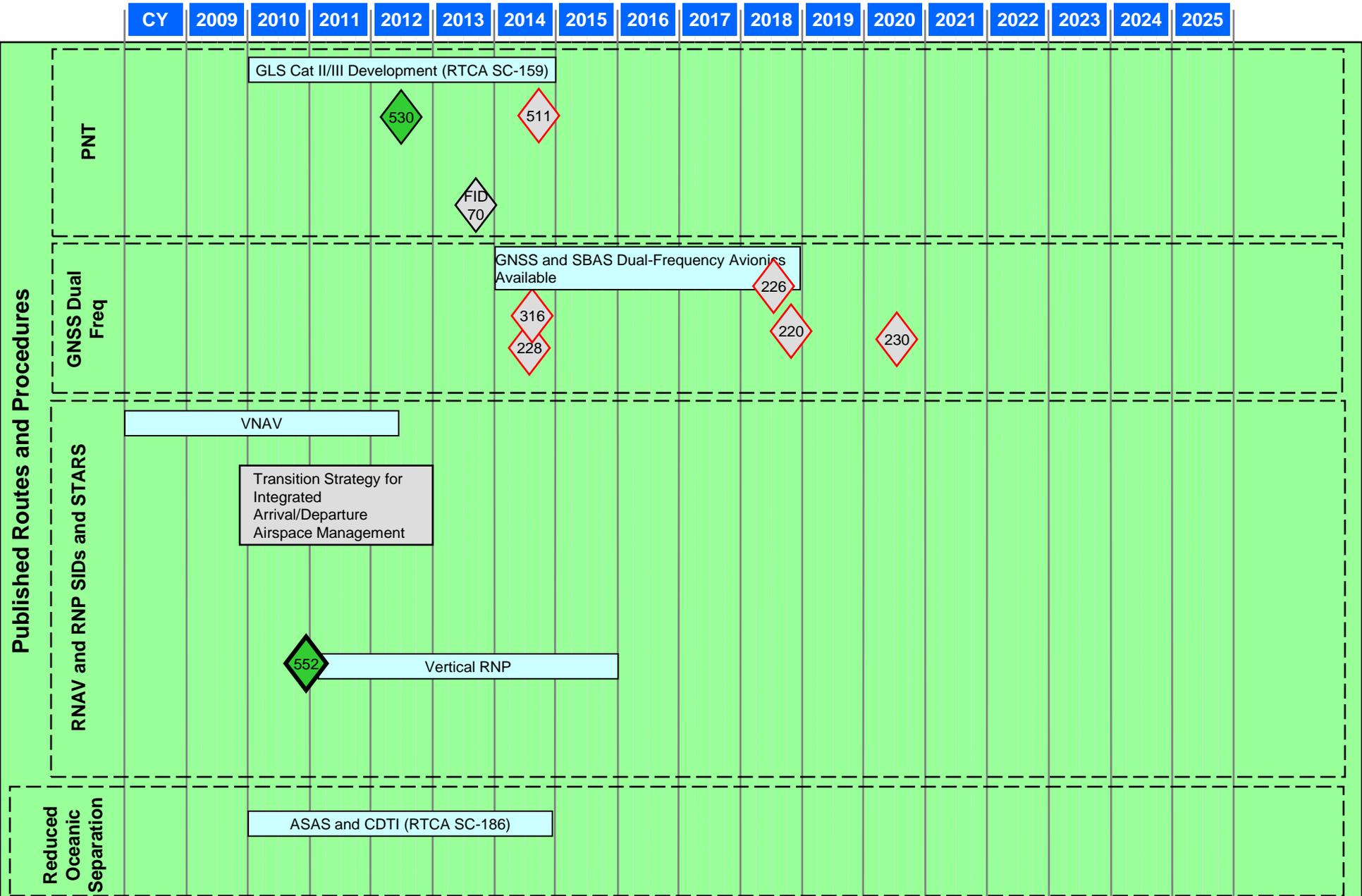
**APPROVED**

# Aircraft Roadmap (5 of 11)



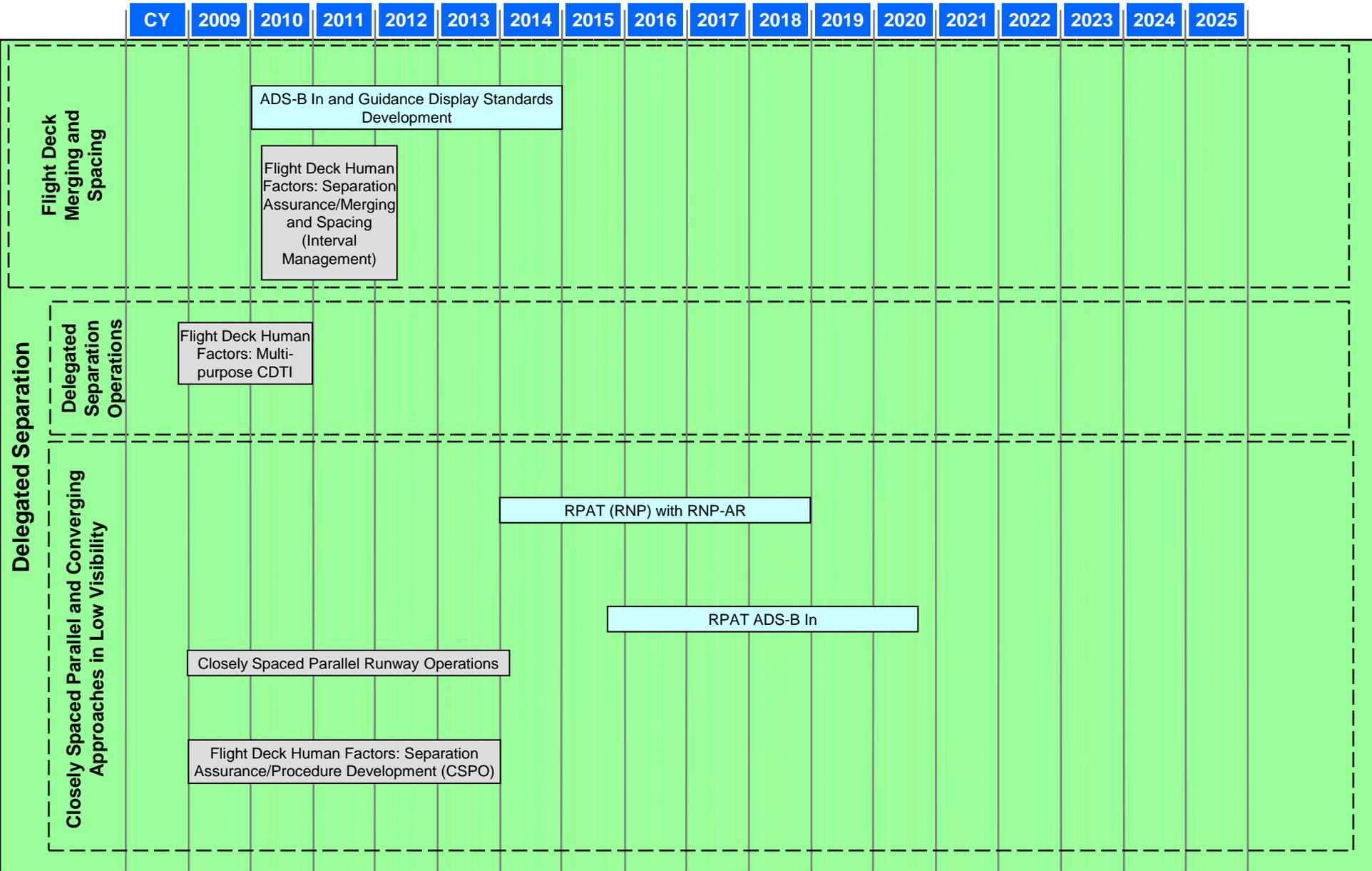
**APPROVED**

# Aircraft Roadmap (6 of 11)



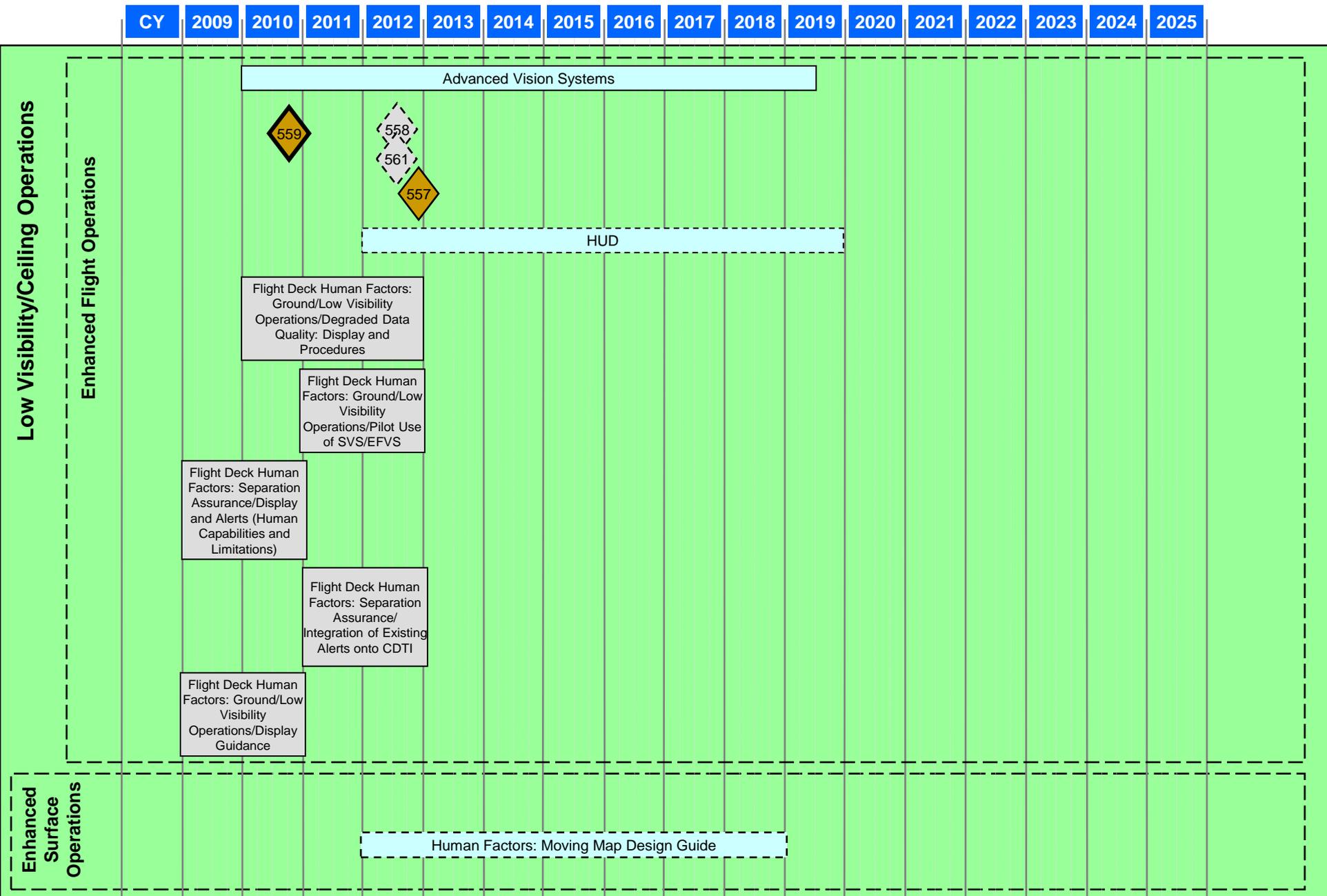


# Aircraft Roadmap (8 of 11)



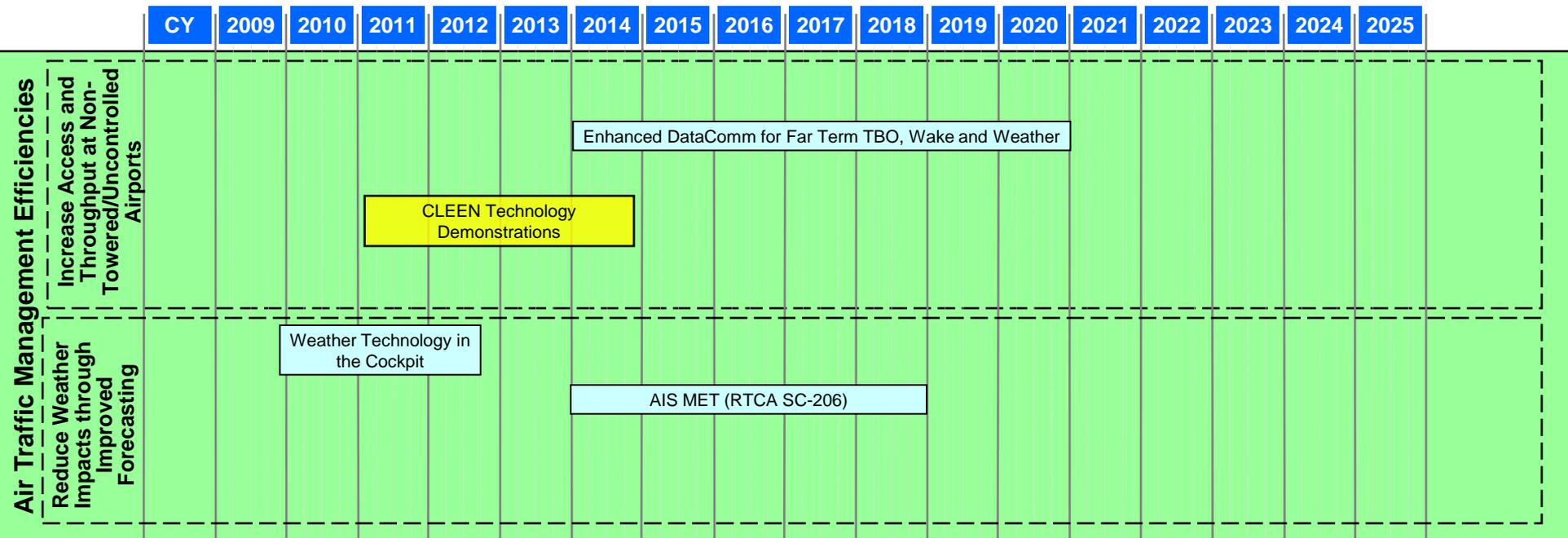
**APPROVED**

# Aircraft Roadmap (9 of 11)



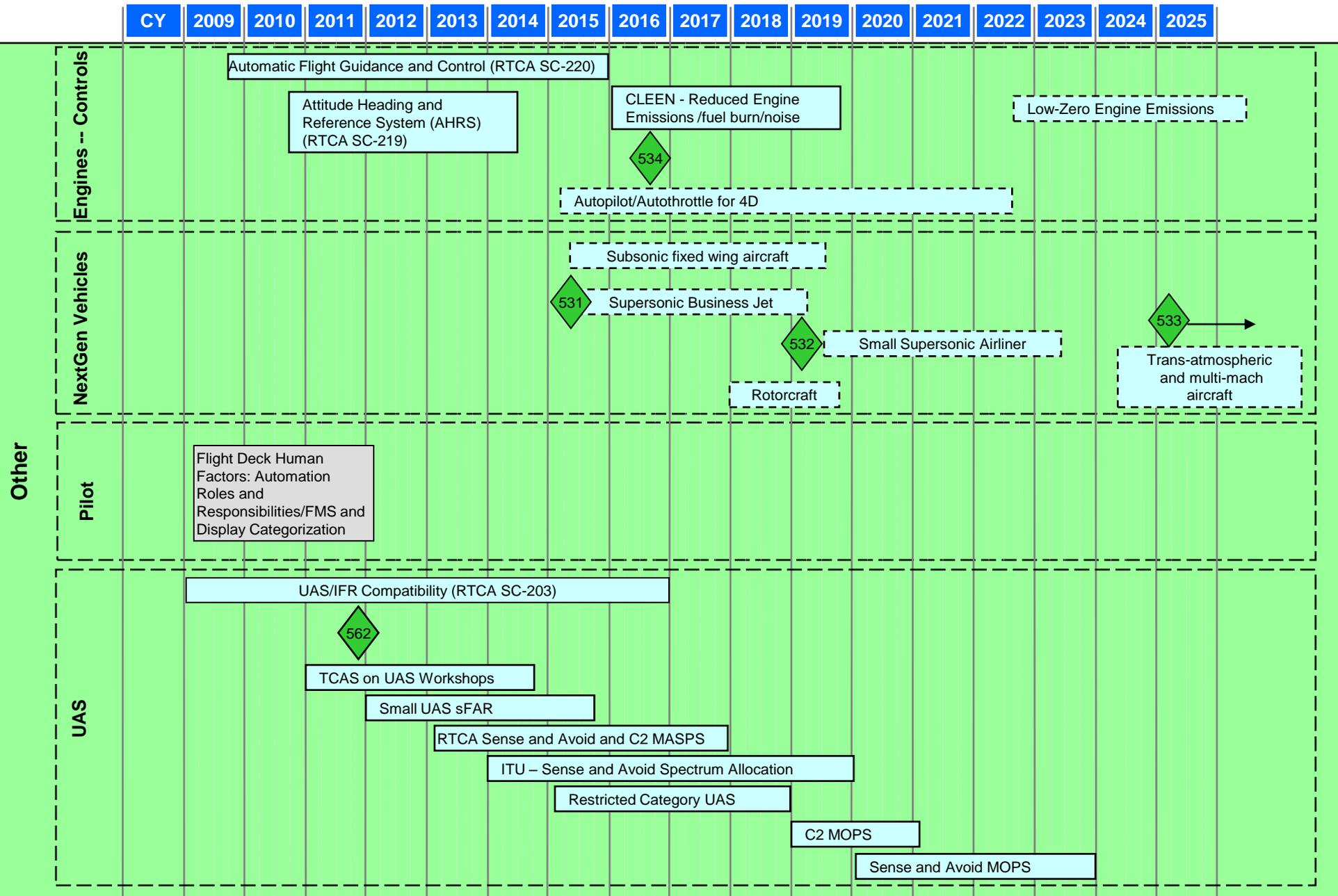
**APPROVED**

# Aircraft Roadmap (10 of 11)



**APPROVED**

# Aircraft Roadmap (11 of 11)



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# Aircraft Roadmap: Assumptions

Identifier	Description
AC-01	<p>The roadmap identifies four phases</p> <ul style="list-style-type: none"> <li>a) Conops development and R&amp;D in required areas</li> <li>b) Standards development</li> <li>c) AVS Approval</li> <li>d) ATC Procedure development</li> <li>e) Deployment. After the standards process is complete, and manufacturers have developed, integrated, fully tested and made new avionics available, aircraft, engines and fuels available, an additional 7 to 10 years is needed to achieve wide scale equipage of a new capability               <ul style="list-style-type: none"> <li>1. Different aircraft are expected to equip with different equipment. This roadmap does not currently distinguish between aircraft types.</li> </ul> </li> </ul>
AC-02	The aircraft roadmap includes environment research areas and assumptions and linkage to Non-NAS EA.
AC-03	Any air vehicle to include any UAS that participates in the NAS must operate in a way that is transparent to the ANSP and ATSP.

# Aircraft Roadmap: Decision Points (1 of 3)

DP #	Target Date CY	High Priority	Domain	Name
52	2010 Q2	N	Surveillance	Final Decision for Avionics Mandate/Rulemaking for ADS-B (out)/MODE-S/UAT (Complete)
53	2010 Q4	N		Agency policy published on Navigation future configuration to be GNSS-based (Complete)
70	2013 Q3	N	Navigation	Final Investment Decision (FID) for the acquisition of CAT II/III Ground Based Augmentation System (GBAS)
81	2015	N	Navigation	VOR decision on far-term drawdown
94	2020	N	Navigation	Decision on complete ILS CAT I drawdown
160	2012 Q4	N		Aircraft standards publication for Segment 2 linked to DataComm AC 20-140B
171	2011 Q2	N		RTCA NAC TOPS CONUSE
172	2012 Q4	N		JPDO Far Term TBO Recommendation
176	2009 Q3	Y	Navigation	DME NextGen Strategy Plan—Decision to procure next generation of DMEs to replace aging systems and expand the network where needed to support RNAV & NextGen (Complete)
220	2018	Y	Navigation	Completion of Dual Frequency (GPS L1 and L5) development & testing for the WAAS ground and space segment hardware, software, and user equipment standards and avionics, required by DoD Mandate, issued September 2008
226	2018	Y	Navigation	Completion of Dual frequency multi-constellation GNSS avionics activities
228	2014	Y	Navigation	Decision to proceed with WAAS dual frequency avionics activities to validate standards and lower risk for avionics development.
230	2020	Y	Navigation	Cut-over to dual frequency operations
235	2014	N	Navigation	Decision on active drawdown of Cat I ILSs operating in the NAS
237	2018	N	Navigation	Decision on replacement Cat II/III ILSs operating in the NAS
245	2011 Q1	N	Navigation	Decision on near-term minimum operational VOR ground network
253	2008 Q4	N	Surveillance	In-Service Decision for SBS Essential Services (TIS-B/FIS-B) NAS wide implementation (Complete)
254	2010 Q3	N	Surveillance	In-Service Decision for SBS Critical Services (ADS-B) NAS wide implementation, including backup strategy (Complete)
316	2014	Y	Navigation	GBAS ground facilities and single-frequency avionics available for use
324	2013	N	Navigation	Decision to proceed with ALS(I) LED lamps, based on Operational Capability Demonstration with EFVS aircraft
511	2014	Y	Navigation	Alternate PNT Strategy
523	2011 Q4	N		Air-Ground Data Security Requirements

# Aircraft Roadmap: Decision Points (2 of 3)

DP #	Target Date CY	High Priority	Domain	Name
525	2011 Q4	N		UAS Trajectory Performance
527	2018	N		Decision on proposed set of trajectory Management performance levels
528	2019	N		NextGen FMS
530	2012	N		GBAS MOPS
531	2015	N		Supersonic Business Jet (NASA)
532	2019	N		Small Supersonic Airliner (NASA)
533	2025	N		Efficient Multi-Mach aircraft (NASA)
534	2016	N		New Engine
535	2015	N		RNAV above FL 180
536	2015	N		RNP 2 above FL 290
537	2010 Q4	N		Order 8400.12B - Required Navigation Performance 10 Operational Authorization (Complete)
538	2010 Q4	N		Order 8400.33 Procedures for Obtaining Authorization for Required Navigation Performance 4 (RNP-4) Oceanic and Remote Area Operations (Complete)
542	2016	N		RNAV for all of CONUS airspace
543	2016	N		RNAV for all "busy" airspace
544	2014	N		SC 214 Avionics
545	2011 Q4	N		SC-214 MOPS
546	2017	N		Upset Aircraft Recovery-Controls
547	2018	N		Crashworthiness
548	2019	N		Envelope Protection
549	2019	N		Flight Crew Awareness
552	2010 Q4	N		AC 90-101 RNP AR (RNP as a key enabler for Environment) (Complete)
557	2012 Q4	N		MASPS for Advanced Vision Systems for Landing
558	2012	N	Airport	LED Airport Lighting Phase In
559	2010 Q3	N		AC 20-167 for Advanced Vision Systems (Complete)
561	2012	N	Airport	EISA Compliance Policy
562	2011 Q4	N		MOPS for UAS pilot to aircraft communications link

# Aircraft Roadmap: Decision Points (3 of 3)

DP #	Target Date CY	High Priority	Domain	Name
563	2014	N	Human Systems Integration	Define Collaborative Integrated Flight Deck Decision Support Requirements
564	2014	N	Human Systems Integration	Identify Unique Requirements for Single Pilot Operations
566	2013	N	Human Systems Integration	Establish Air Crew Segment 2 DataComm Requirements for Displays & Procedures
567	2013	N	Human Systems Integration	Define Procedures and Training Requirements for Low Visibility Ground Operations
568	2014	N	Human Systems Integration	Define Human Factors Guidelines for NextGen Instrument Procedures
569	2015	N	Human Systems Integration	Determine Enhanced Flight Deck Displays for Separation and Collision Avoidance
576	2012	N	Human Systems Integration	Provide ATC/FD DataComm Concept of Operations
578	2014	N	Human Systems Integration	Determine guidelines for FD functional allocation and automation roles
580	2014	N	Human Systems Integration	Provide Human Factors Guidance for Flight Deck Risk and Error Management

# Air-Ground

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# Air-Ground Infrastructure Roadmap (1 of 6)

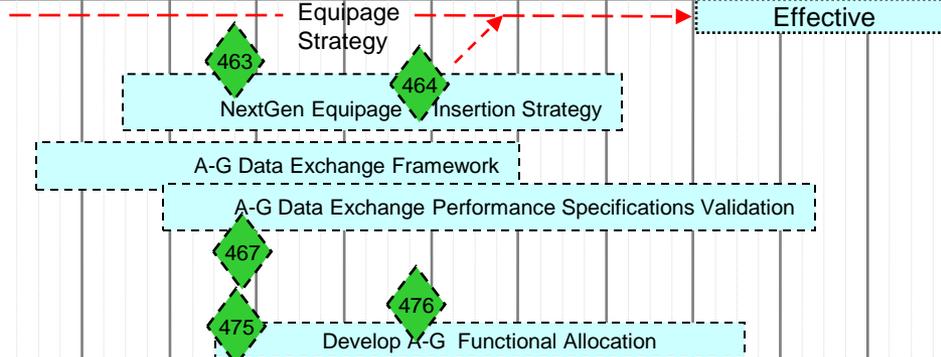
CY 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025

Aircraft



A-G Integration: Communication

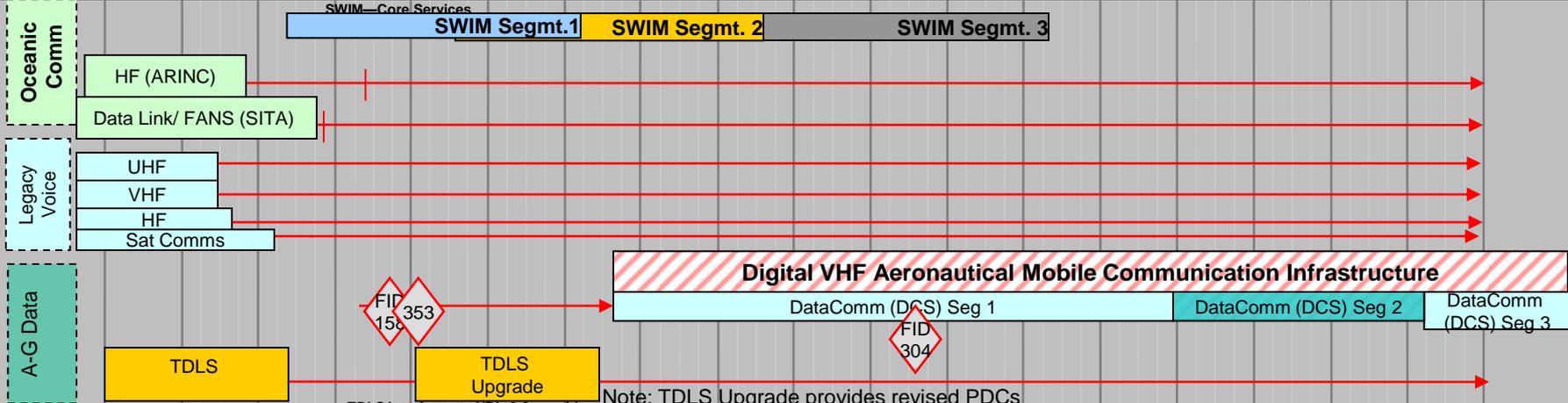
Air Ground Activities



SWIM - Core Services



ANSP Communications

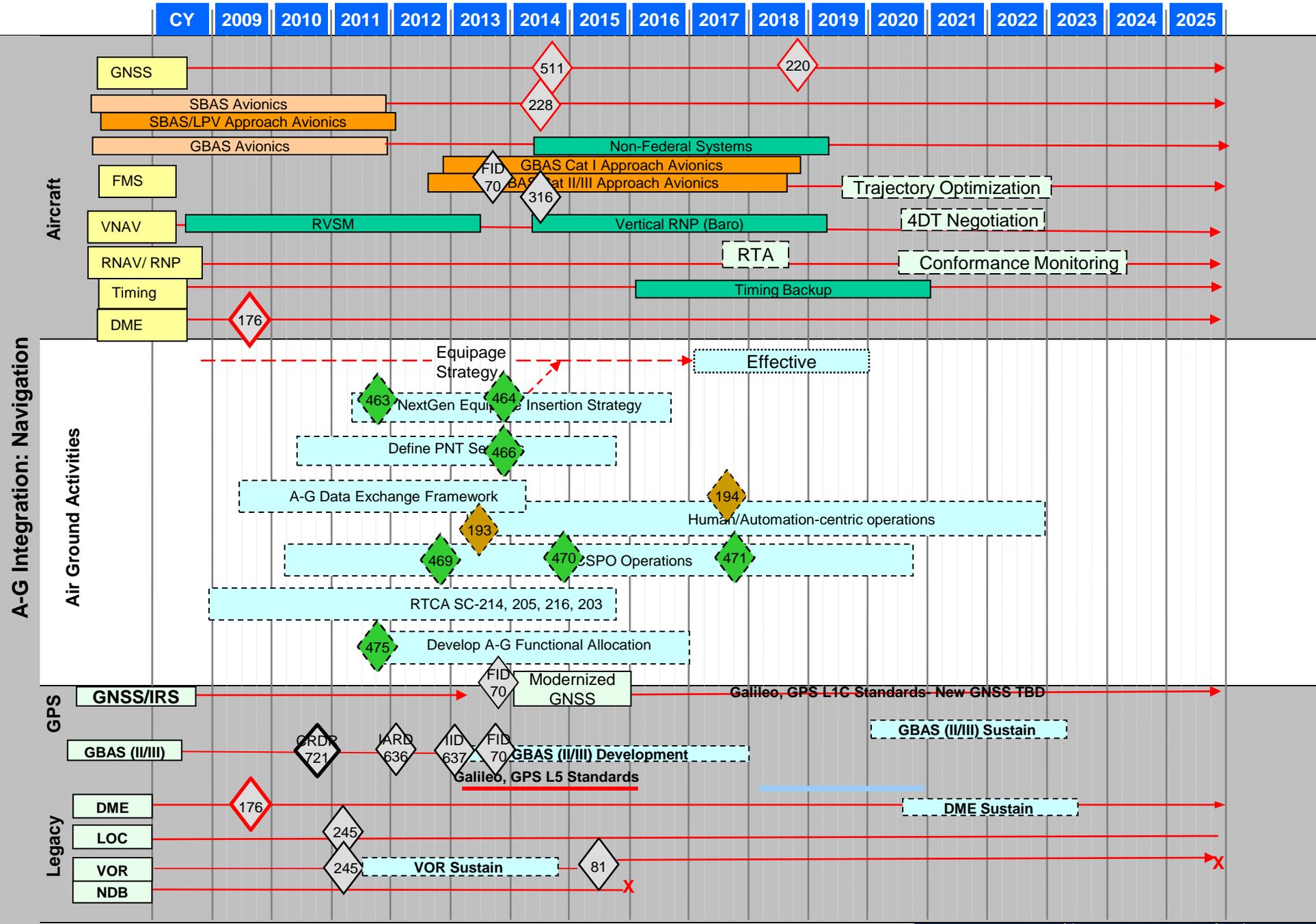


TDLS interfaces to VDL-2 & provides DataComm Functionality in the ATCT (Seg 1)

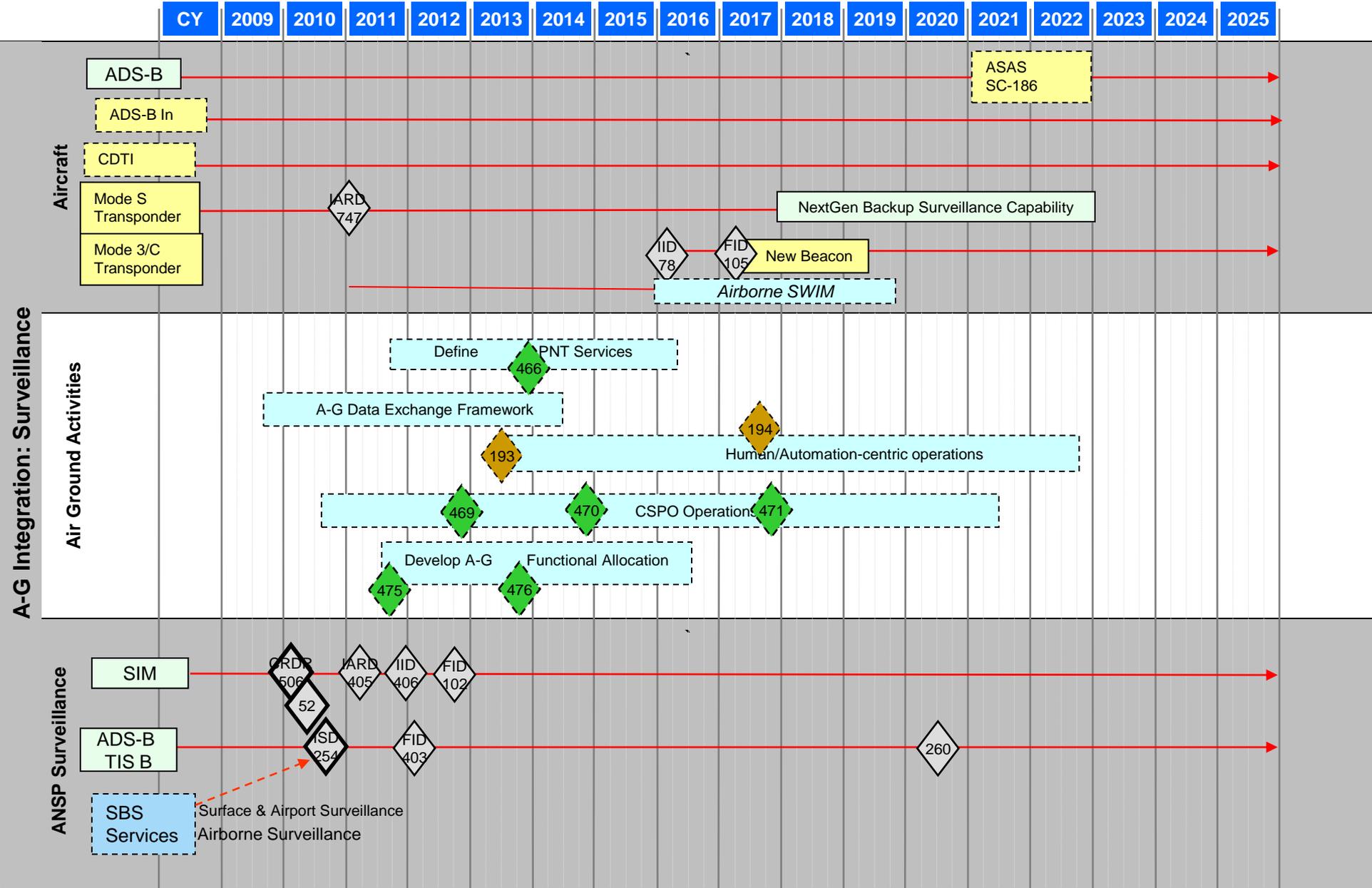
Note: TDLS Upgrade provides revised PDCs

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# Air-Ground Infrastructure Roadmap (2 of 6)



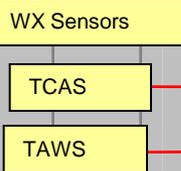
# Air-Ground Infrastructure Roadmap (3 of 6)



# Air-Ground Infrastructure Roadmap (4 of 6)

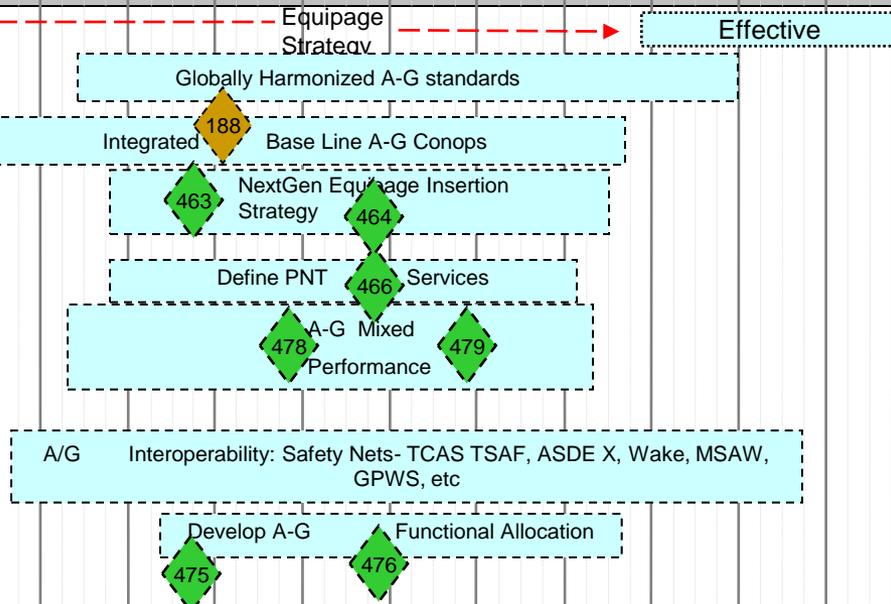
CY 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025

Aircraft

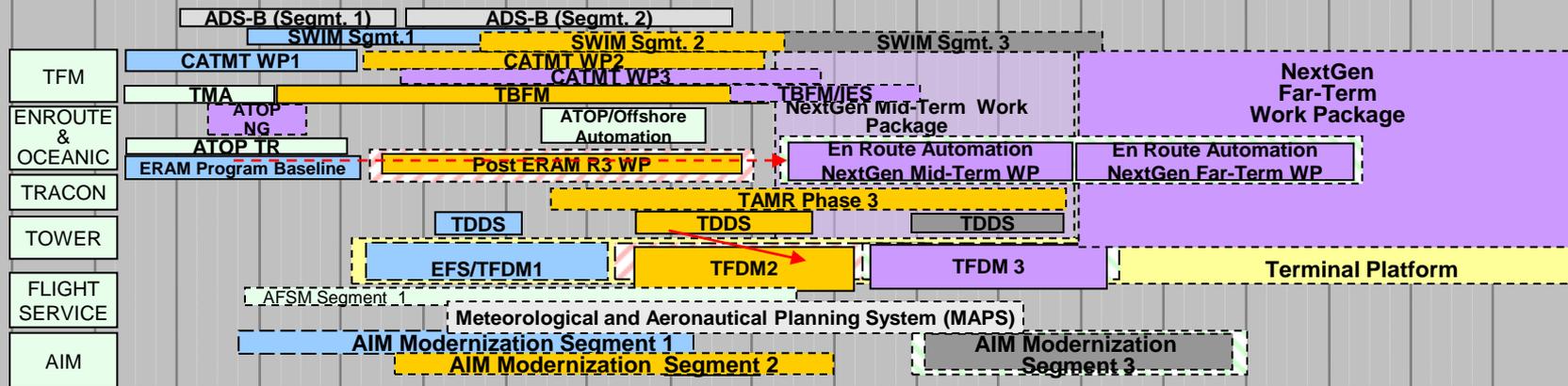


A-G Interoperability

Air Ground Activities



ANSP Automation



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# Air-Ground Infrastructure Roadmap (5 of 6)

CY 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025

Supporting Activities

A-G Services

NextGen Equipage Strategy

Ensure A/G Integrati<sup>188</sup> with NextGen Conops

CSPO Operations

Mid-Term Conops

Trajectory Ops Conops

Multi-Sector Planner Conops

High Altitude Conops

A-G Performance Specifications

NextGen SESAR Comparison/ Coordination

Globally Harmonized A-G standards

A-G Data Exchange Framework

A-G Data Exchange Framework Performance Requirements Validation

UAS ATC Interoperability Requirements<sup>474</sup>

Human/Automation-centric operations

Trade Studies<sup>193</sup>

Perform A-G Related Trade Studies- TBD

<sup>194</sup>

Support Standards Working Groups

RTCA SC-214, 205, 216, 203

Airborne SWIM

Galileo, GPS L5 Standards

Galileo, GPS L1C Standards- New GNSS TBD

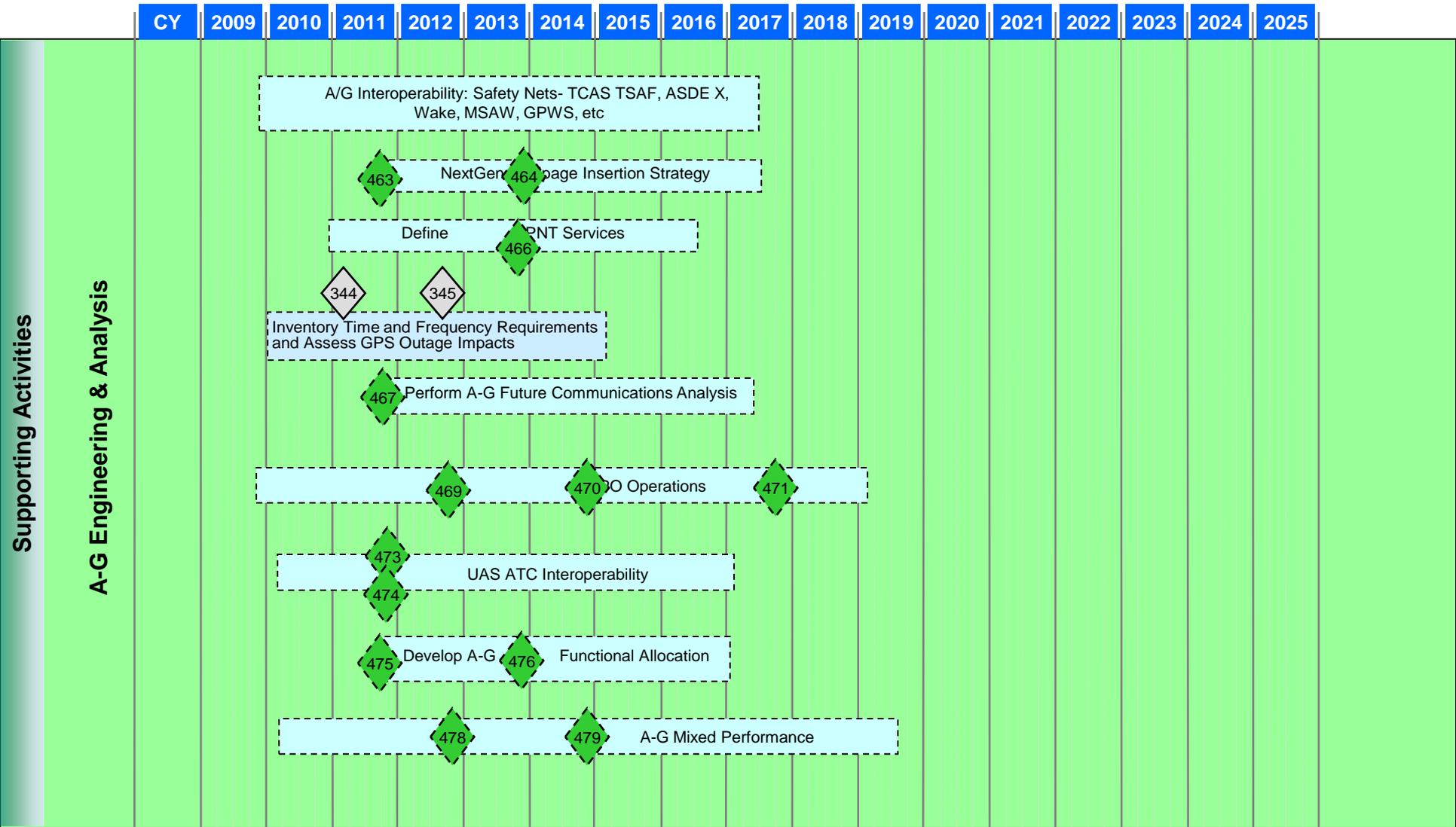
4 D Trajectory Standards

Support Joint Industry/Gov Workgroups

JPDO, IWP, ACWG, ANSWG

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# Air-Ground Infrastructure Roadmap (6 of 6)



Supporting Activities

A-G Engineering & Analysis

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# Air-Ground Roadmap: Assumptions (1 of 2)

Identifier	Description
AG-01	<p>Harmonization of Air/Ground System functions not complete:</p> <ul style="list-style-type: none"> <li>a) End-to-End concepts, approvals, performance, safety, security are general concerns regarding the NAS</li> <li>b) Any operation or improvement that is dependant on ACAS (TCAS), airborne automation, automatic dependent surveillance in, and addressing (IP) are far term implementations.</li> </ul>
AG-02	<p>Synchronization of airborne and ground capabilities and infrastructure remains open</p> <ul style="list-style-type: none"> <li>a) A minimum of 7 to 10 years is needed to achieve fleet-wide aircraft equipage of a new capability, from the time equipment becomes available.</li> <li>b) Ground systems continue to be developed from a bottoms-up approach resulting in mission gaps and performance mismatch</li> </ul>
AG-03	<p>Air-Ground standards will evolve from a technology-based to an integrated performance-based approach.</p>
AG-04	<p>Functions such as airborne TCAS, Ground Conflict Probe, and ADS-B conflict management are becoming temporally overlapping.</p>
AG-05	<p>Air-Ground Challenges:</p> <ul style="list-style-type: none"> <li>a) Air-Ground Interoperability/ Safety Nets</li> <li>b) NextGen Equipage Insertion Strategy</li> <li>c) PNT Duplicative Services</li> <li>d) Air-Ground Future Communications Analysis</li> <li>e) Closely Spaced Parallel Operations</li> <li>f) UAS ATC Interoperability</li> <li>g) Air-Ground Functional Allocation (Human-Automation Centric Operations)</li> <li>h) Mixed Performance</li> <li>i) Air-Ground DEF Performance Requirements Validation</li> </ul>
AG-06	<p>NAS weather systems are not depicted on the A/G Roadmap. (See Weather Roadmap).</p>
AG-07	<p>The Air-Ground Roadmap interfaces with other NASEA Roadmaps and does not include any stand alone systems.</p>

# Air-Ground Roadmap: Assumptions (2 of 2)

Identifier	Description
AG-08	Synchronize Aircraft Equipage with Ground Infrastructure and Acquisition: Aircraft equipage may include ADS-B (in), GNSS, Beacon Transponder, TCAS, TAWS, navigation requirements, Data Link, Weather Sensors, (temp, wind, humidity, turbulence, icing, and wake) and TIS-B/ FIS-B.
AG-09	<p>SWIM Air Capabilities:</p> <ol style="list-style-type: none"> <li>1) Airborne SWIM supports advisory communications through NNEW and commercial communication services (e.g. Iridium, InmarsatSBB, AirCell, XM Aviator).</li> <li>2) No mandatory equipment envisioned for airborne SWIM capability.</li> </ol>
AG-10	A-G tasks are aligned and compliment NASEA DP's and Air-Ground Evolution Environment. NASEA DP's should address A-G Challenge to support NextGen success.
AG-11	AVS provides advice and guidance on NextGen Concepts that are being developed. AVS supports NextGen from a Regulatory perspective (i.e. findings of compliance), however, their current role does not allow defining specific design requirements for end-to-end system interoperability.

# Air-Ground Roadmap: Decision Points (1 of 2)

DP #	Target Date CY	High Priority	Domain	Name
52	2010 Q2	N	Surveillance	Final Decision for Avionics Mandate/Rulemaking for ADS-B (out)/MODE-S/UAT
70	2013 Q3	N	Navigation	Final Investment Decision (FID) for the acquisition of CAT II/III Ground Based Augmentation System (GBAS)
78	2016 Q1	N	Surveillance	Initial Investment Decision to implement a NextGen beacon/backup radar system for ATC
81	2015	N	Navigation	VOR decision on far-term drawdown
102	2012 Q3	N	Surveillance	Final Investment Decision to implement SIM in terminal and en route legacy radar systems
105	2017	N	Surveillance	Final Investment Decision to implement a NextGen beacon/backup radar system for ATC
158	2011 Q3	Y	Communication	Data Communications Segment 1 FID (part 1 of a split FID)
160	2012 Q4	N	Aircraft	Aircraft standards publication for Segment 2 linked to DataComm AC 20-140B
176	2009 Q3	Y	Navigation	DME NextGen Strategy Plan—Decision to procure next generation of DMEs to replace aging systems and expand the network where needed to support RNAV & NextGen (Complete)
188	2012 Q1	N		Define an Integrated and base-lined Air-Ground Concepts
193	2013	N		Define Human/Automation design principles to support NextGen infrastructure
194	2017	N		Planning Decision: Incorporate results into future Requirement for NextGen Technology and Human/Automation intensive operations
220	2018	Y	Navigation	Completion of Dual Frequency (GPS L1 and L5) development & testing for the WAAS ground and space <b>segment</b> hardware, software, and user equipment standards and avionics, required by DoD Mandate, issued September 2008
228	2014	Y	Navigation	Decision to proceed with WAAS dual frequency avionics activities to validate standards and lower risk for avionics development.
245	2011 Q1	N	Navigation	Decision on near-term minimum operational VOR ground network
254	2010 Q3	N	Surveillance	In-Service Decision for SBS Critical Services (ADS-B) NAS wide implementation, including backup strategy (Complete)
260	2020	N	Surveillance	Decision on ADS-B Rule Compliance
304	2018	Y	Communication	Data Communications Segment 2 FID

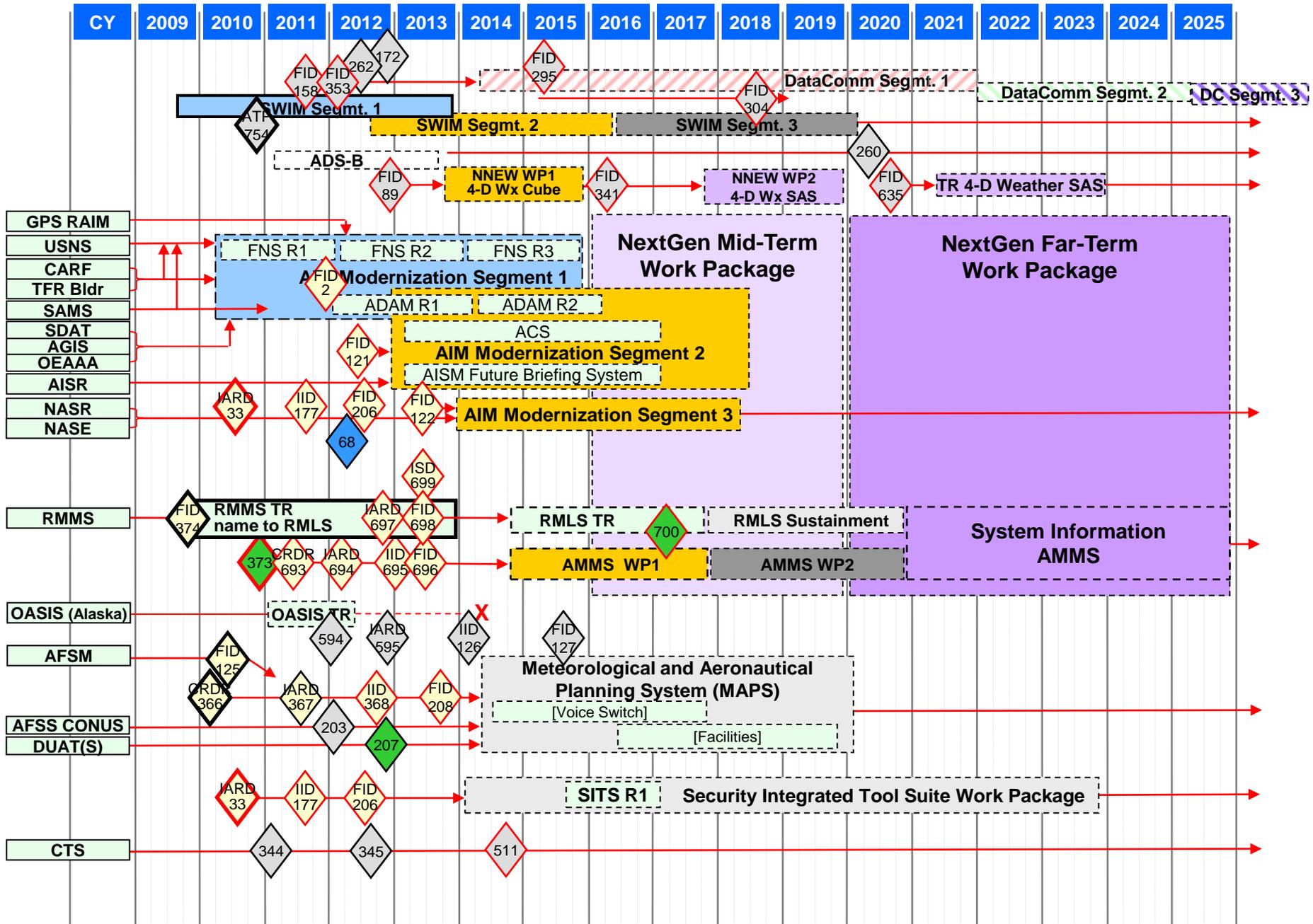
# Air-Ground Roadmap: Decision Points (2 of 2)

DP #	Target Date CY	High Priority	Domain	Name
316	2014	N	Navigation	GBAS ground facilities and single-frequency avionics available for use
344	2011 Q1	N	Enterprise Services	Establish Requirements for a Backup Timing Source
345	2012 Q3	N	Enterprise Services	Implementation strategy decision for GPS timing backup
353	2012 Q1	Y	Communication	Data Communications Segment 1 FID (part 2 of a split FID)
403	2012 Q1	N	Surveillance	Final Investment Decision for SBS Implementation of Advanced ADS-B Applications
463	2011 Q3	N		Deliver NextGen Equipage Insertion Strategy
464	2013 Q4	N		Deliver Equipage Insertion Plan- Output Boeing OTA
466	2013	N		Planning Decision: Develop A-G PNT Requirements
467	2011 Q4	N		Deliver A-G Future Communications Analysis
469	2012 Q4	N		Planning Decision: Develop Requirements to Implement Independent Operations Below 4300' w/ Dual ILS
470	2014 Q4	N		Planning Decision: Develop Requirements for Independent Operations below 4300' using PBN
471	2017 Q4	N		Planning Decision: Develop Requirements to Implement Independent Operations Applying Advanced Concepts
473	2011 Q4	N		Planning Decision: Develop Requirements for UAS Performance Envelope for UAS Fleets
474	2011 Q4	N		Planning Decision: Develop UAS ATC Interoperability Performance Requirements
475	2011 Q3	N		Planning Decision: Develop A-G Functional Allocation Trade Space
476	2013 Q4	N		Deliver A-G Functional Allocation Trade Space to NASEA Requirements
478	2012 Q4	N		Planning Decision: Develop Best Equipped Best Served Strategy to Support Operational Benefits to Equipped Aircraft
479	2014 Q4	N		Deliver Best Equipped Best Served Strategy
511	2014	Y	Navigation	Alternate PNT Strategy
636	2012 Q1	N	Navigation	Investment Analysis Readiness Decision (IARD) for the acquisition of CAT II/III Ground Based Augmentation System (GBAS)
637	2013 Q1	N	Navigation	Initial Investment Decision (IID) for the acquisition of CAT II/III Ground Based Augmentation System (GBAS)
721	2010 Q3	N	Navigation	CRDR for the acquisition of CAT II/III Ground Based Augmentation System (GBAS) (COMPLETE)
747	2011 Q1	N	Surveillance	Investment Analysis Readiness Decision for legacy beacon (Mode S) SLEP through 2025

# Automation



# Automation Roadmap (2 of 20)



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# Automation Roadmap (3 of 20)

CY 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025

Oceanic In-trail Climb and Descent 102108

CRDR 386 IARD 387 IID 388 FID 389

Oceanic Tactical Trajectory Management: ADS-C Climb and Descent Procedures

ADS-B In Trail Procedures

Delegated Responsibility for In-Trail Separation 102118

SBS Aircraft-to-Aircraft Horizontal Separation CDTI Assisted Visual System

CRDR 360 IARD 361 IID 75 FID 111

Automation Support for Separation Management 102137

Advanced Separation Management

Unmanned Aircraft Systems (UAS) 4D Trajectory-based demonstration

ATC Human Factors: Separation Management Modern Procedures

FID 31 IARD 361 IID 75 FID 111  
CRDR 360

CRDR 360 IARD 361 IID 75 FID 111  
CRDR 364 IARD 365 IID 83 FID 110

Reduced Horizontal Separation Standards, En Route -3 Miles 102117

SBS 3-mile Separation for Enroute

CRDR 360 IARD 361 IID 75 FID 111

Concepts and Technology Development/Interval Management (IM) with Delegated Separation and Self-Separation

CRDR 364 IARD 365 IID 83 FID 110

Automated Negotiation/Separation Management 104121

*Initiate Trajectory-Based Operations  
ATC Separation Assurance / Separation Management*

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# Automation Roadmap (4 of 20)

CY 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025

Oceanic Tactical Trajectory Management: Web-enabled Collaborative Trajectory Planning (Pre-Departure Clearances)

Flexible Entry Times for Oceanic Tracks 104102

JARD 357

FID 57

Point-in-Space Metering 104120

Trajectory Management – Arrival Tactical Flow

FID 195

JARD 357

FID 57

Oceanic Tactical Trajectory Management: Oceanic Conflict Advisory Trials (OCAT)

Initial Conflict Resolution Advisories 102114

CRDR 360

JARD 361

IID 75

FID 111

IID 388

FID 389

IID 75

FID 111

IID 356

FID 346

FID 660

FID 46

FID 57

FID 198

IID 177

FID 206

Composite Enterprise Trajectory

*Initiate Trajectory-Based Operations  
TM Synchronization / Trajectory Management*

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# Automation Roadmap (5 of 20)

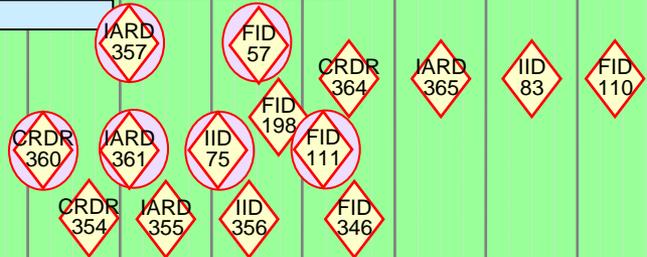
CY 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025

ATC Human Factors: Conflict Resolution Advisories

Automated Support for Conflict Resolution 104127

Advanced Separation Management  
Beyond 3D PAM

Automated Support for Trajectory Negotiation 104105



Trajectory Operations WorkGroup

Investigate Multi-Sector Planner (MSP) Concept for NextGen Mid-Term

Trajectory-Based Management - Gate-To-Gate 104126



**Initiate Trajectory-Based Operations  
TM Synchronization / Trajectory Management**

Increase Capacity and Efficiency Using Area Navigation (RNAV) and Required Navigation Performance (RNP) 108209

Advanced Separation Management



Automation Requirements for High Altitude Performance Based Airspace

Flexible Airspace Management 108206



Dynamic Airspace Management (Flexible dynamic airspace, ARMS)

**Initiate Trajectory-Based Operations  
Airspace Management / Capacity Management (Airspace)**

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# Automation Roadmap (6 of 20)

CY	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
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Trajectory Operations WorkGroup

Investigate Multi-Sector Planner (MSP) Concept for NextGen Mid-Term

Trajectory Operations WorkGroup

Investigate Multi-Sector Planner (MSP) Concept for NextGen Mid-Term

Investigate Multi-Sector Planner (MSP) Concept for NextGen Mid-Term

Trajectory Operations WorkGroup

Generic Airspace Operations

Corridors-in-the-Sky (CITS)

Optimal Airspace Allocation

CRDR 364 IARD 365 IID 83 FID 110

CRDR 364 IARD 365 IID 83 FID 110

CRDR 364 IARD 365 IID 83 FID 110

Flow Corridors - Level 1 Static 108105

Flow Corridors - Level 2 Dynamic 108106

Dynamic Airspace Performance Designation 108213

**Initiate Trajectory-Based Operations**  
Airspace Management / Capacity Management (Airspace)

Provide Interactive Flight Planning from Anywhere 101103

Optimal Airspace Allocation

Corridors-in-the-Sky (CITS)

Generic Airspace Operations

CRDR 364 IARD 365 IID 83 FID 110

CRDR 360 IARD 361 IID 75 FID 111

IARD 357 FID 57

**Initiate Trajectory-Based Operations**  
ATC-Advisory & Flight Planning, Emergency and Alerting, Infrastructure-Information Management / Flight and State Data Management

**APPROVED**

# Automation Roadmap (7 of 20)

CY 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025

Improved Parallel Runway Operations 102141

Closely Spaced Parallel Runway Operations



Concepts and Technology Development/Interval Management (IM) with Delegated Separation and Self-Separation



Delegated Separation - Complex Procedures 102149

Concepts and Technology Development/Interval Management (IM) to Single or Dependent Parallel Runways



Reduce Separation - High Density Terminal Less Than 3-miles 102150

Advanced Scheduling for Congested Terminal Airspace

Tactical Conflict Prediction and Resolution Functions for Congested Terminal Airspace

Integrated Arrival/Departure/Surface Scheduling



**Increase Arrivals/Departures at High Density Airports**  
ATC-Separation Assurance / Separation Management

Integrated Arrival & Departure Operations

Integrated Arrival/Departure Airspace Management 104122

Integrated Arrival/Departure/Surface Scheduling



ATC Human Factors: 3D Path Arrival Management (PAM) Ground-based Automation Capability



**Increase Arrivals/Departures at High Density Airports**  
Airspace Management / Capacity Management (Airspace)

**APPROVED**

# Automation Roadmap (8 of 20)

CY 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025

Time Based Metering Using RNAV and RNP Route Assignments 104123

Trajectory Management - Arrival Tactical Flow

IARD  
357

FID  
57

3D Path Arrival  
Management -  
Demonstration

Surface Trajectory Prediction and Conformance  
Monitoring

Initial Surface Traffic Management 104209

Surface Tactical Flow

Surface Trajectory Prediction and Conformance  
Monitoring

Surface/Tower/Terminal  
Engineering for  
Flight  
Data/Clearance  
Delivery & Monitoring

FID  
660

FID  
198

CRDIARD  
631 30

IID  
115

FID  
46

Integrated  
Arrival/Departure/Surface  
Scheduling

Time-Based Metering in the Terminal Environment 104128

CRDR  
362

IARD  
363

IID  
275

FID  
276

*Increase Arrivals/Departures at High Density Airports  
TM-Synchronization / Trajectory Management*

**APPROVED**

# Automation Roadmap (9 of 20)

CY	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
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Trajectory Management - Arrival Tactical Flow

Improved Management of Arrival/Surface/Departure Flow Operations 104117

Surface/Tower/Terminal Engineering for Flight Data/Clearance Delivery & Monitoring

Multiple Airport Runway Management

Single Airport Runway Management

CRDR 437

FDIM

Flight Data Interface Modernization

Integrated Arrival/Departure/Surface Scheduling

Enhanced Departure Flow Operations 104208

Trajectory Operations WorkGroup

Digital TMI Automation

ATC Human Factors: Integrated Departure Decision Support Tools (DST)

JARD 357

FID 57

CRDR 362

JARD 363

IID 275

FID 276

FID 198

CRDR 360

JARD 361

IID 75

FID 111

CRDR 362

JARD 363

IID 275

FID 276

JARD 357

FID 57

CRDR 362

JARD 363

IID 275

FID 276

**Increase Arrivals/Departures at High Density Airports**  
*TM-Synchronization / Trajectory Management*

**APPROVED**

# Automation Roadmap (10 of 20)

CY	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
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Trajectory Operations WorkGroup

IARD 357

FID 57

Full Surface Traffic Management with Conformance Monitoring 104206

Surface Trajectory Prediction and Conformance Monitoring

CRDR 364

IARD 365

IID 83

FID 110

Surface Conflict Detection and Resolution (CD&R)

Integrated Arrival/Departure/Surface Scheduling

CRDR 362

IARD 363

IID 275

FID 276

FID 198

Metroplex Operations Management

CRDR 364

IARD 365

IID 83

FID 110

Multiple Airport Runway Management

FID 198

Integrated Arrival/Departure and Surface Traffic Management for Metroplex 104125

Digital TMI Automation

Single Airport Runway Management

CRDR 362

IARD 363

IID 275

FID 276

Metroplex Operations Management

CRDR 364

IARD 365

IID 83

FID 110

Efficient Metroplex Merging and Spacing 102142

Digital TMI Automation

FID 198

Trajectory Operations WorkGroup

CRDR 362

IARD 363

IID 275

FID 276

IARD 357

FID 57

Trajectory Operations WorkGroup

FID 198

Limited Simultaneous Runway Occupancy 102153

Surface Conflict Detection and Resolution (CD&R)

**Increase Arrivals/Departures at High Density Airports**  
*TM-Synchronization / Trajectory Management*

**APPROVED**

# Automation Roadmap (11 of 20)

CY 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025

Wake Turbulence Mitigation Departures (WTMD)

FID 660

Wake Turbulence Mitigation for Departures (WTMD): Wind-Based Wake Procedures 102140

FID 198

Wake - SRD

IID 45

ATP 753

FID 107

CRDR 362

IARD 363

IID 275

FID 276

Airspace Modification to Expand WTMA Capacity Gains

FID 660

CRDR 362

IARD 363

IID 275

FID 198

FID 276

Wake Turbulence Mitigation for Arrivals: CSPRs 102144

Wake Turbulence Mitigation for Arrivals - System (WTMA-S) Activities

Wake - SRA

Ground Based Augmentation Systems

CRDR 631

IARD 30

IID 115

FID 46

FID 198

Ground Based Augmentation System (GBAS) Precision Approaches 107107

Cross-wind Reduced Separation for Departure Operations (CREDOS) Project

FID 198

Single Runway Departure Wake Mitigation 102151

Generic Airspace Operations

CRDR 364

IARD 365

IID 83

FID 110

Dynamic, Pairwise Wake Turbulence Separation 102152

Corridors-in-the-Sky (CITS)

Optimal Airspace Allocation

Surface Trajectory Prediction and Conformance Monitoring

FID 198

Provide Surface Situation to Pilots, Service Providers and Vehicle Operators for Near-Zero-Visibility Surface Operations 102409

Surface Conflict Detection and Resolution (CD&R)

**Increase Flexibility in the Terminal Environment**  
**ATC-Separation Assurance / Separation Management**

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# Automation Roadmap (12 of 20)

CY	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
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Optimized Profile Descent Procedures Operational Trials

Optimized Profile Descent Procedures Operational Trials

Use Optimized Profile Descent 104124

IID 45

FID 107

FID 660  
FID 31

CRDR 362

IARD 363

IID 275

FID 276

Asia and South Pacific Initiative to Reduce Emissions (ASPIRE) - Demonstration

Atlantic Interoperability Initiative to Reduce Emissions (AIRE) - Demonstration

Low Visibility Surface Operations 107202

NextGen Navigation Initiatives

Common Status and Structure Data

CRDR 362

IARD 363

IID 275

FID 276

IID 45

CRDARD 63

IARD 30

ATP 753

FID 107

FID 660

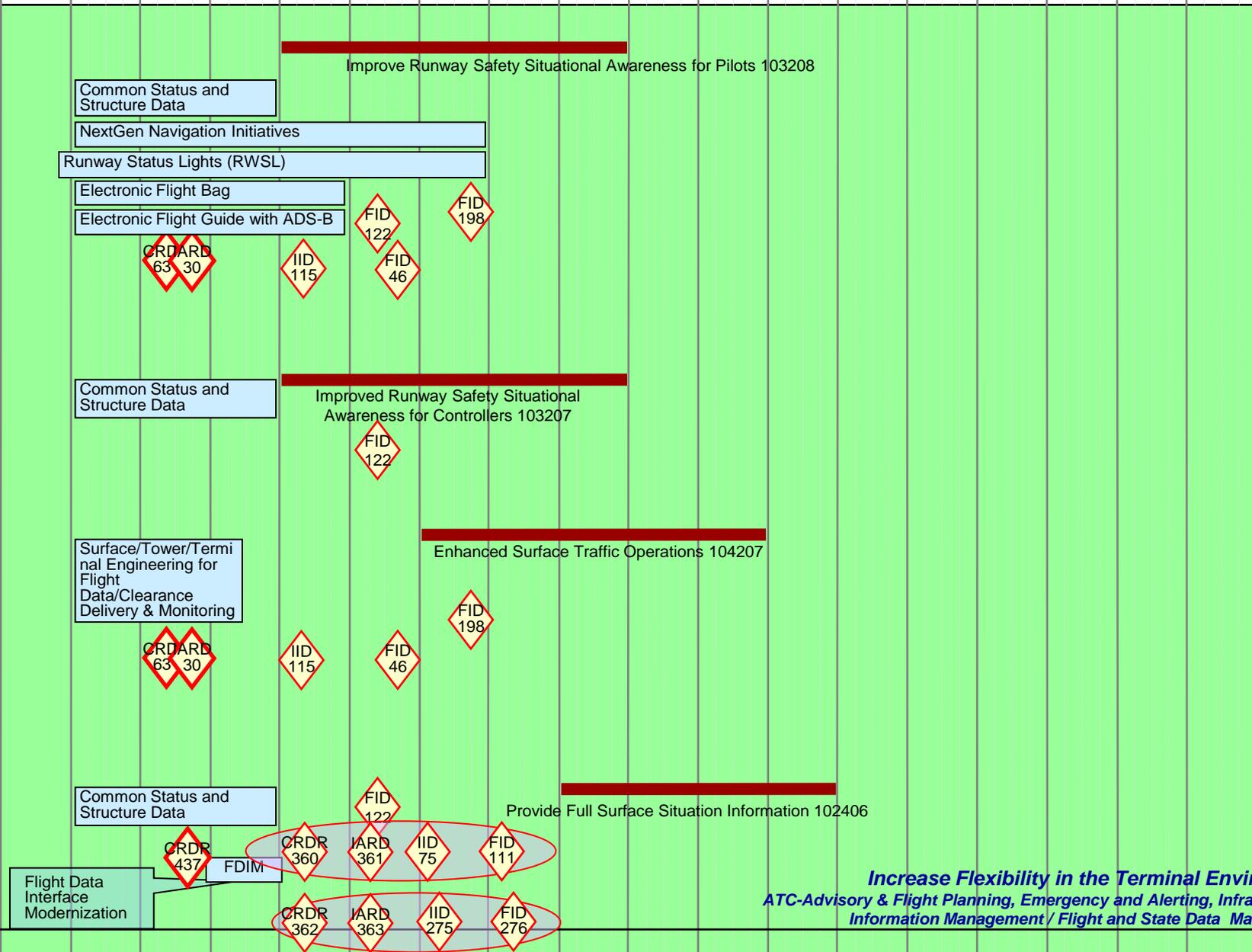
IID 115

FID 46

*Increase Flexibility in the Terminal Environment  
TM-Synchronization / Trajectory Management*

# Automation Roadmap (13 of 20)

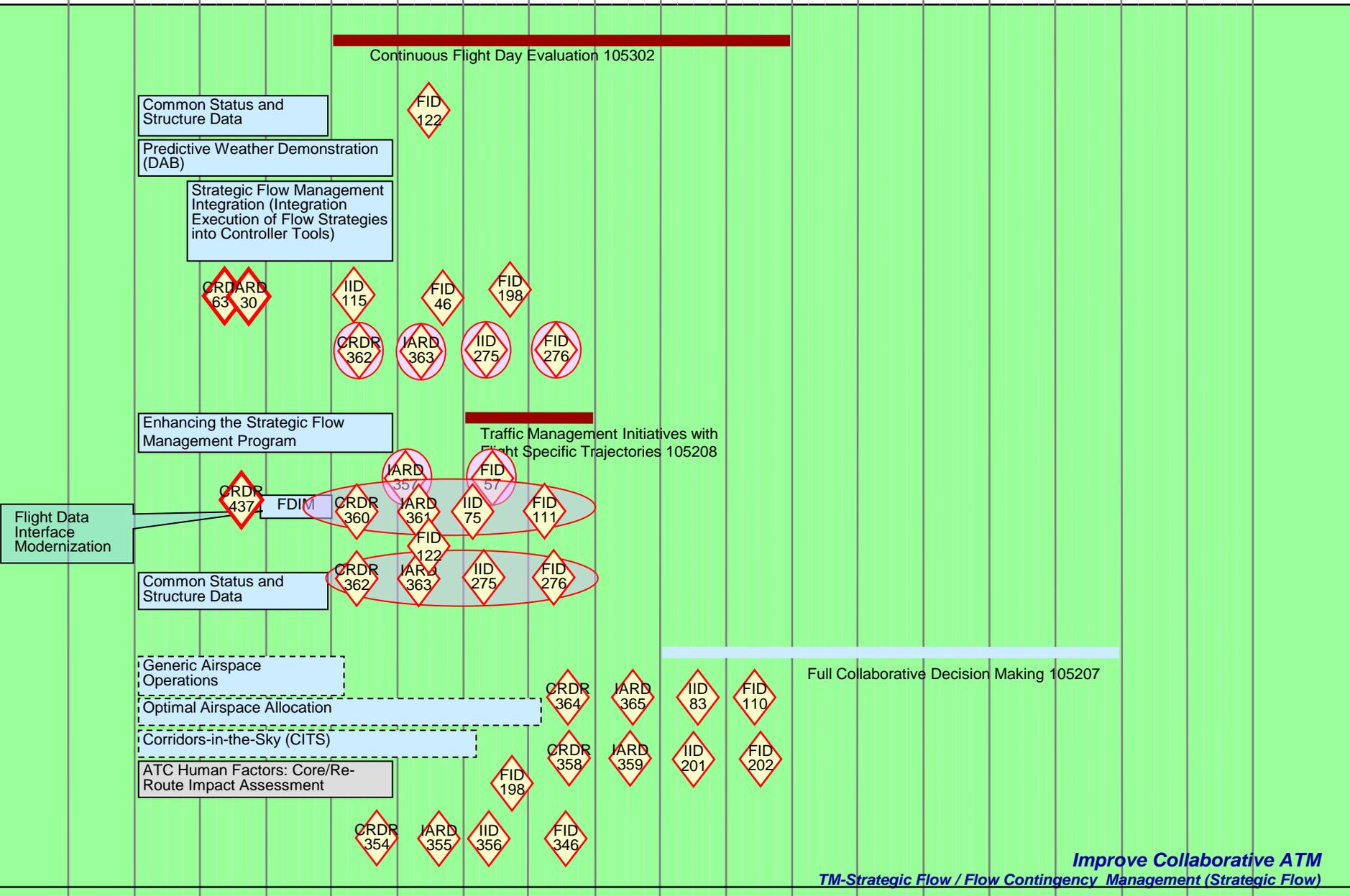
CY 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025



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# Automation Roadmap (14 of 20)

CY 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025



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# Automation Roadmap (15 of 20)

CY 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025

Improved Management of Special Activity Airspace 108212

Common Status and Structure Data

Dynamic Airspace Management (Flexible dynamic airspace, ARMS)

FID 122

FID 31

*Improve Collaborative ATM  
Airspace Management / Capacity Management (Airspace)*

Provide Full Flight Plan Constraint Evaluation with Feedback 101102

Common Status and Structure Data

Enhancing the Strategic Flow Management Program

Advanced Methods for TFM

FID 122

IARD 357

FID 57

CRDR 437

FDIM

CRDR 360

IARD 361

IID 75

FID 111

Flight Data Interface Modernization

CRDR 362

IARD 363

IID 275

FID 276

Common Status and Structure Data

Flight Data Object Demonstration

FID 122

On-Demand NAS Information 103305

CRDR 360

IARD 361

IID 75

FID 111

En Route Wake Vortex Avoidance Advisor

Predictive Weather Demonstration (DAB)

CRDR 362

IARD 363

IID 275

FID 276

FID 31

CRDARD 63

30

IID 115

FID 46

FID 198

*Improve Collaborative ATM  
ATC-Advisory & Flight Planning, Emergency and Alerting, Infrastructure-Information Management / Flight and State Data Management*

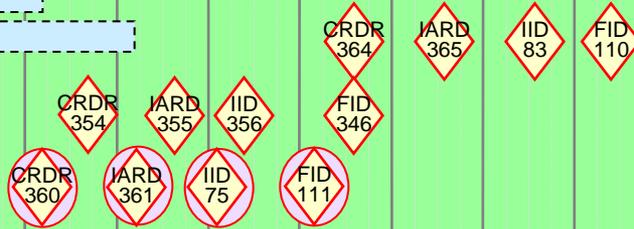
**APPROVED**

# Automation Roadmap (16 of 20)

CY 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025

Metroplex Operations Management  
 Multiple Airport Runway Management  
 Single Airport Runway Management  
 Digital TMI Automation

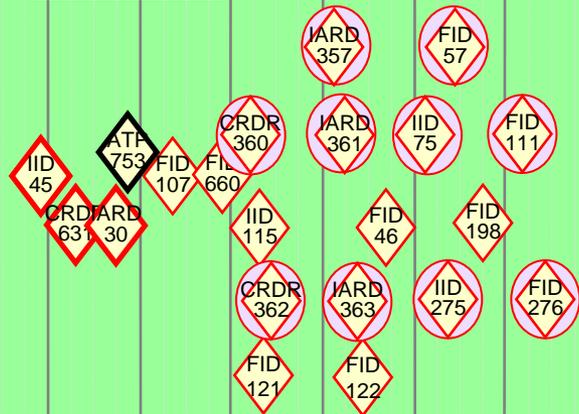
Full Integration of Weather Information into NAS Automation and Decision Making 103123



*Reduce Weather Impact  
 TM Synchronization/Trajectory Management*

Initial Integration of Weather Information into NAS Automation and Decision Making 103119

Weather Observation Improvements  
 Weather Forecast Improvements  
 Dynamic Airspace Management (Flexible dynamic airspace, ARMS)



*Reduce Weather Impact  
 TM-Strategic Flow / Flow Contingency Management (Strategic Flow)*

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# Automation Roadmap (17 of 20)

CY 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025

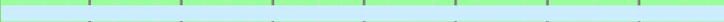


Initial Improved Weather Information from Non-Ground Based Sensors 103116

Weather Observation Improvements

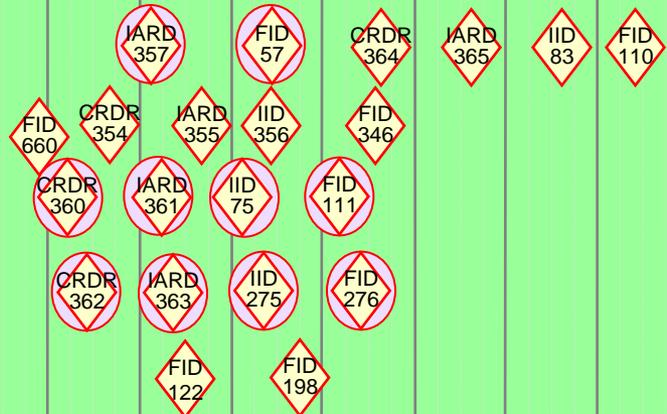
Dynamic Airspace Management (Flexible dynamic airspace, ARMS)

FID 122



Full Improved Weather Information and Dissemination 103121

Digital TMI Automation



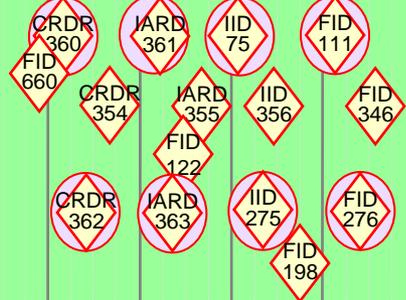
**Reduce Weather Impact**  
 ATC-Advisory & Flight Planning, Emergency and Alerting, Infrastructure-Information Management / Flight and State Data Management

**APPROVED**

# Automation Roadmap (18 of 20)

CY	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
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Security Integrated Tool Suite  
Operational Security Capability for Threat Detection and Tracking, NAS Impact Analysis and Risk-Based Assessment 109302



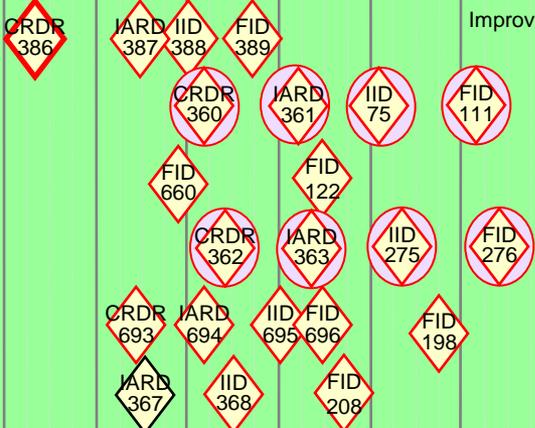
Content Definition for the Security Integrated Tool Suite  
Dynamic Flight Risk Profile and Security Airspace research



Operational Security Capability with Dynamic Flight Risk Assessment for Improved Security Airspace Planning and Management 109317

Develop Integrated NextGen Safety Plan

Enhance Emergency Alerting 106202  
ASIAS - Information Sharing and Emergent Trend Detection 109303  
Enhanced Aviation Safety Information Analysis and Sharing 109304  
Improved Safety for NextGen Evolution 109305



**Increase Safety, Security, and Environmental Performance**  
ATC-Advisory & Flight Planning, Emergency and Alerting, Infrastructure-Information Management / Flight and State Data Management

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# Automation Roadmap (19 of 20)

CY	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
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ATC Human Factors: NextGen Human Factors in ATC Workstation Integration/Human Factors Requirements for an Enroute and TRACON Common Automation Platform

Improved Safety for NextGen Evolution 109305

Inventory Time and Frequency Requirements and Assess GPS Outage Impacts

ATC Human Factors: NextGen Human Factors in ATC Workstation Integration/NextGen Workstation Design - Human Performance Budget



ATC Human Factors: NextGen Human Factors in ATC Workstation Integration/NextGen Workstation Design - Enroute

ATC Human Factors: Future En Route Workstation (FEWS) III: Data reduction, analysis, and reporting



ATC Human Factors: NextGen Human Factors in ATC Workstation Integration/NextGen Workstation Design - Tower and TRACON

ATC Human Factors: Future Terminal Workstation (FTWS)



**Increase Safety, Security, and Environmental Performance**  
 ATC-Advisory & Flight Planning, Emergency and Alerting, Infrastructure-Information Management / Flight and State Data Management

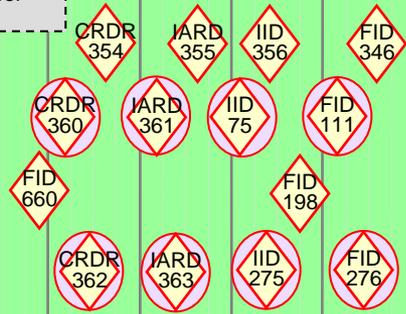
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# Automation Roadmap (20 of 20)

CY 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025

Investigate Multi-Sector Planner (MSP) Concept for NextGen Mid-Term

NAS Wide Sector Demand Prediction and Resource Planning 105104



**Transform Facilities**  
Airspace Management / Capacity Management (Airspace)

NextGen Networked Facilities - Staffed NextGen Tower (SNT) R&D and NextGen Tower Concept Validation

Remotely Staffed Tower Services 109402



Integrated Business Continuity Planning

Business Continuity Services 109405



NextGen Networked Facilities - Automated NextGen Tower (ANT) R&D

Automated Virtual Towers 109404



**Transform Facilities**  
ATC-Advisory & Flight Planning, Emergency and Alerting, Infrastructure-Information Management / Flight and State Data Management

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# Automation Roadmap: Assumptions

Identifier	Description
AUTO-01	Net-centric Enterprise Services will replace designated existing point to point interfaces with a system based on a Service Oriented Architecture providing enhanced data exchange, enhanced flexibility, and enhanced security for FAA Operations Personnel, and airspace users within a common information environment to support NextGen Operational Improvements.
AUTO-02	ADS-B is a necessary infrastructure element to support Trajectory Based Operations, Flexible Terminal, and High Density Terminal solution sets.
AUTO-03	Data Communication is a necessary infrastructure element to support Trajectory Based Operations, Flexible Terminal, and High Density Terminal solution sets.
AUTO-04	Existing automation platforms will provide the basis for the Next Generation capabilities through the mid-term.
AUTO-05	New platforms will only be added to augment existing automation systems when necessary.
AUTO-06	Operational Service Units will be responsible for JRC Final Investment Decisions.
AUTO-07	Policy and standards decisions prescribing the use of hand-held devices for data messaging by General Aviation pilots and aircraft are established.
AUTO-08	Consistent security management across Data Communication, Automation and SWIM support the evolution.
AUTO-09	Human-system integration will be conducted during analysis, design, development, and testing of Automation programs.
AUTO-10	Safety analysis and considerations will be included in all applicable phases of Automation analysis, design, development, and testing and platforms will provide data as required for safety monitoring and analysis.
AUTO-11	Automation platform designs will support environmental and energy saving initiatives.

# Automation Roadmap: Decision Points (1 of 4)

DP#	Target Date	High Priority	Domain	Name
2	2011 Q4	Y		AIM Modernization Segment 1 Final Investment Decision
30	2010 Q3	Y		Investment Analysis Readiness Decision for Tower Flight Data Manager 1 (TFDM1) (Complete)
31	2012 Q1	Y		Final Investment Decision for Post ERAM R3 Work Package
33	2010 Q3	Y		Investment Analysis Readiness Decision for Security Integrated Tool Suite (SITS) (Complete)
45	2009 Q4	Y		Terminal Automation Modernization and Replacement (TAMR) Phase 3 Initial Investment Decision (Complete)
46	2013 Q3	Y		Tower Flight Data Manager 1 (TFDM1) Final Investment Decision
55	2009 Q3	N		Assess common front end display components for Radar Display (i.e., R-side) monitor (Complete)
57	2014 Q2	Y		TBFM/WP3 Final Investment Decision
67	2010 Q2	N		Approval of offshore implementation long term plan (Complete)
68	2012	N		Decision to support NASE integration with AIM
75	2014	Y		En Route Automation NextGen Mid-Term Work Package Initial Investment Decision
83	2017	Y		Transition to NextGen Far Term automation platforms and display subsystem through convergence Initial Investment Decision
89	2012 Q4	Y	Weather	Investment Decision (FID) for NextGen Wx Processor WP1 (includes CIWS functionality, NG WARP functionality & NNEW WP1 functionality (includes WARP WINS & FBWTG, may also include WMSCR Wx Communications functionality))
102	2012 Q3	N	Surveillance	Final Investment Decision to implement SIM in terminal and en route legacy radar systems
107	2011 Q2	Y		TAMR Phase 3 Segment 1 Final Investment Decision
109	2010 Q3	N		Architectural Decision to Pursue a Common Information Display System (IDS) (Complete)
110	2018	Y		Approve final investment for transition to NextGen automation platforms and display subsystem through convergence
111	2015	Y		En Route Automation NextGen Mid-Term Work Package Final Investment Decision
115	2012 Q2	Y		Approve Tower Flight Data Manager 1 Initial Investment Decision
117	2015	N		Decision to decommission FDIO systems
119	2010 Q1	Y		Final Investment Decision for CATMT Work Package 3 contents (Complete)
121	2012 Q2	Y		AIM Modernization Segment 2 Final Investment Decision
122	2013 Q2	Y		AIM Modernization Segment 3 Final Investment Decision
125	2010 Q2	N		Alaska Flight Service Modernization (AFSM) Segment 1 Final Investment Decision (Complete)
126	2014 Q1	N	Facilities	Initial Investment Decision (IID) Flight Services Facilities (Alaska)

# Automation Roadmap: Decision Points (2 of 4)

DP#	Target Date	High Priority	Domain	Name
127	2015 Q3	N	Facilities	Final Investment Decision (FID) Flight Services Facilities (Alaska)
128	2009 Q2	N	Enterprise Services	Final Investment Decision for SWIM Segment 1B (Baseline for FY 11 - 13) (Complete)
158	2011 Q3	Y	Communication	Data Communications Segment 1 FID (part 1 of a split FID)
172	2012 Q4	N	Aircraft	4DT concept complete, including common definition of Flight Object path and constraints. Major agency decision on constrained trajectory, negotiated trajectory, delegated trajectory)
177	2011 Q3	Y		Initial Investment Decision for SITS Air Domain Security Architectures
195	2010 Q2	Y		Time Based Flow Management (TBFM) Final Investment Decision (Complete)
198	2014	Y		Tower Flight Data Manager 2 (TFDM2) Final Investment Decision
199	2009 Q4	N		DOTS Sustainment/Integration Decision (Complete)
200	2017 Q1	N		En Route/Oceanic Integration Assessment
201	2017	Y		En Route /Oceanic IES NextGen WP Initial Investment Decision
202	2018	Y		En Route /Oceanic IES NextGen WP Final Investment Decision
203	2012 Q1	N	Communication	Flight Service, MAPS Voice System Provisioning Coordination with NVS
206	2012 Q3	Y		Final Investment Decision for SITS Air Domain Security Architecture
207	2012 Q4	N		DUAT Continuation decision
208	2013 Q3	Y		Meteorological and Aeronautical Planning System (MAPS) Final Investment Decision
260	2020	N	Surveillance	Decision on ADS-B Rule Compliance
262	2012	N	Airspace & Procedures	Decision to implement Integrated Arrival/Departure Airspace (Big Airspace) at candidate areas
275	2014	Y		TRACON Automation NextGen Mid-Term Work Package Initial Investment Decision
276	2015	Y		TRACON Automation NextGen Mid-Term Work Package Final Investment Decision
295	2015 Q2	Y	Information System Security	FID for two Mid Term capabilities: IDR and IPE, plus legacy NAS transition for all five capabilities
304	2018	Y	Communication	Data Communications Segment 2 FID
341	2016 Q2	Y	Weather	Investment Decision (FID) for NNEW WP2 and transition of ADAS communications (and WMSCR Comms if not completed in NNEW WP1) to NNEW WP2

# Automation Roadmap: Decision Points (3 of 4)

DP#	Target Date	High Priority	Domain	Name
344	2011 Q1	N	Enterprise Services	Establish Requirements for a Backup Timing Source
345	2012 Q3	N	Enterprise Services	Implementation strategy decision for GPS timing backup
346	2015	Y		Final Investment Decision for CATMT Work Package 4
353	2012 Q1	Y	Communication	Data Communications Segment 1 FID (part 2 of a split FID)
354	2012	Y		CATMT Work Package 4 Concept and Requirements Definition Readiness Decision
355	2013	Y		CATMT Work Package 4 Investment Analysis Readiness Decision
356	2014	Y		CATMT Work Package 4 Initial Investment Decision
357	2013 Q1	Y		TBFM/WP3 Investment Analysis Readiness Decision
358	2015	Y		En Route /Oceanic IES NextGen WP Concept and Requirements Definition Readiness Decision
359	2016	Y		En Route /Oceanic IES NextGen WP Investment Analysis Readiness Decision
360	2012	Y		En Route Automation NextGen Mid-Term Work Package Concept and Requirements Definition Readiness Decision
361	2013	Y		En Route Automation NextGen Mid-Term Work Package Investment Analysis Readiness Decision
362	2012	Y		TRACON Automation NextGen Mid-Term Work Package Concept and Requirements Definition Readiness Decision
363	2013	Y		TRACON Automation NextGen Mid-Term Work Package Investment Analysis Readiness Decision
364	2015	Y		Transition to NextGen Far Term automation platforms and display subsystem through convergence Concept and Requirements Definition Readiness Decision
365	2016	Y		Transition to NextGen Far Term automation platforms and display subsystem through convergence Investment Analysis Readiness Decision
366	2010 Q1	N		Meteorological and Aeronautical Planning System (MAPS) Concept and Requirements Definition Readiness Decision (Complete)
367	2011 Q2	N		Meteorological and Aeronautical Planning System (MAPS) Investment Analysis Readiness Decision
368	2012 Q3	Y		Meteorological and Aeronautical Planning System (MAPS) Initial Investment Decision
373	2010 Q4	Y		RMMS CONOPS for NextGen Integration Strategy Decision (Complete)
374	2009 Q4	N		RMMS Technology Refresh Final Investment Decision (Complete)

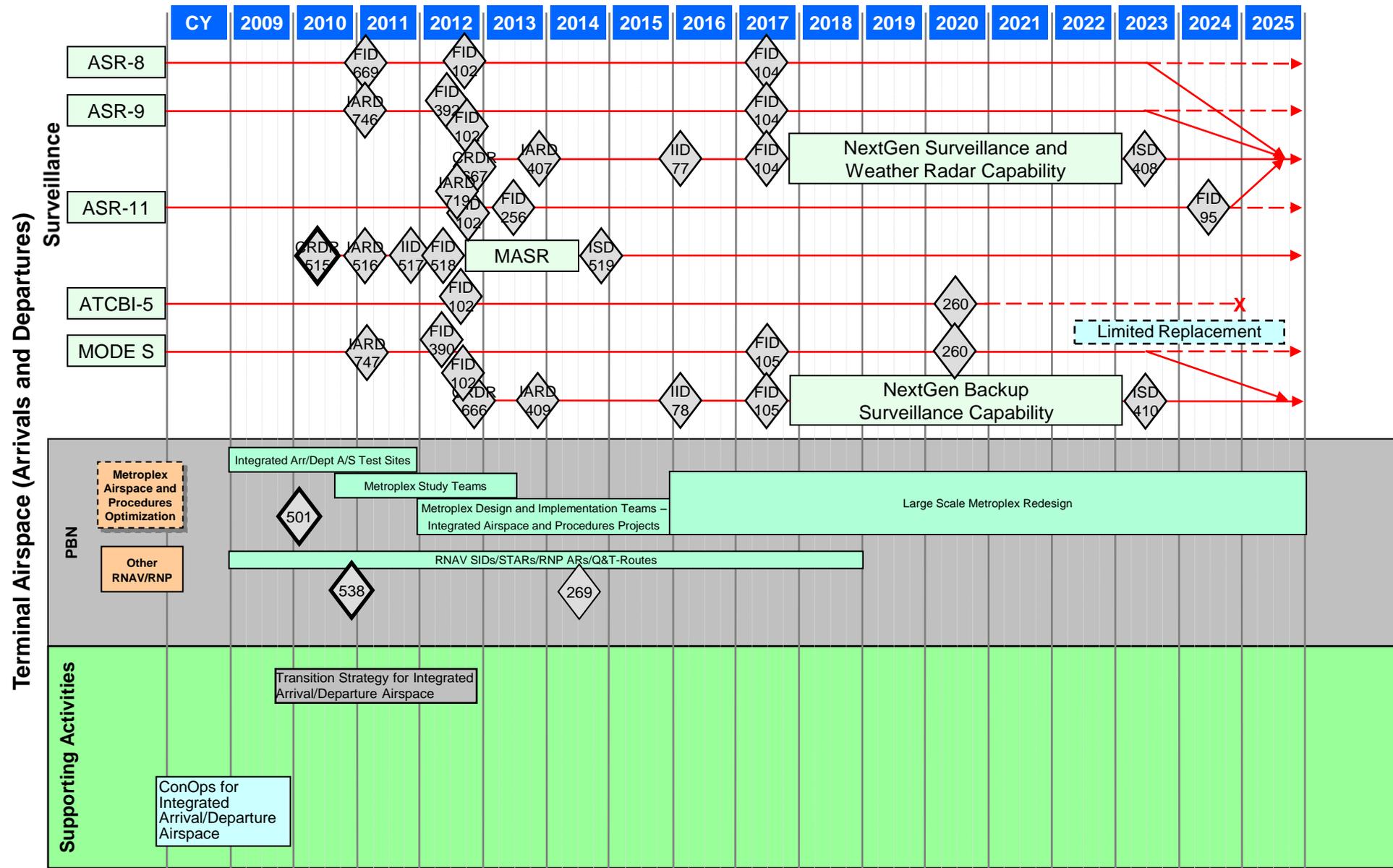
# Automation Roadmap: Decision Points (4 of 4)

DP#	Target Date	High Priority	Domain	Name
386	2010 Q2	Y		NextGen ATOP/Offshore Automation Concept and Requirements Definition Readiness Decision (Complete)
387	2011 Q2	Y		NextGen ATOP/Offshore Automation Investment Analysis Readiness Decision
388	2012 Q1	Y		NextGen ATOP/Offshore Automation Initial Investment Decision
389	2012 Q3	Y		NextGen ATOP/Offshore Automation Final Investment Decision
437	2010 Q3	Y		Flight Data Interface Modernization Concept and Requirements Definition Readiness Decision (Complete)
511	2014	Y	Navigation	Alternate PNT Strategy
594	2012 Q1	N	Facilities	Strategy Decision for Flight Services Facilities (Alaska)
595	2012 Q4	N	Facilities	IARD for Flight Services Facilities (Alaska)
596	2011 Q1	N		Traffic Flow Management Sustainment Final Investment Decision
630	2012 Q4	N		Policy Decision on Data Rights and Release Policies For Sharing Surface and Arrival Data
631	2010 Q2	Y		Concept and Requirements Definition Readiness Decision (CRDR) for Tower Flight Data Manager 1 (TFDM1) (Complete)
635	2020	Y	Weather	Investment Decision (FID) for NNEW Tech Refresh
660	2011 Q4	Y		Final Investment Decision for TAMR Phase 3 Segment 2
693	2011 Q2	Y		Concept and Requirements Definition Readiness Decision for AMMS Work Package 1 and Work Package 2
694	2012 Q1	Y		Investment Analysis Readiness Decision for AMMS Work Package 1 and Work Package 2
695	2013 Q1	Y		Initial Investment Decision for AMMS Work Package 1 and Work Package 2
696	2013 Q2	Y		Final Investment Decision for AMMS Work Package 1 and Work Package 2
697	2012 Q4	Y		Investment Analysis Readiness Decision for RMLS Technology Refresh
698	2013 Q2	Y		Final Investment Decision for RMLS Technology Refresh
699	2013 Q2	Y		In Service Decision for RMMS Technology Refresh
700	2017 Q1	Y		Strategy Decision for AMMS and RMLS NextGen Integration
748	2011 Q2	N		Baseline Change Decision (BCD) for ERAM
753	2010 Q4	N		Authorization to Proceed (ATP) towards TAMR Phase 3 Segment 1 FID (DP 107)
754	2010 Q4	N	Enterprise Services	Authorization to Proceed (ATP) towards SWIM Segment 2 FID (DP 708)

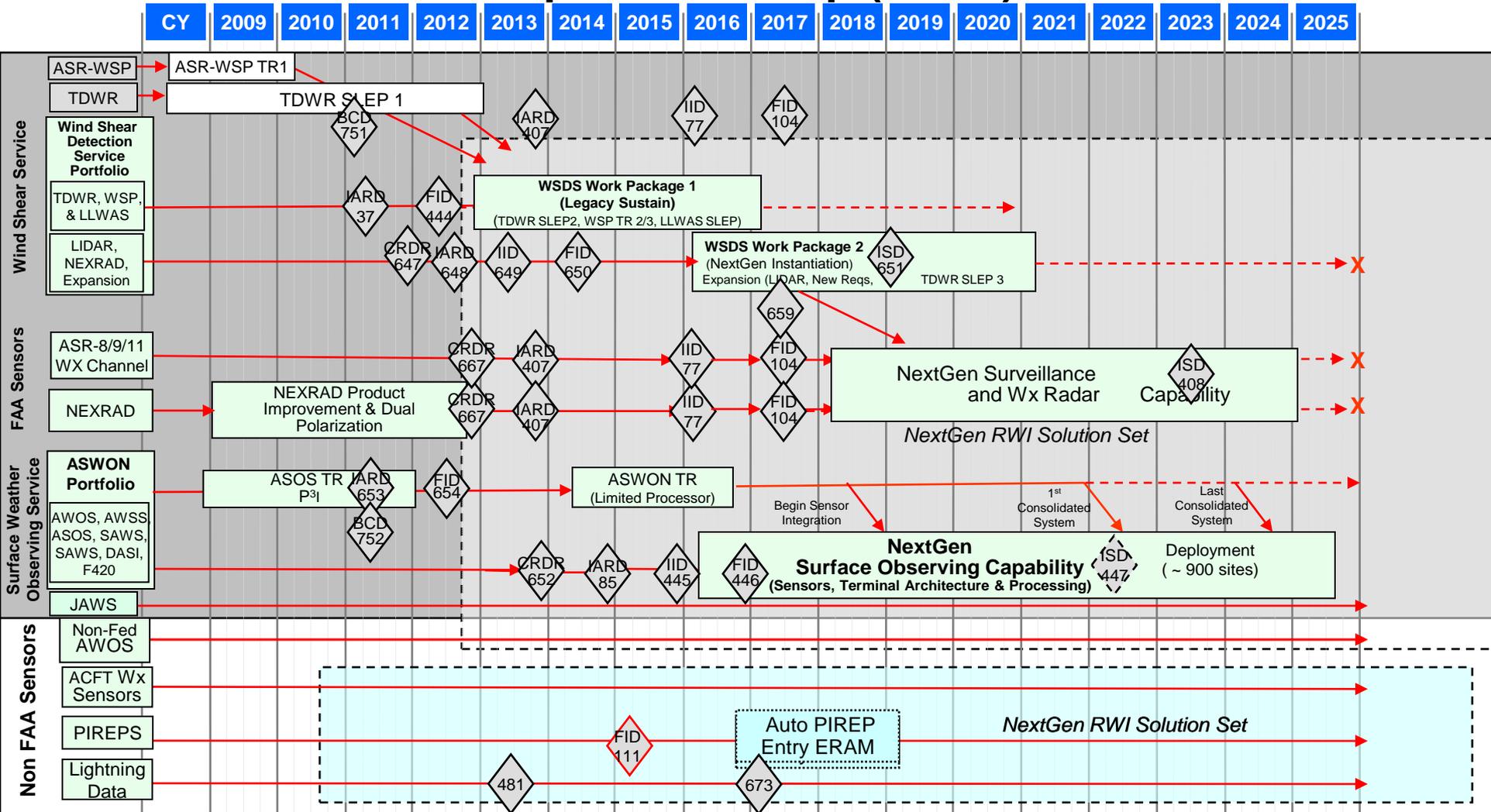
# Airport

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# Airport Roadmap (1 of 9)



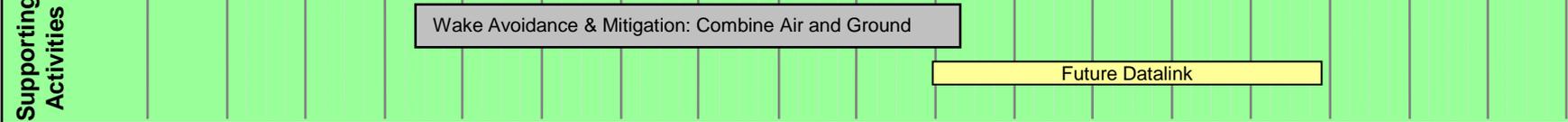
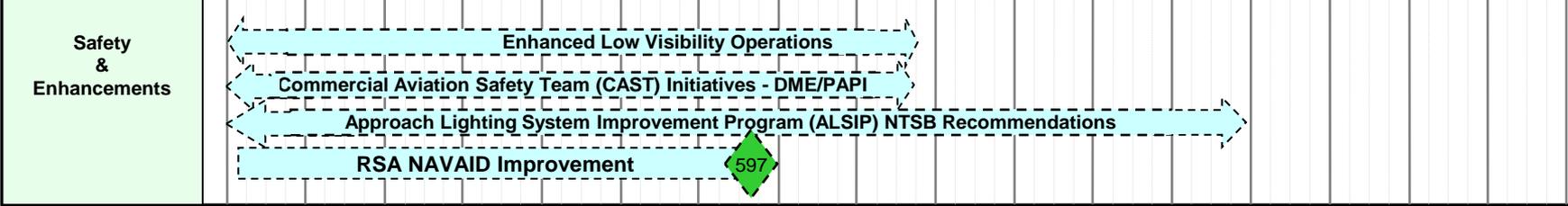
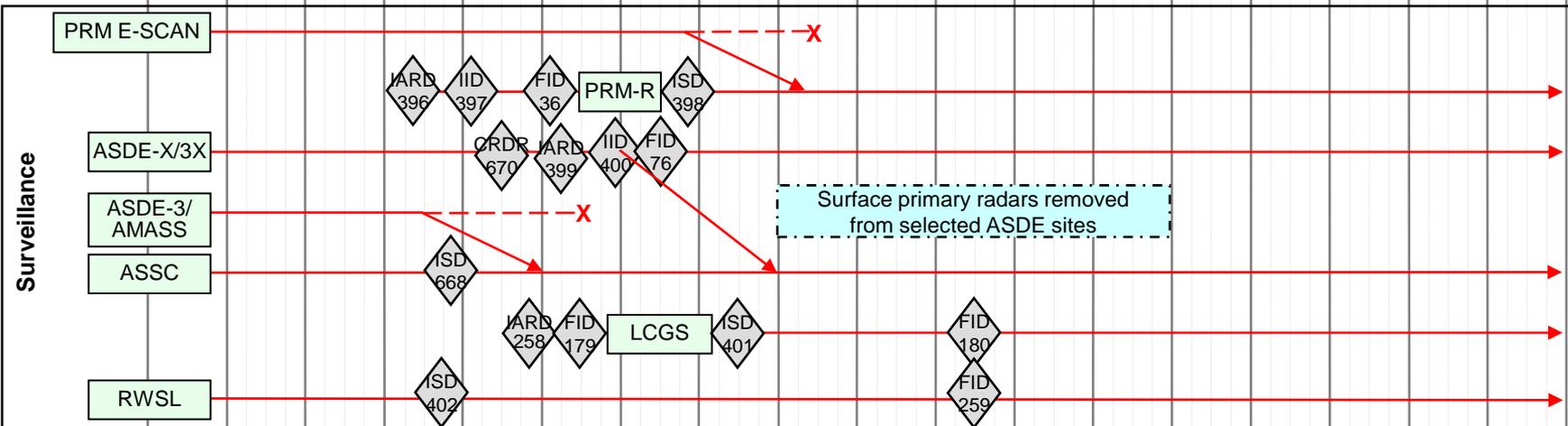
# Airport Roadmap (2 of 9)



# Airport Roadmap (3 of 9)

CY 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025

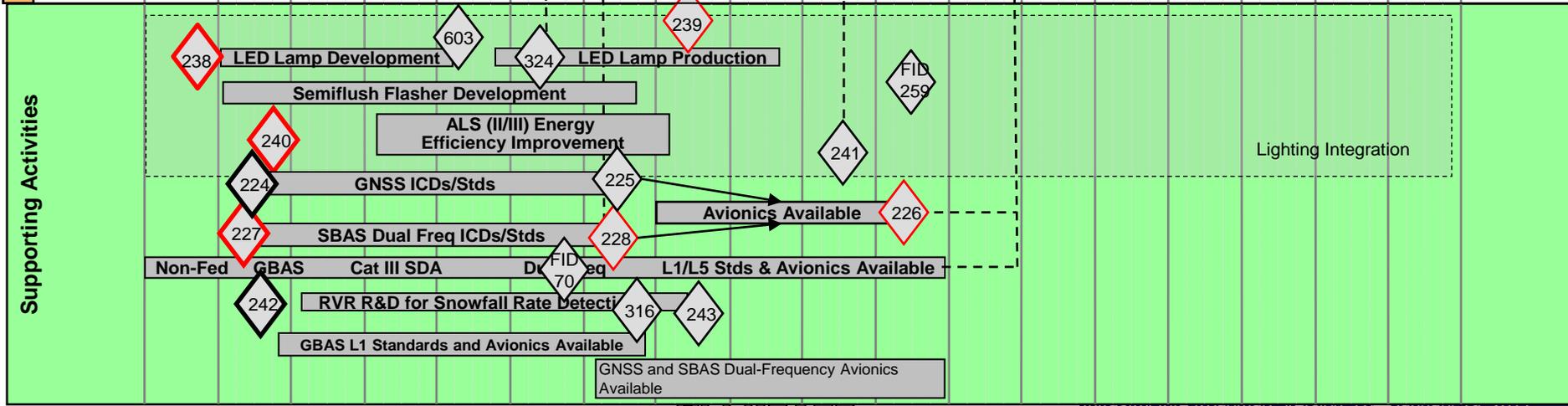
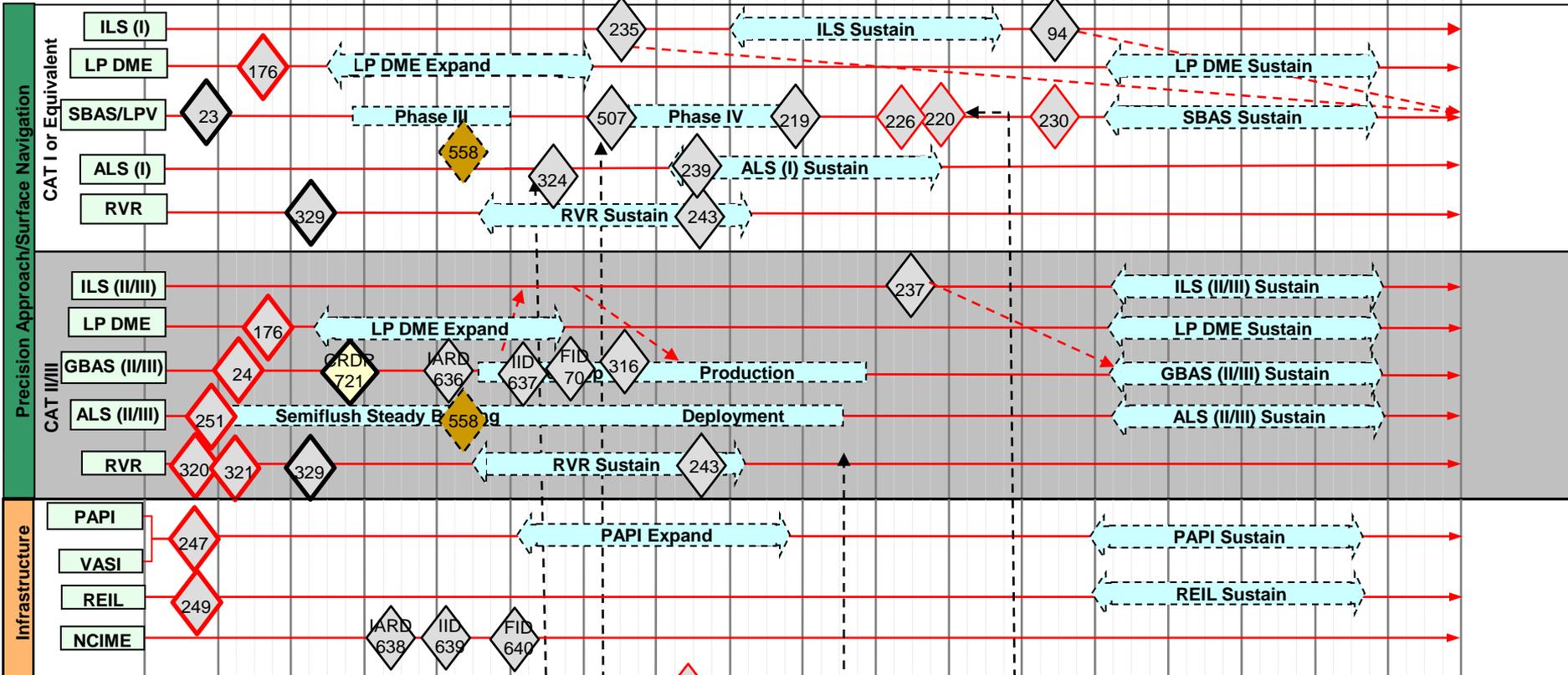
Approach and Landing/Takeoff



# Airport Roadmap (4 of 9)

CY 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025

Approach and Landing/Takeoff

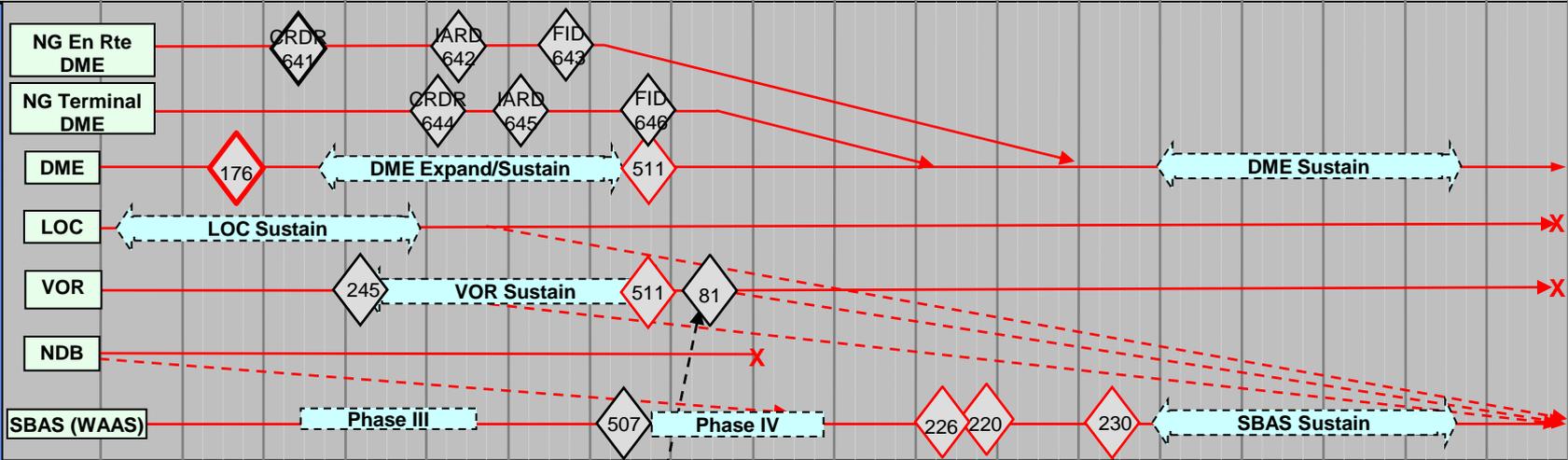


# Airport Roadmap (5 of 9)

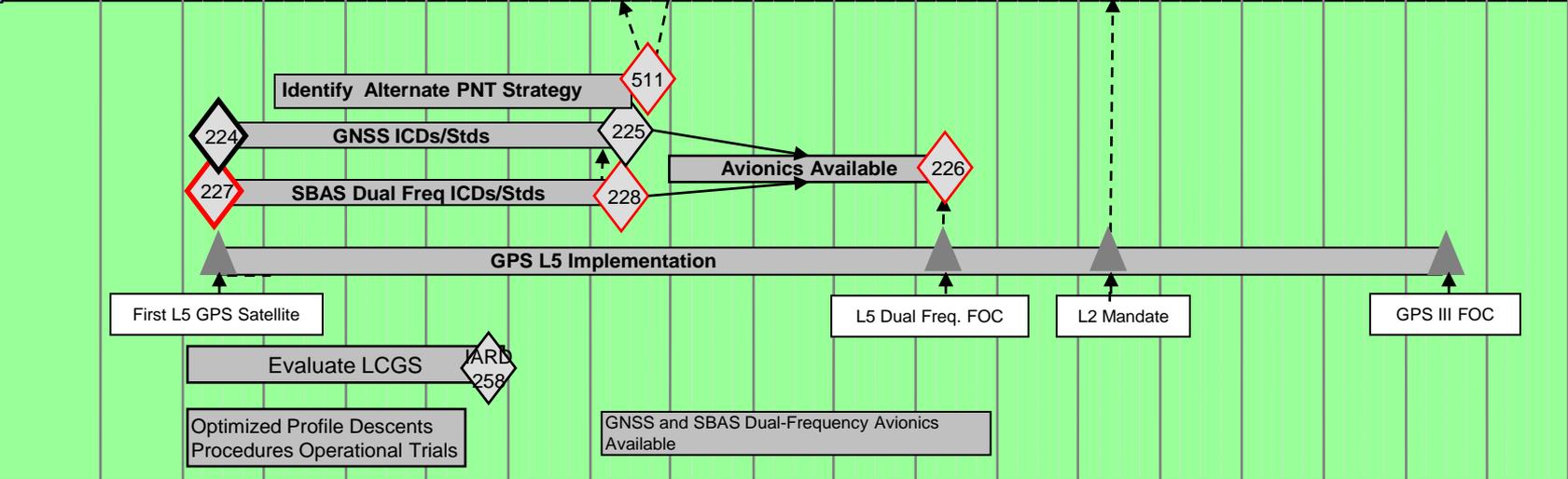
CY 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025

Approach and Landing/Takeoff

En Route/Terminal/  
Non-Precision Approach

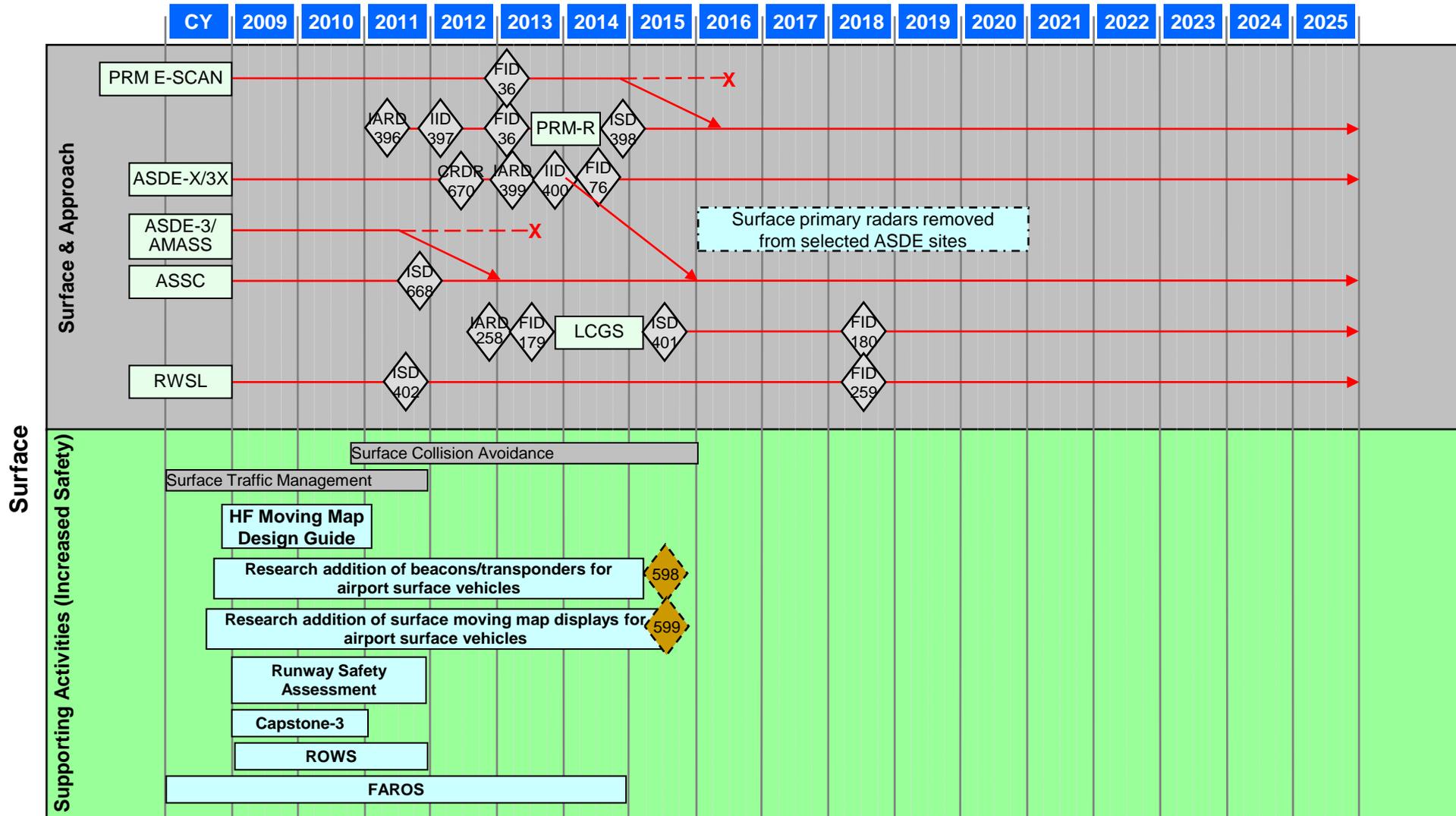


Supporting Activities



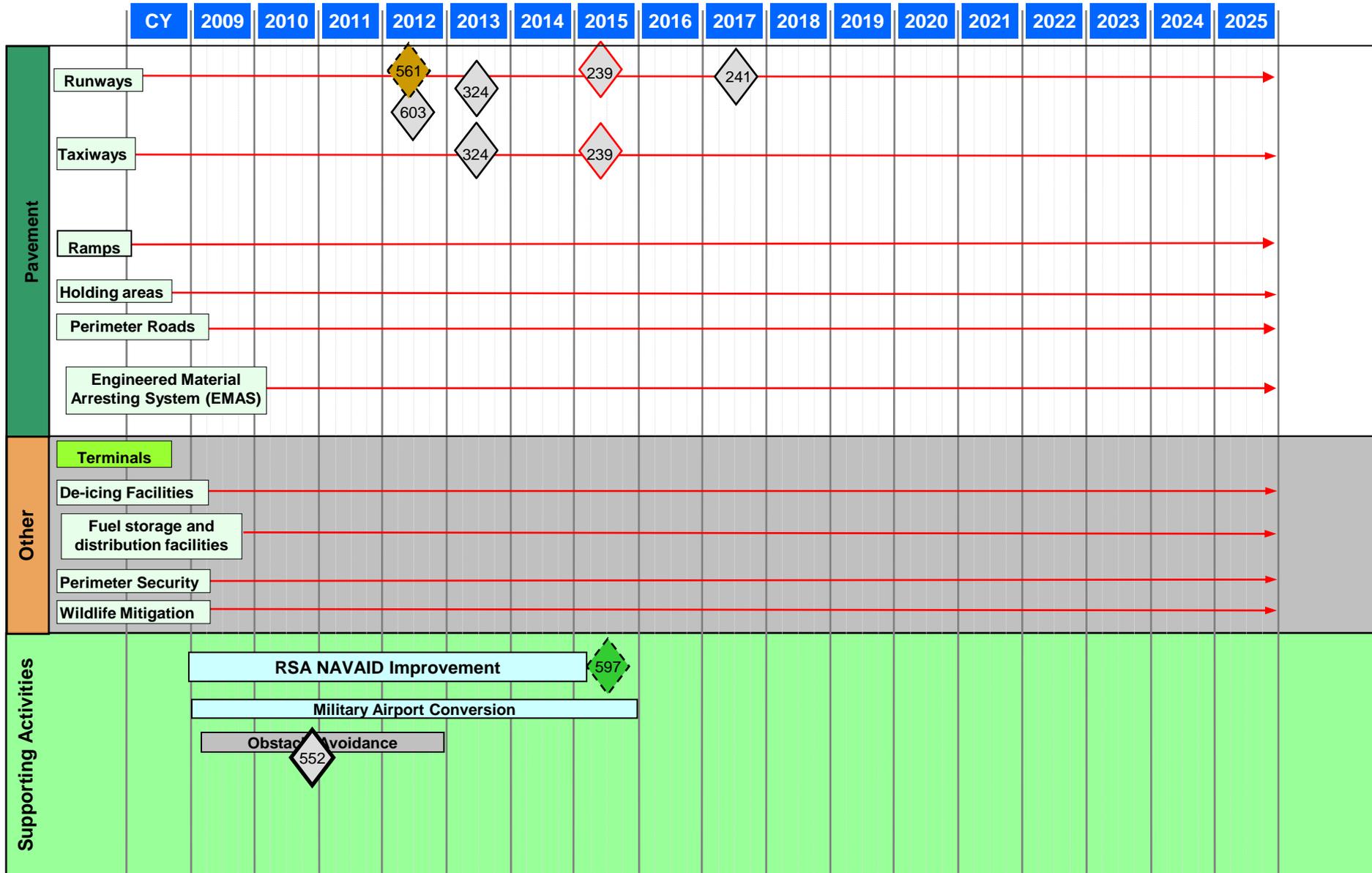
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# Airport Roadmap (6 of 9)



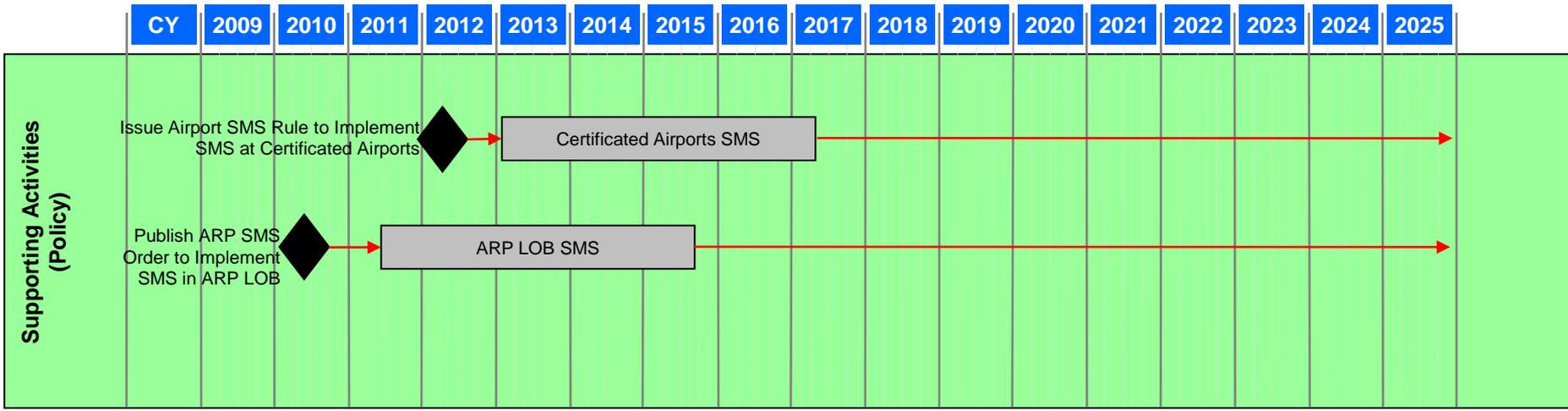


# Airport Roadmap (8 of 9)



# Airport Roadmap (9 of 9)

Infrastructure



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# Airport Roadmap: Assumptions

Identifier	Description
APT-01	This roadmap will focus on airport airside and landside activities (not including inside the airport terminal), and arrival/departure operations out to about 5 miles.
APT-02	Airports are covered in general; specific airports are not described.
APT-03	Initial work covers large/medium hub airports.
APT-04	Key decisions are pulled from other roadmaps.
APT-05	This is an initial roadmap that connects FAA infrastructure elements to airport airside infrastructure elements, and provides a basis for future tracking of the boundary and boundary issues.

# Airport Roadmap: Decision Points (1 of 6)

DP #	Target Date CY	High Priority	Domain	Name
36	2013 Q1	N	Surveillance	Final Investment Decision for migration of PRM to PRM-R (based on multilateration)
37	2011 Q2	N	Weather	IARD to Tech Refresh/SLEP wind shear detection services capability of all WS systems (to address wind shear study & technologies)
70	2013 Q3	N	Navigation	Final Investment Decision (FID) for the acquisition of CAT II/III Ground Based Augmentation System (GBAS)
76	2014	N	Surveillance	Final Investment Decision for removal or SLEP/replace ASDE surface primary radars (evolving requirements for safety and security may impact decision)
77	2016 Q1	N	Surveillance	Initial Investment Decision to implement a NextGen Surveillance and Weather Radar Capability for ATC
78	2016 Q1	N	Surveillance	Initial Investment Decision to implement a NextGen beacon/backup radar system for ATC
81	2015	N	Navigation	VOR decision on far-term drawdown
85	2014 Q4	N	Weather	Investment Decision (IARD) to Consolidate & Replace ASWON automated surface observing systems (replacement for all ASWON sensors plus NextGen requirements)
94	2020	N	Navigation	Decision on complete ILS CAT I drawdown
95	2024	N	Surveillance	Decision for replacement of terminal primary radars (ASR-11 PSR) and removal of terminal beacons (ASR-11 MSSR)
102	2012 Q3	N	Surveillance	Final Investment Decision to implement SIM in terminal and en route legacy radar systems
104	2017	N	Surveillance	Final Investment Decision to implement a NextGen Surveillance and Weather Radar Capability for ATC
105	2017	N	Surveillance	Final Investment Decision to implement a NextGen beacon/backup radar system for ATC
111	2015	Y	Automation	Final Investment Decision for 'auto PIREP' in ERAM Mid-term Work Package Wx I&I working up sponsor
176	2009 Q3	Y	Navigation	DME NextGen Strategy Plan—Decision to procure next generation of DMEs to replace aging systems and expand the network where needed to support RNAV & NextGen (Complete)
179	2013	N	Surveillance	Combined Initial Investment Decision and Final Investment Decision for LCGS
180	2018	N	Surveillance	Final Investment Decision for ADS-B to assume LCGS function, or approve a Technology Refresh for LCGS
212	2020	N	Weather	Investment Decision (IARD) to add WT Mitigation for Single Runway (WTSR) decision support capability

# Airport Roadmap: Decision Points (2 of 6)

DP #	Target Date CY	High Priority	Domain	Name
219	2016	N	Navigation	Completion of all WAAS instrument approach procedures (LPV and LP) for all qualifying runways in the National Airspace System (NAS), estimated to be 5500 runway ends. Original date of 2018 was accelerated to 2016.
220	2018	Y	Navigation	Completion of Dual Frequency (GPS L1 and L5) development & testing for the WAAS ground and space segment hardware, software, and user equipment standards and avionics, required by DoD Mandate, issued September 2008
224	2009 Q2	N	Navigation	Decision to develop dual frequency multi-constellation GNSS avionics (Complete)
225	2014	N	Navigation	Decision to proceed with dual frequency multi-constellation GNSS avionics activities to validate standards and lower risk for avionics development
226	2018	Y	Navigation	Completion of Dual frequency multi-constellation GNSS avionics activities
227	2009 Q2	Y	Navigation	Decision to develop dual frequency SBAS/WAAS avionics (Complete)
228	2014	Y	Navigation	Decision to proceed with WAAS dual frequency avionics activities to validate standards and lower risk for avionics development.
230	2020	Y	Navigation	Cut-over to dual frequency operations
235	2014	N	Navigation	Decision on active drawdown of Cat I ILSs operating in the NAS
237	2018	N	Navigation	Decision on replacement Cat II/III ILSs operating in the NAS
238	2008 Q4	Y	Navigation	ALS (I) - Decision to develop and implement replacements for PAR 38 & 56 lamps (Complete)
239	2015	Y	Navigation	Production ALS(I) lamps available for installation
240	2009 Q4	Y	Navigation	ALS (II/III) - Decision to improve energy efficiency of lighting systems (Complete)
241	2017	N	Navigation	Energy efficient ALSF-2 production systems available
242	2009 Q3	N	Navigation	Decision to conduct R & D to explore RVR for prediction of precipitation (Complete)
243	2015	N	Navigation	Decision to implement enhanced capability based on results of RVR research
245	2011 Q1	N	Navigation	Decision on near-term minimum operational VOR ground network
247	2008 Q4	Y	Navigation	Decision to develop and implement replacements for PAPI lamps with LEDs (Complete)
249	2008 Q4	Y	Navigation	Decision to develop and implement replacements for REIL lamps with LEDs (Complete)
251	2008 Q4	Y	Navigation	Decision to deploy semiflush fixtures for existing sites and new establishments (Complete)
256	2013	N	Surveillance	Final Investment Decision for ASR-11 Technology Refresh Segment 2 (through 2025)
258	2012 Q4	N	Surveillance	Investment Analysis Readiness Decision for LCGS
259	2018	N	Surveillance	Final Investment Decision for RWSL Technology Refresh

# Airport Roadmap: Decision Points (3 of 6)

DP #	Target Date CY	High Priority	Domain	Name
260	2020	N	Surveillance	Decision on ADS-B Rule Compliance
269	2014	N	Airspace and Procedures	Identify locations (e.g. additional TRACONS and previously re-designed facilities)
271	2011 Q2	N	Airspace and Procedures	Wake Turbulence Procedures
316	2014	N	Navigation	GBAS ground facilities and single-frequency avionics available for use
320	2008 Q4	Y	Navigation	Decision to implement RVR 1800 at OEP Airports (Complete)
321	2009 Q1	Y	Navigation	Increased capacity at ILS/RVR equipped runways during IMC (Complete)
324	2013	N	Navigation	Decision to proceed with ALS(I) LED lamps, based on Operational Capability Demonstration with EFVS aircraft
329	2010 Q1	N	Navigation	RVR Sustainment: ISD for PC-RVR for use within the NAS (Complete)
390	2012 Q2	N	Surveillance	Final Investment Decision (FID) for legacy beacon (Mode S) SLEP through 2025
392	2012 Q2	N	Surveillance	Final Investment Decision for legacy radar (ASR-9) SLEP through 2025
396	2011 Q2	N	Surveillance	Investment Analysis Readiness Decision for Precision Runway Monitor-Replacement
397	2012 Q1	N	Surveillance	Initial Investment Decision for migration of PRM to PRM-R (based on multilateration)
398	2014 Q4	N	Surveillance	In-Service Decision for PRM-R (based on multilateration)
399	2013 Q1	N	Surveillance	Investment Analysis Readiness Decision for removal or SLEP/replace ASDE surface primary radars
400	2013 Q4	N	Surveillance	Initial Investment Decision for removal or SLEP/replace ASDE surface primary radars
401	2015	N	Surveillance	In-Service Decision for Low Cost Ground Surveillance system
402	2011 Q3	N	Surveillance	In-Service Decision for Runway Status Light system
407	2013 Q4	N	Surveillance	Investment Analysis Readiness Decision for NextGen Surveillance and Weather Radar Capability
408	2023	N	Surveillance	In-Service Decision for NextGen Surveillance and Weather Radar Capability
409	2013 Q4	N	Surveillance	Investment Analysis Readiness Decision for New Beacon/Backup System
410	2023	N	Surveillance	In-Service Decision for New Beacon/Backup System
444	2012 Q2	N	Weather	FID to Tech Refresh/SLEP all low-level wind shear detection systems as part of wind shear detection service
445	2015 Q4	N	Weather	Investment Decision (IID) to consolidate and replace ASWON automated surface observing capability (replacement for all ASWON sensors plus NextGen requirements)
446	2016 Q4	N	Weather	Investment Decision (FID) to consolidate and replace ASWON automated surface observing capability (replacement for all ASWON sensors plus NextGen requirements)
447	2022	N	Weather	ISD to replace all automated surface observing systems with NextGen Surface Observing capability
481	2013	N	Weather	Executive Level decisions to move access to Lightning data to NNEW

# Airport Roadmap: Decision Points (4 of 6)

DP #	Target Date CY	High Priority	Domain	Name
501	2010 Q1	N	Airspace & Procedures	Determine Implementation Plan and initial Demonstration Site(s) for IOP (Complete)
507	2014	N	Navigation	WAAS moves from Phase III to Phase IV
511	2014	Y	Navigation	Alternate PNT Strategy
515	2010 Q2	N	Surveillance	Concept and Requirements Definition Readiness (CRDR) Decision for a Mobile/Transportable Airport Surveillance Radar (MASR) (Complete)
516	2011 Q1	N	Surveillance	Investment Analysis Readiness Decision (IARD) for a Mobile/Transportable Airport Surveillance Radar (MASR)
517	2011 Q4	N	Surveillance	Initial Investment Decision (IID) for a Mobile/Transportable Airport Surveillance Radar (MASR)
518	2012 Q2	N	Surveillance	Final Investment Decision (FID) for a Mobile/Transportable Airport Surveillance Radar (MASR)
519	2014 Q4	N	Surveillance	In-Service Decision (ISD) for a Mobile/Transportable Airport Surveillance Radar (MASR)
538	2010 Q4	N	Aircraft	Order 8400.33 Procedures for Obtaining Authorization for Required Navigation Performance 4 (RNP-4) Oceanic and Remote Area Operations (Complete)
552	2010 Q4	N	Aircraft	AC 90-101 RNP AR (RNP as a key enabler for Environment) (Complete)
558	2012	N		LED Airport Lighting Phase In
561	2012	N		EISA Compliance Policy
597	2015	N		RSA NAVAID Improvements (Complete)
598	2015	N		Decision on Requirements/Policy for of beacon/transponders for airport surface vehicles
599	2015	N		Decision on Requirements/Policy for Surface Moving Maps on Airport Surface Vehicles
603	2012	N	Navigation	LED Prototypes available for testing
636	2012 Q1	N	Navigation	Investment Analysis Readiness Decision (IARD) for the acquisition of CAT II/III Ground Based Augmentation System (GBAS)
637	2013 Q1	N	Navigation	Initial Investment Decision (IID) for the acquisition of CAT II/III Ground Based Augmentation System (GBAS)
638	2011 Q2	N	Navigation	Investment Analysis Readiness Decision (IARD) for the Acquisition of NAVAID Control, Interlock, and Monitoring Equipment (NCIME)
639	2012 Q1	N	Navigation	Initial Investment Decision (IID) for the Acquisition of NAVAID Control, Interlock, and Monitoring Equipment (NCIME)

# Airport Roadmap: Decision Points (5 of 6)

DP #	Target Date CY	High Priority	Domain	Name
640	2013 Q1	N	Navigation	Final Investment Decision (FID) for the Acquisition of NAVAID Control, Interlock, and Monitoring Equipment (NCIME)
641	2010 Q2	N	Navigation	Concept & Requirements Definition Readiness Decision (CRDR) Decision for the acquisition of En Route Distance Measuring Equipment (DME) (Complete)
642	2012 Q2	N	Navigation	Investment Analysis Readiness Decision (IARD) for the acquisition of En Route Distance Measuring Equipment (DME)
643	2013 Q3	N	Navigation	Final Investment Decision (FID) for the acquisition of En Route Distance Measuring Equipment (DME)
644	2012 Q1	N	Navigation	Concept & Requirements Definition Readiness (CRDR) Decision for the acquisition of Terminal Distance Measuring Equipment (DME)
645	2013 Q1	N	Navigation	Investment Analysis Readiness Decision (IARD) for the acquisition of Terminal Distance Measuring Equipment (DME)
646	2014 Q3	N	Navigation	Final Investment Decision (FID) for the acquisition of Terminal Distance Measuring Equipment (DME)
647	2011 Q4	N	Weather	Investment Decision (CRDR) for WSDS Work Pkg 2 using rightsizing study to examine new technology, NEXRAD improvements & LIDAR to extend WSDS coverage expansion to un-/under-protected sites
648	2012 Q3	N	Weather	Investment Decision (IARD) for WSDS Work Pkg 2 using rightsizing study to examine new technology, NEXRAD improvements & LIDAR to extend WSDS coverage expansion to un-/under-protected sites.
649	2013 Q2	N	Weather	Investment Decision (IID) for WSDS Work Pkg 2 using rightsizing study to examine new technology, NEXRAD improvements & LIDAR to extend WSDS coverage expansion to un-/under-protected sites
650	2014 Q2	N	Weather	Investment Decision (FID) for WSDS Work Pkg 2 using rightsizing study to examine new technology, NEXRAD improvements & LIDAR to extend WSDS coverage expansion to un-/under-protected sites
651	2019 Q1	N	Weather	Investment Decision (ISD) for WSDS Work Pkg 2 using rightsizing study to examine new technology, NEXRAD improvements & LIDAR to extend WSDS coverage expansion to un-/under-protected sites
652	2013 Q4	N	Weather	Investment Decision (CRDR) for NextGen Surface Observing Capability (replacement for all ASWON sensors plus NextGen requirements)
653	2011 Q2	N	Weather	Investment Decision (IARD) for ASWON Tech Refresh of ASOS/AWOS/AWSS processors & S/W until NextGen Surface Observing Capability FOC circa 2027

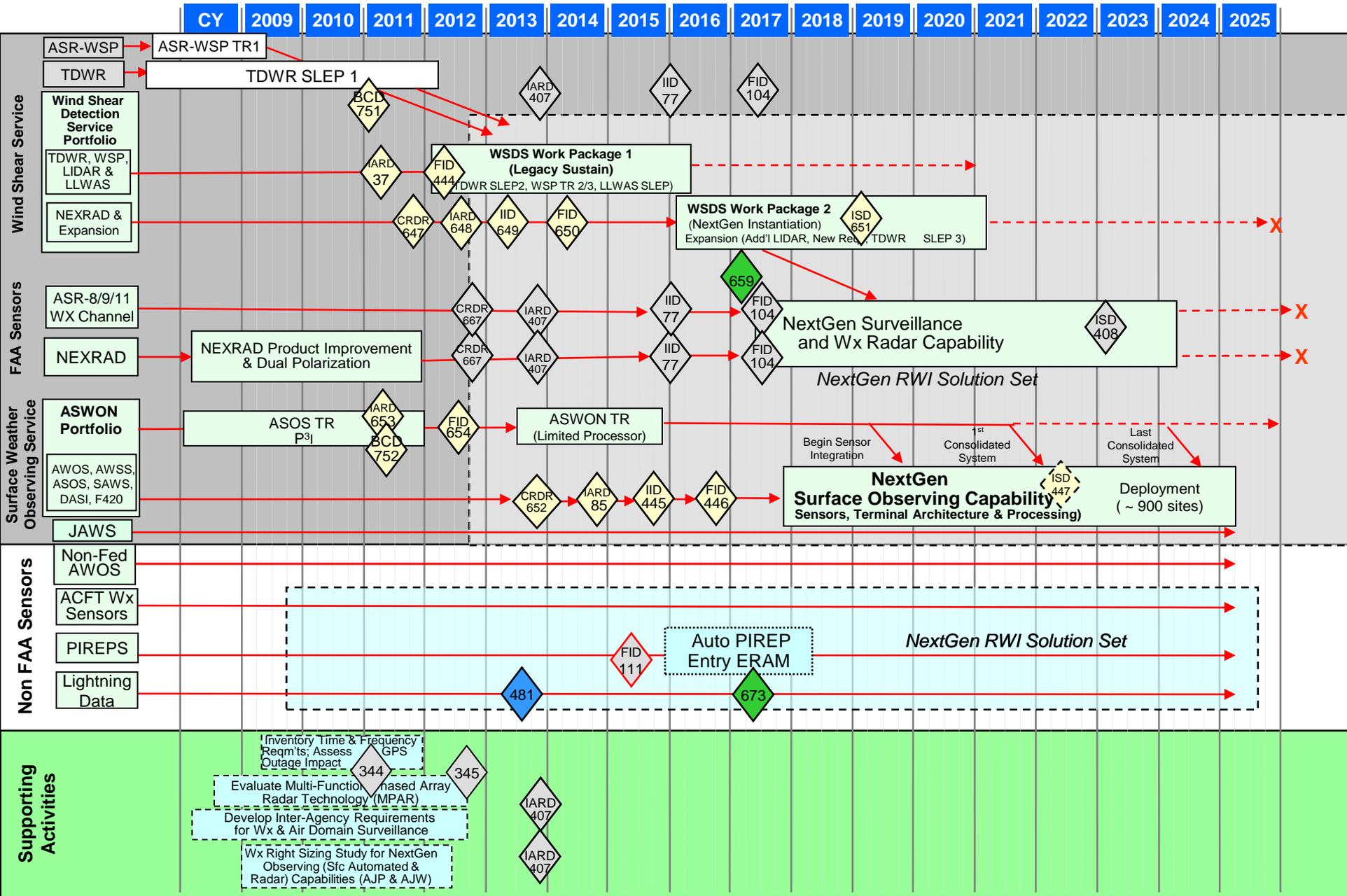
# Airport Roadmap: Decision Points (6 of 6)

DP #	Target Date CY	High Priority	Domain	Name
654	2012 Q3	N	Weather	Investment Decision (FID) for ASWON Tech Refresh of ASOS/AWOS/AWSS processors & S/W until NextGen Surface Observing Capability FOC circa 2027
659	2017	N	Weather	Strategy Decision for SLEP 3 on TDWR if Wind Shear Functionality not viable in NG Surveillance & Wx Radar Capability
661	2014 Q4	N	Airspace and Procedures	Wake Re-Categorization
666	2012 Q4	N	Surveillance	Concept and Requirements Definition Readiness (CRDR) Decision for New Beacon/Backup System
667	2012 Q4	N	Surveillance	Concept and Requirements Definition Readiness (CRDR) Decision for NextGen Surveillance and Weather Radar Capability
668	2011 Q4	N	Surveillance	In Service Decision for Airport Surface Surveillance Capability
669	2011 Q1	N	Surveillance	Final Investment Decision for legacy radar (ASR-8) facility improvements
670	2012 Q2	N	Surveillance	Concept and Requirements Definition Readiness (CRDR) Decision for removal or SLEP/replace ASDE surface primary radars
673	2017	N	Weather	Strategy decision to execute option for FAA obtaining Total Lightning Data
712	2012	N	Surveillance	Strategy decision on whether to procure AeroMACS capability on the FTI contract
719	2012	N	Surveillance	Investment Analysis Readiness Decision (IARD) for ASR-11 Technology Refresh Segment 2 (through 2025)
721	2010 Q3	N	Navigation	CRDR for the acquisition of CAT II/III Ground Based Augmentation System (GBAS) (COMPLETE)
746	2011 Q1	N	Surveillance	Investment Analysis Readiness Decision for legacy radar (ASR-9) SLEP, through 2025
747	2011 Q1	N	Surveillance	Investment Analysis Readiness Decision for legacy beacon (Mode S) SLEP through 2025
751	2011 Q1	N	Weather	Baseline Change Decision (BCD) for TDWR
752	2011 Q2	N	Weather	Baseline Change Decision (BCD) for ASWON (ASOS P3I)

# Weather

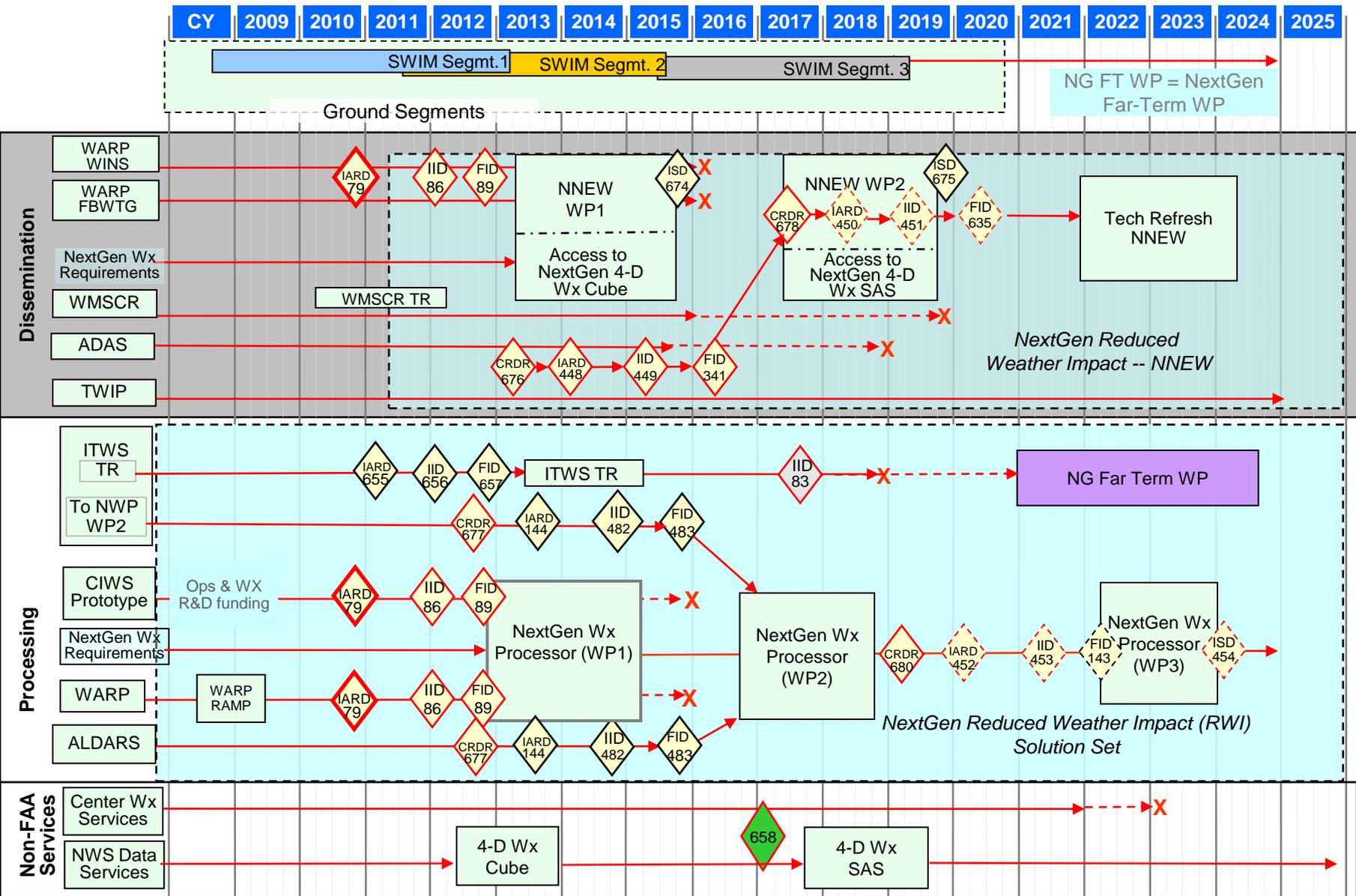
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# Weather Roadmap (1 of 4)



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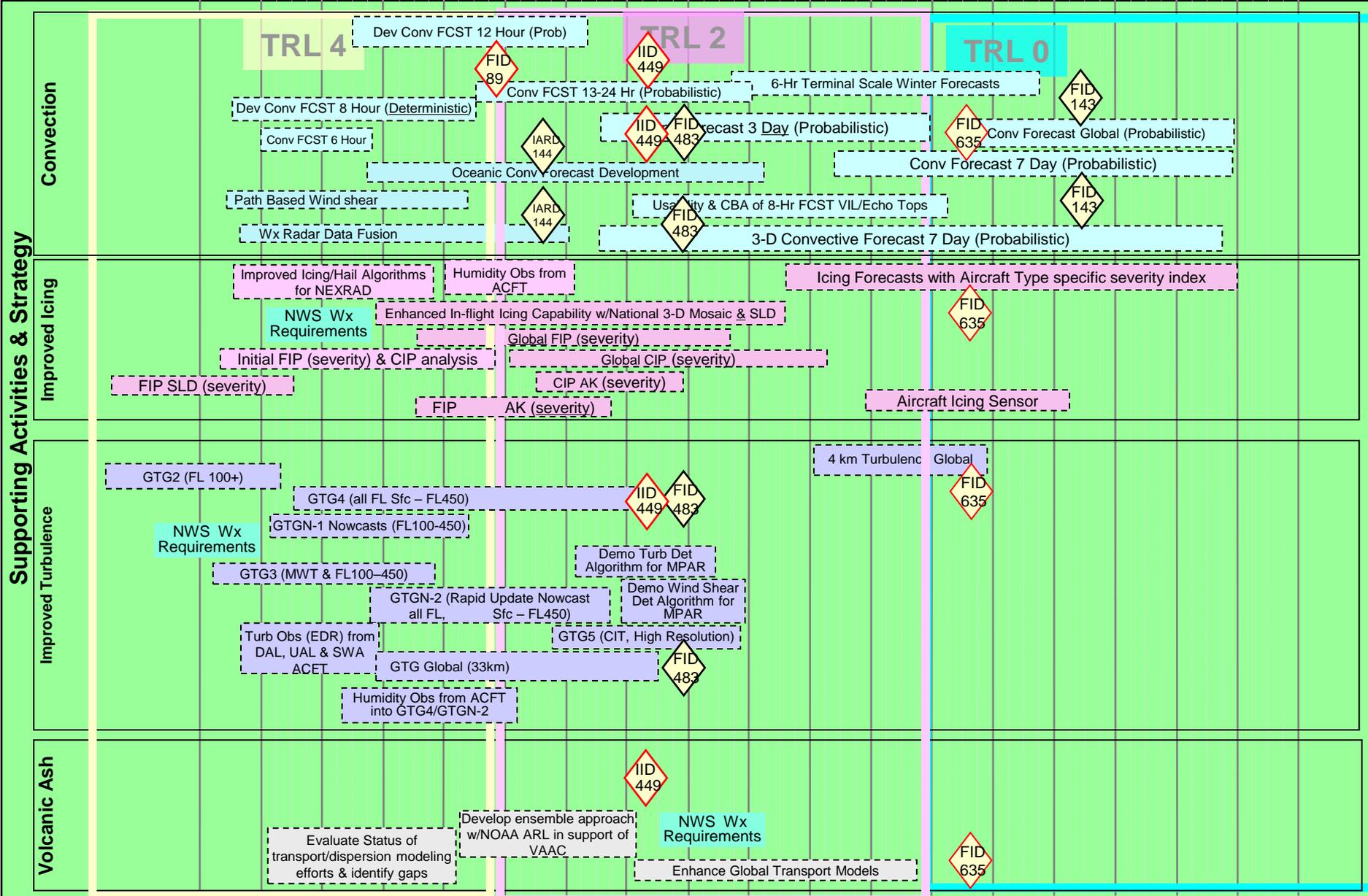
# Weather Roadmap (2 of 4)



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# Weather Roadmap (3 of 4)

CY 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025



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# Weather Roadmap (4 of 4)

CY 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025

TRL 4

TRL 2

TRL 0

**Nat'l Ceiling & VIS (NCV)**

NCV 0-12Hr NE US Probabilistic, 1-Hr RVR forecast, Nat'l C&V Nowcast, IID 449 Alaska 0-30 Hr Probabilistic, Assess Feasibility of Hi-Res C&V Terminal 0-12 Hr, NWS Wx Requirements, NCV 13-30 Hr Full CONUS Probabilistic, NCV 0-12Hr Full CONUS Probabilistic

**Policy**

FAR Updates for Probabilistic Wx, Use of Probabilistic Wx, Rules Changes and Training for new products, New Wx Sensors on Aircraft, FID 483, IID 449, FID 635

**Modeling/Simulation**

Validate Wx Performance Requirements, Determine Quantifiable Wx Impact on NAS, Improve Ensemble Forecasts, WRF-Rapid Refresh (North America), CONUS (NA) HRRR, NWS Wx Requirements, Evaluate Use of New Forecast Products, Global HRRR, IID 449, FID 483, FID 635

**Demos**

Value of using forecast rather than waiting for observation, Wx in Cockpit, Interoperability of Wx data exchange using pub/ sub/ metadata, 4D Wx Cube data exchange w/NNEW enabled systems, 4-D Wx Cube Demo/Prototype, NWS Wx Requirements, Turb Det Algorithm for MPAR, IID 449, Evaluate Dynamic & Passive Control of Act Wx Sensor Dissemination, FID 483, IID 449

**Other**

TWINDS Upgrade, 4-D Wx SAS Algorithms, Improved Optimum Interpolation Schemes Requirements, Synthetic Vision, Full integration of Canadian & TDWRs into 3-D Mosaic, Full integration of Gulf of Mexico Radars into 3-D Mosaic, Inventory Time & Frequency Reqs and Assess GPS Impact, 4-D Wx SAS Algorithms, Winter Wx Forecasts, FID 449, IID 449, FID 483, FID 635, 344, 345

Supporting Activities & Strategy

# Weather Roadmap: Assumptions (1 of 2)

Identifier	Description
WX-01	Ongoing NextGen (NG) Weather functional & performance requirements development for Midterm may result in new/emerging requirements that create perturbations in NextGen Weather Architecture
WX-02	Weather Sensor Sustainment Issues: <ol style="list-style-type: none"> <li>1) Terminal Portfolio approach               <ol style="list-style-type: none"> <li>a) Wind Shear systems (LLWAS, WSP, TDWR &amp; LIDAR) consolidated into Wind Shear Detection Services (WSDS) to sustain capabilities with DP's for IARD, IID, FID &amp; ISD; WSDS to split into 2 Work Pkgs—Sustain &amp; NextGen Instantiation (Sensor Expansion, LIDAR, New Req'm'ts)</li> <li>b) Perform ATO-W/ATO-P 'Right Sizing' study for NextGen Observing (Sfc Automated &amp; Radar) Capability                   <ol style="list-style-type: none"> <li>a) Consolidate Automated Surface Observing systems (ASOS, AWOS, AWSS) plus F-420, DASI, WME &amp; CHI into a single platform if NextGen Surface Observing requirements permit</li> <li>b) NextGen Surveillance/Weather Radar continues to support Weather requirements for Terminal &amp; En route</li> </ol> </li> </ol> </li> <li>2) Continue obtaining Surface Observations from non-Fed AWOS systems</li> <li>3) Both NextGen Surveillance and Weather (Radar &amp; Surface Observing) capabilities will consider multi-agency requirements</li> </ol>
WX-03	<ol style="list-style-type: none"> <li>1) Having replaced aging technology, ADAS-Rehost serves as a consolidating access point for Wx observations at NNCCs (National Network Control Center) rather than ARTCCs</li> <li>2) Evaluation of WMSCR communications to determine if movement of functionality to NNEW should occur in WP1 or WP2. ALDARS functionality (in ADAS) to be subsumed by NNEW WP 2 (information extraction functionality of NNEW WP1 enables publishing of lightning reports to NextGen Surface Observing capability)</li> </ol>
WX-04	Wind Shear/Microburst functionality continues to be ground based unless aircraft avionics technology matures to the point where the capability can be transferred to the aircraft circa 2025
WX-05	The following Aircraft Roadmap decision may have an impact on weather - DP93. For full descriptions see decision spreadsheet. Regulatory action likely per DP 93 to define Wx Sensor equipage for fully-capable aircraft
WX-06	Migrate Weather to common Network Enabled Operations (NEO) <ol style="list-style-type: none"> <li>1) Provide FAA Requirements for 4-D Weather Data Cube</li> <li>2) Fund FAA portion of the development of associated modeling capability* that produces SAS data/information based on FAA Requirements</li> </ol> *NOTE: 1) NWS modeling capability not part of the 4-D Wx SAS but required to create data 2) IAW ICAO ConOps for ATM, ATM includes Service Providers & Users, e.g., pilots & dispatchers

# Weather Roadmap: Assumptions (2 of 2)

Identifier	Description
WX-07	<p>Convergence of Wx Processing Capability into NextGen Wx Processor</p> <ol style="list-style-type: none"> <li>1) NextGen Weather Processor (NWP) WP 1                             <ol style="list-style-type: none"> <li>a) CIWS continues as prototype until integrated into NG WxP WP1 as part of 0-8 hour convective forecast (CoSPA) capability; CIWS Comms functionality subsumed into NNEW WP1</li> <li>b) WARP RAMP (radar acquisition &amp; mosaic processor) must be sustained into NextGen era until transferred to NextGen system</li> <li>c) WARP remote BT functionality to general IDS with NNEW-provided data</li> <li>d) ITWS TR required to continue functionality until NWP WP2 fielded to achieve operational consistency among Wx system displays</li> </ol> </li> <li>2) NWP WP2:                             <ol style="list-style-type: none"> <li>a) Selected Wx R&amp;D algorithms matured since WP1 baseline frozen may be incorporated here</li> <li>b) Implement improved Convective algorithms from Aviation Wx R&amp;D</li> <li>c) ITWS functionality transferred to NWP WP2, except functions allocated to NextGen Far Term Work Package to meet latency requirements of Wind Shear/Microburst Detection &amp; Prediction advisories</li> </ol> </li> <li>3) NWP WP3: Selected Wx R&amp;D algorithms matured since WP2 baseline was frozen; most likely not an FAA 'box'</li> </ol>
WX-08	<p>To provide improved observations &amp; enhanced forecasts, significant R&amp;D and infrastructure changes are required</p> <ol style="list-style-type: none"> <li>1) R&amp;D must be prioritized in order to meet NextGen Vision</li> <li>2) To reach NextGen by 2025, R&amp;D near and midterm funding must be increased</li> <li>3) The output of Algorithms developed via R&amp;D will be available via the 4-D Wx SAS</li> <li>4) Sensor measurement, accuracy &amp; frequency must be increased in accordance with mid-/far-term Performance Rqm'ts</li> </ol>
WX-9	Weather information becomes available at user-specified resolution but weather impact is determined by user DST
WX-10	Wx Communications functionality to be provided by NNEW
WX-11	That NG Sfc Observing Capability & NG Surv/Wx Radar Capability [systems] will be implemented as multi-agency systems
WX-12	CWSU support addressed as Strategy DP 658 Center Weather Services to discontinue as advanced DSTs are fielded
WX-13	WARP Remote Briefing Terminal requirements to be included in National IDS contract
WX-14	NWP will implement a 'translation functionality' that will change state of the atmosphere information into weather-related constraints to NAS airspace in Segment 1 and the NNEW Segment 1 will deliver this information
WX-15	Weather-related constraints on NAS Airspace will be translated into NAS operational Impacts by User DSTs

# Weather Roadmap: Decision Points (1 of 4)

DP#	Target Date CY	High Priority	Domain	Name
37	2011 Q2	N		Wind Shear Detection Services (WSDS) Work Pkg 1 to SLEP/Tech Refresh Legacy Wind Shear systems, TDWR, WSP & LLWAS; Tailored IARD requested. Also includes level 1 activity/funding (2014/15) for work ups for New York TDWR Relocation. Note: Pgm Ofc to query AEB if IID needed (DP 443 (IID) to be combined with this (IARD))
77	2016 Q1	N	Surveillance	Investment Decision (IID) to implement a NextGen Surveillance and Weather Radar Capability for ATC
79	2010 Q4	Y		Investment Decision (IARD) for NextGen Wx Processor WP1 and NNEW WP1 to enter IA (includes funding for access to the 4-D Wx Data Cube) (Complete)
83	2017	Y	Automation	Investment Decision (IID) to transition to NextGen Far Term automation platforms and display subsystem through convergence (would include ITWS safety-related functionality Microburst Predict algorithm) to NG Far term WP
85	2014 Q4	N		Investment Decision (IARD) to Consolidate & Replace ASWON automated surface observing systems (replacement for all ASWON sensors plus NextGen requirements)
86	2012 Q1	Y		Investment Decision (IID) for NextGen Wx Processor WP1 (includes CIWS functionality & RAMP WARP functionality) & NNEW WP1 (includes WARP WINS & FBWTG functionality, may also include WMSCR Wx Communications functionality)
89	2012 Q4	Y		Investment Decision (FID) for NextGen Wx Processor WP1 (includes CIWS functionality, NG WARP functionality & NNEW WP1 functionality (includes WARP WINS & FBWTG, may also include WMSCR Wx Communications functionality))
104	2017	N	Surveillance	Investment Decision (FID) to implement a NextGen Surveillance and Weather Radar Capability for ATC
111	2015	Y	Automation	Investment Decision (FID) for 'auto PIREP' in ERAM Mid-term Work Package; Wx NI&I working up sponsor
143	2022	N		Investment Decision (FID) to Provide 10-Hour Convective Forecast Capability and In-Flight Icing Observation from Airborne Aircraft To NextGen Weather Processor WP3
144	2013 Q3	N		Investment Decision (IARD) to transfer ITWS functionality to NWP WP2 [(includes improved data quality, TWIP, upgraded TWINDS & path-based wind shear from TR); while ITWS safety-related functionality (Microburst Predict) may remain 'local' or reside in NextGen FarTerm WP - DP83]; and to transfer ALDARS functionality in (ADAS) to NWP WP2
341	2016 Q2	Y		Investment Decision (FID) for NNEW WP2 and transition of ADAS communications (and WMSCR Comms if not completed in NNEW WP1) to NNEW WP2
344	2011 Q1	N	Enterprise Services	Establish Requirements for a Backup Timing Source
345	2012 Q3	N	Enterprise Services	Implementation strategy decision for GPS timing backup

# Weather Roadmap: Decision Points (2 of 4)

DP#	Target Date CY	High Priority	Domain	Name
407	2013 Q4	N	Surveillance	Investment Decision (IARD) for NextGen Surveillance and Weather Radar Capability
408	2023	N	Surveillance	In-Service Decision for NextGen Surveillance and Weather Radar Capability
444	2012 Q2	N		Investment Decision (FID) to Tech Refresh/SLEP wind shear detection services legacy systems to sustain capability (to include level 1 activity/funding for New York TDWR relocation)
445	2015 Q4	N		Investment Decision (IID) to consolidate and replace ASWON automated surface observing capability (replacement for all ASWON sensors plus NextGen requirements)
446	2016 Q4	N		Investment Decision (FID) to consolidate and replace ASWON automated surface observing capability (replacement for all ASWON sensors plus NextGen requirements)
447	2022	N		In Service Decision (ISD) to replace all automated surface observing systems with NextGen Surface Observing capability
448	2014 Q1	Y		Investment Decision (IARD) for NNEW WP2 and transition of ADAS communications (and WMSCR Comms if not completed in NNEW WP1) to NNEW WP2
449	2015 Q2	Y		Investment Decision (IID) for NNEW WP2 and transition of ADAS communications (and WMSCR Comms if not completed in NNEW WP1) to NNEW WP2
450	2018	Y		Investment Decision (IARD) for NNEW Tech Refresh
451	2019	Y		Investment Decision (IID) for NNEW Tech Refresh
452	2020	Y		Investment Decision (IARD) to provide 10-hour Convective Forecast capability to NWP WP3 and in-flight Icing Observation from airborne aircraft to NWP WP3
453	2021	Y		Investment Decision (IID) to provide 10-hour Convective Forecast capability to NWP WP3 and provide in-flight Icing Observation from airborne aircraft to NWP WP3
454	2024	Y		In Service Decision (ISD) to document final configuration of the NextGen Wx Processor Work Pkg 3 (NWP WP3)
481	2013	N		Executive Level Decision to move access to Lightning data to NNEW
482	2014 Q4	N		Investment Decision (IID) to transfer ITWS functionality to NWP WP2 [(includes improved data quality, TWIP, upgraded TWINDS & path-based wind shear from TR); while ITWS safety-related functionality (Microburst Predict) may remain 'local' or reside in NextGen FarTerm WP - DP83]; and to transfer ALDARS functionality in (ADAS) to NWP WP2

# Weather Roadmap: Decision Points (3 of 4)

DP #	Target Date CY	High Priority	Domain	Name
483	2015 Q4	N		Investment Decision (FID) to transfer ITWS functionality to NWP WP2 [(includes improved data quality, TWIP, upgraded TWINDS & path-based wind shear from TR); while ITWS safety-related functionality (Microburst Predict) may remain 'local' or reside in NextGen FarTerm WP - DP83]; and to transfer ALDARS functionality in (ADAS) to NWP WP2
635	2020	Y		Investment Decision (FID) for NNEW Tech Refresh
647	2011 Q4	N		Investment Decision (CRDR) for WSDS Work Pkg 2 using rightsizing study to examine new technology, NEXRAD improvements & additional LIDAR to extend WSDS coverage expansion to un-/under-protected sites
648	2012 Q3	N		Investment Decision (IARD) for WSDS Work Pkg 2 using rightsizing study to examine new technology, NEXRAD improvements & additional LIDAR to extend WSDS coverage expansion to un-/under-protected sites.
649	2013 Q2	N		Investment Decision (IID) for WSDS Work Pkg 2 using rightsizing study to examine new technology, NEXRAD improvements & additional LIDAR to extend WSDS coverage expansion to un-/under-protected sites
650	2014 Q2	N		Investment Decision (FID) for WSDS Work Pkg 2 using rightsizing study to examine new technology, NEXRAD improvements & additional LIDAR to extend WSDS coverage expansion to un-/under-protected sites
651	2019 Q1	N		In Service Decision (ISD) for WSDS Work Pkg 2 using rightsizing study to examine new technology, NEXRAD improvements & additional LIDAR to extend WSDS coverage expansion to un-/under-protected sites
652	2013 Q4	N		Investment Decision (CRDR) for NextGen Surface Observing Capability (replacement for all ASWON sensors plus NextGen requirements)
653	2011 Q2	N		Investment Decision (IARD) for ASWON Tech Refresh of ASOS/AWOS/AWSS processors & S/W until NextGen Surface Observing Capability FOC circa 2027
654	2012 Q3	N		Investment Decision (FID) for ASWON Tech Refresh of ASOS/AWOS/AWSS processors & S/W until NextGen Surface Observing Capability FOC circa 2027
655	2011 Q1	N		Investment Decision (IARD) to Tech Refresh all 34 ITWS (includes improved data quality, upgraded TWINDS & path-based wind shear, and possible expansion to 3 new sites (SCT, PDX & SEA) as well as service to secondary/reliever airports)

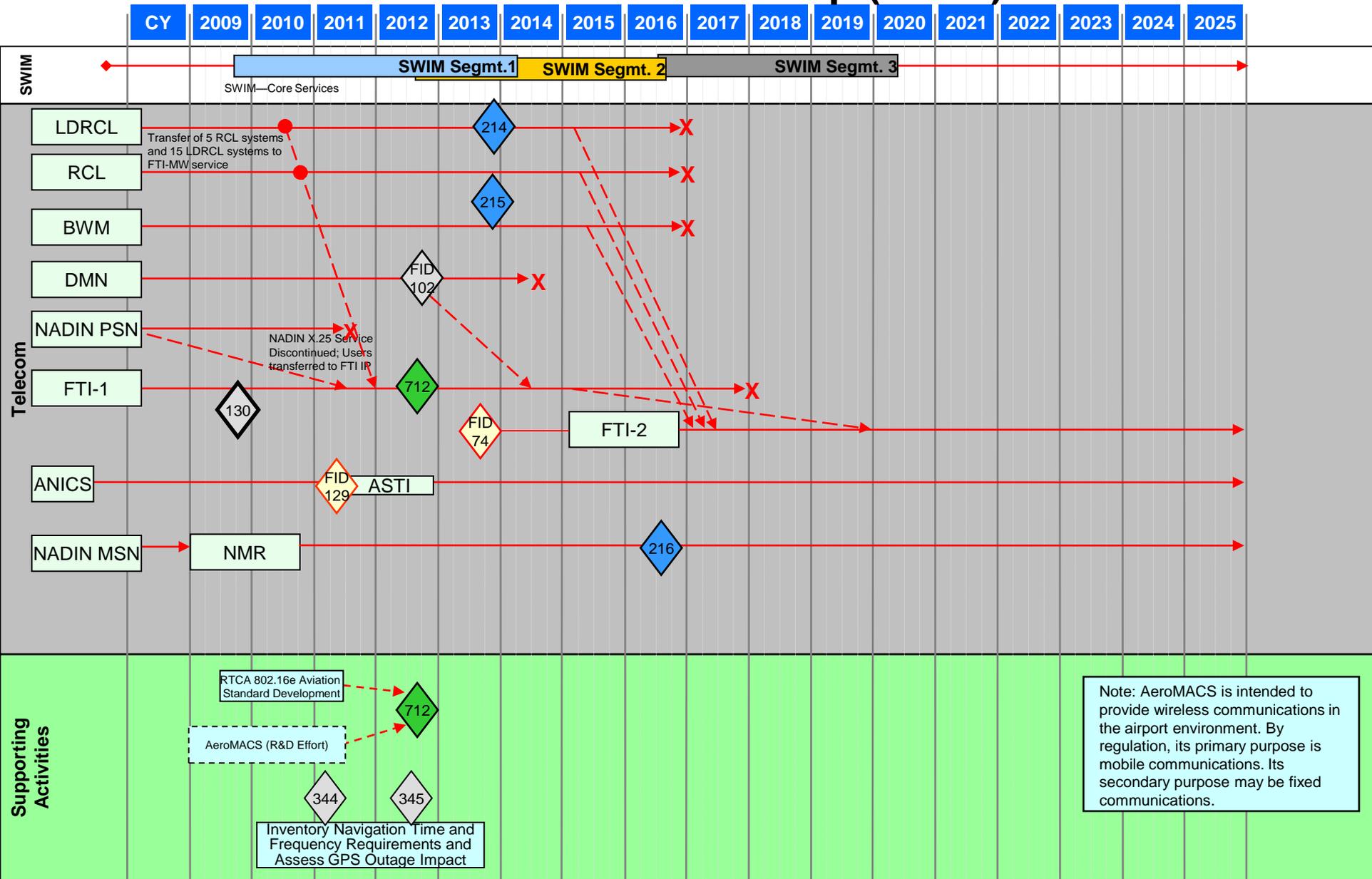
# Weather Roadmap: Decision Points (4 of 4)

DP #	Target Date CY	High Priority	Domain	Name
656	2012 Q1	N		Investment Decision (IID) to Tech Refresh all 34 ITWS (includes improved data quality, upgraded TWINDS & path-based wind shear, and possible expansion to 3 new sites (SCT, PDX & SEA) as well as service to secondary/reliever airports)
657	2012 Q4	N		Investment Decision (FID) to Tech Refresh all 34 ITWS (includes improved data quality, upgraded TWINDS & path-based wind shear, and possible expansion to 3 new sites (SCT, PDX & SEA) as well as service to secondary/reliever airports)
658	2017	Y		Strategy Decision to determine if Automation/DSTs can provide sufficient Weather support services that CWSU contract with NWS may not need to be renewed
659	2017	N		Strategy Decision for SLEP 3 on TDWR if Wind Shear Functionality not viable in NG Surveillance & Wx Radar Capability
667	2012 Q4	N	Surveillance	Investment Decision (CRDR) for NextGen Surveillance and Weather Radar Capability
673	2017	N		Strategy decision to execute option for FAA obtaining Total Lightning Data
674	2015 Q4	Y		In Service Decision (ISD) for NNEW WP 1
675	2019 Q4	Y		In Service Decision (ISD) for NNEW WP 2
676	2013 Q2	Y		Investment Decision (CRDR) for NNEW WP2 and transition of ADAS communications (and WMSCR Comms if not completed in NNEW WP1) to NNEW WP2
677	2012 Q3	Y		Investment Decision (CRDR) to transfer ITWS functionality to NWP WP2 [(includes improved data quality, TWIP, upgraded TWINDS & path-based wind shear from TR); while ITWS safety-related functionality (Microburst Predict) may remain 'local' or reside in NextGen FarTerm WP - DP83]; and to transfer ALDARS functionality in (ADAS) to NWP WP2
678	2017 Q2	Y		Investment Decision (CRDR) to fund NNEW Tech Refresh
680	2019	Y		Investment Decision (CRDR) to provide 10-hour Convective Forecast capability to NWP WP3 and in-flight Icing Observations from airborne aircraft to NWP WP3
751	2011 Q1	N		Baseline Change Decision (BCD) for TDWR
752	2011 Q2	N		Baseline Change Decision (BCD) for ASWON (ASOS P3I)

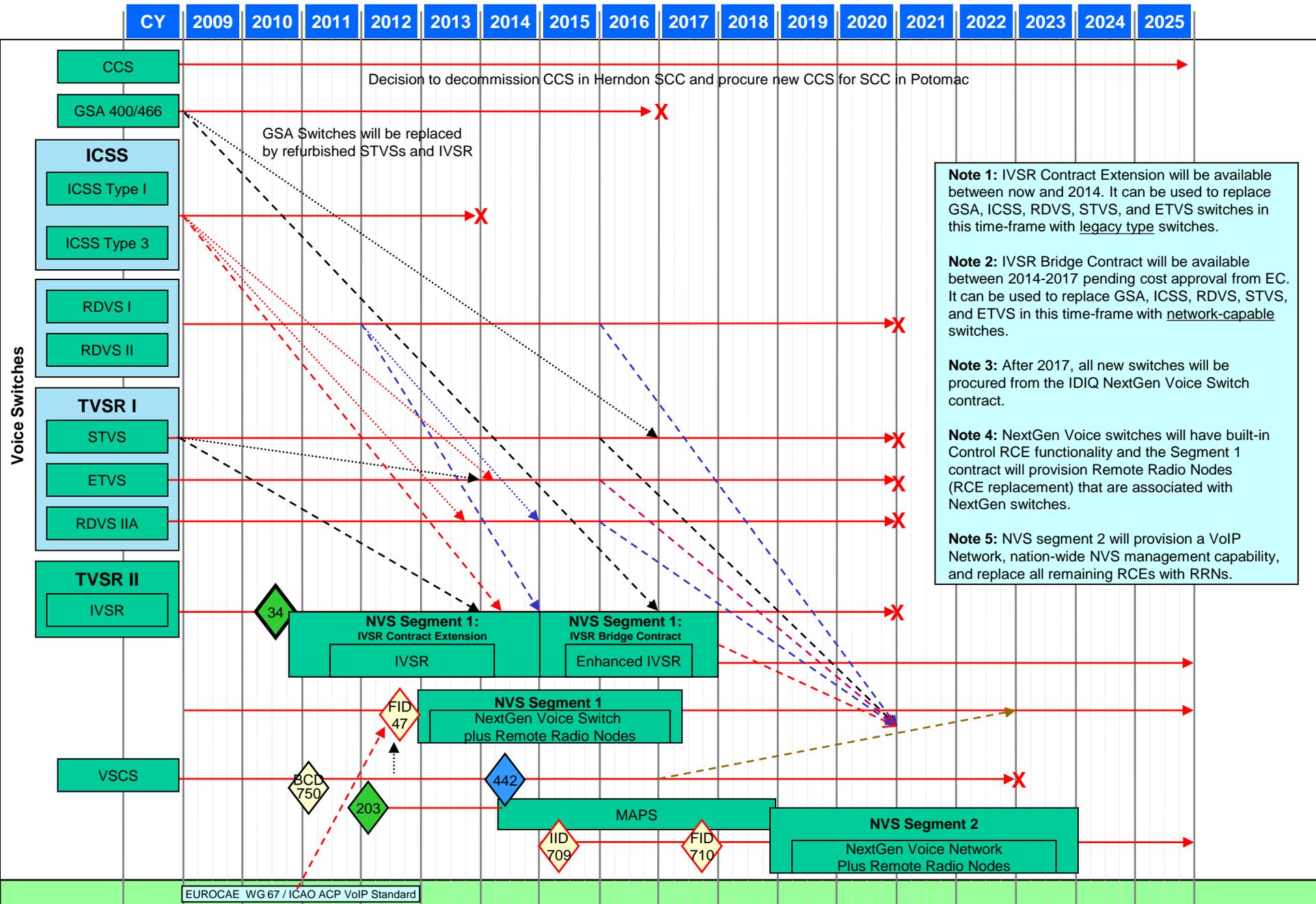
# Communication

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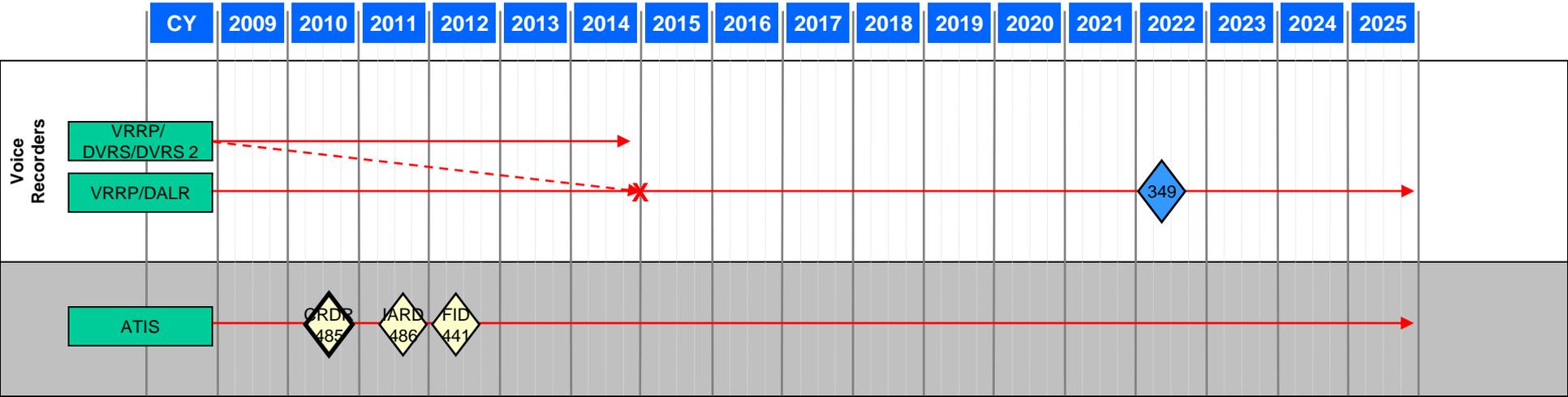
# Communication Roadmap (1 of 5)



# Communication Roadmap (2 of 5)



# Communication Roadmap (3 of 5)



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# Communication Roadmap (4 of 5)

CY 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025

Legacy A/G Voice

## NEXCOM Seg. 1A

MDR VHF Ground Radios

UHF Radios Replacement

## NEXCOM Seg. 2

VHF Ground Radios

UHF Ground Radios

ETR UHF/VHF Transceivers

VHF Handheld

BUEC

RCE

Airport Cable Loop

Communications Facilities Enhancement

RFI ELIM

Interference Detection Location And Mitigation

ATF 755

FID 499

FID 47

712

FID 74

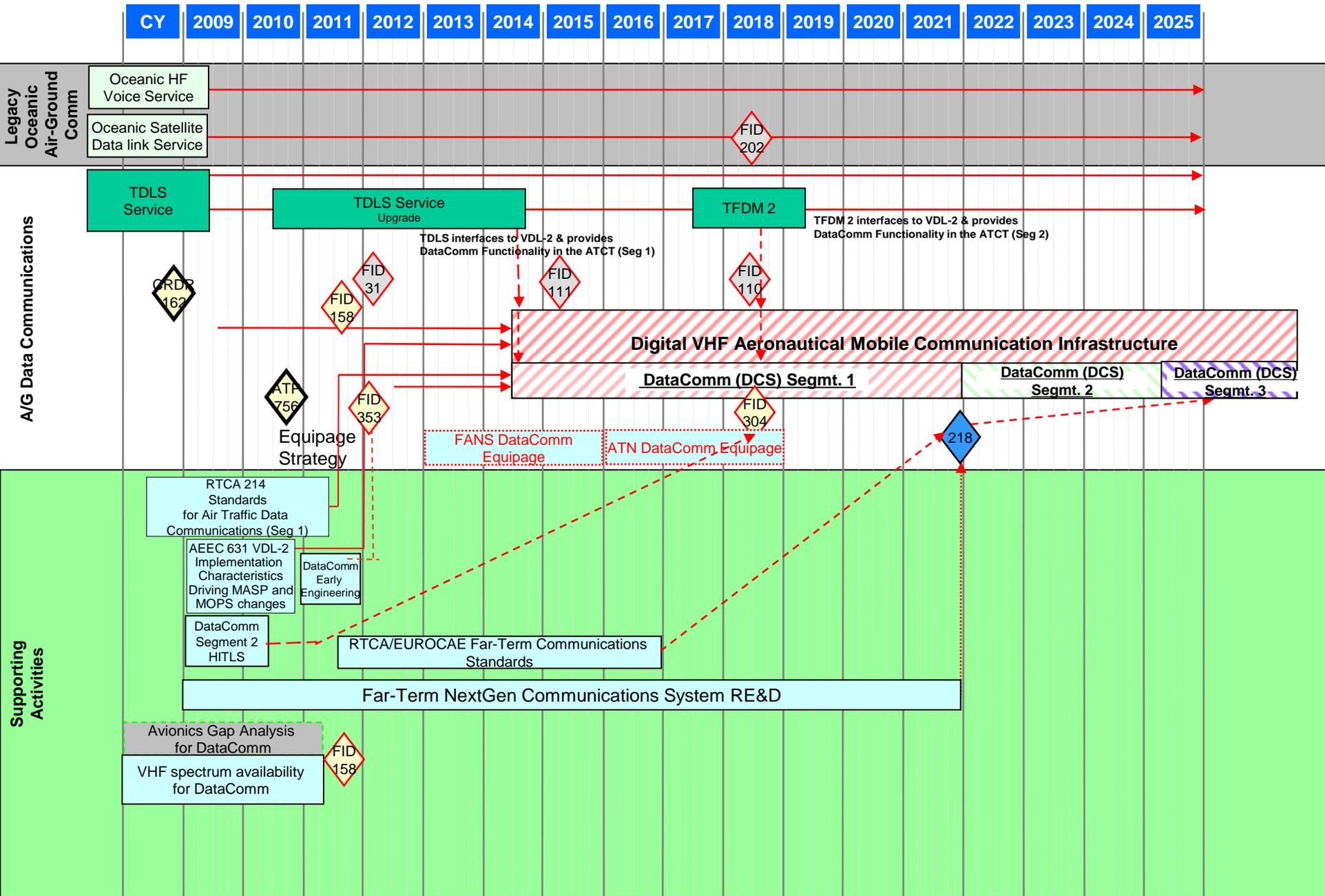
FID 710

FID 352

**Note:** Current plans assign the responsibility for RCE replacement to the NVS program

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# Communication Roadmap (5 of 5)



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# Communication Roadmap: Assumptions (1 of 2)

Identifier	Description
COMM-01	NAS must transition from dedicated “nailed up” sector-based and independent facility operations to networked area based operations
COMM-02	FTI becomes primary Voice/Data transport system a) ASTI (ANICS) will not be integrated into FAA Telecommunications Infrastructure contract
COMM-03	NAS Voice System is required to meet consolidation/collocation, Business Continuity Plan, Load Balancing/Load Sharing, 4D Trajectory concepts (resource mapped to flows, and Big Airspace)
COMM-04	All flight safety critical A/G communications are over VHF based systems a) Advisory communications (e.g. Weather, NAS Status, NOTAMS) may be supported by commercial communications services through "airborne access to SWIM" services. Initial Implementation linked to NextGen Network Enabled Weather (NNEW) capability
COMM-05	Infrastructure evolution is driven by: a) Transition strategies start in higher altitude airspaces migrating toward lower altitudes b) Implementation starts in large facilities migrating to small facilities c) Expectation for reduction in number of facilities—(staffed and unstaffed) d) Infrastructure and people “dedicated to specific airspace” changing to “quickly and easily adapted to airspace as needed” e) Expectation for very low growth in number of operational sectors (“airspace growth”) through the mid term, limiting demand on dedicated resources
COMM-07	There will be a JRC decision in 2014 (DP 214) to decommission LDRCL. LDRCL users will transition to FTI-2 Services.
COMM-08	There will be a JRC decision in 2010 (DP 215) to decommission RCL. RCL users will transition to FTI-1 Services. It is also assumed in this time frame that BWM is being used solely in conjunction with the RCL, and so it will be decommissioned in concert with the RCL.
COMM-09	There will be an approved transition plan for migrating real-time surveillance data directly onto FTI services in order to allow DMN decommissioning.

## Communication Roadmap: Assumptions (2 of 2)

Identifier	Description
COMM-10	There will be a decision (DP 218) whether to implement ATC data communications capabilities using yet to be defined broad-band communications links in addition to VDL-2.
COMM-11	Relationship between SWIM and Communications: SWIM requires FTI IP service.
COMM-12	Three ICSS switches in Alaska AFSSs (represented by AFSM on the Roadmap) will be replaced by NVS switches. The coordination for this replacement is captured by DP 203.

# Communication Roadmap: Decision Points (1 of 2)

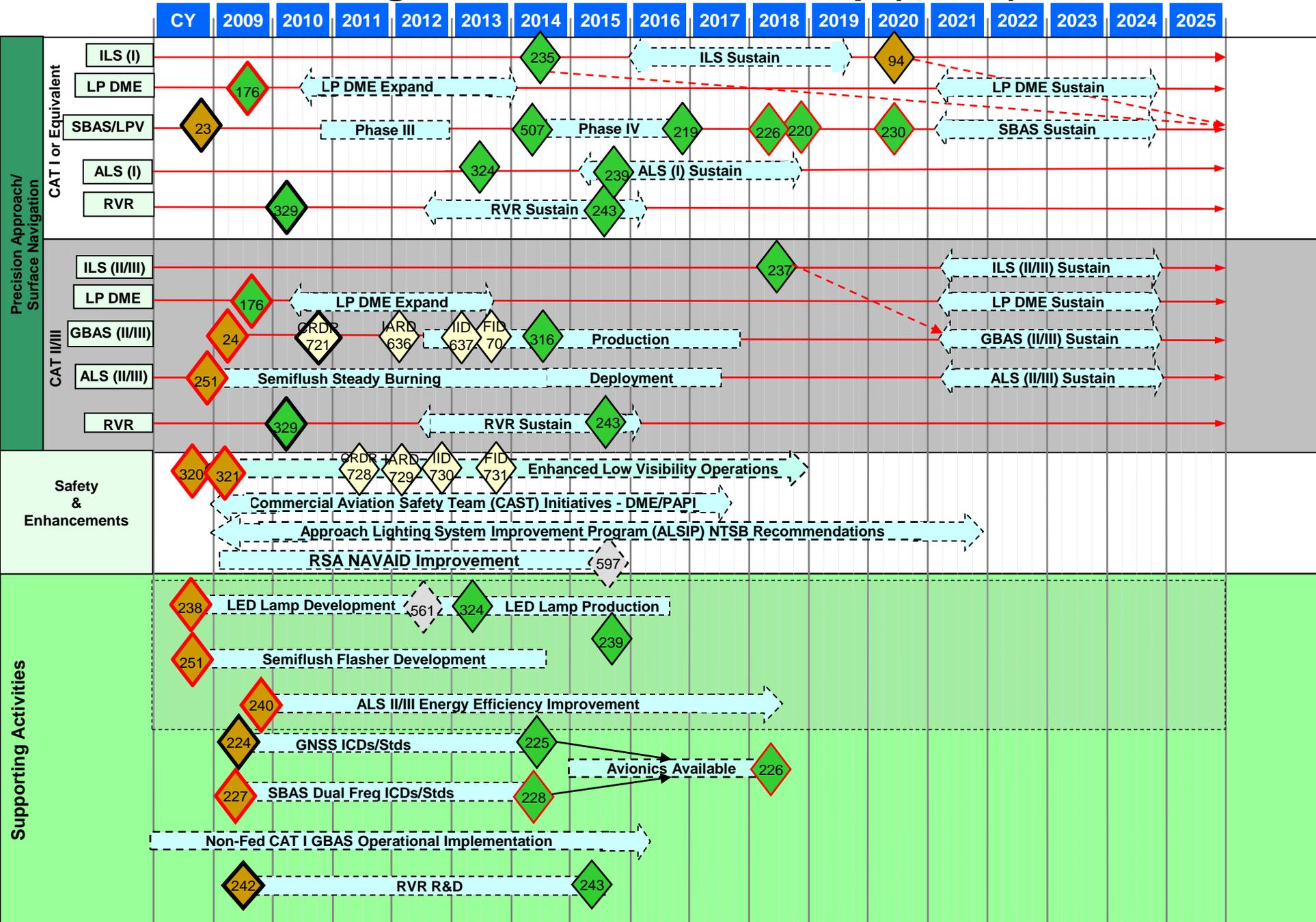
DP #	Target Date CY	High Priority	Domain	Name
31	2012 Q1	Y	Automation	Final Investment Decision for Post ERAM R3 Work Package
34	2010 Q3	N		Decision on Voice Bridge Contract (Align with NVS IID) (Complete)
47	2012 Q3	Y		Final Investment Decision for NAS Voice System Segment 1
74	2013	Y		Final Investment Decision for FTI Re-compete contract
102	2012 Q3	N	Surveillance	Final Investment Decision to implement SIM in terminal and en route legacy radar systems
110	2018	Y	Automation	Approve final investment for transition to NextGen automation platforms and display subsystem through convergence
111	2015	Y	Automation	En Route Automation NextGen Mid-Term Work Package Final Investment Decision
129	2011 Q2	Y		Final Investment Decision for Alaska Satellite Telecommunications Infrastructure (ASTI) Technical Refresh
130	2009 Q3	N	Enterprise Services	Selection of SWIM Segment 2 candidates (Complete)
158	2011 Q3	Y		Data Communications Segment 1 FID (part 1 of a split FID)
162	2008 Q3	N		Agency Link Decision for FCI (Complete)
202	2018	Y	Automation	En Route /Oceanic IES NextGen WP Final Investment Decision
203	2012 Q1	N		Flight Service, MAPS Voice System Provisioning Coordination with NVS
214	2013	N		Determine to Sustain or Decommission LDRCL
215	2013 Q4	N		Determine to Sustain or Decommission RCL
216	2016	N		Decision to Sustain NMR or to replace NMR
218	2021	N		CRDR for migration to L-band for DataComm
304	2018	Y		Data Communications Segment 2 FID
344	2011 Q1	N	Enterprise Services	Establish Requirements for a Backup Timing Source
345	2012 Q3	N	Enterprise Services	Implementation strategy decision for GPS timing backup
349	2022 Q2	N		Approve Digital Audio Legal Recorder replacement

## Communication Roadmap: Decision Points (2 of 2)

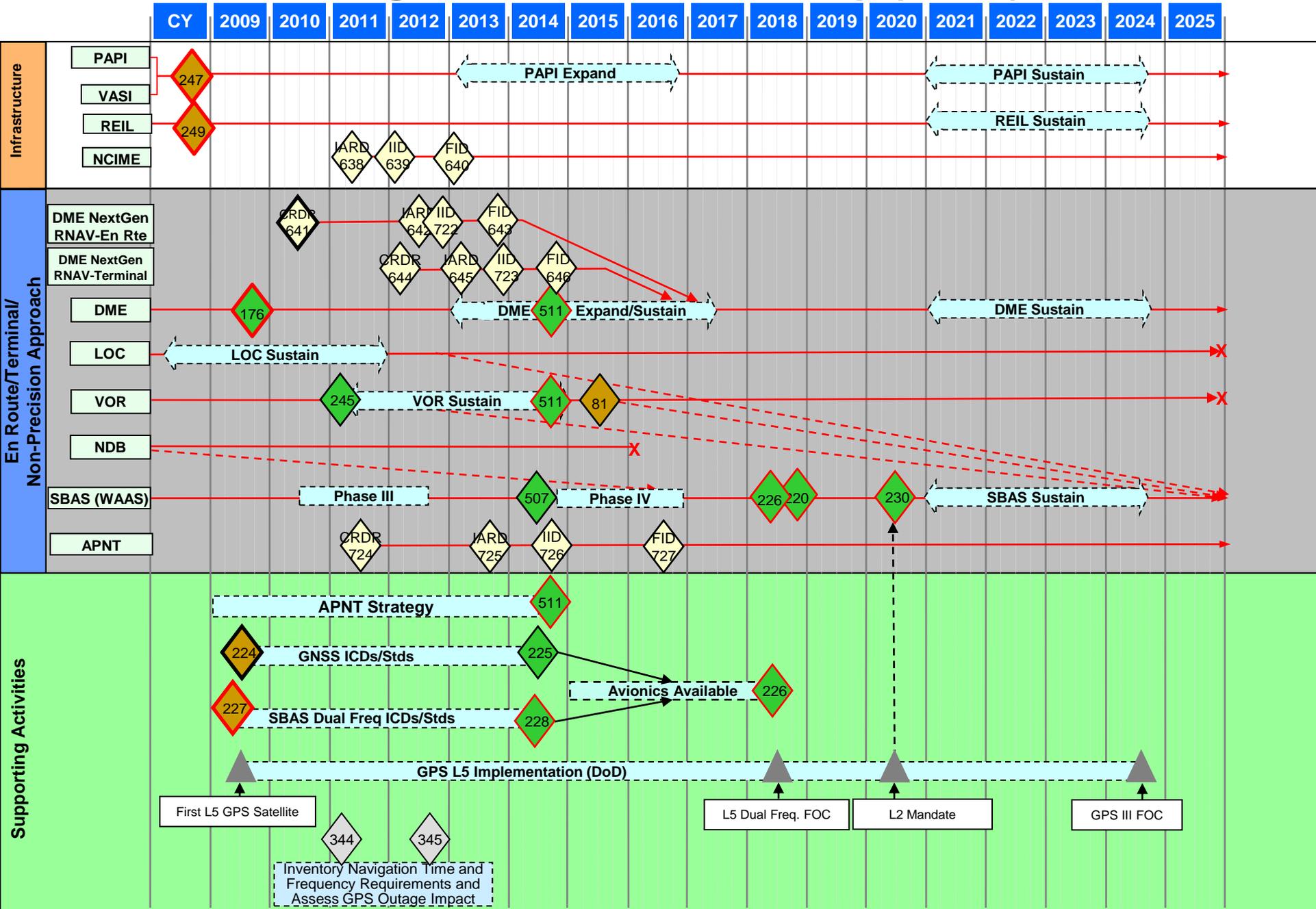
DP #	Target Date CY	High Priority	Domain	Name
352	2009 Q4	N		Approve IDLM Enhancement (Complete)
353	2012 Q1	Y		Data Communications Segment 1 FID (part 2 of a split FID)
441	2012 Q2	N		ATIS Technical Refresh FID
442	2014	N		Determine need for VSCS Technical Refresh Phase IV
485	2010 Q3	N		ATIS Technical Refresh CRDR (Complete)
486	2011 Q3	N		ATIS Technical Refresh IARD
499	2011 Q3	Y		FID for NEXCOM Segment 2
709	2015	Y		NVS Segment 2 IID
710	2017	Y		NVS Segment 2 FID
712	2012	N		Strategy decision on whether to procure AeroMACS capability on the FTI contract
750	2011 Q1	N		Baseline Change Decision (BCD) for VSCS
755	2010 Q4	N		Authorization to Proceed (ATP) towards NEXCOM FID (DP 499)
756	2010 Q3	N		Authorization to Proceed (ATP) towards Datacomm (DCS) Segment 1

# Navigation

# Navigation Services Roadmap (1 of 2)



# Navigation Services Roadmap (2 of 2)



# Navigation Services Roadmap: Assumptions

Identifier	Description
NAV-01	<p>NextGen implementation requires an aggressive transition to services that support performance-based navigation. This requires:</p> <ul style="list-style-type: none"> <li>a) Close collaboration with the aviation community</li> <li>b) A clear definition of the standard services that will be provided by FAA</li> <li>c) Other services supported by non-Federal entities</li> </ul>
NAV-02	<p>FAA is migrating to NAS-wide performance-based navigation—RNAV/RNP/LPV (primarily GNSS) for en route, terminal, and approach &amp; landing domains. This will include:</p> <ul style="list-style-type: none"> <li>a) Transition from VORs to GNSS RNAV for en route and terminal</li> <li>b) Transition from ILS to GNSS (SBAS/GBAS)* for approach and landing</li> <li>c) Provision for CAT I or equivalent approach &amp; landing service by SBAS at airports meeting minimum criteria</li> <li>d) Extent of CAT II and CAT III service by GBAS is TBD</li> </ul> <p>* SBAS is WAAS; GBAS is LAAS</p>
NAV-03	<p>Need to continue working closely with users and the avionics industry on equipage issues</p> <ul style="list-style-type: none"> <li>a) Current equipage is insufficient to support transition from ground-based infrastructure to performance-based navigation</li> <li>b) In the future, equipage will be in place to support transition to performance-based navigation</li> <li>c) Implementation dates allow sufficient lead time to accommodate time-lines</li> </ul>
NAV-04	<p>Policy will be in place to maintain safety, security, and capacity and preclude significant economic impact during GNSS outages</p>
NAV-05	<p>Department of Defense will maintain a GPS constellation consistent with the Standard Positioning Service.</p>

# Navigation Roadmap: Decision Points (1 of 3)

DP #	Target Date CY	High Priority	Domain	Name
23	2008 Q3	N		Category (CAT) I Instrument Approach Policy (Complete)
24	2009 Q1	Y		Decision to proceed with Ground Based Augmentation System (GBAS) CAT II/III research and development to develop a prototype, validate requirements, and demonstrate feasibility for a low risk acquisition of CAT-II/III capable Local Area Augmentation System (LAAS) (Complete)
70	2013 Q3	N		Final Investment Decision (FID) for the acquisition of CAT II/III Ground Based Augmentation System (GBAS)
81	2015	N		Very High Frequency Omni-Directional Ranging (VOR) decision on far-term drawdown
94	2020	N		Decision on complete Instrument Landing System (ILS) CAT I drawdown
176	2009 Q3	Y		Distance Measuring Equipment (DME) NextGen Strategy Plan—Decision to procure next generation of DMEs to replace aging systems and expand the network where needed to support Area Navigation (RNAV) & NextGen (Complete)
219	2016	N		Completion of all Wide Area Augmentation System (WAAS) instrument approach procedures (Localizer Performance with Vertical Guidance ((LPV) and LP) for all qualifying runways in the National Airspace System (NAS), estimated to be 5500 runway ends. Original date of 2018 was accelerated to 2016.
220	2018	Y		Completion of Dual Frequency (GPS L1 and L5) development & testing for the WAAS ground and space segment hardware, software, and user equipment standards and avionics, required by DoD Mandate, issued September 2008
224	2009 Q2	N		Decision to develop dual frequency multi-constellation Global Navigation Satellite System (GNSS) avionics (Complete)
225	2014	N		Decision to proceed with dual frequency multi-constellation GNSS avionics activities to validate standards and lower risk for avionics development.
226	2018	Y		Completion of Dual frequency multi-constellation GNSS avionics activities
227	2009 Q2	Y		Decision to develop dual frequency SBAS/WAAS avionics (Complete)
228	2014	Y		Decision to proceed with WAAS dual frequency avionics activities to validate standards and lower risk for avionics development.
230	2020	Y		Cut-over to dual frequency operations
235	2014	N		Decision on active drawdown of CAT I ILSs operating in the NAS
237	2018	N		Decision on replacement CAT II/III ILSs operating in the NAS
238	2008 Q4	Y		Approach Lighting System (ALS) (I) Decision to develop and implement replacements for PAR 38 & 56 lamps (Complete)
239	2015	N		Production ALS(I) lamps available for installation
240	2009 Q4	Y		ALS (II/III) - Decision to improve energy efficiency of lighting systems (Complete)

# Navigation Roadmap: Decision Points (2 of 3)

DP #	Target Date CY	High Priority	Domain	Name
242	2009 Q3	N		Decision to conduct R&D to explore Runway Visual Range (RVR) for prediction of precipitation (Complete)
243	2015	N		Decision to implement enhanced capability based on results of RVR research
245	2011 Q1	N		Decision on near-term minimum operational VOR ground network
247	2008 Q4	Y		Decision to develop and implement Light Emitting Diode (LED) technology to replace incandescent lamps. Precision Approach Path Indicator (PAPI) is the ICAO accepted standard visual glide slope indicator. Whenever possible, Visual Approach Slope Indicator (VASI) systems will be replaced with PAPI systems (Complete)
249	2008 Q4	Y		Decision to develop and implement replacements for Runway End Identifier Lights (REIL) lamps with LEDs (Complete)
251	2008 Q4	Y		Decision to deploy semiflush fixtures for existing sites and new establishments (Complete)
316	2014	N		GBAS ground facilities and single-frequency avionics available for use
320	2008 Q4	Y		Decision to implement RVR 1800 at Operational Evolution Partnership (OEP) Airports (Complete)
321	2009 Q1	Y		Increased capacity at ILS/RVR equipped runways during IMC (Complete)
324	2013	N		Decision to proceed with ALS (I) LED lamps, based on Operational Capability Demonstration with Enhanced Flight Vision System (EFVS) aircraft
329	2010 Q1	N		RVR Sustainment: In-Service Decision (ISD) for PC-RVR for use within the NAS (Complete)
344	2011 Q1	N	Enterprise Services	Establish Requirements for a Backup Timing Source
345	2012 Q3	N	Enterprise Services	Implementation strategy decision for GPS timing backup
507	2014	N		WAAS moves from Phase III to Phase IV
511	2014	Y		Alternate Position, Navigation, and Timing (APNT) solution determined
561	2012	N	Airport	Energy Independence and Security Act (EISA) Compliance Policy
597	2015	N	Airport	Runway Safety Area (RSA) NAVAID Improvements
636	2012 Q1	N		Investment Analysis Readiness Decision (IARD) for the acquisition of CAT II/III Ground Based Augmentation System (GBAS)
637	2013 Q1	N		Initial Investment Decision (IID) for the acquisition of CAT II/III Ground Based Augmentation System (GBAS)
638	2011 Q2	N		Investment Analysis Readiness Decision (IARD) for the Acquisition of NAVAID Control, Interlock, and Monitoring Equipment (NCIME)
639	2012 Q1	N		Initial Investment Decision (IID) for the Acquisition of NAVAID Control, Interlock, and Monitoring

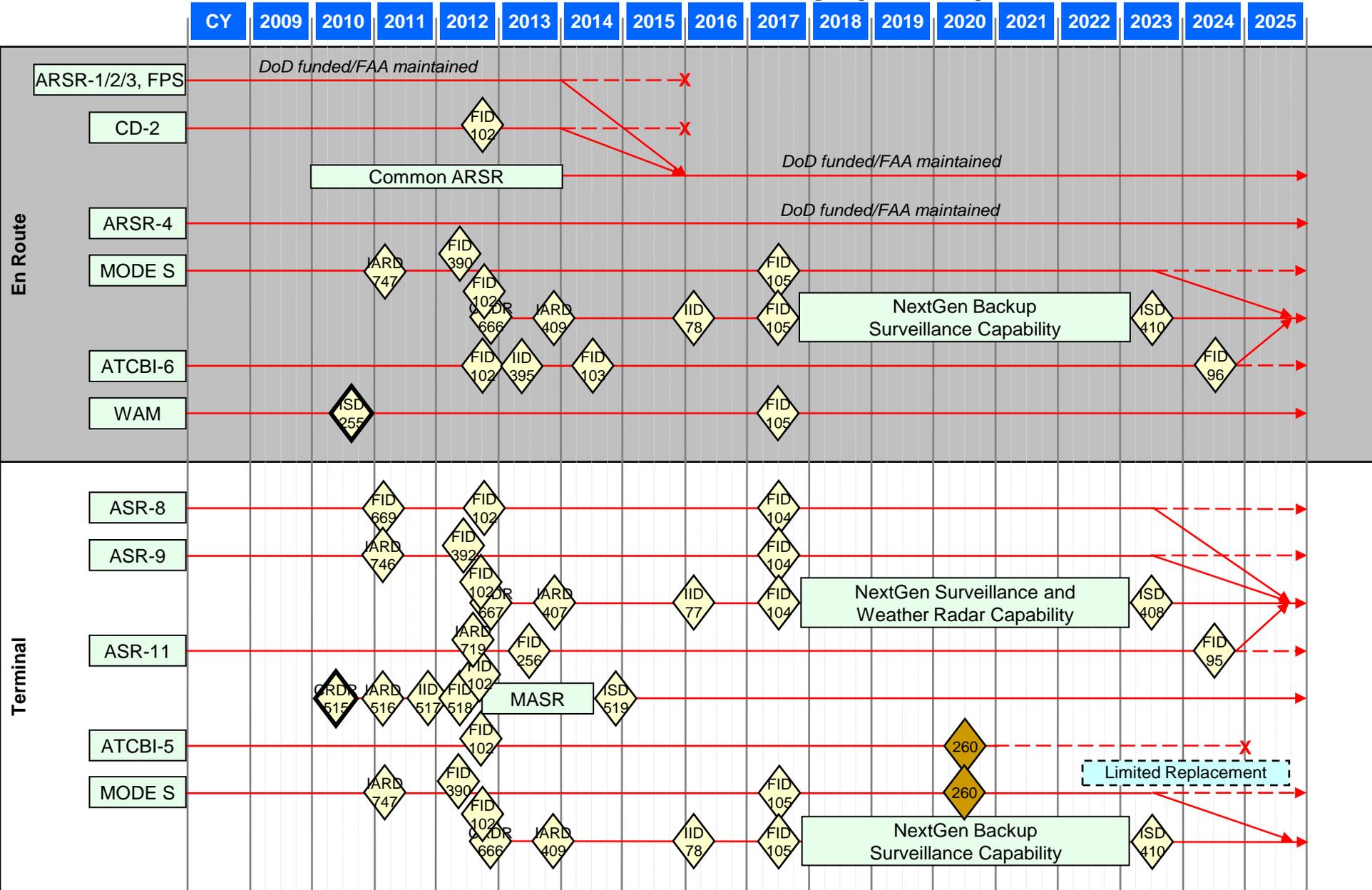
# Navigation Roadmap: Decision Points (3 of 3)

DP #	Target Date CY	High Priority	Domain	Name
640	2013 Q1	N		Final Investment Decision (FID) for the Acquisition of NAVAID Control, Interlock, and Monitoring Equipment (NCIME)
641	2010 Q2	N		Concept & Requirements Definition Readiness (CRDR) Decision for the acquisition of NextGen RNAV-En Route Distance Measuring Equipment (DME) (Complete)
642	2012 Q2	N		Investment Analysis Readiness Decision (IARD) for the acquisition of NextGen RNAV - En Route Distance Measuring Equipment (DME)
643	2013 Q3	N		Final Investment Decision (FID) for the acquisition of NextGen RNAV - En Route Distance Measuring Equipment (DME)
644	2012 Q1	N		Concept & Requirements Definition Readiness (CRDR) Decision for the acquisition of NextGen RNAV - Terminal Distance Measuring Equipment (DME)
645	2013 Q1	N		Investment Analysis Readiness Decision (IARD) for the acquisition of NextGen RNAV - Terminal Distance Measuring Equipment (DME)
646	2014 Q3	N		Final Investment Decision (FID) for the acquisition of NextGen RNAV - Terminal Distance Measuring Equipment (DME)
721	2010 Q3	N		Concept & Requirements Definition Readiness (CRDR) Decision for the acquisition of CAT II/III Ground Based Augmentation System (GBAS) (Complete)
722	2012 Q4	N		Initial Investment Decision (IID) for the acquisition of NextGen RNAV-En Route Distance Measuring Equipment (DME)
723	2013 Q4	N		Initial Investment Decision (IID) for the acquisition of NextGen RNAV-Terminal Distance Measuring Equipment (DME)
724	2011 Q2	N		Concept & Requirements Definition Readiness (CRDR) Decision for Alternate Positioning, Navigation and Timing (APNT)
725	2013 Q3	N		Investment Analysis Readiness Decision (IARD) for Alternate Positioning, Navigation and Timing (APNT)
726	2014 Q3	N		Initial Investment Decision (IID) for Alternate Positioning, Navigation and Timing (APNT)
727	2016 Q3	N		Final Investment Decision (FID) for Alternate Positioning, Navigation and Timing (APNT)
728	2011 Q2	N		Concept & Requirements Definition Readiness (CRDR) Decision for Enhanced Low Visibility Operations (ELVO)
729	2012 Q1	N		Investment Analysis Readiness Decision (IARD) for Enhanced Low Visibility Operations (ELVO)
730	2012 Q4	N		Initial Investment Decision (IID) for Enhanced Low Visibility Operations (ELVO)
731	2013 Q3	N		Final Investment Decision (FID) for Enhanced Low Visibility Operations (ELVO)

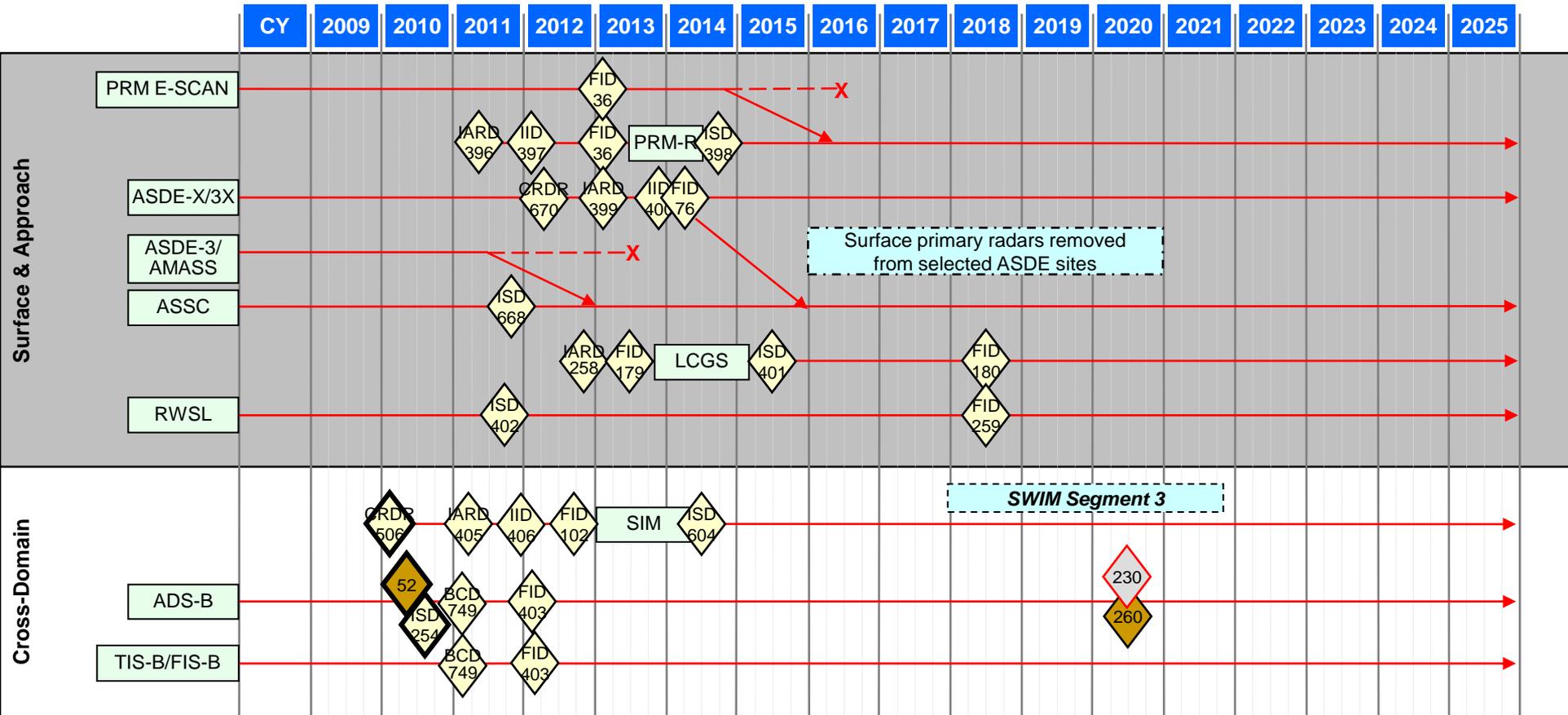
# Surveillance

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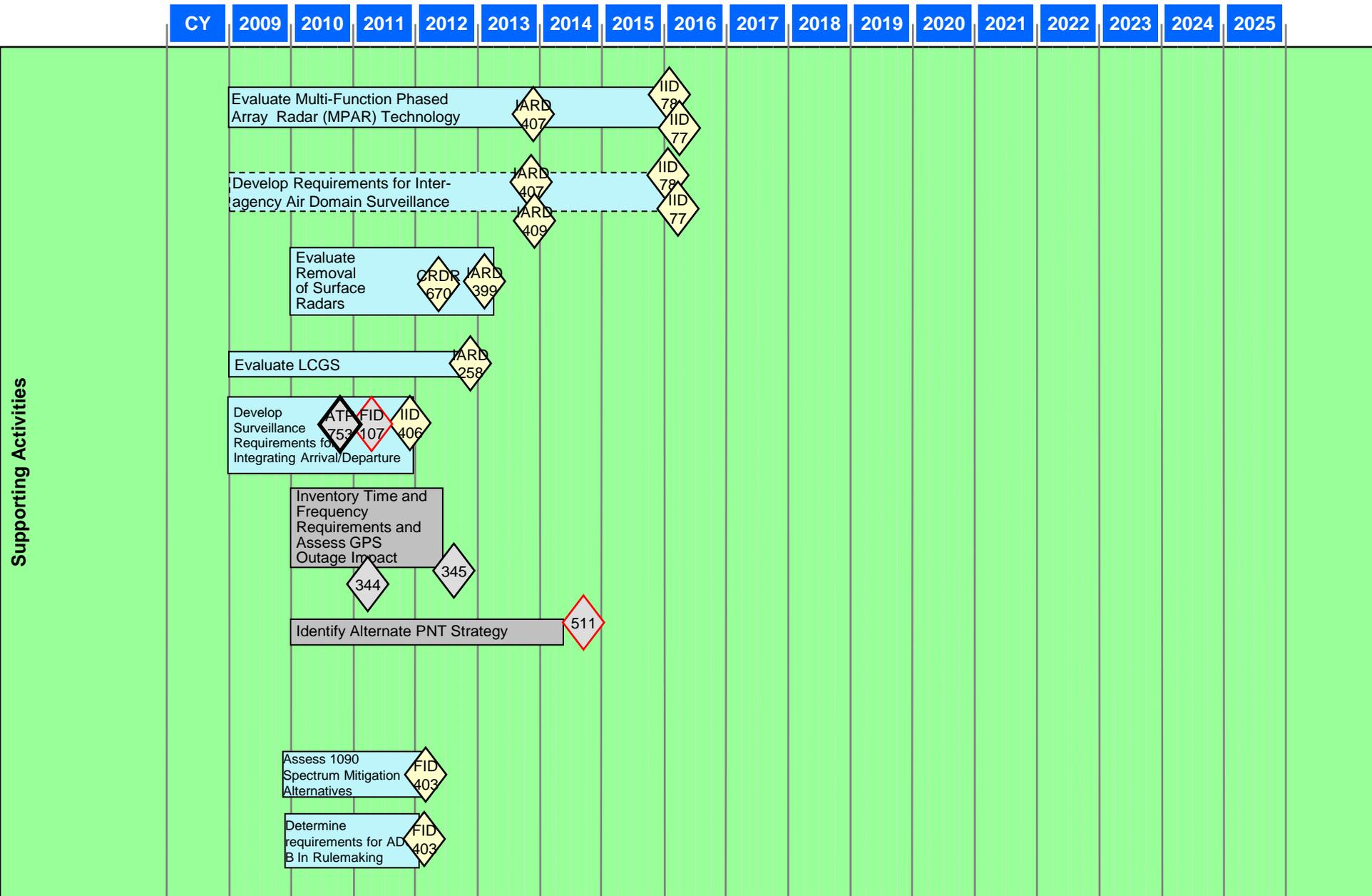
# Surveillance Roadmap (1 of 3)



# Surveillance Roadmap (2 of 3)



# Surveillance Roadmap (3 of 3)



Supporting Activities

# Surveillance Roadmap: Assumptions

Identifier	Description
SURV-01	Migration to Automatic Dependent Surveillance—Broadcast (ADS-B) as primary means of surveillance a) Airspace rule to be in effect and backup to be in place by 2020 (compliance date) <ol style="list-style-type: none"> <li>1. Existing surveillance infrastructure will remain in place until 2020</li> </ol>
SURV-02	Backup to mitigate loss of on-board GPS positioning source required a) Backup strategy was identified in January 2007 <ol style="list-style-type: none"> <li>1. Retain all en route beacons (~150 monopulse systems with selective interrogation)</li> <li>2. Retain limited set of terminal beacons at Operational Evolution Partnership (OEP)/High Density Terminals (~50 locations)</li> </ol> b) All terminal primary radars are retained <ol style="list-style-type: none"> <li>1. Used as safety (ATC) backup</li> <li>2. May also be retained for aviation security and/or weather requirements</li> </ol>
SURV-03	Surface primary radar surveillance will not be required at selected ASDE sites a) Requires mandated equipage of all surface vehicles b) Surface surveillance to be supported by multilateration and ADS-B at these sites
SURV-04	PRM-A, with multilateration technology, will replace PRM E-Scan
SURV-06	Department of Defense/Department of Homeland Security continues to fund LRR systems through 2025
SURV-07	Digital automation system inputs are assumed for implementation of SIM

# Surveillance Roadmap: Decision Points (1 of 3)

DP #	Target Date CY	High Priority	Domain	Name
36	2013 Q1	N		Final Investment Decision for migration of PRM to PRM-R (based on multilateralation)
52	2010 Q2	N		Final Decision for Avionics Mandate/Rulemaking for ADS-B (out)/MODE-S/UAT (Completed)
76	2014	N		Final Investment Decision for removal or SLEP/replace ASDE surface primary radars (evolving requirements for safety and security may impact decision)
77	2016 Q1	N		Initial Investment Decision to implement a NextGen Surveillance and Weather Radar Capability for ATC
78	2016 Q1	N		Initial Investment Decision to implement a NextGen beacon/backup radar system for ATC
95	2024	N		Decision for replacement of terminal primary radars (ASR-11 PSR) and removal of terminal beacons (ASR-11 MSSR)
96	2024	N		Decision for replacement of en route beacons (ATCBI-6)
102	2012 Q3	N		Final Investment Decision to implement SIM in terminal and en route legacy radar systems
103	2014	N		Final Investment Decision for technology refresh of beacons (ATCBI-6)
104	2017	N		Final Investment Decision to implement a NextGen Surveillance and Weather Radar Capability for ATC
105	2017	N		Final Investment Decision to implement a NextGen beacon/backup radar system for ATC
107	2011 Q2	Y	Automation	TAMR Phase 3 Segment 1 Final Investment Decision
179	2013	N		Combined Initial Investment Decision and Final Investment Decision for LCGS
180	2018	N		Final Investment Decision for ADS-B to assume LCGS function, or approve a Technology Refresh for LCGS
230	2020	Y	Navigation	Cut-over to dual frequency operations
254	2010 Q3	N		In-Service Decision for SBS Critical Services (ADS-B) NAS wide implementation, including backup strategy (Complete)
255	2010 Q3	N		In-Service Decision for WAM (Alaska and Colorado) (Complete)
256	2013	N		Final Investment Decision for ASR-11 Technology Refresh Segment 2 (through 2025)
258	2012 Q4	N		Investment Analysis Readiness Decision for LCGS
259	2018	N		Final Investment Decision for RWSL Technology Refresh
260	2020	N		Decision on ADS-B Rule Compliance
344	2011 Q1	N	Enterprise Services	Establish Requirements for a Backup Timing Source

# Surveillance Roadmap: Decision Points (2 of 3)

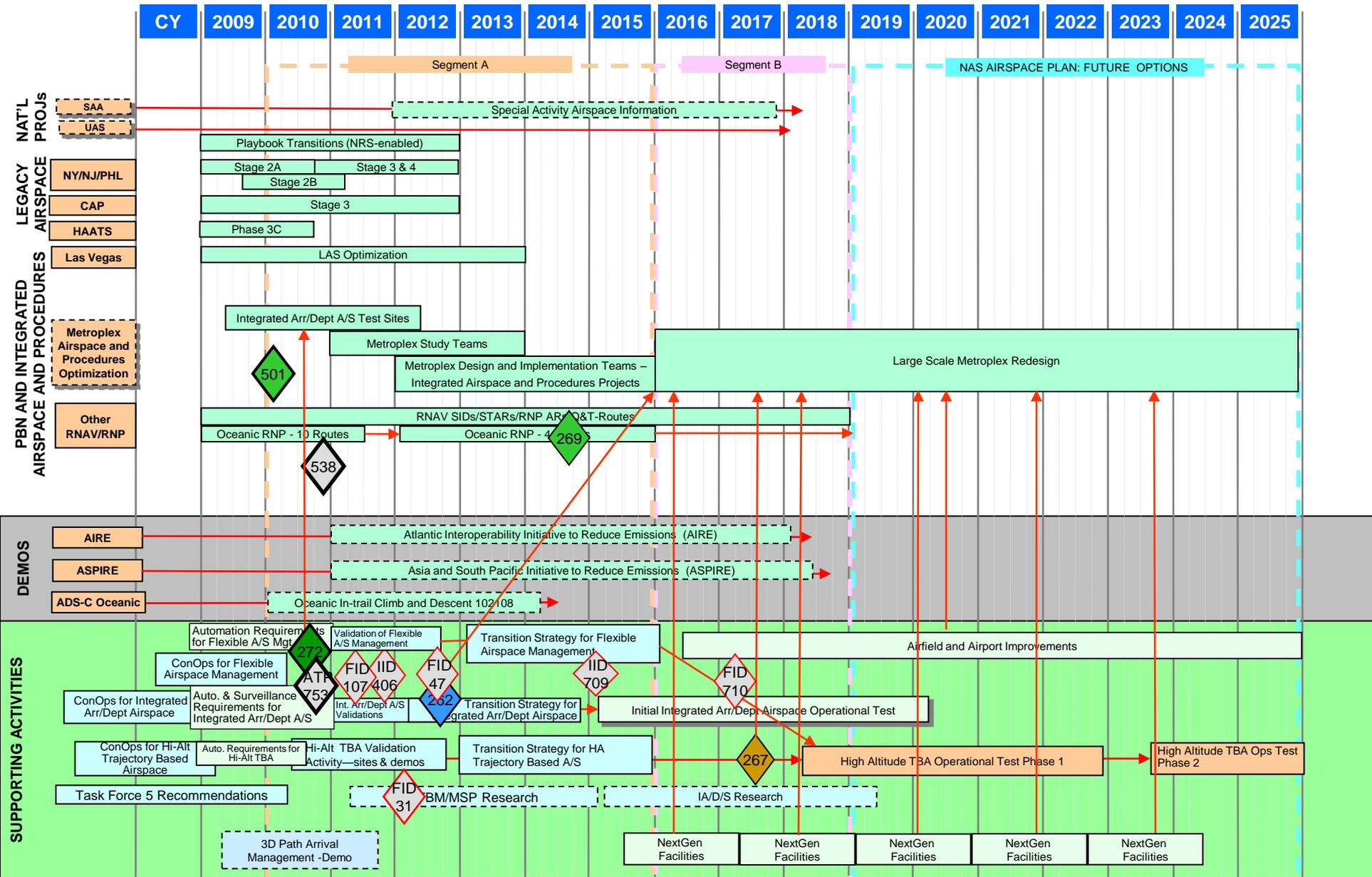
DP #	Target Date CY	High Priority	Domain	Name
345	2012 Q3	N	Enterprise Services	Implementation strategy decision for GPS timing backup
390	2012 Q2	N		Final Investment Decision for legacy beacon (Mode S) SLEP through 2025
392	2012 Q2	N		Final Investment Decision for legacy radar (ASR-9) SLEP through 2025
395	2013	N		Initial Investment Decision for Technology Refresh of ATCBI-6 beacon system
396	2011 Q2	N		Investment Analysis Readiness Decision for Precision Runway Monitor-Replacement
397	2012 Q1	N		Initial Investment Decision for migration of PRM to PRM-R (based on multilateration)
398	2014 Q4	N		In-Service Decision for PRM-R (based on multilateration)
399	2013 Q1	N		Investment Analysis Readiness Decision for removal or SLEP/replace ASDE surface primary radars
400	2013 Q4	N		Initial Investment Decision for removal or SLEP/replace ASDE surface primary radars
401	2015	N		In-Service Decision for Low Cost Ground Surveillance system
402	2011 Q3	N		In-Service Decision for Runway Status Light system
403	2012 Q1	N		Final Investment Decision for SBS Implementation of Advanced ADS-B Applications
405	2011 Q1	N		Investment Analysis Readiness Decision for SIM in terminal and en route legacy radar systems
406	2011 Q4	N		Initial Investment Decision for SIM in terminal and en route legacy radar systems
407	2013 Q4	N		Investment Analysis Readiness Decision for NextGen Surveillance and Weather Radar Capability
408	2023	N		In-Service Decision for NextGen Surveillance and Weather Radar Capability
409	2013 Q4	N		Investment Analysis Readiness Decision for New Beacon/Backup System
410	2023	N		In-Service Decision for New Beacon/Backup System
506	2010 Q1	N		Concept and Requirements Definition Readiness (CRDR) Decision for SIM in Terminal and En Route Legacy Radar Systems (Complete)
511	2014	Y	Navigation	Alternate PNT Strategy
515	2010 Q2	N		Concept and Requirements Definition Readiness (CRDR) Decision for a Mobile/Transportable Airport Surveillance Radar (MASR) (Complete)
516	2011 Q1	N		Investment Analysis Readiness Decision (IARD) for a Mobile/Transportable Airport Surveillance Radar (MASR)
517	2011 Q4	N		Initial Investment Decision (IID) for a Mobile/Transportable Airport Surveillance Radar (MASR)
518	2012 Q2	N		Final Investment Decision (FID) for a Mobile/Transportable Airport Surveillance Radar (MASR)
519	2014 Q4	N		In-Service Decision (ISD) for a Mobile/Transportable Airport Surveillance Radar (MASR)

# Surveillance Roadmap: Decision Points (3 of 3)

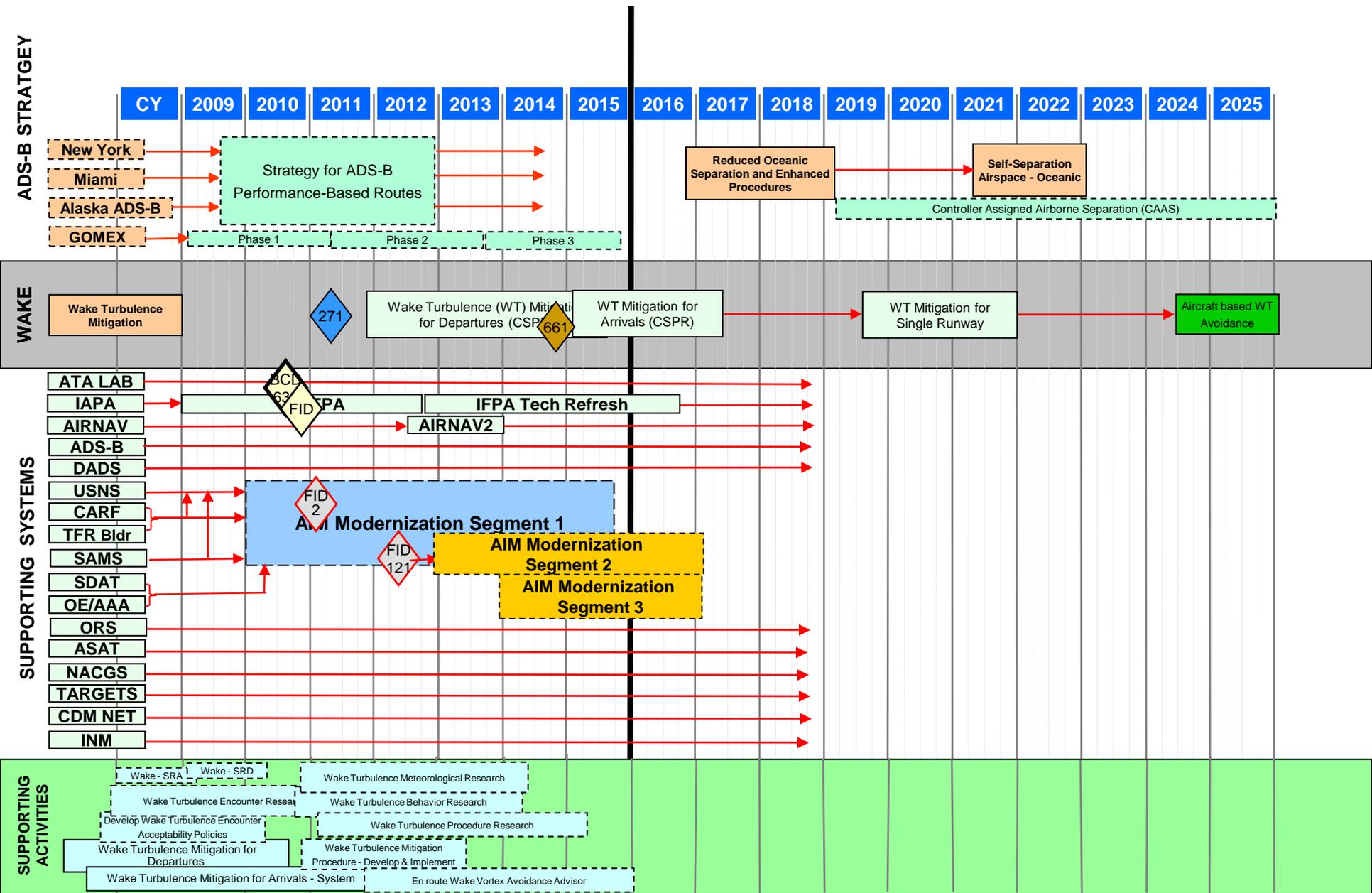
DP #	Target Date CY	High Priority	Domain	Name
604	2014 Q2	N		In-Service Decision (ISD) for SIM in Terminal and En Route Legacy Radar Systems
666	2012 Q4	N		Concept and Requirements Definition Readiness (CRDR) Decision for New Beacon/Backup System
667	2012 Q4	N		Concept and Requirements Definition Readiness (CRDR) Decision for NextGen Surveillance and Weather Radar Capability
668	2011 Q4	N		In Service Decision for Airport Surface Surveillance Capability
669	2011 Q1	N		Final Investment Decision for legacy radar (ASR-8) facility improvements
670	2012 Q2	N		Concept and Requirements Definition Readiness (CRDR) Decision for removal or SLEP/replace ASDE surface primary radars
719	2012	N		Investment Analysis Readiness Decision (IARD) for ASR-11 Technology Refresh Segment 2 (through 2025)
746	2011 Q1	N		Investment Analysis Readiness Decision for legacy radar (ASR-9) SLEP, through 2025
747	2011 Q1	N		Investment Analysis Readiness Decision for legacy beacon (Mode S) SLEP through 2025
749	2011 Q1	N		Baseline Change Decision (BCD) for SBS
753	2010 Q4	N	Automation	Authorization to Proceed (ATP) towards TAMR Phase 3 Segment 1 FID (DP 107)

# Airspace & Procedures

# Airspace & Procedures Roadmap (1 of 4)

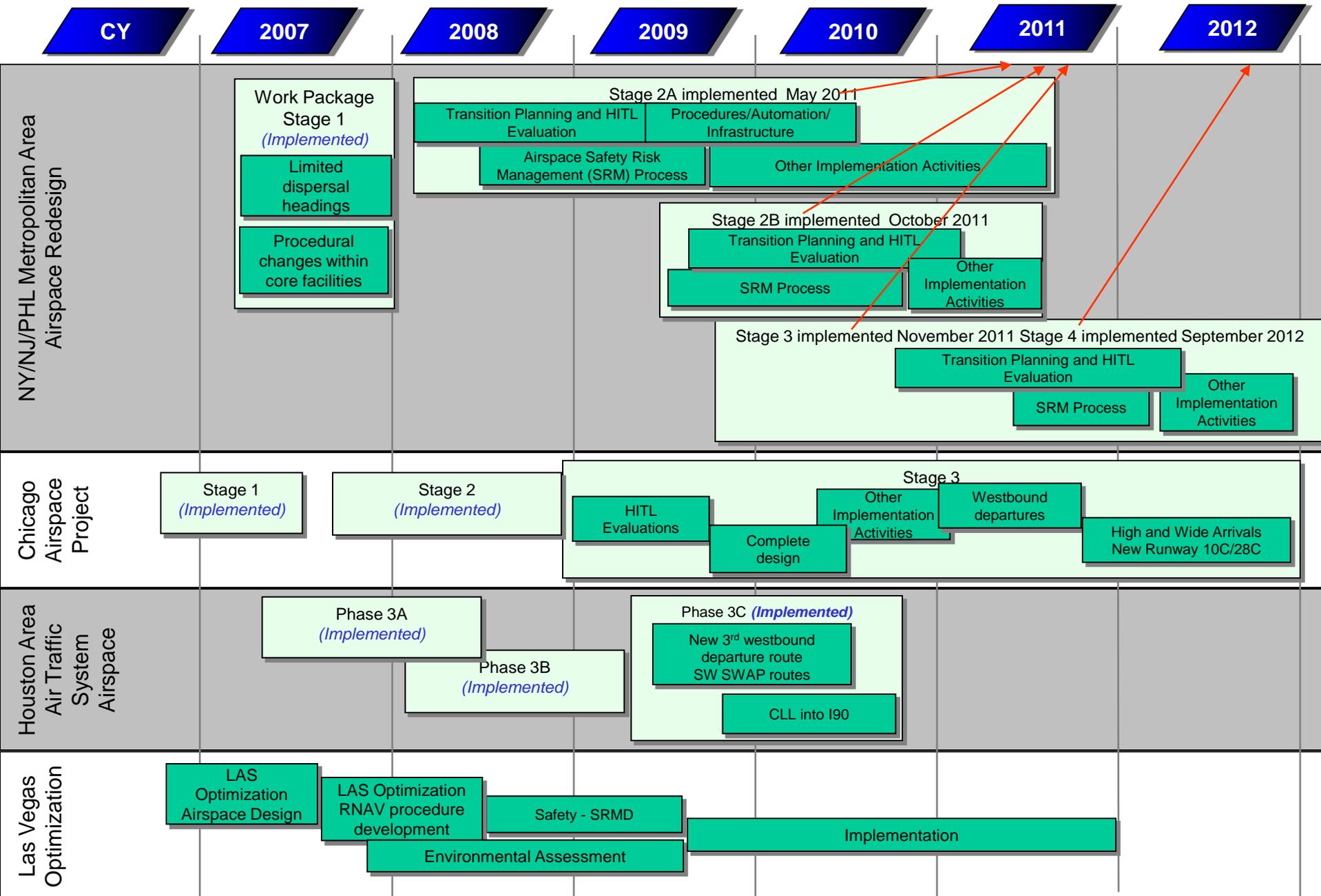


# Airspace & Procedures Roadmap (2 of 4)



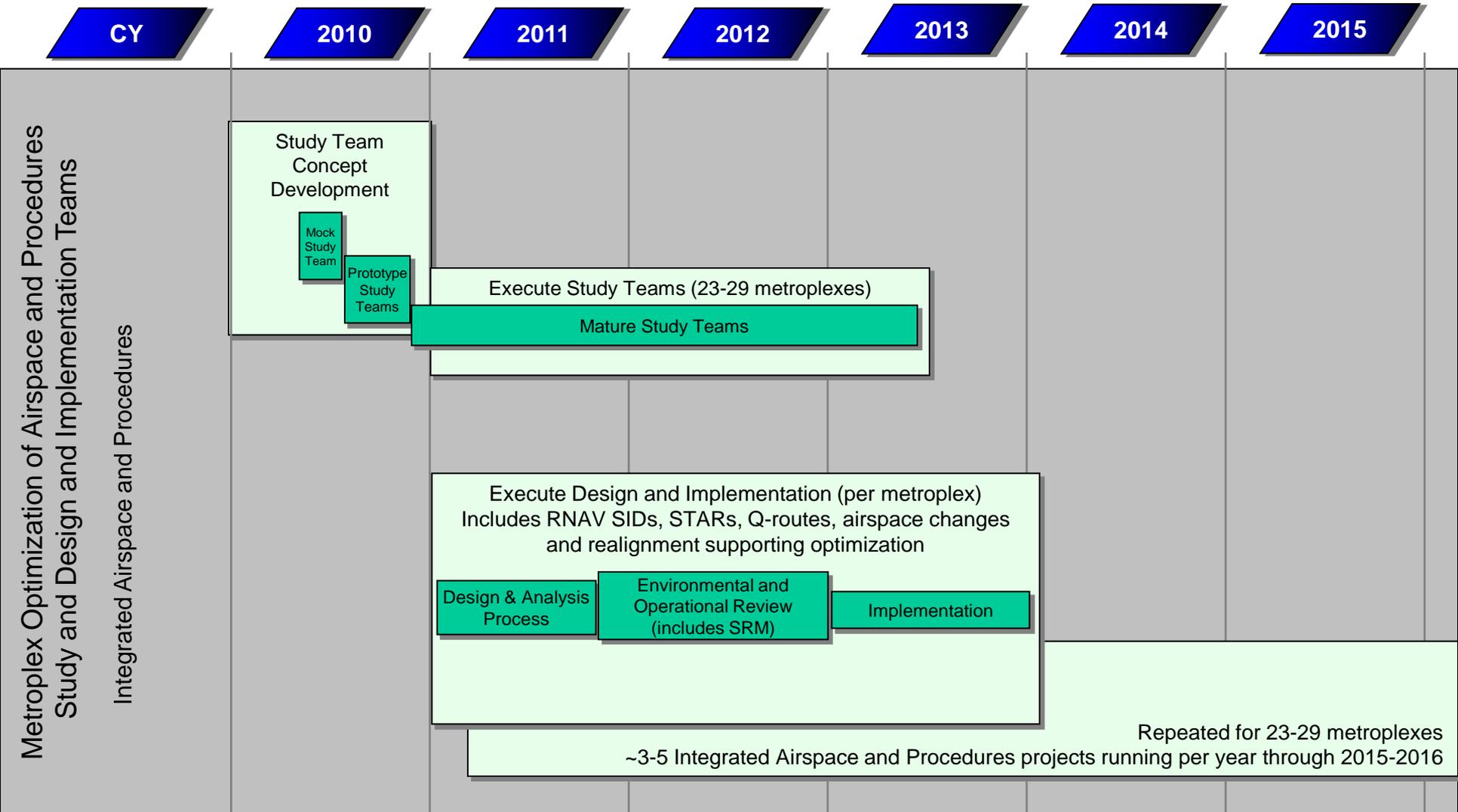
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# Airspace & Procedures Roadmap (3 of 4)



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# Airspace & Procedures Roadmap (4 of 4)



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# Airspace & Procedures Roadmap: Assumptions

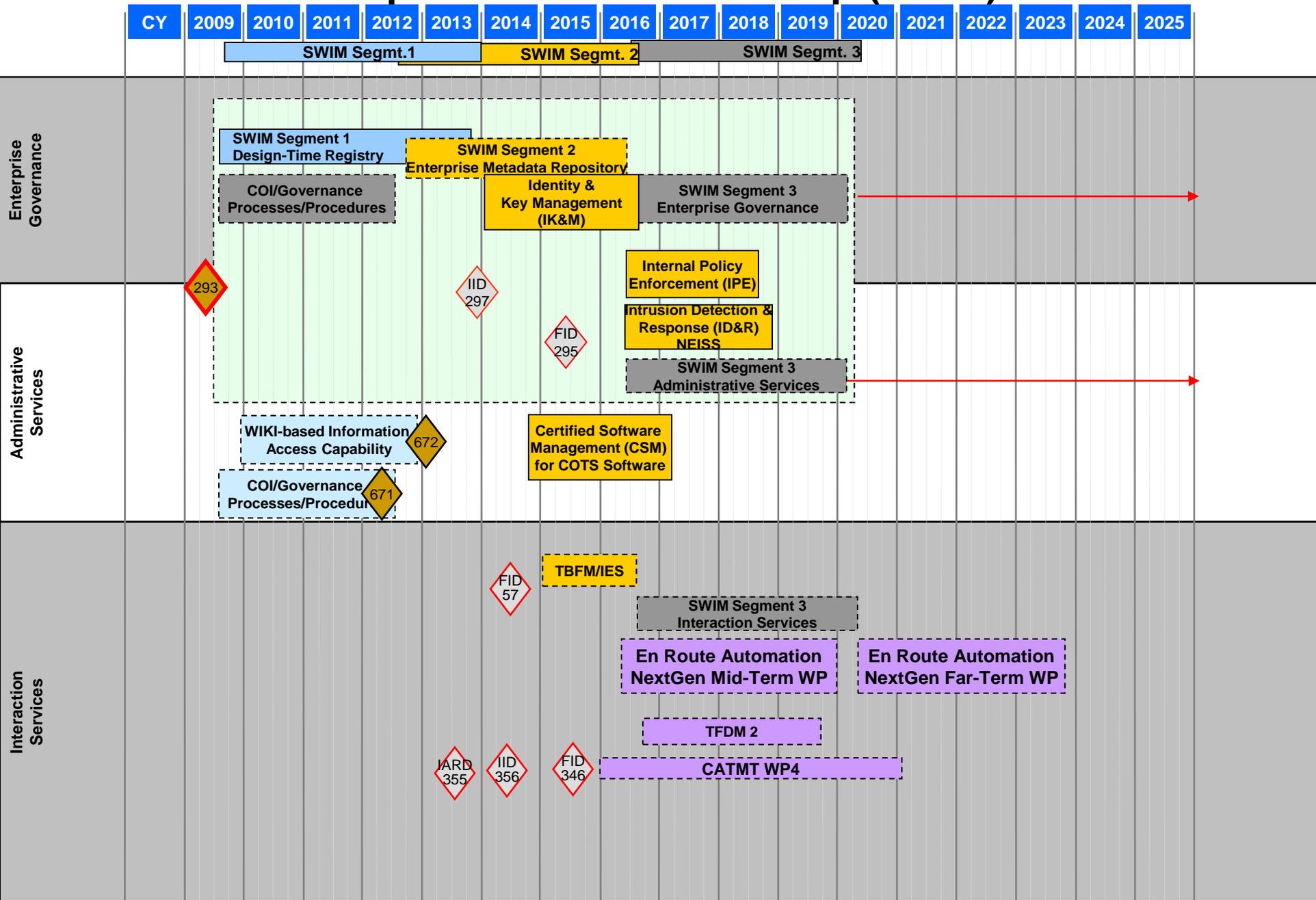
Identifier	Description
A&P-01	<p>Airspace Modernization Assumptions</p> <ul style="list-style-type: none"> <li>a) Flexibility into any of the agency's facility plans</li> <li>b) Future Airspace &amp; NASA research funding is sufficient and provides favorable benefits</li> <li>c) System Dependencies               <ul style="list-style-type: none"> <li>1. ADS-B</li> <li>2. ERAM</li> <li>3. TFMS WP2</li> <li>4. DataComm</li> </ul> </li> </ul>
A&P-02	<p>Integrated Arrival/Departure Airspace (Big Airspace) Assumptions</p> <ul style="list-style-type: none"> <li>a) Key Integrated Arrival/Departure Airspace enablers:               <ul style="list-style-type: none"> <li>1. Extension of 3 Mile Separation &amp; Terminal Procedures</li> <li>2. Integrated arrival/departure airspace configurations</li> <li>3. Flexible sector &amp; bi-directional routes published</li> <li>4. 5 mile lateral spacing for Required Navigation Performance (RNP) enables 5 mile lateral route spacing</li> <li>5. New voice system (NAS Voice System), leased circuits, and Air-Ground communications channels to handle transition</li> <li>6. Cost benefits are based on creating X Integrated Arrival/Departure (Big Airspace) facilities, covering X major metropolitan areas</li> </ul> </li> <li>b) Cost analysis based on general assumptions about the concept, not on any detailed requirements or technical solutions</li> <li>c) Benefits analysis based on extrapolating results from FT simulations to other sites given traffic forecasts and historical weather patterns</li> <li>d) Sites identified where large TRACON facilities exist could accommodate additional BA operational positions with refurbishment. New buildings would be needed where no large TRACON exists.</li> </ul>

# Airspace and Procedures Roadmap: Decision Points

DP #	Target Date CY	High Priority	Domain	Name
2	2011 Q4	Y	Automation	AIM Modernization Segment 1 Final Investment Decision
31	2012 Q1	Y	Automation	Final Investment Decision for Post ERAM R3 Work Package
47	2012 Q3	Y	Communication	Final Investment Decision for NAS Voice System Segment 1
107	2011 Q2	Y	Automation	TAMR Phase 3 Segment 1 Final Investment Decision
121	2012 Q2	Y	Automation	AIM Modernization Segment 2 Final Investment Decision
262	2012	N		Decision to implement Integrated Arrival/Departure Airspace (Big Airspace) at candidate areas
267	2017	N		Decision to proceed with High Altitude Trajectory Based Airspace Concept Phase 1
269	2014	N		Identify locations (e.g. additional TRACONS and previously re-designed facilities)
271	2011 Q2	N		Wake Turbulence Procedures
272	2010 Q3	N		Recommend 1 or 2 test field locations and define automation requirements (Complete)
406	2011 Q4	N	Surveillance	Initial Investment Decision for SIM in terminal and en route legacy radar systems
501	2010 Q1	N		Determine Implementation Plan and initial Demonstration Site(s) for IOP (Complete)
538	2010 Q4	N	Aircraft	Order 8400.33 Procedures for Obtaining Authorization for Required Navigation Performance 4 (RNP-4) Oceanic and Remote Area Operations (Complete)
632	2010 Q4	N		Baseline Change Decision (BCD) for Instrument Flight Procedures Automation (Complete)
661	2014 Q4	N		Wake Re-Categorization
709	2015	Y	Communication	NVS Segment 2 IID
710	2017	Y	Communication	NVS Segment 2 FID
753	2010 Q4	N	Automation	Authorization to Proceed (ATP) towards TAMR Phase 3 Segment 1 FID (DP 107)

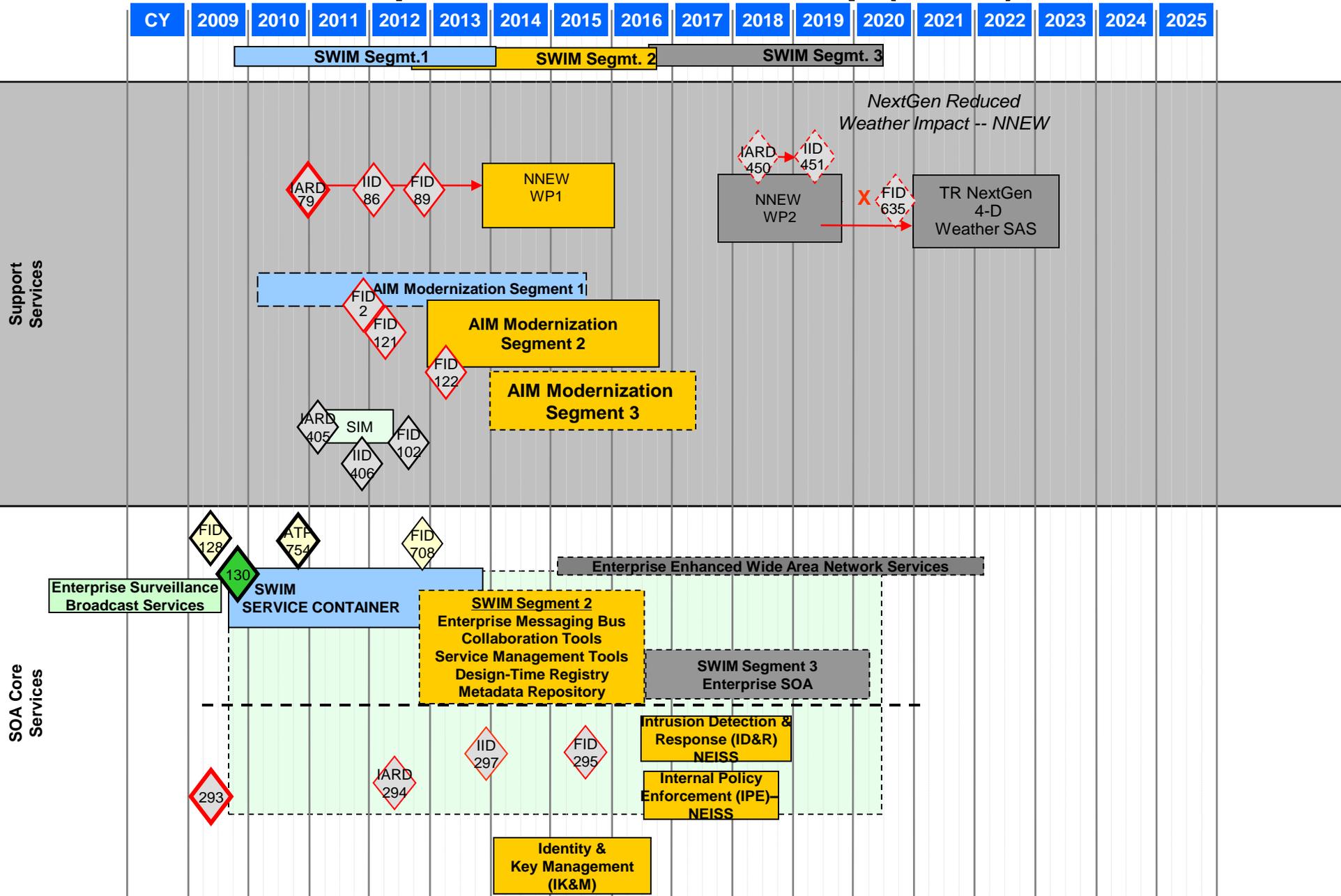
# Enterprise Services

# Enterprise Services Roadmap (1 of 7)



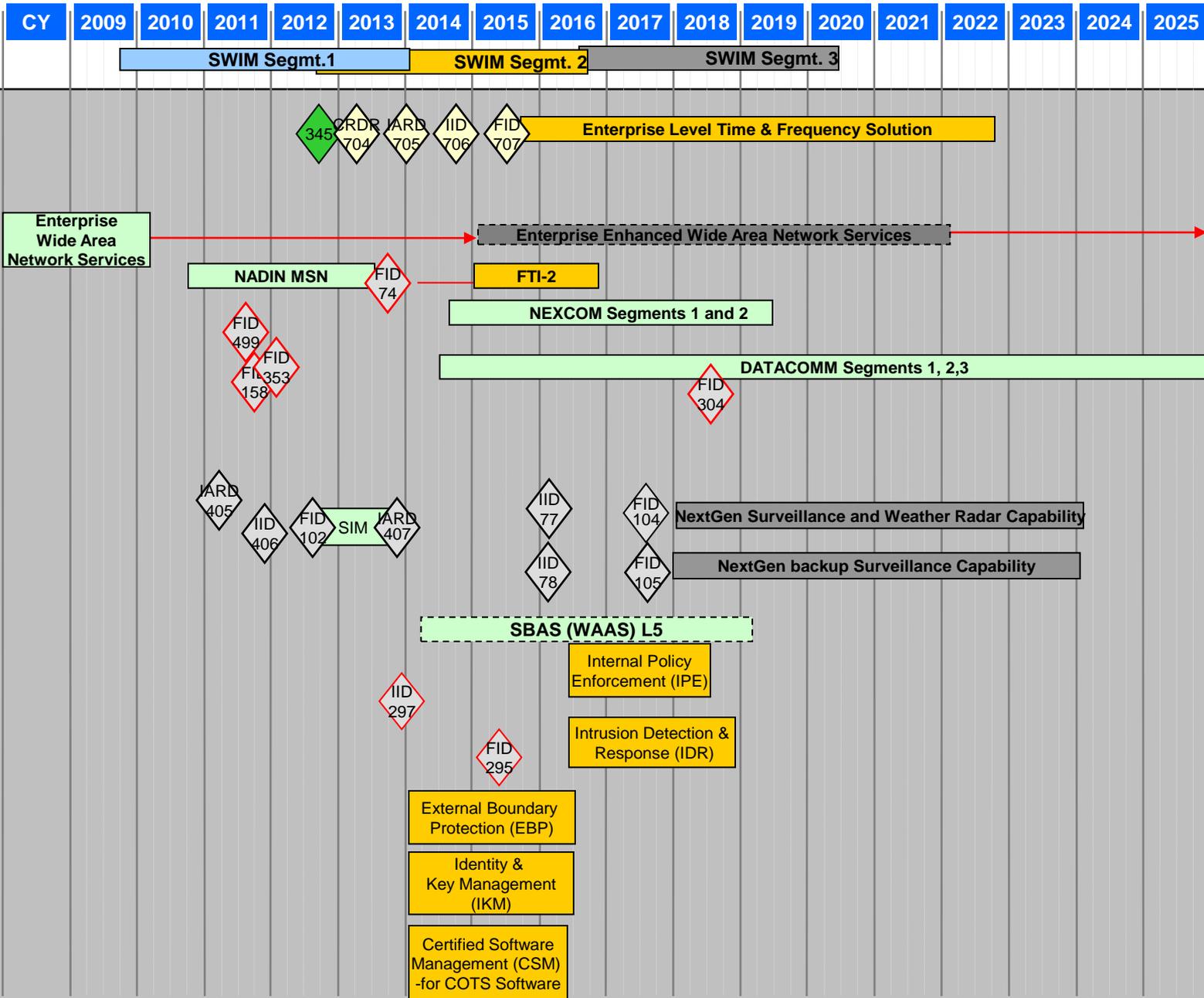
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# Enterprise Services Roadmap (2 of 7)



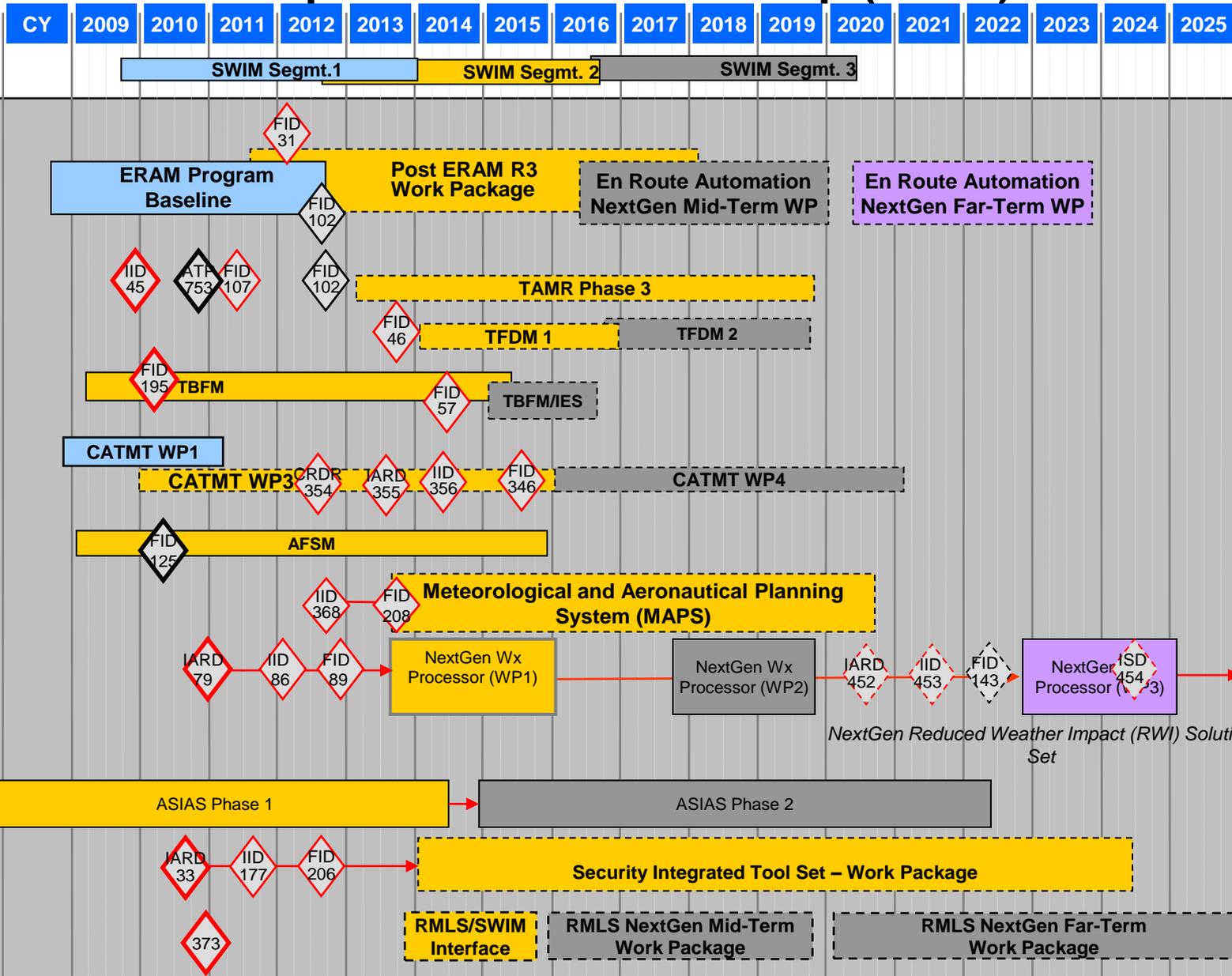
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# Enterprise Services Roadmap (3 of 7)



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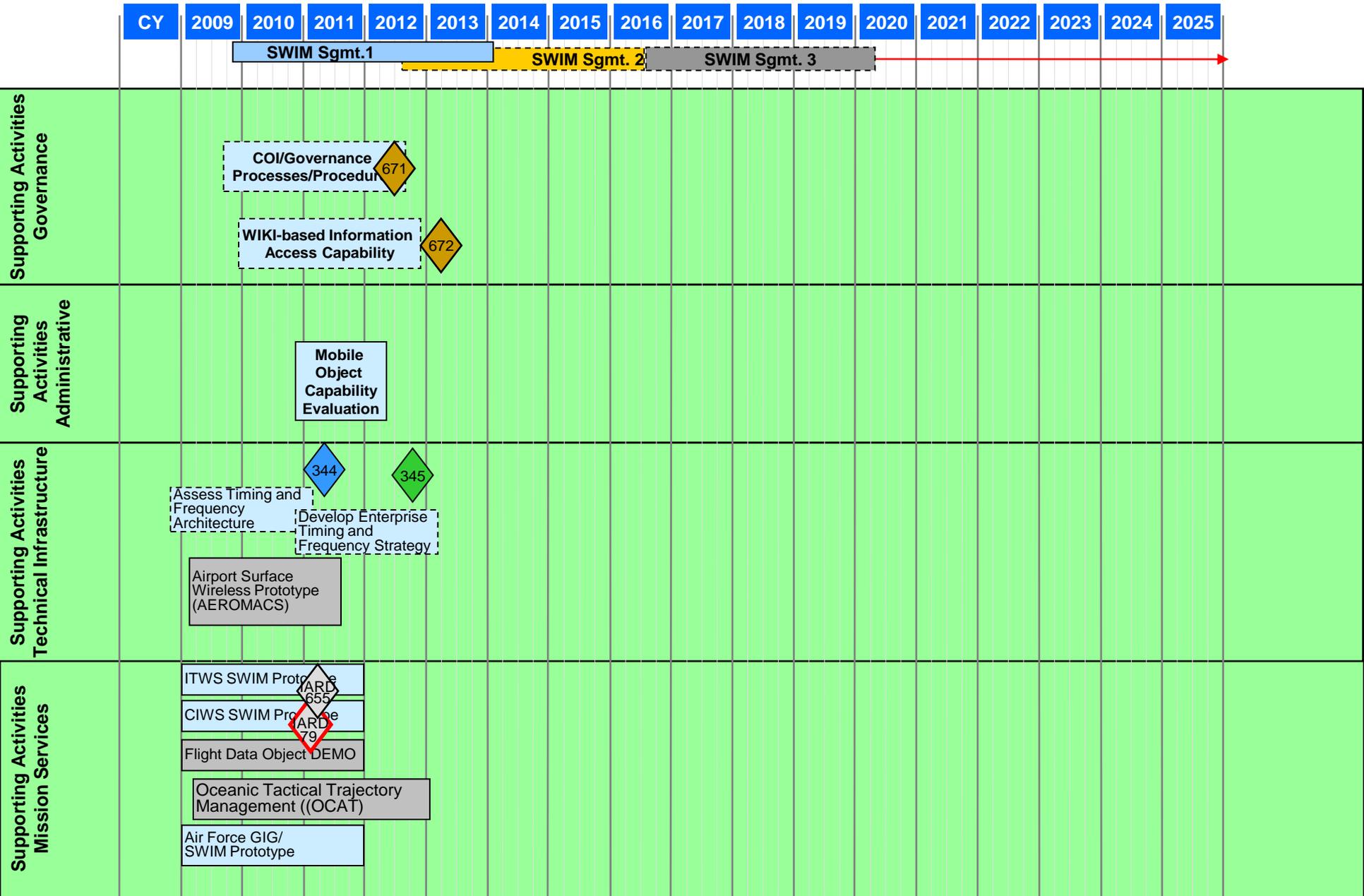
# Enterprise Services Roadmap (4 of 7)



Enterprise Mission Services

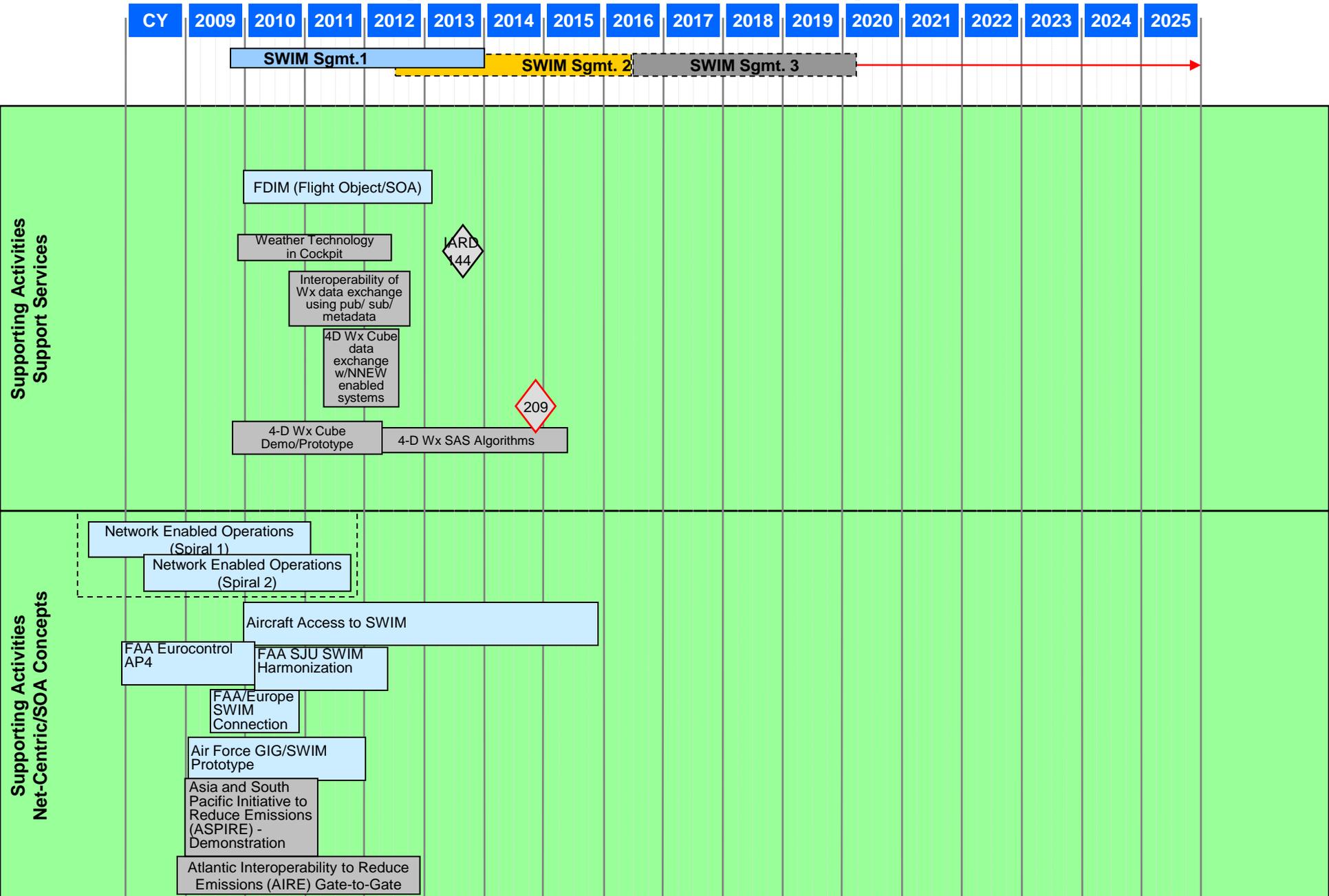
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# Enterprise Services Roadmap (5 of 7)



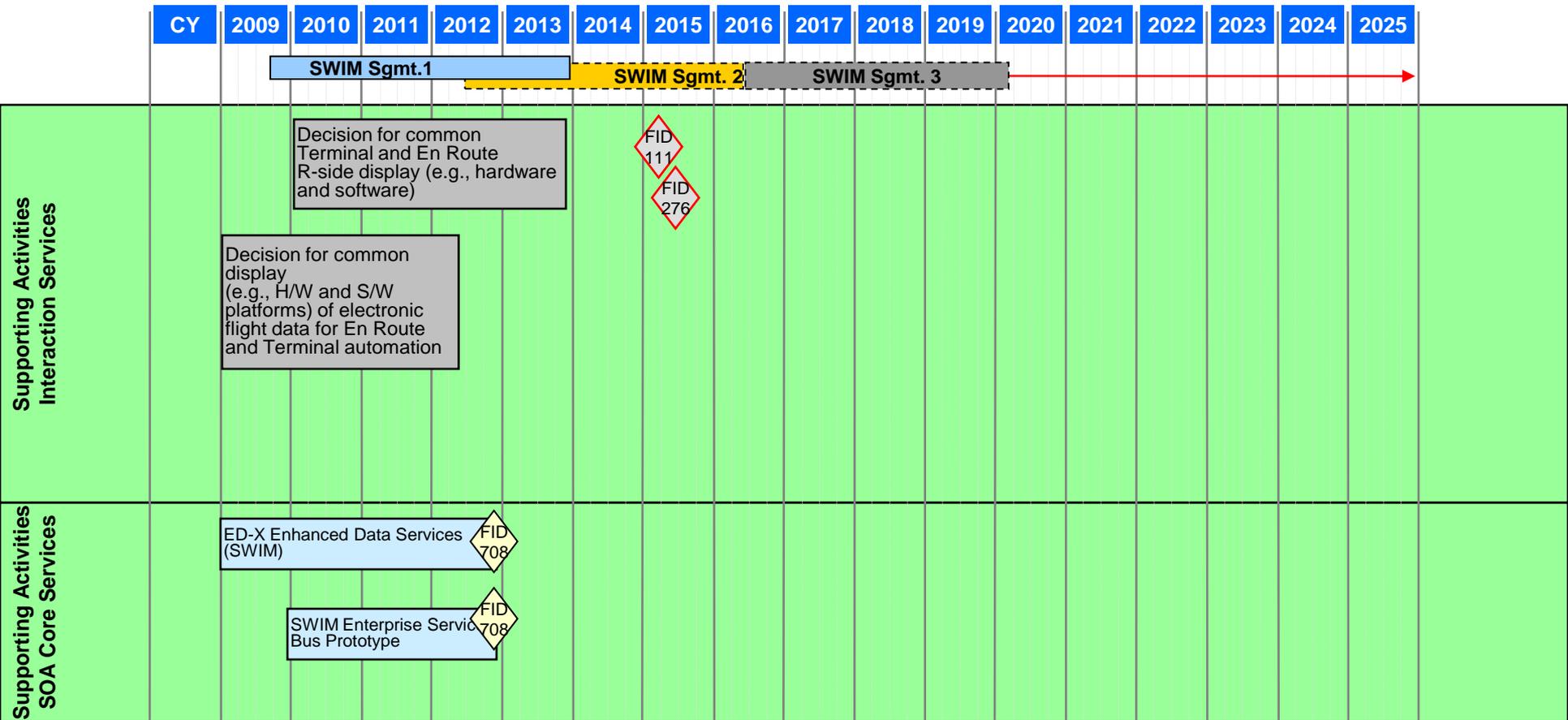
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# Enterprise Services Roadmap (6 of 7)



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# Enterprise Services Roadmap (7 of 7)



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# Enterprise Services Roadmap: Assumptions

Identifier	Description
ES-01	FAA Net Centric Programs will exchange information based on Service Oriented Architecture principles, comply with SWIM policies and standards and use SWIM core infrastructure to the extent practicable
ES-02	SWIM will provide policies, standards, and core infrastructure to support data management, based on existing systems and networks to the extent practicable, and using proven technologies to reduce cost and risk

# Enterprise Services Roadmap: Decision Points (1 of 3)

DP #	Target Date CY	High Priority	Domain	Name
2	2011 Q4	Y	Automation	AIM Modernization Segment 1 Final Investment Decision
31	2012 Q1	Y	Automation	Final Investment Decision for Post ERAM R3 Work Package
33	2010 Q3	Y	Automation	Investment Analysis Readiness Decision for Security Integrated Tool Suite (SITS) (Complete)
45	2009 Q4	Y	Automation	Terminal Automation Modernization and Replacement (TAMR) Phase 3 Initial Investment Decision (Complete)
46	2013 Q3	Y	Automation	Tower Flight Data Manager 1 (TFDM1) Final Investment Decision
57	2014 Q2	Y	Automation	TBFM/WP3 Final Investment Decision
74	2013	Y	Communication	Approve FTI Re-Compete Decision
77	2016 Q1	N	Surveillance	Initial Investment Decision to implement a NextGen Surveillance and Weather Radar Capability for ATC
78	2016 Q1	N	Surveillance	Initial Investment Decision to implement a NextGen beacon/backup radar system for ATC
79	2010 Q4	Y	Weather	Investment Analysis Readiness Decision (IARD) for NextGen Wx Processor WP1 and NNEW WP1 to enter IA (Complete)
86	2012 Q1	Y	Weather	Investment Decision (IID) for NextGen Wx Processor WP1 (includes CIWS functionality & RAMP WARP functionality) & NNEW WP1 (includes WARP WINS & FBWTG functionality, may also include WMSCR Wx Communications functionality)
89	2012 Q4	Y	Weather	Investment Decision (FID) for NextGen Wx Processor WP1 (includes CIWS functionality, NG WARP functionality & NNEW WP1 functionality (includes WARP WINS & FBWTG, may also include WMSCR Wx Communications functionality))
102	2012 Q3	N	Surveillance	Final Investment Decision to implement SIM in terminal and en route legacy radar systems
104	2017	N	Surveillance	Final Investment Decision to implement a NextGen Surveillance and Weather Radar Capability for ATC
105	2017	N	Surveillance	Final Investment Decision to implement a NextGen beacon/backup radar system for ATC
107	2011 Q2	Y	Automation	TAMR Phase 3 Segment 1 Final Investment Decision
111	2015	Y	Automation	En Route Automation NextGen Mid-Term Work Package Final Investment Decision
121	2012 Q2	Y	Automation	AIM Modernization Segment 2 Final Investment Decision
122	2013 Q2	Y	Automation	AIM Modernization Segment 3 Final Investment Decision
125	2010 Q2	N	Automation	Alaska Flight Service Modernization (AFSM) Segment 1 Final Investment Decision (Complete)
128	2009 Q2	N		Final Investment Decision for SWIM Segment 1B (Baseline for FY 11 - 13) (Complete)
130	2009 Q3	N		Selection of SWIM segment 2 candidates (Complete)
158	2011 Q3	Y	Communication	Data Communications Segment 1 FID (part 1 of a split FID)
177	2011 Q3	Y	Automation	Initial Investment Decision for SITS Air Domain Security Architectures

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# Enterprise Services Roadmap: Decision Points (2 of 3)

DP #	Target Date CY	High Priority	Domain	Name
195	2010 Q2	Y	Automation	Time Based Flow Management (TBFM) Final Investment Decision (Completed)
206	2012 Q3	Y	Automation	Final Investment Decision for SITS Air Domain Security Architecture
208	2013 Q3	Y	Automation	Meteorological and Aeronautical Planning System (MAPS) Final Investment Decision
276	2015	Y	Automation	Terminal Automation NextGen Mid-Term Work Package Final Investment Decision
293	2009 Q2	Y	Information Systems Security	Policy Decision between ATO-E, ATO-W, and ATO-P to allocate the initial focus of Enterprise Information System Security (ISS) (Complete)
294	2012 Q2	Y	Information Systems Security	IARD for Mid Term Work Package
295	2015 Q2	Y	Information Systems Security	FID for ID&R, EBP, IPE, and CSM capabilities of Mid Term Work Package
297	2013 Q4	N	Information Systems Security	IID for EBP, ID&R, IPE, and CSM for the Mid Term Work Package
304	2018	Y	Communication	Data Communications Segment 2 FID
344	2011 Q1	N		Establish Requirements for a Backup Timing Source
345	2012 Q3	N		Implementation strategy decision for GPS timing backup
346	2015	Y	Automation	Final Investment Decision for CATMT Work Package 4
353	2012 Q1	Y	Communication	Data Communications Segment 1 FID (part 2 of a split FID)
354	2012	Y	Automation	CATMT Work Package 4 Concept and Requirements Definition
355	2013	N	Automation	CATMT Work Package 4 Investment Analysis Readiness Decision
356	2014	Y	Automation	CATMT Work Package 4 Initial Investment Decision
368	2012 Q3	N	Automation	Meteorological and Aeronautical Planning System (MAPS) Initial Investment Decision
373	2010 Q4	Y	Automation	RMMS CONOPS for NextGen Integration Strategy Decision (Complete)
405	2011 Q1	N	Surveillance	Investment Analysis Readiness Decision for SIM in terminal and en route legacy radar systems
406	2011 Q4	N	Surveillance	Initial Investment Decision for SIM in terminal and en route legacy radar systems
407	2013 Q4	N	Surveillance	Investment Analysis Readiness Decision for NextGen Surveillance and Weather Radar Capability

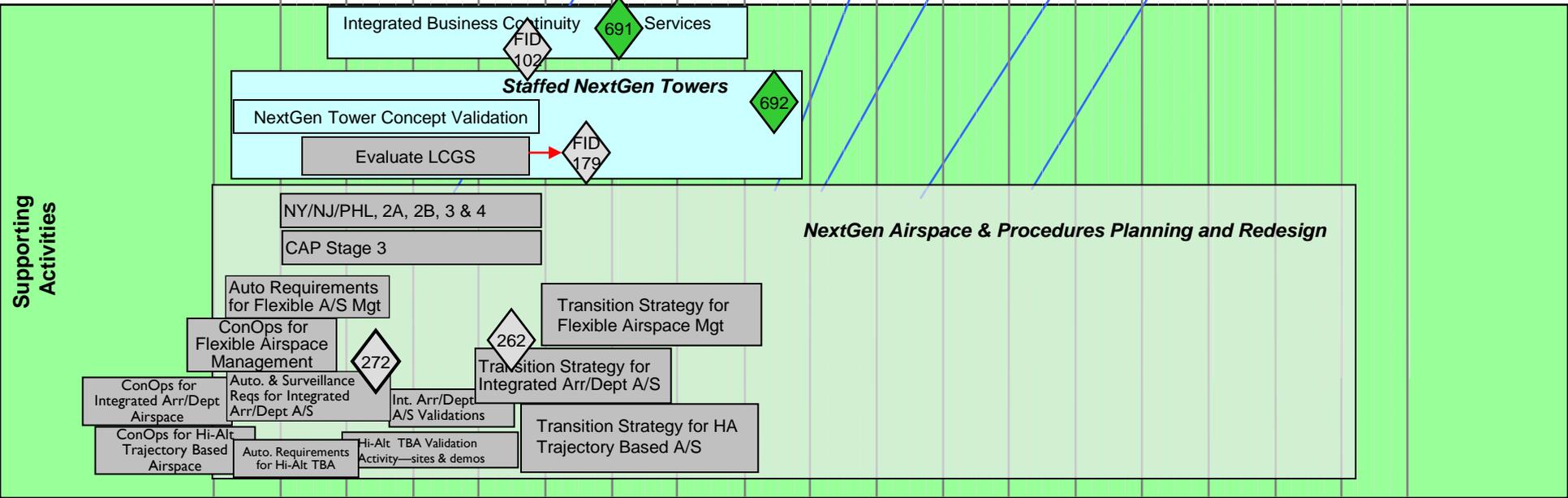
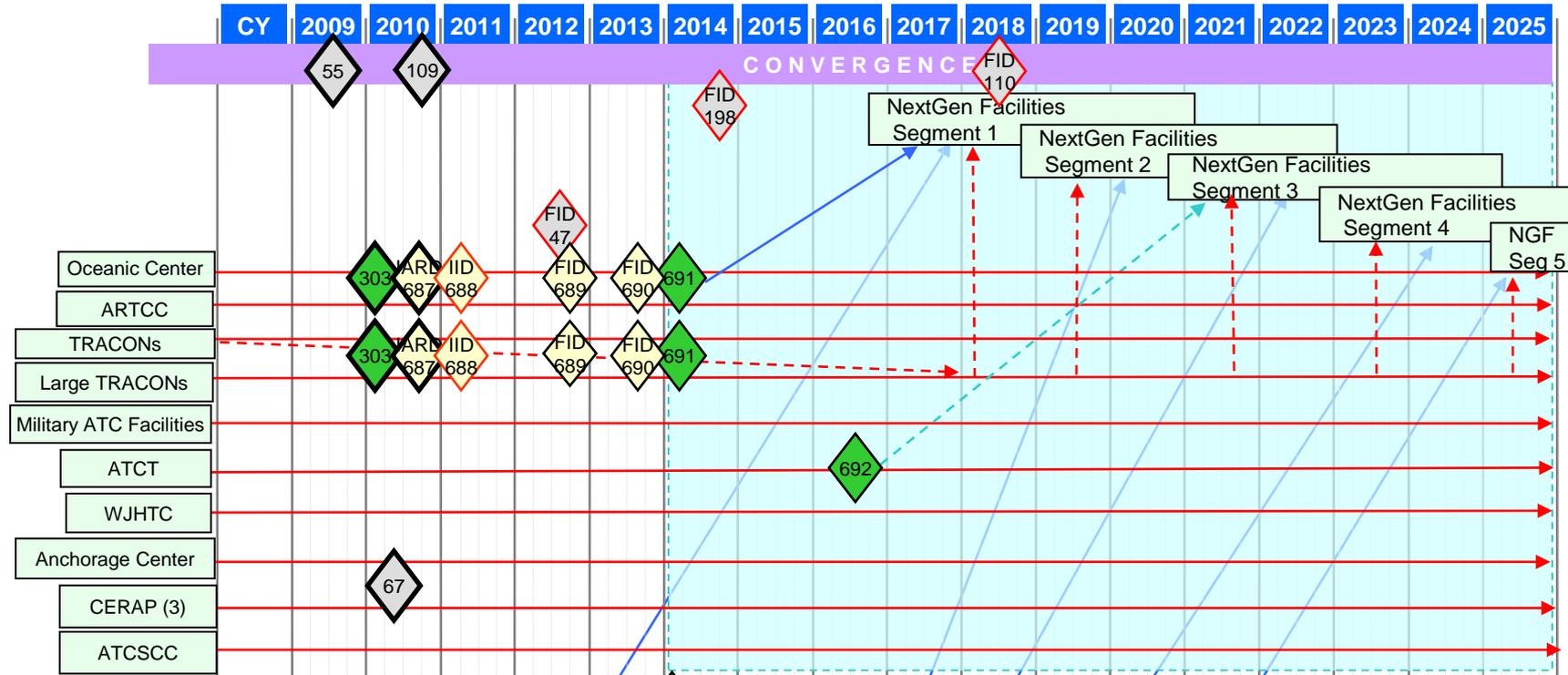
# Enterprise Services Roadmap: Decision Points (3 of 3)

DP #	Target Date CY	High Priority	Domain	Name
499	2011 Q3	Y	Communication	FID for NEXCOM Segment 2 Modernization Phase 2
655	2011 Q1	N	Weather	Investment Decision (IARD) to Tech Refresh all 34 ITWS (includes improved data quality, upgraded TWINDS & path-based wind shear, and possible expansion to 3 new sites (SCT, PDX & SEA) as well as service to 2 <sup>nd</sup> ary/reliever airports)
671	2012 Q2	N		Policy Decision for SWIM Managed Communities of Interest (COI), Governance Processes and Procedures
672	2013	N		Policy Decision to Implement SWIM WIKI-based Information Access Capability
704	2013 Q2	N		Concept and Requirements Definition Readiness (CRDR) for the Enterprise Level Time and Frequency Solution
705	2014 Q1	N		Investment Analysis Readiness Decision (IARD) for the Enterprise Level Time and Frequency Solution
706	2014 Q4	N		Initial Investment Decision (IID) for the Enterprise Level Time and Frequency Solution
707	2015 Q2	N		Final Investment Decision (FID) for the Enterprise Level Time and Frequency Solution
708	2012 Q4	N		Final Investment Decision for SWIM Segment 2b
753	2010 Q4	N	Automation	Authorization to Proceed (ATP) towards TAMR Phase 3 Segment 1 FID (DP 107)
754	2010 Q4	N		Authorization to Proceed (ATP) towards SWIM Segment 2 FID (DP 708)

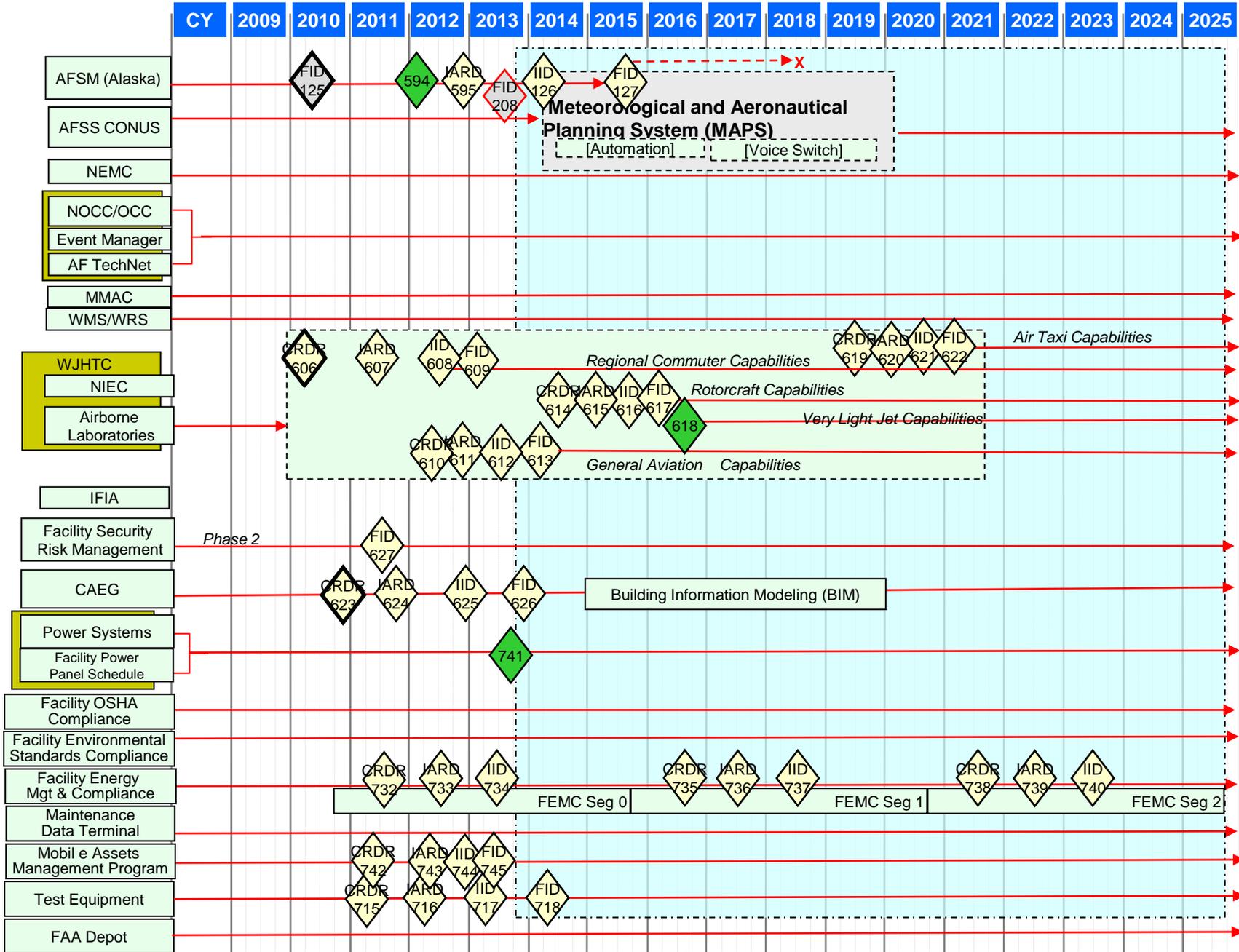
# Facilities

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# Facilities Roadmap—Staffed (Air Traffic) (1 of 4)

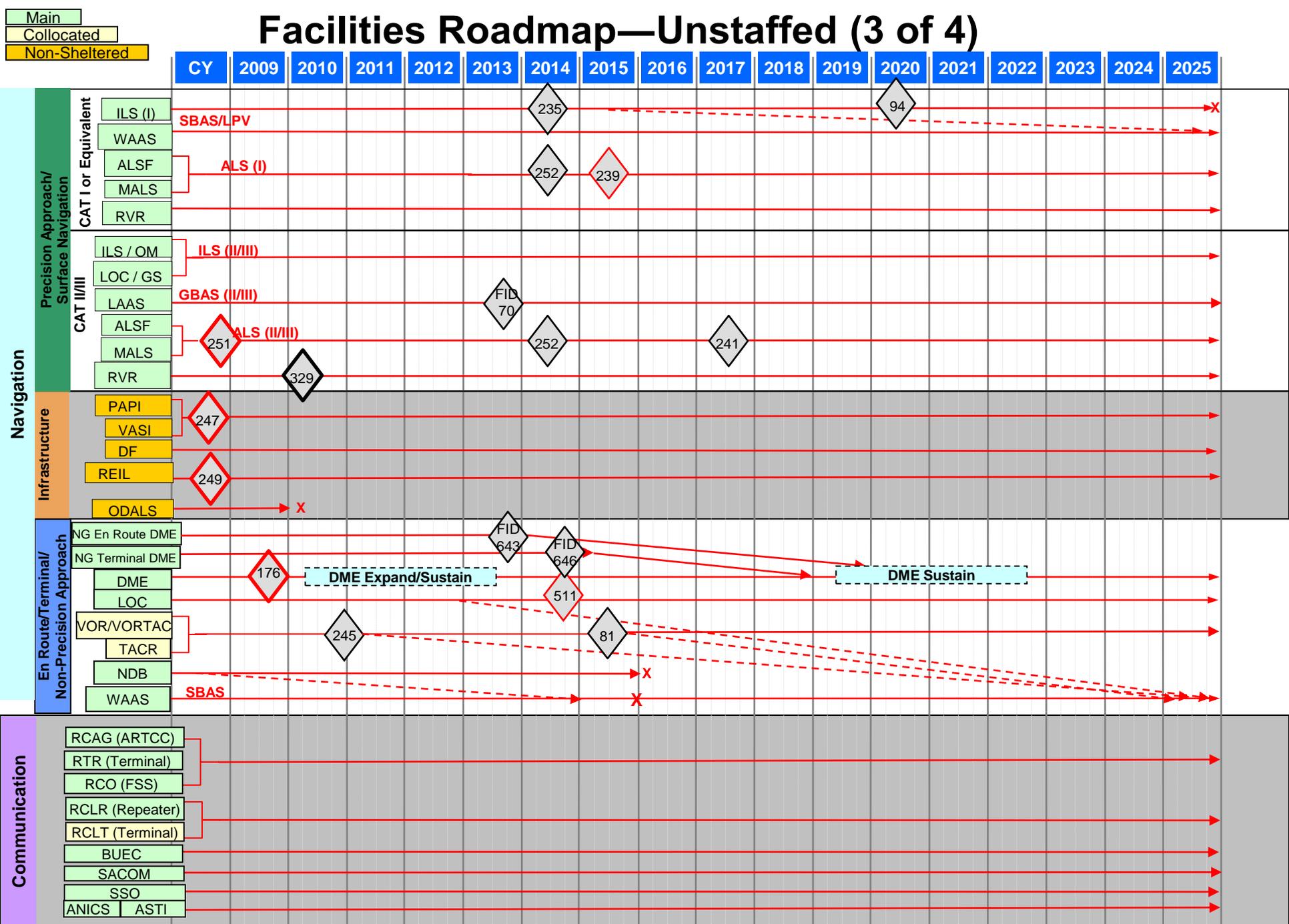


# Facilities Roadmap—Staffed & Support (Non-ATC) (2 of 4)



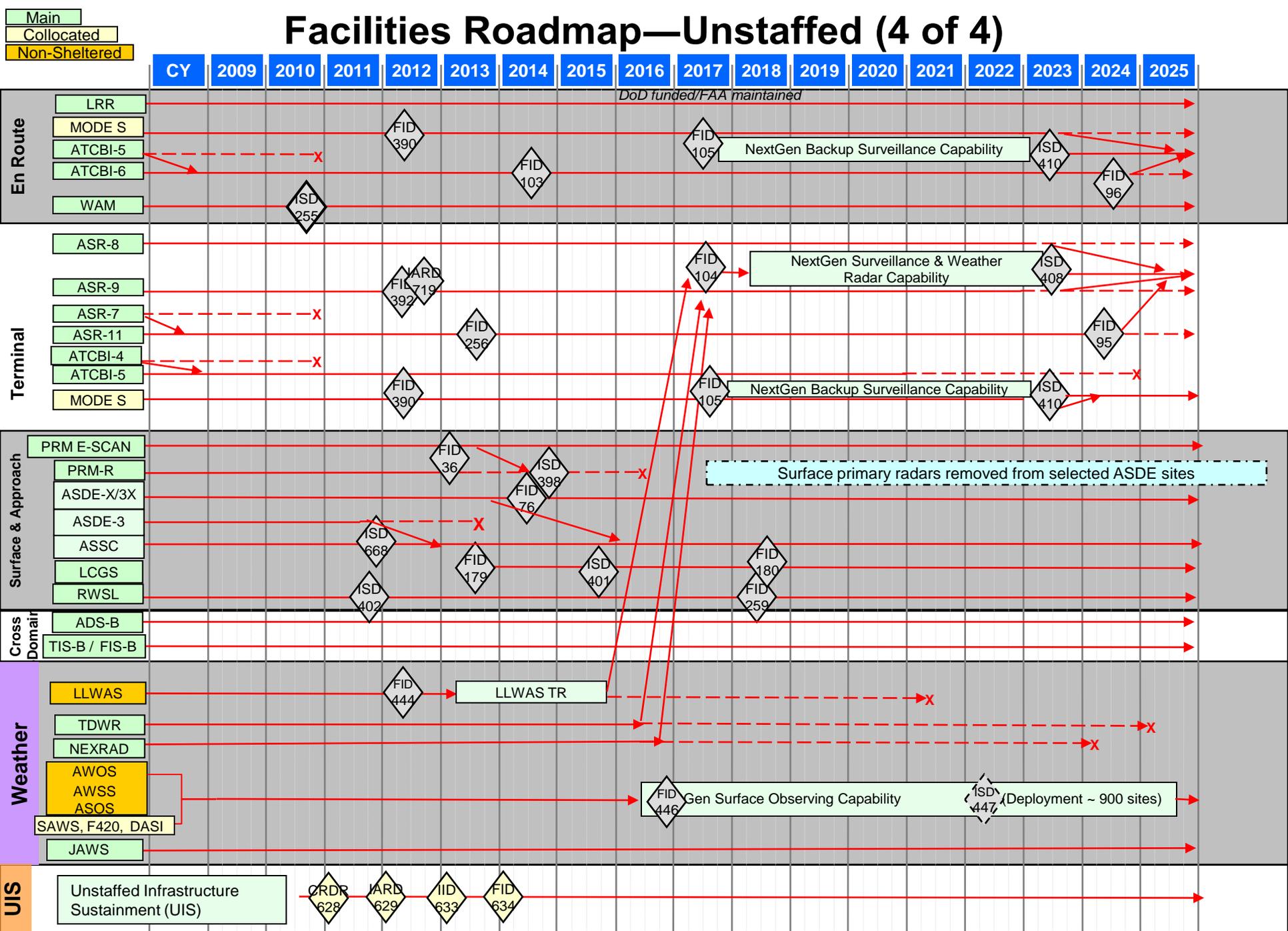
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# Facilities Roadmap—Unstaffed (3 of 4)



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# Facilities Roadmap—Unstaffed (4 of 4)



# Facilities Roadmap: Assumptions

Identifier	Description
FAC-01	Business Continuity will be integrated into the design of the NextGen Facilities
FAC-02	Facilities will be built to mandated security and safety guidelines
FAC-03	The airspace will be restructured to accommodate transitional and NextGen airspace concepts (e.g. Big Airspace, flexible airspace, classic en route airspace, mixed equipage airspace, special use airspace, super-density flexible airspace, etc.)
FAC-04	NextGen Facilities will use a new geo-independent model, where service delivery is best aligned to manage costs and increase efficiencies
FAC-05	Airspace planning projects and NextGen Facilities projects should be inter-dependently scheduled in accordance with national priorities
FAC-06	ATC tasks will evolve consistent with changes in the management of airspace
FAC-07	NextGen Facilities will accommodate NextGen automation and enterprise services enhancements
FAC-08	Site locations will be determined according to a number of factors that consider safety, security, and human resources
FAC-09	Facilities Unstaffed (UIS) Roadmap depicts only significant AMS (FID and ISD) and policy/strategy decisions from other Infrastructure Roadmaps that affect UIS Facilities

# Facilities Roadmap: Decision Points—Staffed Facilities (1 of 5)

DP #	Target Date CY	High Priority	Domain	Name
47	2012 Q3	Y	Communication	Final Investment Decision (FID) for NAS Voice System (Segment 1)
55	2009 Q3	N	Automation	Assess common front end display components for Radar Display (i.e., R-side) monitor (Complete)
67	2010 Q2	N	Automation	Approval of offshore implementation long term plan (Complete)
102	2012 Q3	N	Surveillance	Final Investment Decision to implement SIM in terminal and en route legacy radar systems
109	2010 Q3	N	Automation	Architectural Decision to Pursue a Common Information Display System (IDS) (Complete)
110	2018	Y	Automation	Approve final investment for transition to NextGen automation platforms and display subsystem through convergence
125	2010 Q2		Automation	Alaska Flight Service Modernization (AFSM) Segment 1 Final Investment Decision (Complete)
126	2014 Q1	N		Initial Investment Decision (IID) Flight Services Facilities (Alaska)
127	2015 Q3	N		Final Investment Decision (FID) Flight Services Facilities (Alaska)
179	2013	N	Surveillance	Combined Initial Investment Decision and Final Investment Decision for LCGS
198	2014	Y	Automation	Tower Flight Data Manager 2 (TFDM2) Final Investment Decision
208	2013 Q3	Y	Automation	Meteorological and Aeronautical Planning System (MAPS) Final Investment Decision
262	2012	N	Airspace & Procedures	Decision to implement Big Airspace at candidate areas
272	2010 Q3	N	Airspace & Procedures	Recommend 1 or 2 test field locations and define automation requirements
303	2010 Q2	N		Future Facility Strategy Decision (Complete)
594	2012 Q1	N		Strategy Decision for Flight Services Facilities (Alaska)
595	2012 Q4	N		IARD for Flight Services Facilities (Alaska)
606	2010 Q2	N		Concept and Requirements Definition Decision (CRDR) for the Airborne Labs: Regional Commuter Capabilities (Convair 580 Replacement) (Complete)
607	2011 Q2	N		Investment Analysis Readiness Decision (IARD) for Airborne Labs: Regional Commuter Capabilities (Convair 580 Replacement)
608	2012 Q2	N		Initial Investment Decision (IID) for Airborne Labs: Regional Commuter Capabilities (Convair 580 Replacement)
609	2013 Q1	N		Final Investment Decision (FID) for the Airborne Labs: Regional Commuter Capabilities (Convair 580 Replacement)

# Facilities Roadmap: Decision Points—Staffed Facilities (2 of 5)

DP #	Target Date CY	High Priority	Domain	Name
610	2012 Q2	N		Concept and Requirements Definition Decision (CRDR) for Airborne Labs: General Aviation Capabilities (Aero Commander 680E Replacement)
611	2012	N		Investment Analysis Readiness Decision (IARD) for Airborne Labs: General Aviation Capabilities (Aero Commander 680E Replacement)
612	2013	N		Initial Investment Decision (IID) for Airborne Labs: General Aviation Capabilities (Aero Commander 680E Replacement)
613	2014	N		Final Investment Decision (FID) for Airborne Labs: General Aviation Capabilities (Aero Commander 680E Replacement)
614	2014	N		Concept and Requirements Definition Decision (CRDR) for Airborne Labs: Rotorcraft Capabilities (Sikorski S76 Replacement)
615	2015	N		Investment Analysis Readiness Decision (IARD) for Airborne Labs: Rotorcraft Capabilities (Sikorski S76 Replacement)
616	2015	N		Initial Investment Decision (IID) for Airborne Labs: Rotorcraft Capabilities (Sikorski S76 Replacement)
617	2016	N		Final Investment Decision (FID) for Airborne Labs: Rotorcraft Capabilities (Sikorski S76 Replacement)
618	2016	N		Strategy Decision - Airborne Labs: Very Light Jet
619	2019	N		Concept and Requirements Definition Decision (CRDR) for Airborne Labs: Air Taxi Capability (King Air Replacement)
620	2020	N		Investment Analysis Readiness Decision (IARD) for Airborne Labs: Air Taxi Capability (King Air Replacement)
621	2020	N		Initial Investment Decision (IID) for Airborne Labs: Air Taxi Capability (King Air Replacement)
622	2021	N		Final Investment Decision (FID) for Airborne Labs: Air Taxi Capability (King Air Replacement)
623	2010 Q4	N		Concept and Requirements Definition Decision (CRDR) Building Information Modeling (BIM) (Completed)
624	2011 Q3	N		Investment Analysis Readiness Decision (IARD) for Building Information Modeling (BIM)
625	2012 Q4	N		Initial Investment Decision (IID) for Building Information Modeling (BIM)
626	2013 Q4	N		Final Investment Decision (FID) for Building Information Modeling (BIM)
627	2011 Q2	N		Final Investment Decision (FID) for Facility Security Risk Management (FSRM) Phase II

# Facilities Roadmap: Decision Points—Staffed Facilities (3 of 5)

DP #	Target Date CY	High Priority	Domain	Name
687	2010 Q3	N		Investment Analysis Readiness Decision (IARD) for NextGen Facilities Program (Complete)
688	2011 Q2	Y		Initial Investment Decision (IID) for NextGen Facilities Program, Segment 1
689	2012 Q3	N		Final Investment Decision (FID) for NextGen Facilities Program Segment 1, Project 1
690	2013 Q3	N		Final Investment Decision (FID) for NextGen Facilities Program Segment 1, Project 2
691	2014 Q1	N		Strategy Decision for Developing Integrated Business Continuity Services Concepts & Infrastructure
692	2016	N		Strategy Decision for Integration of Certain ATCT Functions into NextGen Facilities
715	2011 Q2	N		Concept and Requirements Definition Decision (CRDR) for Facility Test Equipment
716	2012 Q2	N		Investment Analysis Readiness Decision (IARD) for Facility Test Equipment
717	2013 Q2	N		Initial Investment Decision (IID) for Facility Test Equipment
718	2014 Q2	N		Final Investment Decision (FID) for Facility Test Equipment
741	2013 Q3	N		Strategy Decision to plan for AMS DPs for Power Systems
732	2011 Q2	N		Concept and Requirements Definition Decision (CRDR) for FEMC Segment 0
733	2012 Q2	N		Investment Analysis Readiness Decision (IARD) for FEMC Segment 0
734	2013 Q2	N		Initial Investment Decision (IID) for FEMC Segment 0
735	2016 Q2	N		Concept and Requirements Definition Decision (CRDR) for FEMC Segment 1
736	2017 Q2	N		Investment Analysis Readiness Decision (IARD) for FEMC Segment 1
737	2018 Q2	N		Initial Investment Decision (IID) for FEMC Segment 1
738	2021 Q2	N		Concept and Requirements Definition Decision (CRDR) for FEMC Segment 2
739	2022 Q2	N		Investment Analysis Readiness Decision (IARD) for FEMC Segment 2
740	2023 Q2	N		Initial Investment Decision (IID) for FEMC Segment 2
742	2011 Q2	N		Concept and Requirements Definition Readiness Decision (CRDR) for MAMP
743	2012 Q2	N		Investment Analysis Readiness Decision (IARD) for MAMP
744	2012 Q4	N		Initial Investment Decision (IID) for MAMP
745	2013 Q2	N		Final Investment Decision (FID) for MAMP

# Facilities Roadmap: Decision Points—Unstaffed (4 of 5)

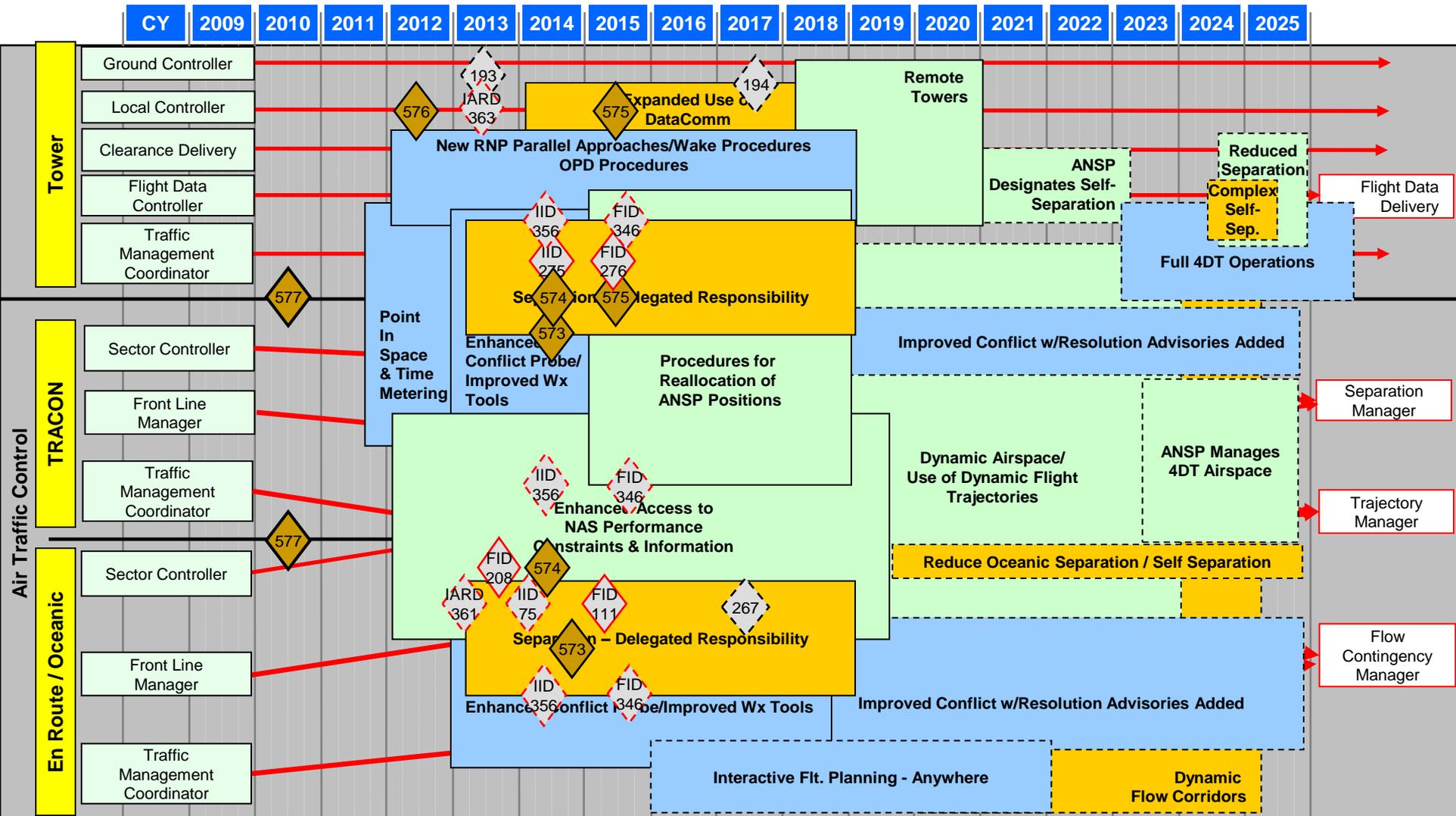
DP #	Target Date CY	High Priority	Domain	Name
36	2013 Q1	N	Surveillance	Final Investment Decision (FID) for migration of PRM to PRM-R (based on multilateration)
70	2013 Q3	N	Navigation	Final Investment Decision (FID) for the acquisition of CAT II/III Ground Based Augmentation System (GBAS)
76	2014	N	Surveillance	Final Investment Decision (FID) for removal or SLEP/replace ASDE surface primary radars (evolving requirements for safety and security may impact decision)
81	2015	N	Navigation	VOR decision on far-term drawdown
94	2020	N	Navigation	Decision on complete ILS CAT I drawdown
95	2024	N	Surveillance	Decision for replacement of terminal primary radars (ASR-11 PSR) and removal of terminal beacons (ASR-11 MSSR)
96	2024	N	Surveillance	Decision for replacement of en route beacons (ATCBI-6)
103	2014	N	Surveillance	Final Investment Decision (FID) for technology refresh of beacons (ATCBI-6)
104	2017	N	Surveillance	Final Investment Decision (FID) to implement a NextGen Surveillance and Weather Radar Capability for ATC
105	2017	N	Surveillance	Final Investment Decision (FID) to implement a NextGen beacon/backup radar system for ATC
176	2009 Q3	Y	Navigation	DME NextGen Strategy Plan—Decision to procure next generation of DMEs to replace aging systems and expand the network where needed to support RNAV & NextGen (Complete)
179	2013	N	Surveillance	Combined Initial Investment Decision and Final Investment Decision for LCGS
180	2018	N	Surveillance	Final Investment Decision (FID) for ADS-B to assume LCGS function, or approve a Technology Refresh for LCGS
235	2014	N	Navigation	Decision on active drawdown of Cat I ILSs operating in the NAS
239	2015	N	Navigation	Production ALS(I) lamps available for installation
241	2017	N	Navigation	Energy efficient ALSF-2 production systems available
245	2010 Q4	N	Navigation	Decision on near-term minimum operational VOR ground network
247	2008 Q4	Y	Navigation	Decision to develop and implement replacements for PAPI lamps with LEDs (Complete)
249	2008 Q4	Y	Navigation	Decision to develop and implement replacements for REIL lamps with LEDs (Complete)
251	2008 Q4	Y	Navigation	Decision to deploy semiflush fixtures for existing sites and new establishments (Complete)
252	2014	N	Navigation	Semiflush flasher fixtures production system available
255	2010 Q3	N	Surveillance	In-Service Decision for WAM (Alaska and Colorado) (Complete)
256	2013	N	Surveillance	Final Investment Decision (FID) for ASR-11 Technology Refresh Segment 2 (through 2025)

# Facilities Roadmap: Decision Points—Unstaffed (5 of 5)

DP #	Target Date CY	High Priority	Domain	Name
259	2018	N	Surveillance	Final Investment Decision (FID) for RWSL Technology Refresh
329	2010 Q1	N	Navigation	RVR Sustainment: ISD for PC-RVR for use within the NAS (Complete)
390	2012 Q2	N	Surveillance	Final Investment Decision (FID) for legacy beacon (Mode S) SLEP through 2025
392	2012 Q2	N	Surveillance	Final Investment Decision (FID) for legacy radar (ASR-9) SLEP through 2025
398	2014 Q4	N	Surveillance	In-Service Decision for PRM-R (based on multi-lateration)
401	2015	N	Surveillance	In-Service Decision for Low Cost Ground Surveillance system
402	2011 Q3	N	Surveillance	In-Service Decision for Runway Status Light system
408	2023	N	Surveillance	In-Service Decision for NextGen Surveillance and Weather Radar Capability
410	2023	N	Surveillance	In-Service Decision for New Beacon/Backup System
444	2012 Q2	N	Weather	Final Investment Decision (FID) to Tech Refresh/SLEP all low-level wind shear detection systems as part of wind shear detection service
446	2016 Q4	N	Weather	Investment Decision (FID) to consolidate and replace ASWON automated surface observing capability (replacement for all ASWON sensors plus NextGen requirements)
447	2022	N	Weather	ISD to replace all automated surface observing systems with NextGen Surface Observing capability
511	2014	Y	Navigation	Alternate PNT Strategy
628	2011 Q1	N		Concept and Requirements Definition Readiness Decision (CRDR) for Unstaffed Infrastructure Sustainment (UIS)
629	2012 Q1	N		Investment Analysis Readiness Decision (IARD) for Unstaffed Infrastructure Sustainment (UIS)
633	2013 Q1	N		Initial Investment Decision (IID) for Unstaffed Infrastructure Sustainment (UIS)
634	2014 Q1	N		Final Investment Decision (FID) for Unstaffed Infrastructure Sustainment (UIS)
643	2013 Q3	N	Navigation	FID for NextGen En Route DME
646	2014 Q3	N	Navigation	FID for NextGen Terminal DME
668	2011 Q4	N	Surveillance	In-Service Decision (ISD) for Airport Surface Surveillance Capability (part of SBS baseline)
719	2012	N	Surveillance	Investment Analysis Readiness Decision (IARD) for ASR-11 Technology Refresh Segment 2 (through 2025)

# Human Systems Integration

# Human Systems Integration Roadmap (1 of 13)



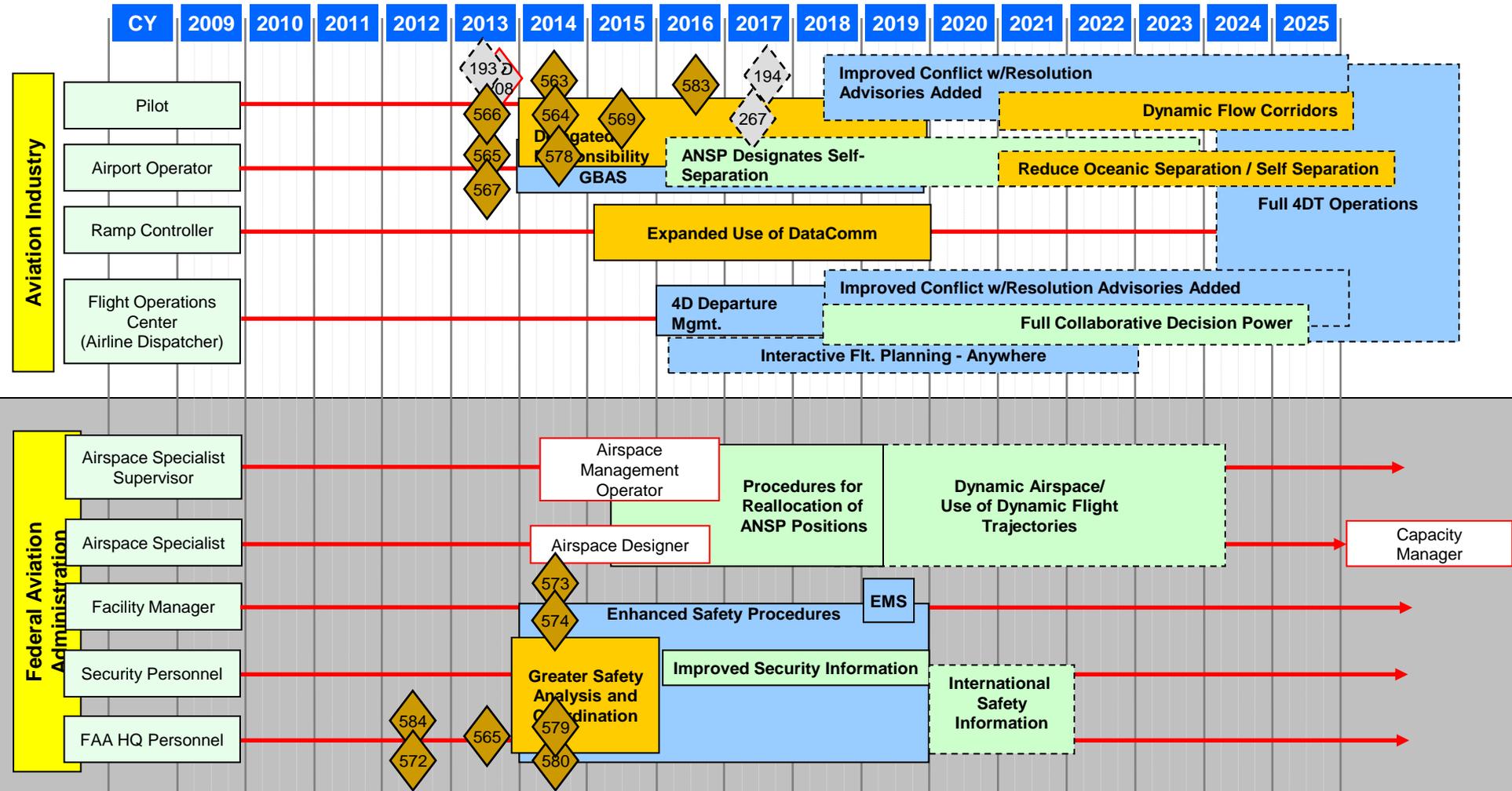
Notes:

- (1) The shaded boxes above are intended to reflect changes to the NAS workforce and work environment.
- (2) The shaded boxes above are intended to represent an earliest potential "implementation" of a capability.
- (3) Far Term representations on the HSI Roadmap (2018 – 2025) depicted in dotted-line boxes are included for planning purposes.
- (4) The actors represented in this roadmap are selected from NAS EA "actors".

Work Environment Change in Automation
  Mixed Workforce/Work Environment Change
  Workforce Change in Role/Responsibility

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# Human Systems Integration Roadmap (2 of 13)



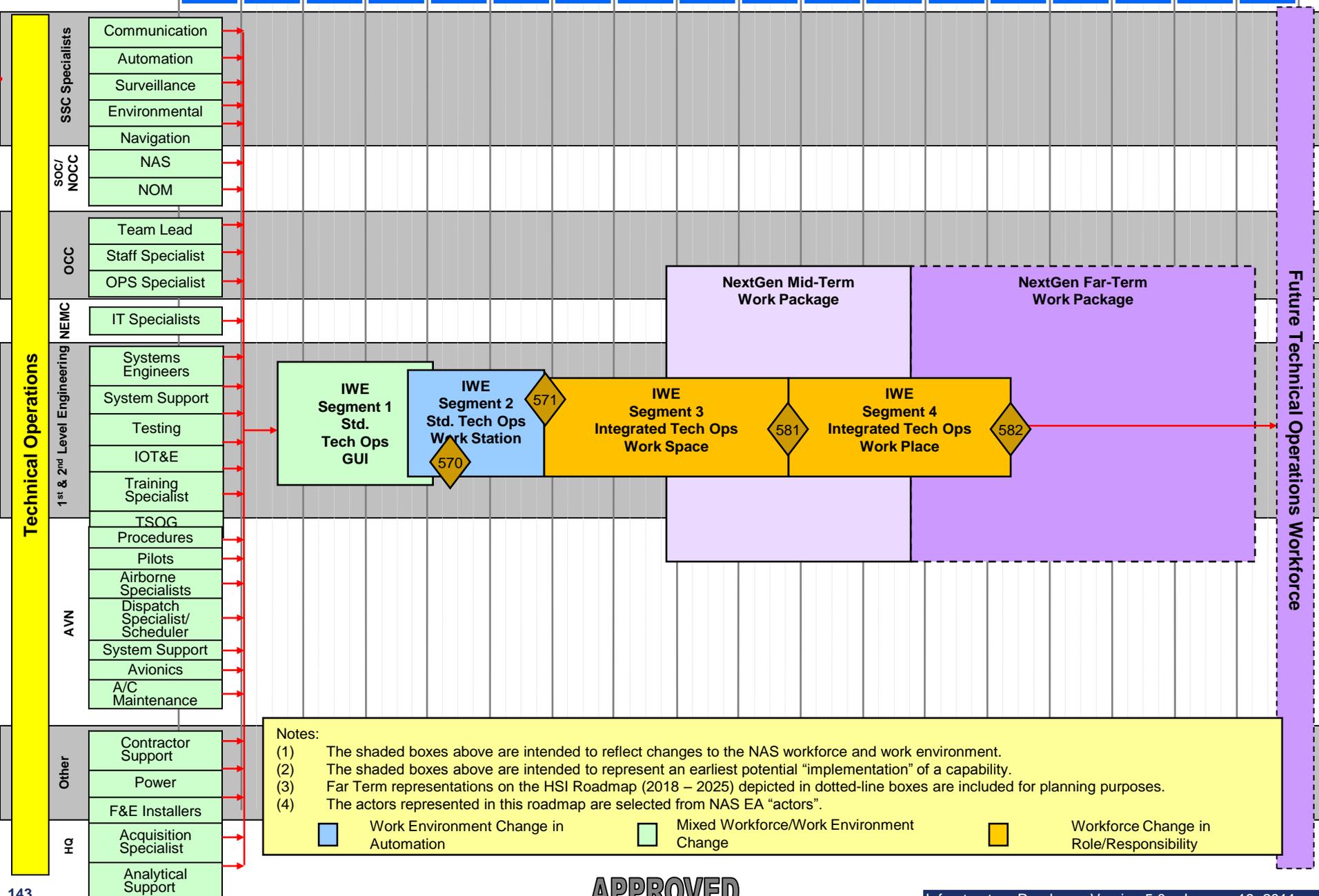
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- (4) The actors represented in this roadmap are selected from NAS EA "actors".

■ Work Environment Change in Automation     
 ■ Mixed Workforce/Work Environment Change     
 ■ Workforce Change in Role/Responsibility

# Human Systems Integration Roadmap (3 of 13)

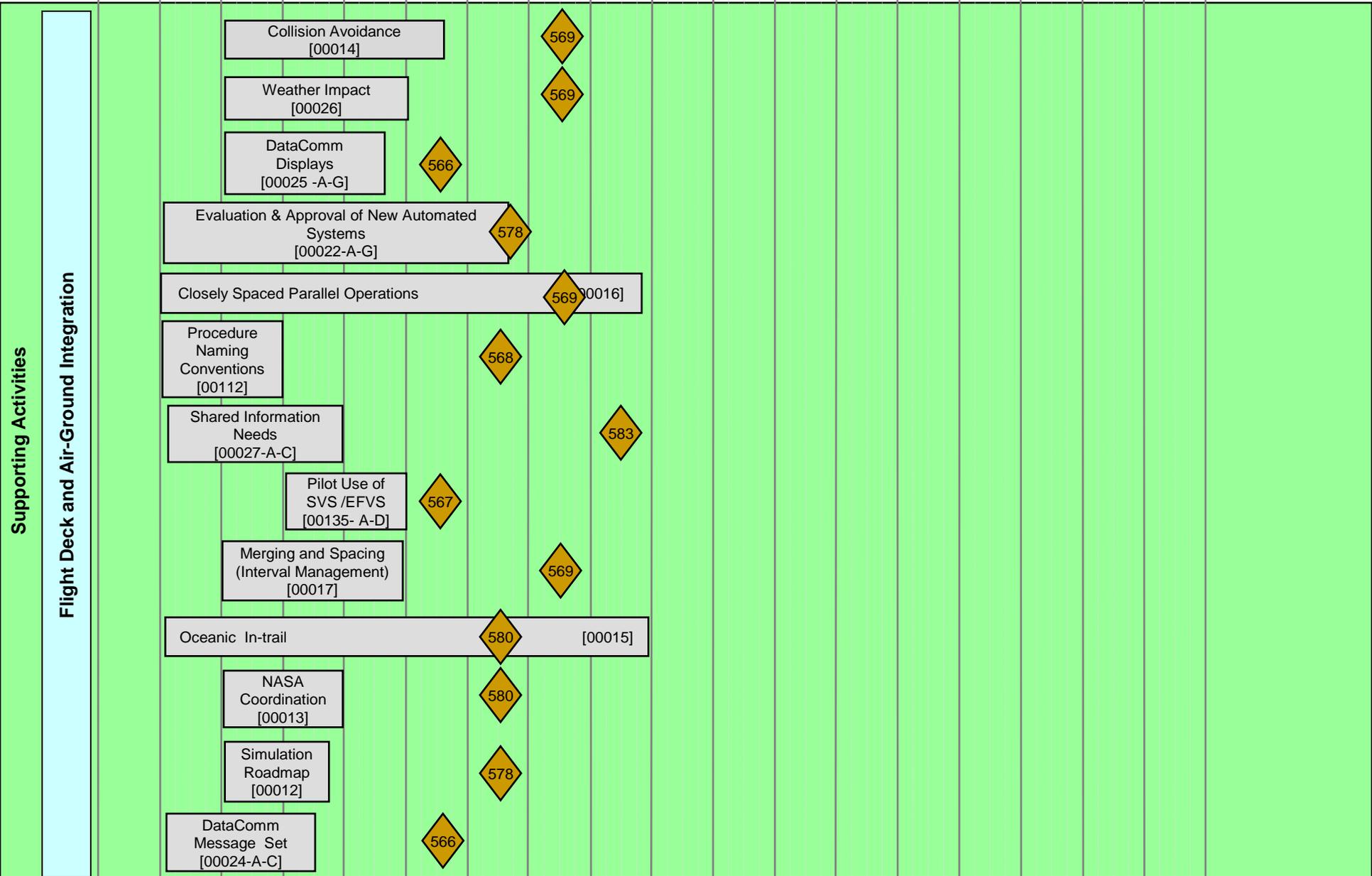
CY 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025



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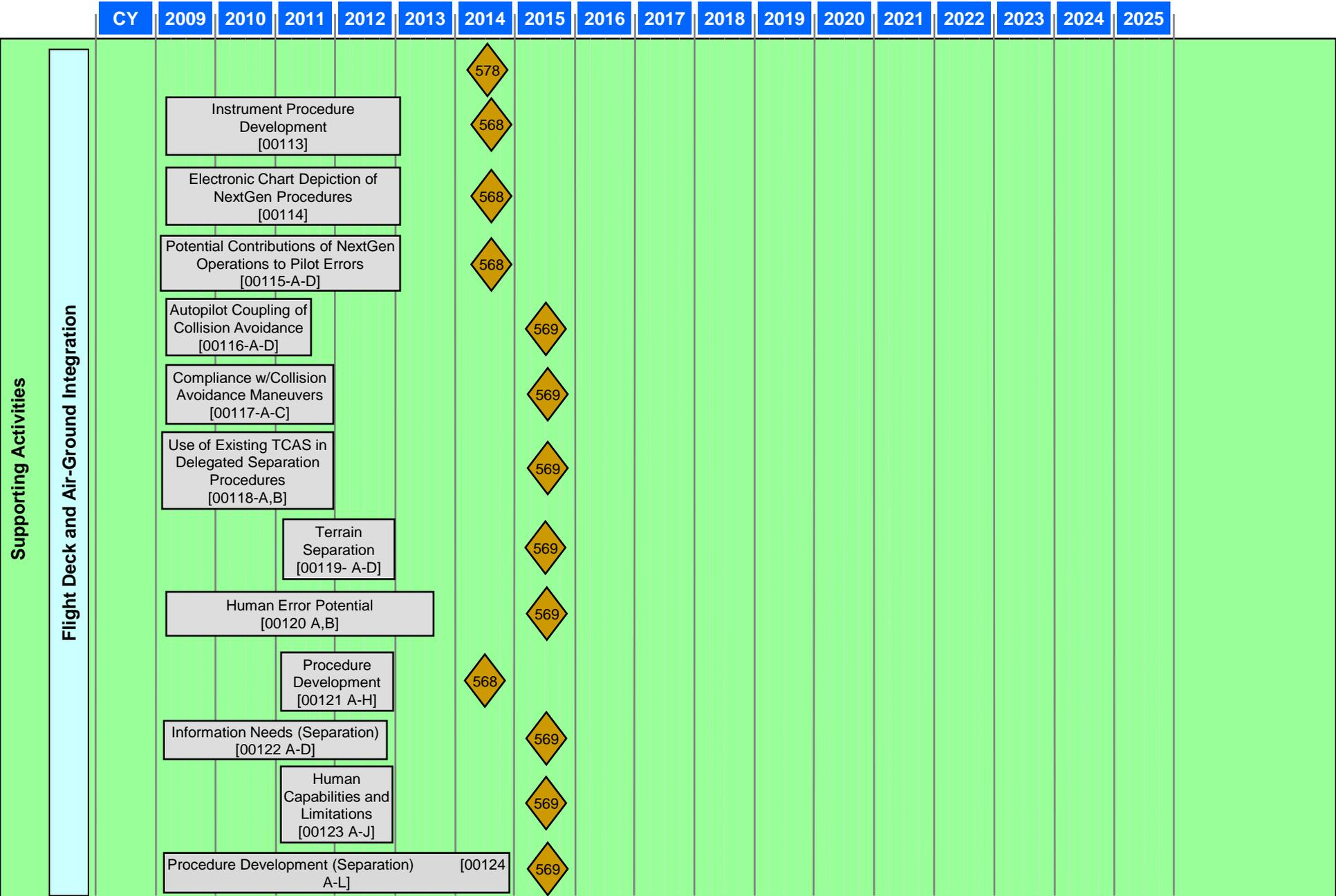
# Human Systems Integration Roadmap (4 of 13)

CY	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
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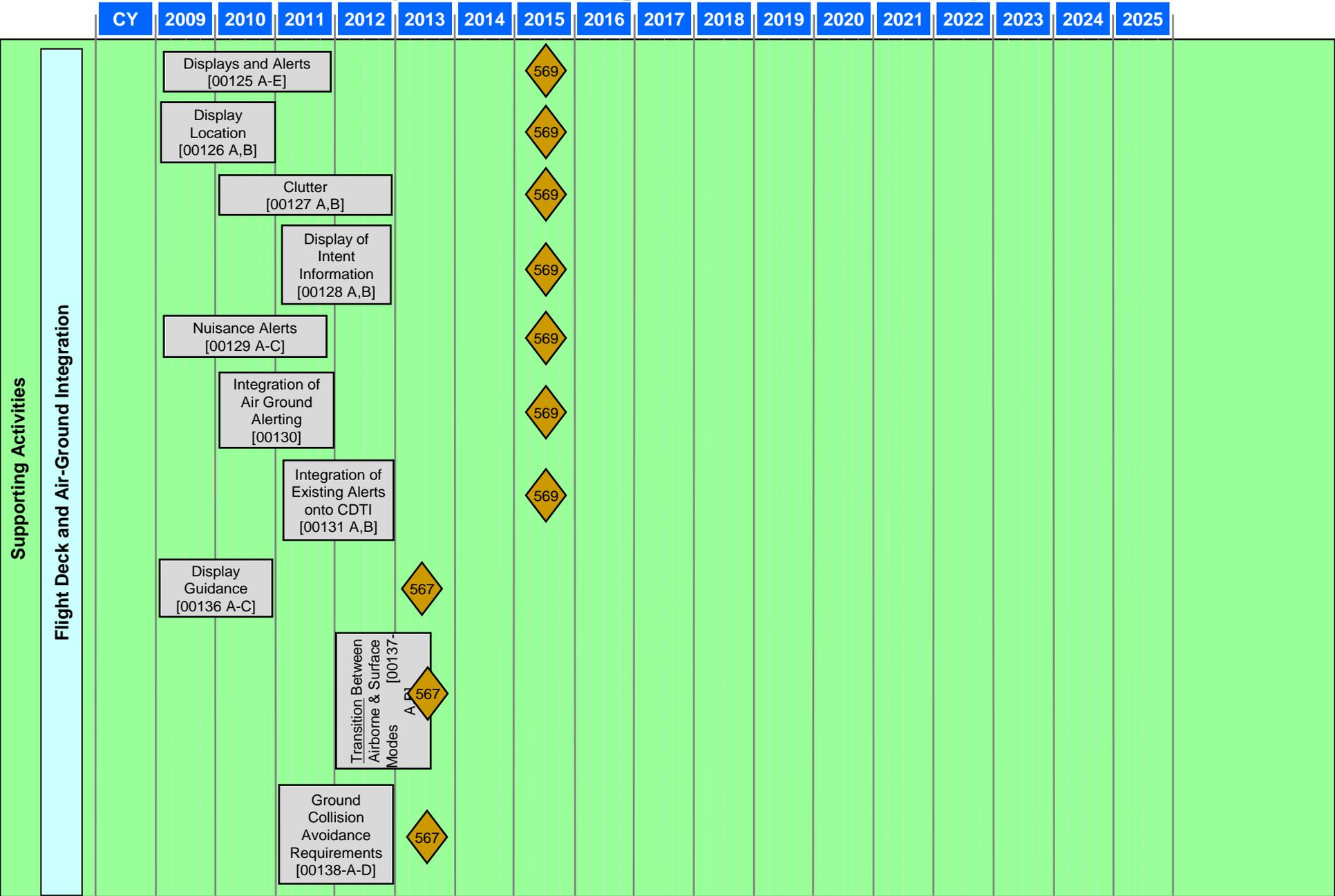


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# Human Systems Integration Roadmap (5 of 13)

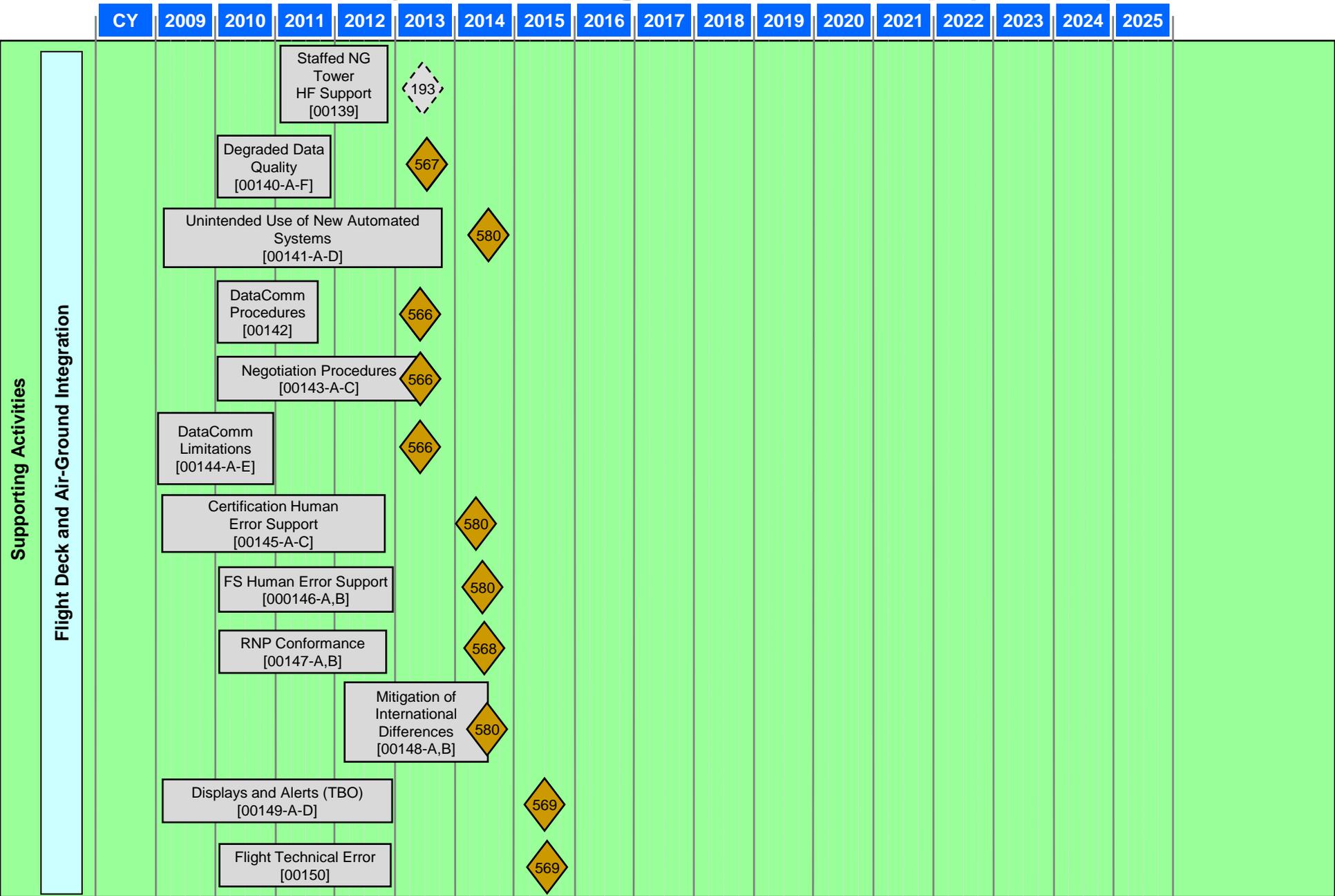


# Human Systems Integration Roadmap (6 of 13)



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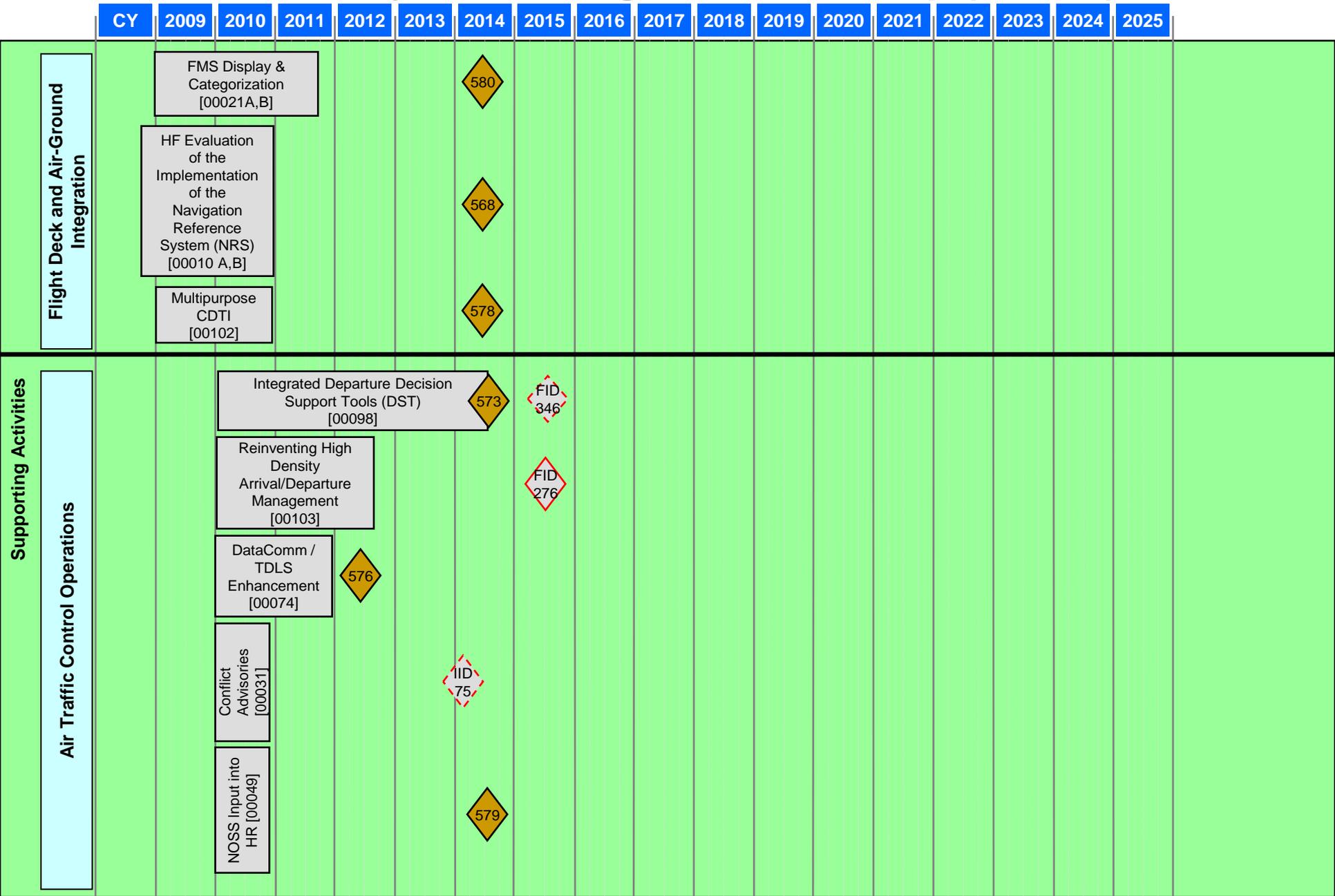
# Human Systems Integration Roadmap (7 of 13)



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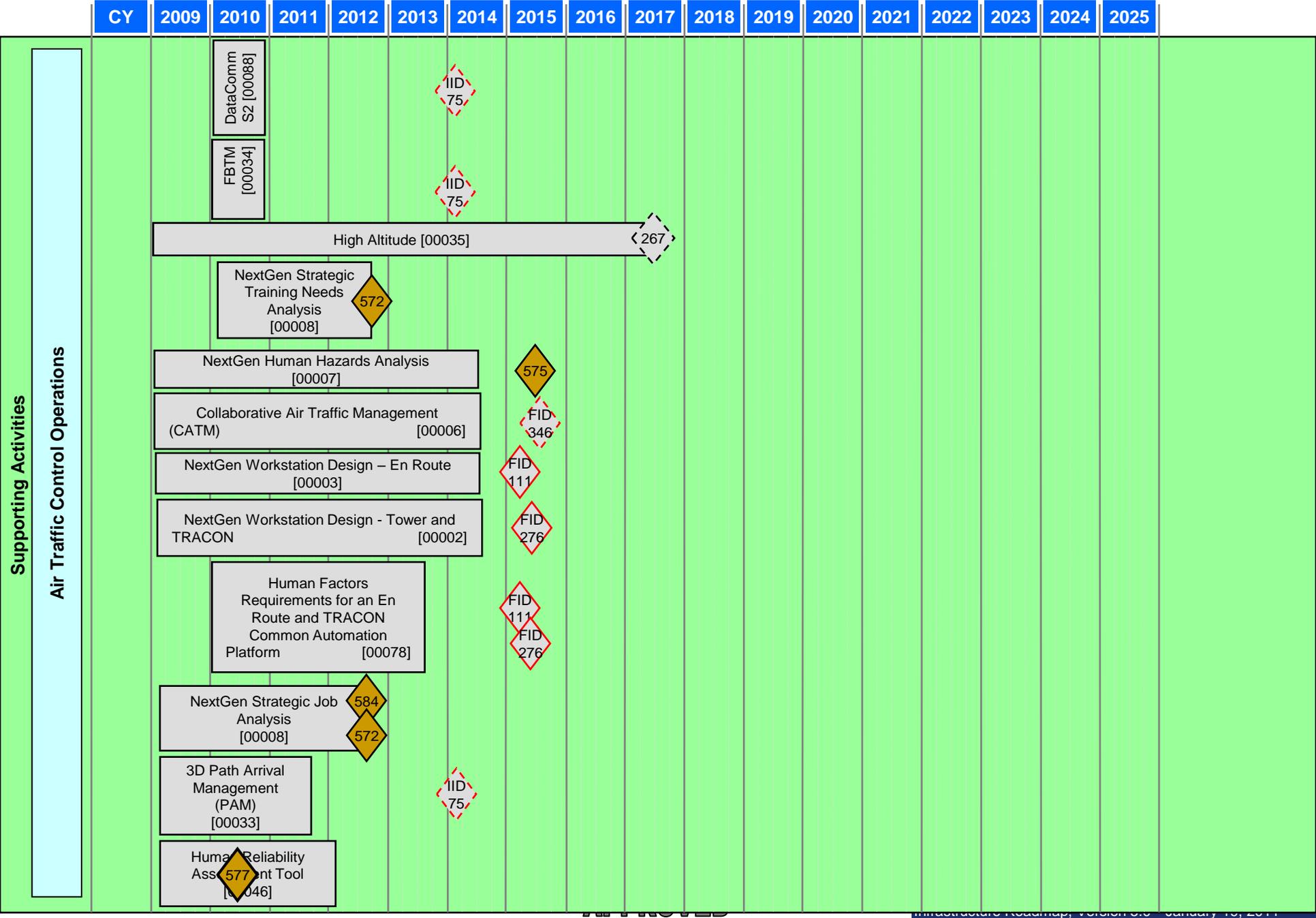


# Human Systems Integration Roadmap (9 of 13)

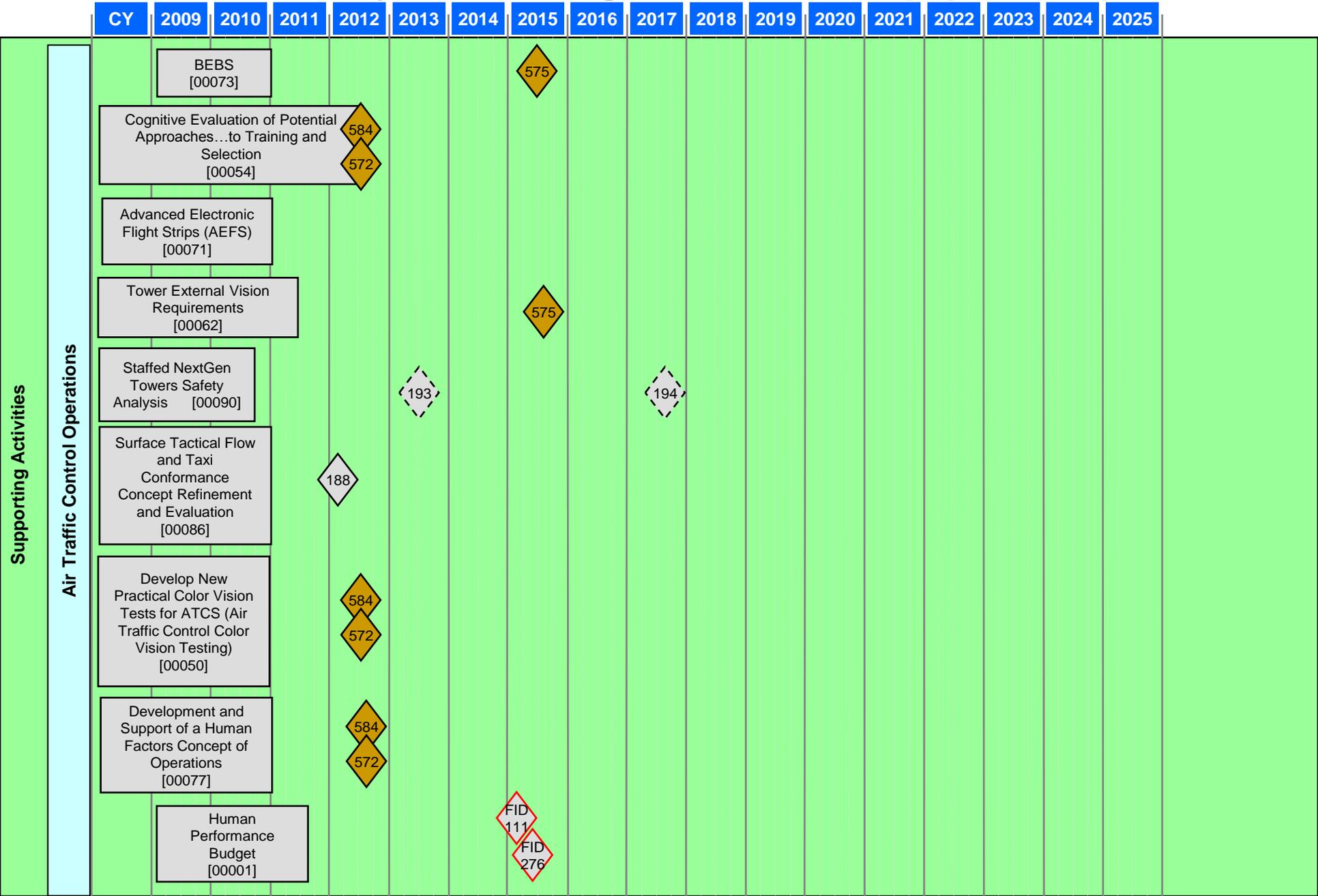


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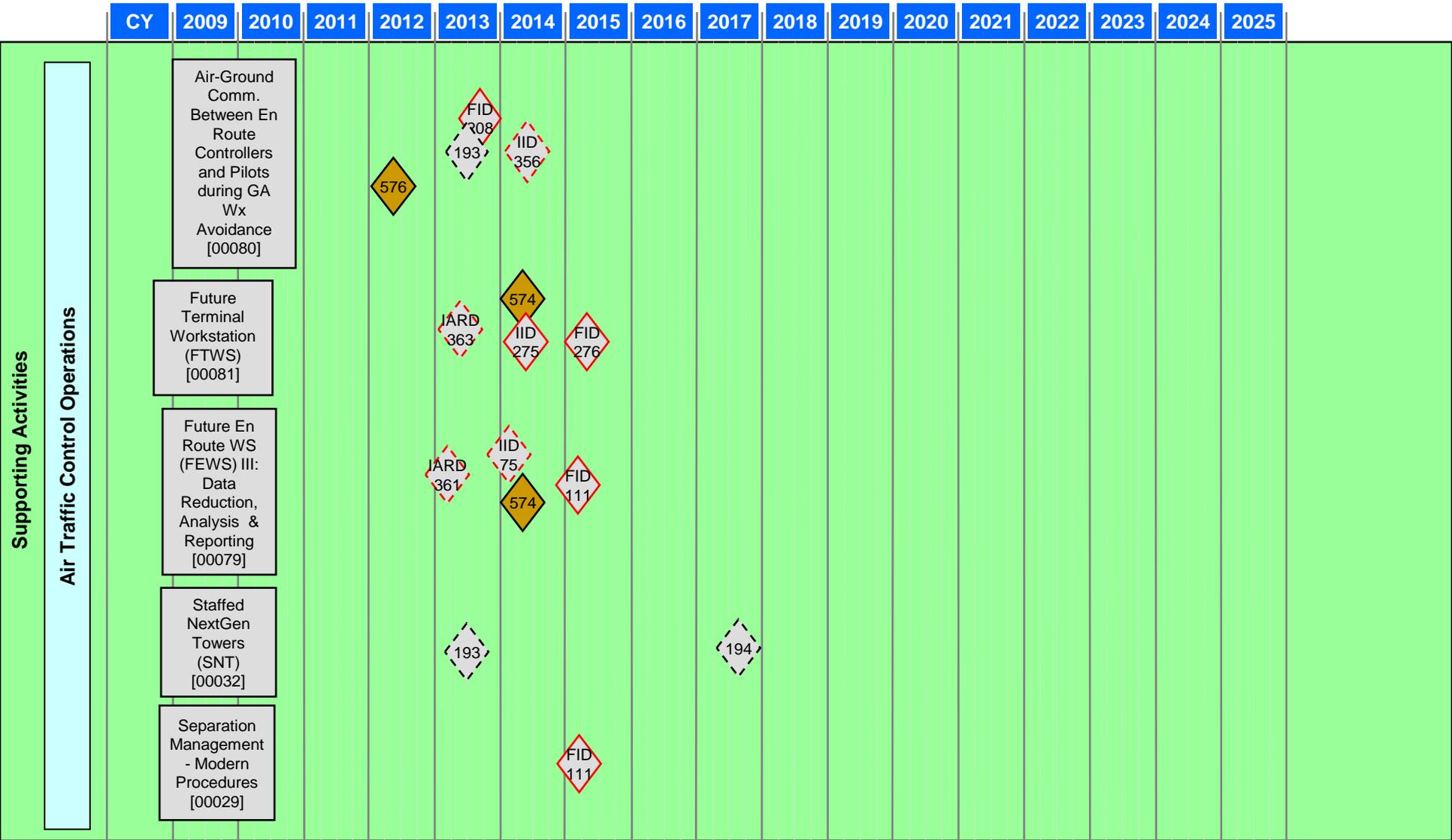
# Human Systems Integration Roadmap (10 of 13)



# Human Systems Integration Roadmap (11 of 13)



# Human Systems Integration Roadmap (12 of 13)



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# Human Systems Integration Roadmap (13 of 13)

CY 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025

Supporting Activities

Technical Operations

**Change in Work Environment:**

- TO Alerts and Alarms
- Standard TO Terminology
- Standard TO Symbology
- Standard TO Style Guide
- TO GUI Standard
- Information Requirements for Remote Maintenance Monitoring [00037]
- HFDS Update

570

**Change in Automation:**

- Model & Evaluate Specialist Ops (Field & Center)
- Define KSAO Requirements
- Determine Specialist Response Parameters
- Develop scheduling/ coordinating UCI Requirements
- Develop Integrated Monitoring & Control UCI

**Change in Role/Responsibility:**

- Career Development/Work Force Shape
- Control Center Standardization/ Oversight

571

**Change in Work Environment:**

- Develop Integrated Control Center Concept

**Change in Automation:**

- Determine Intelligent Documentation Users
- Determine Intelligent Documentation Information Requirements
- Evaluate and Review Advanced Facility Concept
- Establish Reporting Requirements
- Establish Paging Requirements

**Change in Role/Responsibility:**

- Determine Strategic Staffing Requirements
- Establish Training Requirements
  - Distributed
  - Integrated Tailored
- Develop and Establish KSAOs for Advanced Center
- Career Development/Work Force Shape
- Control Center Standardization/ Oversight

581

**Change in Work Environment:**

- Establish Collaboration Requirements
- Establish Simplified Security

**Change in Automation:**

- Develop Predictive Maintenance Model
- Determine Intelligent Software Requirements

**Change in Role/Responsibility:**

- Establish Tailored Service Certification
- Determine Consolidated Streamlined Ops

582

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# Human Systems Integration Roadmap: Assumptions

Identifier	Description
HSI-01	The HSI Roadmap relates to the NextGen changes in roles and responsibilities (and therefore procedures), but also includes human-system performance and productivity, safety (human reliability), information requirements and information display, personnel selection, training, and staffing impacts.
HSI-02	Human Factors analysis, design, development, and testing are to be accomplished within program/project detailed system engineering activities and not necessarily represented in the HSI Roadmap.
HSI-03	NAS infrastructure and capabilities are not constrained by limitations in personnel staffing, selection, and training unless otherwise identified.
HSI-04	Additional HSI impacts and dependencies are to be fully analyzed as needed in terms of: <ul style="list-style-type: none"> <li>a) Convergent or divergent roles (e.g., new actors, obsolete roles)</li> <li>b) Implied role changes not apparent in the OI description</li> <li>c) Non-OI dependent changes to roles/functions</li> <li>d) More comprehensive assessment of Far-term OI impacts on the workforce and work environments</li> </ul>
HSI-05	“Gaps” in concept of ops/concept of use (such as off-nominal scenarios) will be filled to identify and resolve other changes in roles and responsibilities.
HSI-06	NextGen HSI Roadmap products represent information systems, information requirements, guidelines, standards, design requirements, specifications, methods, and tools for incorporating human factors in the NextGen NAS Enterprise Architecture. (Core human factors program requirements may not be fully represented.)
HSI-07	Notional “Operational Improvements” devised for the purposes of constructing the Tech Ops HSI Roadmap will be validated as the Tech Ops concept of operations matures.
HSI-08	The definition and descriptions of NAS Actors will continue to mature. For example, converging NAS Actors (e.g., trajectory managers for transition and en route) are sufficiently similar in the functions, procedures, interfaces and equipment to obviate distinctive actors’ names and descriptions; and, non-converging NAS Actors (e.g., separation managers and trajectory managers) are sufficiently distinct to require different names and descriptions.

# Human Systems Integration Roadmap: Decision Points (1 of 2)

DP #	Target Date	High Priority	Domain	Name
75	2014	Y	Automation	En Route Automation NextGen Mid-Term Work Package Initial Investment Decision
111	2015	Y	Automation	En Route Automation NextGen Mid-Term Work Package Final Investment Decision
188	2012 Q1	N	Air / Ground	Define an Integrated and base-lined Air-Ground Concepts
193	2013	N	Air / Ground	Define Human/Automation design principles to support NextGen infrastructure
194	2017	N	Air / Ground	Planning Decision: Incorporate results into future Requirement for NextGen Technology and Human/Automation intensive operations
208	2013 Q3	Y	Automation	Meteorological and Aeronautical Planning System (MAPS) Final Investment Decision
267	2017	N	Airspace & Procedures	Decision to proceed with High Altitude Trajectory Based Airspace Concept Phase 1
275	2014	Y	Automation	Terminal Automation NextGen Mid-Term Work Package Initial Investment Decision
276	2015	Y	Automation	Terminal Automation NextGen Mid-Term Work Package Final Investment Decision
346	2015	Y	Automation	Final Investment Decision for CATMT Work Package 4
356	2014	Y	Automation	CATMT Work Package 4 Initial Investment Decision
361	2013	Y	Automation	En Route Automation NextGen Mid-Term Work Package Investment Analysis Readiness Decision
363	2013	Y	Automation	Terminal Automation NextGen Mid-Term Work Package Investment Analysis Readiness Decision
563	2014	N		Define Collaborative Integrated Flight Deck Decision Support Requirements
564	2014	N		Identify Unique Requirements for Single Pilot Operations
565	2013	N		Define New and Recurrent Pilot/AOC Training and Certification Requirements
566	2013	N		Establish Air Crew Segment 2 DataComm Requirements for Displays & Procedures
567	2013	N		Define Procedures and Training Requirements for Low Visibility Ground Operations
568	2014	N		Define Human Factors Guidelines for NextGen Instrument Procedures
569	2015	N		Determine Enhanced Flight Deck Displays for Separation and Collision Avoidance
570	2012	N		Provide HF Tech Ops Segment 1 IWE requirements
571	2013	N		Provide HF Tech Ops Segment 2 IWE requirements

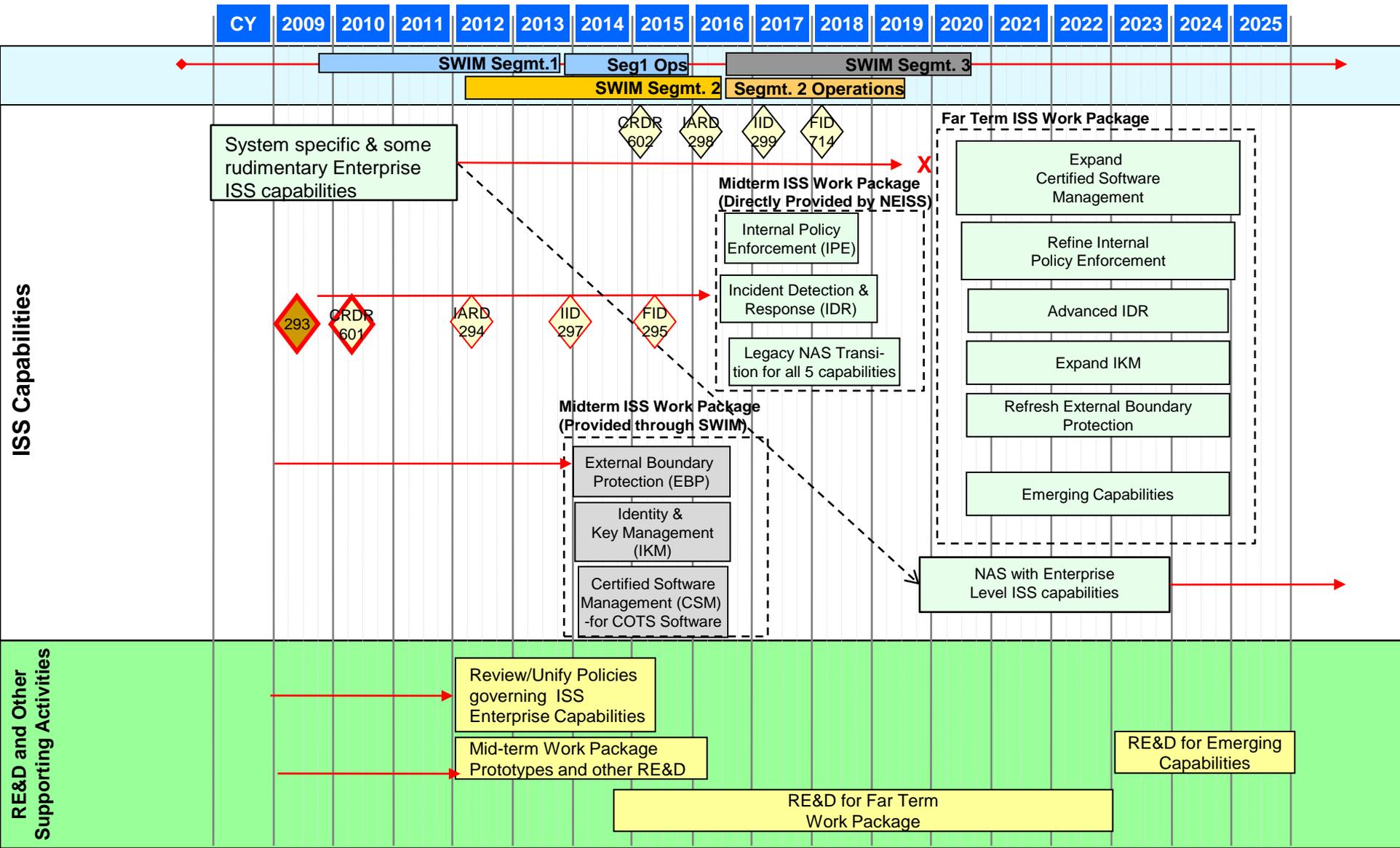
# Human Systems Integration Roadmap: Decision Points (2 of 2)

DP #	Target Date CY	High Priority	Domain	Name
572	2012	N		Provide Requirements and Standards for Personnel Selection, Training, and Staffing
573	2014	N		Provide HSI Requirements for Cross-Domain ATC Decision Support Tools
574	2014	N		Provide HSI Requirements for Workstation Integration
575	2015	N		Provide HSI Requirements to Support ATC Efficiency and Effectiveness Objectives
576	2012	N		Provide ATC/Flight Deck DataComm Concept of Operations
577	2010 Q4	N		Prototype application of internationally harmonized human reliability assessment tool requirements (Complete)
578	2014	N		Determine guidelines for Flight Deck functional allocation and automation roles
579	2014	N		Develop guidelines for human reliability and safety enhancements
580	2014	N		Provide Human Factors Guidance for Flight Deck & A/G Risk and Error Management
581	2017	N		Provide HF Tech Ops Segment 3 IWE requirements
582	2021	N		Provide HF Tech Ops Segment 4 IWE requirements
583	2016	N		Provide a standardized HF taxonomy that supports NextGen initiatives with emphasis on informational needs and the collaborative decision making
584	2012	N		NextGen strategic job selection requirements

# Information System Security

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# Information System Security Roadmap



# Information System Security Roadmap: Assumptions (1 of 2)

Identifier	Description
	<b>General Assumptions</b>
ISS-01	The responsibility for providing information security to the NAS will be extended from individual NAS programs/systems to the NAS Enterprise which will offer five enterprise level information security capabilities: (1) External Boundary Protection (EBP), (2) Incident Detection & Response (IDR) (3) Certified Software Management (CSM), (4) Internal Policy Enforcement (IPE), and (5) Identity and Key Management (IKM). Individual NAS programs/systems will implement these five capabilities according to their C&A Plan of Actions and Milestones and in coordination with the capability providers. Other NAS security capabilities, e.g. local system security management, will remain the sole responsibility of individual systems.
ISS-02	The NAS Enterprise Information System Security (NEISS) program will plan and coordinate the implementation of the enterprise level ISS capabilities within the framework of the FAA acquisition management process (AMS). For the implementation of the IDR and IPE capabilities, NEISS has started and will follow an AMS process specific for these capabilities. However, for the implementation of EBP, IKM, and CSM, NEISS will coordinate with SWIM to develop them in the SWIM acquisition process. Furthermore NEISS will manage the transition plans for all legacy systems to these 5 capabilities.
	<b>Incident Detection and Response (IDR) Capability Assumptions</b>
ISS-03	Enterprise security policy and governance structure will exist for incident detection and response such that the NAS is monitored for malware and other ISS events.
ISS-04	Information regarding all security incidents and security events will be transmitted to a central cyber security incident analysis center, such as the Cyber Security Management Center (CSMC), for analysis.
ISS-05	Coordination of NAS ISS incident detection and response is through the NAS Security Information Group (SIG).
ISS-06	A standard NAS incident Detection architecture and system design will be developed cooperatively between AIS and ATO.
ISS-07	NAS programs, the SIG, and CSMC will cooperatively plan and engineer the NAS incident detection system monitoring, analysis, and response capability.

# Information System Security Roadmap: Assumptions (2 of 2)

Identifier	Description
<b>Assumptions for an External Boundary Protection (EBP) Capability</b>	
ISS-08	Data flows into the NAS from non-NAS entities (external) are potential vectors of information security attack to the NAS and must be protected by the External Boundary Protection (EBP) capability .
ISS-09	For each external data flow requiring boundary protection, FTI will provide the communications transport between the NAS system and the EBP gateway.
<b>Assumptions for an Internal Policy Enforcement Capability</b>	
IPE-01	The Internal Policy Enforcement (IPE) capability is needed to mitigate information security risk arising from (1) the External Boundary Protection (EBP) residual risk, (2) the insider threat, and (3) the accidental introduction of malicious software (malware) into the NAS.
<b>Assumptions for the Identity and Key Management Capability</b>	
ISS-10	Identity and Key Management services for NAS users (humans and IT devices) will be provided over the next 5 years by extensively leveraging functional capabilities available through the SWIM program.
ISS-11	The FAA is planning to first implement Identity and key management services for non-NAS systems and non-NAS users during which time NAS prototype activities will take place for Identity and Key Management services.
ISS-12	AIO/AIS and ATO will collaborate on the planning and engineering of the identify and key management services for the NAS.
ISS-13	NAS requirements for Identity and Key Management services include authentication (including non-repudiation), integrity, and confidentiality.
<b>Assumptions for a Certified Software Management Capability</b>	
ISS-14	The Certified Software Management capability will enhance the current repository for SOA COTS software, access control from any part of the NAS, secure retrieval and transfer, and integrity guarantee utilizing the IKM capability. This capability will also include software vulnerability testing.
ISS-15	For the midterm, enterprise security policy will require that existing SOA COTS software distribution CM for the NAS be enhanced with the CSM capability.
ISS-16	Enterprise security policy will require that official NAS SOA COTS software, configuration, and adaptation data utilizes the CSM capability.

# Information System Security Roadmap: Decision Points

DP #	Target Date CY	High Priority	Domain	Name
293	2009 Q2	Y		Policy Decision between ATO-E, ATO-W, and ATO-P to allocate the initial focus of Enterprise Information System Security (ISS) (Complete)
294	2012 Q2	Y		IARD for Mid Term ISS Work Package directly provided by NEISS.
295	2015 Q2	Y		FID for two Mid Term capabilities: IDR and IPE, plus legacy NAS transition for all five capabilities
297	2013 Q4	Y		IID for two Mid Term capabilities : IDR and IPE, plus legacy NAS transition for all five capabilities
298	2016 Q1	N		IARD for Far Term Work Package
299	2017 Q1	N		IID for Far Term Work Package
601	2010 Q2	Y		Concept and Requirements Definition Readiness (CRDR) for Mid Term ISS Work package directly provided by NEISS (Complete)
602	2015 Q1	N		CRDR for Far Term Work Package
714	2018 Q1	N		FID for Far Term Work Package

# Information System Security Roadmap: Additional Information

**FOR OFFICIAL USE ONLY**

**Public availability to be determined under 5 USC 552**

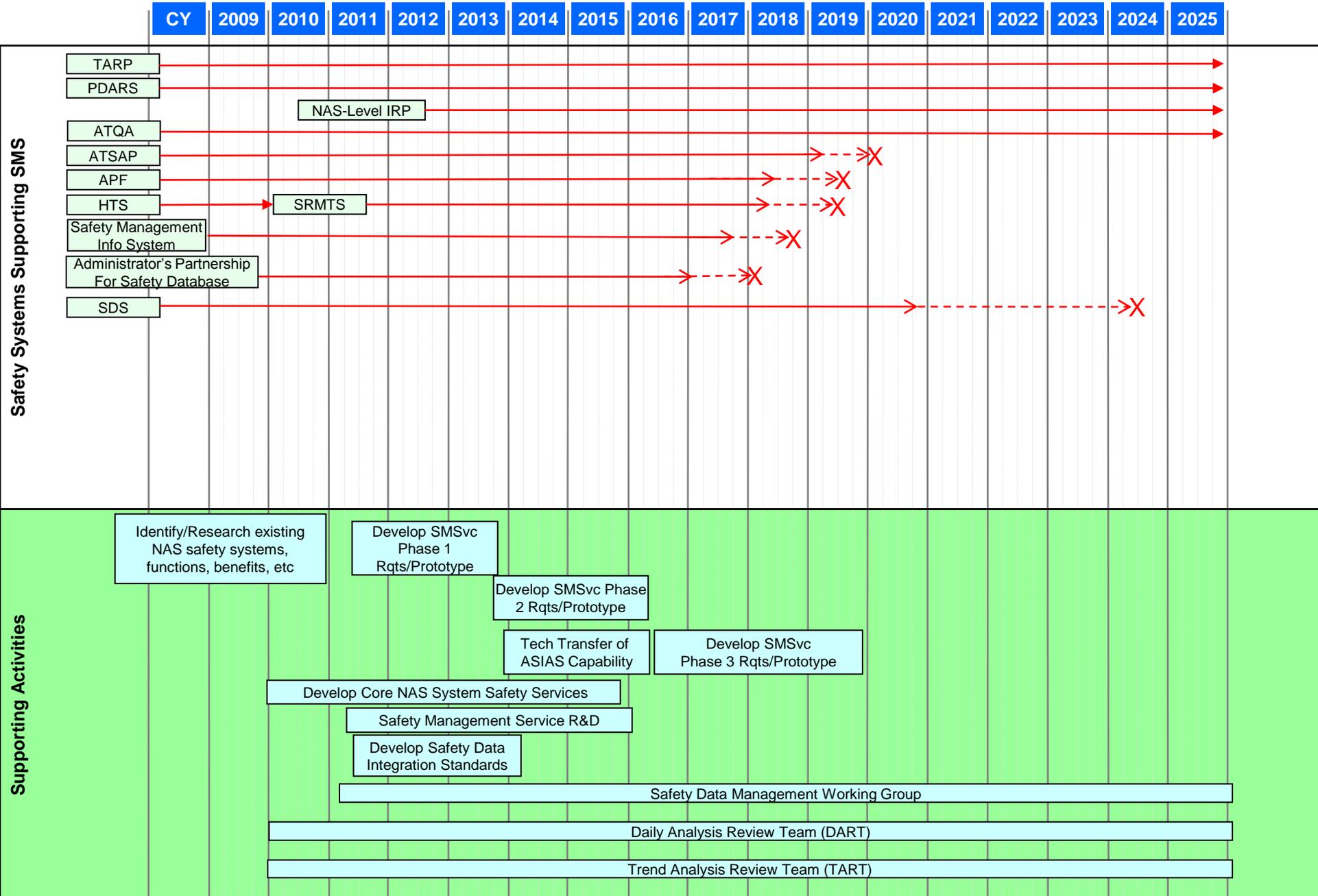
**Detail copies of the Information Systems Security Roadmap  
may be obtained by request to Vidyut Patel, AJP-174,  
Manager, Information Security Team at  
[vidyut.patel@faa.gov](mailto:vidyut.patel@faa.gov) or (609) 485-5046.**

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# Safety

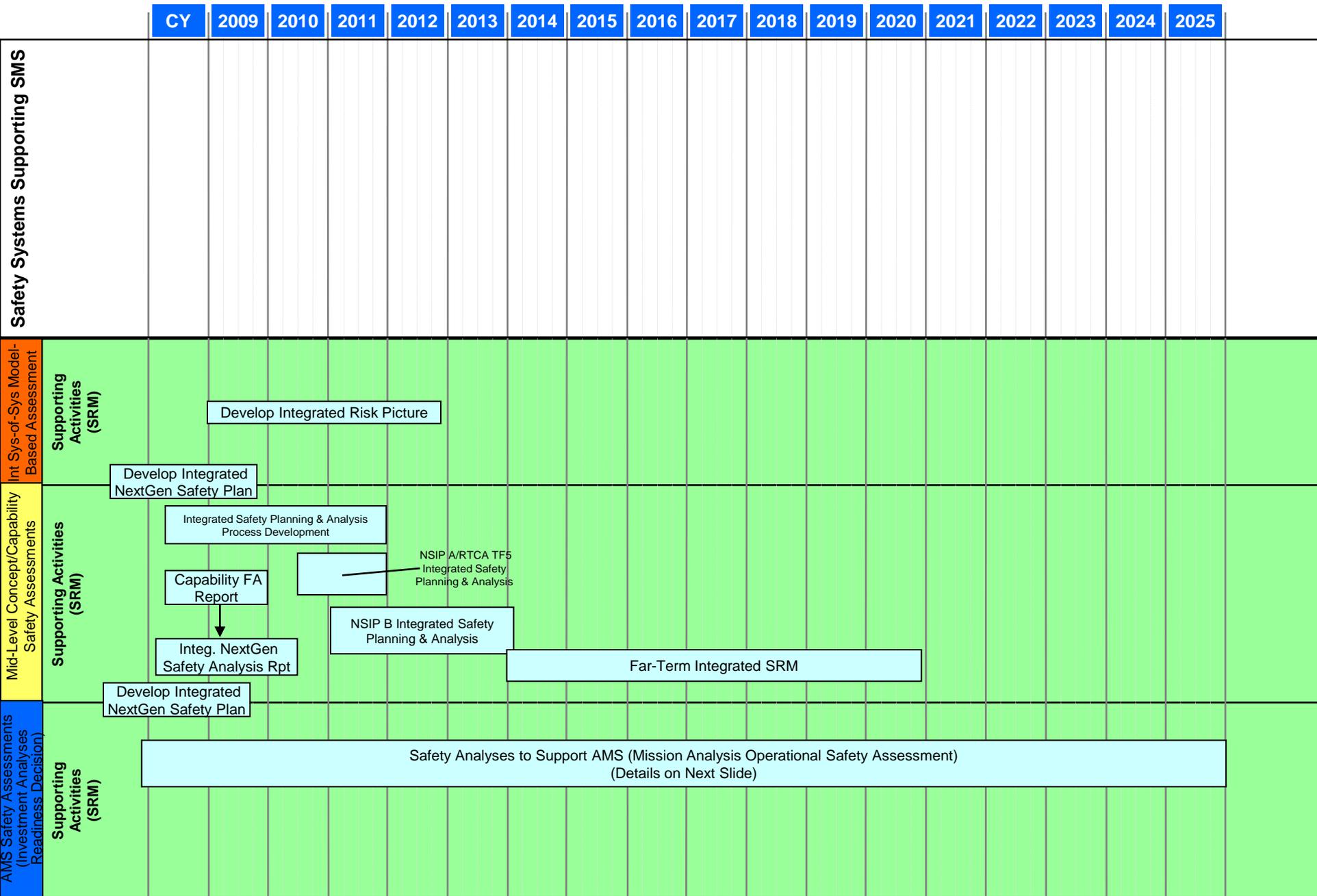
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# Safety Roadmap (1 of 11)

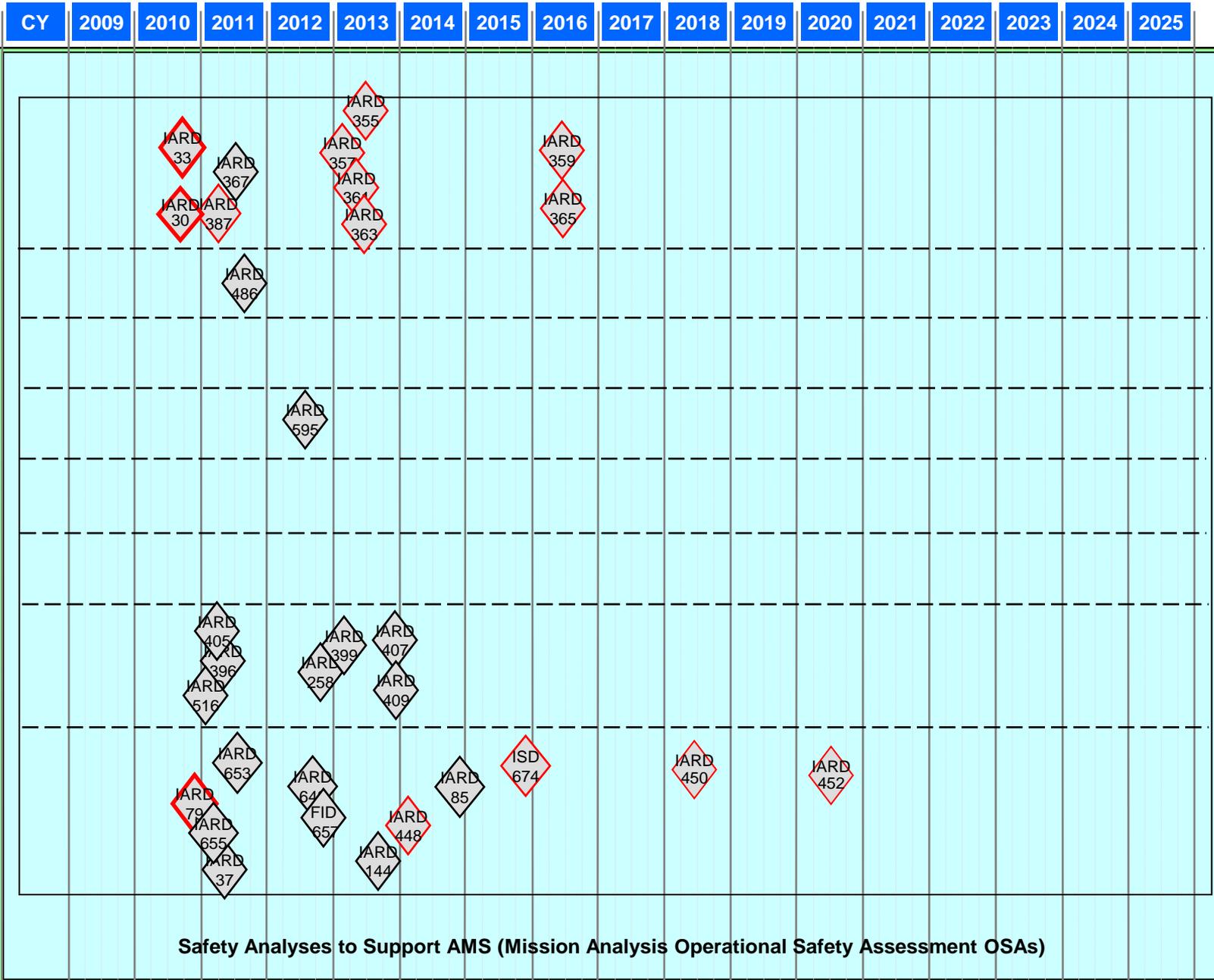


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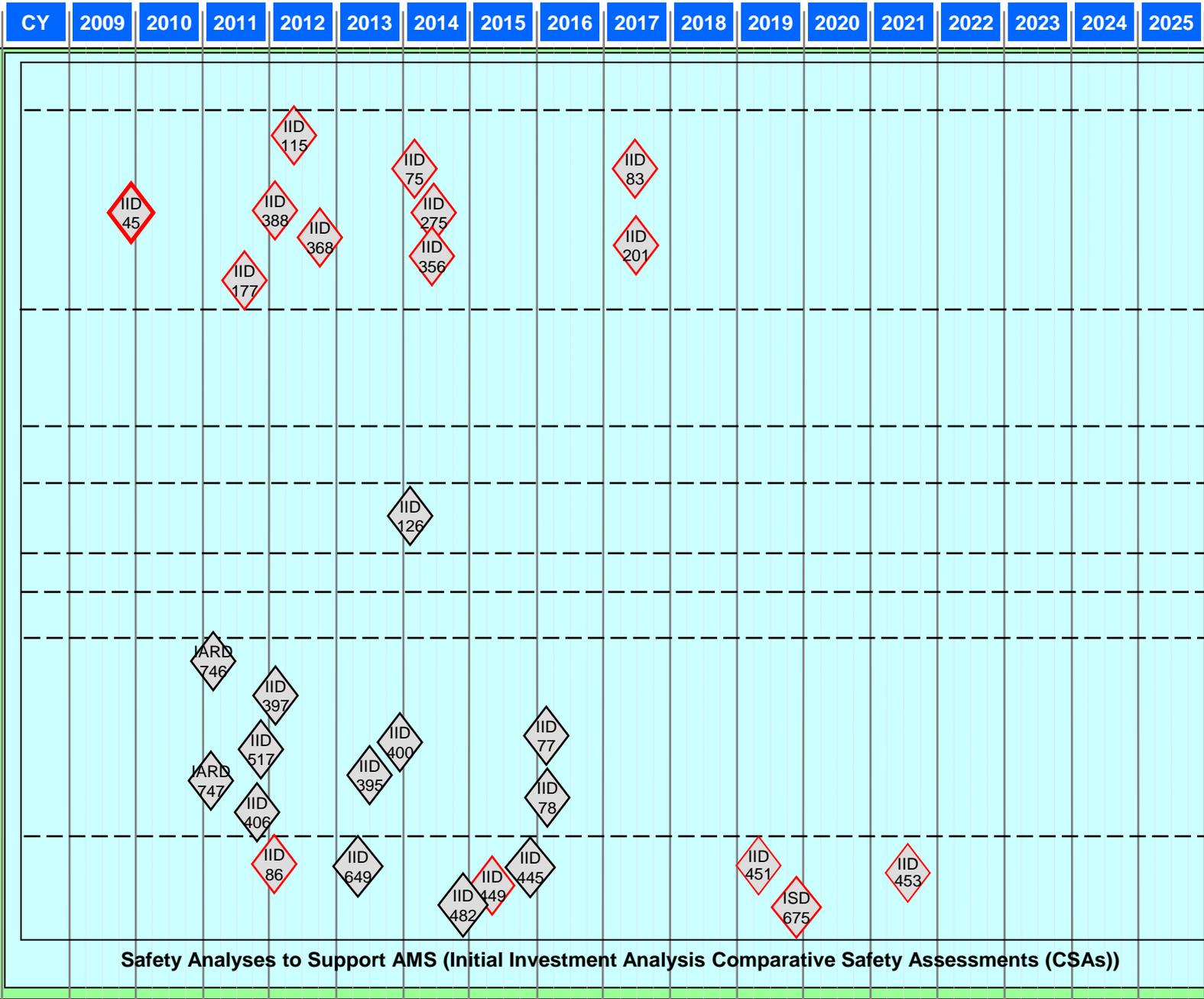
# Safety Roadmap (2 of 11)



# Safety Roadmap (3 of 11)



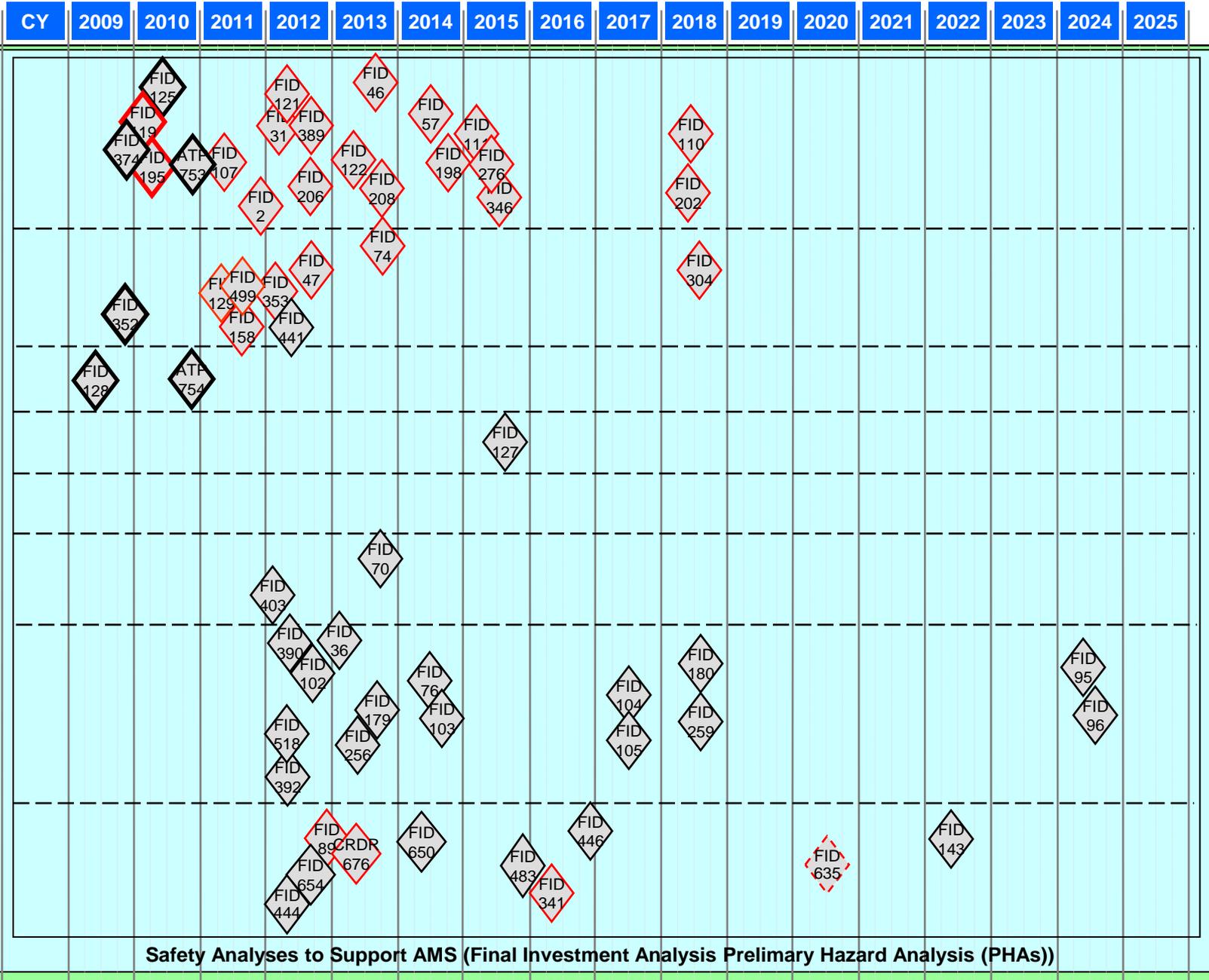
# Safety Roadmap (4 of 11)



Safety Analyses to Support AMS (Initial Investment Analysis Comparative Safety Assessments (CSAs))

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# Safety Roadmap (5 of 11)

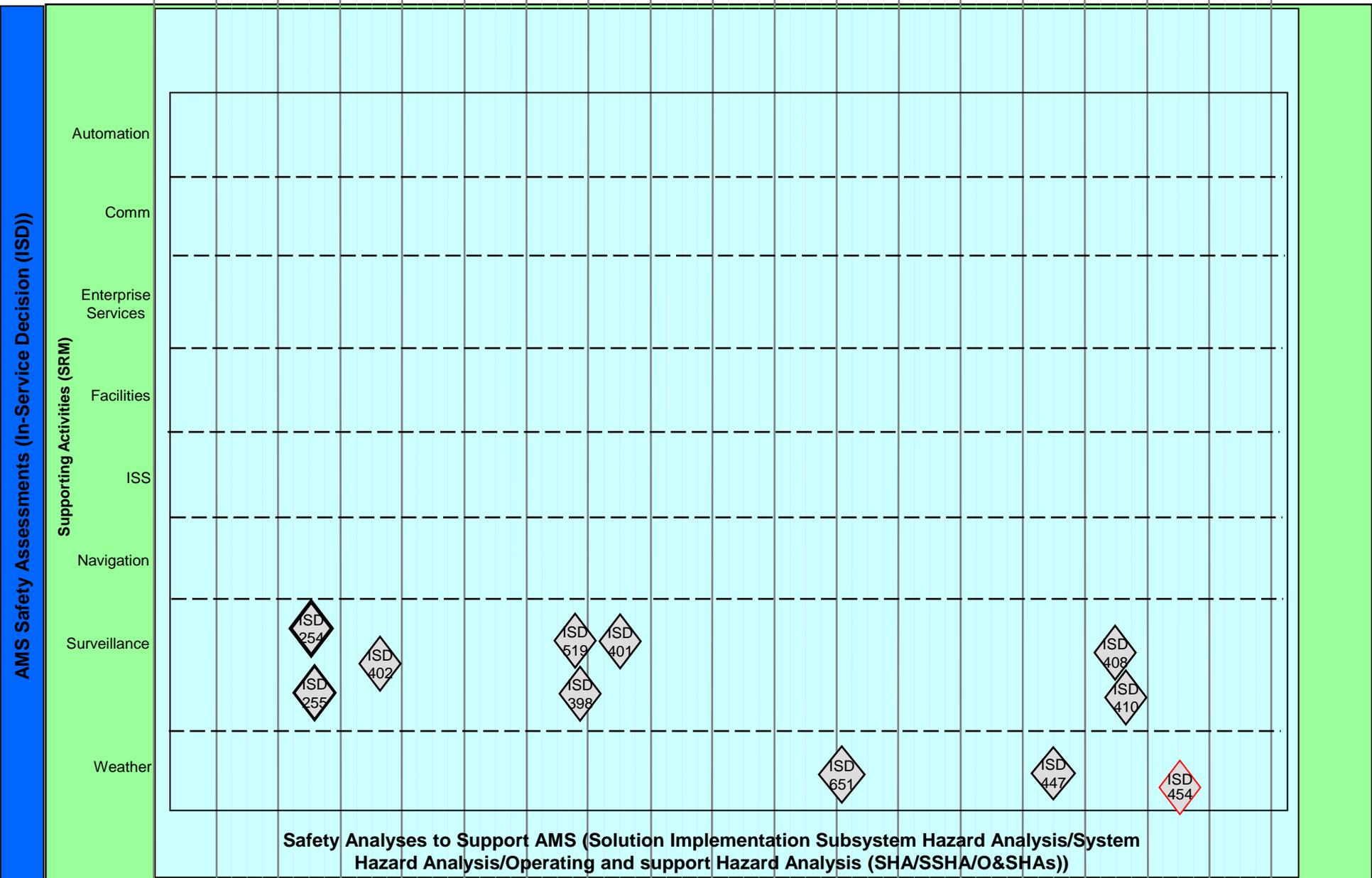


Safety Analyses to Support AMS (Final Investment Analysis Preliminary Hazard Analysis (PHAs))

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# Safety Roadmap (6 of 11)

CY	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
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Safety Analyses to Support AMS (Solution Implementation Subsystem Hazard Analysis/System Hazard Analysis/Operating and support Hazard Analysis (SHA/SSHA/O&SHAs))

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# Safety Roadmap (7 of 11)

CY 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025

Implement a SMS for FAA  
Flight Plan Goal 1 (Increased Safety) – Objective 6

ATO SMS

Develop FAA-wide  
SMS Integration &  
Implementation  
Strategy

Integrated FAA-wide SMS

Non-NAS EA

Evolve Commercial Space  
SMS

Commercial Space LOB SMS

Issue Private Sector SMS Rule

Private Sector SMS

Issue Airport SMS Rule to Implement  
SMS at Certificated Airports

Certificated Airports SMS

Publish ARP SMS  
Order to Implement  
SMS in ARP LOB

ARP LOB SMS

AVS SMS

Communications, Safety Culture/Climate Assessments, Training  
(Business Rules/Processes and Safety Culture), Conferences, Lessons Learned  
and Best Practices Sharing

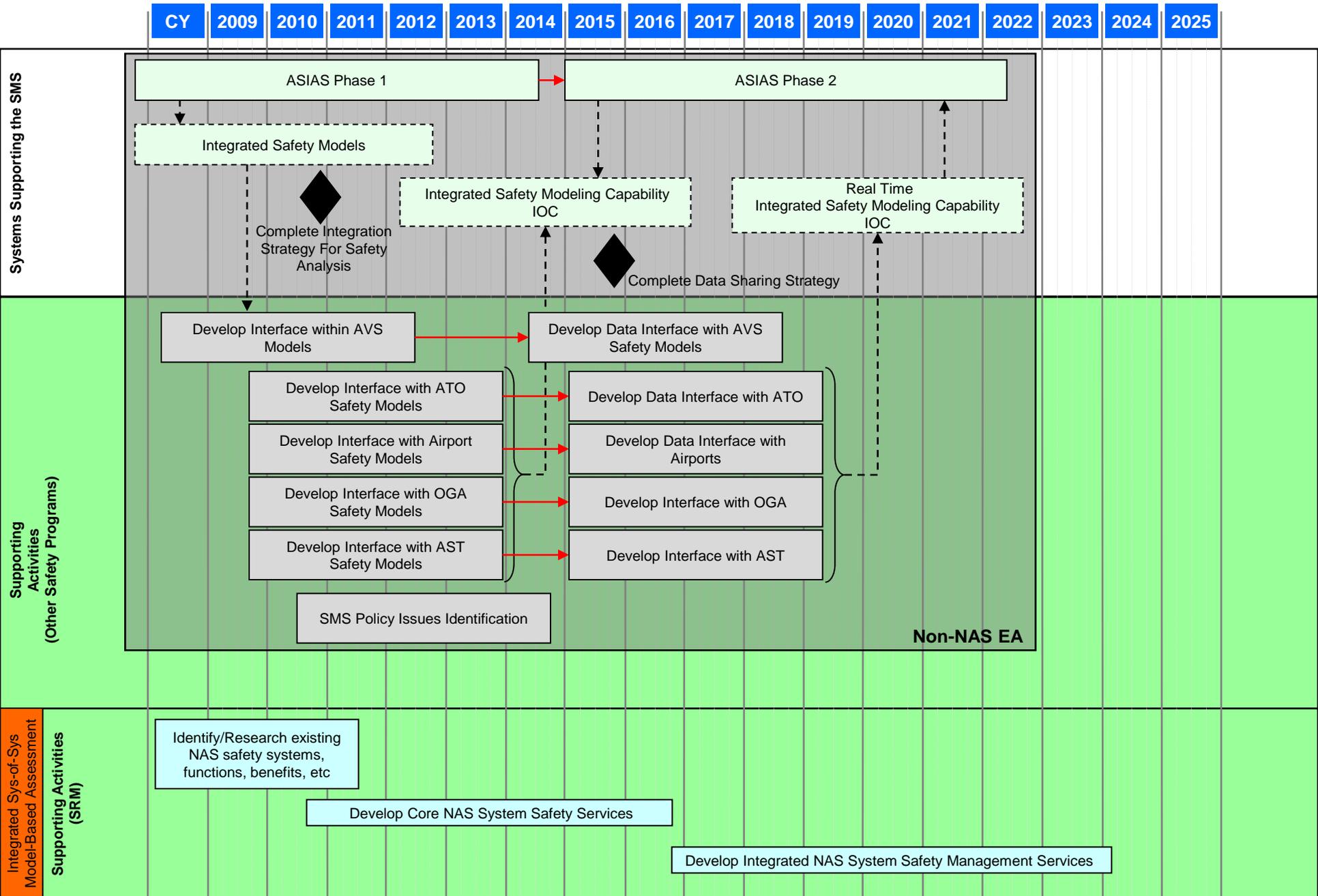
Conduct Safety  
Culture Survey  
for continuous  
improvement

Develop  
action plan for  
culture  
transformation

Trend Analysis, Assessment of Mitigations' Effectiveness,  
Independent Safety Assessments, and IOT&Es

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# Safety Roadmap (8 of 11)



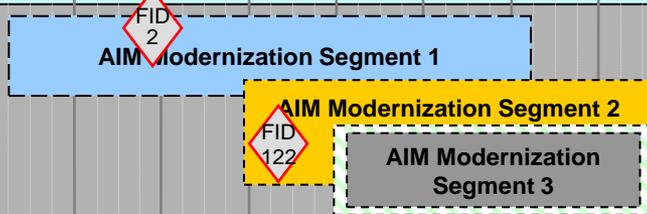
# Safety Roadmap (9 of 11)

CY 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025

## Commercial Air Carrier Fatality Rate Reduction Strategy Assessment & Planning



Airspace & Procedures Roadmap



Automation Roadmap



Airport Roadmap



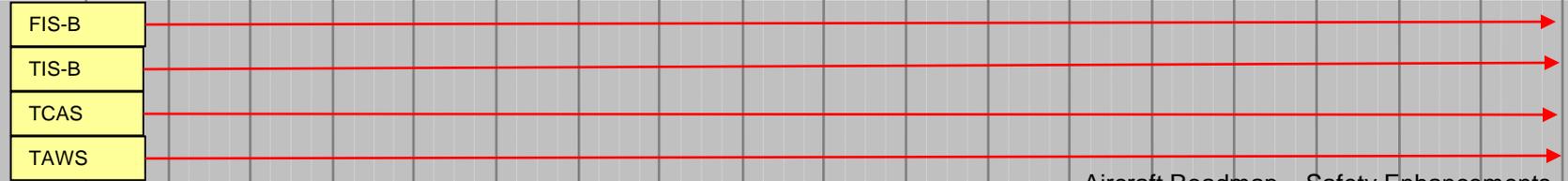
FAA Roadmap

### Reduce Commercial Air Carrier Fatality Rate Flight Plan Goal 1 – Objective 1

Additional activities include:  
• Research Hazardous Materials Safety (aircraft cargo)



A/G Roadmap



Aircraft Roadmap – Safety Enhancements

Supporting Activities (Increased Safety)

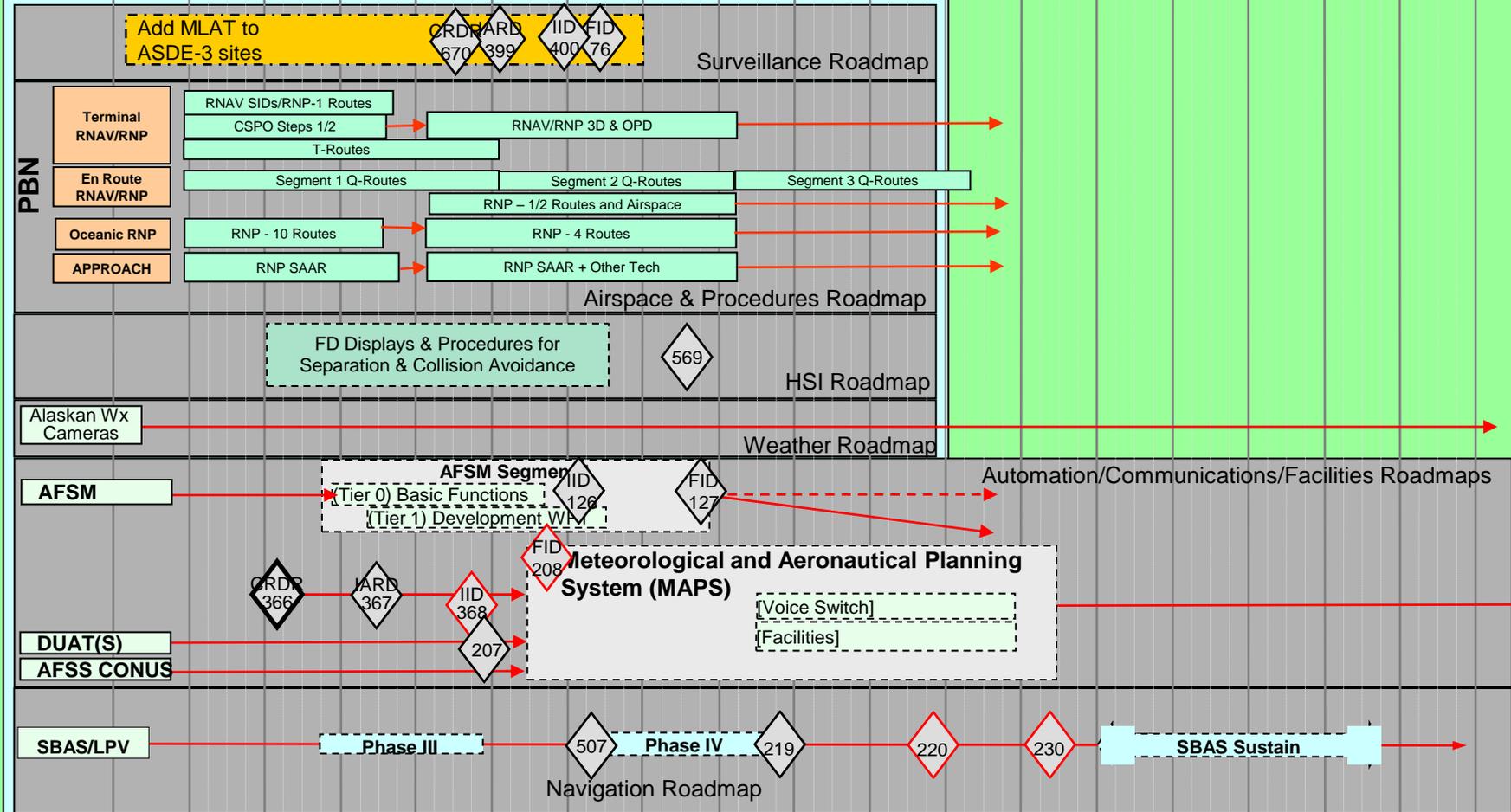
**APPROVED**

# Safety Roadmap (10 of 11)

CY	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
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## GA Fatality Rate Reduction Strategy Assessment & Planning

Supporting Activities (Increased Safety)



- Additional activities include:
- Various ADS-B Improved Pilot Situational Awareness Demonstrations
  - Develop 3 NM Separation Standards (further coordination required to add/link to A&P Roadmap)

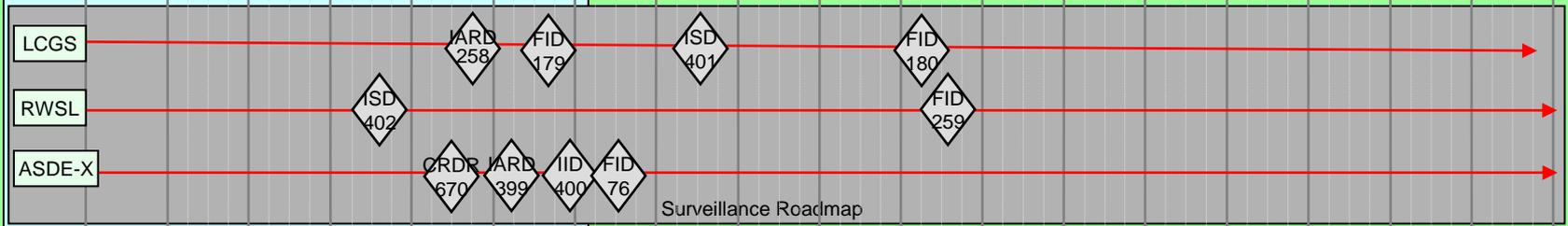
**Reduce GA Fatality Rate  
Flight Plan Goal 1 – Objective 2**

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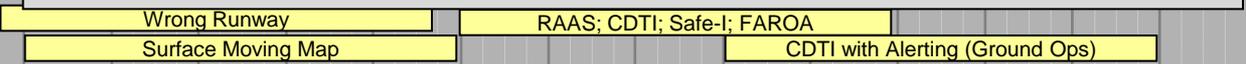
# Safety Roadmap (11 of 11)

CY 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025

## Reduce Runway Incursion Strategy Assessment & Planning



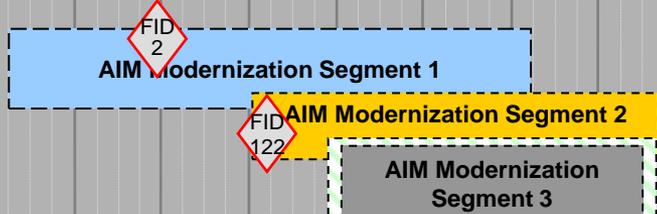
## Surface Collision Avoidance



- Additional activities include:
- Human Error Risk Reduction
  - Runway Incursion Analysis/Runways Safety Council
  - National Runway Safety Plan

## Reduce Runway Incursions Flight Plan Goal 1 – Objective 3

## Reduce OE Strategy Assessment & Planning



- Additional activities include:
- OE Evaluation Process Improvement
- ## Reduce Operational Errors Flight Plan Goal 1 – Objective 5

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Supporting Activities (Increased Safety)

# Safety Roadmap: Assumptions

Identifier	Description
SAFE-01	ASIAs is part of the Regulatory EA. It is depicted on the Safety Infrastructure Roadmap for coordination purposes since: a) It will require NAS data. b) It will provide safety data and tools for the NAS
SAFE-02	SMS Implementations for other LOBs are part of the Non-NAS EAs. These activities are depicted on the Safety Infrastructure Roadmap for coordination purposes.

# Safety Roadmap: Decision Points (1 of 7)

DP #	Target Date CY	High Priority	Domain	Name
2	2011 Q4	Y	Automation	AIM Modernization Segment 1 Final Investment Decision
30	2010 Q3	Y	Automation	Investment Analysis Readiness Decision for Tower Flight Data Manager 1 (TFDM1) (Complete)
31	2012 Q1	Y	Automation	Final Investment Decision for Post ERAM R3 Work Package
33	2010 Q3	Y	Automation	Investment Analysis Readiness Decision for Security Integrated Tool Suite (SITS) (Complete)
36	2013 Q1	N	Surveillance	Final Investment Decision for migration of PRM to PRM-R (based on multilateralation)
37	2011 Q2	N	Weather	IARD to Tech Refresh/SLEP wind shear detection services capability of all WS systems (to address wind shear study & technologies)
45	2009 Q4	Y	Automation	Terminal Automation Modernization and Replacement (TAMR) Phase 3 Initial Investment Decision (Complete)
46	2013 Q3	Y	Automation	Tower Flight Data Manager 1 (TFDM1) Final Investment Decision
47	2012 Q3	Y	Communication	Final Investment Decision for NAS Voice Switch
57	2014 Q2	Y	Automation	TBFM/WP3 Final Investment Decision
70	2013 Q3	N	Navigation	Final Investment Decision (FID) for the acquisition of CAT II/III Ground Based Augmentation System (GBAS)
74	2013	Y	Communication	Approve FTI Re-Compete Decision
75	2014	Y	Automation	En Route Automation NextGen Mid-Term Work Package Initial Investment Decision
76	2014	N	Surveillance	Final Investment Decision for removal or SLEP/replace ASDE surface primary radars (evolving requirements for safety and security may impact decision)
77	2016 Q1	N	Surveillance	Initial Investment Decision to implement a NextGen Surveillance and Weather Radar Capability for ATC
78	2016 Q1	N	Surveillance	Initial Investment Decision to implement a NextGen beacon/backup radar system for ATC
79	2010 Q4	Y	Weather	Investment Analysis Readiness Decision (IARD) for NextGen Wx Processor WP1 and NNEW WP1 to enter IA (Complete)
83	2017	Y	Automation	Transition to NextGen Far Term automation platforms and display subsystem through convergence Initial Investment Decision
85	2014 Q4	N	Weather	Investment Decision (IARD) to Consolidate & Replace ASWON automated surface observing systems (replacement for all ASWON sensors plus NextGen requirements)
86	2012 Q1	Y	Weather	Investment Decision (IID) for NextGen Wx Processor WP1 (includes CIWS functionality & RAMP WARP functionality) & NNEW WP1 (includes WARP WINS & FBWTG functionality, may also include WMSCR Wx Communications functionality)
89	2012 Q4	Y	Weather	Investment Decision (FID) for NextGen Wx Processor WP1 (includes CIWS functionality, NG WARP functionality & NNEW WP1 functionality (includes WARP WINS & FBWTG, may also include WMSCR Wx Communications functionality))
95	2024	N	Surveillance	Decision for replacement of terminal primary radars (ASR-11 PSR) and removal of terminal beacons (ASR-11 MSSR)

# Safety Roadmap: Decision Points (2 of 7)

DP #	Target Date CY	High Priority	Domain	Name
96	2024	N	Surveillance	Decision for replacement of en route beacons (ATCBI-6)
102	2012 Q3	N	Surveillance	Final Investment Decision to implement SIM in terminal and en route legacy radar systems
103	2014	N	Surveillance	Final Investment Decision for technology refresh of beacons (ATCBI-6)
104	2017	N	Surveillance	Final Investment Decision to implement a NextGen Surveillance and Weather Radar Capability for ATC
105	2017	N	Surveillance	Final Investment Decision to implement a NextGen beacon/backup radar system for ATC
107	2011 Q2	Y	Automation	TAMR Phase 3 Segment 1 Final Investment Decision
110	2018	Y	Automation	Approve final investment for transition to NextGen automation platforms and display subsystem through convergence
111	2015	Y	Automation	En Route Automation NextGen Mid-Term Work Package Final Investment Decision
115	2012 Q2	Y	Automation	Approve Tower Flight Data Manager 1 Initial Investment Decision
119	2010 Q1	Y	Automation	Final Investment Decision for CATMT Work Package 3 contents (Complete)
121	2012 Q2	Y	Automation	AIM Modernization Segment 2 Final Investment Decision
122	2013 Q2	Y	Automation	AIM Modernization Segment 3 Final Investment Decision
125	2010 Q2	N	Automation	Alaska Flight Service Modernization (AFSM) Segment 1 Final Investment Decision (Complete)
126	2014 Q1	N	Facilities	Initial Investment Decision (IID) Flight Services Facilities
127	2015 Q3	N	Facilities	Final Investment Decision (FID) Flight Services Facilities
128	2009 Q2	N	Enterprise Services	Final Investment Decision for SWIM Segment 1B (Baseline for FY 11 - 13) (Complete)
129	2011 Q2	Y	Communication	Final Investment Decision for Alaska Satellite Telecommunications Infrastructure (ASTI) Technical Refresh
143	2022	N	Weather	Investment Decision (FID) to Provide 10-Hour Convective Forecast Capability and In-Flight Icing Observation from Airborne Aircraft To NextGen Weather Processor WP3
144	2013 Q3	N	Weather	Investment Decision (IARD) to transfer ITWS functionality to NWP WP2 [(includes improved data quality, TWIP, upgraded TWINDS & path-based wind shear from TR); while ITWS safety-related functionality (Microburst Predict) may remain 'local' or reside in NextGen FarTerm WP - DP83]; and to transfer ALDARS functionality in (ADAS) to NWP WP2
158	2011 Q3	Y	Communication	Data Communications Segment 1 FID (part 1 of a split FID)
177	2011 Q3	Y	Automation	Initial Investment Decision for SITS Air Domain Security Architectures
179	2013	N	Surveillance	Combined Initial Investment Decision and Final Investment Decision for LCGS
180	2018	N	Surveillance	Final Investment Decision for ADS-B to assume LCGS function, or approve a Technology Refresh for LCGS

# Safety Roadmap: Decision Points (3 of 7)

DP #	Target Date CY	High Priority	Domain	Name
195	2010 Q2	Y	Automation	Time Based Flow Management (TBFM ) Final Investment Decision
198	2014	Y	Automation	Tower Flight Data Manager 2 (TFDM2) Final Investment Decision
201	2017	Y	Automation	En Route /Oceanic IES NextGen WP Initial Investment Decision
202	2018	Y	Automation	En Route /Oceanic IES NextGen WP Final Investment Decision
206	2012 Q3	Y	Automation	Final Investment Decision for SITS Air Domain Security Architecture
207	2012 Q4	N	Automation	DUAT Continuation decision
208	2013 Q3	Y	Automation	Meteorological and Aeronautical Planning System (MAPS) Final Investment Decision
219	2016	N	Navigation	Completion of all WAAS instrument approach procedures (LPV and LP) for all qualifying runways in the National Airspace System (NAS), estimated to be 5500 runway ends. Original date of 2018 was accelerated to 2016.
220	2018	Y	Navigation	Completion of Dual Frequency (GPS L1 and L5) development & testing for the WAAS ground and space segment hardware, software, and user equipment standards and avionics, required by DoD Mandate, issued September 2008
230	2020	Y	Navigation	Cut-over to dual frequency operations
254	2010 Q3	N	Surveillance	In-Service Decision for SBS Critical Services (ADS-B) NAS wide implementation, including backup strategy (Complete)
255	2010 Q3	N	Surveillance	In-Service Decision for WM/LAT (Alaska and Colorado) (Complete)
256	2013	N	Surveillance	Final Investment Decision for ASR-11 Technology Refresh Segment 2 (through 2025)
258	2012 Q4	N	Surveillance	Investment Analysis Readiness Decision for LCGS
259	2018	N	Surveillance	Final Investment Decision for RWSL Technology Refresh
275	2014	Y	Automation	Terminal Automation NextGen Mid-Term Work Package Initial Investment Decision
276	2015	Y	Automation	Terminal Automation NextGen Mid-Term Work Package Final Investment Decision
304	2018	Y	Communication	Data Communications Segment 2 FID
341	2016 Q2	Y	Weather	Investment Decision (FID) for NNEW WP2 and transition of ADAS communications (and WMSCR Comms if not completed in NNEW WP1) to NNEW WP2
346	2015	Y	Automation	Final Investment Decision for CATMT Work Package 4
352	2009 Q4	N	Communication	Approve IDLM Enhancement (Complete)
353	2012 Q1	Y	Communication	Data Communications Segment 1 FID (part 2 of a split FID)

# Safety Roadmap: Decision Points (4 of 7)

DP #	Target Date CY	High Priority	Domain	Name
355	2013	Y	Automation	CATMT Work Package 4 Investment Analysis Readiness Decision
356	2014	Y	Automation	CATMT Work Package 4 Initial Investment Decision
357	2013 Q1	Y	Automation	TBFM/WP3 Investment Analysis Readiness Decision
359	2016	Y	Automation	En Route /Oceanic IES NextGen WP Investment Analysis Readiness Decision
361	2013	Y	Automation	En Route Automation NextGen Mid-Term Work Package Investment Analysis Readiness Decision
363	2013	Y	Automation	Terminal Automation NextGen Mid-Term Work Package Investment Analysis Readiness Decision
365	2016	Y	Automation	Transition to NextGen Far Term automation platforms and display subsystem through convergence Investment Analysis Readiness Decision
366	2010 Q1	N	Automation	Meteorological and Aeronautical Planning System (MAPS) Concept and Requirements Definition Readiness Decision (Complete)
367	2011 Q2	N	Automation	Meteorological and Aeronautical Planning System (MAPS) Investment Analysis Readiness Decision
368	2012 Q3	N	Automation	Meteorological and Aeronautical Planning System (MAPS) Initial Investment Decision
374	2009 Q4	N	Automation	RMMS Technology Refresh Final Investment Decision (Complete)
387	2011 Q2	Y	Automation	NextGen ATOP/Offshore Automation Investment Analysis Readiness Decision
388	2012 Q1	Y	Automation	NextGen ATOP/Offshore Automation Initial Investment Decision
389	2012 Q3	Y	Automation	NextGen ATOP/Offshore Automation Final Investment Decision
390	2012 Q2	N	Surveillance	Final Investment Decision for legacy beacon (Mode S) SLEP through 2025
392	2012 Q2	N	Surveillance	Final Investment Decision for legacy radar (ASR-9) SLEP through 2025
395	2013	N	Surveillance	Initial Investment Decision for Technology Refresh of ATCBI-6 beacon system
396	2011 Q2	N	Surveillance	Investment Analysis Readiness Decision for Precision Runway Monitor-Replacement
397	2012 Q1	N	Surveillance	Initial Investment Decision for migration of PRM to PRM-R(based on multilateralation)
398	2014 Q4	N	Surveillance	In-Service Decision for PRM-R (based on multilateralation)
399	2013 Q1	N	Surveillance	Investment Analysis Readiness Decision for removal or SLEP/replace ASDE surface primary radars
400	2013 Q4	N	Surveillance	Initial Investment Decision for removal or SLEP/replace ASDE surface primary radars
401	2015	N	Surveillance	In-Service Decision for Low Cost Ground Surveillance system
402	2011 Q3	N	Surveillance	In-Service Decision for Runway Status Light system
403	2012 Q1	N	Surveillance	Final Investment Decision for SBS Implementation of Advanced ADS-B Applications
405	2011 Q1	N	Surveillance	Investment Analysis Readiness Decision for SIM in terminal and en route legacy radar systems
406	2011 Q4	N	Surveillance	Initial Investment Decision for SIM in terminal and en route legacy radar systems

# Safety Roadmap: Decision Points (5 of 7)

DP #	Target Date CY	High Priority	Domain	Name
407	2013 Q4	N	Surveillance	Investment Analysis Readiness Decision for NextGen Surveillance and Weather Radar Capability
408	2023	N	Surveillance	In-Service Decision for NextGen Surveillance and Weather Radar Capability
409	2013 Q4	N	Surveillance	Investment Analysis Readiness Decision for New Beacon/Backup System
410	2023	N	Surveillance	In-Service Decision for New Beacon/Backup System
441	2012 Q2	N	Communication	ATIS Technical Refresh FID
444	2012 Q2	N	Weather	FID to Tech Refresh/SLEP all low-level wind shear detection systems as part of wind shear detection service
445	2015 Q4	N	Weather	Investment Decision (IID) to consolidate and replace ASWON automated surface observing capability (replacement for all ASWON sensors plus NextGen requirements)
446	2016 Q4	N	Weather	Investment Decision (FID) to consolidate and replace ASWON automated surface observing capability (replacement for all ASWON sensors plus NextGen requirements)
447	2022	N	Weather	ISD to replace all automated surface observing systems with NextGen Surface Observing capability
448	2014 Q1	Y	Weather	Investment Decision (IARD) for NNEW WP2 and transition of ADAS communications (and WMSCR Comms if not completed in NNEW WP1) to NNEW WP2
449	2015 Q2	Y	Weather	Investment Decision (IID) for NNEW WP2 and transition of ADAS communications (and WMSCR Comms if not completed in NNEW WP1) to NNEW WP2
450	2018	Y	Weather	Investment Decision (IARD) for NNEW Tech Refresh
451	2019	Y	Weather	Investment Decision (IID) for NNEW Tech Refresh
452	2020	Y	Weather	IARD to provide 10-hour Convective Forecast capability to NWP WP3 and in-flight Icing Observation from airborne aircraft to NWP WP3
453	2021	Y	Weather	IID to provide 10-hour Convective Forecast capability to NWP WP3 and provide in-flight Icing Observation from airborne aircraft to NWP WP3
454	2024	Y	Weather	ISD to document final configuration of the NextGen Wx Processor Work Pkg 3 (NWP WP3)
482	2014 Q4	N	Weather	Investment Decision (IID) to transfer ITWS functionality to NWP WP2 [(includes improved data quality, TWIP, upgraded TWINDS & path-based wind shear from TR); while ITWS safety-related functionality (Microburst Predict) may remain 'local' or reside in NextGen FarTerm WP - DP83]; and to transfer ALDARS functionality in (ADAS) to NWP WP2
483	2015 Q4	N	Weather	Investment Decision (FID) to transfer ITWS functionality to NWP WP2 [(includes improved data quality, TWIP, upgraded TWINDS & path-based wind shear from TR); while ITWS safety-related functionality (Microburst Predict) may remain 'local' or reside in NextGen FarTerm WP - DP83]; and to transfer ALDARS functionality in (ADAS) to NWP WP2
486	2011 Q3	N	Communication	ATIS Technical Refresh IARD
499	2011 Q3	Y	Communication	FID for NEXCOM Segment 2 Modernization Phase 2

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# Safety Roadmap: Decision Points (6 of 7)

DP #	Target Date CY	High Priority	Domain	Name
507	2014	N	Navigation	WAAS moves from Phase III to Phase IV
516	2011 Q1	N	Surveillance	Investment Analysis Readiness Decision (IARD) for a Mobile/Transportable Airport Surveillance Radar (MASR)
517	2011 Q4	N	Surveillance	Initial Investment Decision (IID) for a Mobile/Transportable Airport Surveillance Radar (MASR)
518	2012 Q2	N	Surveillance	Final Investment Decision (FID) for a Mobile/Transportable Airport Surveillance Radar (MASR)
519	2014 Q4	N	Surveillance	In-Service Decision (ISD) for a Mobile/Transportable Airport Surveillance Radar (MASR)
569	2015	N	Human System Integration	Determine Enhanced Flight Deck Displays for Separation and Collision Avoidance
595	2012 Q4	N	Facilities	IARD for Continuation of Flight Services
597	2015	N	Airport	RSA NAVAID Improvements (Complete)
635	2020	Y	Weather	Investment Decision (FID) for NNEW Tech Refresh
648	2012 Q3	N	Weather	Investment Decision (IARD) for WSDS Work Pkg 2 using rightsizing study to examine new technology, NEXRAD improvements & LIDAR to extend WSDS coverage expansion to un-/under-protected sites
649	2013 Q2	N	Weather	Investment Decision (IID) for WSDS Work Pkg 2 using rightsizing study to examine new technology, NEXRAD improvements & LIDAR to extend WSDS coverage expansion to un-/under-protected sites
650	2014 Q2	N	Weather	Investment Decision (FID) for WSDS Work Pkg 2 using rightsizing study to examine new technology, NEXRAD improvements & LIDAR to extend WSDS coverage expansion to un-/under-protected sites
651	2019 Q1	N	Weather	Investment Decision (ISD) for WSDS Work Pkg 2 using rightsizing study to examine new technology, NEXRAD improvements & LIDAR to extend WSDS coverage expansion to un-/under-protected sites
653	2011 Q2	N	Weather	Investment Decision (IARD) for ASWON Tech Refresh of ASOS/AWOS/AWSS processors & S/W until NextGen Surface Observing Capability FOC circa 2027
654	2012 Q3	N	Weather	Investment Decision (FID) for ASWON Tech Refresh of ASOS/AWOS/AWSS processors & S/W until NextGen Surface Observing Capability FOC circa 2027

# Safety Roadmap: Decision Points (7 of 7)

DP #	Target Date CY	High Priority	Domain	Name
655	2011 Q1	N	Weather	Investment Decision (IARD) to Tech Refresh all 34 ITWS (includes improved data quality, upgraded TWINDS & path-based wind shear, and possible expansion to 3 new sites (SCT, PDX & SEA) as well as service to secondary/reliever airports)
657	2012 Q4	N	Weather	Investment Decision (FID) to Tech Refresh all 34 ITWS (includes improved data quality, upgraded TWINDS & path-based wind shear, and possible expansion to 3 new sites (SCT, PDX & SEA) as well as service to secondary/reliever airports)
670	2012 Q2	N	Surveillance	Concept and Requirements Definition Readiness (CRDR) Decision for removal or SLEP/replace ASDE surface primary radars
674	2015 Q4	Y	Weather	In Service Decision (ISD) for NNEW WP 1
675	2019 Q4	Y	Weather	In Service Decision (ISD) for NNEW WP 2
676	2013 Q2	Y	Weather	Investment Decision (CRDR) for NNEW WP2 and transition of ADAS communications (and WMSCR Comms if not completed in NNEW WP1) to NNEW WP2
746	2011 Q1	N	Surveillance	Investment Analysis Readiness Decision for legacy radar (ASR-9) SLEP, through 2025
747	2011 Q1	N	Surveillance	Investment Analysis Readiness Decision for legacy beacon (Mode S) SLEP through 2025
753	2010 Q4	N	Automation	Authorization to Proceed (ATP) towards TAMR Phase 3 Segment 1 FID (DP 107)
754	2010 Q4	N	Enterprise Services	Authorization to Proceed (ATP) towards SWIM Segment 2 FID (DP 708)

# Appendix A: Acronym List

# Appendix A, Acronym List (1 of 6)

Acronym	Definition	Acronym	Definition
<b>3D</b>	Three dimensional (x, y, z)	<b>ASDE</b>	Airport Surface Detection Equipment
<b>4D</b>	Four dimensional (x, y, z, t)	<b>ASDE-3</b>	Airport Surface Detection Equipment - Model 3
<b>4DT</b>	4D Trajectory	<b>ASDE-3/X</b>	Airport Surface Detection Equipment - Model 3 and ASDE-Model X
<b>AC</b>	Advisory Circular or Aircraft	<b>ASOS</b>	Automated Surface Observing System
<b>ACAS</b>	Airborne Collision Avoidance System	<b>ASPIRE</b>	Asia and South Pacific Initiative to Reduce Emissions
<b>ACE IDS</b>	ASOS Controller Equipment-Information Display System	<b>ASR</b>	Airport Surveillance Radar
<b>ADAM</b>	Advanced Dynamic Airspace Management	<b>ASTI</b>	Alaska Satellite Telecommunications Infrastructure
<b>ADAS</b>	AWOS Data Acquisition System	<b>ATC</b>	Air Traffic Control
<b>ADS-B</b>	Automatic Dependent Surveillance-Broadcast	<b>ATCBI</b>	Air Traffic Control Beacon Interrogator
<b>ADS-C</b>	Automatic Dependent Surveillance-Contract	<b>ATCSCC</b>	David J. Hurley Air Traffic Control System Command Center
<b>AEFS</b>	Advanced Electronic Flight Strip	<b>ATCT</b>	Airport Traffic Control Tower
<b>AFSM</b>	Alaska Flight Service Modernization	<b>ATDS</b>	Air Traffic Dependent Sensor
<b>AFSS</b>	Automated Flight Service Station	<b>ATL</b>	Hartsfield-Jackson Atlanta International Airport
<b>A/G</b>	air-to-ground	<b>ATM</b>	Air Traffic Management
<b>AIM</b>	Aeronautical Information Management	<b>ATO</b>	Air Traffic Organization (FAA)
<b>AIRE</b>	Atlantic Interoperability Initiative to Reduce Emissions	<b>ATOP</b>	Advanced Technologies and Oceanic Procedures
<b>AISM</b>	Aeronautical Information System Modernization	<b>AWG</b>	Automation Working Group
<b>AIXM</b>	Aeronautical Information Exchange Model	<b>AWOS</b>	Automated Weather Observing System
<b>ALDARS</b>	Automated Lightning Detection and Reporting System	<b>AWSS</b>	Automated Weather Sensor System
<b>ALS</b>	Automatic Landing System	<b>AVS</b>	Office of Aviation Safety
<b>AMASS</b>	Airport Movement Area Safety System	<b>BCD</b>	Baseline Change Decision
<b>ANICS</b>	Alaska National Airspace System Interfacility Communication System	<b>BPT</b>	Beaumont/Port Arthur Southeast Texas Regional Airport
<b>ANSP</b>	Air Navigation Service Provider	<b>BUEC</b>	Backup Emergency Communications (VSCS)
<b>ARMS</b>	Airspace Resource Management System	<b>BWM</b>	Bandwidth Manager
<b>ARMT</b>	Airport Resource Management Tool	<b>C&amp;V</b>	Ceiling & Visibility
<b>ARSR</b>	Air Route Surveillance Radar	<b>CAP</b>	Chicago Airspace Project
<b>ARTS 1E</b>	Automated Radar Terminal System Model 1E	<b>CARF</b>	Central Altitude Reservation Function
<b>ARTS IIE</b>	Automated Radar Terminal System Model IIE	<b>CAS</b>	Collision Avoidance System
<b>ARTS IIIE</b>	Automated Radar Terminal System Model IIIE	<b>CAT III</b>	Category III (precision landing)

# Appendix A, Acronym List (2 of 6)

Acronym	Definition	Acronym	Definition
<b>CATM</b>	—Collaborative Air Traffic Management	<b>DSR</b>	—Display System Replacement
<b>CATMT</b>	—Collaborative Air Traffic Management Technologies	<b>DST</b>	—Decision Support Tool
<b>CAVS</b>	—CDTI Assisted Visual Separation	<b>DUATS</b>	—Direct User Access Terminal Service
<b>CDA</b>	—Continuous Descent Approach	<b>EA</b>	—Enterprise Architecture
<b>CDTI</b>	—Cockpit Display of Traffic Information	<b>EARTS</b>	—En Route Automated Radar Tracking System
<b>CERAP</b>	—Combined Center and Radar Approach Control	<b>EC</b>	—ATO Executive Council
<b>CIP</b>	—Current Icing Product	<b>ECG</b>	—En Route Communications Gateway
<b>CIWS</b>	—Corridor Integrated Weather System	<b>ED</b>	—EUROCAE document
<b>CHI</b>	—computer-human interface	<b>ED-X</b>	—Enhanced Data Services (ED-X)
<b>CLL</b>	—College Station Easterwood Field	<b>EFS</b>	—Electronic Flight Strip
<b>ConOps</b>	—Concept of Operations	<b>EFSTS</b>	—Electronic Flight Strip Transfer System
<b>CONUS</b>	—Conterminous United States	<b>EFVS</b>	—Enhanced Flight Vision System
<b>CRDR</b>	—Concepts and Requirements Definition Readiness	<b>ERAM</b>	—En Route Automation Modernization
<b>CSPO</b>	—closely spaced parallel operations	<b>ERIDS</b>	—En Route Information Display System
<b>CSPR</b>	—Closely Spaced Parallel Runways	<b>ETVS</b>	—Enhanced Terminal Voice Switch
<b>CY</b>	—Calendar Year	<b>EVS</b>	—Enhanced Vision System
<b>DAB</b>	—Daytona Beach International Airport	<b>FAA</b>	—Federal Aviation Administration
<b>DAC</b>	—Dynamic Airspace RTT	<b>FACES</b>	—Future Airspace Capacity and Efficiency Study
<b>DASI</b>	—Digital Altimeter Setting Indicator	<b>FANS</b>	—Future Air Navigation System
<b>DC</b>	—Data Communications or DataComm	<b>FBWTG</b>	—FAA Bulk Weather Telecommunications Gateway
<b>DCS</b>	—Data Communication System	<b>FCST</b>	—Forecast
<b>DEN</b>	—Denver International Airport	<b>FDIO</b>	—Flight Data Input/Output
<b>DFM</b>	—Departure Flow Management	<b>FDP2K</b>	—Flight Data Processing 2000
<b>DINS</b>	—Defense Internet NOTAM Service	<b>FEWS</b>	—Future En Route Workstation
<b>DME</b>	—Distance Measuring Equipment	<b>FID</b>	—Final Investment Decision
<b>DMER</b>	—Distance Measuring Equipment (TACAN 2 <sup>nd</sup> Gen)	<b>FIP</b>	—Forecast Icing Product
<b>DMN</b>	—Data Multiplexing Network	<b>FIPS</b>	—Federal Information Processing Standards
<b>DOTS+</b>	—Dynamic Ocean Track System Plus	<b>FIS-B</b>	—Flight Information Service-Broadcast
<b>DP</b>	—Decision Point	<b>FMS</b>	—Flight Management System
<b>DSP</b>	—Departure Spacing Program	<b>FNS</b>	—Federal NOTAM System

# Appendix A, Acronym List (3 of 6)

Acronym	Definition	Acronym	Definition
<b>FOC</b>	Full Operational Capability	<b>IFPA</b>	Instrument Flight Procedure Automation
<b>FP</b>	Flight Plan	<b>IID</b>	Initial Investment Decision
<b>FS21</b>	Flight Services for the 21st Century	<b>ILS</b>	Instrument Landing System
<b>FSS</b>	Flight Service Station	<b>Pv4</b>	Internet Protocol version 4
<b>FT</b>	Far Term	<b>IPv6</b>	Internet Protocol version 6
<b>FTI</b>	FAA Telecommunications Infrastructure	<b>IOC</b>	Initial Operational Capability
<b>FTWS</b>	Future Terminal Workstation	<b>IRU</b>	Inertial reference unit
<b>FY</b>	Fiscal Year	<b>ISD</b>	In-Service Decision
<b>GA</b>	General Aviation	<b>ITWS</b>	Integrated Terminal Weather System
<b>GBAS</b>	Ground-Based Augmentation System	<b>IVSR</b>	Interim Voice Switch Replacement
<b>GIS</b>	Geographic Information System	<b>JAWS</b>	Juneau Airport Wind System
<b>GNSS</b>	Global Navigation Satellite System	<b>JFK</b>	John F. Kennedy International Airport
<b>GNSS/INS</b>	Global Navigation Satellite System/Inertial Navigation System	<b>JPDO</b>	Joint Planning and Development Office
<b>GPS</b>	Global Positioning System	<b>JRC</b>	Joint Resources Council
<b>GS</b>	Glide Slope Indicator	<b>L5</b>	Frequency used by GPS for safety of life signals
<b>GTG</b>	Graphical Turbulence Guidance	<b>LAX</b>	Los Angeles International Airport
<b>HAAM</b>	High Altitude Airspace Management	<b>LCGS</b>	Low Cost Ground Surveillance
<b>HAATS</b>	Houston Area Air Traffic System	<b>LDRCL</b>	Low-Density Radio Communications Link
<b>HAD</b>	High Density Airport	<b>LED</b>	Light-emitting diode
<b>HADDS</b>	Host ATM Data Distribution System	<b>LIDAR</b>	Laser Identification Detection and Ranging
<b>HDA</b>	High-Density Airport	<b>LITE</b>	Local Integrated Tower Equipment
<b>HOST</b>	Host Computer System	<b>LLWAS</b>	Low-Level Windshear Alert System
<b>HRRR</b>	High Resolution Rapid Refresh (weather model)	<b>LOA</b>	Letter of Agreement
<b>H/W</b>	Hardware	<b>LOC</b>	Localizer
<b>IAPA</b>	Instrument Approach Procedures Automation	<b>LRR</b>	long range radar
<b>IARD</b>	Investment Analysis Readiness Decision	<b>M/LAT</b>	Multilateration
<b>ICAO</b>	International Civil Aviation Organization	<b>MALS</b>	Medium-intensity Approach Lighting System
<b>IDAC</b>	Integrated Departure Arrival Capability	<b>MALSR</b>	Medium-intensity Approach Lighting System with Runway Alignment Indicator Lights
<b>IDS</b>	Information Display System	<b>MASPS</b>	Minimum Aviation System Performance Standards
<b>IES</b>	Integrated Enterprise Solution		

# Appendix A, Acronym List (4 of 6)

Acronym	Definition	Acronym	Definition
<b>MB</b>	Microburst	<b>NNCC</b>	National Network Control Center
<b>MMAC</b>	Mike Monroney Aeronautical Center	<b>NNEW</b>	NextGen Network-Enabled Weather
<b>MDCRS</b>	Meteorological Data Collection and Reporting System	<b>NOTAM</b>	Notice to Airmen
<b>MEA</b>	Minimum En Route Altitude	<b>NMR</b>	NADIN MSN Rehost
<b>MEARTS</b>	Micro EARTS	<b>NVS</b>	National Airspace System Voice Switch
<b>MFDS</b>	Multi-function Display System	<b>NWP</b>	NextGen Wx Processor
<b>MIA</b>	Miami International Airport	<b>NWS</b>	National Weather Service
<b>MIAWS</b>	Medium-Intensity Airport Weather System	<b>OASIS</b>	Operational and Supportability Implementation System
<b>MM</b>	Middle marker	<b>Obs</b>	Observation
<b>MODE S</b>	Mode Select	<b>OCC</b>	Operations Control Center
<b>MOPS</b>	Minimum Operational Performance Standards (RTCA)	<b>ODALS</b>	Omnidirectional Approach Lighting System
<b>MPAR</b>	Multifunction Phased-Array Radar	<b>OEAAA</b>	Obstruction Evaluation/Airport Airspace Analysis
<b>MSSR</b>	Monopulse Secondary Surveillance Radar	<b>OEP</b>	Operational Evolution Plan
<b>NADIN PSN</b>	National Airspace Data Interchange Network Packet Switched Network	<b>OFDPS</b>	Offshore Flight Data Processing System
<b>NAS</b>	National Airspace System	<b>OGC</b>	Open Geospatial Consortium, Inc.®
<b>NASA</b>	National Aeronautics and Space Administration	<b>OI</b>	Operational Improvement
<b>NASE</b>	NAS Adaptation Services Environment	<b>OM</b>	outer marker
<b>NASR</b>	National Airspace System Resource	<b>OMP</b>	O'Hare Modernization Plan
<b>NAVAID</b>	Navigational Aid	<b>OPD</b>	Optimized Profile Descent
<b>NCIME</b>	NAVAID Control, Interlock, and Monitoring Equipment	<b>Ops</b>	Operations
<b>NCV</b>	National Ceiling & Visibility	<b>ORD</b>	Chicago O'Hare International Airport
<b>NDB</b>	Non-directional Beacon	<b>OWS</b>	OGC Web Services
<b>NDS</b>	NOTAM Distribution Service	<b>PAM</b>	Path Arrival Management
<b>NEO</b>	Network Enabled Operations	<b>PAPI</b>	Precision Approach Path Indicator
<b>NextGen</b>	Next Generation Air Transportation System	<b>PIREPS</b>	Pilot Reports
<b>NEXRAD</b>	Next Generation Weather Radar	<b>PRM-R</b>	Precision Runway Monitor Replacement
<b>NG</b>	NextGen	<b>PRM-E/A</b>	Precision Runway Monitor Alternate and PRM Electronic Scan
<b>NLDN</b>	National Lightning Detection Network	<b>PRM-E-Scan</b>	Precision Runway Monitor Electronic Scan
<b>nmi</b>	Nautical Mile	<b>Qn</b>	Calendar Quarter n (n = 1-4)
		<b>R&amp;D</b>	Research & Development

# Appendix A, Acronym List (5 of 6)

Acronym	Definition	Acronym	Definition
<b>RAPT</b>	Route Availability Planning Tool	<b>SITA</b>	Société Internationale de Télécommunications Aéronautiques
<b>RCAG</b>	Remote Communications Air/Ground	<b>SITS</b>	Security Integrated Tool Set
<b>RCL</b>	Radio Communications Link	<b>SL</b>	STARS LITE
<b>RCLR</b>	RCL Repeater	<b>SLEP</b>	Service Life Extension Program
<b>RCLT</b>	RCL Terminal	<b>SMA</b>	Surface Movement Advisor
<b>RCO</b>	Remote Communications Outlet	<b>SNT</b>	Staffed NextGen Tower
<b>REIL</b>	Runway End Identifier Lights	<b>SSO</b>	Self-Sustained Outlet
<b>Rn</b>	Release n (n = 1, 2,...N)	<b>STARS</b>	Standard Terminal Automation Replacement System
<b>RNAV</b>	Area Navigation	<b>STL</b>	Lambert-St. Louis International Airport
<b>RNP</b>	Required Navigation Performance	<b>SUA</b>	Special Use Airspace
<b>RTA</b>	Required Time of Arrival	<b>SVS</b>	Synthetic Vision System
<b>RTR</b>	Remote Transmitter/Receiver	<b>S/W</b>	software
<b>RTT</b>	Research Transition Team (JPDO)	<b>SWIM</b>	System-Wide Information Management
<b>RVR</b>	Runway Visual Range	<b>TA</b>	Tailored Arrivals
<b>RWI</b>	Reduced Weather Impact	<b>TACR</b>	Tactical Air Navigation/VOR
<b>RWSL</b>	Runway Status Lights	<b>TAMR</b>	Terminal Automation Modernization and Replacement
<b>SACOM</b>	Satellite Communication Network	<b>TAWS</b>	Terrain Awareness and Warning System
<b>SAIDS</b>	Systems Atlanta Information Display System	<b>TBFM</b>	Time-Based Flow Management
<b>SAMS</b>	Special Use Airspace Management System	<b>TBM</b>	Time-Based Management
<b>SAR</b>	Search and Rescue	<b>TBO</b>	Trajectory-Based Operations
<b>SAS</b>	Single Authoritative Source	<b>TCAS</b>	Traffic Alert and Collision Avoidance System
<b>SAWS</b>	Standalone Weather Sensor	<b>TDDS</b>	Terminal Data Distribution System
<b>SBAS</b>	Satellite-Based Augmentation System	<b>TDLS</b>	Tower Data Link Services
<b>SBS</b>	Surveillance and Broadcast Services	<b>TDWR</b>	Terminal Doppler Weather Radar
<b>SDAT</b>	Sector Design and Analysis Tool	<b>TFDM</b>	Tower Flight Data Manager
<b>SDF</b>	Louisville International Airport	<b>TFDMn</b>	Tower Flight Data Manager Phase n (n = 1, 2,...N)
<b>SDS</b>	Safety Data System	<b>TFM</b>	Traffic Flow Management
<b>SE</b>	System Engineering	<b>TFMS</b>	Traffic Flow Management System
<b>Segmt.</b>	Segment	<b>TIS-B</b>	Traffic Information Service-Broadcast
<b>SID</b>	Standard Instrument Departure	<b>TMA</b>	Traffic Management Advisor

# Appendix A, Acronym List (6 of 6)

Acronym	Definition	Acronym	Definition
<p><b>TR</b>—Technology Refresh</p> <p><b>TRACON</b>—Terminal Radar Approach Control</p> <p><b>TSAFE</b>—Tactical Separation-Assisted Flight Environment (NASA)</p> <p><b>TSO</b>—Technical Standard Order (FAA)</p> <p><b>TWINDS</b>—Terminal Winds</p> <p><b>TWIP</b>—Terminal Weather Information for Pilots</p> <p><b>UAS</b>—Unmanned Aircraft System</p> <p><b>UAT</b>—Universal Access Transceiver</p> <p><b>URET</b>—User Request Evaluation Tool</p> <p><b>USNS</b>—United States NOTAM Service</p> <p><b>VASI</b>—Visual Approach Slope Indicator</p> <p><b>VHF/UHF/HF</b>—Very High Frequency/Ultra High Frequency/High Frequency</p> <p><b>VNAV</b>—Vertical Navigation</p> <p><b>VNTSC</b>—Volpe National Transportation Systems Center</p> <p><b>VOR</b>—VHF Omnidirectional Range</p> <p><b>VOT</b>—VOR Omnidirectional range Test</p> <p><b>VSCS</b>—Voice Switching and Control System (ARTCC)</p> <p><b>WAAS</b>—Wide-Area Augmentation System</p> <p><b>WARP</b>—Weather and Radar Processor</p>		<p><b>WATRS</b>—West Atlantic Route System</p> <p><b>WEP</b>—Wired Equivalent Privacy</p> <p><b>WestCar</b>—Western Caribbean</p> <p><b>WIN</b>—Weather Information Network</p> <p><b>WINS</b>—Weather Information Network Server</p> <p><b>WJHTC</b>—William J. Hughes Technical Center (FAA)</p> <p><b>WM/LAT</b>—Wide area multi-lateration</p> <p><b>WME</b>—Wind Measurement Equipment</p> <p><b>WMS</b>—Wide-area Master Station</p> <p><b>WMSCR</b>—Weather Message Switching Center Replacement</p> <p><b>WP</b>—Work Package</p> <p><b>WPn</b>—Work Package n (n = 1, 2, ...N)</p> <p><b>WRS</b>—wide-area reference station</p> <p><b>WSP</b>—Weather System Processor</p> <p><b>WT</b>—Wake Turbulence</p> <p><b>WTMA</b>—Wake Turbulence Mitigation for Arrival</p> <p><b>WTMD</b>—Wake Turbulence Mitigation for Departure</p> <p><b>WTMSR</b>—Wake Turbulence Mitigation Single Runway</p> <p><b>Wx</b>—Weather</p> <p><b>ZON</b>—FAA Resource Planning Document Code</p>	