

NAS Enterprise Architecture

Infrastructure Roadmaps v18.0



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Infrastructure Roadmap Overview

What are the Infrastructure Roadmaps?

- The FAA Infrastructure Roadmaps show the progression of system deployments, investments, and key decision points for major NAS acquisitions. They depict the acquisition strategy to evolve the NAS from the As-Is to the To-Be environment.
- The Infrastructure Roadmaps show all Capital Investment Plan (CIP) investment projects and systems identified in the NSIP that will deliver the necessary functionality to enable OIs and BTIs.

Guidelines for Understanding the Roadmaps

- The Infrastructure Roadmaps are organized by Domain (Automation, Communication, etc.) and depict projects, systems, services, decision points, and support activities.
- The timeline is in calendar years and shows a 15-year outlook.
- The roadmaps have swim lanes for Infrastructure (white) and Support Activities (green).
- The DP diamonds represent the quarter in which a decision will occur.
- The Support Activity bars represent the dates that work is being performed on the activity.
- The Project bars represent the dates that CIP funding is allocated to a project.
- The System and Service bars represent the dates that a system or service is operational, with red lines indicating sustainment, drawdown, or convergence

Infrastructure Roadmap Legend

Roadmap Shapes Information

2023 2024 2025 Timeline (Calendar Year)	X Decommission
XYZ System / Service / Support Activity	→ System Successor
XYZ Project	- - - → System in Draw-Down Mode
XYZ NextGen Project (Denoted by G CIP Number)	XYZ Support Activity which is primarily tracked on this Infrastructure Roadmap
XYZ Other Architecture Object	XYZ Support Activity which is primarily tracked on another NAS EA Roadmap
XYZ Facility Type	XYZ Planned Support Activity
XYZ Planned / Unfunded (Applies to any fill color type)	

Decision Point Shapes Information

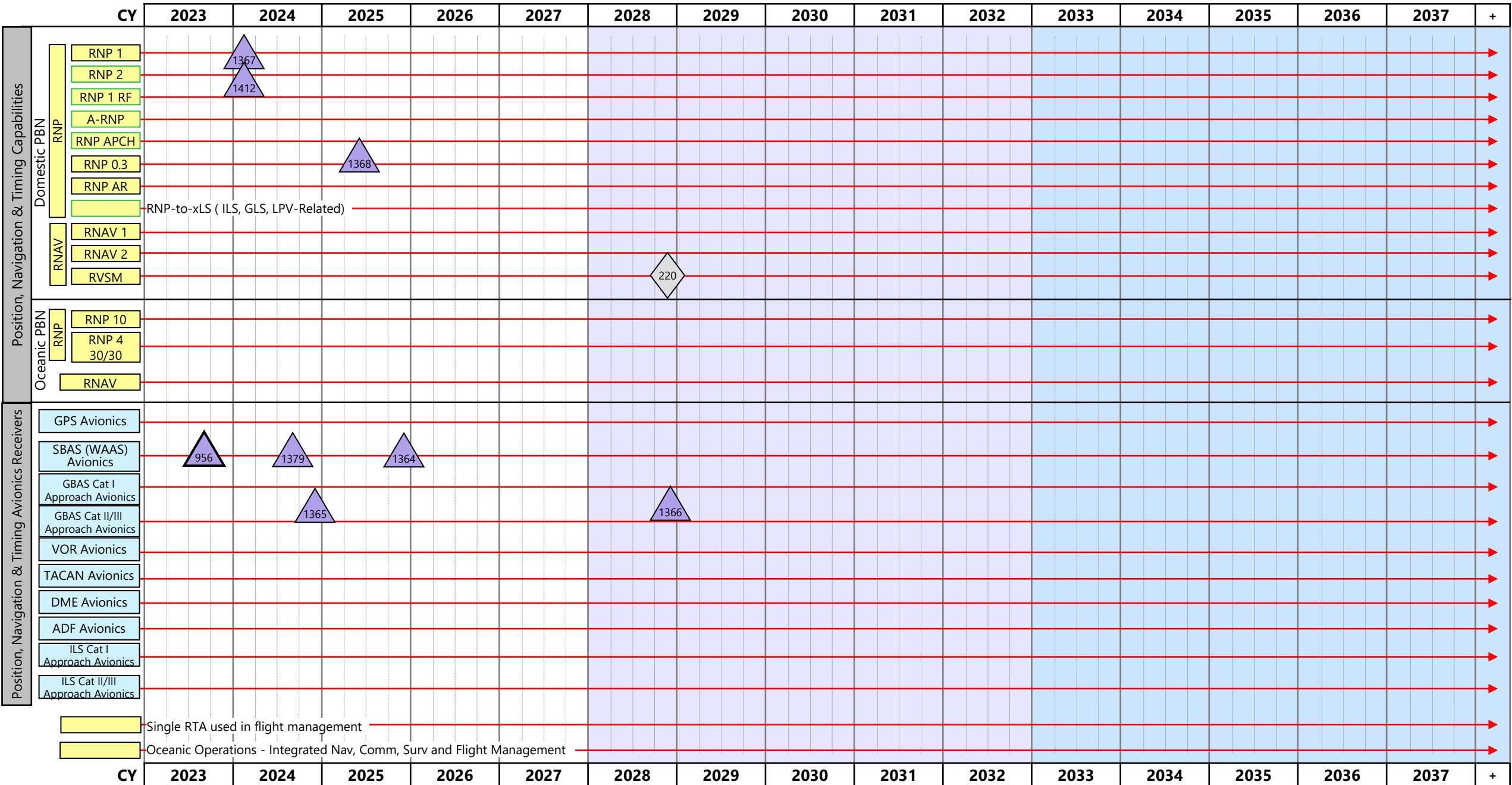
Decision Point Fill Colors	
	AMS Decision Point (CRDR, IARD, IID, FID, BCD)
	Strategy (JRC)
	Strategy (Other)
	Policy Milestone
	Owned by Another Roadmap
	Regulatory Milestone
	Milestone Number
Decision Point Border Styles/Colors	
	Future Baselined
	Completed
	Planned / Unfunded
	High Priority

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Aircraft

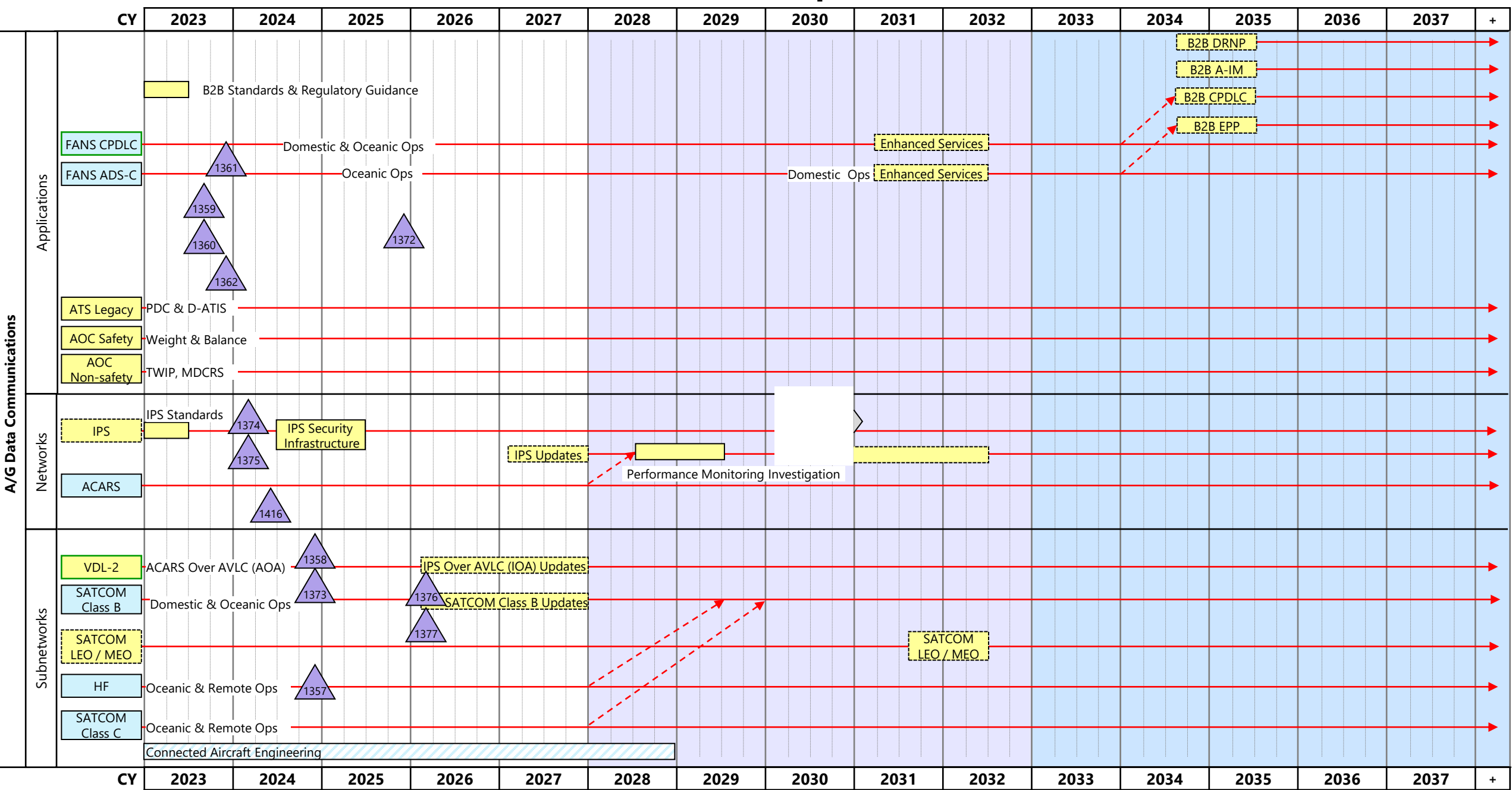
The Aircraft roadmap presents planned advances in Airframe and Avionics in coordination with NAS NextGen improvements.

Aircraft Roadmap (1 of 5)



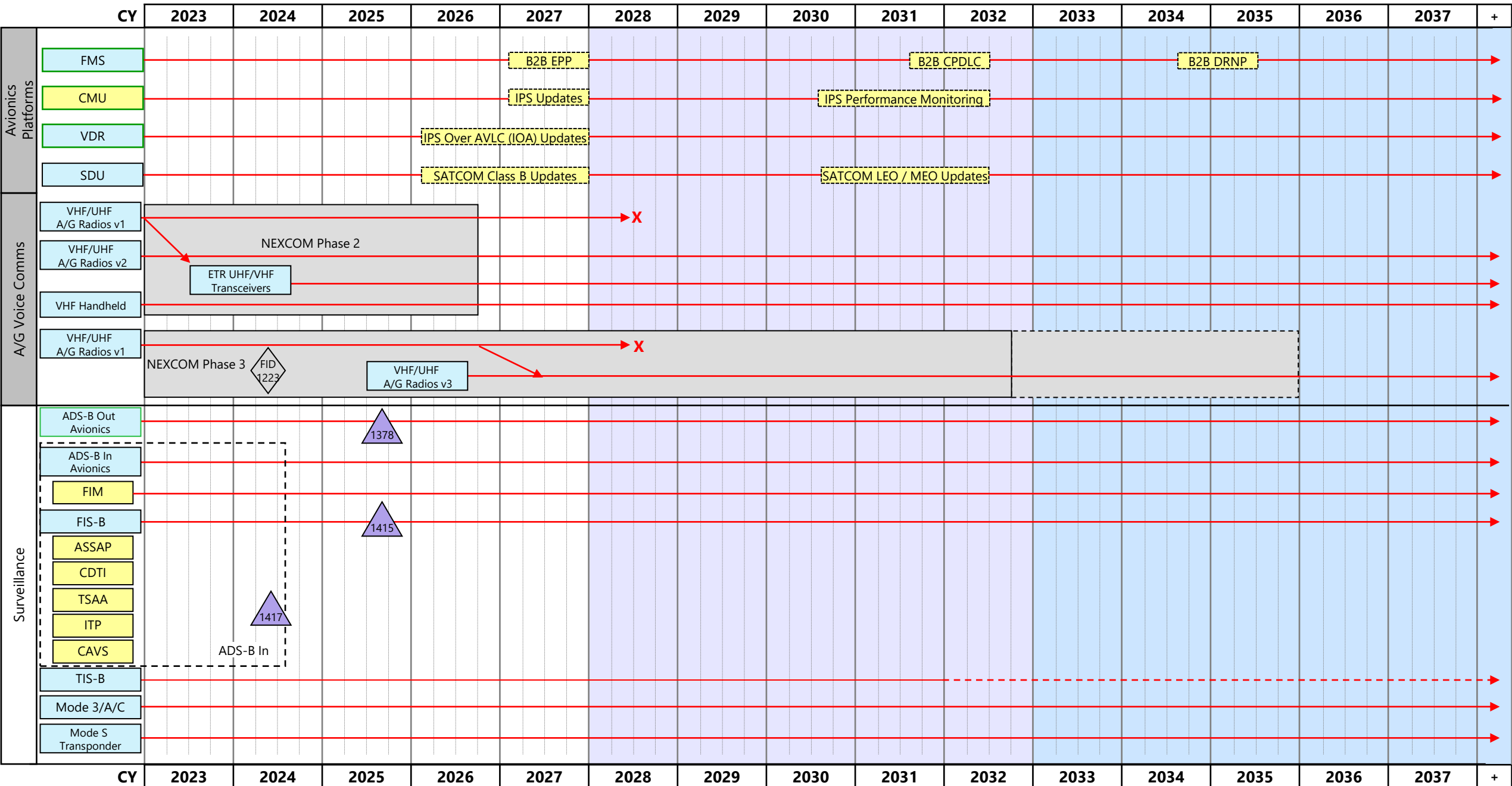
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Aircraft Roadmap (2 of 5)

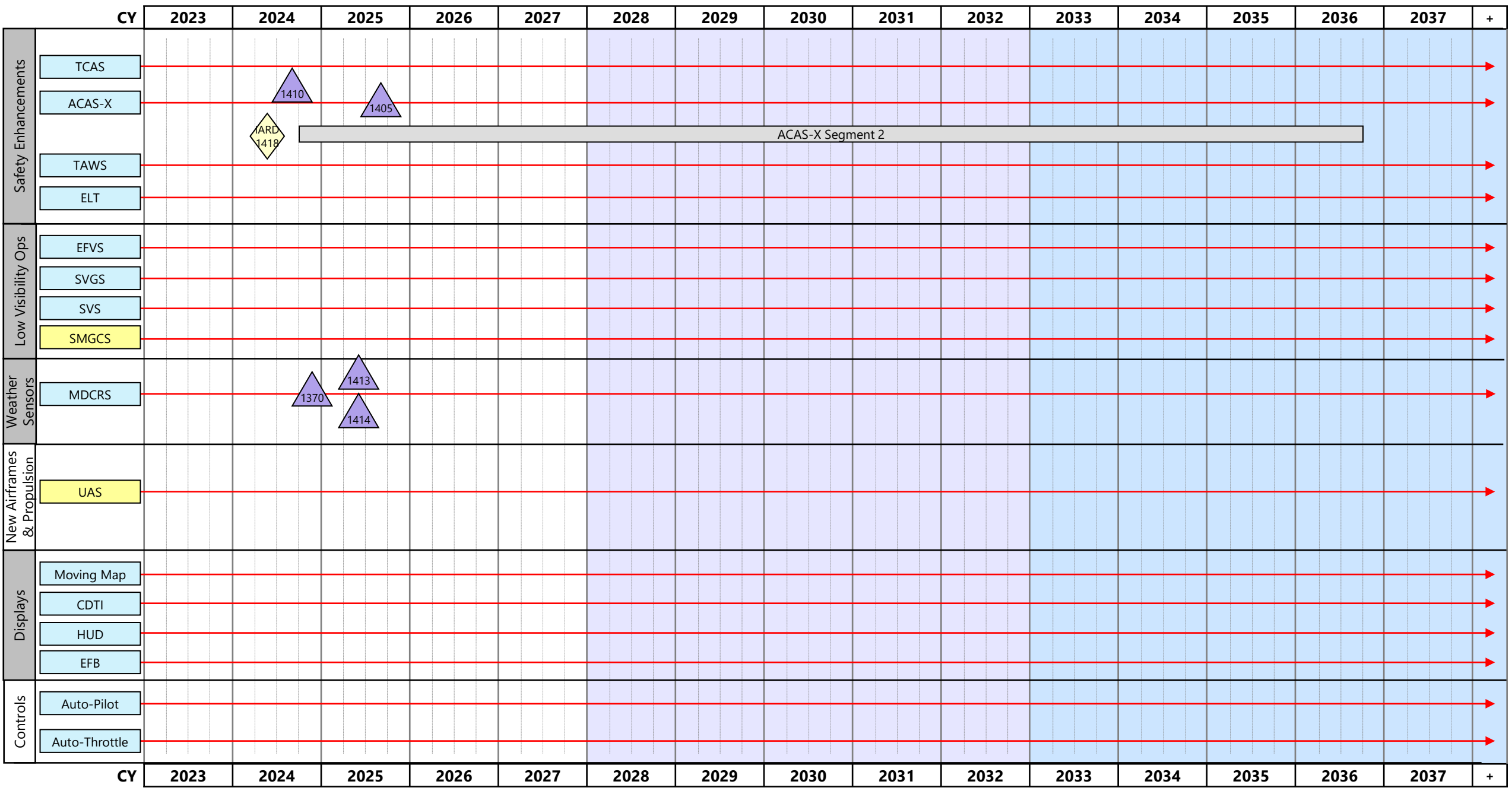


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Aircraft Roadmap (3 of 5)

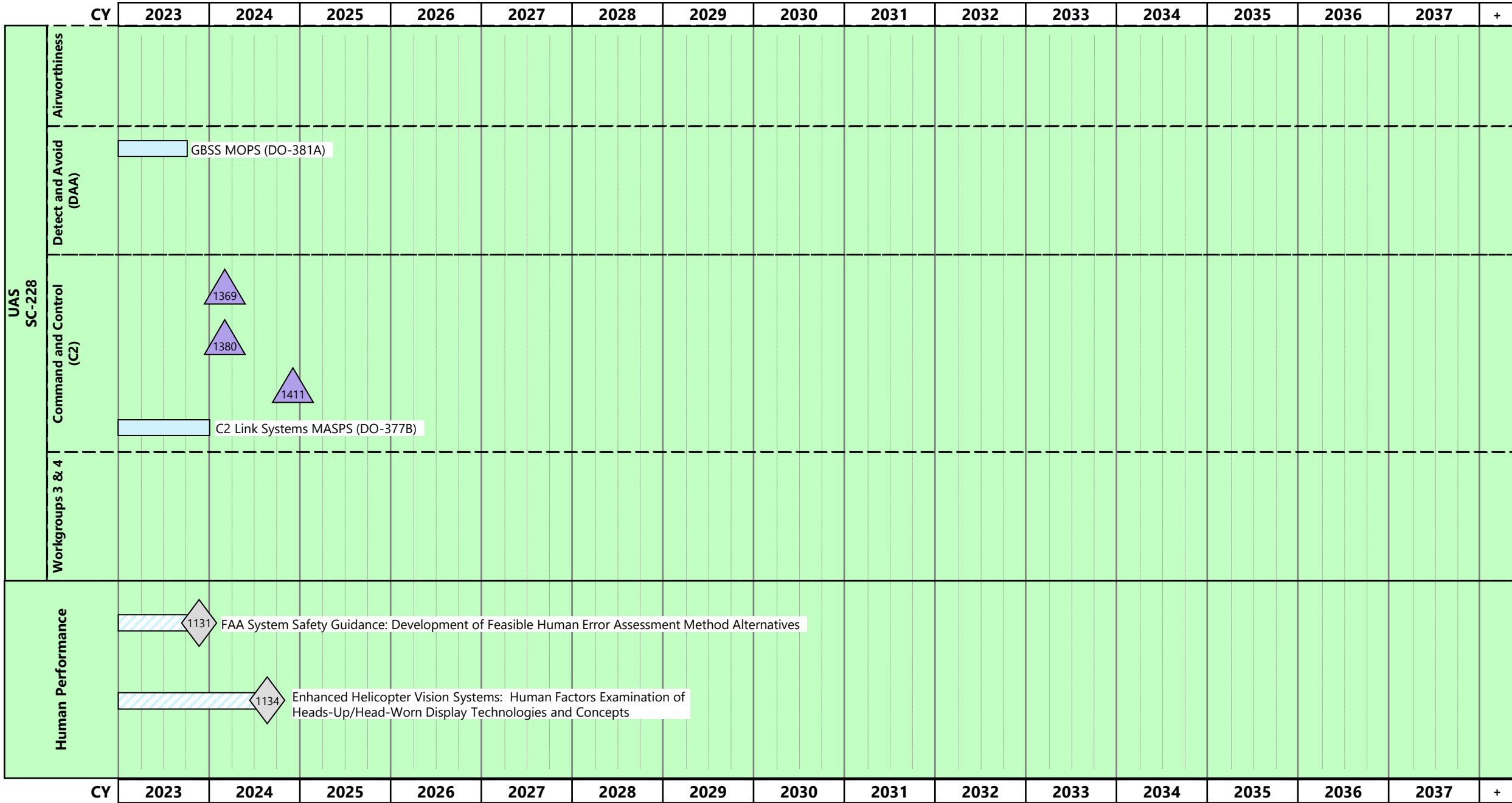


Aircraft Roadmap (4 of 5)



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Aircraft Roadmap (5 of 5)



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Aircraft Roadmap: Assumptions

Identifier	Description
AC-01	<p>The roadmap identifies four phases</p> <ol style="list-style-type: none"> a) CONOPs development and R&D in required areas b) Standards development c) AVS Approval d) ATC Procedure development 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 <ol style="list-style-type: none"> 1. Different aircraft are expected to equip with different equipment. This roadmap does not currently distinguish between aircraft types.
AC-02	The aircraft roadmap includes environment research areas and assumptions and linkage to Mission Support EA.
AC-03	Any aircraft to include any UAS that participates in the NAS must operate in a way that is transparent to the ANSP and ATSP.
AC-04	The Minimum Capability (MCL) items documented in the Aircraft roadmap are accurate as of the September 2019 draft of the MCL.
AC-05	<p>The Minimum Capabilities List (MCL) provides clear and comprehensive guidance to support equipage across all fleets operating in the National Airspace System (NAS). The MCL's purpose is to:</p> <ul style="list-style-type: none"> • Define the minimum aircraft capabilities and associated equipment needed to maximize benefits from FAA investment and operational improvements • Guide "forward-fit" aircraft equipage and inform operator investment decisions • Maximize the return on investment for both the FAA and airspace users
AC-06	The yellow roadmap symbol is being utilized as aircraft operational capabilities on this roadmap.

Aircraft Roadmap: Decision Points

DP #	Target Date CY	Primary Domain	Type	Name
220	2028 Q4	Navigation	Strategy (Other)	Decision to cut over to Dual Frequency IOC Operations
956	2023 Q3	Aircraft	Other Milestone	Publication of SBAS Dual-Frequency\Multi-Constellation (DFMC) MOPS
1131	2023 Q4	Human Systems Integration	Strategy (Other)	Decision on the Approval and Implementation Strategy of Human Factors System Safety Guidance
1134	2024 Q3	Human Systems Integration	Strategy (Other)	Decision on the Approval and Implementation Strategy of Human Factors Guidance for Helicopter Advanced Vision Systems
1357	2024 Q4	Aircraft	Other Milestone	DO-224E Signal-in-Space MASPS for Advanced VHF Digital Data Comm
1358	2024 Q4	Aircraft	Other Milestone	DO-281D MOPS for Aircraft VDL Mode 2
1359	2023 Q3	Aircraft	Other Milestone	DO-350B, Safety and Performance Requirements Standard for ATS Data Communications (SPR Standard)
1360	2023 Q3	Aircraft	Other Milestone	DO-351B, Interoperability Standard for Baseline 2 ATS Data Communications (Baseline 2 Interop Standard)
1361	2023 Q4	Aircraft	Other Milestone	DO-352B, Interoperability Standard for Baseline 2 ATS Data Communications, FANS 1/A Accommodation (FANS 1/A - Baseline 2 Interop Standard)
1362	2023 Q4	Aircraft	Other Milestone	DO-353B, Interoperability Standard for Baseline 2 ATS Data Communications, ATN Baseline 1 Accommodation (ATN Baseline 1 - Baseline 2 Interop Standard)
1364	2025 Q4	Aircraft	Other Milestone	GNSS (SBAS) L1/L5 MOPS Update to GPS/Galileo/SBAS MOPS for dual-frequency equipment
1365	2024 Q4	Aircraft	Other Milestone	GNSS (GBAS) L1/L5 MOPS and ICD Initial MOPS and ICD for Verification and Validation
1366	2028 Q4	Aircraft	Other Milestone	GNSS (GBAS) L1/L5 MOPS and ICD Validated GPS/Galileo/GBAS MOPS and ICD for dual-frequency equipment
1367	2024 Q1	Aircraft	Other Milestone	MOPS DO-283C
1368	2025 Q2	Aircraft	Other Milestone	MOPS DO-257C
1369	2024 Q1	Aircraft	Other Milestone	C2 Link MOPS for Cellular Networks
1370	2024 Q4	Aircraft	Other Milestone	DO-364A / ED-XXX Minimum Aviation System Performance Standards (MASPS) for Aeronautical Information / Meteorological Data Link Services
1372	2025 Q4	Aircraft	Other Milestone	DO-XXX, ATS Data Communication Verification Test Standard
1373	2024 Q4	Aircraft	Other Milestone	DO-383A, Guidance on VDL Mode 2 Air/Ground Interoperability
1374	2024 Q1	Aircraft	Other Milestone	DO-343E MASPS – Inmarsat SBB and Iridium Certus Updates
1375	2024 Q1	Aircraft	Other Milestone	DO-262G MOPS - Inmarsat SBB and Iridium Certus Updates
1376	2026 Q1	Aircraft	Other Milestone	DO-343F MASPS – Iridium Certus updates for network update
1377	2026 Q1	Aircraft	Other Milestone	DO-262H MOPS – Iridium Certus updates for network update
1378	2025 Q3	Aircraft	Other Milestone	Minimal Operational Performance Standards (MOPS) for Active Surveillance Systems
1379	2024 Q3	Aircraft	Other Milestone	White Paper on BeiDou System and BeiDou SBAS

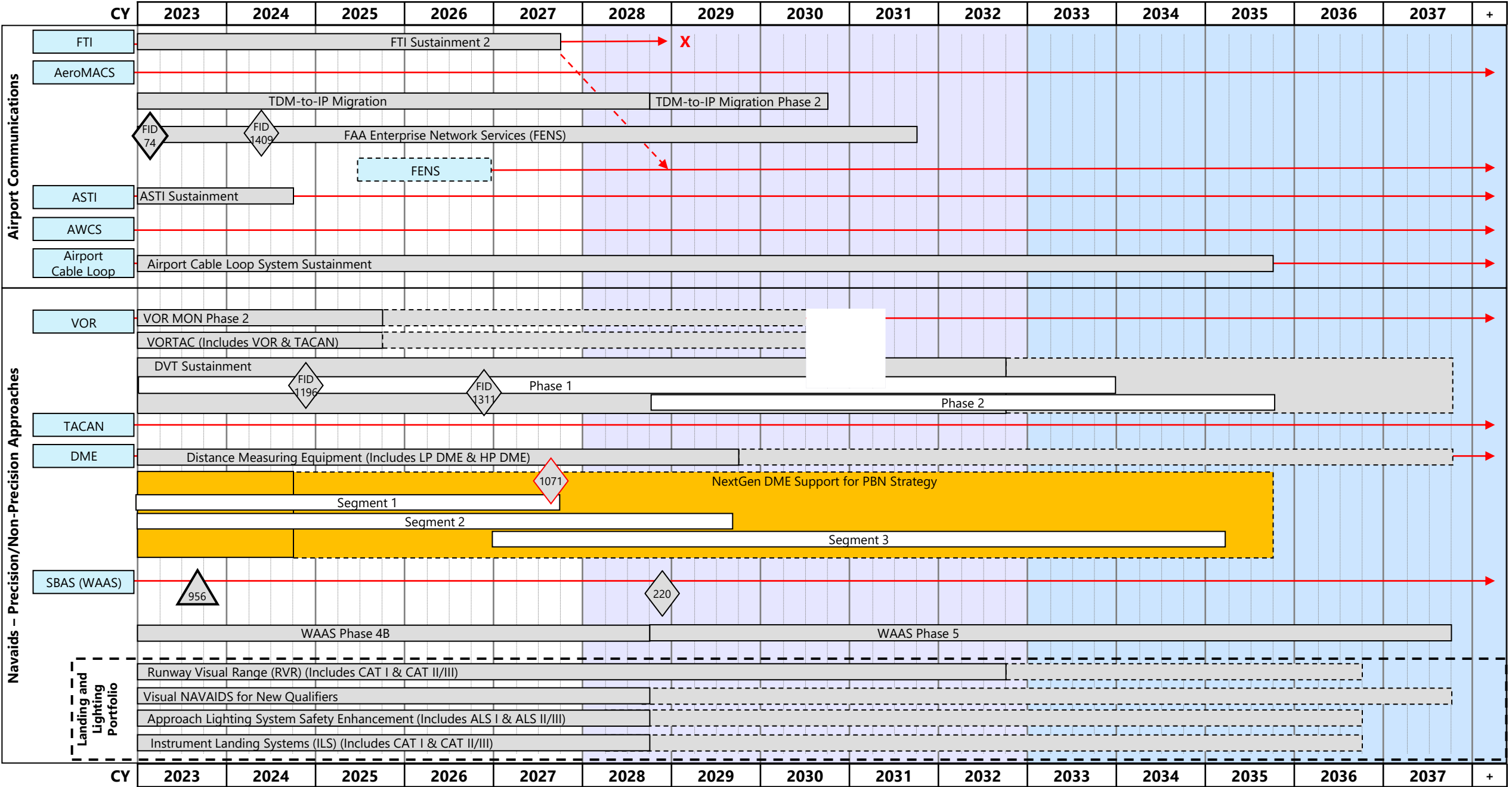
Aircraft Roadmap: Decision Points

DP #	Target Date CY	Primary Domain	Type	Name
1380	2024 Q1	Aircraft	Other Milestone	UHF Band C2 Link System MOPS (DO-XXX)
1405	2025 Q3	Aircraft	Other Milestone	Minimal Operational Performance Standards (MOPS) for ACAS Xr
1410	2024 Q3	Aircraft	Other Milestone	DO-385/ED-256
1411	2024 Q4	Aircraft	Other Milestone	C2 Link MOPS (Terrestrial) (DO-362B)
1412	2024 Q1	Aircraft	Other Milestone	MASP DO-236E
1413	2025 Q2	Aircraft	Other Milestone	DO-XXX / ED-XXX Minimum Aviation System Performance Standards (MASPS) for Automated Atmospheric Turbulence Derivation Techniques
1414	2025 Q2	Aircraft	Other Milestone	RTCA Report - Recommendation(s) Regarding Possible Standards to Support Aircraft-Based Meteorological Observation Dependent Applications
1415	2025 Q3	Aircraft	Other Milestone	DO-358C Minimum Operational Performance Standards (MOPS) for Flight Information Services Broadcast (FIS B) with Universal Access Transceiver (UAT)
1416	2024 Q2	Aircraft	Other Milestone	DO-280B Interoperability Requirements Standard for Aeronautical Telecommunication Network Baseline 1 (ATN B1 Interop Standard) Change 2
1417	2024 Q2	Aircraft	Other Milestone	Change 1 to DO-317C, Aircraft Surveillance Applications (ASA) MOPS
1418	2024 Q2	Aircraft	IARD	Investment Analysis Readiness Decision (IARD) for ACAS-X Segment 2

Airport

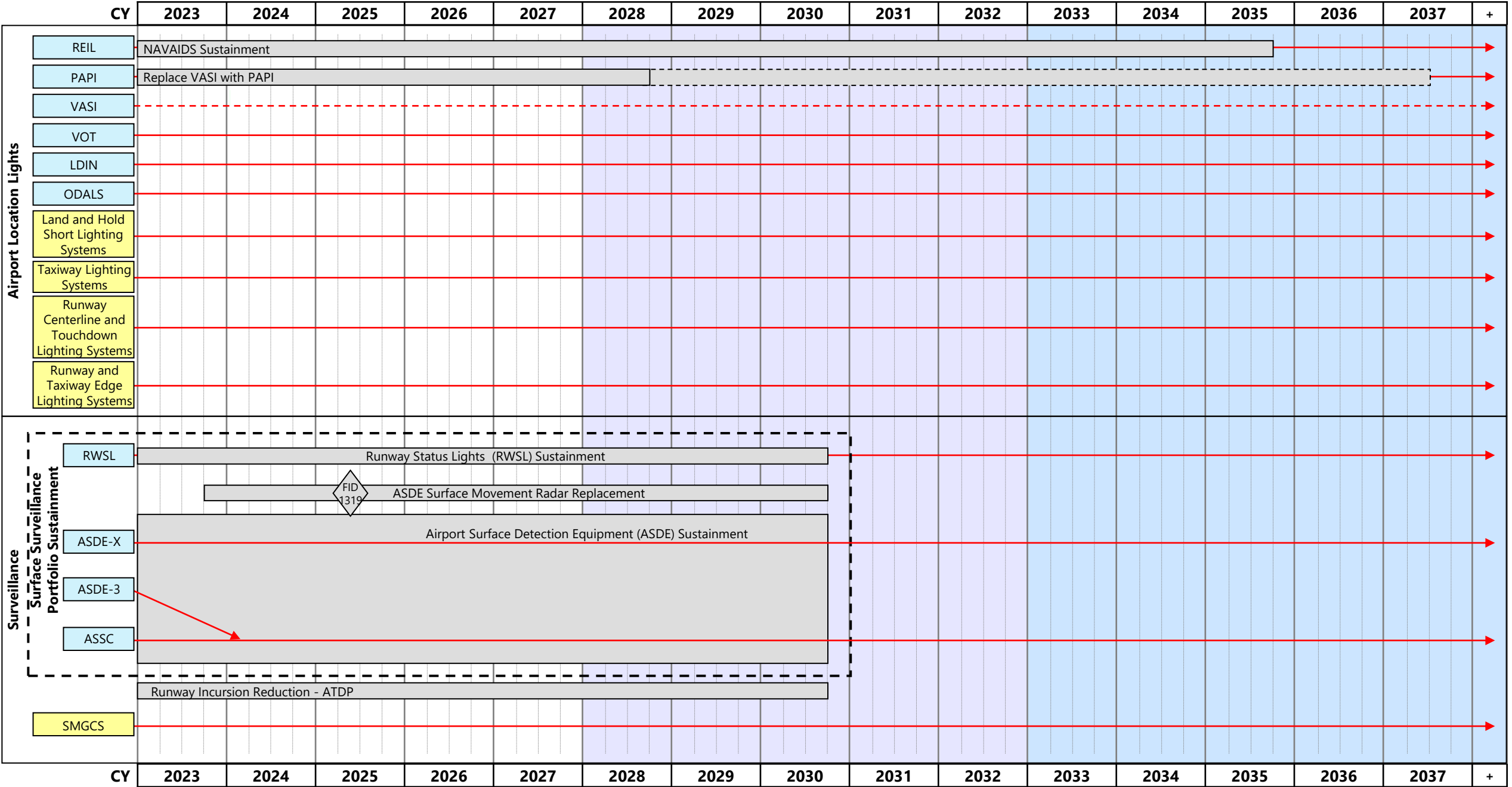
The Airport Roadmap identifies NextGen progression of services, procedures and systems in the airport environment.

Airport Roadmap (1 of 5)



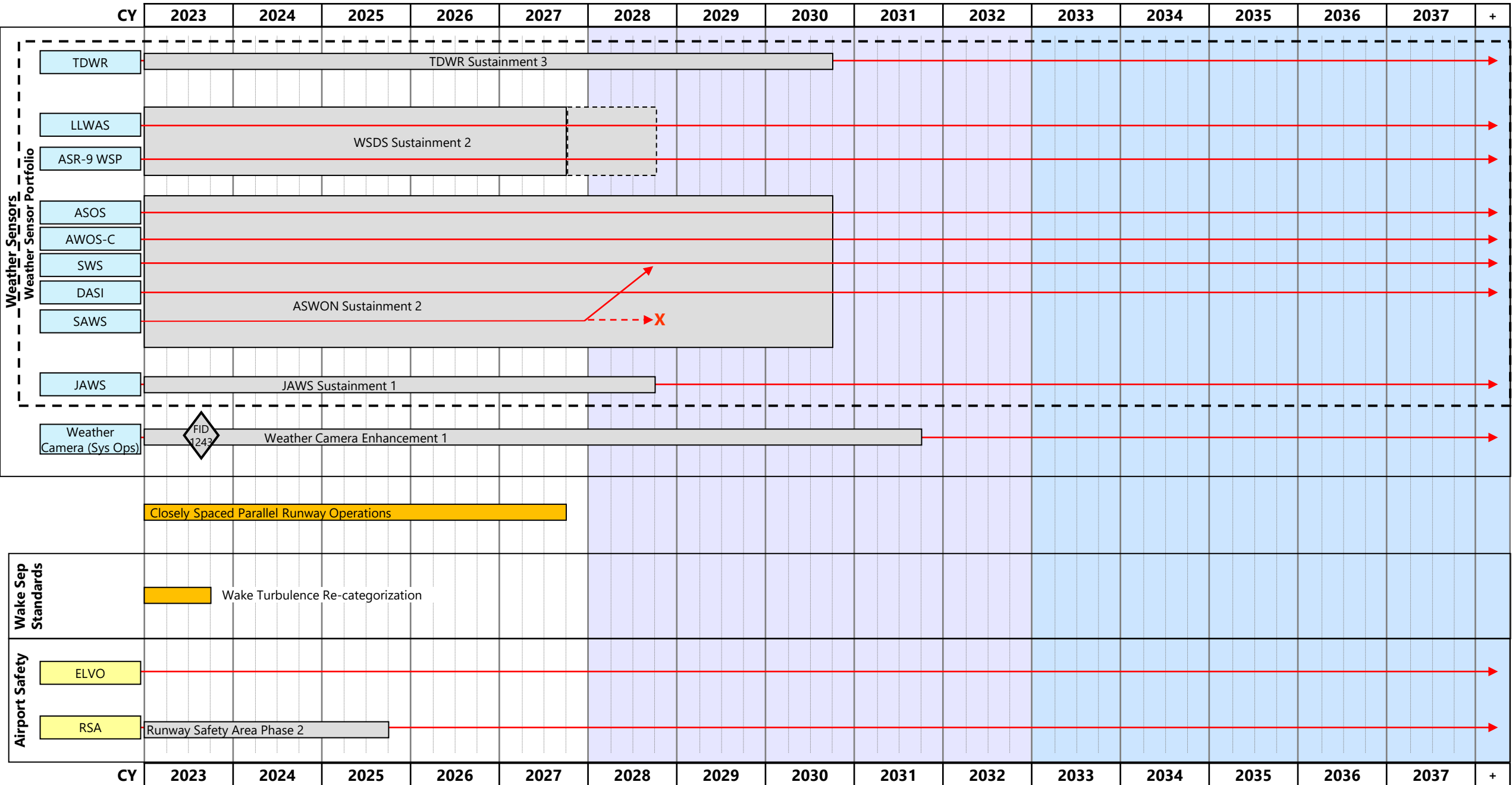
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Airport Roadmap (2 of 5)



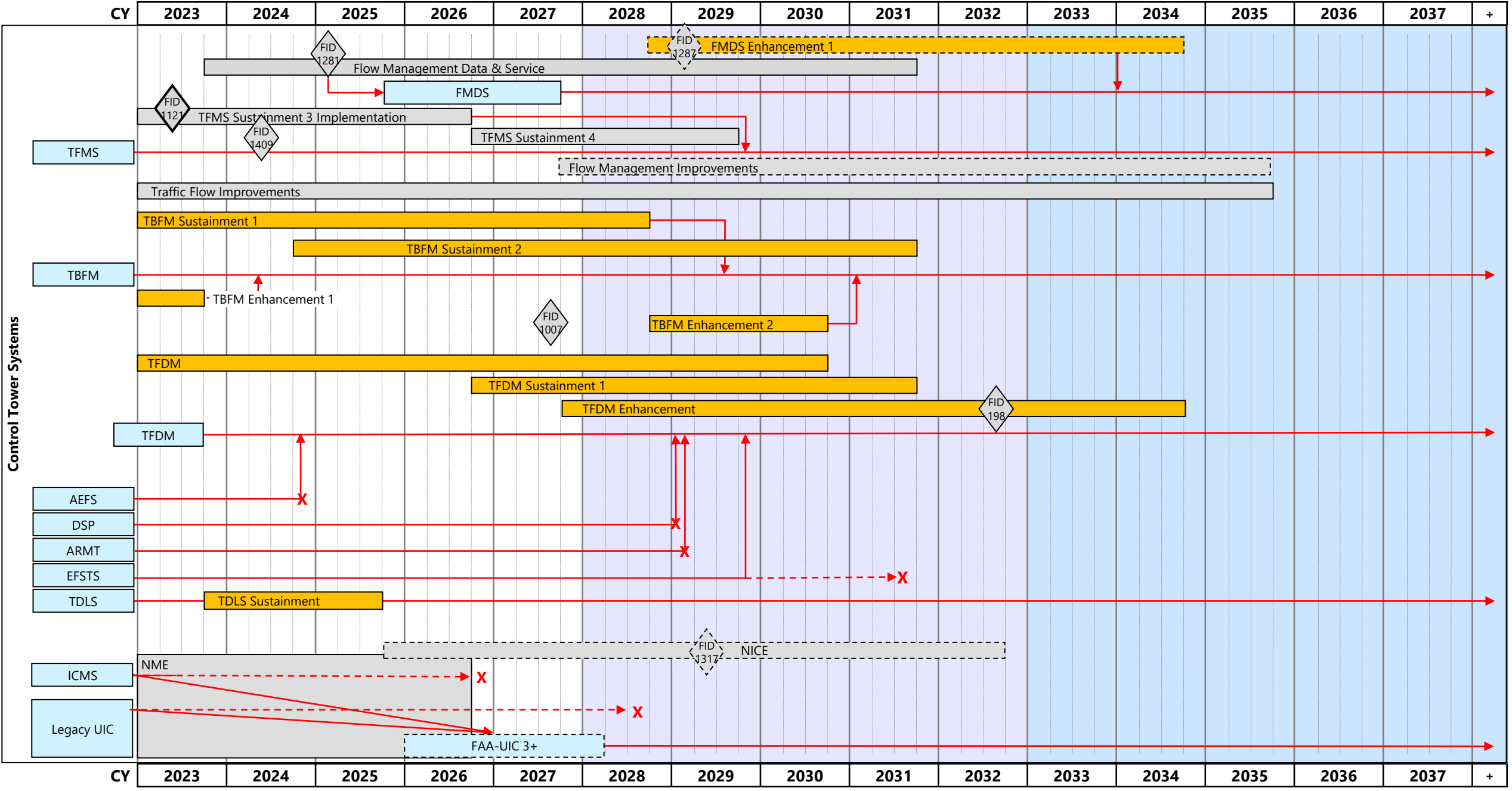
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Airport Roadmap (3 of 5)



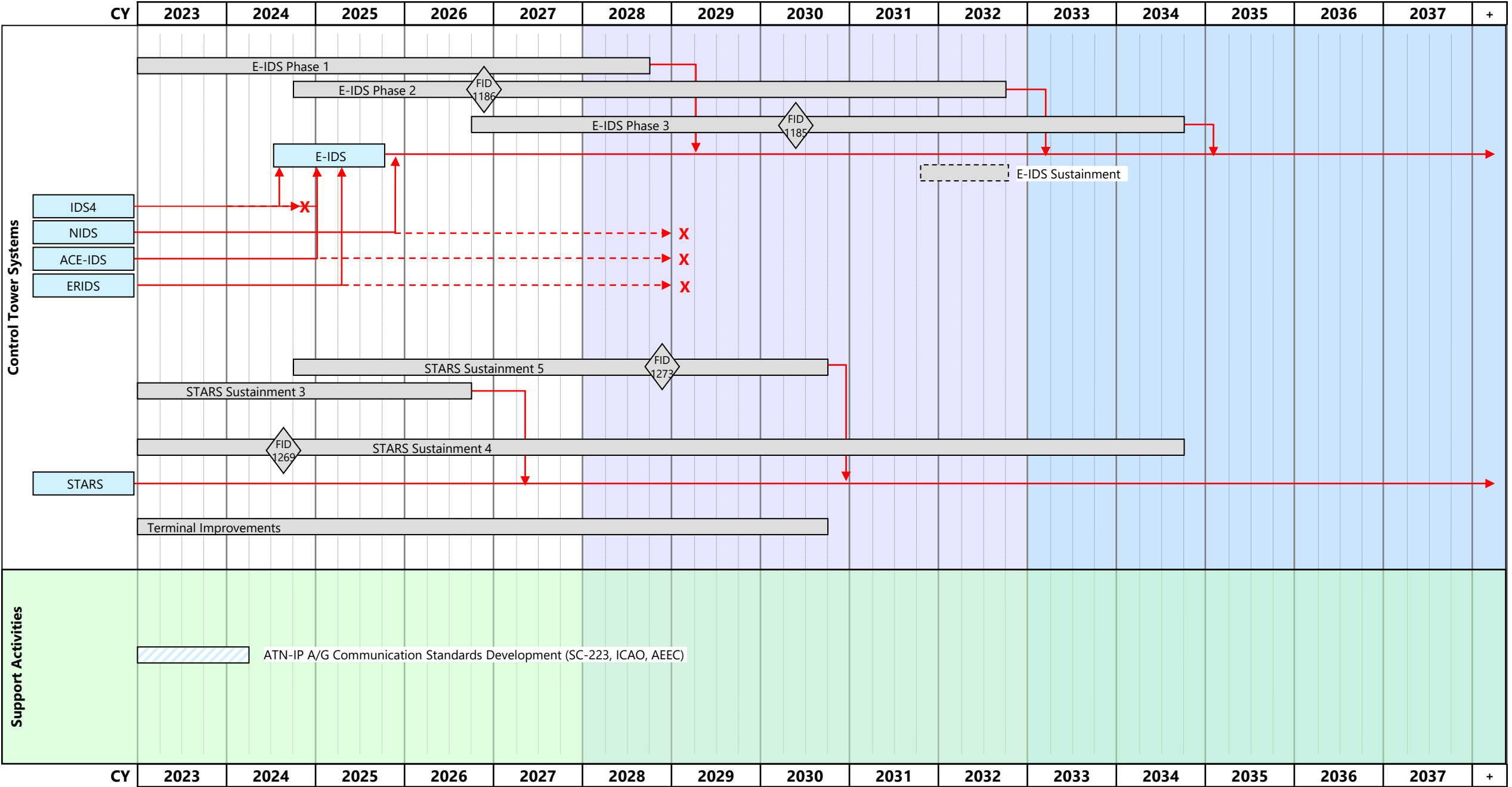
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Airport Roadmap (4 of 5)



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Airport Roadmap (5 of 5)



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Airport Roadmap: Assumptions

Identifier	Description
APT-01	The Airports roadmap will focus on systems and services operating and being performed airside at medium/large Airports and does not include functions/infrastructure internal to the Airport (i.e., security, ground transportation, or baggage handling, etc.).
APT-02	This roadmap is used to provide an evolutionary overview of medium to large Airports and does not convey infrastructure or service implementation specific to an Airport.
APT-04	Majority of this roadmap's content has been pulled from other roadmaps (i.e., Comm, Surveillance, Weather, etc.) if it is in support of Airport Airside Operations.
APT-07	Although there are Non-Fed Navigational Aids (NAVAIDS) and facilities located as some Airports, they may not be depicted fully on the Airports Infrastructure Roadmap.
APT-08	All FTI sub-systems will be assumed by FENS once the TDM-to-IP migration is complete.

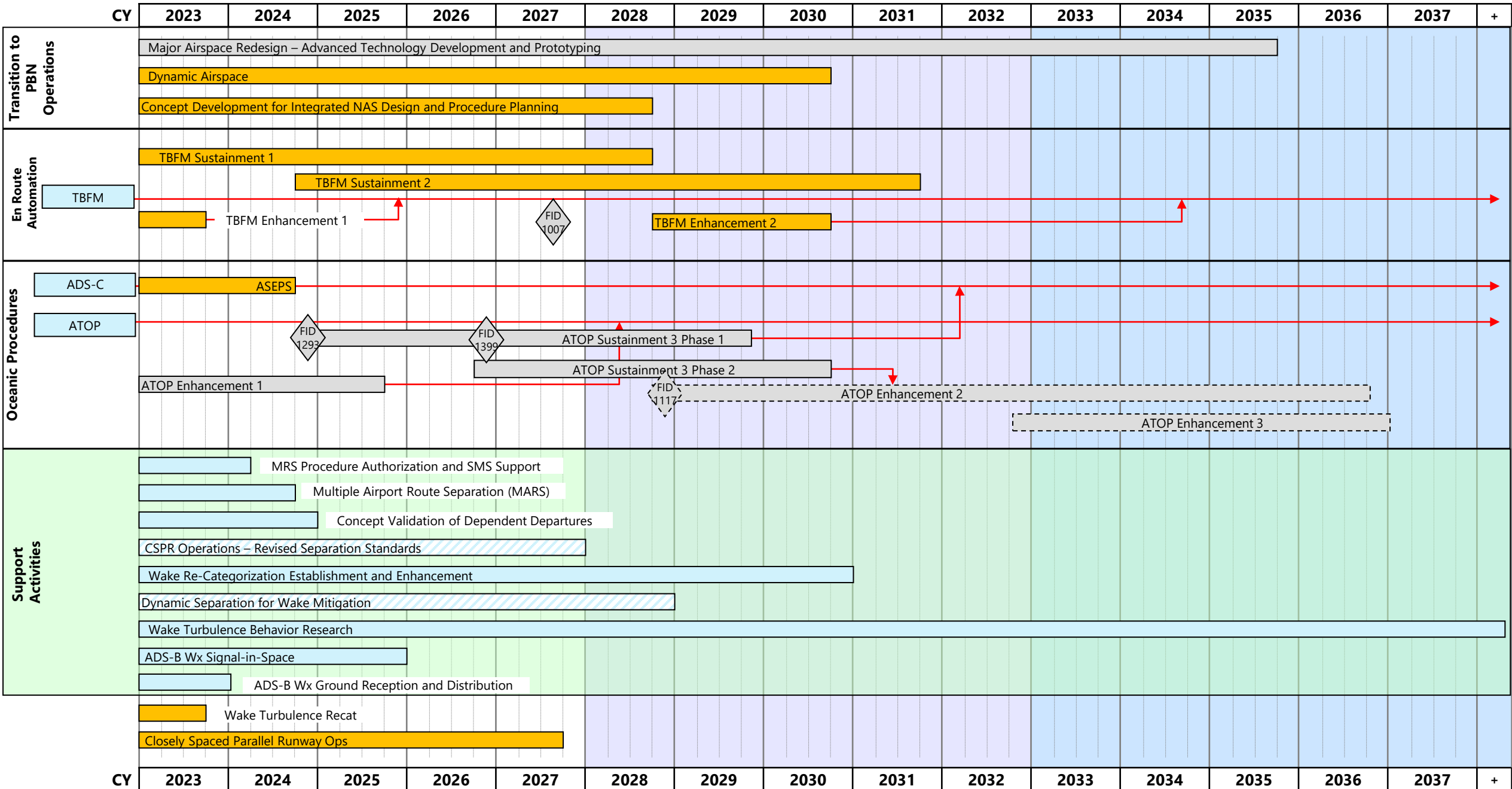
Airport Roadmap: Decision Points (1 of 1)

DP #	Target Date CY	Primary Domain	Type	Name
74	2023 Q1	Communication	FID	Final Investment Decision (FID) for FAA Enterprise Network Services (FENS)
198	2032 Q3	Automation	FID	Final Investment Decision (FID) for TFDM Enhancement
220	2028 Q4	Navigation	Strategy (Other)	Decision to cut over to Dual Frequency IOC Operations
956	2023 Q3	Aircraft	Other Milestone	Publication of SBAS Dual-Frequency\Multi-Constellation (DFMC) MOPS
1007	2027 Q3	Automation	FID	Final Investment Decision (FID) for TBFM Enhancement 2
1071	2027 Q3	Navigation	Strategy	Strategy Decision to determine Next Steps for NextGen DME in support of the PBN Strategy
1121	2023 Q2	Automation	FID	Final Investment Decision (FID) for TFMS Sustainment 3
1185	2030 Q2	Automation	FID	Final Investment Decision (FID) for E-IDS Phase 3
1186	2026 Q4	Automation	FID	Final Investment Decision (FID) for E-IDS Phase 2
1196	2024 Q4	Navigation	FID	Final Investment Decision for DVT Sustainment Program Phase 1
1243	2023 Q3	Weather	FID	Final Investment Decision (FID) for Weather Camera Enhancement 1
1269	2024 Q3	Automation	FID	Final Investment Decision (FID) for STARS Sustainment 4
1273	2028 Q4	Automation	FID	Final Investment Decision (FID) for STARS Sustainment 5
1281	2025 Q1	Automation	FID	Final Investment Decision (FID) for Flow Management Data and Services
1287	2029 Q1	Automation	FID	Final Investment Decision (FID) for Flow Management Data and Service (FMDS) Enhancement 1
1311	2026 Q4	Navigation	FID	Final Investment Decision (FID) for DVT Sustainment Program Phase 2
1317	2029 Q2	Navigation	FID	Final Investment Decision (FID) for Nav aids Interface-Connect Equipment (NICE)
1319	2025 Q2	Surveillance	FID	Final Investment Decision (FID) for ASDE-3 Surface Movement Radar (SMR) Replacement
1409	2024 Q2	Communication	FID	Final Investment Decision for FAA Enterprise Network Services (FENS)

Airspace and Procedures

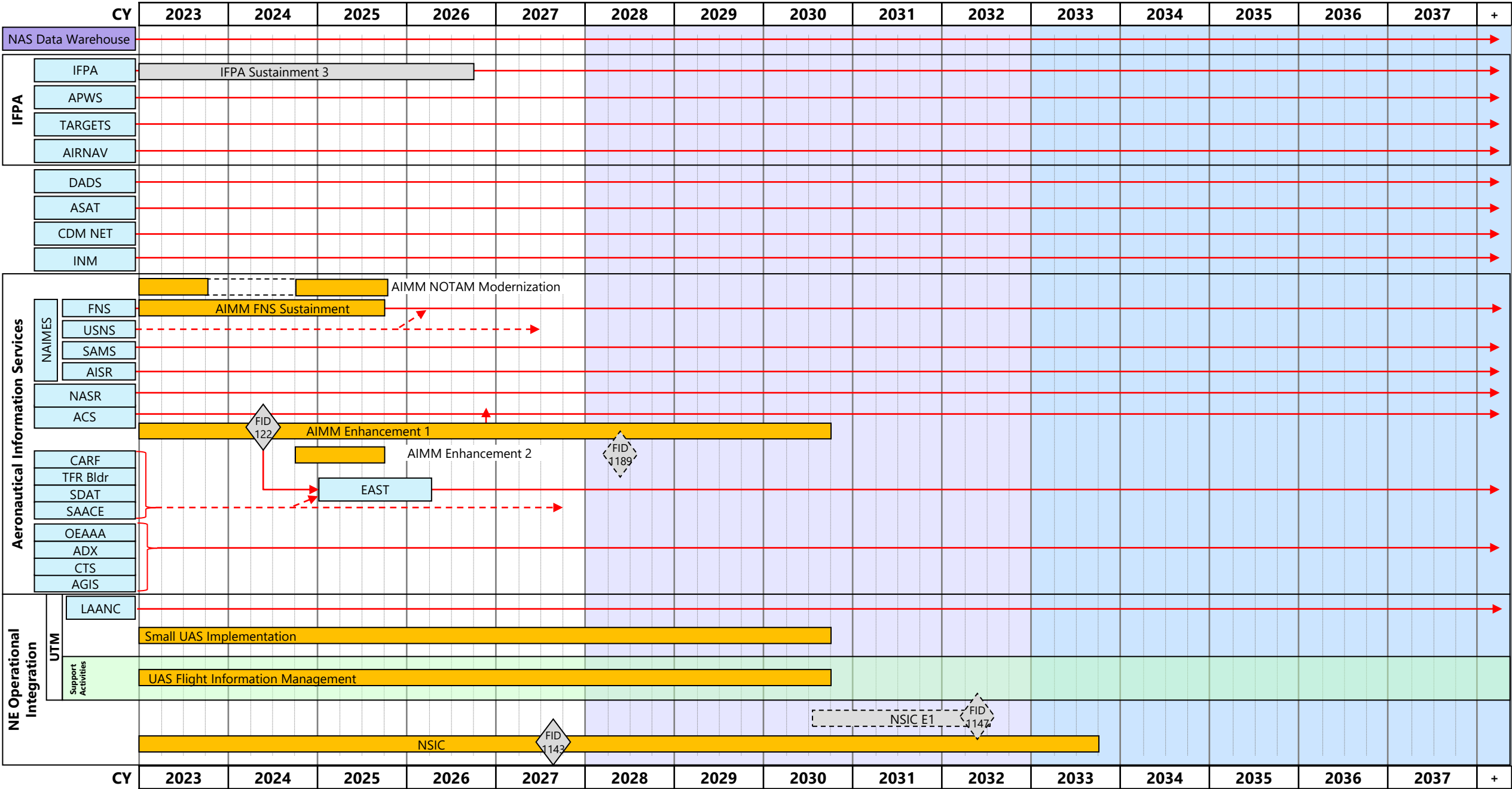
The Airspace and Procedures roadmap presents an Executive View (EV) of systems and procedures, including associated research projects, with an effect on the large-scale redesign and optimization of major airspace.

Airspace and Procedures Roadmap (1 of 2)



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Airspace and Procedures Roadmap (2 of 2)



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Airspace & Procedures Roadmap: Assumptions

Identifier	Description
A&P-01	<p>Integrated Arrival/Departure Airspace Assumptions</p> <ul style="list-style-type: none">a) Key Integrated Arrival/Departure Airspace enablers:<ul style="list-style-type: none">1. Extension of 3 Mile Separation & Terminal Procedures2. Integrated arrival/departure airspace configurations3. Flexible sector & bi-directional routes published4. 5 mile lateral spacing for Required Navigation Performance (RNP) enables 5 mile lateral route spacing5. New voice system (NAS Voice System), leased circuits, and Air-Ground communications channels to handle transition6. Cost benefits are based on creating X Integrated Arrival/Departure (Big Airspace) facilities, covering X major metropolitan areasb) Cost analysis based on general assumptions about the concept, not on any detailed requirements or technical solutionsc) Benefits analysis based on extrapolating results from FT simulations to other sites given traffic forecasts and historical weather patternsd) 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.

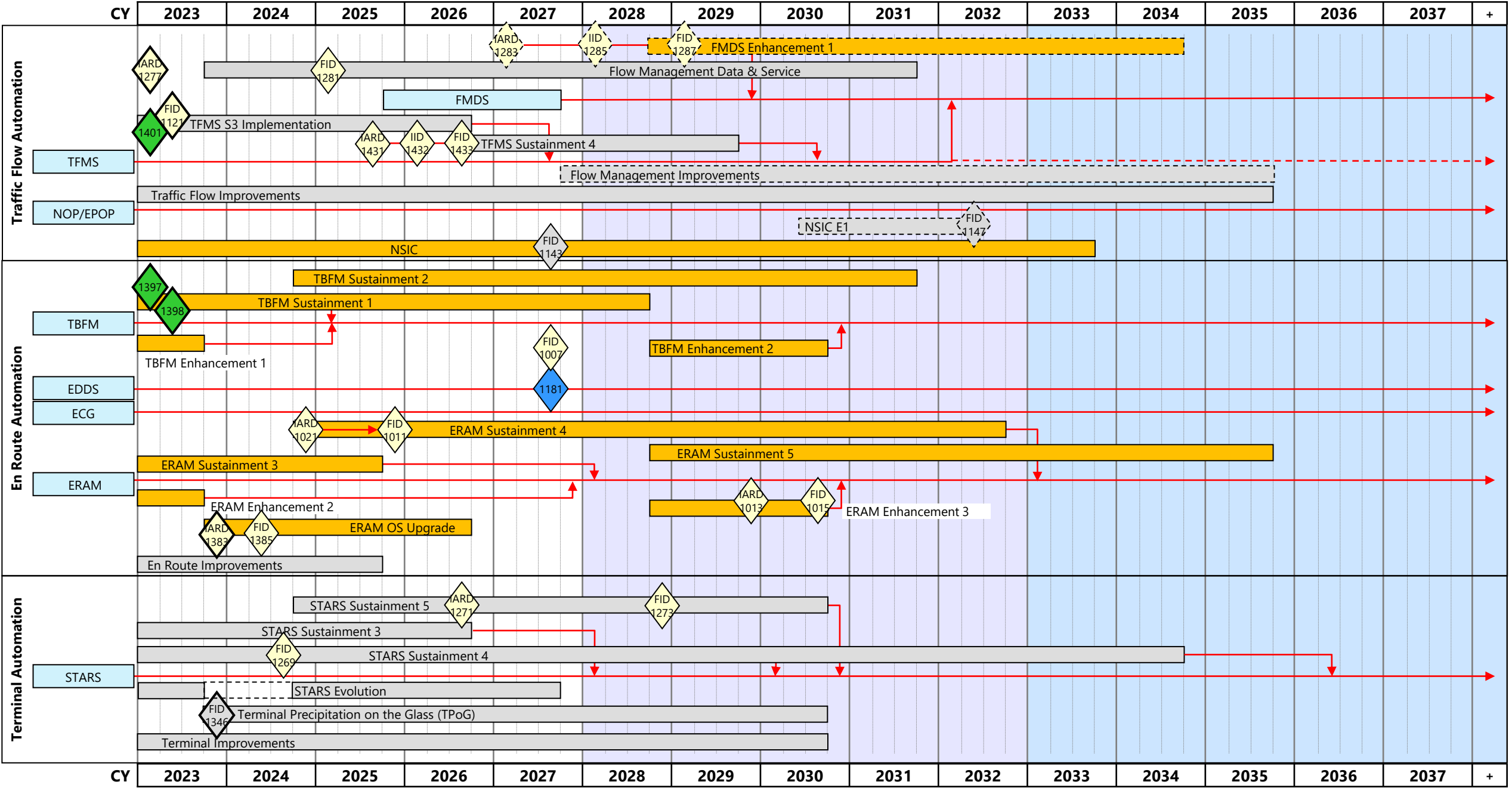
Airspace & Procedures Roadmap: Decision Points (1 of 1)

DP #	Target Date CY	Primary Domain	Type	Name
122	2024 Q2	Automation	FID	Final Investment Decision (FID) for AIMM Enhancement 1
1007	2027 Q3	Automation	FID	Final Investment Decision (FID) for TBFM Enhancement 2
1117	2028 Q4	Automation	FID	Final Investment Decision (FID) for ATOP Enhancement 2
1143	2027 Q3	NE: Commercial Space	FID	Final Investment Decision (FID) for National Airspace System (NAS) Space Integration Capabilities (NSIC)
1147	2032 Q2	NE: Commercial Space	FID	Final Investment Decision (FID) for National Airspace System (NAS) Space Integration Capabilities (NSIC) Enhancement 1
1189	2028 Q2	Automation	FID	Final Investment Decision (FID) for AIMM Enhancement 2
1293	2024 Q4	Automation	FID	Final Investment Decision (FID) for ATOP Sustainment 3 #1
1399	2026 Q4	Automation	FID	Final Investment Decision (FID) for ATOP Sustainment 3 #2

Automation

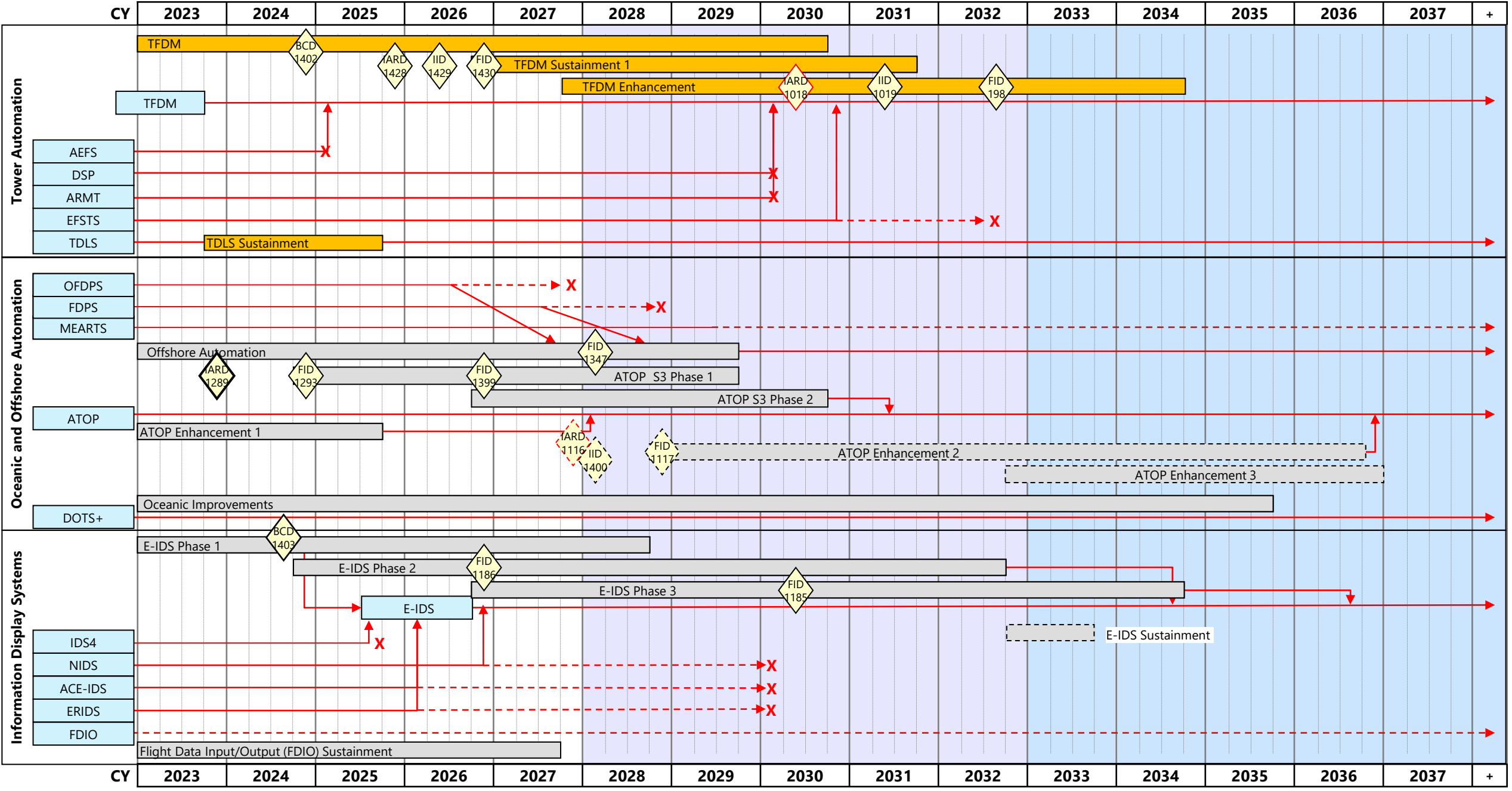
The Automation Roadmap presents an Executive View (EV) of the current automation systems supporting the National Airspace System (NAS) and their enhancement, sustainment or replacement through major development programs and support activities. The Automation Roadmap is intended to convey the major automation program strategy and acquisition decision points as well as program execution through the In-Service Decision. The roadmap serves as a summary view of more detailed plans within each development program.

Automation Roadmap (1 of 4)



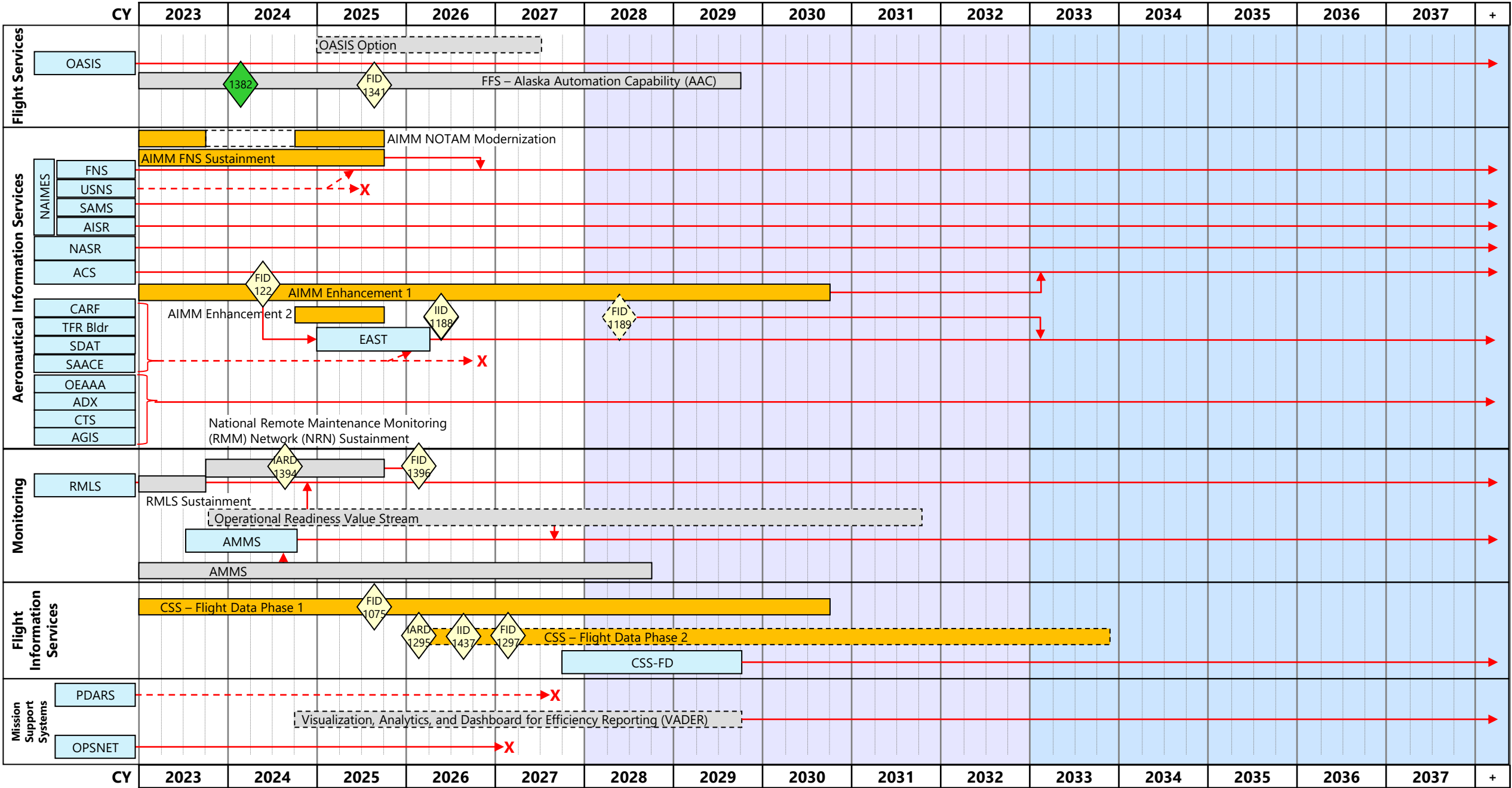
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Automation Roadmap (2 of 4)



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Automation Roadmap (3 of 4)



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Automation Roadmap (4 of 4)

CY	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	+
	Advanced Methods															
	Flight Object															
	Information Management															
	Common Status and Structure Data															
	Separation Automation System Engineering															
	Strategic Flow Management Application															
	Strategic Flow Management Engineering Enhancement				-----											
	Surface Tactical Flow															
	Common Trajectory Models															
CY	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	+

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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	Operational Service Units will be responsible for JRC Final Investment Decisions.
AUTO-05	Policy and standards decisions prescribing the use of hand-held devices for data messaging by General Aviation pilots and aircraft are established.
AUTO-06	Consistent security management across Data Communication, Automation and SWIM support the evolution.
AUTO-07	Human-system integration will be conducted during analysis, design, development, and testing of Automation programs.
AUTO-08	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-09	Automation platform designs will support environmental and energy saving initiatives.

Automation Roadmap: Decision Points (1 of 2)

DP #	Target Date CY	Primary Domain	Type	Name
122	2024 Q2	Automation	FID	Final Investment Decision (FID) for AIMM Enhancement 1
198	2032 Q3	Automation	FID	Final Investment Decision (FID) for TFDm Enhancement
1007	2027 Q3	Automation	FID	Final Investment Decision (FID) for TBFM Enhancement 2
1011	2025 Q4	Automation	FID	Final Investment Decision (FID) for ERAM Sustainment 4
1013	2029 Q4	Automation	IARD	Investment Analysis Readiness Decision (IARD) for ERAM Enhancement 3
1015	2030 Q3	Automation	FID	Final Investment Decision (FID) for ERAM Enhancement 3
1018	2030 Q2	Automation	IARD	Investment Analysis Readiness Decision (IARD) for TFDm Enhancement
1019	2031 Q2	Automation	IID	Initial Investment Decision (IID) for TFDm Enhancement
1021	2024 Q4	Automation	IARD	Investment Analysis Readiness Decision (IARD) for ERAM Sustainment 4
1075	2025 Q3	Automation	FID	Final Investment Decision (FID) for Common Support Services - Flight Data Phase 1
1116	2027 Q4	Automation	IARD	Investment Analysis Readiness Decision (IARD) for ATOP Enhancement 2
1117	2028 Q4	Automation	FID	Final Investment Decision (FID) for ATOP Enhancement 2
1121	2023 Q2	Automation	FID	Final Investment Decision (FID) for TFMS Sustainment 3
1181	2027 Q3	Automation	Strategy (Other)	Strategy Decision for EDDS
1185	2030 Q2	Automation	FID	Final Investment Decision (FID) for E-IDS Phase 3
1186	2026 Q4	Automation	FID	Final Investment Decision (FID) for E-IDS Phase 2
1187	2026 Q2	Automation	IARD	Investment Analysis Readiness Decision (IARD) for AIMM Enhancement 2
1188	2027 Q2	Automation	IID	Initial Investment Decision (IID) for AIMM Enhancement 2
1189	2028 Q2	Automation	FID	Final Investment Decision (FID) for AIMM Enhancement 2
1269	2024 Q3	Automation	FID	Final Investment Decision (FID) for STARS Sustainment 4
1271	2026 Q3	Automation	IARD	Investment Analysis Readiness Decision (IARD) for STARS Sustainment 5
1273	2028 Q4	Automation	FID	Final Investment Decision (FID) for STARS Sustainment 5
1277	2023 Q1	Automation	IARD	Investment Analysis Readiness Decision (IARD) for Flow Management Data and Services
1281	2025 Q1	Automation	FID	Final Investment Decision (FID) for Flow Management Data and Services
1283	2027 Q1	Automation	IARD	Investment Analysis Readiness Decision (IARD) for Flow Management Data and Service (FMDS) Enhancement 1
1285	2028 Q1	Automation	IID	Initial Investment Decision (IID) for Flow Management Data and Service (FMDS) Enhancement 1
1287	2029 Q1	Automation	FID	Final Investment Decision (FID) for Flow Management Data and Service (FMDS) Enhancement 1
1289	2023 Q4	Automation	IARD	Investment Analysis Readiness Decision (IARD) for ATOP Sustainment 3
1293	2024 Q4	Automation	FID	Final Investment Decision (FID) for ATOP Sustainment 3 #1
1295	2026 Q1	Automation	IARD	Investment Analysis Readiness Decision (IARD) for Common Support Services - Flight Data Phase 2

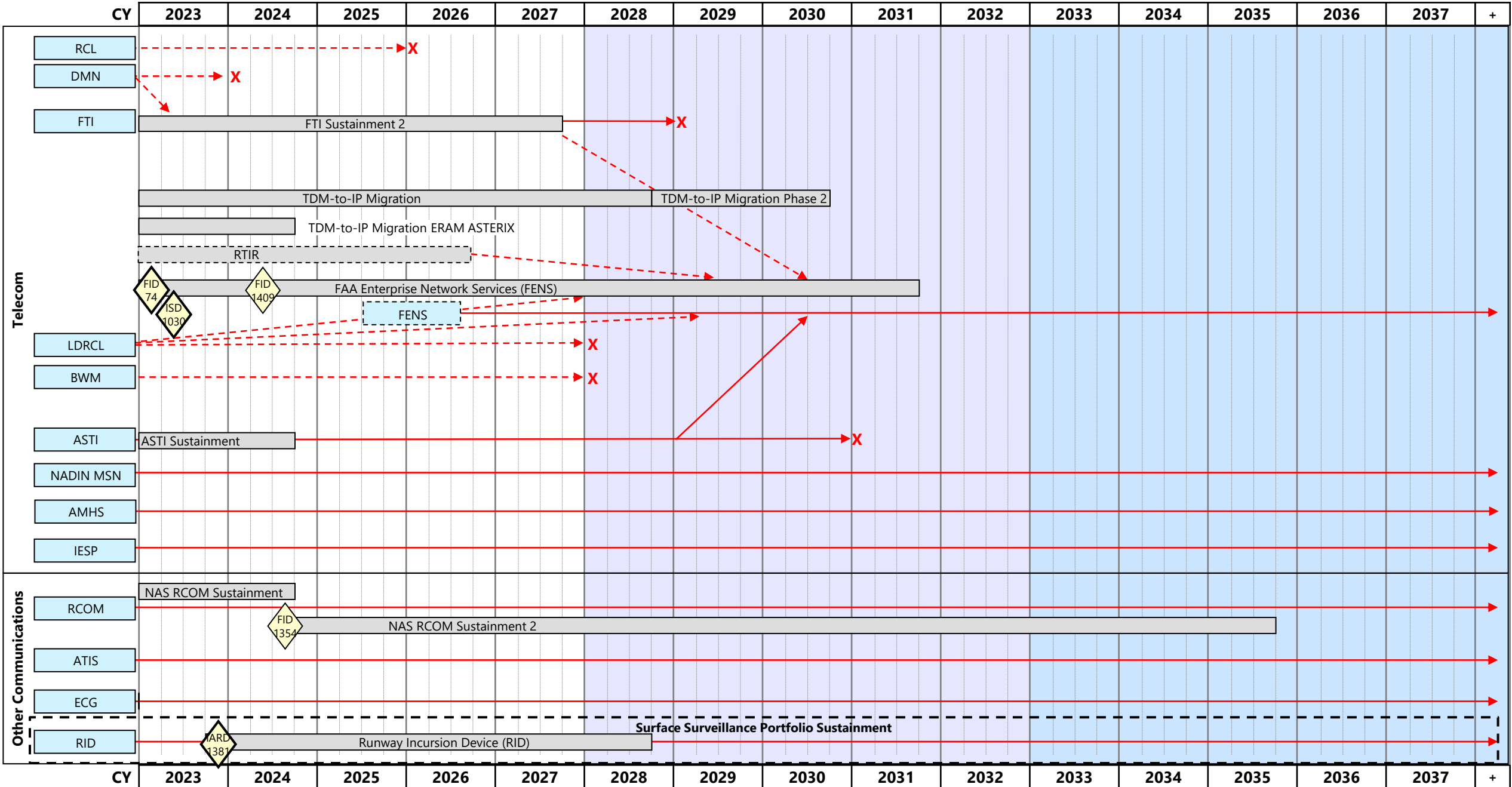
Automation Roadmap: Decision Points (2 of 2)

DP #	Target Date CY	Primary Domain	Type	Name
1297	2027 Q1	Automation	FID	Final Investment Decision (FID) for Common Support Services - Flight Data Phase 2
1341	2025 Q3	Automation	FID	Final Investment Decision (FID) for Future Flight Service - Alaska Automation Capability (AAC)
1347	2028 Q1	Automation	FID	Final Investment Decision (FID) for Offshore Automation #2
1382	2024 Q1	Automation	Strategy	JRC Strategy Decision for JRC Strategy Decision for Future Flight Service - Alaska Automation Capability (AAC)
1383	2023 Q4	Automation	IARD	Investment Analysis Readiness Decision (IARD) for ERAM Operating System Upgrade
1385	2024 Q2	Automation	FID	Final Investment Decision (FID) for ERAM Operating System Upgrade
1394	2024 Q3	Automation	IARD	Investment Analysis Readiness Decision (IARD) for National RMLS Network Sustainment
1396	2026 Q1	Automation	FID	Final Investment Decision (FID) for National RMLS Network Sustainment
1397	2023 Q1	Automation	Strategy	JRC Strategy Decision for TBFM Sustainment 1 (Funding Request)
1398	2023 Q2	Automation	Strategy	JRC Strategy Decision for TBFM Sustainment 1 (Direction Request)
1399	2026 Q4	Automation	FID	Final Investment Decision (FID) for ATOP Sustainment 3 #2
1400	2028 Q1	Automation	IID	Initial Investment Decision (IID) for ATOP Enhancement 2
1401	2023 Q1	Automation	Strategy	Strategy Decision for TFMS S3
1402	2024 Q4	Automation	BCD	Baseline Change Decision for TFDM
1403	2024 Q3	Automation	BCD	Baseline Change Decision for E-IDS Ph1
1428	2025 Q4	Automation	IARD	Investment Analysis Readiness Decision (IARD) for TFDM Sustainment
1429	2026 Q2	Automation	IID	Initial Investment Decision (IID) for TFDM Sustainment
1430	2026 Q4	Automation	FID	Final Investment Decision (FID) for TFDM Sustainment
1431	2025 Q3	Automation	IARD	Investment Analysis Readiness Decision (IARD) for TFMS Sustainment 4
1432	2026 Q1	Automation	IID	Initial Investment Decision (IID) for TFMS Sustainment 4
1433	2026 Q3	Automation	FID	Final Investment Decision (FID) for TFMS Sustainment 4
1437	2026 Q3	Automation	IID	Initial Investment Decision (IID) for CSS-FD Phase 2

Communication

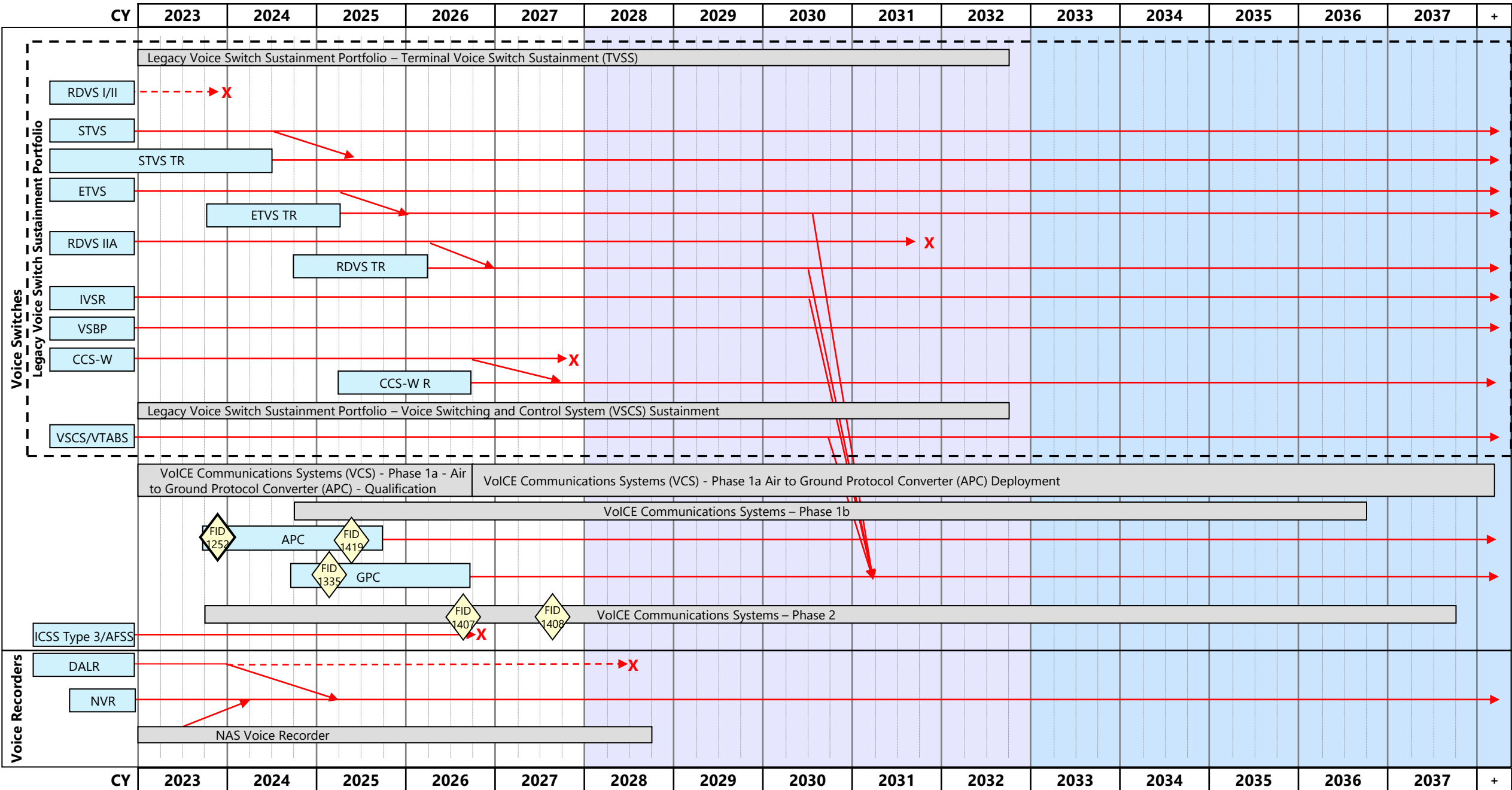
The Communication Roadmap presents an Executive View (EV) of the current communication systems supporting the National Airspace System and their enhancement, sustainment or replacement through major development programs and support activities. The Communications Roadmap is intended to convey the major communication program strategy and acquisition decision points as well as program funding. The roadmap serves as a summary view of more detailed plans within each development program.

Communication Roadmap (1 of 5)



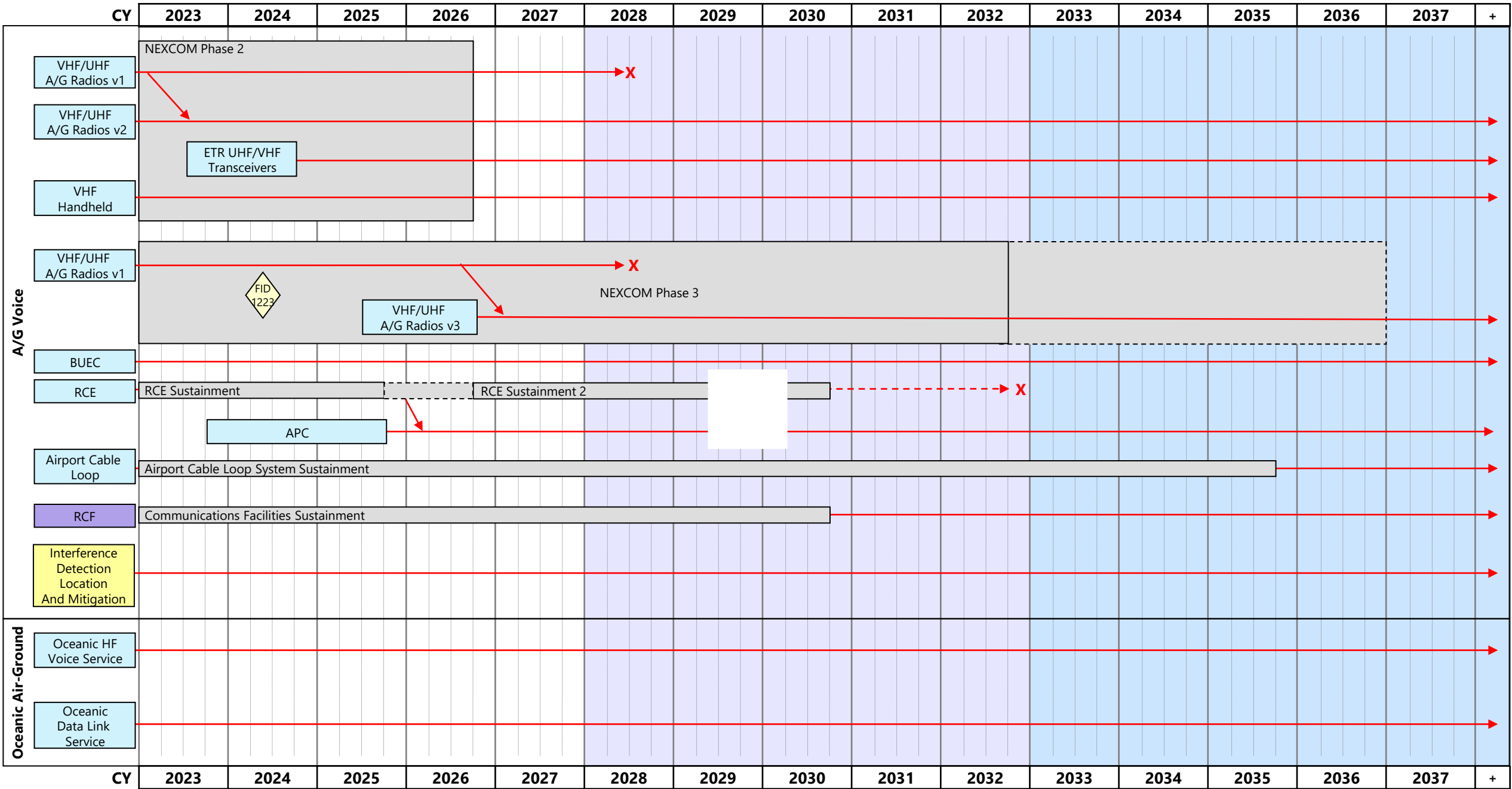
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Communication Roadmap (2 of 5)



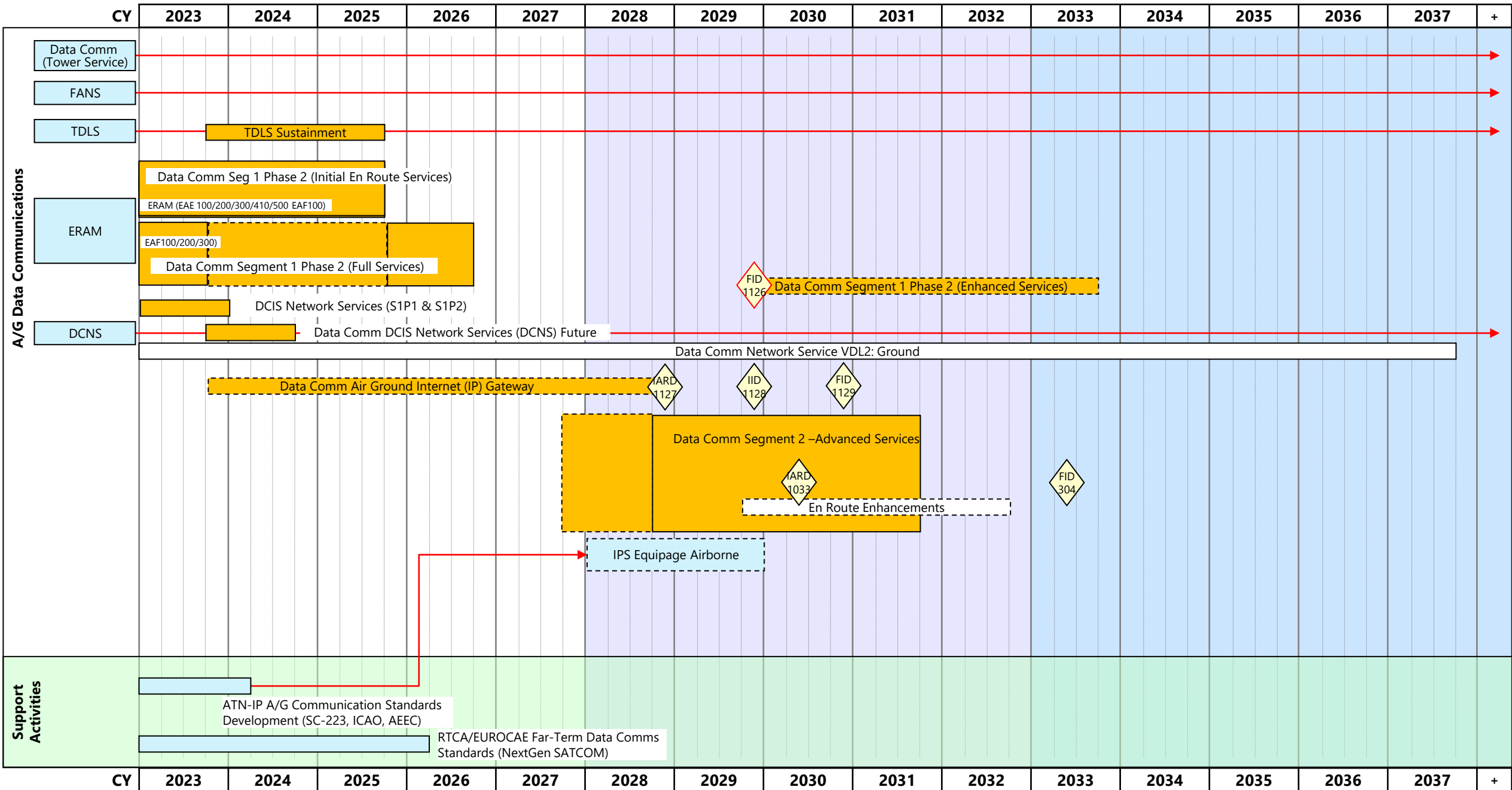
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Communication Roadmap (3 of 5)



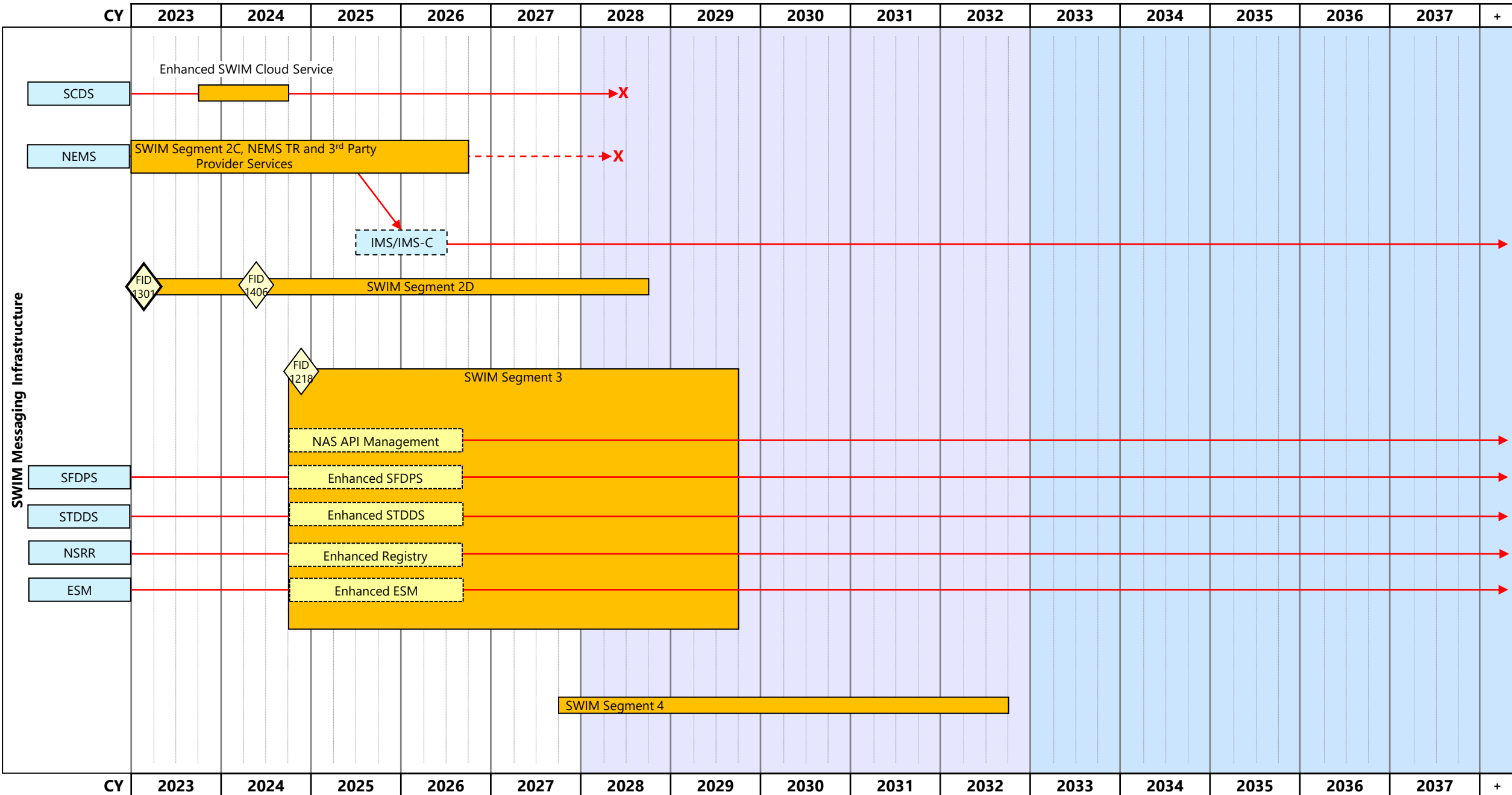
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Communication Roadmap (4 of 5)



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Communication Roadmap (5 of 5)



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Communication Roadmap: Assumptions

Identifier	Description
COMM-01	FENS will become the primary ground-based Voice/Data transport system.
COMM-02	All domestic flight safety critical A/G communications are over VHF based systems. Advisory communications (e.g. Weather, NAS Status, NOTAMS) can be supported by VHF A/G Communication or by commercial communications services through airborne access to SWIM services.
COMM-04	Relationship between SWIM and Communications: SWIM Dataflows all leverage NAS OPS IP service and initial SWIM Segment 2 infrastructure is being implemented with FTI & FENS.
COMM-06	ASTI (ANICS) will not be integrated into FAA Telecommunications Infrastructure contract.
COMM-07	FIDI TR will develop IP communication protocols between automation systems (e.g. ERAM, terminal clients) which end systems will provide the investment necessary to implement required changes.
COMM-08	JRC approved a joint IID for Data Comm Segment 1 and 2 in 2008; therefore, it is projected that IID for Segment 2 will be waived.

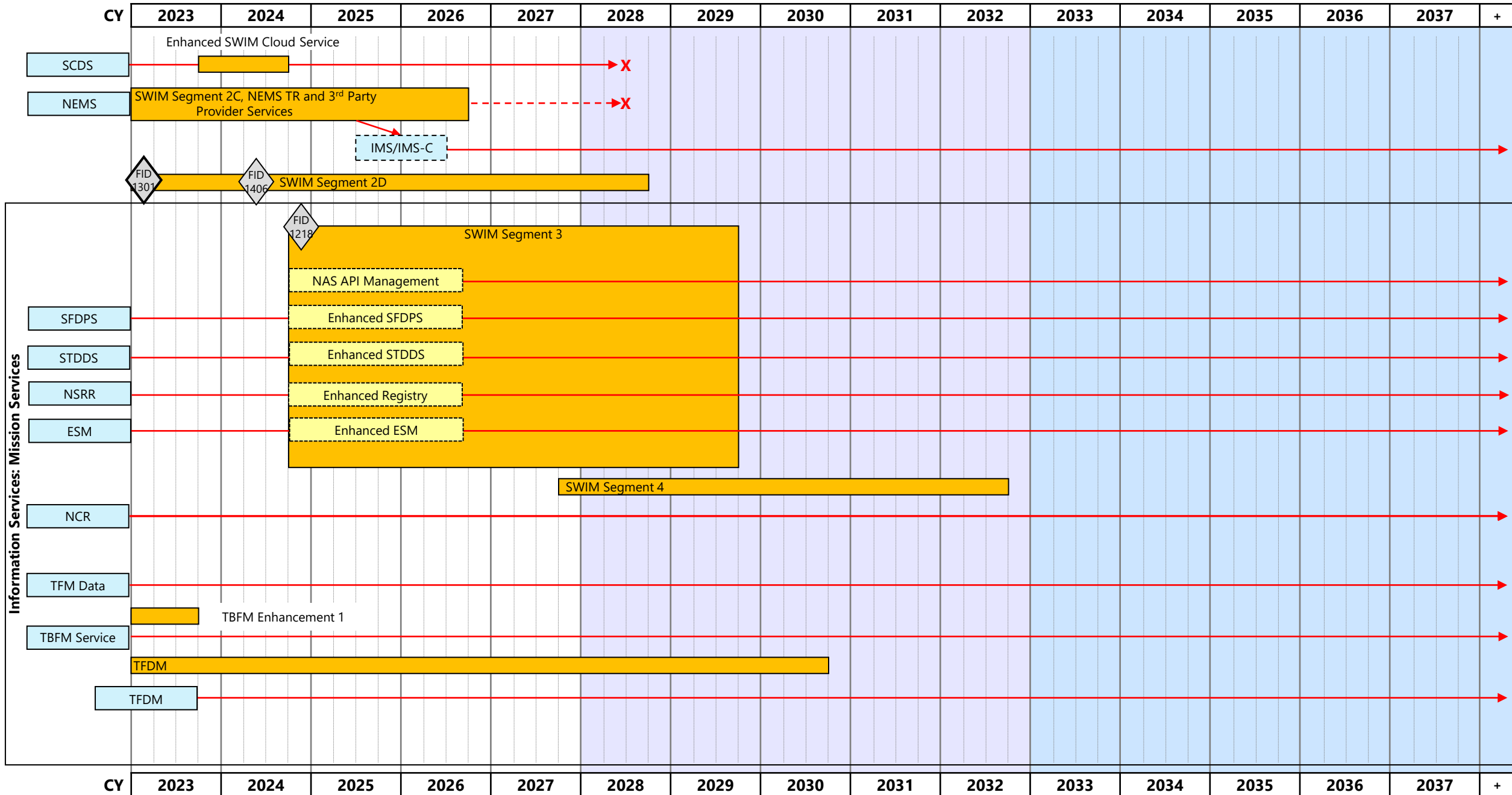
Communication Roadmap: Decision Points (1 of 1)

DP #	Target Date CY	Primary Domain	Type	Name
74	2023 Q1	Communication	FID	Final Investment Decision (FID) for FAA Enterprise Network Services (FENS)
304	2033 Q2	Communication	FID	Final Investment Decision (FID) for Data Comm Segment 2
1033	2030 Q2	Communication	IARD	Investment Analysis Readiness Decision (IARD) for DataComm Segment 2
1126	2029 Q4	Communication	FID	Final Investment Decision (FID) for Data Comm Segment 1 Phase 2 Enhanced Services
1127	2028 Q4	Communication	IARD	Investment Analysis Readiness Decision (IARD) for Data Comm IP Gateway
1128	2029 Q4	Communication	IID	Initial Investment Decision (IID) for Data Comm IP Gateway
1129	2030 Q4	Communication	FID	Final Investment Decision (FID) for Data Comm IP Gateway
1218	2024 Q4	Communication	FID	Final Investment Decision (FID) for SWIM Segment 3
1223	2024 Q2	Communication	FID	Final Investment Decision (FID) for NEXCOM Phase 3
1252	2023 Q4	Communication	FID	Final Investment Decision (FID) for Voice Communications System- APC #1
1301	2023 Q1	Communication	FID	Final Investment Decision (FID) for SWIM 2D
1335	2025 Q1	Communication	FID	Final Investment Decision (FID) for VCS Ph1 - GPC
1354	2024 Q3	Communication	FID	Final Investment Decision (FID) for NAS Recovery Communications (RCOM) Sustainment 2
1381	2023 Q4	Communication	IARD	Investment Analysis Readiness Decision (IARD) for Runway Incursion Device
1406	2024 Q2	Communication	FID	Final Investment Decision for SWIM Segment 2D
1407	2026 Q3	Communication	FID	Final Investment Decision (FID) for VCS Ph2 IP VCS #1
1408	2027 Q3	Communication	FID	Final Investment Decision (FID) for VCS Ph2 IP VCS #2
1409	2024 Q2	Communication	FID	Final Investment Decision for FAA Enterprise Network Services (FENS)
1419	2025 Q2	Communication	FID	Final Investment Decision (FID) for Voice Communications System- APC #2

Enterprise Services

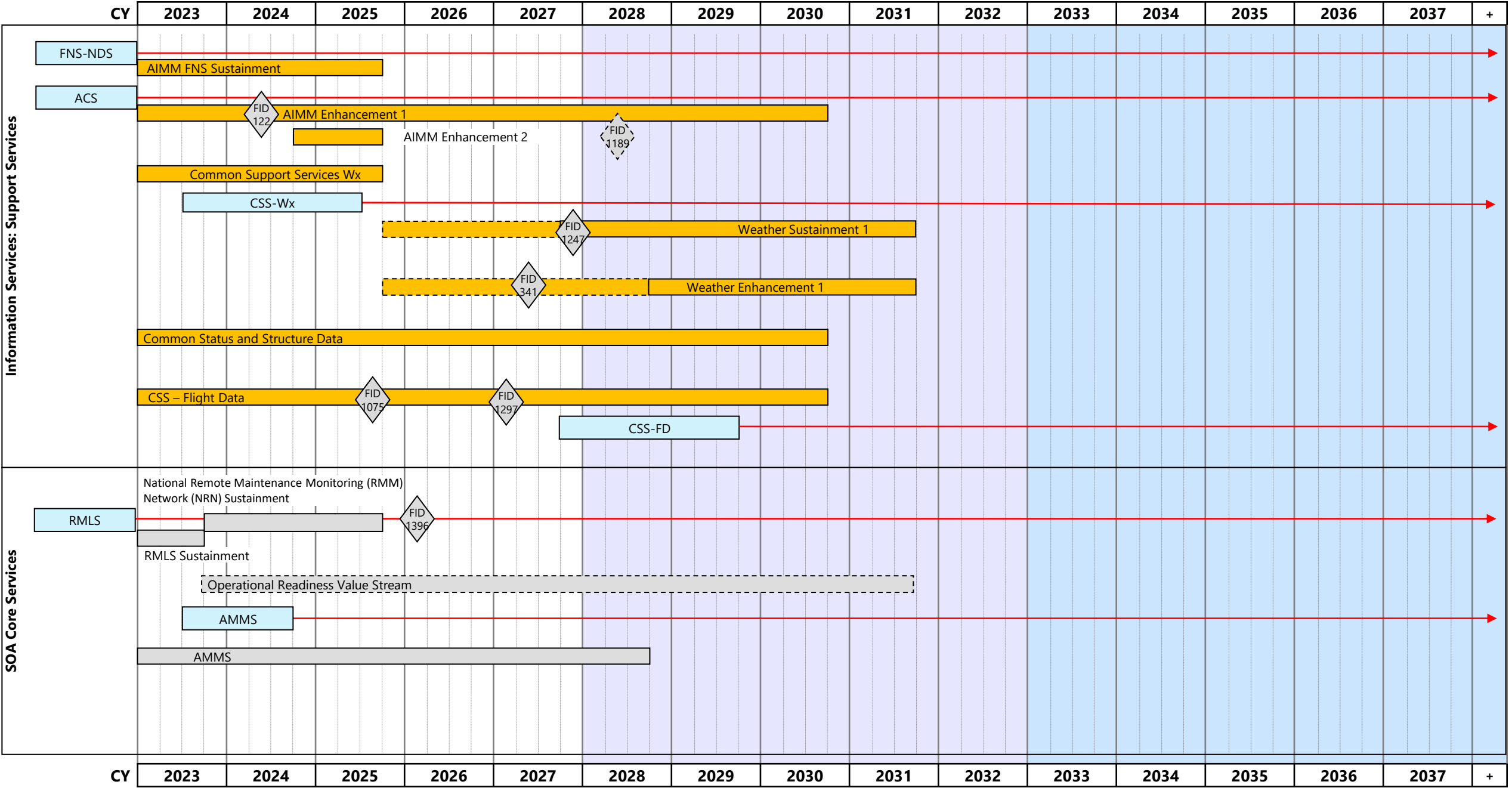
The Enterprise Services Roadmap presents an Executive View (EV) of the evolution of existing and planned enterprise services provided by NAS systems and programs and provides an outline of the major activities, decisions, and milestones. By definition, services are capabilities that exist as processes, applications, infrastructure, or any combination. They are implemented using design principles that support and promote enterprise-wide interoperability, sharing, standardization, federation, awareness, loose coupling, granularity, modularity, abstraction, reuse, and flexibility.

Enterprise Services Roadmap (1 of 3)



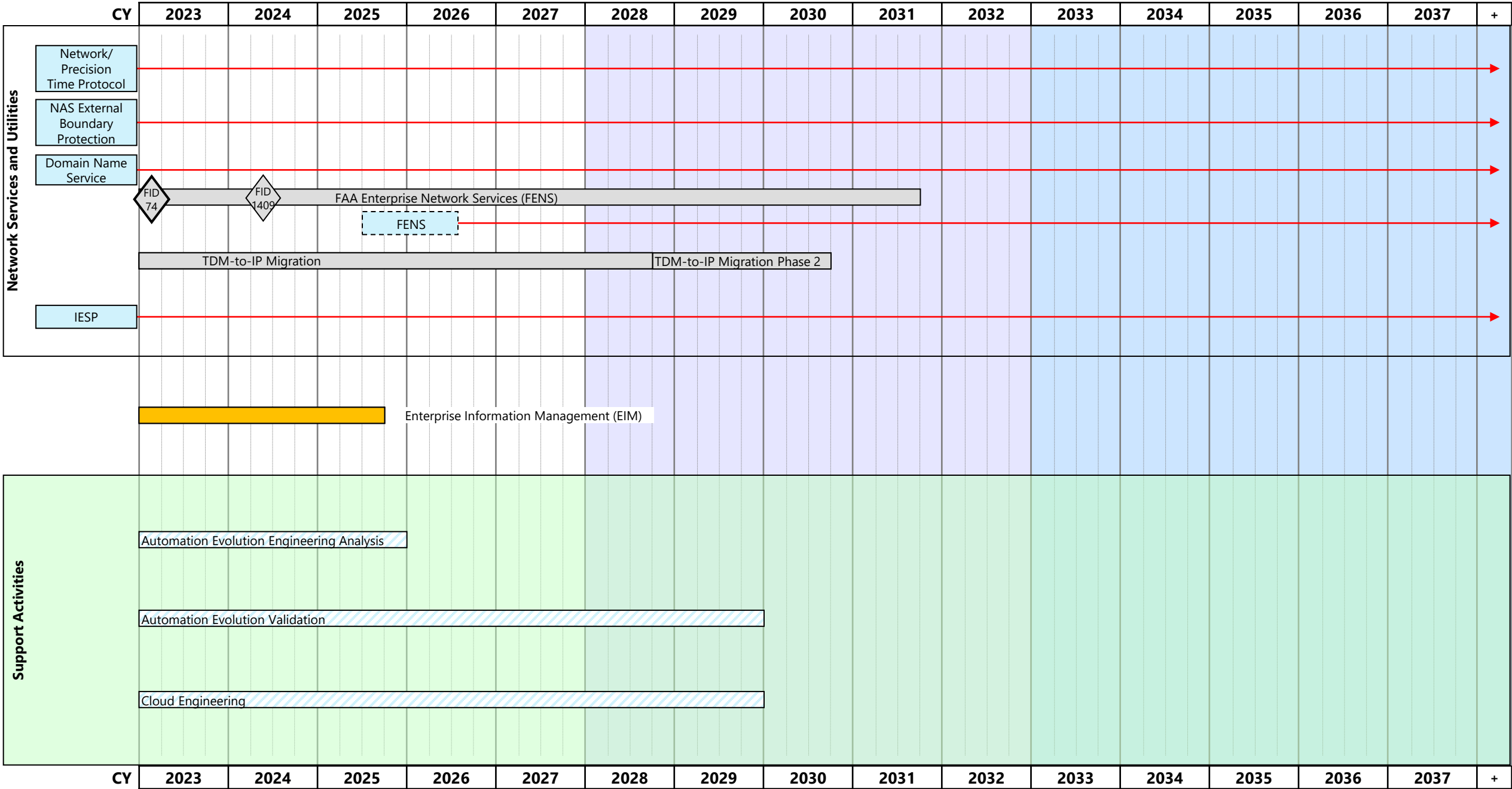
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Enterprise Services Roadmap (2 of 3)



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Enterprise Services Roadmap (3 of 3)



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Enterprise Services Roadmap: Decision Points (1 of 1)

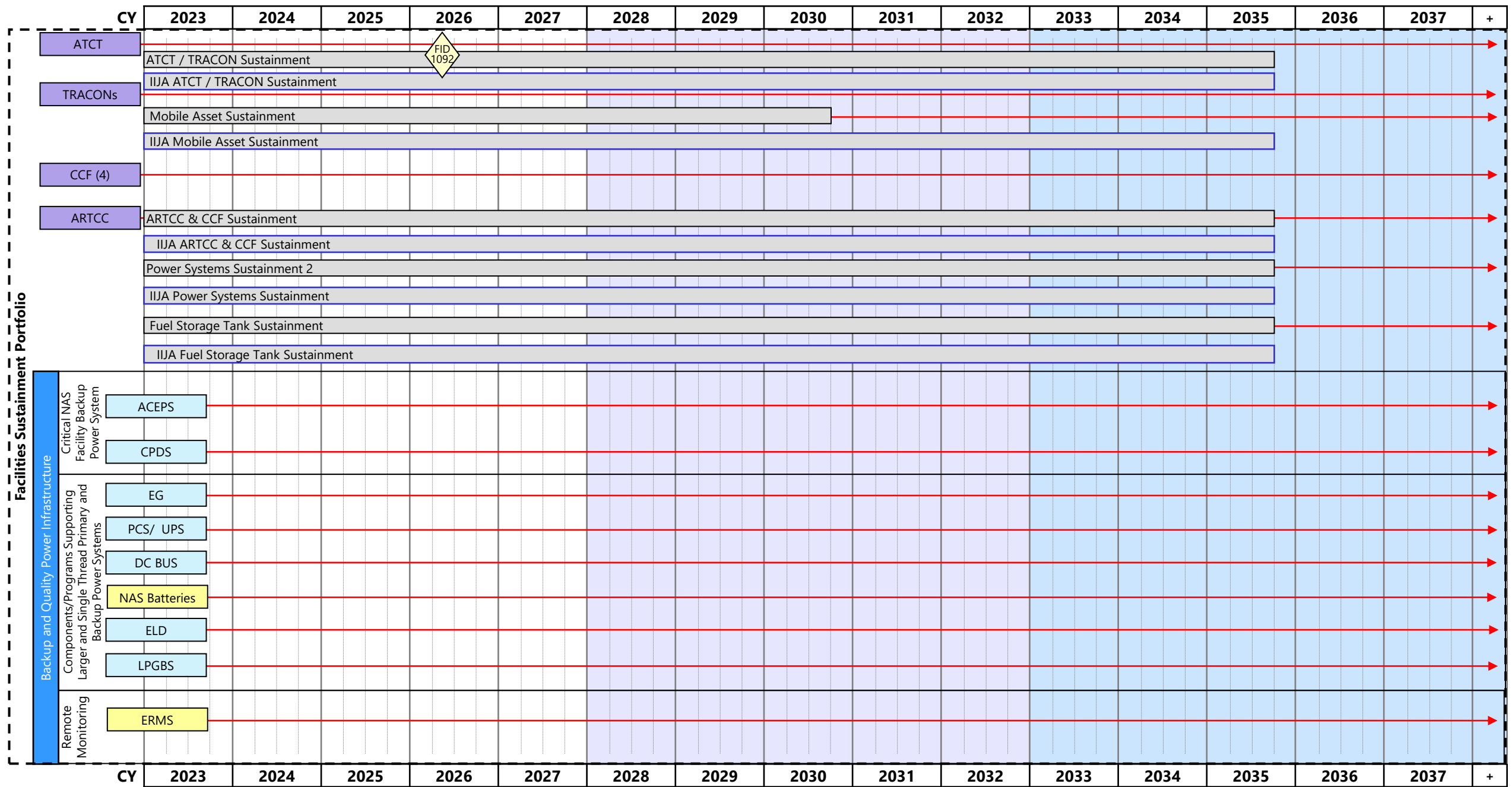
DP #	Target Date CY	Primary Domain	Type	Name
122	2024 Q2	Automation	FID	Final Investment Decision (FID) for AIMM Enhancement 1
341	2027 Q2	Weather	FID	Final Investment Decision (FID) for Weather Enhancement 1
1075	2025 Q3	Automation	FID	Final Investment Decision (FID) for Common Support Services - Flight Data Phase 1
1189	2028 Q2	Automation	FID	Final Investment Decision (FID) for AIMM Enhancement 2
1218	2024 Q4	Communication	FID	Final Investment Decision (FID) for SWIM Segment 3
1247	2027 Q4	Weather	FID	Final Investment Decision (FID) from Weather Sustainment 1
1297	2027 Q1	Automation	FID	Final Investment Decision (FID) for Common Support Services - Flight Data Phase 2
1301	2023 Q1	Communication	FID	Final Investment Decision (FID) for SWIM 2D
1396	2026 Q1	Automation	FID	Final Investment Decision (FID) for National RMLS Network Sustainment
1406	2024 Q2	Communication	FID	Final Investment Decision for SWIM Segment 2D
1409	2024 Q2	Communication	FID	Final Investment Decision for FAA Enterprise Network Services (FENS)

Facilities

The Facilities Roadmap presents an Executive View (EV) of the current National Airspace System (NAS) facilities environment and their sustainment, modernization, or replacement through major development programs.

Items with a blue outline are lines of funding from the Infrastructure Investment & Jobs Act (IIJA), also known as the Bipartisan Infrastructure Law (BIL).

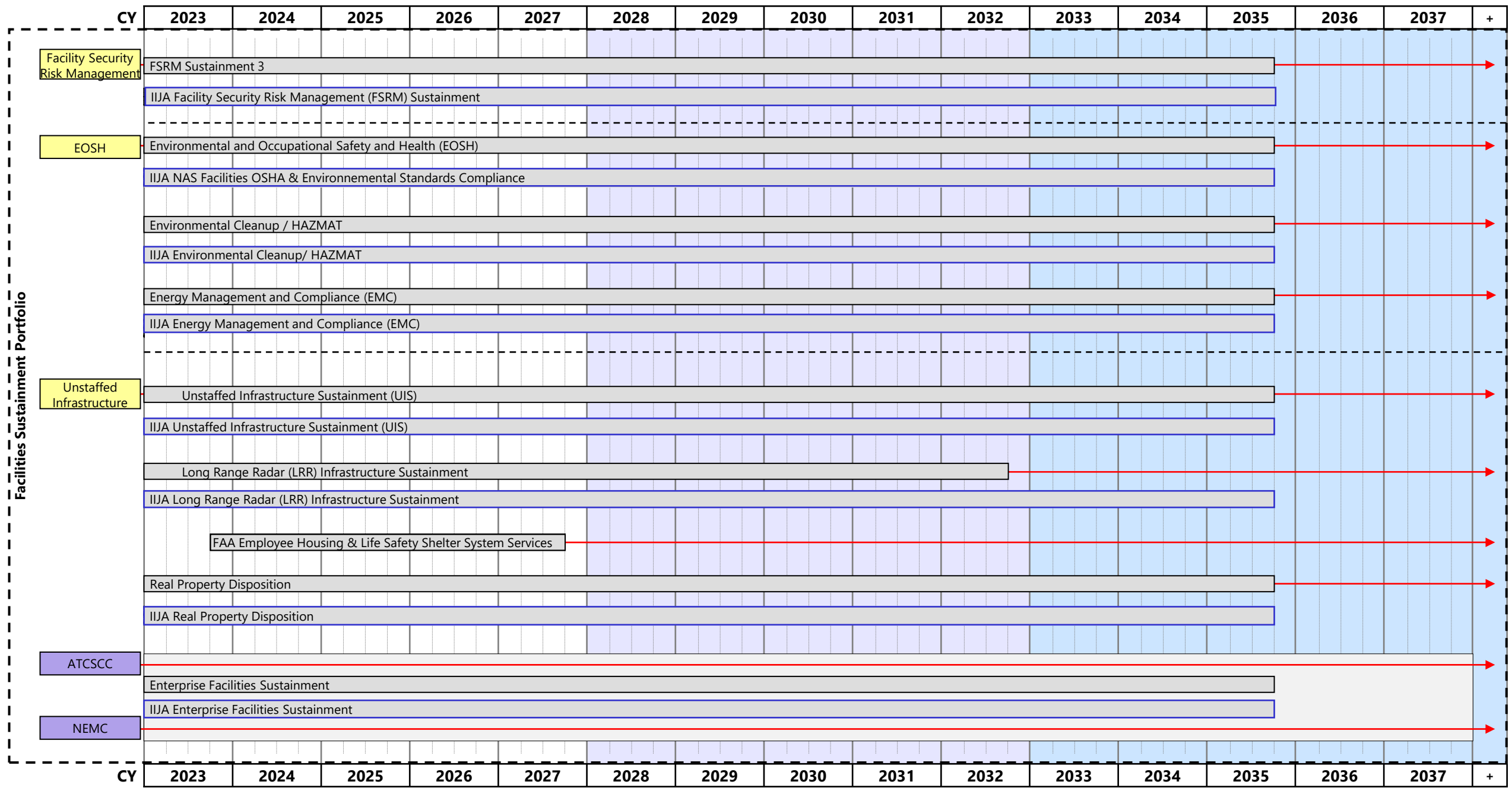
Facilities Roadmap (1 of 5)



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Items with a blue outline are lines of funding from the Infrastructure Investment & Jobs Act (IIJA), also known as the Bipartisan Infrastructure Law (BIL).

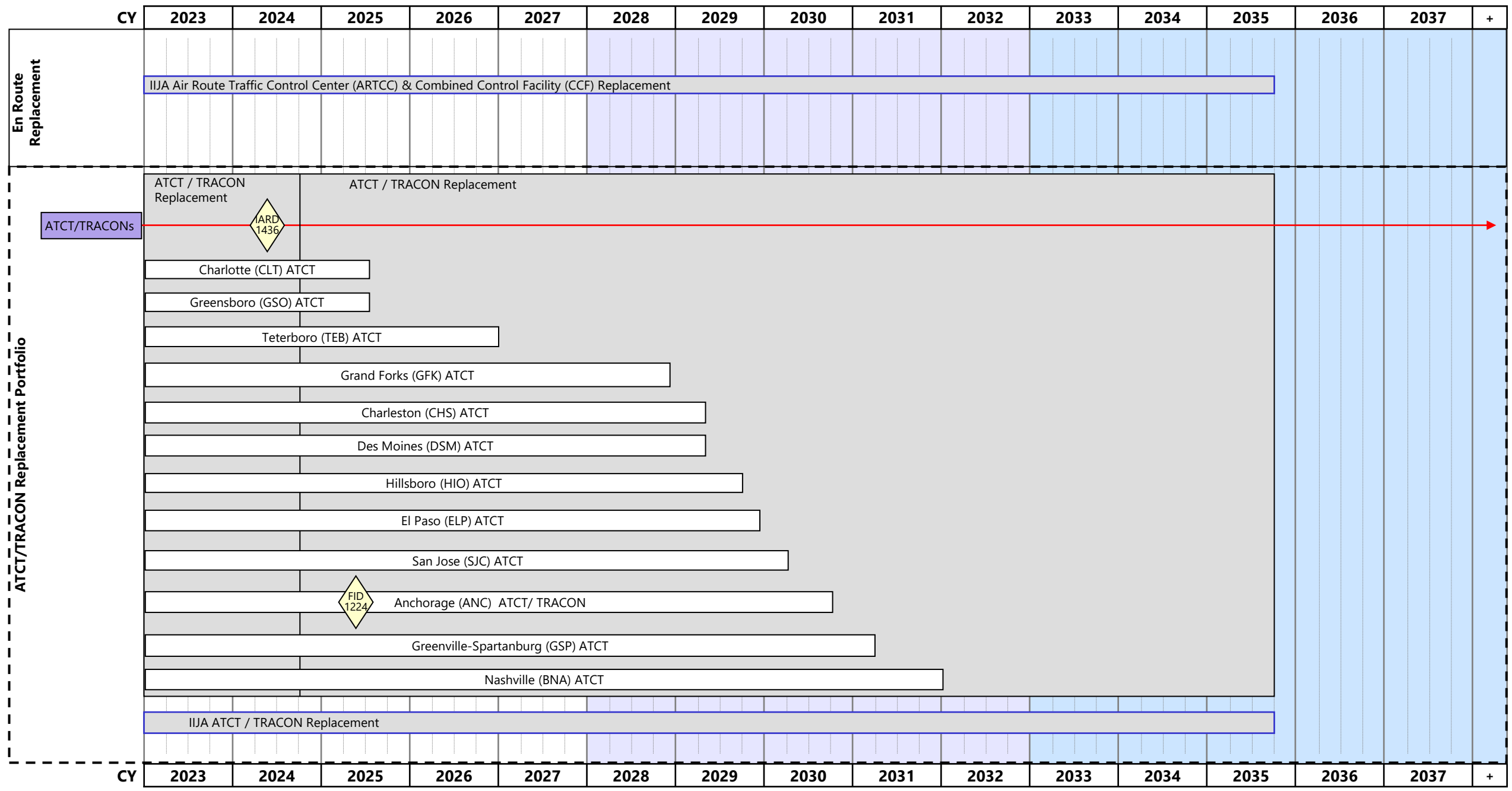
Facilities Roadmap (2 of 5)



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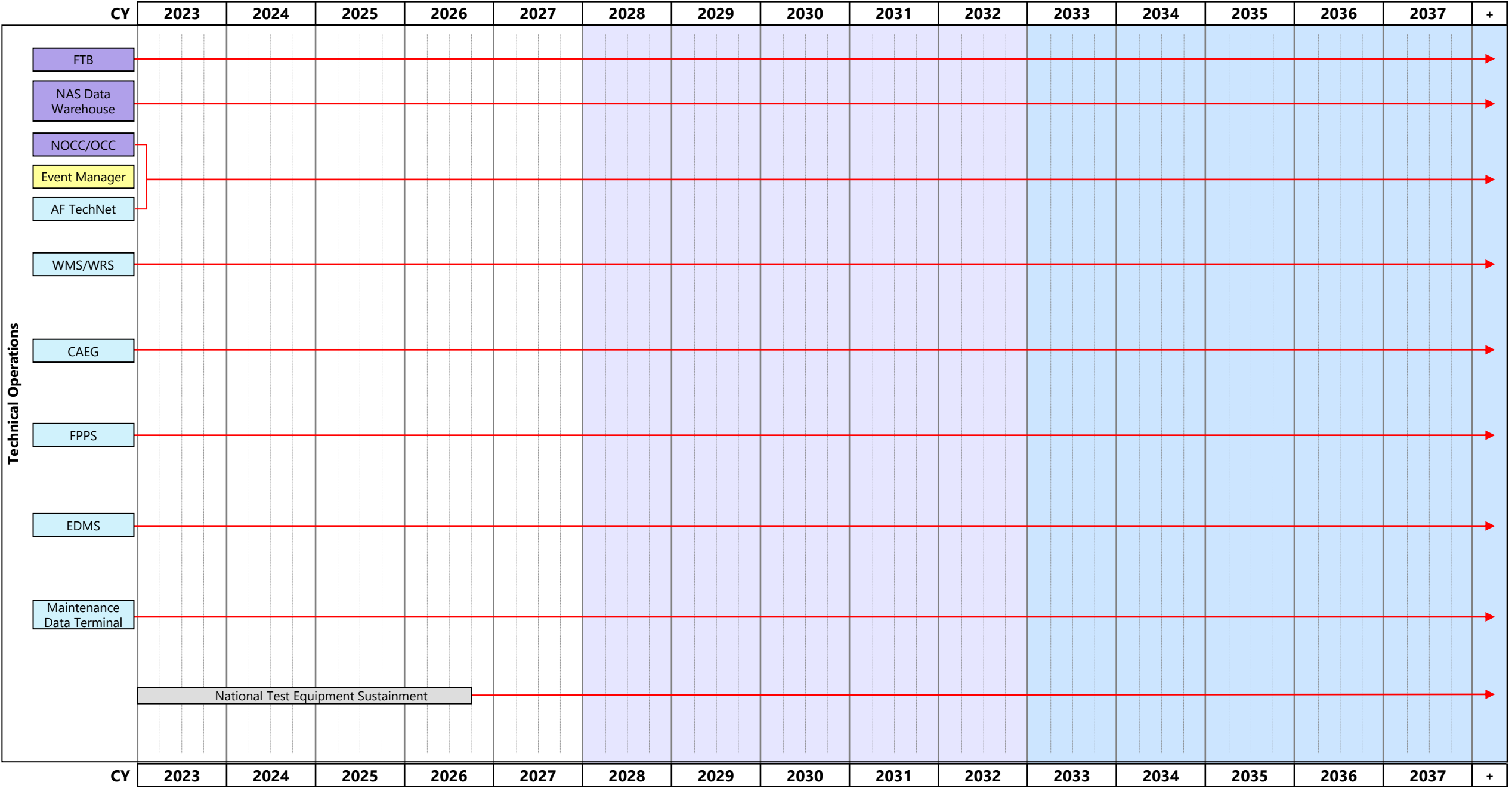
Items with a blue outline are lines of funding from the Infrastructure Investment & Jobs Act (IIJA), also known as the Bipartisan Infrastructure Law (BIL).

Facilities Roadmap (3 of 5)



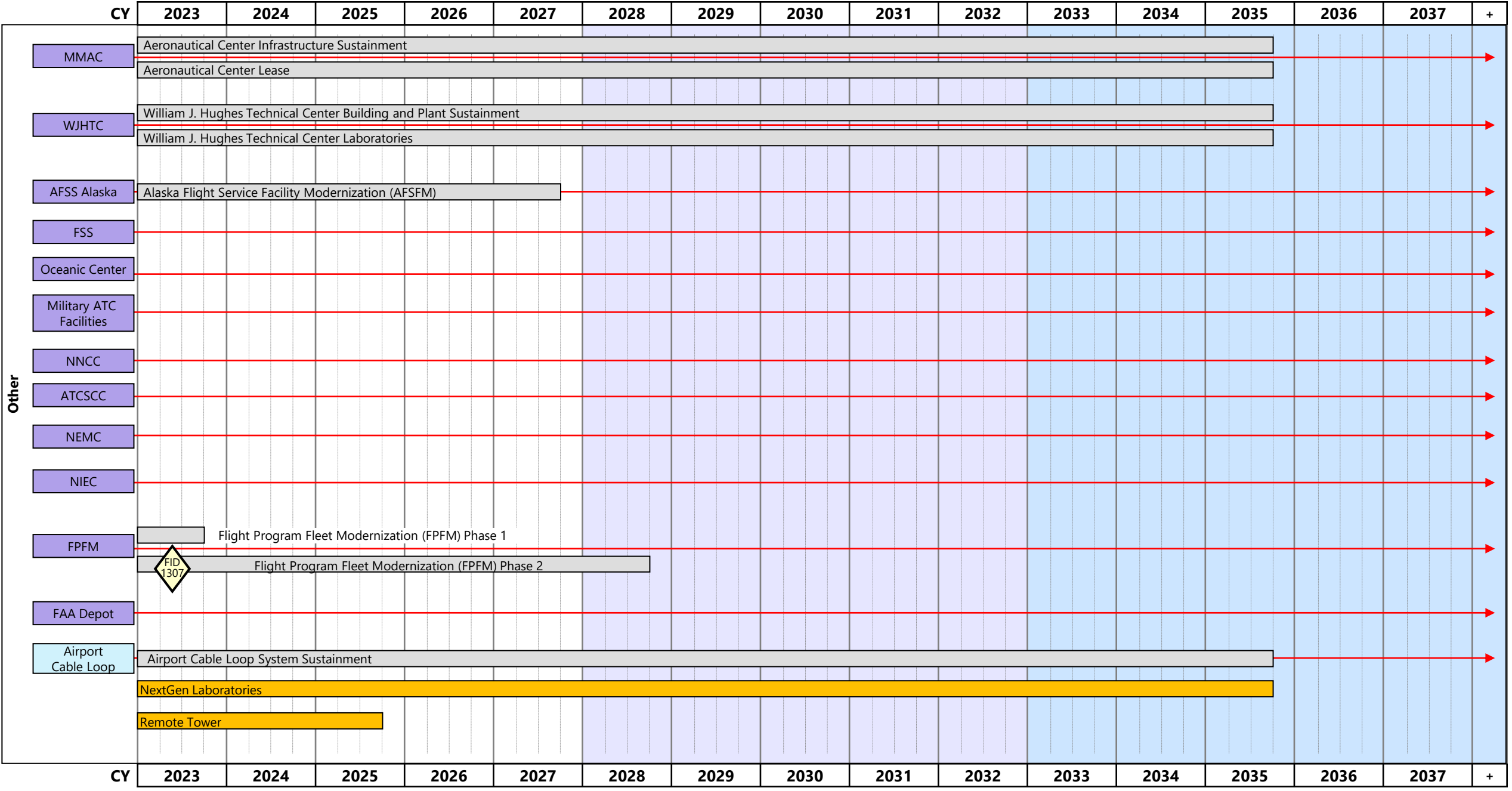
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Facilities Roadmap (4 of 5)



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Facilities Roadmap (5 of 5)



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Facilities Roadmap: Assumptions

Identifier	Description
FAC-01	AJW-2 will need funding for any facilities or infrastructure projects to expand or improve a facility in preparation for a PMO program installation. Refurbish requirements at Large TRACONs and new facilities may be needed to support BA positions. AJW-2 should receive funding and requirements documentation at least 3 years in advance, preferably 4 years, to integrate the project into the Sustainment or New Investment portfolio workplan.
FAC-02	Projects within the Facilities Sustainment Portfolio that are estimated to cost over \$50 million are assigned their own FID decision point.
FAC-03	Projects within the ATCT/ TRACON Replacement Portfolio that are estimated to cost over \$160 million are assigned their own FID decision point.

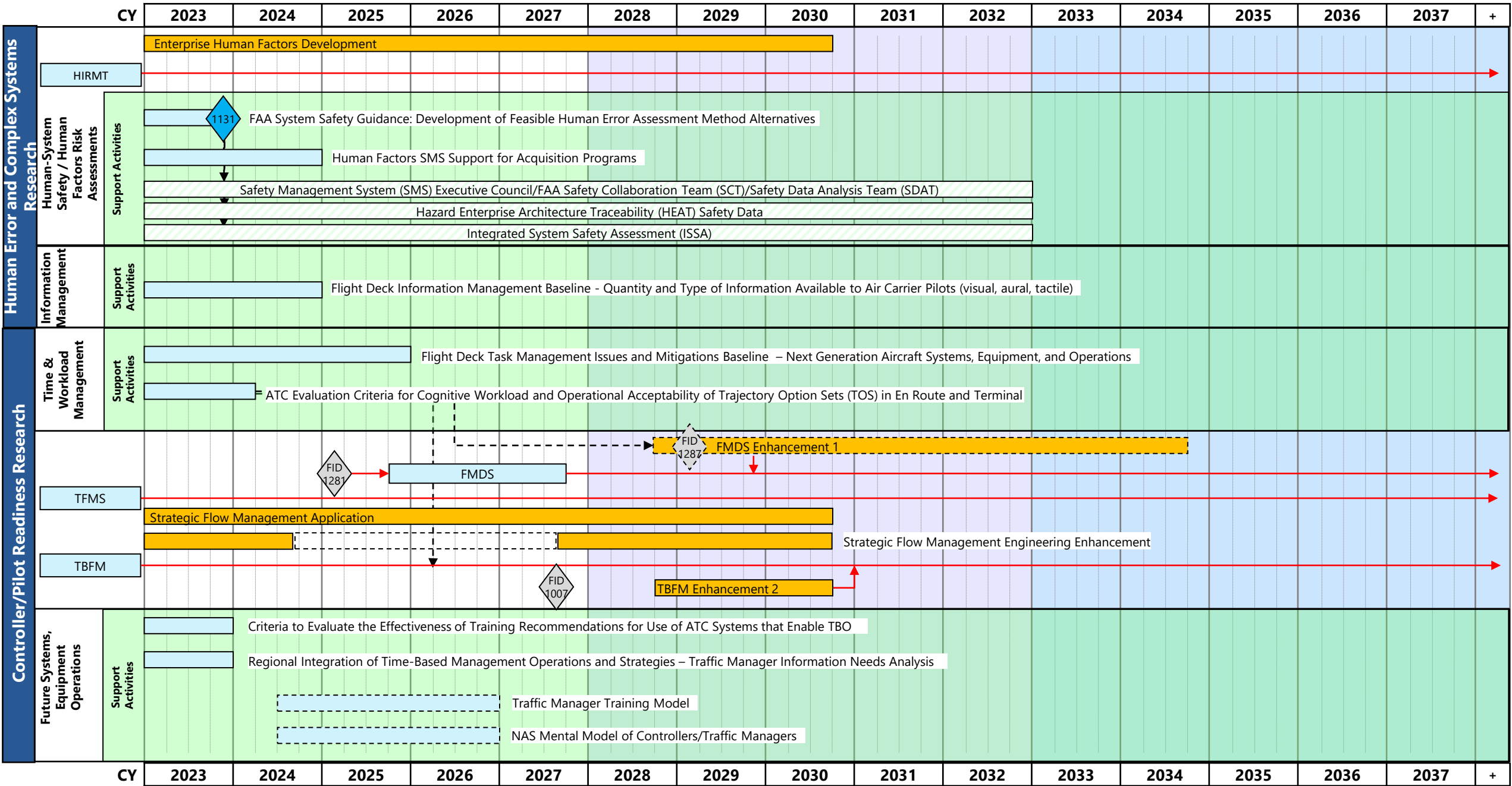
Facilities Roadmap: Decision Points (1 of 1)

DP #	Target Date CY	Primary Domain	Type	Name
1092	2026 Q2	Facilities	FID	Final Investment Decision (FID) for New York TRACON (N90) Sustainment
1224	2025 Q2	Facilities	FID	Final Investment Decision (FID) for Anchorage ATCT/TRACON Replacement
1307	2023 Q2	Facilities	FID	Final Investment Decision (FID) for Flight Program Fleet Modernization Phase 2
1436	2024 Q2	Facilities	IARD	Investment Analysis Readiness Decision (IARD) ATCT/TRACON Replacement Portfolio

Human Systems Integration

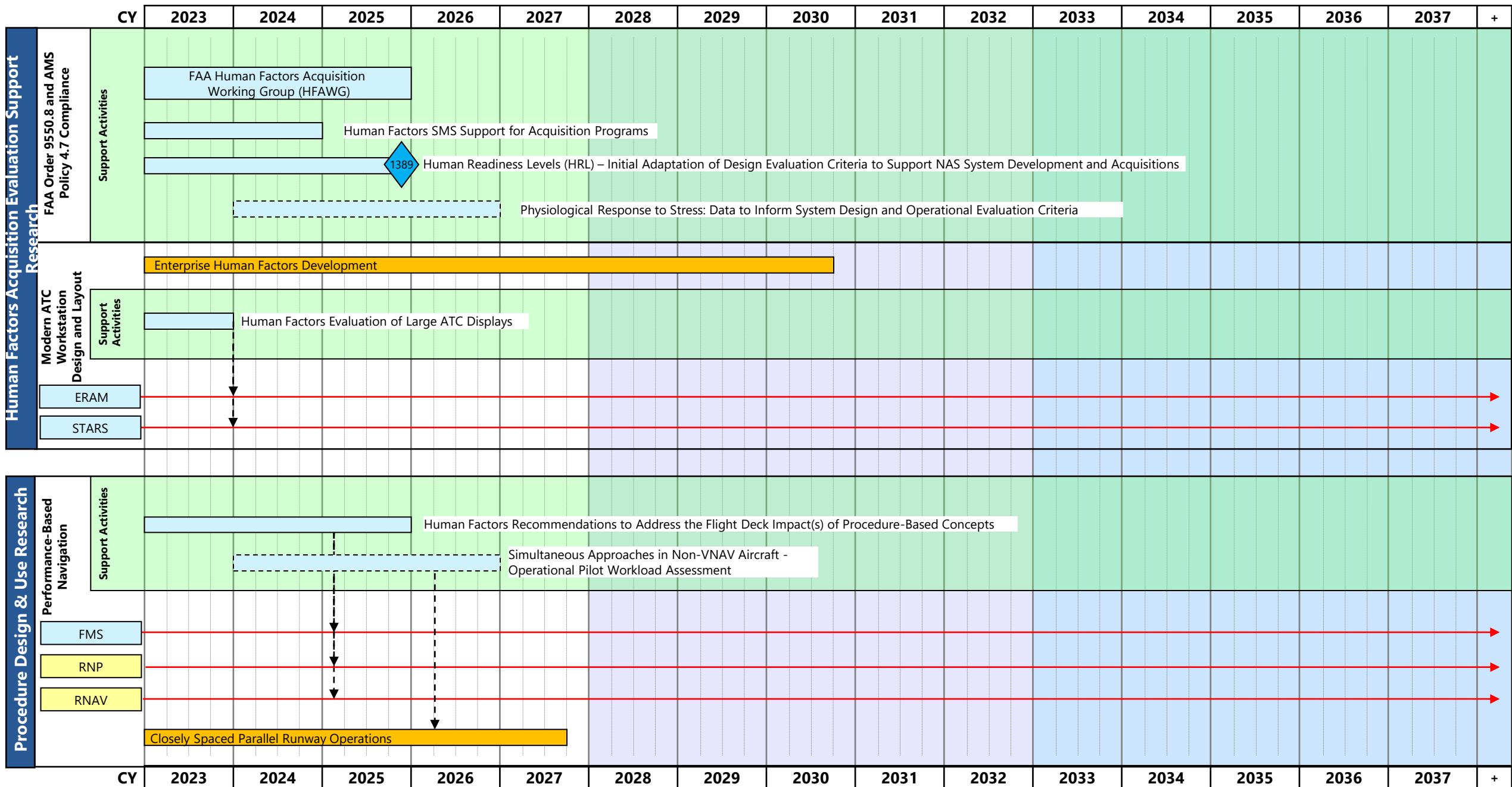
The Human Systems Integration (HSI) Roadmap represents strategic air-ground human factors activities and their direct contributions to the evaluation, development, and evolution of NAS infrastructure. The HSI Roadmap depicts the integration of these activities with cross-cutting NAS infrastructure improvements to identify key human factors product transition points. The HSI Roadmap drives the execution of critical path activities by providing timely human factors inputs to NAS infrastructure investments and related programs.

Human Systems Integration Roadmap (1 of 3)



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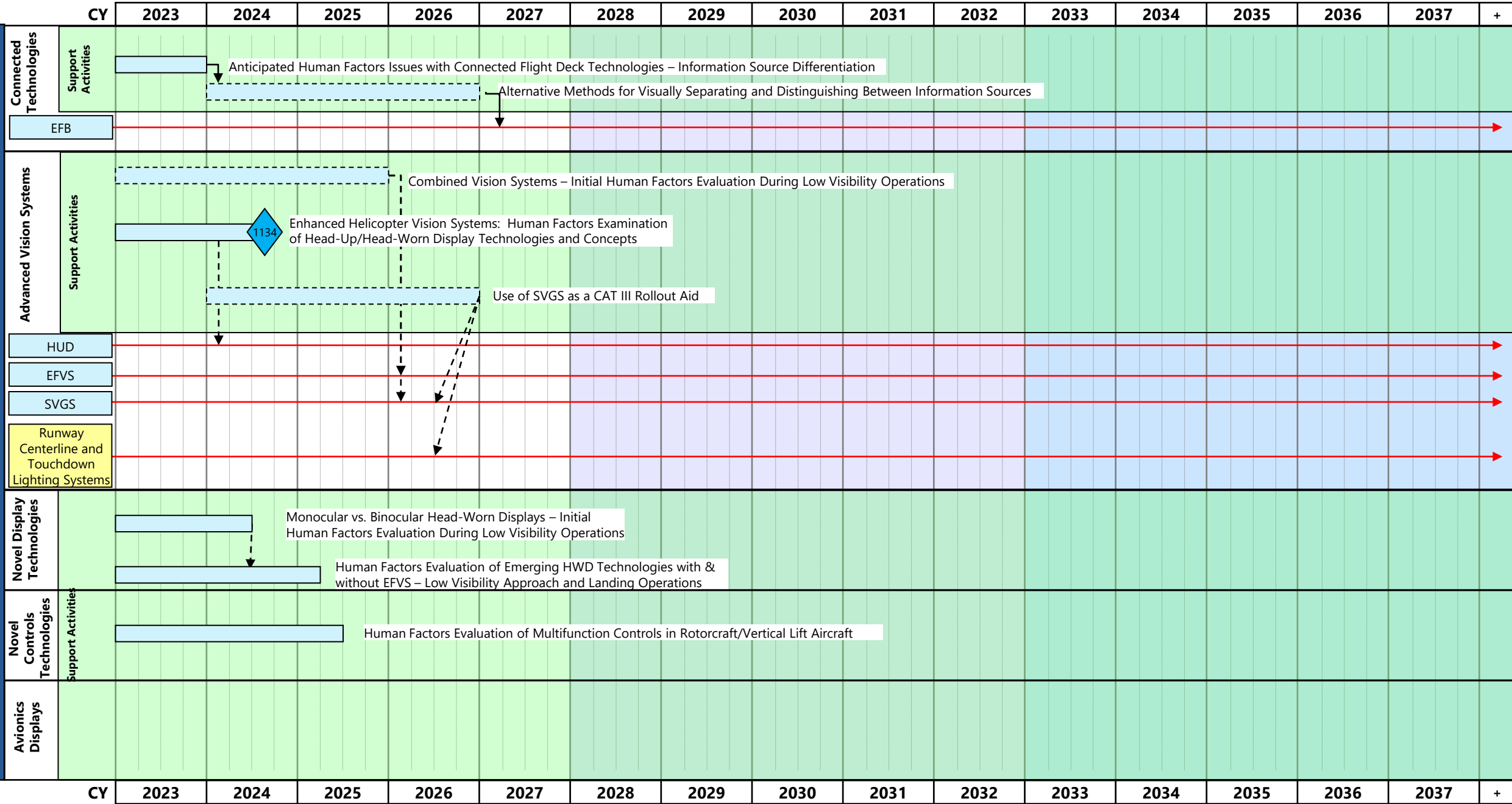
Human Systems Integration Roadmap (2 of 3)



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Human Systems Integration Roadmap (3 of 3)

Human - Machine Interface and Interaction Research






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Human Systems Integration Roadmap: Assumptions

Identifier	Description
HSI-01	The execution of program- and project-specific human factors activities are not represented in the HSI Roadmap.
HSI-02	Human factors integration points represent an identified opportunity for acquisition and procedure development programs to apply specific human factors products.
HSI-03	Human factors integration points represent the final opportunity for acquisition and procedure development programs to apply specific human factors products.
HSI-04	Acquisition and procedure development programs will coordinate with ANG-C1 throughout AMS and other processes to identify and address human factors opportunities.
HSI-05	ANG-C1 will coordinate across programs to identify and address NAS-wide human factors opportunities.

Human Systems Integration Roadmap Summary

Human Factors Functions	Example Infrastructure Development Influences
<p>Human Error and Complex Systems Research <i>User Centered Design</i></p> 	<ul style="list-style-type: none"> • FAA methods to factor human behavior in system-safety/risk assessments • Data to evaluate effectiveness of mitigations for human factors risks • Verification of human factors assumptions – e.g., system design, intended function, end-user experience • FAA methods to evaluate system design and minimize occurrence of design related errors • Criteria to evaluate information display, accessibility, and management based on task urgency/criticality
<p>User Readiness Research <i>Systems, Equipment, Operations</i></p>	<ul style="list-style-type: none"> • Criteria to determine effect of new systems, operations, and procedures to user tasks, skills, and proficiency needs • Data to evaluate effectiveness of electronic/distance learning technology and methods for systems and procedures training • Change management criteria to support user acceptance of air/ground capabilities and target utilization rate achievement • Criteria for management of unfamiliar situations with highly automated systems and operations
<p>Human Factors Acquisition Evaluation Support Research <i>FAA Order 9550.8 and AMS Policy 4.7 Compliance</i></p> 	<ul style="list-style-type: none"> • Apply evidence-based criteria to support the implementation of human factors tools, processes, and requirements into AMS • Evaluate acquisition program requirements and SMS products for human factors • Facilitate the integration of human factors with emerging NAS programs: Independent HF assessment of NextGen concepts • Verify the integration of human factors with NAS programs: Independent HF ISR checklist sign-off • Criteria to evaluate system design for maintainability
<p>Procedure Design and Use Research <i>Complexity, Operational Acceptability, Usability</i></p>	<ul style="list-style-type: none"> • Criteria to evaluate procedure design alternatives and potential impacts to usability, complexity, operational acceptability, and human performance • Develop human factors methods to evaluate the documentation of procedures • Verify the operational acceptability of new procedures and develop mitigations as appropriate
<p>Human-Machine Interface and Interaction Research <i>Systems, Displays, Controls</i></p> 	<ul style="list-style-type: none"> • Provide data on the contribution of technology to human performance and safety • Inform evidence-based human factors standards, guidelines, requirements, and other documentation for systems, displays, and controls • Support technology design reviews, down-selection of alternatives, and response to emerging user interface and interaction issues • Data on user interactions with advanced technologies – e.g., understanding of system behavior, logic, limitations, minimum system transparency needs

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

DP #	Target Date CY	Primary Domain	Type	Name
1007	2027 Q3	Automation	FID	Final Investment Decision (FID) for TBFM Enhancement 2
1131	2023 Q4	Human Systems Integration	Strategy (Other)	Decision on the Approval and Implementation Strategy of Human Factors System Safety Guidance
1134	2024 Q3	Human Systems Integration	Strategy (Other)	Decision on the Approval and Implementation Strategy of Human Factors Guidance for Helicopter Advanced Vision Systems
1389	2025 Q4	Human Systems Integration	Strategy (Other)	Decision to Adapt and Implement Human Readiness Levels in System Development and Acquisition Guidance

Information Systems Security

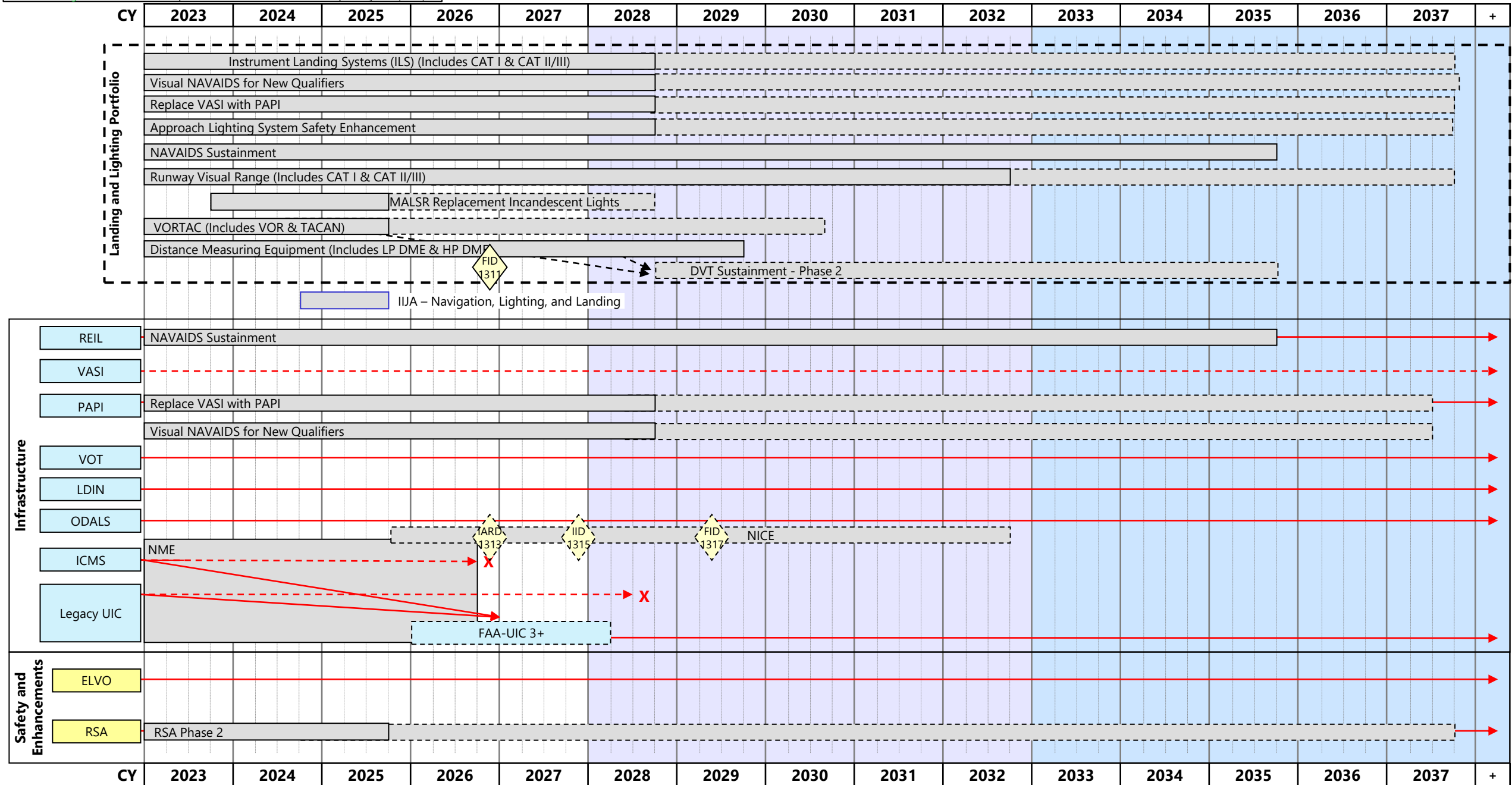
The Information Systems Security roadmap represents the evolution of existing or planned information security services and capabilities to protect NAS systems and data from the continuous cyber threat. The roadmap depicts the information security-related services from the Enterprise Services Roadmap and the supporting policy development activities, feasibility studies, and prototypes to enable the ISS capabilities.

Navigation

The Navigation roadmap depicts the establishment, sustainment and evolution of ground-based, satellite-based, and visual navigation systems which enable aircraft to determine and report their position, navigate in accordance with clearances, and efficiently transit the NAS. These systems support conventional and Performance-Based Navigation (PBN) for the NAS and will ensure safe, efficient, and resilient services.

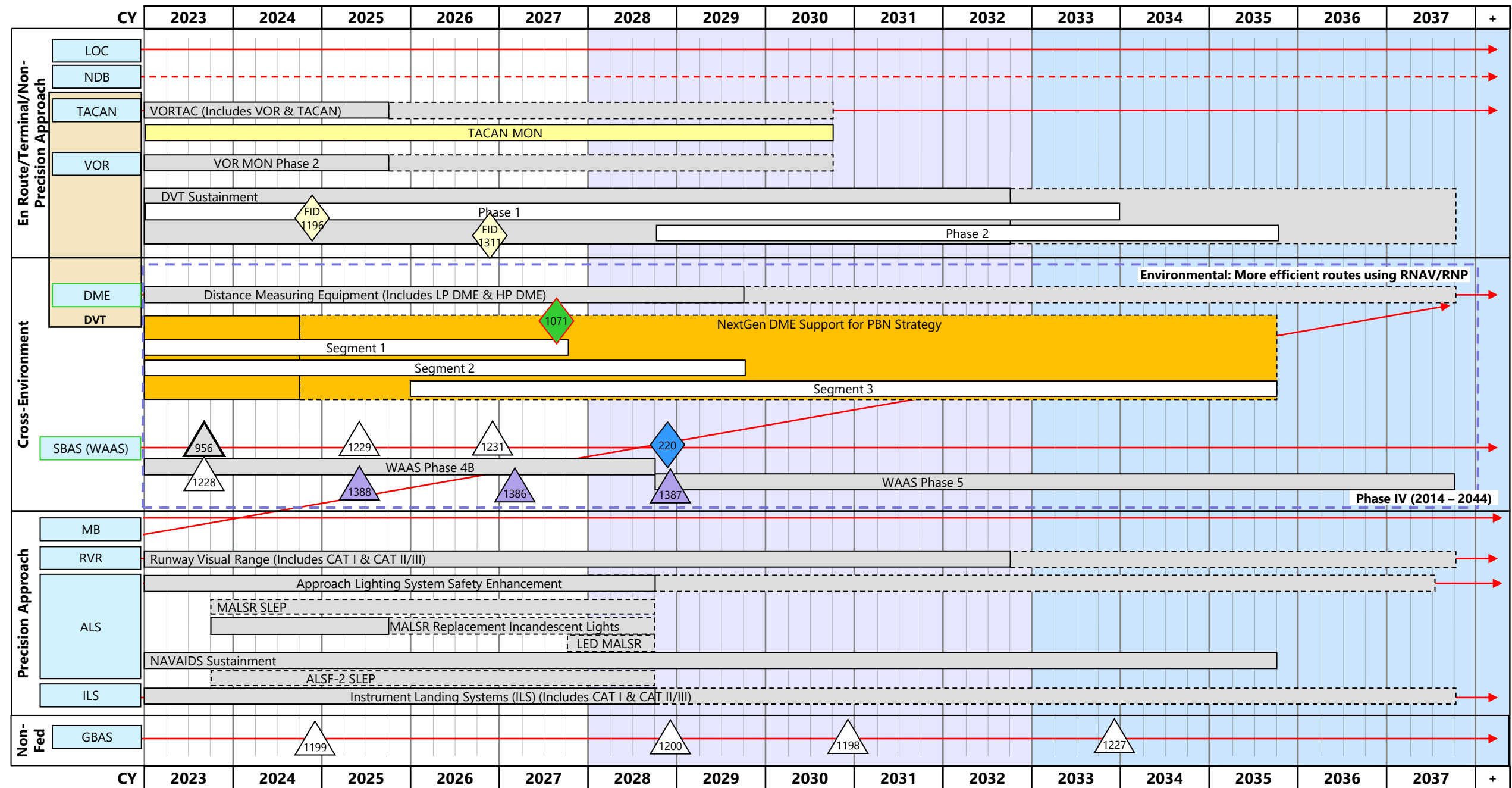
Items with a blue outline are lines of funding from the Infrastructure Investment & Jobs Act (IIJA), also known as the Bilateral Infrastructure Law (BIL).
 Items with a green outline are components of the FAA Minimum Capability List (MCL)

Navigation Roadmap (1 of 3)



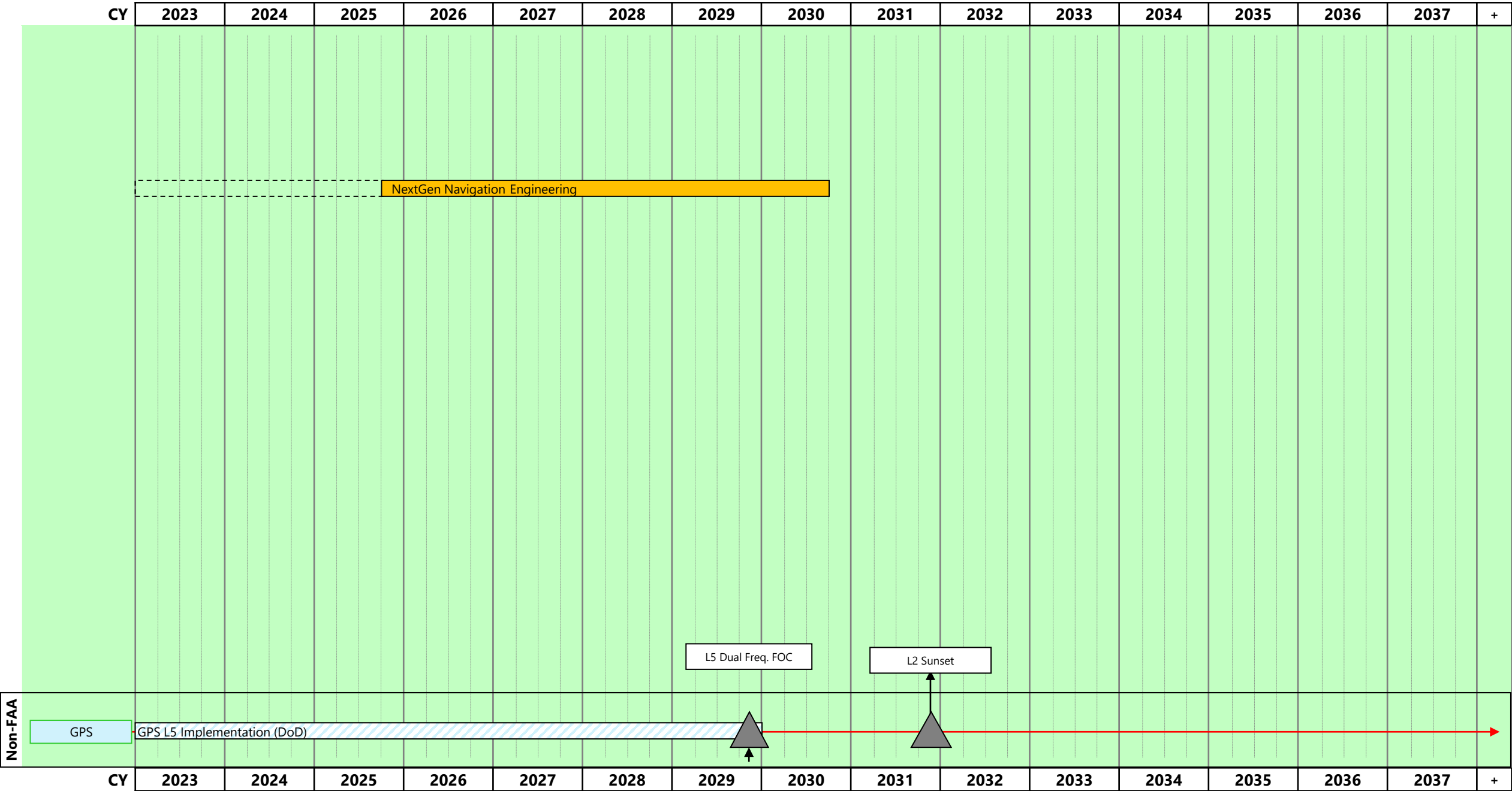
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Navigation Roadmap (2 of 3)



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Navigation Roadmap (3 of 3)



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Navigation Roadmap: Assumptions (1 of 2)

Identifier	Description
NAV-01	<p>FAA is transitioning to PBN operations as the primary capability for daily aircraft operations. PBN is comprised of RNAV and RNP routes and procedures for en route, terminal, and approach & landing operations. This will include:</p> <ul style="list-style-type: none"> a) Transition from conventional routes and procedures defined by VOR to RNAV and RNP approaches enabled by GNSS and DME RNAV navigation as a GNSS outage backup. b) Expansion of Localizer Performance Vertical (LPV) approach procedures enabled by GNSS to provide vertical guidance to all qualifying airports. c) Enhance the DME network to expand DME RNAV coverage for en route and terminal operations as part of a resilient navigation infrastructure
NAV-02	<p>NextGen implementation requires an aggressive transition to services that support Performance-Based Navigation (PBN). This requires:</p> <ul style="list-style-type: none"> a) Navigation Strategy to be fully aligned with the FAA's PBN NAS Navigation Strategy, which provides: <ul style="list-style-type: none"> 1. Clearly defined operational needs and establishment of PBN services for airports and airspace. 2. Close collaboration with the aviation stakeholders
NAV-03	<p>Need to continue working closely with users and the avionics industry to support additional aircraft equipage to facilitate the transition to PBN operations throughout the NAS</p> <ul style="list-style-type: none"> a) The PBN Strategy provides operational benefits that encourage voluntary equipage. b) Equipage must be in place to support transition to PBN
NAV-04	<p>PBN strategy includes the need for a resilient navigation infrastructure to maintain safety, security, and capacity and preclude significant economic impact during GNSS outages. This includes:</p> <ul style="list-style-type: none"> a) Establishing a VOR MON to ensure continued en route and approach operations during GNSS disruptions for aircraft that are not equipped for DME RNAV. b) Providing infrastructure to enable DME RNAV aircraft to continue to their destination served by an ILS approach during GNSS disruptions. c) Sustain ILSs to support approach and landing operations during GNSS disruptions. d) Investigate complementary PNT capabilities to provide resiliency for evolving operational needs.

Navigation Roadmap: Assumptions (2 of 2)

Identifier	Description
NAV-05	FAA has no current plan to acquire Federal GBAS systems. GBAS installations will depend on individual airports' interest and investment.
NAV-06	Department of Defense will maintain a GPS constellation consistent with the Standard Positioning Service. Continue close coordination with DOD to ensure GPS continues to meet the PNT needs for aviation.
NAV-07	The Navigation Roadmap provides an infrastructure strategy to support all phases of flight.
NAV-08	In the future, the DME and VORTAC CIP will no longer be managed in the Landing and Lighting Portfolio and will be transitioned into the DVT Sustainment Program Phase 2.

Navigation Roadmap: Decision Points (1 of 1)

DP #	Target Date CY	Primary Domain	Type	Name
220	2028 Q4	Navigation	Strategy (Other)	Decision to cut over to Dual Frequency IOC Operations
956	2023 Q3	Aircraft	Other Milestone	Publication of SBAS Dual-Frequency\Multi-Constellation (DFMC) MOPS
1071	2027 Q3	Navigation	Strategy	Strategy Decision to determine Next Steps for NextGen DME in support of the PBN Strategy
1196	2024 Q4	Navigation	FID	Final Investment Decision for DVT Sustainment Program Phase 1
1198	2030 Q4	Navigation	Other Milestone	GBAS DFMC ICAO SARPS - Initial Draft
1199	2024 Q4	Navigation	Other Milestone	GBAS DFMC RTCA MOPS - Initial Draft
1200	2028 Q4	Navigation	Other Milestone	GBAS DFMC RTCA MOPS - Final Draft
1227	2033 Q4	Navigation	Other Milestone	GBAS Dual-Frequency Multi-Constellation Standards for Applicability
1228	2023 Q3	Navigation	Other Milestone	SBAS L1/L5 MOPS Part 1
1229	2025 Q2	Navigation	Other Milestone	SBAS L1/L5 MOPS Part 2
1231	2026 Q4	Navigation	Other Milestone	SBAS L1/L5 SARPS Part 2
1311	2026 Q4	Navigation	FID	Final Investment Decision (FID) for DVT Sustainment Program Phase 2
1313	2026 Q4	Navigation	IARD	Investment Analysis Readiness Decision (IARD) for Nav aids Interface-Connect Equipment (NICE)
1315	2027 Q4	Navigation	IID	Initial Investment Decision (IID) for Nav aids Interface-Connect Equipment (NICE)
1317	2029 Q2	Navigation	FID	Final Investment Decision (FID) for Nav aids Interface-Connect Equipment (NICE)
1386	2027 Q1	Navigation	Other Milestone	H-ARAIM IOC
1387	2028 Q4	Navigation	Other Milestone	H-ARAIM FOC
1388	2025 Q2	Navigation	Other Milestone	DFMC H-ARAIM MOPS

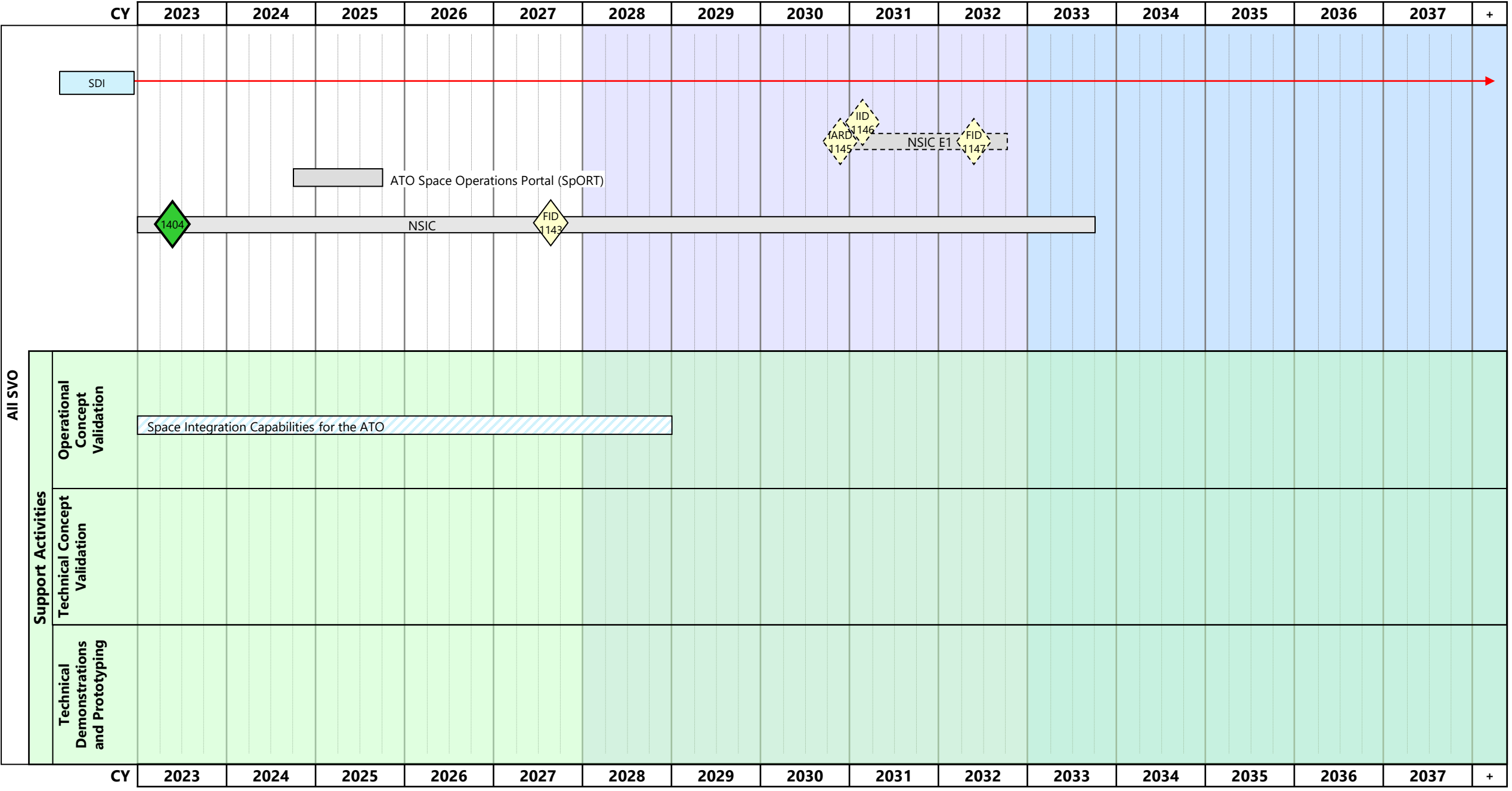
New Entrants

The New Entrants roadmap provides a consolidated timeline of activities and investments, both active and planned, required to integrate UAS and Commercial Space into the NAS.

New Entrants – Commercial Space

The New Entrants Commercial Space Roadmap presents an Executive View (EV) of the current systems supporting the National Airspace System (NAS) and their enhancement, sustainment or replacement through major development programs and support activities. The Commercial Space Roadmap is intended to convey the major program strategy and acquisition decision points as well as program execution through the In-Service Decision. The roadmap serves as a summary view of more detailed plans within each development program.

New Entrants – Commercial Space Roadmap (1 of 1)



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New Entrants – Commercial Space Roadmaps: Assumptions

Identifier	Description
CS-01	NSIC Implementation is dependent on TFMS/ ERAM/ STARS development bandwidth

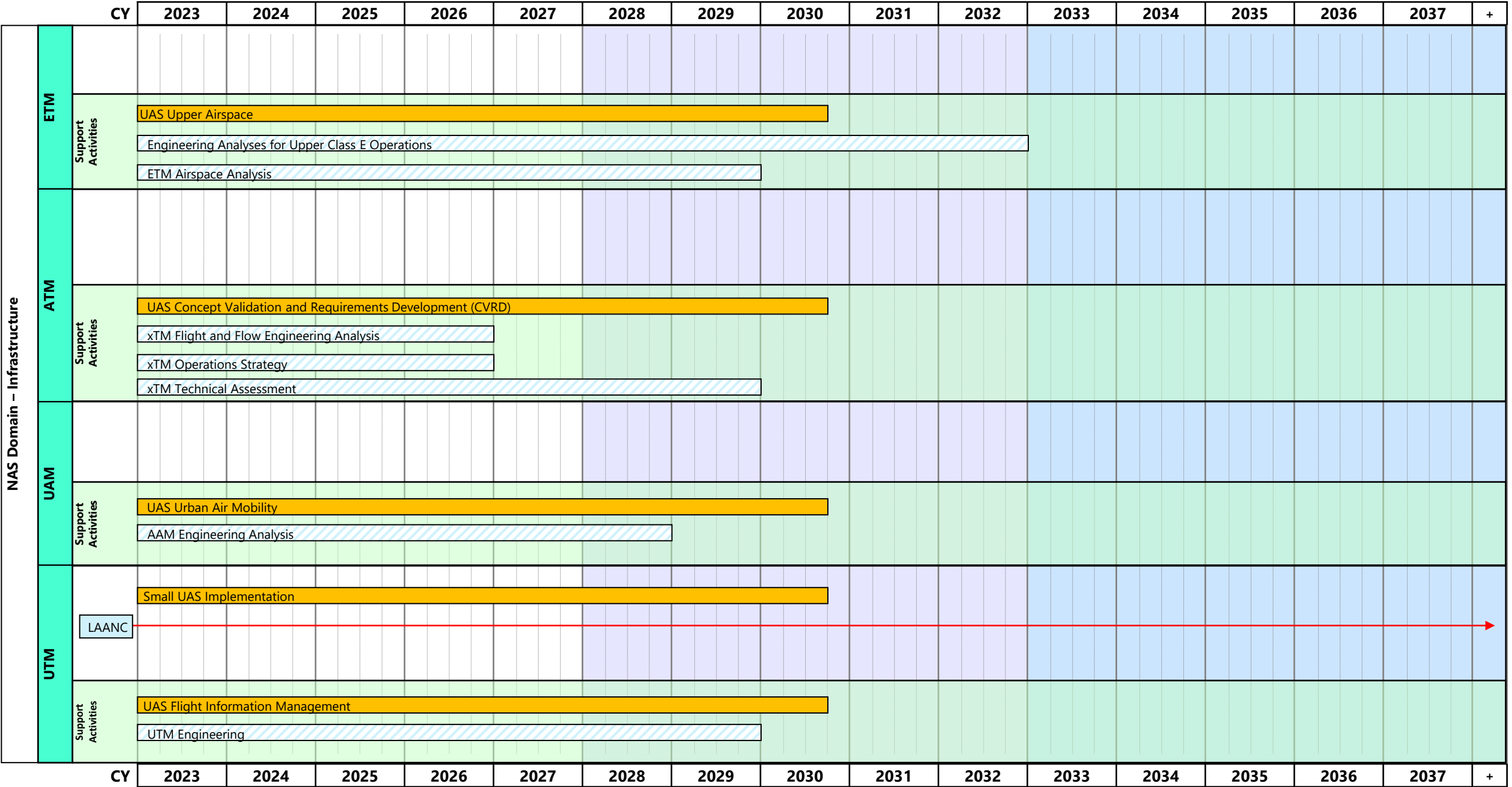
New Entrants – Commercial Space Roadmap: Decision Points (1 of 1)

DP #	Target Date CY	Primary Domain	Type	Name
1143	2027 Q3	NE: Commercial Space	FID	Final Investment Decision (FID) for National Airspace System (NAS) Space Integration Capabilities (NSIC)
1145	2030 Q4	NE: Commercial Space	IARD	Investment Analysis Readiness Decision (IARD) for National Airspace System (NAS) Space Integration Capabilities (NSIC) Enhancement 1
1146	2031 Q1	NE: Commercial Space	IID	Initial Investment Decision (IID) for National Airspace System (NAS) Space Integration Capabilities (NSIC) Enhancement 1
1147	2032 Q2	NE: Commercial Space	FID	Final Investment Decision (FID) for National Airspace System (NAS) Space Integration Capabilities (NSIC) Enhancement 1
1404	2023 Q2	NE: Commercial Space	Strategy	Strategy Decision for NSIC

New Entrants – Unmanned Aircraft Systems

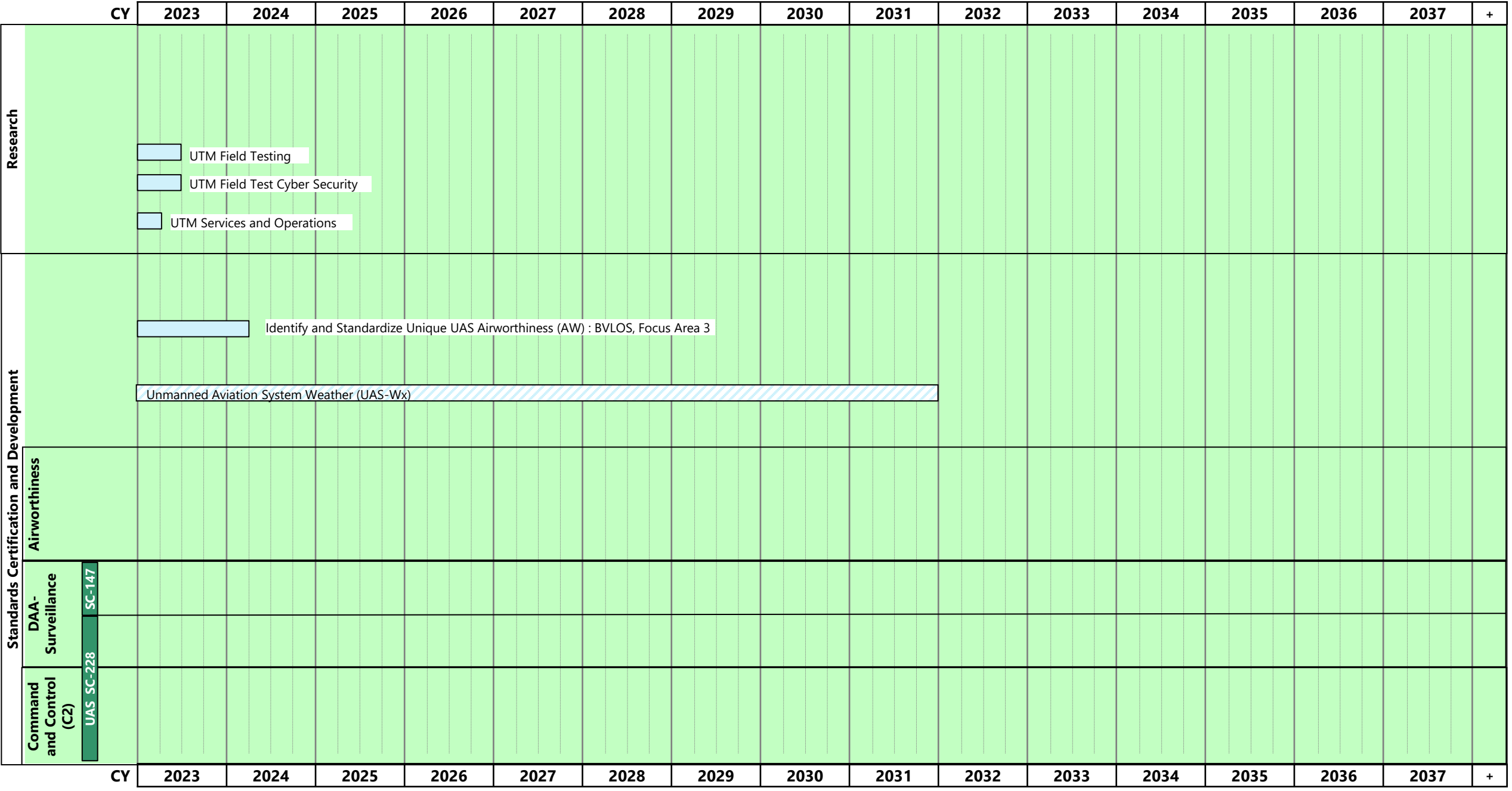
The Unmanned Aircraft Systems (UAS) Roadmaps provide a consolidated timeline of activities and investments, both active and planned, required to integrate UAS operations into the NAS. The current iteration of the roadmaps reflect initial pre-implementation efforts and AMS acquisitions. In the next few years, the FAA UAS community plans to coordinate with the program offices associated with impacted NAS systems and services currently identified and described in the “Integration of Civil Unmanned Aircraft Systems (UAS) in the National Airspace System (NAS) Roadmap” (July 2018). Additionally, the FAA UAS community will collaborate with applicable program offices in requirements allocations decisions, which will be reflected in future versions of this roadmap.

New Entrants – UAS Roadmap (1 of 2)



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New Entrants – UAS Roadmap (2 of 2)



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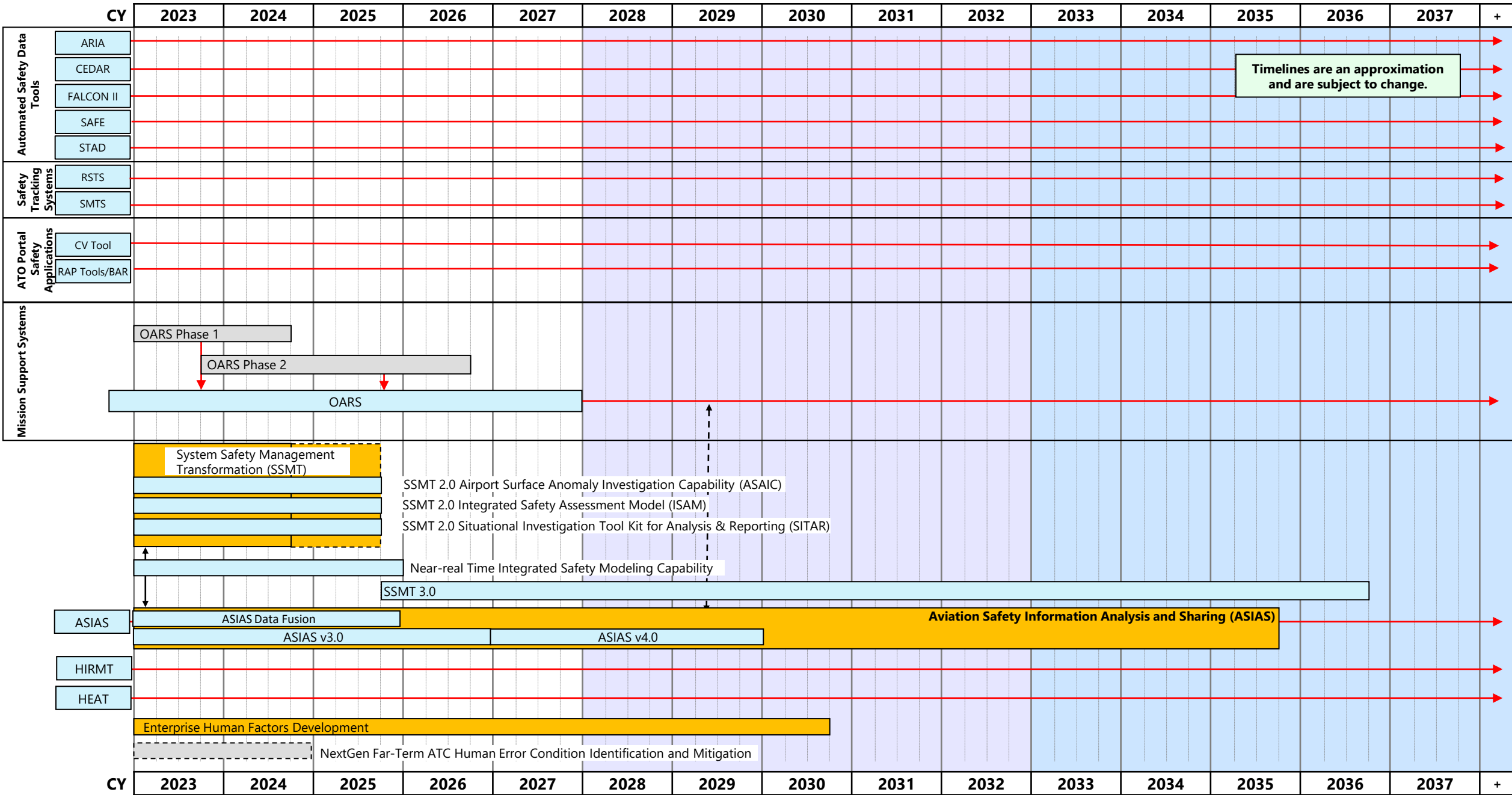
New Entrants – UAS Roadmap: Assumptions

Identifier	Description
UAS-01	<p>The Authoritative references used to populate the CY2019 UAS roadmaps are:</p> <ol style="list-style-type: none">1) “Integration of Civil Unmanned Aircraft Systems (UAS) in the National Airspace System (NAS) Roadmap” (July 2018)2) CIP data provided by AFN and Draft CIP FY 2020 – FY20243) UAS Integration Research Plan (2017 – 2022)4) Other NAS Infrastructure Roadmaps5) UAS Stakeholder inputs
UAS-02	<p>Although impacted NAS systems are identified and documented in “Integration of Civil Unmanned Aircraft Systems (UAS) in the National Airspace System (NAS) Roadmap” (July 2018), requirements allocations have not been discussed and accepted by the organizations that manage the impacted systems. Upon coordination and decisions made about UAS requirements allocation, ANG-B intends to update this roadmap to depict acquisitions that will deliver UAS-related requirements in the future.</p>
UAS-03	<p>Research and Development: The full scope of research and development activities are too numerous and complex to depict on this format of the roadmaps. Roadmap stakeholders are encouraged to reference pages 10, 35 and 38 of “Integration of Civil Unmanned Aircraft Systems (UAS) in the National Airspace System (NAS) Roadmap” (July 2018) to understand the full scope of FAA UAS R&D efforts.</p>

Safety

The Safety Roadmap reflects various aspects of the Safety Risk Management (SRM) process that support enterprise level, concept/capability level, and system level safety. It supports the execution of safety assessments on potential safety issues that span multiple FAA organizations, through cross-cutting stakeholder collaboration, and provides FAA decision-makers with pertinent information to make risk-based decisions. The Safety Roadmap integrates SRM elements with NAS operations and system acquisition milestones through the development of key safety assessments, procedures, guidance, policy and requirements that support the NextGen Enterprise System.

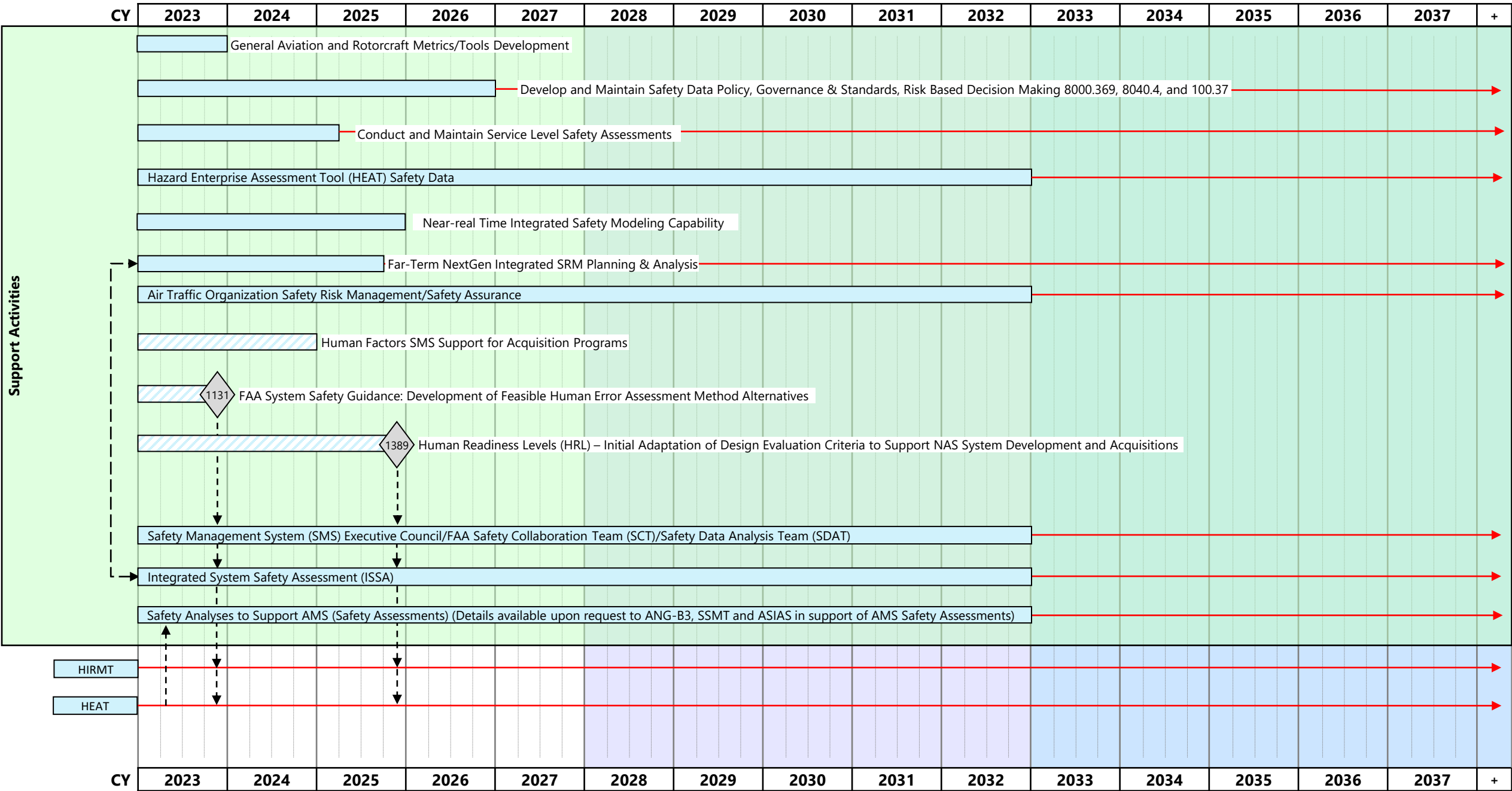
Safety Roadmap (1 of 2)



Timelines are an approximation and are subject to change.

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Safety Roadmap (2 of 2)



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Safety Roadmap: Assumptions

Identifier	Description
SAFE-01	ASIAS is part of the FAA Mission Support 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 FAA Mission Support EA. These activities are depicted on the Safety Infrastructure Roadmap for coordination purposes.

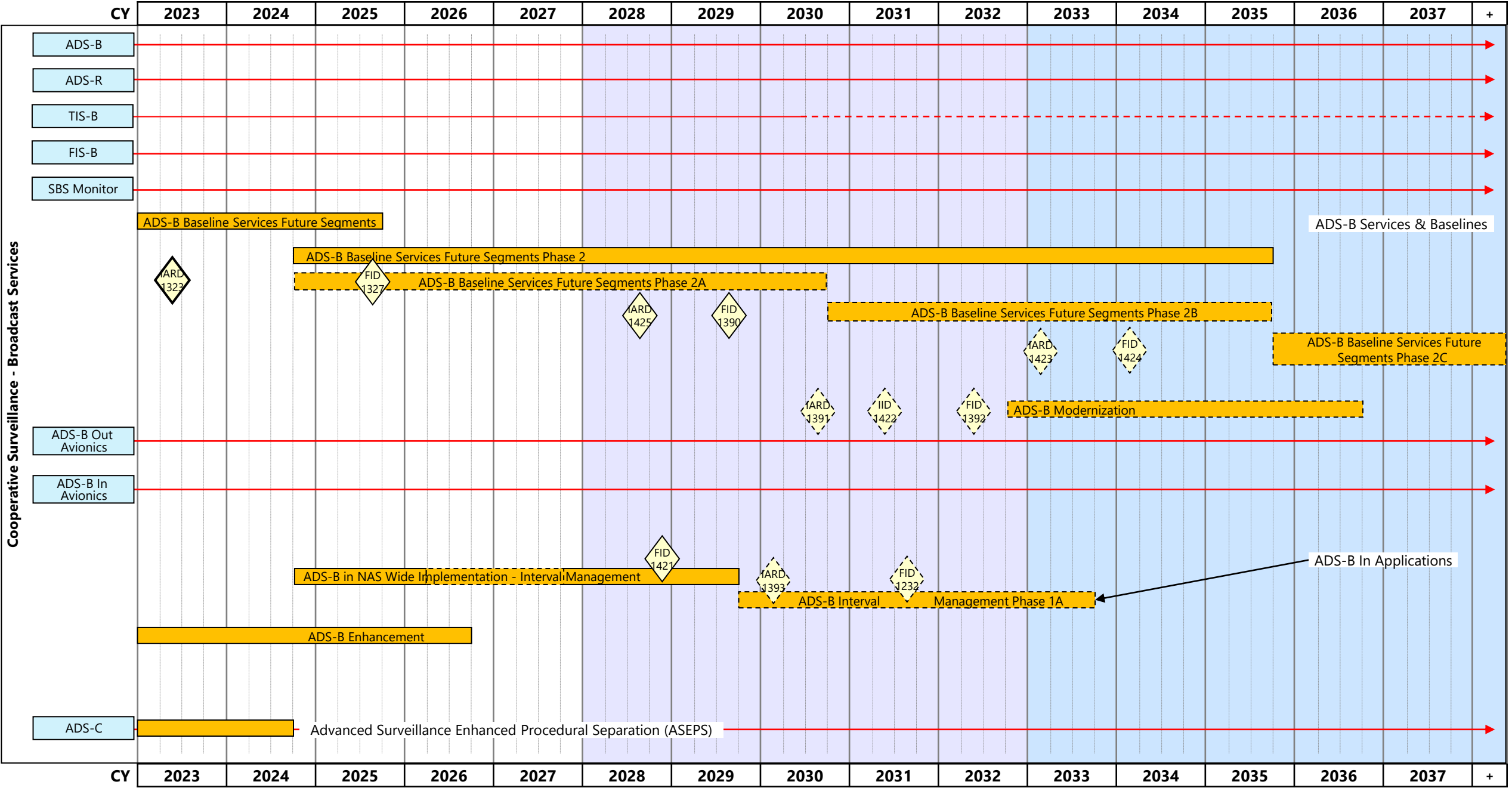
Safety Roadmap: Decision Points (1 of 1)

DP #	Target Date CY	Primary Domain	Type	Name
1131	2023 Q4	Human Systems Integration	Strategy (Other)	Decision on the Approval and Implementation Strategy of Human Factors System Safety Guidance
1389	2025 Q4	Human Systems Integration	Strategy (Other)	Decision to Adapt and Implement Human Readiness Levels in System Development and Acquisition Guidance

Surveillance

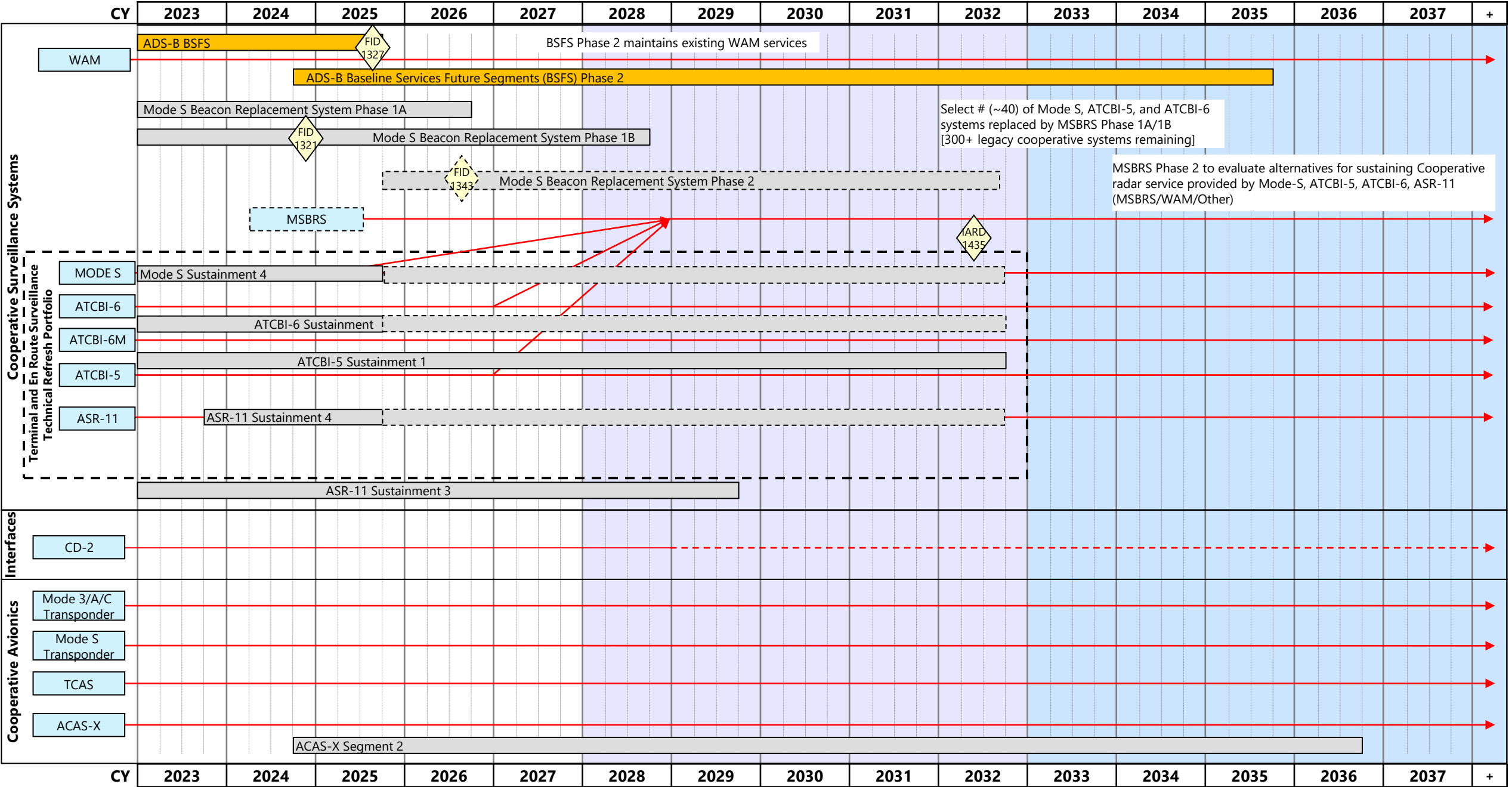
The Surveillance roadmap depicts the sustainment of legacy surveillance systems and the evolution towards the NextGen environment.

Surveillance Roadmap (1 of 4)



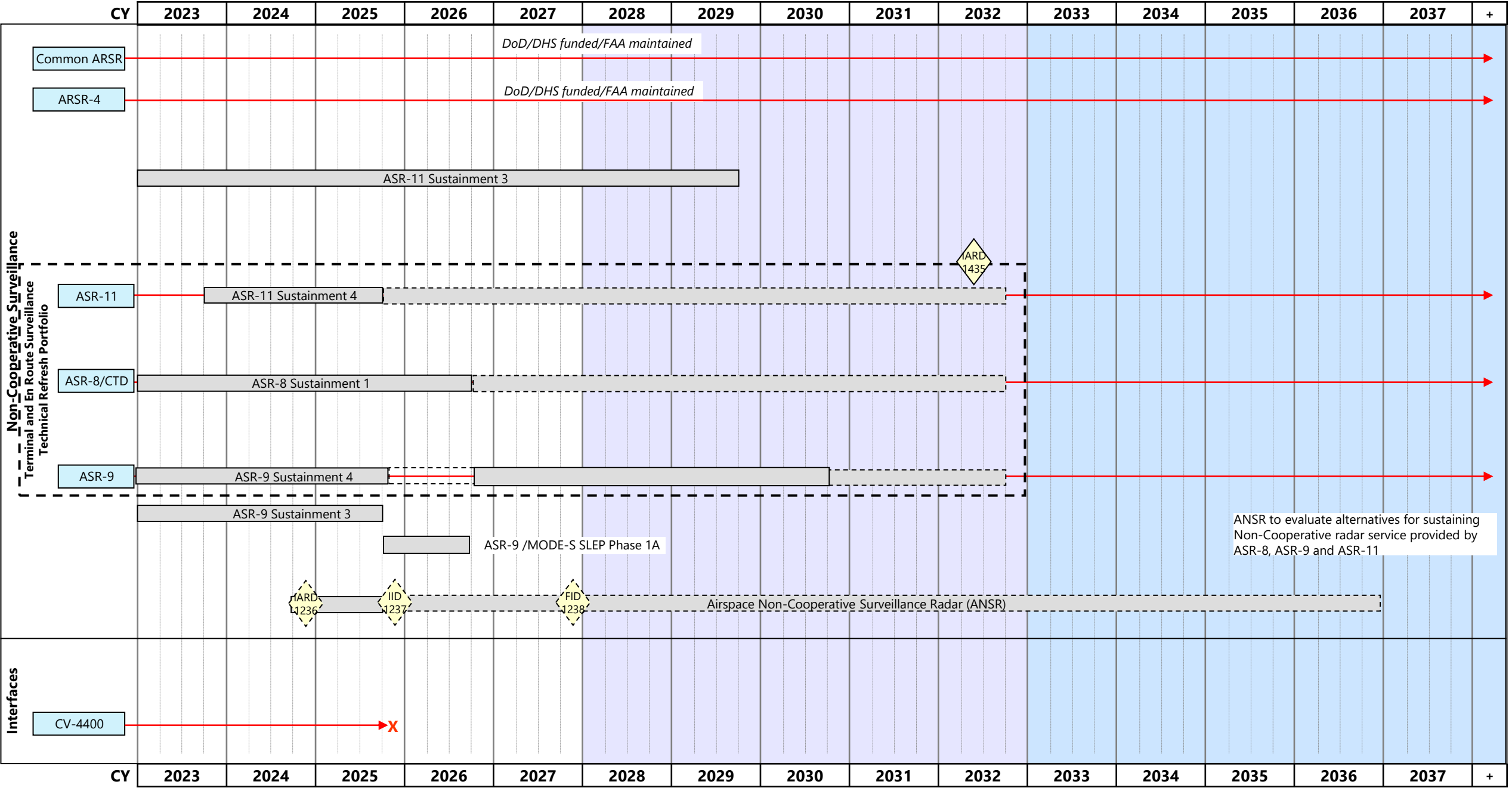
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Surveillance Roadmap (2 of 4)



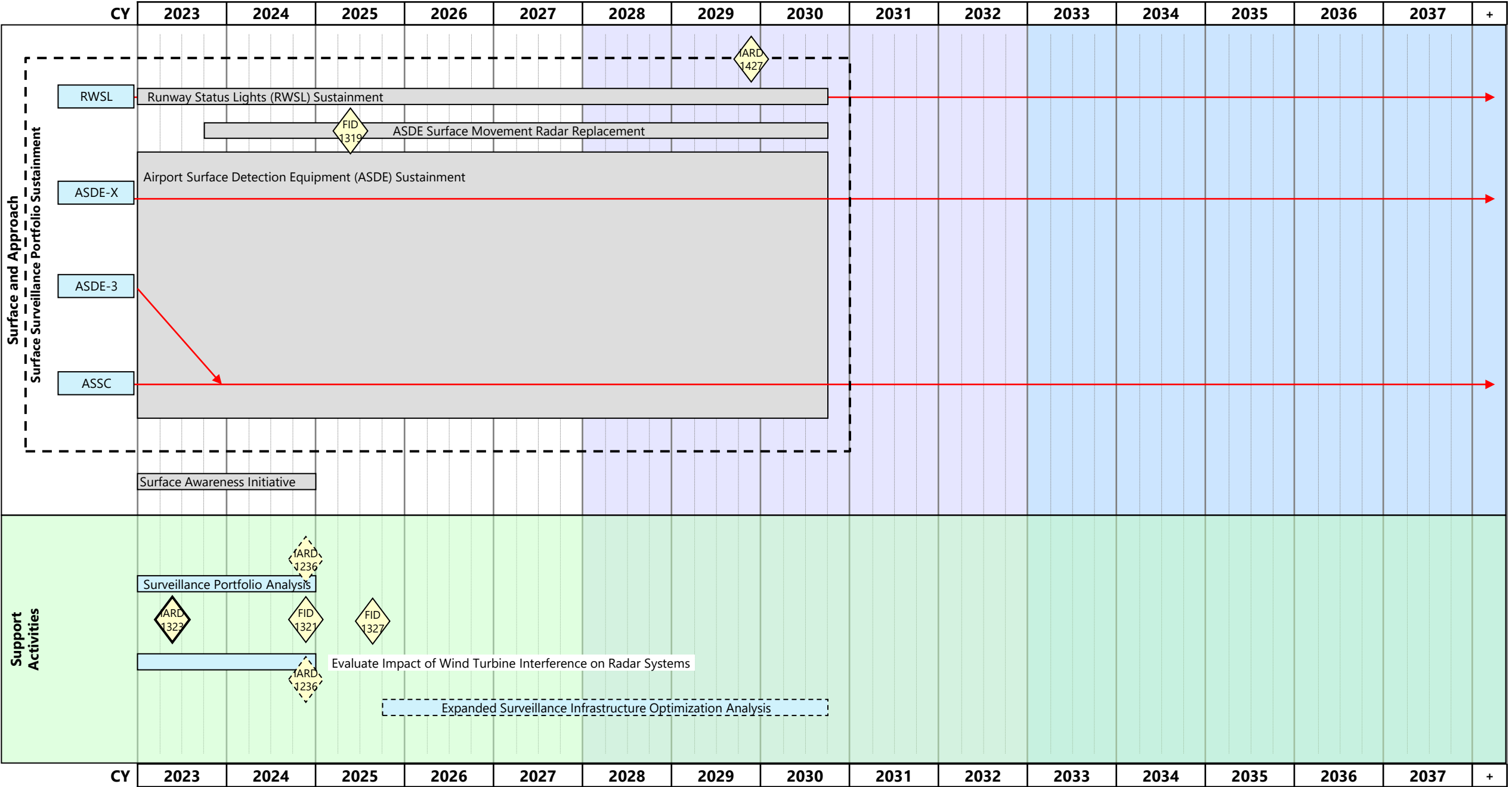
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Surveillance Roadmap (3 of 4)



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Surveillance Roadmap (4 of 4)



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Surveillance Roadmap: Assumptions

Identifier	Description
SURV-01	Backup to mitigate loss of on-board GPS positioning source for ADS-B is required: a) Retain all en route beacons (~150 monopulse systems) b) Retain limited set of terminal beacons (or WAM) based on need (Core 30 airports for resiliency, other airports based on economic analysis and ADS-B equipage rates) c) All terminal non-cooperative surveillance coverage areas are retained for safety purposes d) Selected terminal surveillance systems that will no longer be required will be divested starting in CY2020
SURV-02	The Mode-S Beacon Replacement System (MSBRS) will replace all remaining beacon systems that are not replaced by WAM
SURV-03	The ANSR program will determine the long-term upgrade strategy of the ASR-8, ASR-9, and ASR-11 (PSR portion) systems

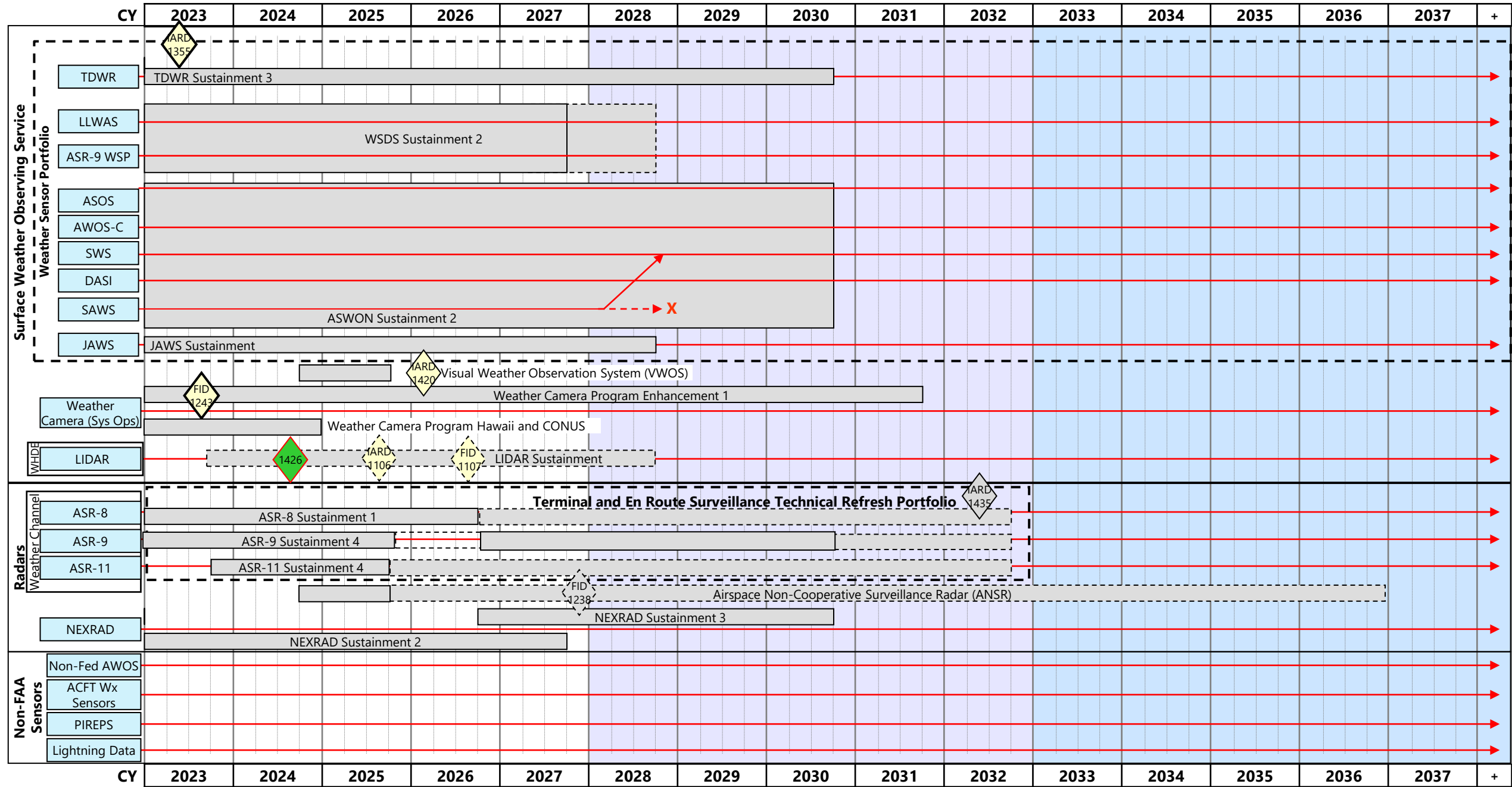
Surveillance Roadmap: Decision Points (1 of 1)

DP #	Target Date CY	Primary Domain	Type	Name
1232	2031 Q3	Surveillance	FID	Final Investment Decision (FID) for ADS-B In Applications: IM Phase 1A
1236	2024 Q4	Surveillance	IARD	Investment Analysis Readiness Decision (IARD) for Airspace Non-cooperative Surveillance Radar (ANSR)
1237	2025 Q4	Surveillance	IID	Investment Initial Decision (IID) for Airspace Non-cooperative Surveillance Radar (ANSR)
1238	2027 Q4	Surveillance	FID	Final Investment Decision (FID) for Airspace Non-cooperative Surveillance Radar (ANSR)
1319	2025 Q2	Surveillance	FID	Final Investment Decision (FID) for ASDE-3 Surface Movement Radar (SMR) Replacement
1321	2024 Q4	Surveillance	FID	Final Investment Decision (FID) for MSBRS Phase 1B
1323	2023 Q2	Surveillance	IARD	Investment Analysis Readiness Decision (IARD) for ADS-B Baseline Services Future Segments Phase 2A
1327	2025 Q3	Surveillance	FID	Final Investment Decision (FID) for ADS-B Baseline Services Future Segments Phase 2A
1343	2026 Q3	Surveillance	FID	Final Investment Decision (FID) for Mode S Beacon Replacement System Phase 2
1390	2029 Q3	Surveillance	FID	Final Investment Decision (FID) for Automatic Dependent Surveillance-Broadcast (ADS-B) Baseline Services Future Segments (BSFS) P2B
1391	2030 Q3	Surveillance	IARD	Investment Analysis Readiness Decision (IARD) for Automatic Dependent Surveillance-Broadcast (ADS-B) Modernization
1392	2032 Q2	Surveillance	FID	Final Investment Decision (FID) for Automatic Dependent Surveillance-Broadcast (ADS-B) Modernization
1393	2030 Q1	Surveillance	IARD	Investment Analysis Readiness Decision for ADS-B In Applications: IM Phase 1A
1421	2028 Q4	Surveillance	FID	Final Investment Decision (FID) for ADS-B Interval Management
1422	2031 Q2	Surveillance	IID	Initial Investment Decision (IID) for ADS-B Modernization
1423	2033 Q1	Surveillance	IARD	Investment Analysis Readiness Decision (IARD) for ADS-B BSFS Phase 2C
1424	2034 Q1	Surveillance	FID	Final Investment Decision (FID) for ADS-B BSFS Phase 2C
1425	2028 Q3	Surveillance	IARD	Investment Analysis Readiness Decision (IARD) for ADS-B BSFS Phase 2B
1427	2029 Q4	Surveillance	IARD	Investment Analysis Readiness Decision (IARD) for Surface Portfolio Sustainment
1435	2032 Q2	Surveillance	IARD	Investment Analysis Readiness Decision (IARD) for Terminal and En Route Surveillance Technical Refresh Portfolio Phase 2

Weather

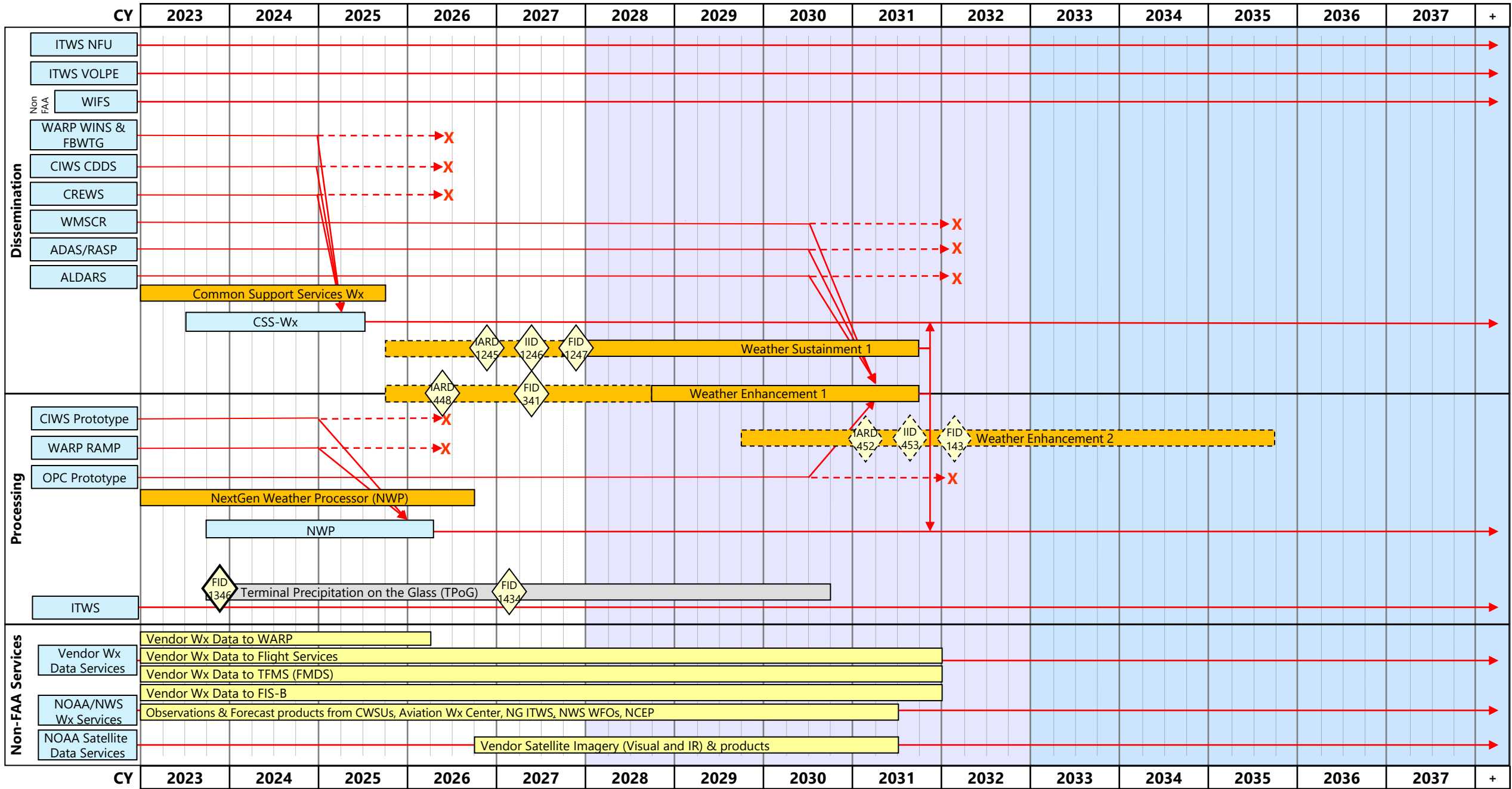
The Weather Roadmap presents an Executive View (EV) of weather-related acquisition activities and the changes to these activities that exist within the Weather enterprise architecture (EA) domain (projects and programs) of the Federal Aviation Administration (FAA). The Weather Roadmap provides the evolution of the weather architecture via AMS milestones and related activities (e.g., aviation weather research, demonstrations, and other agency activities) necessary to achieve the performance objectives and capabilities to support NextGen. As a perspective of the changes in the NAS operational environment, the Weather Roadmap reflects major Weather interdependencies to support (or be supported by) other domains in the NAS enterprise architecture as depicted in NAS Roadmaps.

Weather Roadmap (1 of 4)



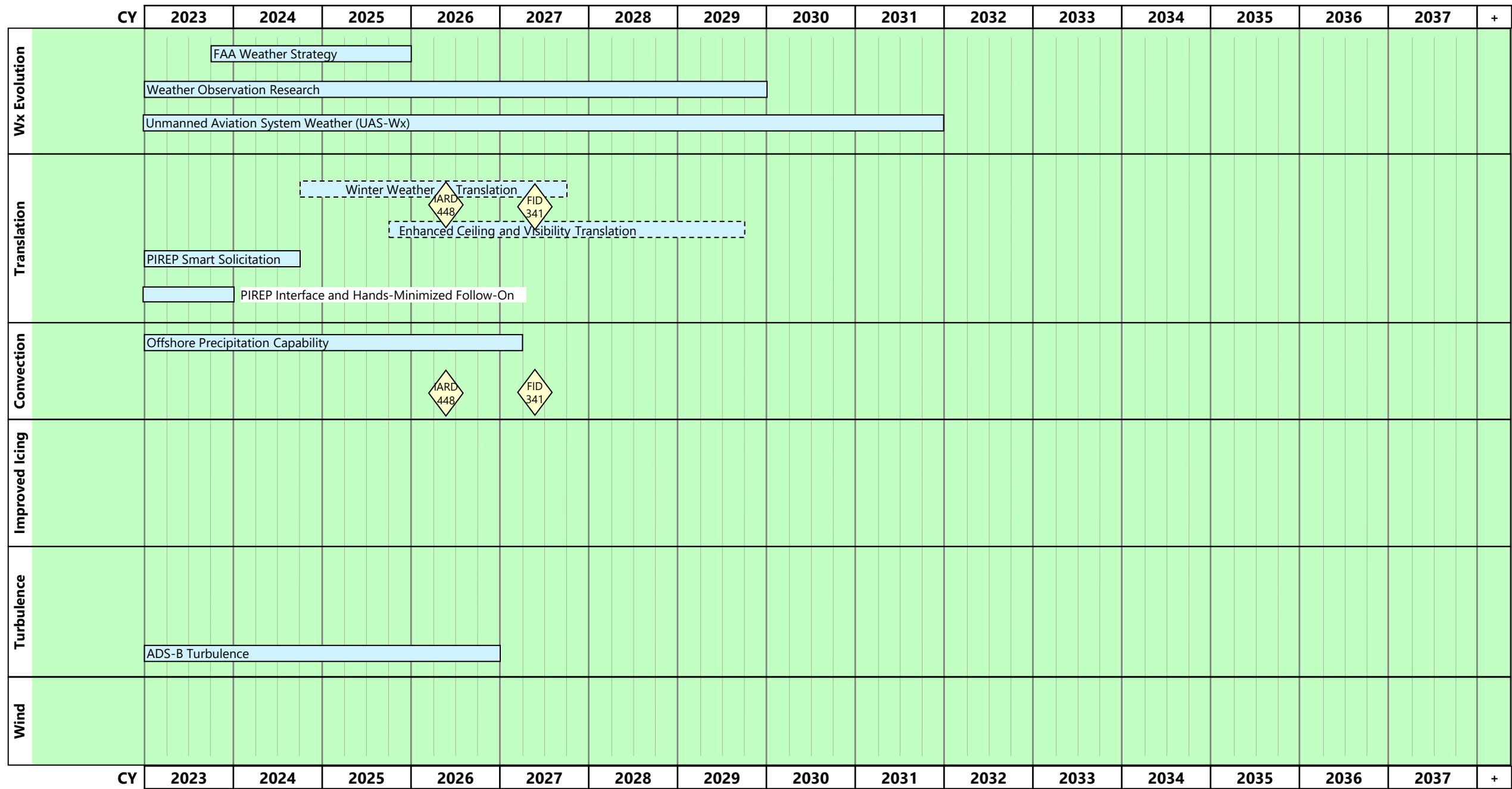
BASELINE

Weather Roadmap (2 of 4)



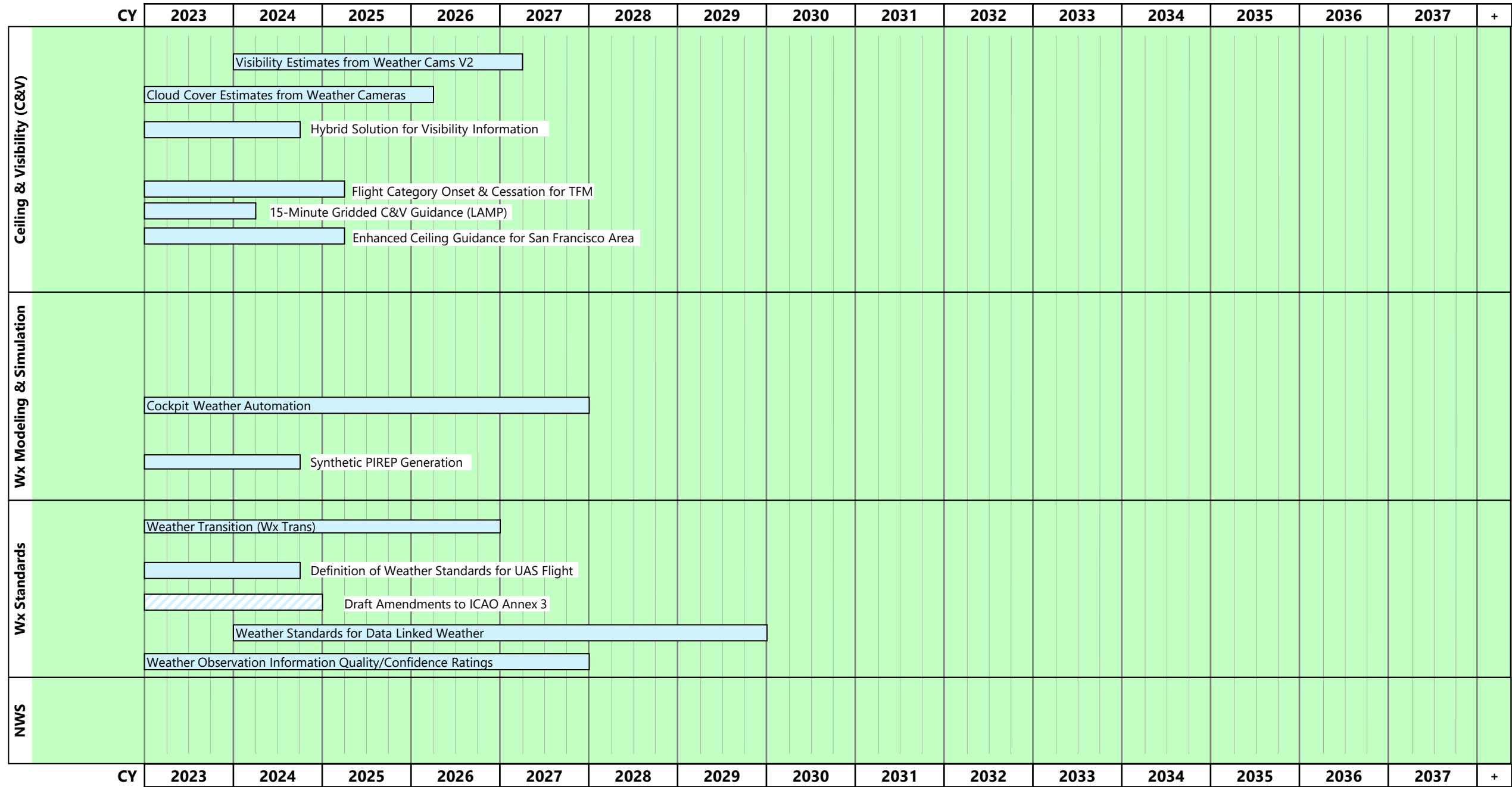
BASELINE

Weather Roadmap (3 of 4)



BASELINE

Weather Roadmap (4 of 4)



BASELINE

Weather Roadmap: Assumptions (1 of 3)

Identifier	Description
WX-01	Ongoing NextGen Weather functional & performance requirements validation may result in new/emerging requirements in NextGen Weather Architecture.
WX-02	<p>FAA Surface Weather Observing Service divides into four functional 'Sustainment' Sensor portfolios: A) Weather Radar, B) Wind Shear Detection Systems (WSDS), C) Aviation Surface Weather Observing Systems (ASWON), and D) other, under Weather Observation Services:</p> <p>A) Radars Portfolio includes:</p> <ol style="list-style-type: none"> 1) ASR-8, ASR-9 and ASR-11 Terminal systems (under the cognizance of FAA Surveillance) evolve to ANSR (Airspace Non-cooperative Surveillance Radar). 2) TDWR with Sustainment 2 extends to 2024; Sustainment 3 extends to 2030. 3) NEXRAD, a Tri-Agency (FAA, DoD & NOAA/NWS) radar network covering CONUS & OCONUS supporting FAA users in both En route and Terminal is Sustained to 2027 (Sus 2) and to 2030 (Sus 3). <p>B) WSDS Sustainment 2 Portfolio addresses LLWAS and ASR-9 WSP obsolescence issues for Sustainment to 2027-2028.</p> <p>C) The ASWON Portfolio has been standardized into ASOS/AWOS-C/SWS systems. All legacy AWOS were decommissioned (FAA upgraded them to AWOS-C) and along with AWSS, WEF, and C&G DASI systems are part of the ASWON Sustainment Program. During ASWON Sustainment 2 all SAWs will be replaced with SWS as well as address future obsolescence of the ASWON portfolio systems to allow sustainment to 2030.</p> <p>D) Others Includes both JAWS (Turbulence detection) funded to 2028, and LIDAR (Dry Microburst detection) that exist as unique systems at a single airport. LIDAR is O&M funded.</p>
WX-03	<p>Under Weather Dissemination, two systems will be subsumed by Weather Enhancement 1:</p> <ol style="list-style-type: none"> A) ADAS-Rehost serves as consolidating access point for Surface Weather observations. B) WMSCR communications functionality and ADAS RASP, including ALDARS functionality.
WX-05	The NAS Weather Infrastructure Portfolio incorporates R&D Research to Ops (RTO) with new weather products/information with increased forecast accuracy/frequency to NAS Users with minimal architectural/infrastructure change. Moreover, RTO Support Activities will further augment support to NAS operational decision-making by including weather "translation" as well as "uncertainty" capabilities.

Weather Roadmap: Assumptions (2 of 3)

Identifier	Description
WX-06	<p>Weather processing functions converge into NextGen Weather Processor (NWP) that will be implemented in several phases. Initial NWP implementation (formerly called NWP WP1) provides NWP-Central services replacing prototype separate CIWS and CoSPA convective weather forecast capabilities with a 0-8 hour merged forecast capability. The Weather and Radar Processor (WARP) Radar Acquisition and Mosaic Processor (RAMP) function is subsumed in initial NWP implementation.</p> <p>Weather Enhancement 1 hosts Wx R&D algorithms matured since initial implementation baseline freeze including improved Convective and Translation algorithms.</p> <p>NWP Enhancement 2 will implement NextGen weather Far-term capabilities. ITWS (including ITWS VOLPE and ITWS NFU) will continue providing terminal weather information for pacing airports.</p>
WX-08	<p>NAS Infrastructure Portfolio will supply weather information at user-specified resolution, both spatially and temporally. NWP will host the first NextGen mid-term "weather translation" product, e.g., Weather Avoidance Fields (WAF) to TFM of convective weather constraints to aircraft movement in NAS airspace (delivered by CSS-Wx). Weather Enhancement 1 will add additional weather Translation products e.g. Turbulence, Wind, Ceiling, Visibility and Precipitation. NWP Sustainment 1 continues necessary system components updates out to 2032.</p>
WX-09	<p>Products developed from requirements allocated to NWS, will likely be delivered to FAA via NWS' NextGen IT Web Services (NG-ITWS). These products will be accessible via CSS-Wx initial implementation or via Weather Enhancement 1.</p>
WX-10	<p>To address emerging anti-icing regulations and to mitigate automated surface observing shortfalls at Level A/B airports, FAA will continue to evaluate R&D opportunities in sensor and algorithm development to improve precipitation discrimination (freezing/frozen/liquid including ice pellets and drizzle). Once mature and tested to meet all FAA automated sensor requirements, in conjunction with NWS this capability will be integrated into ASOS/AWOS-C to support aircraft and airport ground anti/de-icing operations.</p>
WX-11	<p>Weather observation/forecast R&D will continue to be periodically evaluated for maturity to determine whether new/improved functionality should be implemented.</p>

Weather Roadmap: Assumptions (3 of 3)

Identifier	Description
WX-12	FAA will transmit validated Weather Forecast Performance Requirements to NWS after having successfully completed associated supporting activity and validation in Wx Modeling & Simulation. When FAA requirements are finalized and allocated to NWS, if NWS doesn't have the current capability to meet the requirement for weather forecasts (e.g., icing, convection, or C&V), FAA R&D funding will be provided to develop algorithms to fulfill those requirements for subsequent implementation by NWS.
WX-13	The SENSR Executive Steering Group down-scoped the SENSR Program by removing all FAA Short-Range ATC Weather, FAA Terminal Weather, and NOAA / NWS Long-Range Weather requirements prior to IID (Surveillance Roadmap DP 1102). SENSR will NOT replace any weather radars, e.g. NEXRAD, TDWR, ASRs, or WSP (a WSDS provider).
WX-14	New imagery channels, sounding data, and lightning data from Satellite Data Services will be baselined between 2017 Q3 and 2022 Q4. Requirements need to be identified and research conducted on integrating new weather satellite sensor data into FAA systems.
WX-15	ADS-B Weather (ADS-Wx) data (becoming available in 2022) is a component of ADS-B v3 data stream provided by the SBS network, will be distributed by CSS-WX Enhancements along with data from other weather sources in providing comprehensive weather information to its NAS Users.
WX-16	The ASWON S2, TDWR S3, WSDS S2, and JAWS program are now under the Weather Sensors Technology Refresh Portfolio (WSTRP). Grouping the sensor systems into one Portfolio allows for the systematic replacement and sustainment of Weather Sensor systems. As the result of this work, operational costs should be reduced for FAA and enhances the reliability of the assets. The program will be requesting approval of Investment Analysis Readiness Decision (IARD) in June 2023. Final Investment Decision (FID) is not required.
WX-17	FAA implemented nineteen (19) new Weather Camera sites (WCAM) in Hawaii in 2020-2023 to improve aviation safety and efficiency by providing pilots [and forecasters] with near-real time images of weather conditions along their flight routes and at their destinations. WCAM Enhancement E1 will add an additional 160 new camera systems within Alaska and CONUS. Two new functionalities using current weather camera images, Visibility Estimation through Image Analytics (VEIA) and Cloud Estimation through Image Analytics (CEIA), are currently being developed and are projected to be available on the website in FY24.

Weather Roadmap: Decision Points (1 of 1)

DP #	Target Date CY	Primary Domain	Type	Name
143	2032 Q1	Weather	FID	Final Investment Decision (FID) for Weather Enhancement 2
341	2027 Q2	Weather	FID	Final Investment Decision (FID) for Weather Enhancement 1
448	2026 Q2	Weather	IARD	Investment Analysis Readiness Decision (IARD) for Weather Enhancement 1
452	2031 Q1	Weather	IARD	Investment Analysis Readiness Decision (IARD) for Weather Enhancement 2
453	2031 Q3	Weather	IID	Initial Investment Decision (IID) for Weather Enhancement 2
1106	2025 Q3	Weather	IARD	Investment Analysis Readiness Decision (IARD) for LIDAR Sustainment
1107	2026 Q3	Weather	FID	Final Investment Decision (FID) for LIDAR Sustainment
1238	2027 Q4	Surveillance	FID	Final Investment Decision (FID) for Airspace Non-cooperative Surveillance Radar (ANSR)
1243	2023 Q3	Weather	FID	Final Investment Decision (FID) for Weather Camera Enhancement 1
1245	2026 Q4	Weather	IARD	Investment Analysis Readiness Decision (IARD) for Weather Sustainment 1
1246	2027 Q2	Weather	IID	Initial Investment Decision (IID) for Weather Sustainment 1
1247	2027 Q4	Weather	FID	Final Investment Decision (FID) from Weather Sustainment 1
1346	2023 Q4	Weather	FID	Final Investment Decision (FID) for Terminal Precipitation on Glass (TPoG)
1355	2023 Q2	Weather	IARD	Investment Analysis Readiness Decision (IARD) for Weather Sensors Tech Refresh Portfolio
1420	2026 Q1	Weather	IARD	Investment Analysis Readiness Decision (IARD) for Visual Weather Observation System (VWOS)
1426	2024 Q3	Weather	Strategy	JRC Strategy Decision for LIDAR Sustainment
1434	2027 Q1	Weather	FID	Final Investment Decision (FID) for TPoG #2
1435	2032 Q2	Surveillance	IARD	Investment Analysis Readiness Decision (IARD) for Terminal and En Route Surveillance Technical Refresh Portfolio Phase 2