FAA Reauthorization Act of 2018, Section 547
Enhanced Air Traffic Services

NAC Task 20-3 Report

To be Presented to the NextGen Advisory Committee

March 2021

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Executive Summary

In October 2019, the Federal Aviation Administration (FAA) tasked the NextGen Advisory Committee (NAC) with providing advice on Section 547 of the FAA Reauthorization Act of 2018. This report documents the efforts of a NAC-level Ad Hoc Team and presents recommendations for the Enhanced Air Traffic Services pilot program.

The Ad Hoc Team has identified a short list of eight Section 547 pilot program candidates and recommends that preferential basis for the pilot program should not be based on Ground Delay Programs (GDPs), but on ability to provide advantage to equipped operators. Of the eight candidates, the three that provide a definitive gain for equipped operators and best meet the Ad Hoc Team's definition for preferential basis are:

- Simultaneous independent Established on Required Navigation Performance (EoR) at Los Angeles International Airport (LAX),
- Simultaneous dependent approaches to closely spaced parallel runways (FAA Order 7110.308) for General Edward Lawrence Logan International (BOS),
- Controller Pilot Data Link Communications (CPDLC) Departure Clearance (DCL) capabilities at Orlando International (MCO).

The FAA has stated that the procedures for BOS may not be feasible until mid-2022 due to ongoing environmental review and training considerations. A staggered start for the pilot program would support inclusion of this application at BOS.

The staggered start could also promote consideration for the remaining four candidates, particularly because they provide targeted benefits and showcase emerging technologies. A commitment to enabling activities could allow for the inclusion of these valuable candidates sometime in 2022:

- Advanced Required Navigation Performance (A-RNP) approach procedures for Ski Country airports, Missoula International Airport (MSO), Bozeman Yellowstone International Airport (BZN) or Eagle County Regional Airport (EGE),
- Simultaneous dependent EoR at Portland International Airport (PDX),
- Simultaneous dependent EoR at Dallas Love Field (DAL), and
- Simultaneous dependent EoR at Nashville International Airport (BNA).

While not directly meeting the preferential basis description, the Automatic Dependent Surveillance Broadcast (ADS-B) Out application enabling 3 nautical mile (nm) separation in en route airspace for Seattle Tacoma International Airport (SEA)/Seattle Air Route Traffic Control Center (ZSE) is expected to provide access and throughput benefits, via equipping with ADS-B Out, and may be feasible by September 2021.

Background

The Federal Aviation Administration (FAA) Reauthorization Act of 2018 was passed by Congress and signed into law in October 2018. Section 547, entitled Enhanced Air Traffic Services, establishes a pilot program to provide air traffic control services on a preferential basis to aircraft equipped with certain NextGen avionics (See Appendix A for full Congressional language).

In October 2019, then FAA Deputy Administrator Daniel Elwell tasked the NextGen Advisory Committee (NAC) with providing advice to the FAA on Section 547. This tasking included an interim product, including a list of candidate Section 547 applications, and a final down-selected list of applications by spring 2020. To address the tasking, the NAC Chairperson created and led an Ad Hoc Team consisting of a subset of NAC members. Membership was focused on airlines and other operators, with the primary responsibility within their organizations for coordinating equipage investment and resource placement. This group held initial meetings in late 2019 and early 2020. However, the effort was put on hiatus in March 2020 as the Coronavirus (COVID) 19 global pandemic took shape.

In August 2020, the NAC was asked to continue its efforts to provide advice to the FAA on Section 547 (see Appendix B). With an extension into spring 2021, the revised tasking requested the same key elements of the original assignment:

- A short list of recommended candidate airports and applications (airport, aircraft capability, and concept) for the pilot program;
- For airports, while the legislation points to providing preferential basis at airports with Ground Delay Programs, the FAA seeks a recommendation from industry if this is appropriate or if other airports are preferred and why; and
- Describe potential and targeted benefits of most value to industry.

This report documents the efforts of the Section 547 Ad Hoc Team under the August 2020 revised tasking and presents the Team's recommendations for the Enhanced Air Traffic Services pilot program.

Methodology Overview

To address the tasking elements, the Ad Hoc Team conducted a series of meetings between October 2020 and March 2021. These meetings are summarized below:

- October 2020: Reorientation meeting, reviewing tasking and previous materials developed in early 2020 under Tasking 19-2.
- November 2020: Received an update from the FAA on current initiatives that might be considered in fulfillment of Section 547 requirements; and defined NextGen avionics and preferential basis, for the purposes of this tasking.
- December 2020: Developed candidate list using input from FAA and other NAC recommendations (e.g. Performance Based Navigation (PBN) Clarification Report).
- January 2021: Reviewed proposed candidates, then down-selected to "short" list by assessing readiness, return, and relevance.
- February-March 2021: Completed coordination and documentation.

The Ad Hoc Team members were supported by Air Traffic Management and Flight Operations subject matter experts (SMEs) from within their organization. These operator SMEs worked in tandem with the Ad Hoc Team. The FAA provided SMEs as well. Appendix C contains a list of Ad Hoc Team members and other supporting participants.

Throughout the Ad Hoc Team's efforts, data was provided and used to inform the team's deliberations. This data included:

- From the FAA, pre-COVID data on aircraft equipage (communication, navigation, and surveillance) and airport information (including construction schedules, Severe Weather Avoidance Plan (SWAP) frequency, Ground Delay Program (GDP)/Ground Stop (GS) history);
- An update on current levels and near-term forecasts of National Airspace System (NAS) operations from the FAA;
- From the PBN Clarification Ad Hoc and NextGen Opportunities Workgroup, debrief on the recommendations and findings of their respective activities;
- From the FAA's PBN Dashboard and the PBN Clarification Report, updated post-COVID PBN equipage data;
- From the FAA Data Communications Program Office, recent Controller Pilot Data Link Communication (CPDLC) Departure Clearances (DCL) equipage and utilization information by airport.

The operator SME team also obtained background information from meetings with the NextGen Opportunities team and the Data Communications NextGen Integration Working Group (NIWG).

Key Definitions

The Congressional language references two key phrases: "certain NextGen avionics" and "preferential basis." For purposes of the Ad Hoc Team's deliberations, the two phrases were interpreted as follows.

Certain NextGen Avionics

For the deliberations of the Ad Hoc Team, "certain NextGen Avionics" are identified as the navigation, communication, and surveillance baseline capabilities in the NAC Minimum Capabilities List (MCL)[1]. For the Section 547 task, the team chose to highlight the following baseline capabilities:

- Navigation: Required Navigation Performance (RNP) with Radius to Fix (RF), Advanced RNP (A-RNP), Autopilot coupled Vertical Navigation (VNAV);
- Communication: CPDLC DCL;
- Surveillance: Automatic Dependent Surveillance Broadcast (ADS-B) Out.

[1] "Minimum Capabilities List (MCL) Ad Hoc Team NAC Task 19-1 Report," November 2020.

Preferential Basis
The Congressional language was developed during some of the highest levels of aviation activity and well before the COVID-19 pandemic would cause a devastating impact to NAS operations. Air traffic operations, ground delays and other traffic management initiatives have since been significantly reduced from pre-COVID traffic levels. Between March 2020 and September 2020, the quantity of GDPs has decreased by over 90% compared to the same months in 2019. Given these circumstances, the Ad Hoc Team felt that the concept of preferential basis needed to be reinterpreted.

The Ad Hoc Team identified several key tenets around the concept of preferential basis:

- The intent of the Section 547 pilot program is to prove the benefits of the NextGen investment by highlighting the advantage of NextGen equipage (verses punitive action for the non-equipped).
- Proving the benefit of NextGen equipage should still permit accommodation of non-equipped operators, though not with the same benefit gains as equipped operators.
- Preferential basis to equipped operators should not hinder overall capacity or reduce throughput.

Basically the Ad Hoc Team defines preferential basis for enhanced air traffic services in a manner very similar to the Transportation Security Administration (TSA) Pre Check program – no operator will be denied service, but those that have chosen to equip will experience more efficient service, shorter queuing or priority clearances.

Tasking Element 1: Short List of Candidate Airports and Applications

The short list of candidates was developed in the following manner:

Candidate Generation: An initial set of candidates was developed from multiple sources, all associated with previous or ongoing NAC activities. Resources included the PBN Clarification Ad Hoc Team Report[2] and the NextGen Opportunities presentation[3]. Using these sources helps ensure that candidate applications mirror existing priorities. The FAA also provided input on current modernization initiatives that could meet the intent of Section 547 and be implemented in the specified timeframes[4]. Given the limited lead time before the planned start of the pilot program, the FAA input emphasized concepts that are already in development or operational. Appendix D contains the list of the initial candidate applications.

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[2] "Performance Based Navigation Clarification NAC Task 19-4 Report," November 2020.

[3] "NextGen Opportunities," briefing to NAC SC Opportunities Meeting, June 2020.

[4] "FAA Reauthorization - Section 547," briefing by Rebecca Guy to NAC Section 547 Ad Hoc Team, November 2020; and "FAA Mixed Options," briefing by Kim Stover to NAC Section 547 Ad Hoc Team, February 2020.

Candidate Down-Select: The Ad Hoc Team reduced the initial set by a little more than half using a simple priority query. A subjective scoring process was used to assess the remaining candidates. The three categories for scoring included:

- Readiness = how likely is it that the candidate will be operational by September 2021.
- Return = how well does the candidate provide benefit to equipped operators.
- Relevance = how well does the candidate meet the intent of the Congressional language.

Each operator (representative or entity) provided one set of scores, which were then averaged to produce an aggregate score. As a result of the scoring assessment and associated discussion, two candidates were removed from consideration: one for lowest readiness score and the other for the lowest return score. Appendix E contains a more detailed description of the down-select process.

Additional Considerations: The Ad Hoc Team discussed the results of the down-select process with the FAA SMEs. Concern was raised that the candidates did not cover the communications element of the MCL, a key consideration for the FAA. The Ad Hoc Team agreed that inclusion of a CPDLC DCL candidate would be most beneficial for airport that has weather impacts causing reroutes and at a location with a mix of carriers and equipage. Using the data that was provided by the FAA Data Communications Program Office, a candidate using the FAA's concept for CPDLC DCL capabilities was added into consideration.

Finalization of the Short List: The short list of candidate applications consists of the following eight initiatives:

- Simultaneous independent Established on RNP (EoR) at Los Angeles International Airport (LAX),
- Simultaneous dependent EoR at Portland International Airport (PDX),
- Simultaneous dependent EoR at Dallas Love Field (DAL),
- Simultaneous dependent EoR at Nashville International Airport (BNA),
- Simultaneous dependent approaches to closely spaced parallel runways (FAA Order 7110.308) for General Edward Lawrence Logan International (BOS),
- A-RNP approach procedures for Ski Country airports, Missoula International Airport (MSO), Bozeman Yellowstone International Airport (BZN) or Eagle County Regional Airport (EGE),
- ADS-B Out application enabling 3 nautical mile (nm) separation in en route airspace for Seattle Tacoma International Airport (SEA)/Seattle Air Route Traffic Control Center (ZSE), and
- CPDLC DCL capabilities at Orlando International Airport (MCO).

These eight candidates are based on established concepts[5] and showcase three primary MCL equipage categories. Most of the candidates highlight PBN capabilities with EoR, A-RNP

[5] All concepts have been referenced or worked as part of previous NAC Ad Hoc or NIWG activities.

and 7110.308 approaches. Appendix F contains additional details describing the concepts for each of the short list candidates. These details include information on expected benefits and potential risks, provided primarily by SMEs supporting the Ad Hoc Team. Airport operators from the candidate airports were not involved in the development of this supporting data or in the recommended candidates. Coordination among the FAA, airport operators and aircraft operators will be needed as part of the implementation of the pilot program[6].

The Congressional language identifies the "duration of daily service" for the pilot program to be at least three consecutive hours, between 0600 and 2200 local time. The Ad Hoc Team recommends that the hours of operation be selected such that maximum benefit can be achieved when there is a predominance of equipped operators and overall airport operations can be enhanced. Presently air traffic continues to recover, and schedules are evolving, so it is difficult to pinpoint times for these applications. Currently no time-of-day limitations were noted, primarily because each of these candidates could provide benefit during any time of use. The Ad Hoc Team recommends continued operator engagement in defining operating times for the pilot program.

It is important to note that while the FAA stated all eight candidates were viable, only three of eight candidate applications in the short list were likely to be operationally feasible by September 2021:

- Simultaneous independent EoR at LAX,
- ADS-B Out enabled 3 nm separation in en route airspace for SEA/ZSE, and
- CPDLC DCL capabilities at MCO.

The other five candidates require activities with longer lead times (e.g. establishing or changing criteria, developing new procedures, conducting safety studies or environmental review). Given limited access to operational facilities, training challenges and other risks associated with the COVID-19 recovery, the FAA suggested that it could take anywhere from a few months or to over a year to complete these actions. Given the benefit potential of these five candidates, the Ad Hoc Team has recommendations to address these concerns under Tasking Element 3.

Tasking Element 2: Rational for Preferential Basis

As stated earlier in this report, the Ad Hoc Team recommends selection for the pilot program not be limited to airports with GDPs or other traffic management initiatives (TMIs). The airports identified in the short list candidate applications were selected for following reasons:

- Expectation that the application could showcase a capability enabled by NextGen avionics;
- Potential to benefit equipped operators, without denying service to the non-equipped; and
- Ability to enhance operational efficiency or throughput.

[6] See Appendix A for Congressional Language on Airport Selection (paragraph 1c).

Using the TSA Pre Check analogy, the following short list of candidates best meet the updated definition of preferential basis that the Ad Hoc Team used during its deliberations:

- Simultaneous independent EoR at LAX – equipped operators receive shorted downwind segments.
- Simultaneous dependent approaches to closely spaced parallel runways (FAA Order 7110.308) for BOS – equipped operators enable use of an additional arrival runway.
- CPDLC DCL capabilities at MCO – equipped operators have priority for departure as a result of receipt of the reroute update through CPDLC.

Tasking Element 3: Targeted Benefits of Most Value

The objective of the Section 547 pilot program should be to showcase key capabilities, by providing an advantage to those that have invested in NextGen avionics and translating that advantage into real benefits. The benefits of the most value to the operators are delivered by capabilities that minimize operational constraints, while increasing throughput, access, and efficiency. The 7110.308 closely spaced parallel procedures are good example of incentivizing autopilot coupled VNAV while benefiting overall airport throughput.

Section 547 is an opportunity to incentivize operators to equip with emerging capabilities and avionics that can provide increased throughput and access. The pilot program should not include applications simply because they are feasible by September 2021. The A-RNP applications are primary examples of emerging capabilities that can provide profound benefits but may not be operationally feasible by September 2021[7].

Staggering the start of the pilot program is an option for inclusion of high-value candidate applications. Under this proposal, the pilot program could start with the candidates that are feasible in September 2021 (e.g. EoR at LAX or 3 nm separation for SEA/ZSE). Other candidates that might be feasible by mid 2022 (e.g. 7110.308 at BOS or A-RNP at MSO) could be added when enabling activities (i.e. procedure development) are complete. This option does not advocate for extension of the pilot program, rather applications with the later start would still conclude by September 2023 (per Congressional language). The Ad Hoc Team believes that the high-value benefits offset the reduced duration and would still meet the intent of the language. The Ad Hoc Team recommends asking Congress to consider the staggered start concept and is committed to accompany the FAA in that discussion.

Summary of Findings and Recommendations

Since the original tasking in October 2019, the aviation system has experienced a significant level of change due to the impacts of the COVID 19 pandemic. Reduced timelines and other limitations necessitated a broader interpretation of the Congressional language. The Ad Hoc Team's findings and recommendations reflect this construct while striving to retain the spirit of the language.

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[7] The FAA has identified that A-RNP approaches will require new criteria, procedure development/amendment, and flight check, thus making it unlikely that these procedures would be available by September 2021.

The Ad Hoc Team has identified a short list of eight Section 547 pilot program candidates:

- Simultaneous independent EoR at LAX,
- Simultaneous dependent EoR at PDX,
- Simultaneous dependent EoR at DAL,
- Simultaneous dependent EoR at BNA,
- Simultaneous dependent approaches to closely spaced parallel runways (FAA Order 7110.308) for BOS,
- A-RNP approach procedures for Ski Country airports, MSO, BZN or EGE,
- ADS-B Out enabled 3 nm separation in en route airspace for SEA/ZSE, and
- CPDLC DCL capabilities at MCO.

The Ad Hoc Team recommends that the hours of operation be selected such that maximum benefit can be achieved when there is a predominance of equipped operators and overall airport operations can be enhanced. While the report does not include specific time of day recommendations due to flight schedule evolution, the Ad Hoc Team does recommend continued operator engagement in defining operating times for the pilot program.

Given the impacts of COVID-19 on traffic levels, the Ad Hoc Team recommends preferential basis for the pilot program be based on ability to provide advantage to equipped operators, not on GDP history or occurrences. Of the eight candidates, the three that provide a definitive gain for equipped operators and best meet the Ad Hoc Team's definition for preferential basis are:

- Simultaneous independent EoR at LAX,
- Simultaneous dependent approaches to closely spaced parallel runways (FAA Order 7110.308) for BOS, and
- CPDLC DCL capabilities at MCO.

The FAA has stated that the procedures for BOS may not be feasible until mid-2022 due to ongoing environmental review and training considerations. A staggered start for the pilot program would support inclusion of this application at BOS, as well as consideration for the remaining four candidates. A commitment to enabling activities could allow for the addition of these valuable candidates sometime in 2022:

- A-RNP approach procedures for Ski Country airports, MSO, BZN or EGE,
- Simultaneous dependent EoR at PDX,
- Simultaneous dependent EoR at DAL, and
- Simultaneous dependent EoR at BNA.

While not directly meeting the preferential basis description, the ADS-B Out application enabling 3 nm separation in en route airspace for SEA/ZSE is expected to provide access and throughput benefits, via equipping with ADS-B Out, and may be feasible by September 2021.

All the proposed candidates are priorities and important opportunities to showcase NextGen avionics and technologies. Those that are not included under the Section 547 pilot program should be pursued through programs and activities outside Section 547. Throughout this effort,

the FAA SMEs have stated that the priority of these initiatives is understood and have pledged to pursue them outside the Section 547 pilot program, in particular the short list candidates. Given the repeated importance of these proposals, the Ad Hoc Team recommends that the FAA provide information on next steps as soon as practical, including details on the interim actions (e.g. criteria development, environmental review, flight check), for the initiatives not pursued under Section 547.

In addition to responding to the three elements of the FAA's tasking letter, the Ad Hoc Team has additional recommendations that will help ensure that the Section 547 pilot program meets its objectives.

Some of the candidates include amendments or new procedures. Amendments to existing procedures and/or new procedure development must be done in collaboration with aircraft and airport operators, in accordance with FAA orders and guidelines. The Ad Hoc Team recommends collaborative design and development efforts for any procedure changes or additions.

The overall success of Section 547 pilot program is dependent on continued engagement with aircraft and airport operators, to monitor progress and review operational consequences throughout the duration of the pilot program. The Ad Hoc Team recommends the following cooperative engagement efforts:

- Existing collaborative forums should be considered for coordination of technical and operational activities supporting the pilot program, including review of safety studies and training requirements, as needed;
- Status of planning efforts should be provided at the next NAC meeting, and overall pilot program status shared with the NAC as the program moves forward;
- Aircraft and airport operators, or their representative organizations, should be engaged in monitoring the safety and operational impacts of the pilot program, in particular ensuring airport throughput is not reduced due to Section 547 applications;
- Assessment should include the impacts to the equipped and non-equipped aircraft;
- Finally, aircraft and airport operators should contribute to the final report to be delivered to Congress at the end of the effort.

Appendix A: Congressional Language

SEC. 547. ENHANCED AIR TRAFFIC SERVICES.

(a) IN GENERAL.—Not later than 180 days after the date of enactment of this Act, the Administrator shall establish a pilot program to provide air traffic control services on a preferential basis to aircraft equipped with certain NextGen avionics that—

(1) lasts at least 2 years; and

(2) operates in at least 3 suitable airports.

(b) DURATION OF DAILY SERVICE.—The air traffic control services provided under the pilot program established under subsection (a) shall occur for at least 3 consecutive hours between 0600 and 2200 local time during each day of the pilot program.

(c) AIRPORT SELECTION.—The Administrator shall designate airports for participation in the pilot program after consultation with aircraft operators, manufacturers, and airport sponsors.

(d) DEFINITIONS.—

(1) CERTAIN NEXTGEN AVIONICS.—The term ‘‘certain NextGen avionics’’ means those avionics and related software designated by the Administrator after consultations with aircraft operators and manufacturers.

(2) PREFERENTIAL BASIS.—The term ‘‘preferential basis’’ means—

(A) prioritizing aircraft equipped with certain NextGen avionics during a Ground Delay Program by assigning them fewer minutes of delay relative to other aircraft based upon principles established after consultation with aircraft operators and manufacturers; or

(B) sequencing aircraft equipped with certain NextGen avionics ahead of other aircraft in the Traffic Flow Management System to the maximum extent consistent with safety.

(e) SUNSET.—The pilot program established under subsection (a) shall terminate on September 30, 2023.

(f) REPORT.—Not later than 90 days after the date on which the pilot program terminates, the Administrator shall submit to the appropriate committees of Congress a report on the results of the pilot program.

Appendix B: FAA Tasking Letter

Below is an excerpt from the tasking letter from then Deputy FAA Administrator, Daniel Elwell, to NAC Chair, Russell Childs, dated August 10, 2020:

> **Task 20-3 (Task 19-2 Extension): FAA Reauthorization Act of 2018, Section 547**
>
> The NAC is asked to continue its efforts with providing advice to the FAA in accordance with FAA Reauthorization Act of 2018, Section 547. This tasking was originally issued prior to the emergence of the COVID-19 pandemic and its resulting economic impact on the aviation community. The FAA is cognizant of the need for the NAC members to remain focused on restarting industry operations as an essential part of the national recovery. This tasking is **extended through Spring 2021** to ensure the FAA is able to fulfill the congressional request contained in Section 547.
>
> The NAC advice should include the following:
>
> - A short list of recommended candidate airports and applications (airport, aircraft capability, and concept) for the pilot program
> - For airports, while the legislation points to providing preferential basis at airports with Ground Delay Programs, the FAA seeks a recommendation from industry if this is appropriate or if other airports are preferred and why
> - Describe potential and targeted benefits of most value to industry.
>
> Scope:
>
> - FAA will provide the NAC team an update on current and near-term forecast of NAS operations.
> - FAA will provide the NAC team an update of current FAA/NAC initiatives that might be considered in fulfillment of any part of Section 547 requirements.

Other portions of the letter covering other NAC taskings – on autopilot coupled VNAV and ADS-B In Applications – have been omitted from this Appendix. The full letter can be found on the FAA website at:

> https://www.faa.gov/about/office_org/headquarters_offices/ang/nac/media/20200810_NAC_Tasks_20-1_20-2_20-3.pdf.

Appendix C: Section 547 Ad Hoc Team and Other Supporting Participants

Ad Hoc Team Members	Organization
Ed Bolen	National Business Aviation Association
Patrick Burns	Delta Air Lines
Russell “Chip” Childs	SkyWest
Warren Christie (Lead)	JetBlue Airways
Don Dillman	FedEx Express
Craig Drew	Southwest Airlines
John Ladner	Alaska Airlines
Bryan Quigley	United Airlines
Kimball Stone	American Airlines

FAA SMEs	Organization
Rebecca Guy	Air Traffic Mission Support
Shawn Kozica	Air Traffic Mission Support

Operator SMEs	Organization
Lee Brown	JetBlue Airways
Steve Brown	National Business Aviation Association
Charles Cook	JetBlue Airlines
Lynae Craig	Alaska Airlines
Rick Dalton	Southwest Airlines
Robert Flynn	United Airlines
Robert Goldman	Delta Air Lines
Gary McMullin	Southwest Airlines
Brett Peyton	Alaska Airlines
Ron Renk	United Airlines
Phil Santos	FedEx Express
Eric Silverman	American Airlines
Dave Surridge	American Airlines
Jon Tree	FedEx Express
Heidi Williams	National Business Aviation Association
Greg Young	Delta Air Lines

Appendix D: Initial List of Candidates

Application	Airport	NextGen Avionics	Source	Notes
EoR with equipped on more efficient downwind	LAX	RNP w RF/ A-RNP	FAA input PBN Clarification Report	Included in short list
EoR with equipped on more efficient downwind	DEN	RNP w RF/ A-RNP	PBN Clarification Report	Lower priority for Sec 547
EoR with equipped on more efficient downwind	IAH	RNP w RF/ A-RNP	PBN Clarification Report	Lower priority for Sec 547
EoR with equipped on more efficient downwind	BNA	RNP w RF/ A-RNP	PBN Clarification Report	Included in short list
EoR with equipped on more efficient downwind	PDX	RNP w RF/ A-RNP	PBN Clarification Report	Included in short list
EoR with equipped on more efficient downwind	DAL	RNP w RF/ A-RNP	PBN Clarification Report	Included in short list
A-RNP approaches for access	MSO	A-RNP	PBN NIWG NextGen Opportunities	Combined for short list
A-RNP approaches for access	BZN	A-RNP	PBN NIWG NextGen Opportunities	
A-RNP approaches for access	EGE	A-RNP	PBN NIWG NextGen Opportunities	
A-RNP approaches for access	GUC	A-RNP	PBN NIWG NextGen Opportunities	Lower priority for Sec 547
A-RNP approaches for access	HDN	A-RNP	PBN NIWG NextGen Opportunities	Lower priority for Sec 547
PBN to deconflict airports	DAL/ DFW	RNP w RF	PBN Clarification Report NextGen Opportunities	Lower priority for Sec 547
PBN to deconflict airports	LGA/ JFK	RNAV	PBN Clarification Report NextGen Opportunities	Dropped from short list due to lower feasibility by 9/21
PBN arrivals & extended metering reducing vectors	DEN	RNAV	FAA input	Dropped from short list due to lower expected benefit
PBN arrivals to reduce TMIs/GDPs	JFK	RNP	NEC NIWG	Lower priority for Sec 547
PBN approaches with SCIA to increase throughput	PHL	RNAV	NEC NIWG	Lower priority for Sec 547
PBN approaches with .308 to increase throughput	SFO	RNAV	MRO NIWG	Lower priority for Sec 547
PBN approaches with .308 to increase throughput	EWR	RNAV	MRO NIWG	Lower priority for Sec 547
PBN approaches with .308 to increase throughput	BOS	VNAV	MRO NIWG	Included in short list
MRS to increase throughput	MEM	ADS-B Out	MRO NIWG NextGen Opportunities	Lower priority for Sec 547
3nm in en route airspace to increase throughput	SEA/ZSE	ADS-B Out	Industry input	Included in short list
Dedicated routes to increase throughput	ZMA/ ZNY	ADS-B Out/ SBS	SBS Interchange Meeting	Lower priority for Sec 547

Note: A CPDLC DCL candidate was included in the FAA input briefing provided in November 2020. The Ad Hoc Team initially did not include a DCL candidate in its initial list of candidates. Inclusion of a DCL candidate in the recommended short list is addressed in the main body of the report.

Appendix E: Scoring Assessment to Support Candidate Down-Select

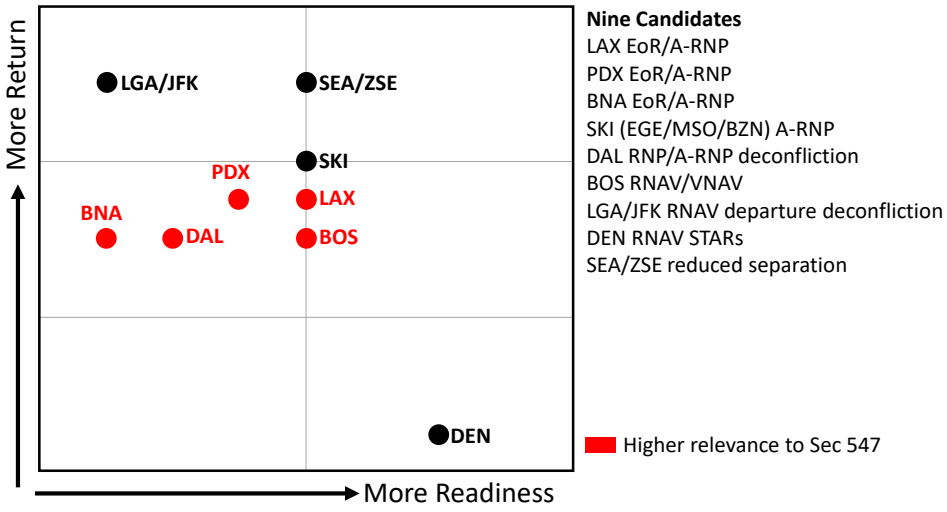
A two step-process was used to develop the short-list of candidates for the pilot program.

First, each Ad Hoc Team member was asked to identify the top six candidates, reflecting the priorities and considerations for each of their organizations. The nine candidates that received at least two priority votes were taken to the second step.

Second, the remaining nine candidates were assessed using a scoring process similar to one used for PBN Clarification prioritization. The Ad Hoc Team and supporting operator SMEs subjectively estimated the readiness, return and relevance of the remaining candidate. The factors were defined as follows:

- Readiness[8] = how likely is it that the candidate will be operational by September 2021
- Return = how well does the candidate provide benefit to equipped operators
- Relevance = how well does the candidate meet the intent of Sec 547 language

Each operator (representative or entity) provided one set of scores. The inputs were averaged to produce an aggregate score. The chart below presents the summary of the scoring.



As a result of the scoring assessment and associated discussion, two candidates were removed from consideration for the recommended candidate short list:

- The DEN RNAV STARs candidate was dropped due to its low potential for benefit.
- The LGA/JFK PBN airport deconfliction candidate was dropped due to concerns over the potential impact of pending airspace changes in the New York area.

[8] The readiness included in this scoring represents an operator-based assessment. The FAA SMEs provided separate input on readiness which is described in the body of the report.

Appendix F: Short List Candidate Details

<table>
<tr><td>Candidate: Established on RNP (EoR) at LAX</td><td rowspan="4">Concept:
• Independent simultaneous EoR operation using existing RNP procedures
• Aircraft that are EoR-capable receive shorter (time and distance) approaches
• Non-equipped would remain on longer downwinds
• A-RNP not required for EoR, but could increase utilization rates</td></tr>
<tr><td>Configuration Specifics: Arrival runways 24R, 25L</td></tr>
<tr><td>Equipage: RNP w RF; A-RNP (not required for EoR)</td></tr>
<tr><td>Time of Day Considerations: None</td></tr>
<tr><td>Benefits:
• More efficient (time and distance) approaches
• Keeping aircraft on higher approach profile, supporting community interests</td><td>Key Readiness Concerns:
• Timeframe for procedure amendment
• Timeframe for A-RNP criteria approval
• Community engagement</td></tr>
<tr><td colspan="2">Other Notes:
• Based on existing RNP approaches; transitions may need to be modified; procedure workgroup meeting may be required
• A-RNP will increase utilization of the approaches
• LAX would be independent simultaneous EoR operation; all required monitor positions exist
• Review arrival/departure throughput while in use; no throughput decrease due to EoR</td></tr>
</table>

<table>
<tr><td>Candidate: Established on RNP (EoR) at PDX</td><td rowspan="4">Concept:
• Dependent simultaneous EoR operation with existing procedures
• Aircraft that are EoR-capable receive shorter (time and distance) approaches
• Non-equipped would remain on longer downwinds
• A-RNP not required for EoR, but could increase utilization rates</td></tr>
<tr><td>Configuration Specifics: East flow - 10L, 10R; West flow - 28L, 28R</td></tr>
<tr><td>Equipage: RNP w RF; A-RNP (not required for EoR)</td></tr>
<tr><td>Time of Day Considerations: None</td></tr>
<tr><td>Benefits:
• More efficient (time and distance) approaches
• Keeping aircraft on higher approach profile, supporting community interests</td><td>Key Readiness Concerns:
• Timeframe for A-RNP criteria approval
• Safety study and waiver required for dependent simultaneous EoR operation</td></tr>
<tr><td colspan="2">Other Notes:
• A-RNP will increase utilization of the approaches
• New monitor positions would be required
• Review arrival/departure throughput while in use; no throughput decrease due to EoR</td></tr>
</table>

Candidate: Established on RNP (EoR) at BNA	**Concept:** • Dependent simultaneous EoR operation with existing procedures • Aircraft that are EoR-capable receive shorter (time and distance) approaches • Non-equipped would remain on longer downwinds • A-RNP not required for EoR, but could increase utilization rates
Configuration Specifics: South flow - 20L, 20R; North – 02L, 02R	
Equipage: RNP w RF; A-RNP (not required for EoR)	
Time of Day Considerations: None	
Benefits: • More efficient (time and distance) approaches	**Key Readiness Concerns:** • Timeframe for A-RNP criteria approval • Safety study and waiver required for dependent simultaneous EoR operation
Other Notes: • A-RNP will increase utilization of the approaches • New monitor positions would be required • Review arrival/departure throughput while in use; no throughput decrease due to EoR	

Candidate: Established on RNP (EoR) at DAL	**Concept:** • Dependent simultaneous EoR operation with existing procedures • Aircraft that are EoR-capable receive shorter (time and distance) approaches • Non-equipped would remain on longer downwinds • A-RNP not required for EoR, but could increase utilization rates
Configuration Specifics: South flow - 13L, 13R; North flow – 31L, 31R	
Equipage: RNP w RF; A-RNP (not required for EoR)	
Time of Day Considerations: None	
Benefits: • More efficient (time and distance) approaches	**Key Readiness Concerns:** • Timeframe for new DAL procedures; potential missed approach modifications needed at DFW • Timeframe for A-RNP criteria approval • Safety study and waiver required for dependent simultaneous EoR operation
Other Notes: • A-RNP will increase utilization of the approaches • New monitor positions would be required • Review arrival/departure throughput while in use; no throughput decrease due to EoR	

Candidate: Advanced RNP arrival procedures at Ski Country airports (MSO, BZN, EGE)	**Concept:** • Add or replace existing RNP AR approaches with A-RNP approaches • A-RNP capable aircraft receive access to ski-country airports • Non-equipped receive delayed access, based on operating conditions
Configuration Specifics: MSO: Rwy 30; BZN: Rwy 30; EGE: Rwy 25	
Equipage: A-RNP	
Time of Day Considerations: None	
Benefits: • Increased access to airport	**Key Readiness Concerns:** • Timeframe for new procedure development, including A-RNP criteria approval • Timeframe for flight checks
Other Notes: • Procedures have been drafted, but no production timeframe	

Candidate: 7110.308 procedures at BOS	**Concept:** • Dual arrival runway capability: 1 nm diagonal spaced approaches to closely spaced parallel runways • 04R for leading aircraft (ILS); 4L for trailing aircraft (RNAV-LNAV/VNAV capability required) – lead aircraft must be large or small (equivalent CWT categories)
Configuration Specifics: 04L and 04R	
Equipage: Autopilot Coupled VNAV	
Time of Day Considerations: For maximum benefit should avoid periods with high international arrivals or hours with high percentage of heavy aircraft	
Benefits: • Increased arrival throughput in less than visual approach weather (dependent on qualified aircraft pairs)	**Key Readiness Concerns:** • Completion of EA for new RNAV approach for 04L • Sorting of arrivals to keep LNAV only aircraft on 04R ILS
Other Notes: • Utilization would be limited to instrument flight conditions and consistent with 7110.308 usage descriptions in the "Draft Environmental Assessment for Boston Logan RNAV (GPS) Runway 04L" published in September 2020 • Sorting process may reduce qualified pairs and impact AAR • Segregating aircraft by type (e.g. regional on 04R) could aid sorting	

Candidate: 3nm in-trail separation in en route airspace at ZSE targeting SEA arrivals/departures	**Concept:** • Using current 7110.65 conditions, allow 3 nm separation using ERAM automation with ADS-B providing reliable targets
Configuration Specifics: Below FL230	
Equipage: ADS-B Out	
Time of Day Considerations: No time of day restrictions; should be managed as part of facility implementation plan	
Benefits: • Increased airspace throughput	**Key Readiness Concerns:** • ERAM adaptation
Other Notes: • Uses existing separation standards in 7110.65 • This capability is intended for any applicable airspace within ZSE. Tasking requires identification of an airport, therefore SEA is highlighted in the candidate description.	

Candidate: CPDLC DCL capabilities at MCO	**Concept:** • Equipped operators have priority for departure as a result of receipt of the reroute through Data Comm. • During a disruption at an airport (e.g., weather or runway turnaround) prioritize departures for DCL equipped aircraft.
Configuration Specifics: none	
Equipage: FANS-1/A over VHF to support CPDLC DCL	
Time of Day Considerations: None	
Benefits: • Reduced departure delays	**Key Readiness Concerns:** • Training and segregating equipped aircraft
Other Notes: • May aid development of a national policy	

Appendix G: Acronyms and Airport/Facility Identifiers

Acronyms

ADS-B	Automatic Dependent Surveillance Broadcast
A-RNP	Advanced Required Navigation Performance
COVID	Coronavirus
CPDLC	Controller Pilot Data Link Communications
DCL	Departure Clearances
EA	Environmental Assessment
EoR	Established on Required Navigation Performance
ERAM	En Route Automation Modernization
FANS	Future Air Navigation System
GDP	Ground Delay Program
GPS	Global Positioning System
GS	Ground Stop
ILS	Instrument Landing System
LNAV	Lateral Navigation
MCL	Minimum Capabilities List
NAS	National Airspace System
NM	Nautical Mile
PBN	Performance Based Navigation
RF	Radius to Fix
RNP	Required Navigation Performance
SMEs	Subject Matter Experts
SWAP	Severe Weather Avoidance Plan
TSA	Transportation Security Administration
VHF	Very High Frequency
VNAV	Vertical Navigation

Airport/Facility Identifiers

BNA	Nashville International Airport
BOS	General Edward Lawrence Logan International
BZN	Bozeman Yellowstone International Airport
EGE	Eagle County Regional Airport
DAL	Dallas Love Field
LAX	Los Angeles International Airport
MCO	Orlando International Airport
MSO	Missoula International Airport
PDX	Portland International Airport
SEA	Seattle Tacoma International Airport
ZSE	Seattle Air Route Traffic Control Center