Renaming & Removing Outstanding Enroute IFP dependencies on ground-based NAVAIDs

Gateway Documentation
Stage 1 Define
Step 1B
Design Principles

V1.1

NATS Public

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Issue	Month/Year	Change Requests in this issue
Issue 1.0	May 2021	Submitted to SARG
Issue 1.1	May 2021	Following CAA Review at the Stage 1 Define Gateway, the following has been updated: Paragraph 2.7 updated from Define to Develop and Assess Gateway

References

Reference	Name	Hyperlink
1	DVOR CAA Airspace Change Progress Portal Page	Link
2	DVOR Phase 1 STARs Statement of Need	Link
3	DVOR Phase 1 STARs Assessment Meeting Slides	Link
4	DVOR Phase 1 STARs Assessment Meeting Minutes	Link

Contents

1. Introduction and Background

1.1 This document continues the CAP1616 process started with a Statement of Need (SoN) submitted in December 2020. Following the Assessment meeting on the 21st April 2021 a revised SoN was submitted, V3 (Ref 2).

1.2 The intent of this document is to summarise and satisfy the requirements of CAP1616 Stage 1 Define Gateway, Step 1B Design Principles. The CAA reference is ACP-2020-101, the link to the CAA progress page is here.

1.3 Following NATS DVOR Rationalisation Program, 12 procedures remain in the UK Aeronautical Information Publication (AIP) which are dependent on ground-based Navigation Aids (NavAids). These procedures serve four airports (Liverpool, Manchester, Bristol and Cardiff) and include 11 Standard Terminal Arrival Routes (STARs) and 1 Hold. This proposal seeks to redesignate these procedures in line with ICAO Annex 11 'Air Traffic Services' Appendix 3 and to remove any remaining dependency on ground-based NavAids using PBN replication.

1.4 Airport based procedures such as Standard Instrument Departures (SIDs) and instrument approaches are not relevant to the en-route scope of this proposal, hence they are excluded. Airport operators are developing separately their own equivalent SID and instrument approach procedures presuming DVOR rationalisation.

1.5 NATS took part in a (CAA-led) consultation with the National Air Traffic Management Advisory Committee (NATMAC) in 2009. NATMAC members were provided with a consultation paper which outlined NATS' plans to rationalise the DVOR infrastructure; alongside being invited to provide feedback or questions on the proposal. As the consultation was completed before the introduction of CAP1616, there was not a requirement for NATS to engage or seek feedback on Design Principles.

1.6 A follow-up informative letter was sent to NATMAC members in 2010 which summarised the results of the consultation; including broad support from airlines and a recognised requirement for airports to remove their own airport procedure dependencies. NATS, through the DVOR rationalisation Project, also provided the NATMAC members with an update on the project in 2018; including an explanation of the stages required to remove the NavAid dependencies and how they will be physically removed from service.

1.7 In 2018, NATS formally notified all airports which have AIP-published procedures using the relevant DVORs, that they are required to remove all dependencies by December 2022. This gave airports a four-year notice period to carry out the CAP1616 Airspace Change Process (ACP) work required to remove their own dependencies. Airports were given the opportunity to formally request an extension to this period if they wish to rely on a DVOR beyond December 2022.

1.8 This document outlines the Design Principles we will use to remove the remaining en-route dependencies on ground-based NavAids, and the rationale behind them. The design principles are focused on how best to remove the en-route DVOR dependencies alongside ensuring that the changes are safe and do not result in any changes to flight behaviour. We therefore conclude that there is no need to re-consult with the NATMAC members, nor any additional stakeholders, as there will not be any impact upon them.

2. Stage 1 Define

Step 1A Assess requirement

2.1 The Statement of Need (SoN) for this ACP was submitted on 14th December 2020 and a CAA Technical Regulator was allocated on 8th February 2021. A revised SoN (V2) was submitted 30th March 2021 renaming the ACP.

2.2 The Assessment Meeting was held over Microsoft TEAMs on 21st April 2021. NATS provided a short presentation which covered the Statement of Need, background of the change, potential design options and

provisional timescales (Ref 3). The justification and technicalities of the change were discussed. This was attended by representatives from NATS and the CAA, as listed in the Assessment Meeting minutes (Ref 4).

2.3 Information subsequently supplied by NATS to the CAA, and uploaded to the portal in April/May 2021, included:

- A revised SoN (V3) (Ref 2);
- The Assessment Meeting presentation slide pack redacted for publication (Ref 3);
- The Assessment Meeting Minutes redacted for publication (Ref 4).

2.4 This proposal is limited to the MIRSI Hold and following STARS which have remaining dependencies on ground-based NavAids:

- MIRSI 1A, 2B, 2C and 2D;
- TIPOD 3A, 2B, 1C, 1D and 1E;
- BRI 1C;
- CDF 1C.

2.5 This submission is proposing to redesignate these STARs in line with ICAO naming conventions and to replicate these procedures using an appropriate standard of PBN to remove any remaining dependency on ground-based NavAids.

2.6 There are no other en-route flight procedures, airport-based procedures or ATS Routes under consideration as part of this proposal.

2.7 The CAA agreed that this proposal falls under the Airspace Change Process with a provisional level of 2C, subject to the outcome of the Develop and Assess Gateway.

2.8 This proposal is targeting an implementation date of not before AIRAC 05/2022, 19th May 2022. This is one of the four major annual NAS builds which this proposal can be implemented in, because the proposed changes affect the NAS adaptation.

Step 1A complete

Step 1B Design Principles

2.9 A set of Design Principles were devised for the DVOR rationalisation project and it was anticipated that these design principles would be used throughout the DVOR project. The previously submitted individual DVOR proposals –which can be viewed on the CAAs online portal – seek the same outcome, just applied to different physical NavAids.

2.10 The original Design Principles have been fit for purpose and successfully used throughout the DVOR rationalisation project since the first deployment in 2018 (SAM/OCK), however they were reviewed and amended as part of the Brecon (BCN) DVOR rationalisation ACP in 2020 (link to portal page). This was to ensure that the Design Principles remain relevant and to incorporate improvements developed from the previous deployments.

2.11 The five Design Principles to be used in this ACP are summarised in the table below:

Design Principle (DP)	Priority	Description
DP1- Safety	High	The proposed airspace change must maintain or enhance the current level of safety
DP2- No Change to Flight behaviour	High	None of the proposed technical changes to definitions of STARS/Holds would result in a change to actual flight behaviours –laterally, vertically or in dispersal
DP3- PBN Specification	High	The proposed airspace change will yield maximum safety and efficiency benefits by using an appropriate standard of PBN
DP4- Remove DVOR Dependencies	High	Remove en-route dependencies on ground-based NavAids through appropriate design changes; including removing unnecessary references to ground-based NavAids which are not material to the procedure and rationalising rarely used STARs.
DP5- Airspace Optimisation	Medium	Where appropriate, the proposed airspace will facilitate an optimised airspace design. Including: • Use PBN Replication –replacing conventional STARs/ Holds with RNAV STARs/ Holds; • Using CAA STAR Truncation Policy, when applied logically to STARs with many common segments, can result in the withdrawal of unnecessary duplicate STARs; • Minor changes to a STAR which currently cannot be flown as it is formally defined for legacy reasons –these changes reflect what would actually happen in practice; • Extend or split a current STAR to allow important Descent Planning levels to be formally incorporated in the STAR description

2.12 The five Design Principles summarised above are further detailed below. The Design Principles are all to be considered as having the same high priority aside from DP5 –airspace optimisation –which should only be met if there are appropriate improvements to make, and none of the other principles are negatively impacted. Design Principles1-4 are all imperative to the DVOR programme and should be met as best as possible to ensure a safe and appropriate proposed design, which removes any remaining en-route DVOR dependencies.

Design Principle 1 (DP1) Safety: The proposed airspace change must maintain or enhance the current level of safety for all stakeholders.

Rationale: Safety is a priority for NERL and underpins any airspace change proposal. It is imperative that proposed changes do not have a detrimental safety impact for any airspace users.

Design Principle 2 (DP2) – No Change to Flight behaviour: None of the proposed technical changes to definitions of STARS/ Holds would result in a change to actual flight behaviours –laterally, vertically or in dispersal.

Rationale: A key design criterion of the DVOR programme has always been to maintain current connectivity and avoid any changes to flight behaviour. It is therefore imperative that any proposed design meets this objective.

Design Principle 3 (DP3) – PBN Specification: The proposed airspace change will yield maximum safety and efficiency benefits by using an appropriate standard of PBN.

Rationale: The default PBN specification standard will continue to be RNAV5, as agreed between the NATS DVOR team and the CAA at the start of this programme of work. This has been the assumption and default navigation specification for all the DVOR ACPs submitted so far. However, this Design Principle is being

included to allow the consideration of other PBN specifications, such as RNAV1, rather than committing to a specific standard.

2.13 Current conventional IFPs can be replicated using the CAA PBN STAR Replication Policy (March 2018, link to policy) and Policy for RNAV Holding Attached to Arrival Procedures in UK Airspace (Feb 2016, link to policy). The impact of changing the navigation status of a procedure –and to what specification –will be fully assessed.

2.14 The NATS IFP design team will analyse the existing conventional procedure and use appropriate standards to draw up a replacement, following the same track over the ground and vertical dimensions (aligning with DP2). Replication of IFPs under these policies means there would be no significant change to tracks over the ground, purely technical changes to the definitions of the IFPs. This Design Principle also supports DP4 where contingency STARs/ Holds would no longer be required after RNAV replication; thus, they can be withdrawn from service.

Design Principle 4 (DP4) – Remove DVOR Dependencies: Remove en-route dependencies on ground-based NavAids through appropriate design changes; including removing unnecessary references to ground-based NavAids which are not material to the procedure and rationalising rarely used STARs.

Rationale: The proposal should include remove existing en-route DVOR dependencies whilst aligning with the first three Design Principles: maintain or enhance safety; introduce no changes to flight behaviours; and propose an appropriate standard of PBN (if relevant).

2.15 Based on previous DVOR ACPs, the following design techniques have been provided as examples used to remove DVOR dependencies. All proposed design changes will be fully explained and justified in subsequent documentation, alongside an impact assessment of the proposed change.

Administrative change: remove unnecessary references to the DVOR which are not material to the procedure. Conventional STAR plates may contain references to a DVOR which are not used in the IFP such as a STAR waypoint defined by a DVOR and associated radials/ distances. The applicable waypoint definitions would be updated to remove the DVOR definitions thus removing the NavAid dependency from the STAR chart.

Revised STAR designations should be in line with standard ICAO method –named after the first waypoint of the procedure, not the final waypoint as per typical UK designations. The route indicator will be named after the destination airport; for example, 'H' would denote London Heathrow. These administrative changes would introduce no impact to the IFP itself.

Replication: as covered in DP3 above, conventional procedures –with DVOR dependencies –can be replaced with RNAV versions, using an appropriate specification.

Withdrawal: contingency Holds and STARs-designed to be used when a DVOR is out of service-can be withdrawn where the DVOR is being removed and the procedure is being RNAV replicated (aligning with DP3). As per DP2, the proposal will ensure that current connectivity for relevant ATS routes/ waypoints will be retained.

Design Principle 5 (DP5) – Airspace Optimisation: Where appropriate, the proposed airspace will facilitate an optimised airspace design which could include a simplified airspace design or environmental improvement.

Rationale: Previous DVOR ACP submissions have proposed changes which, alongside supporting the DVOR programme objectives, offer improvements to the ATC network or supporting technical documentation e.g. AIP charts. This Design Principle has therefore been included in recognition and support of additional changes being proposed which offer administrative/ environmental/ technical improvements, whilst fully aligning to the four Design Principles outlined above.

Examples of technical improvements could include the techniques outlined under DP4 above (administrative/ replication/ withdrawal), alongside the following examples:

Incorporation of Descent Planning Levels: extend or split an existing STAR to retain important Descent Planning Level(s) by incorporating these into the future STAR description. These levels are often currently included and described in the notes on the conventional procedure chart. Use of appropriate existing routeings/ waypoints and addition of new waypoints will be carefully considered. STARs will be created using RNAV design criteria and where possible, to align with the existing STAR routing to avoid any change to flight behaviours.

Technical Amendment: propose a change which would improve the current ATC network/ connectivity; such as an environmental improvement or design simplification. This could include correcting an existing IFP technical issue or flight-plan disconnection which is worked around in practice. For example, a stack-swap STAR cannot be selected by most traffic as it starts at a waypoint which the majority of flights bypass. A stack-swap would increase ATC and cockpit workload as the disconnected stack-swap STAR would need to be manually issued. This non-flight-plannable STAR could be technically amended to start at an appropriate waypoint; thus, improving the connectivity, reducing workload and introducing no change to actual flight behaviours.

Truncation: assess the impact of truncating appropriate STARs which have common segments with ATS routes, creating unnecessary duplication. An ATS route can be extended/ implemented to match the relevant STAR route segment until a common "head" is reached, or to a suitable intermediate waypoint shortening the procedure. The STAR can then be truncated, ensuring there is no change to connectivity.

Where this Design Principle is relevant, all previous principles will be adhered to; for example, Design Principle 3 –if a STAR requires replication alongside a truncation. Replication of remaining segments of IFP under STAR Replication Policy means there would be no change to tracks over the ground, purely technical changes to the definitions of the IFPs.

STAR truncation can lead to fewer and less complex IFPs, less ongoing maintenance, a reduction in FDP processing and a simplified ATC network.

Withdrawal: if STARs are rarely used or other STARs provide the same connectivity, the impact of removing them can be assessed. If the four above Design Principles are still met, the STAR can be removed as part of this proposal.

3. Stakeholder Engagement

3.1 As per previous submissions, airports will be fully briefed on the proposed changes and the justification behind why the en-route DVOR dependencies are being removed. This will be focussed on airports whose aerodrome AIP pages will change as a result of the nomenclature changes. However, the proposed changes have all been designed to be invisible from an airport's perspective, asides from the administrative AIP changes; there are no other impacts anticipated.

3.2 The en-route changes as part of this proposal, and previously, will have a minimal impact on airspace users as flight paths will not change; and there will be no impact to ground-based communities. Hence, due to the nature of the DVOR rationalisation ACPs, stakeholder engagement on each Design Principle for each individual submission is not relevant or necessary.

3.3 A CAA-led consultation occurred with NATMAC in 2009, with a NATMAC Informative produced on 7th October 2010. Airlines were broadly supportive, with the NATS reduction in expenditure as a favourable item.

Step 1B complete

End of document