

Establishing the Correct PBN Specifications for ATS Routes

Table 1 provides a comparison of PBN Specifications in different airspace types.

Category R (remote) airspace – served by ADS-C, CPDLC, HF and space-based ADS-B.	Category S (surveillance) airspace – served by ground-based radar or ADS-B or MLAT, and VHF.
- Optimal ATM Planning – <u>no</u> fixed ATS routes, Dynamic Airborne Reroute Procedures (DARP) or User Preferred Routes (UPR). - Acceptable ATM Planning – PBN fixed routes using RNP 2 (or less optimally, RNP 4), which had an ATC separation standard. <i>Note: RNAV 2, which had no on-board monitoring, may be used in the transition period with RNP 1 and GNSS as an equivalence (APANPIRG Conclusion).</i> - Poor ATM Planning – PBN fixed routes using the outdated, non-PBCS RNAV 10 (RNP 10) specification. - Unacceptable ATM Planning – use of the RNAV 5 specification, which requires VHF and ground-based navigation aid geometry coverage.	- Optimal ATM Planning – <u>no</u> fixed ATS routes, free route airspace (FRA). - Acceptable ATM Planning – PBN fixed routes using the RNP 2 or RNAV 2 specification. - Poor ATM Planning – PBN fixed routes using the RNAV 5 specification, or RNP 1, which was designed for terminal airspace (normally, within 40NM of an aerodrome). <i>Note: RNAV 5, which had no on-board monitoring, had no ICAO ATC separation standard, and no requirement for a database, GNSS input, or automated waypoint sequencing, as it was originally conceived as a low-end specification (Basic RNAV).</i> - Unacceptable ATM Planning – use of the oceanic RNAV 10 (RNP 10) or RNP 4 specifications, which were designed for oceanic airspace.

Table 1: Optimal PBN Implementation within Category R and S Airspace

Key aspects about the establishment of the correct PBN for ATS routes are as follows.

- States must, before establishing a PBN specification for routes or airspace, determine the aircraft equipage that supports the specification – if it is less than 90%, an alternative specification should be chosen to ensure the most appropriate service levels and a lower number of non-compliant aircraft to reduce controller workload in mixed-mode operations.
 - Unless planning an Organized Track System (OTS), it is preferable to designate airspace portions as a specific ATC separation service volume, rather than individual ATS routes, as this allows off-track and flexible routing options, and means less complexity for ATC.
 - There is no need to re-designate a conventional ATS route to allow a PBN-capable aircraft to use that route – as long as WGS-84 compliant route waypoints are published in the database!
 - Surveillance-monitored longitudinal spacing may be implemented within Category S airspace without changing the designation of the ATS route. Thus, within Category S airspace, the main reason for a PBN route specification is for obstacle appraisal and navigation, not for ATC separation (as surveillance-based separation should be applied).
- Note: higher performing PBN specifications such as RNAV 2 provided greater lateral track-keeping assurance of closely-spaced route systems (an example of this is the near parallel routes spaced approximately 8NM apart with the Republic of Korea's airspace).*