Never before in history have our skies been more crowded with so many different types of aircraft – as the aviation industry strives to meet society's continuously changing need for air travel. And as air travel continues to be a fundamental part of our lifestyle, our skies are expected to get even busier over the next two decades, tripling by some estimates.

How will the aviation community meet the demands of increasing air travel? By harnessing emerging advances in aircraft technology, aerodynamics, and on-board flight deck avionics, which are improving at an unprecedented speed. These improvements lead to innovative uses of new technologies to meet the public's need for a safer and more efficient air transportation system.

The FAA is revolutionizing the way aircraft navigate our crowded skies by creating new flight paths, producing new navigation standards, and transforming our National Airspace…all through a new initiative called Performance-Based Navigation.

With Performance-Based Navigation, aircraft use advanced flight management systems, on-board inertial systems, heads-up display systems, and other satellite and ground systems to compute position, speed, and other vital navigation information. The new approach virtually automates the aircraft's entire navigation function – from departure to landing.

And here's how it works: To begin with, there are two key elements associated with Performance-Based Navigation. The first is Area Navigation, better known as RNAV, and the second is Required Navigation Performance, known as RNP.

With RNAV, pilots no longer need to zig zag from one ground navigation station to another. Instead, they can fly a direct path to their final destination, which results in reduced flight distances and fuel costs.

With RNP, we introduce a new concept called: "containment," which allows aircraft to fly even more precise and accurate paths. The aircraft is "contained" within a narrow corridor. This means that with RNP, more "lanes" can be built into the same limited airspace, creating more capacity where we need it.

Together, RNAV and RNP are the basic building blocks of Performance-Based Navigation, advancing the Nation's air traffic management system into the future.

But the future is here now. To see how RNAV is changing navigation, we turn to Atlanta's Hartsfield Jackson International airport – the world's busiest airport – where 10,000 RNAV flights now depart every week.

Because these aircraft no longer rely on ground navigation equipment, departure points or gates can be placed anywhere in the terminal airspace, increasing throughput and reducing delays.

RNAV aircraft arrive and depart with minimal controller voice instructions and fly the pre-defined routes reliably. This gives the controllers more time to sequence the aircraft efficiently and handle the bottlenecks safely.

The advantages of RNAV are numerous. They include navigational flexibility, greater safety, shorter routes, reduced time, and less use of fuel, which affects engine exhaust emissions and environmental impact.

The second fundamental element of Performance-Based Navigation – RNP – allows aircraft to fly even more precise and accurate paths.

Here's how it works: Through a concept called "containment, aircraft can use on board avionics and flight management systems to fly through a highway in the sky traversing the airspace more directly and efficiently. Pilots are able to fly this highway with pin-point accuracy and repeatability. With RNP, more accurate paths can be placed where they are needed in the limited airspace, creating additional lanes and more capacity.

Accurate navigation is enabled by the satellite navigation technology of GPS, the government's Global Positioning System. On board the aircraft, GPS receivers allow continuous and reliable reception of navigation signals virtually anywhere in the airspace.

With its accuracy and reliability, RNP has the potential for enabling simultaneous approaches to closely-spaced parallel runways in reduced visibility conditions, resulting in increased airport capacity.

RNP also benefits some of the world's most remote airports, which are often located in mountainous terrain.

For example, RNP procedures have provided vastly improved safety and access to Juneau's airport. Sited at the end of the winding Gastineau Channel, Juneau is flanked by some of the world's most scenic yet forbidding mountain peaks. On a clear day, on the approach to the airport, the beauty of the dramatic terrain on either side of the channel is breathtaking.

But if weather conditions deteriorate and visibility is reduced, predictable access to the airport is lost and the typical conventional procedure into Juneau is suspended. Pilots must divert or cancel their flights, leaving passengers stranded.

With RNP, however, the approach and landing into Juneau airport is safe and predictable, with fully stabilized and guided navigation pin-point accuracy is achieved every single time.

Together, RNAV and RNP form the basis of Performance-Based Navigation. From RNAV's new highways in the sky, providing additional capacity en route, to RNP's approaches into the world's busiest airports – RNAV and RNP are opening up new opportunities and solutions in air transportation across the U.S. and around the world.

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