

Mr. Chairman, Members of the Committee, I am Chet Fuller, President – GE Aviation Systems, Civil. Thank you for the opportunity to testify before the Subcommittee today on the issue of Area Navigation (RNAV) and Required Navigation Performance (RNP), an issue central to the discussion on NextGen, the modernization of our nation’s air traffic control system.

There are a few things I would like you to understand about RNP:

- *First* – RNP means greater accuracy and precision and RNP enables efficiency. It is through RNP that operators and the flying public derive the value of NextGen Air Traffic Management.
- *Second* – RNP saves time, it saves fuel, it reduces Carbon emissions, and it reduces community noise on both approach and departure.
- *Third* – RNP is fundamental to the transition from the past - ground-based, voice controlled air traffic management - to the future – time and space based and digitally controlled system, otherwise known as 4 Dimensional Trajectory Based Operations or 4D TBO.
- *And Fourth* – The technology is ready today, all we have to do to reap the benefits of RNP is accelerate implementation.

GE Aviation is a leader in efficient technology - From its beginnings to the world's most powerful commercial jet engines today, GE's history of powering the world's aircraft features more than 90 years of innovation. However, our innovation is not limited to aircraft engines.

For more than two decades, GE Aviation's navigation systems have guided the world's most successful air transport aircraft, racking up more than 130 million hours of operation on Boeing 737 and Airbus A320 family aircraft. In fact, every 2.7 seconds an aircraft takes off with a GE Flight Management System (FMS).

GE's leadership has resulted in advancements that support NextGen and ATM improvements including:

- GE was the first to demonstrate RNP operations at 0.1nm with Alaska Airlines into Juneau, Alaska in the 90s;
- We were the first to extend the capability of RNP to the fourth dimension – time – with 4 Dimensional Trajectory Based Operations (4D TBO) in revenue service with Scandinavian Airlines;
- And we have played an integral part in Southwest Airlines' plans to begin RNP operations across most of their system with our large area displays and FMS.
- We also supply National Airspace capable systems to the US military.

Everyone understands at some level the Need for Air Traffic Modernization. Our current ATC system is outdated, and relies on a 1960s era infrastructure. It's a very large sky, but the fact of the matter is we use very little of it, and what we do use, we use inefficiently. The airways we fly today are 8 nautical miles wide, because they have to be. Radar was a technical wonder 50 years ago, but it's an anachronism today. While an aircraft of the past was doing well to be within a few miles of the airway centerline, today's GPS equipped aircraft are almost always within a wingspan

of airway center. Improving navigational accuracy, in all 4 dimensions, equals increased airspace capacity and efficiency.

Let me tell you about two examples, which showcase the benefit of RNP and GE's technology. There is no reason to wait to develop RNP procedures; RNP is being implemented around the world today, with immediate benefits. In **Brisbane, Australia**, Qantas has been the lead carrier in a project that has clearly demonstrated that air traffic controllers can integrate RNP capable aircraft and non-RNP capable aircraft in a medium traffic density airport environment, creating immediate reductions in CO2, fuel burn and noise. Qantas has already implemented RNP procedures at 15 Australian airports. This effort is reducing CO2 emissions and fuel consumption today.

Another demonstration, conducted by **Scandinavian Airlines in Sweden**, has taken RNP one-step further by adding time to the equation. With 4 Dimensional Trajectory Based Operations, they have added the ability to de-conflict traffic through trajectory negotiation. In thousands of such approaches into Stockholm they have reduced the area exposed to noise 65 db or greater by 50 percent¹. Perhaps the most notable aspect of these approaches is that they use time to increase predictability, pointing the way toward what is needed to enhance capacity while flying the new efficient profiles at high density airports. More tests are needed in this area to establish the full realizable benefits, but we are already on the path to success.

¹ Figures published by Scandinavian Airlines as part of NUP2+ project.

However, we need to take note that all approaches are not created equal. If you take an existing approach and merely re-create it so that it might be flown using RNP equipment and procedures, you get exactly the same results – almost no improvement.

The most efficient descent is *one single continuous* descent, where the engines are at low power the entire time. This is also the quietest descent. The aircraft flying this perfect approach will not suffer through multiple step-downs, throttle changes, and extra miles.

Unfortunately, many of the RNP procedures published in the U.S. over the last few years simply replicate existing ground based navigation procedures, and in so doing create very little benefit. There are many things to consider when creating an optimized approach, but a key factor is the performance of the aircraft. We support the emphasis on measuring benefits in new RNP procedure design as included in the Senate’s FAA Reauthorization Bill, and feel that metrics to ensure the effectiveness of new procedures are vital. Efficient procedures become even more critical as we transition to 4D Trajectory Based Operations.

RNP is also valuable for optimized departures. In climb aircraft are forced to fly low and slow with high thrust, taking circuitous routes for terrain clearance or noise abatement – all of which reduce efficiency. RNP can help to create significantly improved departure tracks routed to reduce noise, which can also be flown with lower

thrust. RNP with Trajectory Based Operations can also help to de-conflict departing traffic and reduce separation, all of which essentially adds departure capacity.

RNP offers substantial environmental benefits. Using RNP, aircraft are able to fly the most efficient route in the shortest distance, saving time, money and fuel and lowering emissions. It is estimated that these shorter routes have the potential to cut global CO2 emissions by about 13 million metric tons per year² - that's more than 1.2 billion gallons of fuel. Oddly, one of the factors slowing down the proliferation of RNP procedures is the environment.

Because the RNP path differs from the previous instrument procedure, there is some question whether an environmental assessment is required to determine the impact of the new RNP paths. While this is a valid concern that ultimately will need to be resolved, there are immediate ways that beneficial RNP paths can be designed that shouldn't require environmental review. In particular, RNP routes can be designed to replicate the routes taken today by aircraft on clear, good weather days, when controllers clear them for a visual approach.

The benefits are clear, so what should we do?

- *First* – Accelerate the creation of high quality RNP approach and departure procedures immediately.

² Meeting Aviation Challenges Through Performance Based Navigation, ICAO/IATA

- *Second* – Create metrics for success. Measure the effectiveness of new procedures by their efficiency gains and their acceptance in use.
- *Third* – We need to accelerate movement toward the NextGen vision of 4D TBO, extending RNP to time. This requires a coordinated effort integrating Communications, Navigation and Surveillance – **one strategy, one vision, many enablers**

Let me close by simply saying in summary, there are very few initiatives that will simultaneously improve fuel efficiency, aircraft emissions, community noise, system capacity, and airline productivity all together. The benefits are real, they have been proven here and elsewhere, and thousands of aircraft are already equipped.

We are ready.

The time is now to work together – for the benefit of the environment, the airlines, and the flying public. Thank you.