Shaping the Future ATC System

BY BASIL J. BARIMO

1956 was a watershed year in shaping the future of our air traffic control (ATC) system. The sad fact is that a tragedy — the midair collision between two airliners over the Grand Canyon — had to occur before we took seriously the need for a more proactive approach to developing a safer ATC infrastructure.

Moving aggressively in the late 1950s — with the dawn of commercial jet operations — the United States led the world in deploying a state-of-the-art ATC system. Through innovation, and an unfailing commitment to safety on the part of both industry and government, new technologies continued to improve system performance and capacity. This innovation now includes technologies such as the traffic alert and collision avoidance system, which has proven to be highly effective. Similarly, the risk presented by controlled flight into terrain has been substantially reduced through the deployment of ground proximity warning system and terrain awareness and warning system technology. Wind shear detection and alerting systems, another breakthrough for aviation safety, continue to help pilots avoid dangerous weather.

Today, the result is, inarguably, the safest and the most reliable system of transportation.

However, the concept of operations in today's ATC system has not changed since the 1950s, and that presents us with a real problem. Why? Simply put, the basic design elements of the ATC system cannot be "grown" to meet increasing demand. Today's system relies on voice communication, radar surveillance and navigation over fixed points on the ground as its three core components. This effectively creates "one-lane roads" in the sky, where aircraft operate with verbal guidance from an air traffic controller monitoring them by radar. The system is straightforward but increasingly inefficient, as the limited nature of those one-lane roads combines with scarce radio frequencies and radar constraints to cause congestion. The ATC system that fueled dramatic economic growth in the U.S. now threatens to stifle it.

While the system remains incredibly safe, its design lacks the growth potential to meet burgeoning demand. This demand will grow from 45,000 flight operations per day to 61,000 daily flight operations by 2016. Increased congestion will become prevalent as new classes of aircraft — such as very light jets and unmanned aerial vehicles — are introduced into the system.

In the past, growth has been accommodated by adding more air traffic controllers and equipment and subdividing airspace. Adding more staffing to the system, however, is providing diminishing returns. As we run out of Band-Aid solutions, inefficiency increases. The situation is further complicated by an antiquated funding mechanism that divorces system use from system revenues and, as a result, has not kept pace with the investment needed to keep the ATC system up to date, let alone to undertake the modernization needed for next-generation technologies.

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Without question, the inadequacies of the current ATC system pose a significant challenge to maintaining the standards of safety and efficiency we expect from the aviation industry. But this crisis is not limited to the airlines; it is shared among all those who use the National Airspace System (NAS), including those in the business aviation and general aviation communities. We cannot afford to let delays and capacity limits become the safety margin of the future. This human-centric, maintenance-intensive, ground-based system must be transformed to avoid stifling economic growth, which is a direct result of a safe and vibrant air transportation system.

The time has come for us to set the course for the future of aviation growth. The wise choice — supported by empirical data and decades of analysis — is to begin at once the transition to an information-centric, satellite-driven, digital air traffic management system, taking full advantage of existing and developing technologies. Efficient growth in system capacity translates into even higher levels of safety, an expanding economy, environmental benefits and continuing world aviation leadership. It is the smart solution.

By leveraging existing technologies and adopting improved procedures, we can facilitate growth and enable the economy to continue to benefit from an extensive air transport network. The transformation of the U.S. ATC system involves more than simply replacing old equipment and manual processes, however. A closer look reveals two distinct but equally important strategies: deploying technologies and replacing outdated and redundant infrastructure. There are three key principles to implementing these strategies:

- Reduce the cost of the current system through automation and productivity improvements. Consolidating redundant facilities, decommissioning obsolete equipment and procedures, and rationalizing the workforce will further free up funds for capacity investments. For example, today we rely on 21 en route

centers and 168 terminal radar approach control facilities in the U.S. The fact is, those facilities could be easily consolidated into a handful of secure network-enabled operations centers, which would safely and smartly service the entire nation.

- Increase the capacity and efficiency of the current system by leveraging navigation equipment already aboard, transitioning to performance-based NAS, achieving visual arrival and departure rates during instrument conditions and rationally segregating different types of aircraft to optimize traffic flow. The Global Positioning System does not do much good if we are still limited to flying along the rigid highways in the skies.

- Build a system that enables growth through the deployment of modular technologies for a scalable, flexible architecture. Much of the technology envisioned for the future system has already been developed and tested.

Although addressing the shortcomings of our outdated ATC system seems an obvious choice in the face of mounting congestion, the process is fraught with challenges. The transition will require a new approach to the way funding and investment decisions are made, as well as systematic facility consolidation, innovative financing to accelerate technological deployment and a commitment by system users to pay for the services they consume. All of us must embrace change.

Maintaining the highest level of aviation safety and security continues to govern every decision as we plan for the next-generation system. A safer and more secure air transport system is what the public expects and what U.S. airlines will continue to deliver. Safety and security are not only the foundation of the airline industry — they are indeed the foundation of our future. Transforming our nation's air traffic control system is a formidable challenge. Bold change is needed and tough decisions must be made. When the dust settles, the flying public deserves a NAS that is safer, smarter and fairer. ●

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