

33 NAS ARCHITECTURE SUMMARY

NAS users and the FAA defined the future operations of the NAS in the *Joint Government/Industry Operational Concept for the Evolution of Free Flight*. This concept of operations, which is the foundation of the architecture, is consistent with the FAA's Air Traffic Services (ATS) *A Concept of Operations for the National Airspace System in 2005*.

This architecture is an evolutionary plan for modernizing the NAS and moving towards Free Flight. It incorporates new technologies, procedures, and concepts intended to meet the needs of NAS users and service providers. It includes schedules for the various NAS components, aligned to the expected funding levels indicated by the FAA's in January 1998 funding projections through 2015. The architecture is designed to provide *all* airspace users with more flexible and efficient operations.

The NAS architecture describes changes to the NAS in communications, navigation, surveillance, automation tools, and avionics designed to improve NAS operations and services. Specific details contained in this architecture include:

- Description of NAS capabilities
- Enabling technologies, including their interdependencies
- Research and development required for new technology and procedures
- Transition schedules for functional enhancements
- Projected costs for the FAA and users.

The NAS architecture is divided into three implementation phases, from 1998 to 2015:

- *Phase 1 (1998–2002)*: Focuses on sustaining essential air traffic control services and delivering early user benefits; satellite-based navigation systems will be deployed and air-air surveillance will be introduced
- *Phase 2 (2003–2007)*: Concentrates on deploying the next generation of communications, navigation, and surveillance (CNS) equipment and the automation upgrades necessary to accommodate new CNS capabilities

- *Phase 3 (2008–2015)*: Completes the required infrastructure and integration of automation advancements with the new CNS technologies that enable additional Free Flight capabilities throughout the NAS.

The architecture will continue to be updated, and numerous factors can and will change it. Results of investment analyses will immediately be factored into the NAS Architecture data base and may affect individual program costs. Research continues to identify new technologies that could affect cost and the timing of improvements. Funding levels may have a major impact on both the timing and extent of NAS modernization. Because this architecture takes an integrated view, any individual program slip can affect other programs and eventually lead to changes in delivery time of new capabilities.

The FAA intends to use the architecture in several important ways. The agency will support the annual budget process by prioritizing funding levels of programs critical to modernization and the sustainment of legacy systems. The architecture provides alternative investment analysis starting points for new systems.

The architecture is the FAA's public commitment to modernize the NAS consistent with budgets and good management. Most importantly, the architecture forms the basis for continuing discussions and planning with the aviation industry and users. It provides the aviation industry a tool for planning the avionics upgrades that complement the new technologies and procedures envisioned for Free Flight.

This architecture estimates the time required for changing FAA regulations and certification procedures, for hardware development, and for users to equip with appropriate avionics. Reasonable assumptions have been made about the rate at which users will equip with new avionics. However, the marketplace greatly influences the aviation industry and is one factor that could affect equipage rates.

It is extremely difficult to accurately predict system performance levels when so many new technologies are being introduced at once. However, safety remains a primary consideration in mod-

ernizing the NAS and determining if/when new services will become available to users. With time, understanding of new technologies and their human factors implications will become clearer. This understanding could alter the concept of operations (CONOPS) and the architecture.

This NAS architecture would not have been possible without the help and guidance of the entire

user community. The continued involvement of RTCA, the International Civil Aviation Organization (ICAO), and the Core Team is vital to shaping the future of the NAS. The FAA intends to reach new levels of trust and cooperation with NAS users, with the goal of providing the safest, most cost-effective, and efficient airspace system in the world.