In October 2013 the Assembly of ICAO member states adopted the new, fourth edition of the Global Air Navigation Plan (GANP). The new GANP, part of a system of regional performance dashboards and global performance reporting, provides the strategic direction for ATM change programmes worldwide.

The GANP’s Aviation System Block Upgrades (ASBU) planning and integration framework is one of the keys to achieving global interoperability. It was formulated in 2010/2011 reflecting the SESAR, CARATS and NextGen plans and architecture and the ICAO Global ATM Operational Concept (GATMOC).

The ASBU framework contains 51 modules, each representing a specific improvement in a capability in one of the Performance Improvement Areas (PIAs). The modules are organised into time blocks (0 to 3) with milestone dates of 2013, 2018, 2023 and 2028 respectively. These are the availability dates of the technologies and global standards and procedures for the modules in each block. Work will then be completed at Regional and State level to prepare for operation. Implementation, in line with local requirements and priorities, will follow; for example, Block 1 modules will generally be implemented, where required, between 2018 and 2023.

The development of a capability forms a thread of modules across the blocks. Not all modules are required in all States, and not all threads have modules in all blocks (see table on next page).

The short term priority is implementation of Performance-Based Navigation (PBN), the foundation of Block 0. For Block 1, modules have been categorised as essential, desirable, specific or optional, to aid planning.

The Block Upgrades are supplemented by technology roadmaps for the Communication, Surveillance, Navigation, Information Management and Avionics areas. An ATM logical architecture is being developed, to describe the linkages between ASBU modules, GATMOC components and the operational environment.

ICAO is working with ARINC, RTCA and EUROCAE, standardisation bodies who are developing technical standards. CANSO (the ANSP association) actively supports and promotes the ASBU system.
USA: NextGen and the FAA

The NextGen programme was launched in 2003 to improve the safety, security, efficiency, quality and affordability of the US airspace system.

In addition to their research and development work, recent progress includes:

- Deployment of key capabilities, including near-term improvements to ATM at congested airports in major cities
- Deployment of key NextGen foundation projects: (i) En-route automation (ERAM) — a new computer system for the 20 US en-route control centres — implementation expected to be complete by March 2015
- Deployment of key NextGen foundation projects: (ii) ADS-B — to extend aircraft surveillance coverage — deployment to be completed by end 2014
- Investment decisions for DataComm, SWIM and the NAS Voice System
- Senior appointments to strengthen programme management.

The FAA NextGen Implementation Plan (2013) details the development and delivery of NextGen Operational Improvements (OIs), in time segments from 2012 to 2016+, grouped into portfolios:

- Improved surface operations
- Improved approaches and low-visibility operations
- Improved multiple runway operations
- Performance based navigation
- Time based flow management
- Collaborative air traffic management
- Separation management
- On-demand NAS Information
- Environment and energy
- System safety management
- NextGen infrastructure

The FAA has established an Operational Incentives programme to encourage aircraft operators to invest in the required equipment and training, and demonstrating the benefits is high on the FAA’s agenda.

The Single European Sky (SES)

The political Single European Sky initiative was launched in 1999, to drive cost and capacity improvements in European ATM. Functional Airspace Blocks (FABs) and the ANSP Performance Scheme are cornerstones of SES. The nine FABs (where ATM is harmonised across borders) are in operation, and have begun to achieve positive results. For example, the UK-Ireland FAB expects cumulative savings to customers to exceed €300m by 2020. As FABs mature and collaboration develops, benefits delivery will accelerate. The Performance Scheme was introduced in 2012. Targets for 2015-2019 have recently been agreed. They include a 3·3% annual ATM cost reduction.

SES2+, controversial new legislation to accelerate SES, was launched in 2013. SES2+ consolidates the SES2 legislation of 2009, contains powers for the European Commission and introduces changes and new provisions.

ANSP Alliances such as A6 (SESAR ANSPs) and Borealis offer a strong co-operative network alongside the formal FAB system. The strategic role of National Supervisory Authorities (NSAs) will be crucial. SES2+ recognises the importance of extra-FAB collaboration and aims to strengthen NSA independence and promote inter-NSA collaboration.

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### Acronym | Capability developed | B0 2013 | B1 2018 | B2 2023 | B3 2028+
--- | --- | --- | --- | --- | ---
APTA | Approaches with vertical guidance | ✓ | ✓ | ✓ |
WAKE | Wake Turbulence Separation | ✓ | ✓ | ✓ | ✓
RSEQ | Sequencing AMAN/DMAN/SMAN | ✓ | ✓ | ✓ |
SURF | Surface Operations | ✓ | ✓ | ✓ |
ACDM | Airport CDM | ✓ | ✓ | ✓ |
RATS | Remotely Operated Aerodrome Control | ✓ | ✓ | ✓ |
FICE | Data Sharing and FF-ICE | ✓ | ✓ | ✓ |
DATM | Digital ATM Information | ✓ | ✓ | ✓ |
SWIM | System-Wide Information Mgt | ✓ | ✓ | ✓ |
AMET | Meteorological Information | ✓ | ✓ | ✓ |
FRTO | ATS Routing (Free) | ✓ | ✓ | ✓ |
NCPS | Network Planning & Management | ✓ | ✓ | ✓ |
ASUR | Ground Surveillance | ✓ | ✓ | ✓ |
ASEP | Airborne Separation/ Sit Awareness | ✓ | ✓ | ✓ |
OPFL | Optimal Flight Levels | ✓ | ✓ | ✓ |
ACAS | Collision Avoidance System | ✓ | ✓ | ✓ |
SNET | Safety Nets | ✓ | ✓ | ✓ |
PIA1: Airport Operations
PIA2: Globally Interoperable Systems and Data
PIA3: Optimum Capacity and Flexible Flights
PIA4: Efficient Flight Paths

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The ASBU Framework: PIAs, Threads, Modules and Blocks.

![NextGen Vision](image)

Educated and informed pilots and air traffic controllers are essential to the successful delivery of NextGen. FAA's next steps are to continue to work with industry and other Federal agencies to implement NextGen and work closely with the NAS to ensure safe and efficient operations.
SESAR ATC improvements currently under test:

- Reduction in holding times
- Free routing between specified entry and exit points
- 4D trajectory flying
- Remote tower services

SESAR

The SESAR programme is the technology pillar of SES. Under the annual ‘release’ system, flight trials and simulations verify and validate SESAR solutions. 68 exercises took place in 2011-2013, and a further 20 are planned for Release 4 (2014). Solutions validated so far, or planned for 2014, include:

- Point merge in complex TMA (exploiting flight management systems to reduce vectoring and traditional holding)
- Free routing (allowing airspace users to plan their routes freely between specified entry and exit points)
- Initial 4D trajectory (4iD) and flying to a time in en-route and TMA airspace — the first 4iD flight was in February 2012
- Remote tower services and infrastructure.

There is growing emphasis on SESAR deployment planning. In 2015, the Interim Deployment Programme will hand over to the Deployment Manager (to be appointed). The latter will manage the Common Projects to deploy functionality essential to the future ATM system. The first has been defined. The Pilot Common Project covers four functional areas, initially:

- Extended AMAN and PBN in high density TMAs
- Airport integration and throughput
- Flexible airspace management and free Route
- Network collaborative management.

Incentives will support the Common Projects, and EU funding is expected.

SESAR, NextGen and the ASBU Framework

The ASBU modules are the hub of interoperability. The modules can be used as a template for defining a new programme, or for checking the coverage of a defined plan. They facilitate the planning and management of collaboration by aiding identification of common elements and activities, and by providing shared terminology.

The SESAR programme has mapped its OIs to ASBU modules, and the results are summarised below. SESAR's plans effectively address all ASBU modules. For Blocks 0 and 1, available information confirms that NextGen presents a similar picture.

SESAR/NextGen collaboration is facilitated by the 2011 Memorandum of Understanding between the FAA and the EC. Key areas include:

- Transversal activities e.g. concept of operations, separation provision, road-mapping, investment
RPAS integration

The challenge of integrating remotely-piloted aircraft (RPAs) into the air navigation system is being addressed at state, regional and global levels.

ICAO is working on the development of the required standards and procedures and ASBU modules have been defined:

- APTA — Approaches with vertical guidance
- WAKE — Wake Turbulence Separation
- RSEQ — Sequencing AMAN/DMAN/SMAN
- SURF — Surface Operations
- ACDM — Airport CDM
- RATS — Remotely Operated Aerodrome Control
- FICE — FF-ICE
- DATM — Digital ATM Information
- SWIM — System Wide Information Mgt
- AMET — Meteorological Information
- FRTO — ATS Routing (Free)
- NOPS — Network Operations
- ASUR — Ground Surveillance
- ASEP — Airborne Separation/Sit Awareness
- OPFL — Optimum Flight Levels
- ACAS — Collision Avoidance System
- SNET — Safety Nets
- CDO — Continuous Descent Operations
- TBO — Trajectory-based Operations
- CCO — Continuous Climb Operations
- RPAS — RPAS Integration

### SESAR OIs and ASBU Modules

- **B0** — Basic RPAS operation
- **T0** — Wider access to airspace
- **B3** — Safe operation in all classes of airspace

**Programme-specific goals**

- B1-RPAS (readiness date 2018) — basic RPAS operation
- B2-RPAS (2023) — wider access to airspace
- B3-RPAS (2028) — safe operation in all classes of airspace

**Roadmaps**

- Roadmaps have been published in both Europe and the USA. Test operations continue with sites and programmes under development or in operation.

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**Conclusion**

Approval of the new GANP and the ASBU framework is much more than a formal milestone. It provides an agreed framework for planning and coordinating the delivery of both interoperability and programme-specific goals, and for making informed investment decisions.

Using the framework, SESAR and NextGen are progressing towards their goals, and have links with many of the other programmes world-wide which are aiming for alignment with the framework; ANSPs are forming alliances and other groupings to increase efficiency; ICAO is working closely with technical standardisation bodies to ensure that global standards and procedures will be ready when needed.

At national, regional and global levels, partnership and collaboration will be the keys to success.

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**ICAO’s timetable for the introduction of remotely piloted aircraft systems (RPAS) into the air navigation system:**

- **2018** — Basic RPAS operation
- **2023** — Wider access to airspace
- **2028** — Safe operation in all classes of airspace