



OACI

ORGANIZACIÓN DE AVIACIÓN CIVIL INTERNACIONAL

ORGANISMO ESPECIALIZADO
DE LA ONU





MEJORAS POR BLOQUE DEL SISTEMA DE AVIACIÓN (ASBU)

Mayda Alicia Ávila

Especialista Regional de Comunicaciones, Navegación y Vigilancia

Fabiana Todesco

Especialista Regional de Aeródromos y Ayudas Terrestres

MEJORAS POR BLOQUE DEL SISTEMA DE AVIACIÓN (ASBU)

✈ La metodología ASBU del GANP de la OACI es un enfoque mundial programático y flexible que permite a todos los Estados miembros mejorar sus capacidades de navegación aérea en función de sus requisitos operacionales específicos.



MEJORAS POR BLOQUE DEL SISTEMA DE AVIACIÓN (ASBU)

✈ *El ASBU funciona de acuerdo con la siguiente estructura:*

- ✈ *Hilo conductor ASBU: tres categorías diferentes, operativa, de información y tecnología.*
- ✈ *Módulo ASBU: es el conjunto de elementos de un hilo conductor que, de acuerdo con la hoja de ruta de los habilitadores, estará disponible para su implementación dentro del plazo definido establecido por el Bloque ASBU.*
- ✈ *Bloque ASBU: esto implica que el elemento y todos los habilitadores asociados a él deben estar disponibles para su implementación en el año del bloque ASBU.*
- ✈ *Elemento ASBU: este módulo es el conjunto de elementos de un hilo conductor que, de acuerdo con la hoja de ruta de los habilitadores, estará disponible para su implementación dentro del plazo definido establecido por el Bloque ASBU.*



HILO CONDUCTOR ASBU

INFORMACIÓN

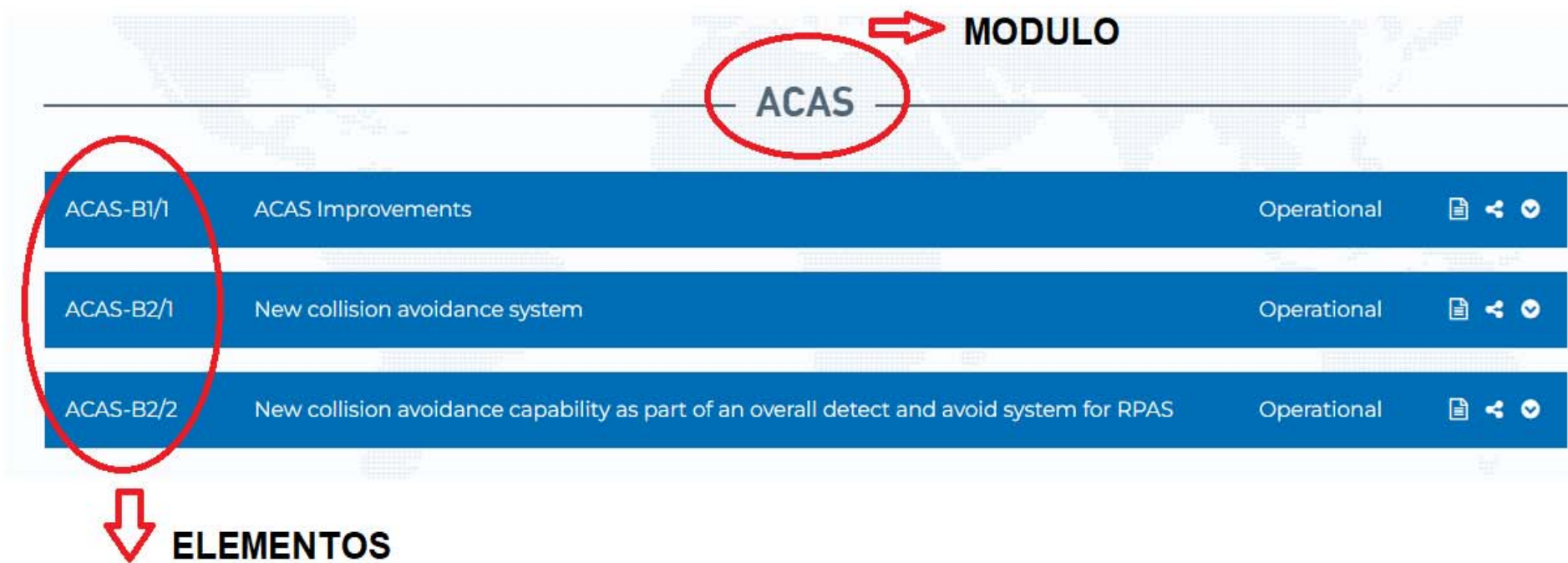
- ✈ *AMET: Información meteorológica*
- ✈ *DAIM: Gestión digital de la información aeronáutica.*
- ✈ *FICE: Información de vuelo y flujo para un entorno colaborativo (FF-ICE).*
- ✈ *SWIM: Gestión de la información en todo el sistema*

TECNOLOGÍA

- ✈ *ASUR: Sistemas de vigilancia*
- ✈ *COMI: Infraestructura de comunicación*
- ✈ *COMS: Servicio de comunicación ats*
- ✈ *NAVS: Sistemas de navegación*

OPERACIONAL

- ✈ *ACAS: Sistema anticolidión de a bordo (ACAS)*
- ✈ *ACDM: Toma de decisiones en colaboración con el aeropuerto*
- ✈ *APTA: Mejorar las operaciones de llegada y salida*
- ✈ *CSEP: Separación cooperativa*
- ✈ *DATS: Servicios Digitales de Tráfico Aéreo de Aeródromo*
- ✈ *FRTO: Mejora de las operaciones mediante trayectorias en ruta mejoradas.*
- ✈ *GADS: Sistema Mundial de Socorro y Seguridad Aeronáuticos (GADSS)*
- ✈ *NOPS: Operaciones de red*
- ✈ *OPFL: Mejora del acceso a los niveles óptimos de vuelo en el espacio aéreo oceánico y remoto*
- ✈ *RSEQ: Mejora del flujo de tráfico mediante la secuenciación de pistas*
- ✈ *SNET: Redes de seguridad en tierra*
- ✈ *SURF: operaciones de superficie*
- ✈ *TBO: Operaciones basadas en la trayectoria*
- ✈ *WAKE: Separación por turbulencia en estela*



The image shows a screenshot of a table from the ICAO ASBU. The table has three rows. The word 'ACAS' is circled in red above the table, with a red arrow pointing to the word 'MODULO' to its right. The first row of the table is also circled in red, with a red arrow pointing down to the word 'ELEMENTOS' below it.

ACAS		MODULO
ACAS-B1/1	ACAS Improvements	Operational
ACAS-B2/1	New collision avoidance system	Operational
ACAS-B2/2	New collision avoidance capability as part of an overall detect and avoid system for RPAS	Operational

<https://www4.icao.int/ganportal/ASBU>

ELEMENTO ASBU

Cada elemento ASBU contiene información sobre su descripción funcional, habilitadores, aplicabilidad de implementación y evaluación de impacto en el desempeño. Los Estados deben entender que los elementos ASBU se abordan para satisfacer una necesidad operacional o resolver una deficiencia, aumentar la eficiencia y la seguridad.



✈ *¿Por qué?: el principal propósito, proporciona un resumen de la esencia del elemento Para los elementos operacionales proporciona información de la relación directa del desempeño.*

✈ *el qué: descripción de lo que las partes interesadas pueden hacer con este elemento que no se podía hacer antes. Esta sección no pretende describir la mejora del rendimiento o los beneficios*

✈ *el cómo: información adicional para mejorar la comprensión del elemento*

MEJORAS POR BLOQUE DEL SISTEMA DE AVIACIÓN (ASBU)

✈ *Los Elementos ASBU tienen diferentes niveles de madurez:*

- ✈ *Listo para implementación: este nivel de madurez se enfoca en el final del desarrollo del sistema y la capacidad operativa inicial a nivel mundial.*
- ✈ *Normalización: este nivel de madurez se centra en la definición de las disposiciones necesarias para la interoperabilidad del sistema y la armonización de los procedimientos.*
- ✈ *Validación: este nivel de madurez se centra en la investigación y validación industrial e incluye la validación de la prueba de concepto, la implementación y prueba de prototipos independientes, las pruebas y la creación de prototipos en un entorno representativo y la demostración de viabilidad de ingeniería completa en la aplicación del sistema real.*
- ✈ *Concepto: este nivel de madurez se centra en la investigación exploratoria e incluye la investigación científica, la investigación de los principios básicos observados e informados y la definición del concepto.*



Sixth edition of the GANP 

Main Purpose  Meteorological observations in support of flexible airspace management, improved situational awareness, collaborative decision-making and dynamically optimized flight trajectory planning.

New Capabilities  Provision of observations of additional meteorological parameters/elements. More automated observations. Higher temporal and spatial resolution for lightning, radar and satellite information.

Description  This element represents the provision of meteorological observational products including:

- Automatic Weather Observation System (AWOS) information (including real-time exchange of wind and RVR data)
- Local reports (MET REPORT / SPECIAL)
- Aerodrome reports (METAR / SPECI)
- Lightning information
- Ground-based weather radar information
- Meteorological satellite imagery
- Aircraft meteorological report (ie. ADS-B, AIREP, AMDAR etc.)
- Vertical wind and temperature profiles
- Volcano Observatory Notice for Aviation (VONA)
- Wind shear alerts

Maturity Level  Ready for implementation

Human Factor Considerations

1. Does it imply a change in task by a user or affected others? No
2. Does it imply processing of new information by the user? No
3. Does it imply the use of new equipment? Yes
4. Does it imply a change to levels of automation? Yes

CLASIFICACIÓN DE LOS ELEMENTOS ASBU POR SU NIVEL DE MADURACIÓN



- ✓ Elementos clasificados acorde a su nivel de maduración.
- ✓ Se está trabajando en un material guía para la evaluación de los elementos ASBU en su estado de maduración “listos para implementar”.

EJEMPLO:

ASBU ELEMENTS	
Ready for implementation:	
Standardization:	
Validation:	
Concept:	
No define:	

ACDM (Airport Collaborative Decision Making)				
B0	B1	B2	B3	B4
ACDM-B0/1 Airport CDM Information Sharing (ACIS) Operational		ACDM-B2/1 Airport Operations Plan (AOP) Operational	ACDM-B3/1 Full integration of ACDM and TAM in TBO Operational	
ACDM-B0/2 Integration with ATM Network Function Operational		ACDM-B2/2 Airport Operations Centre (APOC) Operational		
		ACDM-B2/3 Total Airport Management (TAM) Operational		
AMET (Advanced Meteorological Information)				
B0	B1	B2	B3	B4
AMET-B0/1 Meteorological observations products Information	AMET-B1/1 Meteorological observations information Information	AMET-B2/1 Meteorological observations information Information	AMET-B3/1 Meteorological observations information Information	AMET-B4/1 Meteorological observations information Information
AMET-B0/2 Meteorological forecast and warning products Information	AMET-B1/2 Meteorological forecast and warning information Information	AMET-B2/2 Meteorological forecast and warning information Information	AMET-B3/2 Meteorological forecast and warning information Information	AMET-B4/2 Meteorological forecast and warning information Information
AMET-B0/3 Climatological and historical meteorological products Information	AMET-B1/3 Climatological and historical meteorological information Information	AMET-B2/3 Climatological and historical meteorological information Information	AMET-B3/3 Climatological and historical meteorological information Information	AMET-B4/3 Climatological and historical meteorological information Information
AMET-B0/4 Dissemination of meteorological products Information	AMET-B1/4 Dissemination of meteorological information Information	AMET-B2/4 Meteorological information service in SWIM Information	AMET-B3/4 Meteorological information service in SWIM Information	AMET-B4/4 Meteorological information service in SWIM Information

HABILITADORES

CATEGORIAS:

- ✈ *Disposiciones reglamentarias, normativa.*
- ✈ *Procedimientos operativos*
- ✈ *Capacidad de los sistemas abordo (avionica)*
- ✈ *Infraestructura en tierra*
- ✈ *Entrenamiento*
- ✈ *Autorización operative*
- ✈ *Otros*

TIPO DE HABILITADOR:

- ✈ *Marco normativo nacional.*
- ✈ *Intercambio de información*
- ✈ *Sistemas abordo de la aeronave*
- ✈ *Infraestructura en tierra*
- ✈ *Entrenamiento*
- ✈ *Certificación*
- ✈ *Otros*



EJEMPLO:

ENABLERS					
Enabler Category	Enabler Type	Enabler Name	Description / References	Stakeholders	Year
Ground system infrastructure	Surveillance	ADS-B ground stations	ADS-B ground stations receive information from aircraft and transmit it to one or more Service Delivery Points Reference material: Technical standa... read more	ANSP	2008
Ground system infrastructure	Surveillance	*Service Delivery Point(s) for ADS-B information	Service Delivery Point(s) receive ADS-B information provides it to ATC automation for processing and display to controller Reference material: Guid... read more	ANSP	2008
Ground system infrastructure	Technical systems	HMI that supports controller awareness	Human Machine Interface (HMI) of the Air Traffic Controller Working Position (ATCo CWP) Reference: Guidance material: ICAO Doc. 9924 Aeronautical... read more	ANSP	2008
Airborne system capability	Surveillance	SSR Mode S transponder with extended squitter version 0, version 1 and version 2	Reference: Technical standards and guidance material: ICAO Annex 10 Volume IV Chapter 2,3 and 5 ICAO Doc. 9871 Technical Provisions for Mode S ... read more	Aircraft manufacturer Aircraft operator	2008
Training	-	Training requirements ADS-B implementation	Depending on the ANSP implementation, some controller training on new symbology may be required. If phraseology is changed by an ANSP, then controller... read more	ANSP	2008
Airborne system capability	Navigation	Basic Aviation GNSS receiver with RAIM	Position source. Basic Aviation GNSS receiver with RAIM. Such a receiver must comply with the technical performance requirements of either [E]TSO-C129... read more	Aircraft manufacturer Aircraft operator	2008





Gracias!

ASBU ELEMENTS				
Ready for implementation:				
Standardization:				
Validation:				
Concept:				
No define:				
ACAS (Airborne Collision Avoidance System)				
B0	B1	B2	B3	B4
	ACAS-B1/1 ACAS Improvements Operational	ACAS-B2/1 New collision avoidance system Operational		
		ACAS-B2/2 New collision avoidance capability as part of an overall detect and avoid system for RPAS Operational		
ACDM (Airport Collaborative Decision Making)				
B0	B1	B2	B3	B4
ACDM-B0/1 Airport CDM Information Sharing (ACIS) Operational		ACDM-B2/1 Airport Operations Plan (AOP) Operational	ACDM-B3/1 Full integration of ACDM and TAM in TBO Operational	
ACDM-B0/2 Integration with ATM Network function Operational		ACDM-B2/2 Airport Operations Centre (APOC) Operational		
		ACDM-B2/3 Total Airport Management (TAM) Operational		
AMET (Advanced Meteorological Information)				
B0	B1	B2	B3	B4
AMET-B0/1 Meteorological observations products Information	AMET-B1/1 Meteorological observations information Information	AMET-B2/1 Meteorological observations information Information	AMET-B3/1 Meteorological observations information Information	AMET-B4/1 Meteorological observations information Information
AMET-B0/2 Meteorological forecast and warning products Information	AMET-B1/2 Meteorological forecast and warning information Information	AMET-B2/2 Meteorological forecast and warning information Information	AMET-B3/2 Meteorological forecast and warning information Information	AMET-B4/2 Meteorological forecast and warning information Information
AMET-B0/3 Climatological and historical meteorological products Information	AMET-B1/3 Climatological and historical meteorological information Information	AMET-B2/3 Climatological and historical meteorological information Information	AMET-B3/3 Climatological and historical meteorological information Information	AMET-B4/3 Climatological and historical meteorological information Information
AMET-B0/4 Dissemination of meteorological products Information	AMET-B1/4 Dissemination of meteorological information Information	AMET-B2/4 Meteorological information service in SWIM Information	AMET-B3/4 Meteorological information service in SWIM Information	AMET-B4/4 Meteorological information service in SWIM Information
APTA (Airport Accessibility)				
B0	B1	B2	B3	B4
APTA-B0/1 PBN Approaches (with basic capabilities) Operational	APTA-B1/1 PBN Approaches (with advanced capabilities) Operational	APTA-B2/1 GBAS CAT II/III precision approach procedures Operational	APTA-B3/1 Parallel approaches without vertical guidance	
APTA-B0/2 PBN SID and STAR procedures (with basic capabilities) Operational	APTA-B1/2 PBN SID and STAR procedures (with advanced capabilities) Operational	APTA-B2/2 Simultaneous operations to parallel runways Operational	APTA-B3/2 Implementation of A-RNP to support non-complex simultaneous independent parallel approaches Operational	
APTA-B0/3 SBAS/GBAS CAT I precision approach procedures Operational		APTA-B2/3 PBN Helicopter Steep Approach Operations Operational		
APTA-B0/4 CDO (Basic) Operational	APTA-B1/4 CDO (Advanced) Operational	APTA-B2/4 Performance based aerodrome operating minima – Advanced aircraft with SVGS Operational		

ASBU ELEMENTS				
Ready for implementation:				
Standardization:				
Validation:				
Concept:				
No define:				
APTA (Airport Accessibility)				
B0	B1	B2	B3	B4
APTA-B0/5 CCO (Basic) Operational	APTA-B1/5 CCO (Advanced) Operational			
APTA-B0/6 PBN Helicopter Point in Space (PinS) Operations Operational				
APTA-B0/7 Performance based aerodrome operating minima – Advanced aircraft Operational				
APTA-B0/8 Performance based aerodrome operating minima – Basic aircraft				
ASUR (Alternative Surveillance)				
B0	B1	B2	B3	B4
ASUR-B0/1 Automatic Dependent Surveillance – Broadcast (ADS-B) Technology	ASUR-B1/1 Reception of aircraft ADS-B signals from space (SB ADS-B) Technology	ASUR-B2/1 Evolution of ADS-B and Mode S Technology	ASUR-B3/1 New non-cooperative surveillance system for airborne aircraft (medium altitudes) Technology	ASUR-B4/1 Further evolution of ADS-B and MLAT Technology
ASUR-B0/2 Multilateration cooperative surveillance systems (MLAT) Technology		ASUR-B2/2 New community based surveillance system for airborne aircraft (low and higher airspace) Technology		
ASUR-B0/3 Cooperative Surveillance Radar Downlink of Aircraft Parameters (SSR- DAPS) Technology				
COMI (Communication infrastructure)				
B0	B1	B2	B3	B4
COMI-B0/1 Aircraft Communication Addressing and Reporting System (ACARS) Technology		COMI-B2/1 Air-Ground ATN/IPs Technology	COMI-B3/1 VHF Data Link (VDL) Mode-2 Connectionless	
COMI-B0/2 Aeronautical Telecommunication Network/Open System Interconnection (ATN/OSI) Technology	COMI-B1/2 VHF Data Link (VDL) Mode 2 Multi- Frequency Technology	COMI-B2/2 Aeronautical Mobile Airport Communication System (AeroMACS) aircraft mobile connection Technology	COMI-B3/2 SATCOM Class A voice and data Technology	
COMI-B0/3 VHF Data Link (VDL) Mode 0/A Technology	COMI-B1/3 SATCOM Class B Voice and Data Technology	COMI-B2/3 Links meeting requirements for non- safety critical communication Technology	COMI-B3/3 L-band Digital Aeronautical Communication System (LDACS) Technology	
COMI-B0/4 VHF Data Link (VDL) Mode 2 Basic Technology	COMI-B1/4 Aeronautical Mobile Airport Communication System (AeroMACS) Ground-Ground Technology		COMI-B3/4 Links meeting requirements for safety critical communication Technology	
COMI-B0/5 Aeronautical Mobile Airport Communication System (AeroMACS) Class C Data Technology				
COMI-B0/6 High Frequency Data Link (HF DL) Technology				
COMI-B0/7 ATS Message Handling System (AMHS) Technology				

ASBU ELEMENTS				
Ready for implementation:				
Standardization:				
Validation:				
Concept:				
No define:				
COMS (ATS Communication service)				
B0	B1	B2	B3	B4
COMS-B0/1 CPDLC (FANS 1/A & ATN B1) for domestic and procedural airspace Technology	COMS-B1/1 PBCS approved CPDLC (FANS 1/A+) for domestic and procedural airspace Technology	COMS-B2/1 PBCS approved CPDLC (B2) for domestic and procedural airspace Technology	COMS-B3/1 Extended CPDLC (B2 incl. Adv-IM and dynamic RNP) for dense and complex airspace Technology	
COMS-B0/2 ADS-C (FANS 1/A) for procedural airspace Technology	COMS-B1/2 PBCS approved ADS-C (FANS 1/A+) for procedural airspace Technology	COMS-B2/2 PBCS Approved ADS-C (B2) for domestic and procedural airspace Technology	COMS-B3/2 Extended ADS-C (B2 incl. Adv-IM and dynamic RNP) for dense and complex airspace Technology	
	COMS-B1/3 SATVOICE (incl. routine communications) for procedural airspace Technology	COMS-B2/3 PBCS approved SATVOICE (incl. routine communications) for procedural airspace Technology		
CSEP (Cooperative Separation)				
B0	B1	B2	B3	B4
	CSEP-B1/1 Basic airborne situational awareness during flight operations (AIRB) Operational	CSEP-B2/1 Interval Management (IM) Procedure Operational	CSEP-B3/1 Interval Management (IM) Procedure with complex geometries Operational	CSEP-B4/1 Airborne separation Operational
	CSEP-B1/2 Visual Separation on Approach (VSA) Operational	CSEP-B2/2 Cooperative separation at low altitudes Operational	CSEP-B3/2 Remain Well Clear (RWC) functionality for UAS/RPAS Operational	
	CSEP-B1/3 Performance Based Longitudinal Separation Minima Operational	CSEP-B2/3 Cooperative separation at higher airspace Operational		
	CSEP-B1/4 Performance Based Lateral Separation Minima Operational			
DAIM (Digital Aeronautical Information Management)				
B0	B1	B2	B3	B4
		DAIM-B2/1 Dissemination of aeronautical information in a SWIM environment Information		
	DAIM-B1/2 Provision of digital Aeronautical Information Publication (AIP) data sets Information	DAIM-B2/2 Daily Airspace Management information to support flight and flow Information		
	DAIM-B1/3 Provision of digital terrain data sets Information	DAIM-B2/3 Aeronautical information to support higher airspace operations Information		
	DAIM-B1/4 Provision of digital obstacle data sets Information	DAIM-B2/4 Aeronautical information requirements tailored to UTM Information		
	DAIM-B1/5 Provision of digital aerodrome mapping data sets Information	DAIM-B2/5 NOTAM replacement Information		
	DAIM-B1/6 Provision of digital instrument flight procedure data sets Information			
	DAIM-B1/7 NOTAM improvements Information			

ASBU ELEMENTS				
Ready for implementation:				
Standardization:				
Validation:				
Concept:				
No define:				
DATS (Digital Aerodrome Air Traffic Services)				
B0	B1	B2	B3	B4
	DATS-B1/1 Remotely Operated Aerodrome Air Traffic Services Operational			
FICE (Flight and Flow Information for a Collaborative Environment (FF-ICE))				
B0	B1	B2	B3	B4
FICE-B0/1 Automated basic inter facility data exchange (AIDC) Information		FICE-B2/1 Planning Service Information	FICE-B3/1 Flight information management services for enhanced trajectory operations Information	FICE-B4/1 Integrated flight information management system for end-to-end global flight planning Information
		FICE-B2/2 Filing Service Information		
		FICE-B2/3 Trial Service Information		
		FICE-B2/4 Flight Data Request Service Information		
		FICE-B2/5 Notification Service Information		
		FICE-B2/6 Publication Service Information		
		FICE-B2/7 Flight information management service for higher airspace operations Information		
		FICE-B2/8 Flight information management service for low-altitude operations Information		
		FICE-B2/9 Flight information management support for inflight re-planning Information		
FRTO (Improved operations through enhanced en-route trajectories)				
B0	B1	B2	B3	B4
FRTO-B0/1 Direct routing (DCT) Operational	FRTO-B1/1 Free Route Airspace (FRA) Operational	FRTO-B2/1 Local components of integrated ATFM and ATC Planning function (INAP) Operational		
FRTO-B0/2 Airspace planning and Flexible Use of Airspace (FUA) Operational	FRTO-B1/2 Required Navigation Performance (RNP) routes Operational	FRTO-B2/2 Local components of Dynamic Airspace Configurations (DAC) Operational		
FRTO-B0/3 Pre-validated and coordinated ATS routes to support flight and flow Operational	FRTO-B1/3 Advanced Flexible Use of Airspace (FUA) and management of real time airspace data Operational	FRTO-B2/3 Large Scale Cross Border Free Route Airspace (FRA) Operational		
FRTO-B0/4 Basic conflict detection and conformance monitoring Operational	FRTO-B1/4 Dynamic sectorization Operational	FRTO-B2/4 Enhanced Conflict Resolution Tools Operational		

ASBU ELEMENTS				
Ready for implementation:				
Standardization:				
Validation:				
Concept:				
No define:				
FRTO (Improved operations through enhanced en-route trajectories)				
B0	B1	B2	B3	B4
	FRTO-B1/5 Enhanced Conflict Detection Tools and Conformance Monitoring Operational			
	FRTO-B1/6 Multi-Sector Planning Operational			
	FRTO-B1/7 Trajectory Options Set (TOS) Operational			
GADS (Global Aeronautical Distress and Safety System (GADSS))				
B0	B1	B2	B3	B4
	GADS-B1/1 Aircraft Tracking Operational	GADS-B2/1 Location of an aircraft in Distress Operational		
	GADS-B1/2 Operational Control Directory Operational	GADS-B2/2 Distress tracking information management Operational		
		GADS-B2/4 Flight Data Recovery Operational		
NAVS (Navigation systems)				
B0	B1	B2	B3	B4
NAVS-B0/1 Ground Based Augmentation Systems (GBAS) Technology	NAVS-B1/1 Extended GBAS Technology	NAVS-B2/1 Dual Frequency Multi Constellation (DF MC) GBAS Technology		
NAVS-B0/2 Satellite Based Augmentation Systems (SBAS) Technology		NAVS-B2/2 Dual Frequency Multi Constellation (DF MC) SBAS Technology		
NAVS-B0/3 Aircraft Based Augmentation Systems (ABAS) Technology		NAVS-B2/3 Dual Frequency Multi Constellation (DF MC) ABAS Technology		
NAVS-B0/4 Navigation Minimal Operating Networks (Nav. MON) Technology				
NOPS (Network Operations)				
B0	B1	B2	B3	B4
NOPS-B0/1 Initial integration of collaborative airspace management with air traffic flow management Operational	NOPS-B1/1 Short Term ATFM measures Operational	NOPS-B2/1 Optimised ATM Network Services in the initial TBO context Operational		
NOPS-B0/2 Collaborative Network Flight Updates Operational	NOPS-B1/2 Enhanced Network Operations Planning Operational	NOPS-B2/2 Enhanced dynamic airspace configuration Operational		
NOPS-B0/3 Network Operation Planning basic features Operational	NOPS-B1/3 Enhanced integration of Airport operations planning with network operations planning Operational	NOPS-B2/3 Collaborative Network Operation Planning Operational		

ASBU ELEMENTS				
Ready for implementation:				
Standardization:				
Validation:				
Concept:				
No define:				
NOPS (Network Operations)				
B0	B1	B2	B3	B4
NOPS-B0/4 Initial Airport/ATFM slots and A-CDM Network Interface Operational	NOPS-B1/4 Dynamic Traffic Complexity Management Operational	NOPS-B2/4 Multi ATFM slot swapping and Airspace Users priorities Operational	NOPS-B3/1 ATM Network Services in full TBO context Operational	
NOPS-B0/5 Dynamic ATFM slot allocation Operational	NOPS-B1/5 Full integration of airspace management with air traffic flow management Operational	NOPS-B2/5 Further airport integration within Network Operation Planning Operational	NOPS-B3/2 Cooperative Network Operations Planning Operational	
	NOPS-B1/6 Initial Dynamic Airspace configurations Operational	NOPS-B2/6 ATFM adapted for cross-border Free Route Airspace (FRA) Operational	NOPS-B3/3 Innovative airspace architecture Operational	
	NOPS-B1/7 Enhanced ATFM slot swapping Operational	NOPS-B2/7 UTM Network operations Operational		
	NOPS-B1/8 Extended Arrival Management supported by the ATM Network function Operational	NOPS-B2/8 High upper airspace network operations Operational		
	NOPS-B1/9 Target Times for ATFM purposes Operational			
	NOPS-B1/10 Collaborative Trajectory Options Program (CTOP) Operational			
OPFL (Improved access to optimum flight levels in oceanic and remote airspace)				
B0	B1	B2	B3	B4
OPFL-B0/1 In Trail Procedure (ITP) Operational	OPFL-B1/1 Climb and Descend Procedure (CDP) Operational	OPFL-B2/1 Separation minima using ATS surveillance systems where VHF voice communications are not available Operational	OPFL-B3/1 Helicopter RNP 0.3 Terminal and En-Route Operations Operational	
			OPFL-B3/2 Expansion of upper limit of the Reduced Vertical Separation Minima (RVSM) band of flight levels Operational	
			OPFL-B3/3 Target-to-target separations using Space-based ADS-B data Operational	

ASBU ELEMENTS				
Ready for implementation:				
Standardization:				
Validation:				
Concept:				
No define:				
RSEQ (Improved traffic flow through runway sequencing)				
B0	B1	B2	B3	B4
RSEQ-B0/1 Arrival Management Operational	RSEQ-B1/1 Extended arrival metering Operational	RSEQ-B2/1 Integration of arrival and departure management Operational		RSEQ-B4/1 Departure management in terminal airspace from multiple airports Operational
RSEQ-B0/2 Departure Management Operational			RSEQ-B3/2 Arrival management in terminal airspace with multiple airports Operational	RSEQ-B4/2 Extended arrival management supporting overlapping operations into multiple airports Operational
RSEQ-B0/3 Point merge Operational			RSEQ-B3/3 Increased utilization of runway capacity by improved real-time runway scheduling Operational	
			RSEQ-B3/4 Improved operator fleet management in runway sequencing Operational	
SNET (Ground-based Safety Nets)				
B0	B1	B2	B3	B4
SNET-B0/1 Short Term Conflict Alert (STCA) Operational	SNET-B1/1 Enhanced STCA with aircraft parameters Operational			
SNET-B0/2 Minimum Safe Altitude Warning (MSAW) Operational	SNET-B1/2 Enhanced STCA in complex TMAs Operational			
SNET-B0/3 Area Proximity Warning (APW) Operational				
SNET-B0/4 Approach Path Monitoring (APM) Operational				
SURF (Surface operations)				
B0	B1	B2	B3	B4
SURF-B0/1 Basic ATCO tools to manage traffic during ground operations Operational	SURF-B1/1 Advanced features using visual aids to support traffic management during ground operations Operational	URF-B2/1 Enhanced surface guidance for pilots and vehicle drivers Operational	SURF-B3/1 Optimization of surface traffic management in complex situations Operational	
SURF-B0/2 Comprehensive situational awareness of surface operations Operational	SURF-B1/2 Comprehensive pilot situational awareness on the airport surface Operational	URF-B2/2 Comprehensive vehicle driver situational awareness on the airport surface Operational		
SURF-B0/3 Initial ATCO alerting service for surface operations Operational	SURF-B1/3 Enhanced ATCO alerting service for surface operations Operational	SURF-B2/3 Conflict alerting for pilots for runway operations Operational		
	SURF-B1/4 Routing service to support ATCO surface operations management Operational			
	SURF-B1/5 Enhanced vision systems for taxi operations Operational			

ASBU ELEMENTS				
Ready for implementation:				
Standardization:				
Validation:				
Concept:				
No define:				
SWIM (System Wide Information Management)				
B0	B1	B2	B3	B4
		SWIM-B2/1 Information service provision Information	SWIM-B3/1 Air/Ground SWIM for safety critical information Information	
		SWIM-B2/2 Information service consumption Information		
		SWIM-B2/3 SWIM registry Information		
		SWIM-B2/4 Air/Ground SWIM for non-safety critical information Information		
		SWIM-B2/5 Global SWIM processes Information		
TBO (Trajectory-based operations)				
B0	B1	B2	B3	B4
TBO-B0/1 Introduction of time-based management within a flow centric approach. Operational	TBO-B1/1 Initial Integration of time-based decision making processes Operational	TBO-B2/1 Pre-departure trajectory synchronization within a flight centric and network performance approach Operational	TBO-B3/1 Network based on-demand synchronization of trajectory based operations Operational	TBO-B4/1 Total airspace management performance system Operational
		TBO-B2/2 Extended time-based management across multiple FIRs for active flight synchronization Operational		
WAKE (Wake Turbulence Separation)				
B0	B1	B2	B3	B4
		WAKE-B2/1 Wake turbulence separation minima based on 7 aircraft groups Operational	WAKE-B3/1 Dependent parallel approaches Operational	WAKE-B4/1 En-route Wake Encounter Ground based Prediction Operational
		WAKE-B2/2 Time based wake separation minima for final approach Operational	WAKE-B3/2 Independent segregated parallel operations Operational	WAKE-B4/2 En-Route Wake Encounter on-board flight management/mitigation Operational
			WAKE-B3/3 Wake turbulence separation minima based on leader/follower static pairs- wise Operational	
			WAKE-B3/4 Enhanced dependent parallel approaches Operational	
			WAKE-B3/5 Enhanced independent segregated parallel operations Operational	
			WAKE-B3/6 Time based wake separation minima for departure based on leader/follower static pair-wise Operational	
			WAKE-B3/7 Time based dependent parallel approaches Operational	
			WAKE-B3/8 Time based independent segregated parallel operations Operational	

ASBU ELEMENTS

ELEMENTS READY FOR IMPLEMENTATION

ACAS (Airborne Collision Avoidance System)

B0	B1	B2
	ACAS-B1/1 ACAS Improvements Operational	

ACDM (Airport Collaborative Decision Making)

B0	B1	B2
ACDM-B0/1 Airport CDM Information Sharing (ACIS) Operational		
ACDM-B0/2 Integration with ATM Network function Operational		

AMET (Advanced Meteorological Information)

B0	B1	B2
AMET-B0/1 Meteorological observations products Information		
AMET-B0/2 Meteorological forecast and warning products Information		
AMET-B0/3 Climatological and historical meteorological products Information		
AMET-B0/4 Dissemination of meteorological products Information		

APTA (Airport Accessibility)

B0	B1	B2
APTA-B0/1 PBN Approaches (with basic capabilities) Operational		
APTA-B0/2 PBN SID and STAR procedures (with basic capabilities) Operational		
B0	B1	B2
APTA-B0/3 SBAS/GBAS CAT I precision approach procedures Operational		
APTA-B0/4 CDO (Basic) Operational		
APTA-B0/5 CCO (Basic) Operational		

ASBU ELEMENTS ELEMENTS READY FOR IMPLEMENTATION

B0	B1	B2
APTA-B0/6 PBN Helicopter Point in Space (PinS) Operations Operational		
APTA-B0/7 Performance based aerodrome operating minima – Advanced aircraft Operational		
APTA-B0/8 Performance based aerodrome operating minima – Basic aircraft		

ASUR (Alternative Surveillance)

B0	B1	B2
ASUR-B0/1 Automatic Dependent Surveillance – Broadcast (ADS-B) Technology	ASUR-B1/1 Reception of aircraft ADS-B signals from space (SB ADS-B) Technology	
ASUR-B0/2 Multilateration cooperative surveillance systems (MLAT) Technology		
ASUR-B0/3 Cooperative Surveillance Radar Downlink of Aircraft Parameters (SSR-DAPS) Technology		

COMI (Communication infrastructure)

B0	B1	B2
COMI-B0/1 Aircraft Communication Addressing and Reporting System (ACARS) Technology		
COMI-B0/2 Aeronautical Telecommunication Network/Open System Interconnection (ATN/OSI) Technology	COMI-B1/2 VHF Data Link (VDL) Mode 2 Multi- Frequency Technology	
COMI-B0/3 VHF Data Link (VDL) Mode 0/A Technology	COMI-B1/3 SATCOM Class B Voice and Data Technology	
COMI-B0/4 VHF Data Link (VDL) Mode 2 Basic Technology	COMI-B1/4 Aeronautical Mobile Airport Communication System (AeroMACS) Ground-Ground Technology	
B0	B1	B2

ASBU ELEMENTS ELEMENTS READY FOR IMPLEMENTATION

COMI-B0/5 Satellite communications (SATCOM) Class C Data Technology		
COMI-B0/6 High Frequency Data Link (HFDL) Technology		
COMI-B0/7 ATS Message Handling System (AMHS) Technology		

COMS (ATS Communication service)

B0	B1	B2
COMS-B0/1 CPDLC (FANS 1/A & ATN B1) for domestic and procedural airspace Technology	COMS-B1/1 PBCS approved CPDLC (FANS 1/A+) for domestic and procedural airspace Technology	
COMS-B0/2 ADS-C (FANS 1/A) for procedural airspace Technology	COMS-B1/2 PBCS approved ADS-C (FANS 1/A+) for procedural airspace Technology	
	COMS-B1/3 SATVOICE (incl. routine communications) for procedural airspace Technology	

CSEP (Cooperative Separation)

B0	B1	B2
	CSEP-B1/1 Basic airborne situational awareness during flight operations (AIRB) Operational	
	CSEP-B1/2 Visual Separation on Approach (VSA) Operational	

DAIM (Digital Aeronautical Information Management)

B0	B1	B2
	DAIM-B1/2 Provision of digital Aeronautical Information Publication (AIP) data sets Information	
	DAIM-B1/3 Provision of digital terrain data sets Information	
B0	B1	B2

ASBU ELEMENTS

ELEMENTS READY FOR IMPLEMENTATION

	DAIM-B1/4 Provision of digital obstacle data sets Information	
	DAIM-B1/5 Provision of digital aerodrome mapping data sets Information	
	DAIM-B1/6 Provision of digital instrument flight procedure data sets Information	
	DAIM-B1/7 NOTAM improvements Information	

DATS (Digital Aerodrome Air Traffic Services)

B0	B1	B2

FICE (Flight and Flow Information for a Collaborative Environment (FF-ICE))

B0	B1	B2
FICE-B0/1 Automated basic inter facility data exchange (AIDC) Information		

FRTO (Improved operations through enhanced en-route trajectories)

B0	B1	B2
FRTO-B0/1 Direct routing (DCT) Operational		
FRTO-B0/2 Airspace planning and Flexible Use of Airspace (FUA) Operational		
B0	B1	B2
FRTO-B0/3 Pre-validated and coordinated ATS routes to support flight and flow Operational		
FRTO-B0/4 Basic conflict detection and conformance monitoring Operational		

GADS (Global Aeronautical Distress and Safety System (GADSS))

ASBU ELEMENTS ELEMENTS READY FOR IMPLEMENTATION

B0	B1	B2
	GADS-B1/1 Aircraft Tracking Operational	GADS-B2/1 Location of an aircraft in Distress Operational
	GADS-B1/2 Operational Control Directory Operational	GADS-B2/2 Distress tracking information management Operational
		GADS-B2/4 Flight Data Recovery Operational

NAVS (Navigation systems)

B0	B1	B2
NAVS-B0/1 Ground Based Augmentation Systems (GBAS) Technology		
NAVS-B0/2 Satellite Based Augmentation Systems (SBAS) Technology		
NAVS-B0/3 Aircraft Based Augmentation Systems (ABAS) Technology		
NAVS-B0/4 Navigation Minimal Operating Networks (Nav. MON) Technology		

NOPS (Network Operations)

B0	B1	B2
NOPS-B0/1 Initial integration of collaborative airspace management with air traffic flow management Operational		
NOPS-B0/2 Collaborative Network Flight Updates Operational		
NOPS-B0/3 Network Operation Planning basic features Operational		
NOPS-B0/4 Initial Airport/ATFM slots and A-CDM Network Interface Operational		
NOPS-B0/5 Dynamic ATFM slot allocation Operational		

OPFL (Improved access to optimum flight levels in oceanic and remote airspace)

B0	B1	B2

ASBU ELEMENTS

ELEMENTS READY FOR IMPLEMENTATION

OPFL-B0/1 In Trail Procedure (ITP) Operational		Separation minima using ATS surveillance systems where VHF voice communications are not available Operational
------------------------------------------------------	--	------------------------------------------------------------------------------------------------------------------

RSEQ (Improved traffic flow through runway sequencing)

B0	B1	B2
RSEQ-B0/1 Arrival Management Operational		
RSEQ-B0/2 Departure Management Operational		
RSEQ-B0/3 Point merge Operational		

SNET (Ground-based Safety Nets)

B0	B1	B2
SNET-B0/1 Short Term Conflict Alert (STCA) Operational	SNET-B1/1 Enhanced STCA with aircraft parameters Operational	
SNET-B0/2 Minimum Safe Altitude Warning (MSAW) Operational	SNET-B1/2 Enhanced STCA in complex TMAs Operational	
SNET-B0/3 Area Proximity Warning (APW) Operational		
SNET-B0/4 Approach Path Monitoring (APM) Operational		

SURF (Surface operations)

B0	B1	B2
SURF-B0/1 Basic ATCO tools to manage traffic during ground operations Operational		
SURF-B0/2 Comprehensive situational awareness of surface operations Operational	SURF-B1/2 Comprehensive pilot situational awareness on the airport surface Operational	
B0	B1	B2

ASBU ELEMENTS ELEMENTS READY FOR IMPLEMENTATION

SURF-B0/3 Initial ATCO alerting service for surface operations Operational		
----------------------------------------------------------------------------------	--	--

SWIM (System Wide Information Management)

B0	B1	B2
		SWIM-B2/3 SWIM registry Information

TBO (Trajectory-based operations)

B0	B1	B2
TBO-B0/1 Introduction of time-based management within a flow centric approach. Operational		

WAKE (Wake Turbulence Separation)

B0	B1	B2