Appendix 3E1 - Identified ASBU elements applicable to AFI region in CNS Field

ASBU Module	*ASBU Elements*	*Purpose of elements*	*Maturity level*	*Applicable (Yes or Not)*	*Element enablers*	*Rational of applicability*	*Stakeholders*
COMI	*COMI-B0/1*	*Aircraft Communication Addressing Reporting System (ACARS)*	*Ready for implementation*	*Yes*	• *Communication infrastructure*	• *The Aircraft Communications Addressing and Reporting System (ACARS) is a digital datalink system for transmission of messages between aircraft and ground stations via VHF or satellites.*	• *ANSP*
	COMI-B0/2	*Aeronautical Telecommunication Network/Open System Interconnection (ATN/OSI)*	*Ready for implementation*	*Yes*	• *Communication infrastructure*	• *ATN/OSI provides a bit-oriented multi-layer protocol for exchanging ATS messages between the aircraft and ground system.*	• *ANSP*
	COMI-B0/3	*VHF Data Link (VDL) Mode O/A*	*Ready for implementation*	*Yes*	• *Communication infrastructure*	• *VDL Mode 0/A is a data communications subnetwork that supports transmission of data link messages.*	• *ANSP*
	COMI-B0/4	*VHF Data Link (VDL) Mode 2 Basic*	*Ready for implementation*	*Yes*	• *Communication infrastructure*	• *VDL Mode 2 Basic is a data communications subnetwork that supports transmission of data link messages. It provides higher performance than VDLM0/A.*	• *ANSP*
	COMI-B0/5	*Satellite Communication*	*Ready for implementation*	*Yes*	• *Communication infrastructure*	• *To provide surveillance and communications where VHF*	• *ANSP*

ASBU Module	ASBU Elements	Purpose of elements	Maturity level	Applicable (Yes or Not)	Element enablers	Rational of applicability	Stakeholders
		(SATCOM) Class C Data				*usage is not possible or practicle.*	
	COMI-B0/6	*High Frequency Data Link (HFDL)*	*Ready for implementation*	*Yes*	• *Communication infrastructure*	• *To communicate in areas where SATCOM and VHF are not available.*	• *ANSP*
	COMI-B0/7	*ATS Message Handling System (AMHS)*	*Ready for implementation*	*Yes*	• *Communication infrastructure*	• *Supports improved communication over AFTN* • *Provide flight information coordination between ANSPs at adjacent FIRs, and with relevant military units, support separation assurance, potentially providing, when used in conjunction with other enablers (e.g. navigation capabilities), reduced separation.*	• *ANSP*
	COMI-B1/1	*Ground-Ground Aeronautical Telecommunication Network/Internet Protocol suite (ATN/IPS)*	*Standardization*	*Yes*	• *Communication infrastructure*	• *To provide for a more modern, more efficient, cost-effective, and robust data communications network infrastructure.*	• *ANSP*
	COMI-B1/2	*VHF Data Link (VDL) Mode 2 Multi-Frequency*	*Ready for implementation*	*Yes*	• *Communication infrastructure* • *Aircraft system*	• *Supports transmission of data link message sets to supplement current voice operations, thus reducing voice channel congestion; while increasing productivity and capacity.*	• *ANSP*

ASBU Module	ASBU Elements	Purpose of elements	Maturity level	Applicable (Yes or Not)	Element enablers	Rational of applicability	Stakeholders
						• *Supports increased subnetwork capacity and reduces interference over the standard VDL Mode 2 system.*	
	COMI-B1/3	*SATCOM Class B Voice and Data*	*Ready for implementation*	*Yes*	• *Communication infrastructure*	• *Supports introduction of SATVOICE and SATDATA as a complement to HF voice communications.* • *Provides for oceanic and domestic broadband IPS based safety critical data link operations.* • *Supports safety critical, safety and regularity of flight operations.*	• *ANSP*
	COMI-B1/4	*Aeronautical Mobile Airport Communication System (AeroMACS)*	*Ready for implementation*	*Yes*	• *Airport system* • *Communication infrastructure*	• *Reduced Separation* • *Improved situational awareness* • *Reduced Cost* • *Improved Efficiency*	• *ANSP*
	COMI-B2/1	*Air-Ground ATN/IPS*	*Validation*	*Yes*	• *Communication infrastructure*	• *To improve integrity of the information.*	• *ANSP*
	COMI-B2/2	*Aeronautical Mobile Aircraft Communication System (AeroMACS) aircraft mobile connection*	*Validation*	*Yes*	• *Communication infrastructure*	• *To reduce separation and improve situational awareness.*	• *ANSP*

ASBU Module	***ASBU Elements***	***Purpose of elements***	***Maturity level***	***Applicable (Yes or Not)***	***Element enablers***	***Rational of applicability***	***Stakeholders***
	COMI-B2/3	*Link meeting requirements for non-safety critical communication*	*Validation*	*Yes*	• *Communication infrastructure*	• *To reduce operational cost;* • *To improve performance;* • *To take advantage of new technologies sooner;* • *To enable the global exchange of non-safety information.*	• *ANSP*
COMS	*COMS-B0/1*	*CPDLC (FANS 1/A & ATN B1) for domestic and procedural airspace*	*Ready for implementation*	*Yes*	• *Communication service* • *Equipage requirements or/and mandates* • *SMS*	• *Support reduction of voice channel congestion and increase of capacity in domestic airspace,* • *Support improvement of communication and surveillance in airspace where procedural separation is being applied.*	• *ANSP* • *CAA*
	COMS-B0/2	*ADS-C (FANS 1/A) for procedural airspace*	*Ready for implementation*	*Yes*	• *Communication service* • *Equipage requirements or/and mandates* • *SMS*	• *Supports improvement of surveillance in airspace where procedural separation is being applied.*	• *ANSP* • *CAA*
	COMS-B1/1	*PBCS approved CPDLC (FANS 1/A +) for domestic and procedural airspace*	*Ready for implementation*	*Yes*	• *Communication service* • *Equipage requirements or/and mandates*	*Supports:* • *reduction of voice channel congestion and increase of capacity in domestic airspace,*	• *ANSP*

ASBU Module	ASBU Elements	Purpose of elements	Maturity level	Applicable (Yes or Not)	Element enablers	Rational of applicability	Stakeholders
					• *SMS* • *Operational Approval*	• *introduction of performance-based reduced separation minima in procedural airspace.*	
	COMS-B1/2	*PBCS approved ADS-C (FANS 1/A +) for procedural airspace*	*Ready for implementation*	*Yes*	• *Communication service* • *Equipage requirements or/and mandates* • *SMS* • *Operational Approval*	• *Supports introduction of performance-based reduced separation minima in procedural airspace.*	• *ANSP* • *CAA*
	COMS-B1/3	*SATVOICE (incl. routine communication) for procedural airspace*	*Ready for implementation*	*Yes*	• *Aircraft system* • *Equipage requirements or/and mandates* • *SMS* • *Operational Approval*	• *Increase quality of voice communications in procedural airspace without VHF coverage.*	• *ANSP* • *CAA*
	COMS-B2/1	*PBCS approved CPDLC (B2) for domestic and procedural airspace*	*Validation*	*Yes*	• *Communication service* • *SMS*	• *Provision of Air Traffic Services (ATS), with the extension of data link communications use in support of various ATM enhancements among which:*	• *ANSP*

ASBU Module	ASBU Elements	Purpose of elements	Maturity level	Applicable (Yes or Not)	Element enablers	Rational of applicability	Stakeholders
					• *Operational Approval*	• *Trajectory-based operations, with new CPDLC messages to uplink route amendments (with standardized automation rules to ensure consistent Flight Management System implementation among the aircraft fleet),* • *Surface operations, with new CPDLC TAXI (D-TAXI) messages.*	
	COMS-B2/2	*PBCS approved ADS-C (B2) for domestic and procedural airspace*	*Validation*	*Yes*	• *Communication service* • *SMS* • *Operational Approval*	• *Provision of Air Traffic Services (ATS), with the extension of data link communications use in support of various ATM enhancements among which:* • *Trajectory-based operations, in particular with ADS-C Extended Project Profile (i.e. predicted route ahead of the aircraft, up to 128 waypoints with their predicted level, speed and time).*	• *ANSP* • *CAA*
	COMS-B2/3	*PBCS approved SATVOICE (incl.routine communications) for procedural airspace*	*Validation*	*Yes*	• *Aircraft system* • *SMS* • *Operational Approval*	• *Supports introduction of reduced separation minima in procedural airspace.*	• *ANSP* • *CAA*

ASBU Module	***ASBU Elements***	***Purpose of elements***	***Maturity level***	***Applicable (Yes or Not)***	***Element enablers***	***Rational of applicability***	***Stakeholders***
NAVS	*NAVS-B0/1*	*Ground Based Augmentation System (GBAS)*	*Ready for implementation*	*Yes*	• *Navigation*	• *Support Precision Approach and landing operations at a specific airport (one system may support all runway ends). As an option, may support arrival and departure phases of flight.*	• *ANSP*
	NAVS-B0/2	*Satellite Based Augmentation System (SBAS)*	*Ready for implementation*	*Yes*	• *Navigation*	• *Support PBN in all phases of flight with an increased accuracy, integrity and availability compared to ABAS. Increases accuracy and integrity for the vertical guidance.*	• *ANSP*
	NAVS-B0/3	*Aircraft Based Augmentation system (ABAS)*	*Ready for implementation*	*Yes*	• *Navigation*	• *Support non-precision (LNAV) and vertically guided (LNAV/VNAV) approaches with BaroVNAV and other terminal and enroute navigations.*	• *ANSP*
	NAVS-B0/4	*Navigation Minimal Operating Networks (Nav. MON)*	*Ready for implementation*	*Yes*	• *Navigation*	• *To adjust conventional navaids networks through the increased deployment of satellite based navigation systems and procedures to ensure the necessary levels of resilience for navigation.* • *To provide a minimum level of capabilities to accommodate State aircraft operations where*	• *ANSP*

ASBU Module	ASBU Elements	Purpose of elements	Maturity level	Applicable (Yes or Not)	Element enablers	Rational of applicability	Stakeholders
						there is a mismatch in terms of aircraft equipage. • *To make a more efficient use of the frequency spectrum*	
	NAVS-B1/1	*Extended GBAS*	*Validation*	*Yes*	• *Navigation* • *Operations*	• *To support precision approach and landing operations at a specific airport (one system may support all runway ends). As an option, may support arrival and departure phases of flight.*	• *ANSP*
	NAVS-B2/1	*Dual frequency Multi Constellation (DFMC) GBAS*	*Validation*	*Yes*	• *Navigation*	• *More robust and less vulnerable to atmospheric propagation perturbations, supports Cat I,II, III GBAS landing operations in all regions of the world.*	• *ANSP*
	NAVS-B2/2	*Dual frequency Multi Constellation (DFMC) SBAS*	*Validation*	*Yes*	• *Navigation*	• *To increase availability and expand coverage.* • *To reduce cost through the reduction of the need for ground stations.*	• *ANSP*
	NAVS-B2/3	*Dual frequency Multi Constellation (DFMC) ABAS*	*Validation*	*Yes*	• *Navigation*	• *More robust navigation services (in particular versus loss of a single frequency, or of a single constellation).*	• *ANSP*

ASBU Module	***ASBU Elements***	***Purpose of elements***	***Maturity level***	***Applicable (Yes or Not)***	***Element enablers***	***Rational of applicability***	***Stakeholders***
ASUR	*ASUR-B0/1*	*Automatic Dependent Surveillance - Broadcast (ADS-B)*	*Ready for implementation*	*Yes*	• *Navigation* • *Surveillance* • *Technical systems*	• *To support the provision of Air Traffic Services and operational applications at reduced cost and increased surveillance coverage.*	• *ANSP*
	ASUR-B0/2	*Multi-lateration cooperative surveillance systems (MLAT)*	*Ready for implementation*	*Yes*	• *Navigation* • *Surveillance* • *Technical systems*	• *To provide an alternative to radar surveillance by using available aircraft transponders.*	• *ANSP*
	ASUR-B0/3	*Cooperative Surveillance Radar Downlink of aircraft Parameters (SSR-DAPS)*	*Ready for implementation*	*Yes*	• *Surveillance* • *Technical systems*	• *To obtain additional information from an aircraft transponder in support of the provision of Air Traffic Services.*	• *ANSP*
	ASUR-B1/1	*Reception of aircraft ADS-B signals from space (SB ADS-B)*	*Standardization*	*Yes*	• *Navigation* • *Surveillance* • *Technical systems*	• *To provide surveillance coverage in locations where ground stations siting is not possible or not currently provided.*	• *ANSP*
	ASUR-B2/1	*Evolution of ADS-B and Mode S*	*Validation*	*Yes*	• *Navigation* • *Surveillance* • *Technical systems*	• *To provide new types of data in support of Air Traffic/MET Services and vehicle-to-vehicle applications*	• *ANSP*

ASBU Module	***ASBU Elements***	***Purpose of elements***	***Maturity level***	***Applicable (Yes or Not)***	***Element enablers***	***Rational of applicability***	***Stakeholders***
ACAS	*ACAS-B1/1*	*ACAS Improvement*	*Ready for implementation*	*Yes*	• *Certification* • *Operations* • *aircraft system* • *operational approval* • *surveillance*	• *To provide airborne collision avoidance as a last resort safety net for pilots*	• *ANSP* • *CAA*
	ACAS-B2/1	*New collision avoidance system*	*Standardization*	*Yes*	• *Certification* • *Operations* • *aircraft system* • *operational approval*	• *To provide airborne collision avoidance as a last resort safety net for pilots (improving functionality provided in BBB and Block 0)*	• *ANSP* • *CAA*
	ACAS-B2/2	*New Collision avoidance capability as part of an overall detect and avoid system for RPAS*	*Validation*	*Yes*	• *Certification* • *Operations* • *aircraft system* • *operational approval*	• *As part of a detect and avoid system, to provide the airborne collision avoidance function as a last resort safety net for RPAS' pilots.*	• *ANSP* • *CAA*
FICE	*FICE-B0/1*	*Automated basic facility data exchange (AIDC)*	*Ready for implementation*	*Yes*	• *SMS* • *Flight and Flow information*	• *To improve the efficiency of coordination and tranfer of control between ATS units.*	• *ANSP* • *CAA*

ASBU Module	***ASBU Elements***	***Purpose of elements***	***Maturity level***	***Applicable (Yes or Not)***	***Element enablers***	***Rational of applicability***	***Stakeholders***
					• *National regulatory framework*		
	*FICE-B2/1**	*Planning Service*	*Validation*	*Yes*	• *SMS* • *Flight and Flow information* • *National regulatory framework*	• *To allow aircraft operator to obtain constraint feedback while informing the relevant service providers of their intentions.*	• *ANSP* • *CAA*
	*FICE-B2/2**	*Filing Service*	*Validation*	*Yes*	• *SMS* • *Flight and Flow information* • *National regulatory framework*	• *To enhance ATS flight plan processing including constraints evaluation and enhanced flight information sharing.*	• *ANSP* • *CAA*
	*FICE-B2/3**	*Trial Service*	*Validation*	*Yes*	• *SMS* • *Flight and Flow information* • *National regulatory framework*	• *To provide the aircraft operator with the ability to obtain feedback on a possible change without impacting the flight plan currently being used by the service provider.*	• *ANSP* • *CAA*

ASBU Module	***ASBU Elements***	***Purpose of elements***	***Maturity level***	***Applicable (Yes or Not)***	***Element enablers***	***Rational of applicability***	***Stakeholders***
	*FICE-B2/4**	*Flight Data Request Service*	*Validation*	*Yes*	• *SMS* • *Flight and Flow information* • *National regulatory framework*	• *To make available a query and reply service allowing an operator or authorized stakeholders to query the service providers for information on one of its flights - allows an operator to verify the status of a flight previously submitted.*	• *ANSP* • *CAA*
	*FICE-B2/5**	*Notification Service*	*Validation*	*Yes*	• *SMS* • *Flight and Flow information* • *National regulatory framework*	• *To allow a service provider or operator to notify other parties of the departure or arrival of a flight.*	• *ANSP* • *CAA*
	*FICE-B2/6**	*Publication Service*	*Validation*	*Yes*	• *SMS* • *Flight and Flow information* • *National regulatory framework*	• *To ensure consistent flight information and data is available to all stakeholders. This information can be used to improve ATM decision-making processes.*	• *ANSP* • *CAA*
	*FICE-B2/7**	*Flight Information Management service for higher airspace operations*	*Validation*	*Yes*	• *SMS*	• *Higher airspace operations will have a different multi-national flavour worldwide. The FF-ICE*	• *ANSP* • *CAA*

ASBU Module	***ASBU Elements***	***Purpose of elements***	***Maturity level***	***Applicable (Yes or Not)***	***Element enablers***	***Rational of applicability***	***Stakeholders***
					• *Flight and Flow information* • *National regulatory framework*	*capabilities support a strategic collaborative flight planning environment.*	
	*FICE-B2/8**	*Flight information management service for low-altitude operations*	*Validation*	*Yes*	• *SMS* • *Flight and Flow information*	• *Operators at the lowest altitudes, outside of manned flight terminal operations, have unique shared operating environment to support beyond visual line of sight operations.*	• *ANSP*
	*FICE-B2/9**	*Flight information management support for inflight re-planning*	*Validation*	*Yes*	• *SMS* • *Flight and Flow information*	• *To enable aircraft operators and service providers (ATFM functions) to coordinate the re-optimization of flights based upon changing circumstances. Trajectory changes are limited to those occurring beyond an operationally-appropriate horizon. Service providers (ATFM functions) provide full constraint evaluation on proposed changes.*	• *ANSP*

**: Applicability under the agreement of ATM and CNS Team project members*