

IIMSG5 WP3.1A1 – Appendix 2 - Identified ASBU elements applicable to AFI region in CNS Field

Module	Element	Purpose of the element	Maturity level	Enablers	Applicable (Yes or No)	Rational of applicability
COMI	COMI-B0/1	Aircraft Communication Addressing Reporting System (ACARS)	Ready for implementation	<ul style="list-style-type: none"> Communication infrastructure 	Yes	<ul style="list-style-type: none"> 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.
	COMI-B0/2	Aeronautical Telecommunication Network/Open System Interconnection (ATN/OSI)	Ready for implementation	<ul style="list-style-type: none"> Communication infrastructure 	Yes	<ul style="list-style-type: none"> ATN/OSI provides a bit-oriented multi-layer protocol for exchanging ATS messages between the aircraft and ground system.
	COMI-B0/3	VHF Data Link (VDL) Mode O/A	Ready for implementation	<ul style="list-style-type: none"> Communication infrastructure 	Yes	<ul style="list-style-type: none"> VDL Mode O/A is a data communications subnetwork that supports transmission of data link messages.
	COMI-B0/4	VHF Data Link (VDL) Mode 2 Basic	Ready for implementation	<ul style="list-style-type: none"> Communication infrastructure 	Yes	<ul style="list-style-type: none"> VDL Mode 2 Basic is a data communications subnetwork that supports transmission of data link messages. It provides higher performance than VDLMO/A.

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	COMI-B0/5	Satellite Communication (SATCOM) Class C Data	Ready for implementation	<ul style="list-style-type: none"> Communication infrastructure 	Yes	<ul style="list-style-type: none"> To provide surveillance and communications where VHF usage is not possible or practicle.
	COMI-B0/6	High Frequency Data Link (HFDL)	Ready for implementation	<ul style="list-style-type: none"> Communication infrastructure 	Yes	<ul style="list-style-type: none"> To communicate in areas where SATCOM and VHF are not available.
	COMI-B0/7	ATS Message Handling System (AMHS)	Ready for implementation	<ul style="list-style-type: none"> Communication infrastructure 	Yes	<ul style="list-style-type: none"> 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.
	COMI-B1/1	Ground-Ground Aeronautical Telecommunication Network/Internet Protocol suite (ATN/IPS)	Standardization	<ul style="list-style-type: none"> Communication infrastructure 	Yes	<ul style="list-style-type: none"> To provide for a more modern, more efficient, cost-effective, and robust data communications network infrastructure.
	COMI-B1/2	VHF Data Link (VDL) Mode 2 Multi-Frequency	Ready for implementation	<ul style="list-style-type: none"> Communication infrastructure Aircraft system 	Yes	<ul style="list-style-type: none"> Supports transmission of data link message sets to supplement current voice operations, thus reducing voice channel

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						congestion; while increasing productivity and capacity. <ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Communication infrastructure 	Yes	<ul style="list-style-type: none"> • 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.
	COMI-B1/4	Aeronautical Mobile Aircraft Communication System (AeroMACS)	Ready for implementation	<ul style="list-style-type: none"> • Airport system • Communication infrastructure 	Yes	<ul style="list-style-type: none"> • Reduced Separation • Improved situational awareness • Reduced Cost • Improved Efficiency
	COMI-B2/1	Air-Ground ATN/IPS	Validation	<ul style="list-style-type: none"> • Communication infrastructure 	Yes	<ul style="list-style-type: none"> • To improve integrity of the information.
	COMI-B2/2	Aeronautical Mobile Aircraft Communication System (AeroMACS) aircraft mobile connection	Validation	<ul style="list-style-type: none"> • Communication infrastructure 	Yes	<ul style="list-style-type: none"> • To reduce separation and improve situational awareness.

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	COMI-B2/3	Link meeting requirements for non-safety critical communication	Validation	<ul style="list-style-type: none"> Communication infrastructure 	Yes	<ul style="list-style-type: none"> To reduce operational cost; To improve performance; To take advantage of new technologies sooner; To enable the global exchange of non-safety information.
COMS	COMS-B0/1	CPDLC (FANS 1/A & ATN B1) for domestic and procedural airspace	Ready for implementation	<ul style="list-style-type: none"> Communication service Equipage requirements or/and mandates SMS 	Yes	<ul style="list-style-type: none"> 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.
	COMS-B0/2	ADS-C (FANS 1/A) for procedural airspace	Ready for implementation	<ul style="list-style-type: none"> Communication service Equipage requirements or/and mandates SMS 	Yes	<ul style="list-style-type: none"> Supports improvement of surveillance in airspace where procedural separation is being applied.
	COMS-B1/1	PBCS approved CPDLC (FANS 1/A +) for domestic and procedural airspace	Ready for implementation	<ul style="list-style-type: none"> Communication service Equipage requirements or/and mandates SMS Operational Approval 	Yes	Supports: <ul style="list-style-type: none"> reduction of voice channel congestion and increase of capacity in domestic airspace, 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	<ul style="list-style-type: none"> Communication service 	Yes	<ul style="list-style-type: none"> Supports introduction of performance-based reduced

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				<ul style="list-style-type: none"> • Equipage requirements or/and mandates • SMS • Operational Approval 		separation minima in procedural airspace.
	COMS-B1/3	SATVOICE (incl. routine communication) for procedural airspace	Ready for implementation	<ul style="list-style-type: none"> • Aircraft system • Equipage requirements or/and mandates • SMS • Operational Approval 	Yes	<ul style="list-style-type: none"> • Increase quality of voice communications in procedural airspace without VHF coverage.
	COMS-B2/1	PBCS approved CPDLC (B2) for domestic and procedural airspace	Validation	<ul style="list-style-type: none"> • Communication service • SMS • Operational Approval 	Yes	Provision of Air Traffic Services (ATS), with the extension of data link communications use in support of various ATM enhancements among which: <ul style="list-style-type: none"> • 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.

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	COMS-B2/2	PBCS approved ADS-C (B2) for domestic and procedural airspace	Validation	<ul style="list-style-type: none"> • Communication service • SMS • Operational Approval 	Yes	Provision of Air Traffic Services (ATS), with the extension of data link communications use in support of various ATM enhancements among which: <ul style="list-style-type: none"> • 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).
	COMS-B2/3	PBCS approved SATVOICE (incl.routine communications) for procedural airspace	Validation	<ul style="list-style-type: none"> • Aircraft system • SMS • Operational Approval 	Yes	<ul style="list-style-type: none"> • Supports introduction of reduced separation minima in procedural airspace.
NAVS	NAVS-B0/1	Ground Based Augmentation System (GBAS)	Ready for implementation	<ul style="list-style-type: none"> • Navigation 	Yes	<ul style="list-style-type: none"> • 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.
	NAVS-B0/2	Satellite Based Augmentation System (SBAS)	Ready for implementation	<ul style="list-style-type: none"> • Navigation 	Yes	<ul style="list-style-type: none"> • Support PBN in all phases of flight with an increased accuracy, integrity and availability compared to ABAS.

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						Increases accuracy and integrity for the vertical guidance.
	NAVS-B0/3	Aircraft Based Augmentation system (ABAS)	Ready for implementation	<ul style="list-style-type: none"> Navigation 	Yes	<ul style="list-style-type: none"> Support non-precision (LNAV) and vertically guided (LNAV/VNAV) approaches with BaroVNAV and other terminal and enroute navigations.
	NAVS-B0/4	Navigation Minimal Operating Networks (Nav. MON)	Ready for implementation	<ul style="list-style-type: none"> Navigation 	Yes	<ul style="list-style-type: none"> To adjust conventional nav aids 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 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	<ul style="list-style-type: none"> Navigation Operations 	Yes	<ul style="list-style-type: none"> 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.

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	NAVS-B2/1	Dual frequency Multi Constellation (DFMC) GBAS	Validation	<ul style="list-style-type: none"> Navigation 	Yes	<ul style="list-style-type: none"> More robust and less vulnerable to atmospheric propagation perturbations, supports Cat I,II, III GBAS landing operations in all regions of the world.
	NAVS-B2/2	Dual frequency Multi Constellation (DFMC) SBAS	Validation	<ul style="list-style-type: none"> Navigation 	Yes	<ul style="list-style-type: none"> To increase availability and expand coverage. To reduce cost through the reduction of the need for ground stations.
	NAVS-B2/3	Dual frequency Multi Constellation (DFMC) ABAS	Validation	<ul style="list-style-type: none"> Navigation 	Yes	<ul style="list-style-type: none"> More robust navigation services (in particular versus loss of a single frequency, or of a single constellation).
ASUR	ASUR-B0/1	Automatic Dependent Surveillance - Broadcast (ADS-B)	Ready for implementation	<ul style="list-style-type: none"> Navigation Surveillance Technical systems 	Yes	<ul style="list-style-type: none"> To support the provision of Air Traffic Services and operational applications at reduced cost and increased surveillance coverage.
	ASUR-B0/2	Multi-lateration cooperative surveillance systems (MLAT)	Ready for implementation	<ul style="list-style-type: none"> Navigation Surveillance Technical systems 	Yes	<ul style="list-style-type: none"> To provide an alternative to radar surveillance by using available aircraft transponders.
	ASUR-B0/3	Cooperative Surveillance Radar Downlink of aircraft Parameters (SSR-DAPS)	Ready for implementation	<ul style="list-style-type: none"> Surveillance Technical systems 	Yes	<ul style="list-style-type: none"> To obtain additional information from an aircraft transponder in support of the provision of Air Traffic Services.

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	ASUR-B1/1	Reception of aircraft ADS-B signals from space (SB ADS-B)	Standardization	<ul style="list-style-type: none"> Navigation Surveillance Technical systems 	Yes	<ul style="list-style-type: none"> To provide surveillance coverage in locations where ground stations siting is not possible or not currently provided.
	ASUR-B2/1	Evolution of ADS-B and Mode S	Validation	<ul style="list-style-type: none"> Navigation Surveillance Technical systems 	Yes	<ul style="list-style-type: none"> To provide new types of data in support of Air Traffic/MET Services and vehicle-to-vehicle applications
	ASUR-B2/2	New community based surveillance system for airborne aircraft (low and higher airspace)	Concept	<ul style="list-style-type: none"> Surveillance 	Yes	<ul style="list-style-type: none"> To support the provision of separation services by operators for aircraft operating at very low altitudes (<500 ft) and higher airspace.
ACAS	ACAS-B1/1	ACAS Improvement	Ready for implementation	<ul style="list-style-type: none"> Certification Operations aircraft system operational approval surveillance 	Yes	<ul style="list-style-type: none"> To provide airborne collision avoidance as a last resort safety net for pilots
	ACAS-B2/1	New collision avoidance system	Standardization	<ul style="list-style-type: none"> Certification Operations aircraft system operational approval 	Yes	<ul style="list-style-type: none"> To provide airborne collision avoidance as a last resort safety net for pilots (improving functionality provided in BBB and Block 0)

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	ACAS-B2/2	New Collision avoidance capability as part of an overall detect and avoid system for RPAS	Validation	<ul style="list-style-type: none"> • Certification • Operations • aircraft system • operational approval 	Yes	<ul style="list-style-type: none"> • As part of a detect and avoid system, to provide the airborne collision avoidance function as a last resort safety net for RPAS' pilots.
FICE	FICE-B0/1	Automated basic facility data exchange (AIDC)	Ready for implementation	<ul style="list-style-type: none"> • SMS • Flight and Flow information • National regulatory framework 	Yes	<ul style="list-style-type: none"> • To improve the efficiency of coordination and transfer of control between ATS units.
	FICE-B2/1	Planning Service	Validation	<ul style="list-style-type: none"> • SMS • Flight and Flow information • National regulatory framework 	Yes	<ul style="list-style-type: none"> • To allow aircraft operator to obtain constraint feedback while informing the relevant service providers of their intentions.
	FICE-B2/2	Filing Service	Validation	<ul style="list-style-type: none"> • SMS • Flight and Flow information • National regulatory framework 	Yes	<ul style="list-style-type: none"> • To enhance ATS flight plan processing including constraints evaluation and enhanced flight information sharing.
	FICE-B2/3	Trial Service	Validation	<ul style="list-style-type: none"> • SMS 	Yes	<ul style="list-style-type: none"> • To provide the aircraft operator with the ability to obtain feedback on a possible change

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				<ul style="list-style-type: none"> Flight and Flow information National regulatory framework 		without impacting the flight plan currently being used by the service provider.
	FICE-B2/4	Flight Data Request Service	Validation	<ul style="list-style-type: none"> SMS Flight and Flow information National regulatory framework 	Yes	<ul style="list-style-type: none"> 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.
	FICE-B2/5	Notification Service	Validation	<ul style="list-style-type: none"> SMS Flight and Flow information National regulatory framework 	Yes	<ul style="list-style-type: none"> To allow a service provider or operator to notify other parties of the departure or arrival of a flight.
	FICE-B2/6	Publication Service	Validation	<ul style="list-style-type: none"> SMS Flight and Flow information National regulatory framework 	Yes	<ul style="list-style-type: none"> To ensure consistent flight information and data is available to all stakeholders. This information can be used to improve ATM decision-making processes.

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	FICE-B2/7	Flight Information Management service for higher airspace operations	Validation	<ul style="list-style-type: none"> SMS Flight and Flow information National regulatory framework 	Yes	<ul style="list-style-type: none"> Higher airspace operations will have a different multi-national flavour worldwide. The FF-ICE capabilities support a strategic collaborative flight planning environment.
	FICE-B2/8	Flight information management service for low-altitude operations	Validation	<ul style="list-style-type: none"> SMS Flight and Flow information 	Yes	<ul style="list-style-type: none"> Operators at the lowest altitudes, outside of manned flight terminal operations, have unique shared operating environment to support beyond visual line of sight operations.
	FICE-B2/9	Flight information management support for inflight re-planning	Validation	<ul style="list-style-type: none"> SMS Flight and Flow information 	Yes	<ul style="list-style-type: none"> 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.