

Deployment Scenario Title	CNS services evolution
Deployment Scenario Description	<p>The CNS services evolution deployment scenario includes the following: Integrated CNS and spectrum addresses CNS cross-domain consistency in terms of robustness, spectrum use and interoperability, including civil-military aspects, through the provision of a global view of future CNS services, as well as the definition of the future integrated CNS architecture and the CNS spectrum strategy.</p> <p>FCI services address the provision of digital communication services (IP-based data and digital voice). It supports future ATS and airline operations centre (AOC) services with demanding high air-ground and air-air communication capacity and high performance. It will allow the real-time sharing of 4D trajectories and timely access to ATM data and information services and will enable network-centric SWIM architectures. It manages, in a secure way, different subnetworks. It also integrates the services provided by open networks needed for hyper-connected ATM.</p> <p>The FCI terrestrial datalink and A-PNT enabler, L-DACS (L-Band Digital Aeronautical Communication System), constitutes the future terrestrial air-ground and air-air datalink solution to support increasing ATM performance requirements. The development and standardisation of L-DACS technology will continue. The system will address both avionics and ground implementation.</p> <p>Future satellite communications datalink class A performance will enable more ATM concepts and services to emerge. It aims to provide global interoperability based on an international communications standard that ensures that aircraft equipped with a standard terminal will be able to communicate anywhere using compatible satellite systems. In addition, it is expected to ensure lower costs for aircraft equipment and communication services.</p> <p>Dual-frequency multi-constellation (DFMC) GNSS/SBAS and GBAS address the move towards resilient and performance-based navigation in all phases of flight, taking advantage of a dual GNSS constellation (GPS and Galileo). In particular, for the approach phase, this will include the development of GBAS approach service type F (GAST-F), based on multi-constellation multi-frequency GNSS. Finalisation of the development of GAST-F CAT II/III (these are ICAO categories of precision approach and landing) and DFMC SBAS is expected to maximise the benefits of satellite-based technology for achieving approach in low-visibility conditions down to CAT II/III minima for GBAS and lateral precision with vertical guidance down to 200 ft for SBAS (LPV 200).</p> <p>In the long term, the aim is to develop A-PNT systems capable of providing better performance in comparison with the short-term solution (based on DME-DME) and supporting PBN / required navigation performance (RNP) operations using alternative technologies in the event of a GNSS degradation or outage.</p>
Essential Operational Change	CNS Infrastructure and Services
Maturity	In development phase: Key R&D Activities

Applicable Operating Environment			
Airport	Terminal Airspace	En-Route	Network

Timeline																					
2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035

Performance Contribution of the DS				
Capacity	Safety	Environment	Cost-efficiency	Operational efficiency

Stakeholders affected (at least one enabler to be deployed)						
ANSP		AO		AU		Network Manager
Civil	Military	Civil	Military	Civil	Military	
TWR, APP, ENR, CNS, SWIM, AIS, MET, AMC	TWR, APP, ENR, CNS, AIS, MET, SWIM, AMC	APT Operator	APT Operator	Scheduled, BA Fixed, BA Rotorcraft, GA, FOC	Transport, Fighter, Light, WOC	Network Manager

SESAR Solutions			
Solution Code	Solution Title	Solution Description	Related Elements
PJ.14-01-01	CNS environment evolution	CNS environment evolution aims at identifying potential technological/functional synergies across...	SOL PJ OI DS EOC
PJ.14-02-01	FCI Terrestrial Data Link	Future Communication Infrastructure (FCI) Terrestrial Data Link which includes L-band digital...	SOL PJ OI DS EOC
PJ.14-02-02	Future Satellite Communications Data link	Future Satellite Communications Data link which enables data communications in oceanic and remote...	SOL PJ OI DS EOC
PJ.14-02-04	FCI Network Technologies incl. voice solutions and military interfacing	FCI Network Technologies incl. voice solution and military interfacing sees the migration towards...	SOL PJ OI DS EOC
PJ.14-03-01	GBAS	GBAS sees the finalisation of the development of GBAS CAT III L1 (GBAS approach service type...	SOL PJ OI DS EOC
PJ.14-03-02	Multi Constellation / Multi Frequency (MC/MF) GNSS	Multi Constellation / Multi Frequency (MC/MF) GNSS refers to standardisation developments for...	SOL PJ OI DS EOC
PJ.14-W2-107	Future Satellite Communications Data link	The Key R&D activity addresses the development of the future satellite data link technologies...	PJ DS EOC
PJ.14-W2-60	FCI Terrestrial Data Link and A-PNT enabler (L-DACS)	This Key R&D activity addresses the future terrestrial A/G and A/A data link solution, which...	PJ DS EOC
PJ.14-W2-76	Integrated CNS and Spectrum	The R&D activity addresses the CNS cross-domains consistency in terms of robustness, spectrum...	PJ DS EOC
PJ.14-W2-77	FCI Services	The key R&D activity will allow the real-time sharing of trajectories, timely access to ATM...	PJ DS EOC
PJ.14-W2-79	Dual Frequency / Multi Constellation DFMC GNSS/SBAS and GBAS	The key R&D activity addresses the progress in development of GBAS approach service type F...	PJ DS EOC
PJ.14-W2-81	Long-term alternative Position, Navigation and Timing (A-PNT)	This key R&D activity aims at developing A-PNT systems capable to provide better performances...	PJ DS EOC

Operational Improvement Steps			
OI Step Code	OI Step Title	OI Step Description	Related Elements
CNS-0001-B	Rationalisation of COM systems/infrastructure for SESAR2020 Wave 1	Implement new COM functionalities and/or technologies for CNS systems supporting cost efficiency,...	SOL EN DS
CNS-0002-B	Rationalisation of NAV systems/infrastructure for Step2	Implement new NAV functionalities and/or technologies for CNS systems supporting cost efficiency,...	SOL EN DS
CNS-0003-B	Rationalisation of SUR systems/infrastructure for Step2	Implement new SUR functionalities and/or technologies for CNS systems supporting cost efficiency,...	SOL EN DS
POI-0015-COM	ATM Future Communication Infrastructure Network	The implementation of this POI will enable the combined use of different Air/Ground datalink...	SOL EN DS
POI-0019-COM	SatCOM Class A for ATM	The use of Class A Satellite Communication systems for Air/Ground datalink will support ATC and...	SOL EN DS
POI-0021-AUO	Improved navigation using Dual-Frequency Multi-Constellation (DFMC GNSS)	Use of Dual-Frequency/Multi-Constellation (DF/MC) GNSS technology to provide airspace users with...	SOL EN DS
POI-0022-COM	ATM High Performance Terrestrial Data Link	The implementation of LDACS will provide A/G Datalink capabilities supporting ATC and AOC as well...	SOL EN DS
POI-0023-COM	ATM Air to Air High Performance Datalink	The implementation of LDACS will provide Air/Air data link capabilities and voice services. The...	SOL EN DS
POI-0024-NAV	Increased flexibility in airspace usage through GBAS	Supports optional increase in GBAS precision approach service volume to better match ILS...	SOL EN DS
POI-0025-NAV	GBAS applicability to challenging operational environments in LVC	Enhance GBAS performance and robustness under ground threat conditions such as RFI and jamming...	SOL EN DS
POI-0026-NAV	GAST D applicability to Equatorial and Nordic regions	Achieving Improved Low Visibility Operation using GBAS CAT II/III based on GPS L1 also in...	SOL EN DS
POI-0027-NAV	Enhanced interoperability and efficiency of GBAS infrastructure (operation and maintenance)	Optimization of airport infrastructure use through standardized ATC and Maintenance interfaces...	SOL EN DS
POI-0028-NAV	Improved GBAS robustness and performance using DFMC GNSS	GBAS robustness and performance enhancement by means of Dual Frequency Multi Constellation GNSS.	SOL EN DS

Enablers						
Required/Optional	New/Inherited	Develop/Use	Enabler Code	Enabler Title	Enabler Description	Related Elements
🔒			A/C-02b	Enhanced positioning using multi constellation GNSS dual frequency	Enhanced precision and availability/continuity of positioning (based on GNSS dual frequency,...	STK OI EN DS

Enablers						
Required/Optional	New/Inherited	Develop/Use	Enabler Code	Enabler Title	Enabler Description	Related Elements
🔒			CTE-C01	A/G Voice radio	Existing and New A/G Voice Infrastructure	STK OI DS ⚙️
🔒			CTE-C01a	Existing Voice radio (VHF 25/8.33KHz)	'VHF 8.33 kHz is mandated in all continental airspace to support increases in traffic. Note: This...	STK OI DS ⚙️
➔			CTE-C01b	New Digital A/G Voice	'The migration from analogue to digital Air-ground voice is carried out provided that an...	STK OI DS
🔒			CTE-C01c	SATCOM Voice for ATC (oceanic and Polar)	Use of current SATCOM systems (e.g. INMARSAT3, Iridium, SBB, etc.) to support ATC voice...	OI DS ⚙️
🔒			CTE-C02	A/G Datalink radio	A/G DL Infrastructure covering existing (ACARS and VDL2) and future (AEROMACS, LDACS, Future...	STK OI DS ⚙️
🔒			CTE-C02a	A/G datalink over ACARS (POA/AOA)	A-G datalink using POA and AOA (ACARS over AVLIC) to support AOC and basic ATC data exchange (DCL,...	STK OI DS ⚙️
🔒			CTE-C02b	A/G Datalink over ATN/OSI - Single frequency	A/G datalink using ATN/OSI over VDL2 to support continental ATC services (SES IR) - ATN/OSI B1,...	STK OI EN DS ⚙️
🔒			CTE-C02c	A/G Datalink over ATN/OSI - Multi frequency	Enhanced A/G datalink using ATN/OSI over VDL2 to support continental ATC services - ATN/OSI B1...	STK OI EN DS PCP ⚙️
➔			CTE-C02d	New Airport Datalink technology (AEROMACS)	New wireless technology for the Airport Datalink AEROMACS over ATN/OSI and ATN/IPS, based on IEEE...	STK OI EN DS ⚙️
🔒			CTE-C02d0	New Airport Datalink technology (AEROMACS)	New wireless technology for the Airport Datalink AEROMACS, based on IEEE 802.16 WiMax, as a new...	STK OI DS
➔			CTE-C02e	New A/G datalink using ATN/IPS over L-band	A new terrestrial A-G datalink (LDACS) to augment the VDL2 supported A-G datalink services based...	STK OI EN DS ⚙️
➔			CTE-C02f	Future Satcom for ATM: SATCOM Class B in Multilink	A new satellite A/G datalink to provide service redundancy to the existing terrestrial datalink...	STK OI EN DS ⚙️
🔒			CTE-C02g	Air to Air functionality of New A/G radios	Air to Air functionality of New A/G radios (considered for example in the context of...	STK OI DS ⚙️
➔			CTE-C02h	Future Satcom for ATM - Long term Satcom/IRIS (class A Satcom)	A new satellite A-G datalink to provide service redundancy to the new terrestrial datalink.	STK OI DS ⚙️
🔒			CTE-C03	Commercial Telecom Infrastructure (SATCOM, Gatelink)	Transmission of data (DL) using commercial means on the airport surface (i.e. gatelink) as well...	OI DS ⚙️

Enablers						
Required/Optional	New/Inherited	Develop/Use	Enabler Code	Enabler Title	Enabler Description	Related Elements
🔒			CTE-C03a	Commercial wireless airport surface communication (Gatelink)	Commercial wireless technology, based on IEEE 802.11 and standardized for aviation use, deployed...	OI DS ⚙️
🔒			CTE-C03b	Broadband Satcom Datalink (i.e. Global Express)	A satellite A/G datalink based on existing Satellite systems, e.g. Global Xpress	STK OI DS ⚙️
🔒			CTE-C03c	Commercial wireless technologies at the Airport surface (not for safety-critical services)	Commercial wireless technologies, such as GPRS, EGDE, 4G, etc, are available for use at the...	STK OI DS ⚙️
🔒			CTE-C03d	Commercial mobile/cellular telecommunications to support non-safety services for General Aviation	Support for general aviation (GA) for non safety services: Use of commercial mobile...	STK OI DS
🔒			CTE-C04	Future Communication Infrastructure - ATN/IPS and Multilink	Evolution of the Ground part of A/G infrastructure to support multi-link (IP Router)	STK OI EN DS ⚙️
🔒			CTE-C05	Ground ATS Voice	Ground voice ATS communications using VoIP	OI DS ⚙️
🔒			CTE-C05a	VoIP for ground telephony	Voice over IP (VoIP), based on ED137B VOL2:TELEPHONY, is deployed for ATM ground telephony...	STK OI EN DS PCP ⚙️
🔒			CTE-C05b	Digital Voice / VoIP for ground segment of Air-Ground voice	Voice over IP (VoIP), based on ED137B VOL1:RADIO, is deployed for the Ground-Ground segment of...	STK OI EN DS PCP ⚙️
🔒			CTE-C06	Ground ATM Data communication Network	An IP-based secured network communication service for the connected ANSPs, NM systems (incl. EAD)...	OI DS ⚙️
🔒			CTE-C06a	PENS - Phase 1	PENS provides a common IP-based secured network service for the connected ANSPs, NM systems...	STK OI DS ⚙️
🔒			CTE-C06b	PENS - Phase 2	PENS phase 1 and in addition connectivity to other ATM Users and new datalink systems (SATCOM,...	STK OI DS ⚙️
🔒			CTE-C06c	AMHS	Migration to AMHS (ATS Message Handling System) from AFTN is carried out to improve regional,...	STK OI DS ⚙️
🔒			CTE-C06d	Gateway for CIV/MIL Interoperability	Information exchange gateways/interfaces supporting military aircraft equipped to exchange ATN/B1...	STK OI DS ⚙️
🔒			CTE-CGOV01	Data communications Service Provision for ATS and AOC services	A/G Communications Service Provision under contractual agreements with ANSPs/AOs	OI DS
🔒			CTE-CGOV02	Data and voice Communications Service Provision for ATS and AOC services	A/G Communications Service Provision under contractual agreements with CSPs	OI DS

Enablers						
Required/Optional	New/Inherited	Develop/Use	Enabler Code	Enabler Title	Enabler Description	Related Elements
🔒			CTE-CGOV03	Telco service provider for IP data network supporting ATM services	G/G Communications Service Provision under contractual agreements with ANSPs/AOs as required	OI DS
🔒			CTE-N01	GPS L1/L5	Modernised GPS constellation broadcasts the civilian use signals in two different frequency bands...	STK OI DS PCP ⚙️
🔒			CTE-N02	GALILEO E1/E5	GALILEO Open Service broadcasted in Dual-Frequency (E1/ E5) will be used in ...	OI EN DS ⚙️
🔒			CTE-N05	GNSS performance assessment system	A system to collect, process and assess data of operational core constellations to assess...	STK OI DS ⚙️
🔒			CTE-N06b	EGNOS V3	Multi-Constellation / Multi-Frequency (MC/MF) EGNOS (SBAS). Will support GPS & GALILEO L1...	OI EN DS ⚙️
➔			CTE-N07c	GBAS Cat II/III based on Multi-Constellation / Multi-Frequency (MCMF) GNSS (GPS + GALILEO / L1 + L5)	Multi-Constellation / Multi-Frequency GBAS Cat II/III will support Cat II/III operations.	STK OI EN DS ⚙️
🔒			CTE-N07d	GBAS expanded service volume	Ground Based Augmentation System (GBAS) is a civil-aviation safety-critical system that supports...	STK OI EN DS
➔			CTE-N07e	GBAS CAT II/III based on Single-Constellation / Single-Frequency GNSS (GPS L1) extension to equatorial and Nordic regions	GAST D extension to geographical areas with severe ionospheric conditions such as equatorial and...	STK OI EN DS
🔒			CTE-N07f	GBAS robustness towards interference	This technical enabler supports GBAS CAT II/III SC/SF solution operating in airport environments...	STK OI EN DS
🔒			CTE-N07g	GBAS GS status data provision	A harmonized set of GBAS GS service status data are provided over a standardized ATC and...	STK OI DS
🔒			CTE-S02	Primary SUR sensor	Independent Non Cooperative Surveillance sensors	STK OI DS ⚙️
🔒			CTE-S02c	Multi Static Primary Surveillance Radar	Independent Non Cooperative Surveillance using Multi Static Primary Surveillance Radar for TMA.	STK OI EN DS ⚙️
🔒			CTE-S02d	Video Based Surveillance	The camera sensor (visual or infrared) provides 25 frames per second of video data. Video Based...	STK OI EN DS ⚙️
🔒			CTE-S03	ADS-B Receiving Station	ADS-B Receiving station for the provision of NRA, RAD and APT surveillance including Satellite...	STK OI EN DS ⚙️
🔒			CTE-S03a	ADS-B station for NRA surveillance	ADS-B station for provision of Non Radar Airspace Surveillance, compliant with EUROCAE ED-129...	STK OI EN DS ⚙️

Enablers						
Required/Optional	New/Inherited	Develop/Use	Enabler Code	Enabler Title	Enabler Description	Related Elements
🔒			CTE-S03b	ADS-B station for RAD and APT surveillance	ADS-B station for provision of Radar and Airport surveillance, compliant with EUROCAE ED129A and ...	STK OI EN DS ⚙️
🔒			CTE-S03c	New ADS-B station for future ADS-B applications	ADS-B station for provision future ADSB applications, receiving ED102A+ Phase overlay squitter...	STK OI EN DS ⚙️
🔒			CTE-S03d	Satellite based ADS-B technology	ADS-B Satellite based stations for the provision of surveillance in low density airspace.	STK OI EN DS ⚙️
🔒			CTE-S04	Multilateration ground System	Multilateration Ground system for the provision of En-route, TMA and Airport surveillance,...	STK OI DS ⚙️
🔒			CTE-S04a	Wide Area Multilateration (WAM)	Wide Area Multilateration technology for the provision of independent cooperative surveillance in...	STK OI EN DS ⚙️
🔒			CTE-S04b	Airport Multilateration (MLAT)	Multilateration technology for the provision of independent cooperative surveillance in Airports.	STK OI EN DS ⚙️
🔒			CTE-S06	Composite Surveillance	Composite surveillance encompasses the different combinations of data at surveillance sensor...	STK OI EN DS
🔒			CTE-S02c	Multi Static Primary Surveillance Radar	Independent Non Cooperative Surveillance using Multi Static Primary Surveillance Radar for TMA.	STK OI EN DS ⚙️
🔒			CTE-S02d	Video Based Surveillance	The camera sensor (visual or infrared) provides 25 frames per second of video data. Video Based...	STK OI EN DS ⚙️
🔒			CTE-S03a	ADS-B station for NRA surveillance	ADS-B station for provision of Non Radar Airspace Surveillance, compliant with EUROCAE ED-129...	STK OI EN DS ⚙️
🔒			CTE-S03c	New ADS-B station for future ADS-B applications	ADS-B station for provision future ADSB applications, receiving ED102A+ Phase overlay squitter...	STK OI EN DS ⚙️
🔒			CTE-S04a	Wide Area Multilateration (WAM)	Wide Area Multilateration technology for the provision of independent cooperative surveillance in...	STK OI EN DS ⚙️
🔒			CTE-S04b	Airport Multilateration (MLAT)	Multilateration technology for the provision of independent cooperative surveillance in Airports.	STK OI EN DS ⚙️
🔒			CTE-S07	Surveillance Performance Monitoring Tools	Surveillance Performance Monitoring Tools are enablers of an harmonised performance monitoring of...	STK OI EN DS

Enablers						
Required/ Optional	New/ Inherited	Develop/ Use	Enabler Code	Enabler Title	Enabler Description	Related Elements
🔒			CTE-S07a	Coop sensor SPM Tool ¿ ER & TMA	Surveillance Performance Monitoring Tools, seeking to identify surveillance degradation trends...	STK OI EN DS
🔒			CTE-S07b	Coop sensor SPM Tool ¿ Surface	Surveillance Performance Monitoring Tools, seeking to identify surveillance degradation trends...	STK OI EN DS
🔒			CTE-S07d	Non-Coop sensor SPM Tool ¿ Surface	Surveillance Performance Monitoring Tools, seeking to identify surveillance degradation trends...	STK OI EN DS
🔒			CTE-S07e	SUR Chain SPM Tool ¿ ER & TMA	Surveillance Performance Monitoring Tools, seeking to identify surveillance degradation trends...	STK OI DS
➔			CTE-N03	GLONASS-K	Modernised GLONASS constellation (GLONASS-K) provides additional satellite navigation signals...	OI EN ⚙️
➔			CTE-N04	BEIDOU B1/B5	Dual-frequency (B/B5) BEIDOU constellation (B1 + B5). provides additional satellite navigation...	OI EN ⚙️