ARINC 658

Internet Protocol Suite (IPS) for Aeronautical Safety Services – Roadmap Document

Updates to:

APPENDIX D – STANDARDIZATION GAP ANALYSIS DATA

as of 22 July 2020

22 July 2020 Updates to: APPENDIX D – STANDARDIZATION GAP ANALYSIS DATA [Overview]

INTRODUCTION   Industry stakeholders who participated in the development of the ARINC 658 roadmap document conducted a detailed analysis to understand and assess ATN/IPS-related standardization activities. In particular, the analysis identified gaps where the industry stakeholders believe that a standard is required but an associated standardization activity is not yet identified. The primary objective of the analysis was to identify the need for new ATN/IPS-related ARINC Standards and to identify existing ARINC Standards that may require modification to support ATN/IPS. However, having a comprehensive picture of ATN/IPS-related standardization efforts across standards organizations also helps to minimize duplication of effort and facilitates the identification of topics that might benefit from cross-organization coordination.

WORKBOOK TABS

README	This tab, which provides an overview of the IPS Standardization Gap Analysis workbook
IPS Gap Analysis	Latest version of the IPS Standardization Gap Analysis
IPS Gap Analysis- changes	Latest version of the IPS Standardization Gap Analysis highlighting (in purple) entries that are changed from the prior version.
List Items	Drop-down menu items used in the analysis -- DO NOT CHANGE

IPS GAP ANALYSIS COLUMNS

A	**Work Area**	Together, these columns organize the standardization activities with respect to the ATN/IPS work areas and sub-work areas identified in Sections 3 and 4 of the ARINC 658 Roadmap
B	**Sub-work Area**	Document.

C	**Work Type**	Activity work type, which may take one of the following values (using a pull-down menu):

STD	Standard / Specification
GM	Guidance Material
ANA	Analysis
PRO	Prototype Implementation
VAL	Validation
VER	Verification
V&V	Verification and Validation
OPR	Operations

D	**Work Status**	Status of the work activity, which may take on one of the following values (using a pull-down menu):

Complete	Work activity is complete
In-Progress	Work activity is started and in-progress
Planned	Work activity is planned, but not yet started
Proposed	Work activity is proposed, but not yet planned or started
GAP	Identified work activity gap
TBD/TBS	Work activity to be determined / scheduled (e.g., future activity based on need and business case)

E	**A658 Section where gap is addressed**	A reference to the section in the A658 Roadmap Document where potential actions to address an identified gap are described. The following color coding is used:

#	A658 section in which a gap is described; the gap still exists at the time of this update
#	A658 section in which a gap is described; work activity to address the gap has been initiated, per the status in Column D
	No gap; a work activity was already initiated prior to the publication of A658

F	**Standards Organization**	Taken together, these Columns F&G identify the Standards Development Organization and the associated working group and sub-working group (optional) associated with the
G	**Working Group / Sub-group**	specified standardization activity. The Standards Development Organization is selected using a pull down menu, and the working group / sub-group entry is free text.
H	**Activity Description**	Description of the standardization activity (normal font, black text) OR a description of an identified gap (*italicized font, red text*).
I	**Artifact**	A document number, if known, for the planned output of the work activity.
J	**Planned Completion Date**	Date, if known, when the output of the work activity is expected to be completed.
L, M, N	**Input Dependency**	Other activities/artifacts on which the standardization activity in Col H is dependent. Includes a need date and current availability date. Availability Date > Need Date is a gap.
O, P, Q	**Output Dependency**	Other standardization activities that are dependent on the activities in Col H. Includes a need date and current availability date. Availability Date > Need Date is a gap.
R	**Additional Comments**	Additional commentary, clarification, or observations offered by industry participants
S, T, U	**Topic Scope Allocation**	Allocation of the topic scope (per Work Area in Columns A, B) to the work activities of each standards organization

Work Area	Sub-work Area	Work Type	Work Status	A658 Section where Gap is Addressed	Standards Organization	Working Group / Sub-group	Activity Description / Gap Description	Document No.	Planned Completion Date (MMM-YYYY)	Input Dependency FROM	Input Need Date	Input Availability Date	Output Dependency TO	Output Need Date	Output Availability Date	Additional Comments	ICAO Doc. xxxx	RTCA/EUROCAE IPS Profiles / MASPS	AEEC PP858
							IPS-related Standardization Activities	**Artifact**		**Dependencies** — Activity/Artifact has a Dependency on (needs input from)			There is a Dependency on the Activity/Artifact (is an output to)				**Topic Scope Allocation**		
Application Interfaces	DSI (legacy)		In-Progress		ICAO	WG-I	ATNPKT definition for backward compatibility with existing dialog service-based OSI applications	Doc. 9896	1Q-2022 (unEd)	Doc. 9880		Available Now	ICAO WG-I internal		Available Now	Job Card: CP-DCIWG.006.02 NOTE: Unedited version is an ICAO DOC publication supported by the Panels and approved, in principle, by the Secretary General, which is rendered available to the public for convenience. The final edited version may still undergo alterations in the process of editing.	Doc. 9880: Specified in 9880; may need an update for IPS addressing (e.g., use of a different VER as presented previously by Boeing-Greg). Doc. 9896: One option is to make the change in 9896, but that may still require a note in 9880 to refer to 9896.	None	None
		STD	In-Progress	5.4.4	ICAO	WG-I	Mapping between OSI addresses and IPS address (see comment) Updates to DSI -- application level (CM), overall format, dependence on mobility	Doc. 9896	1Q-2022 (unEd)	ICAO WG-I MSG (IPS addressing and mobility solution)			RTCA/EUROCAE AEEC IPS	3Q-2019	In-progress (Boeing action to submit port reservation requests to IANA)	1. Consider multi-phased approach, where initial deployments use address mapping from OSI to IPS, but future deployments may be IPS addresses only. 2. May start in ICAO and move to RTCA/EUROCAE (SC-214/WG-78)			
	ACARS (legacy)	STD	In-Progress	5.4.1.1, 5.4.4	ICAO	WG-I	Encapsulation of FANS (e.g., A618) for IPS (e.g., mapping of FANS to IPS DS), including what parts of the ACARS message are included (e.g., SMI)	Doc. 9896 GM	1Q-2022 (unEd)	Collins, HON, Boeing		Available Now	RTCA/EUROCAE		Available Now	Current thinking is that this topic is covered under existing job card; pending output of DCIWG Oct 2018 meeting	Doc. 9896: Points to 858 for ACARS-based app adaptation details (AP has been agreed, changes to be incorporated in 9896).	MASPS: Use DO-350A and 9896/858 info for Safety and Perf assessment. Impact of AOC accommodation to be addressed.	ACARS-to-IPSDS Convergence Function detailed specification (Att3)
		STD	*TBD/TBS*	5.4.1.2.7	AEEC	DLK	*Standardization of air-ground messaging layer for AOC (A620 non-safety) applications using MIAM over IPS.*	ARINC 841	TBD	A858; Doc. 9896 ATNPKT format	TBD (future APIM, see comment)		None			The need date for updating the ARINC 841 MIAM Standard is TBD			
	Native IP (future, e.g., SWIM Safety)	STD	In-Progress	5.4.4	AEEC	IPS	Support for native IP applications	ARINC 858	TBD (future suppl.)	Doc. 9896 ATNPKT format	TBD (future APIM, see comment)	TBD (future APIM, see comment)	None			Note that this may be addressed in a future supplement to A858 and not the initial release	Future	Future	Future
Mobility & Multilink	Inter-subnetwork	ANA	In-Progress		ICAO	WG-I / MSG	Mobility sub-group to analyze Multi-link mobility options (e.g.,MIPv6, AERO, LISP) and recommend a candidate	Working Papers		LISP - SESAR 15.2.4 AERO - IETF RFC							Doc. 9896: Mobility management provisions RS/RA air-ground signaling with extensions. Plan A and B approaches being considered by ICAO WG-I MSG	MASPS: Performance and Safety specification and tests covering mobility. Guidance for deployment. Profiles: Update as necessary for consistency with ICAO mobility approach, including any addition mobility-related RFC	Review IPS Management messages (Att4) with respect to which document is appropriate (9896?) -- revisit. Potential need to address how to configure preferences that are communicated to the ground.
		STD	In-Progress		ICAO	WG-I / MSG	Mobility technical provisions	Doc. 9896	1Q-2022 (unEd)				RTCA/EUROCAE MASPS	4Q-2019		Job Card: CP-DCIWG.006.01			
	Inter-region	STD	In-Progress		ICAO	WG-I / MSG	Mobility technical provisions	Doc. 9896	1Q-2022 (unEd)							Doc. 9896: Part of the mobility solution			
Upper Layers	Transport Options	ANA	In-Progress		ICAO	WG-I	Further refinement of transport options, whether UDP/TCP/etc. should both be supported, and including reliability extensions	Working Papers								During WG-I/27, Airbus presented proposal to specify UDP for DS-based apps (i.e., use ATNPKT). Group agreed; Airbus to prepare AP	Requirements	Profiles	Airborne IPS System implications
		STD	In-Progress		ICAO	WG-I	Document IPS transport provisions	Doc. 9896	1Q-2022 (unEd)										
	Supporting Services Identification	STD	In-Progress		ICAO	WG-I / WG-I / MSG	Identify additional services necessary to support IPS, e.g. ICMP, local BGP, etc.	Doc. 9896	1Q-2022 (unEd)				RTCA/EUROCAE Profiles	2Q-2020 (A/R)	OK for now		Doc. 9896: Requirements	Profiles	Airborne IPS System implications
	Profile	STD	In-Progress		EUROCAE + RTCA	WG-108 / SC-223	IPS profiles	ED-262 / DO-379	Sep-2019 (RevA Dec-2021)				ICAO Doc. 9896		Pre-pub version Available now		Doc. 9896: Requirements Add AP to reference the Profiles	Profiles	Airborne IPS System implications
	Application Level Guidance	GM	In-Progress		EUROCAE + RTCA	WG-108 / SC-223	IPS End-to-End interop guidance (MASPS)	ED-TBD DO-TBD	Dec-2021	Doc. 9896 inputs for upper layers	3Q-2019	Available now				Upper layers only -- see other sections (e.g., security, perf., etc.)	Doc. 9896: Process AP's based on prior working papers (e.g., ATNPKT, DTLS)	MASPS: Safety and Perf assessment Impact of AOC accommodation to be addressed	App-level considerations (Sections 6 and 3)

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Lower Layer Interfaces	AeroMACS	STD	Complete		ICAO	WG-S	AeroMACS SARPS	Annex 10	Complete								Doc. 9896: General level requirements for subnetwork interface.	MASPS: Additional requirements for consistent subnetwork interface (e.g., join/leave event other key input parameters) and performance. Subnetwork-agnostic (then individual specs would include detail for how to meet the requirements).	Pointers to subnetwork specs. 858 should be consistent with what is stated in the MASPS. Further detail to document the logical description of the interface. Anything else??
		STD	Complete		ICAO	WG-S	AeroMACS Technical Manual and Guidance	Doc. 10044	Complete							Potential for future update			
		STD	Complete		RTCA	SC-223	AeroMACS Profile	DO-345	Complete							Potential for future update			
		STD	Complete		RTCA	SC-223	AeroMACS MOPS	DO-346	Complete							Potential for future update			
		STD	Complete		AEEC	AeroMACS	AeroMACS Transceiver and Installation	ARINC 766	Complete							Potential for future update			
		STD	*TBD/TBS*	5.4.1.2.4	AEEC	AeroMACS	*AeroMACS architecture concepts (for segregation) to support IPS may not be defined adequately for developers*	ARINC 766	TBD	A858 (I/F with IPS Core functions, multi-link) Doc. 9896 (multi-link technical provisions TBC)	TBD (future APIM, see comment)	End-2020	EUROCAE/RTCA MASPS?	?	TBD (future APIM, see comment)	AEEC is monitoring AeroMACS ground station development, installation, and critical mass. The need date for updating the ARINC 766 Standard is TBD if dual connectivity with ACD and AISD is required in the radio for IPS.			
	LDACS	STD	In-Progress		ICAO	WG-T	LDACS SARPS	Annex 10, Vol III	Dec-2022							Job Card: CP-DCIWG.010.01	Same as above	Same as above	Same as above
		STD	In-Progress		ICAO	WG-T	LDACS Technical Manual	Doc. TBD	Dec-2022							Job Card: CP-DCIWG.010.01			
		GM	In-Progress		ICAO	WG-T	LDACS Guidance Material	Doc. TBD	Dec-2022							Job Card: CP-DCIWG.010.01			
		STD	Planned		EUROCAE	WG-82	Development of MOPS/MASPS	Doc. TBD	TBD										
		STD	*TBD/TBS*	5.4.1.2.5	AEEC	TBD	*LDACS transceiver and interfaces*	ARINC TBD	TBD	A858 (I/F with IPS Core functions, multi-link) Doc. 9896 (multi-link technical provisions TBC)	TBD (future APIM, see comment)	End-2020	EUROCAE/RTCA MASPS?	?	TBD (future APIM, see comment)	AEEC member airlines have yet to discuss the LDACS concept, potential benefits, timing, and other factors that might drive the need for standardization.			
	SATCOM (current) - Performance Class B	STD	Planned		ICAO	WG-T	Update SARPs (generic) and Technical Manual, including technology-specific parts (e.g., INMARSAT and Iridium)	Doc. 9925 (new part) Annex 10 Vol3 Ch4	TBD								Same as above	Same as above	Same as above
		STD	Planned		EUROCAE	WG-82	MOPS / MASPS updates for IPS	ED-TBD	TBD										
		STD	Planned		RTCA	SC-222	MOPS / MASPS updates for IPS	DO-343x	TBD										
		STD	In-Progress		AEEC	AGCS	MK3 Aviation SATCOM Systems Form/Fit/Function additional work currently in progress to focus on ACARS (which may support accommodation)	ARINC 771 ARINC 781	TBD	None									
		STD	*GAP*	5.4.1.2.6	AEEC	AGCS	*Updates (as necessary) and architecture concepts to support IPS*	ARINC 771 ARINC 781	TBD	A858 (I/F with IPS Core functions, multi-link) Doc. 9896 (multi-link technical provisions TBC)	TBD (future APIM, see comment)	End-2020	EUROCAE/RTCA MASPS?	?	TBD (future APIM, see comment)	Some initial placeholder text in planned next versions (2018), but future update expected to fully address IPS.			
	SATCOM (future) - Performance Class A	STD	Proposed		ICAO	WG-T	SATCOM Class A Technical Manual and Guidance and SARPS	Doc. TBD	TBD							Proposal presented by Eurocontrol during ICAO CP/2 in October 2016. Draft Job Card presented during ICAO CP/2 in WP02.	Same as above	Same as above	Same as above
		STD	In-Progress		EUROCAE	WG-82	MOPS / MASPS updates for IPS	ED-TBD	TBD										
		STD	*TBD/TBS*	5.4.2	RTCA	SC-222	*Extension of current MOPS/MASPS to accommodate future SATCOM and IPS*	DO-TBD	TBD										
		STD	*TBD/TBS*	5.4.1.2.6	AEEC	AGCS	*Updates (as necessary) and architecture concepts to support IPS*	ARINC TBD	TBD	A858 (I/F with IPS Core functions, multi-link) Doc. 9896 (multi-link technical provisions TBC)	TBD (future APIM, see comment)	End-2020	EUROCAE/RTCA MASPS?	?	TBD (future APIM, see comment)	See SATCOM Performance Class B. Current SATCOM Performance Class B will evolve and are expected to serve airline needs for the foreseeable future.			

						IPS-related Standardization Activities	Artifact		Dependencies — Activity/Artifact has a Dependency on (needs input from)			There is a Dependency on the Activity/Artifact (is an output to)				Topic Scope Allocation		
Work Area	Sub-work Area	Work Type	Work Status	A658 Section where Gap is Addressed	Standards Organization	Working Group / Sub-group	Activity Description / *Gap Description*	Document No.	Planned Completion Date (MMM-YYYY)	Input Dependency FROM	Input Need Date	Input Availability Date	Output Dependency TO	Output Need Date	Output Availability Date	Additional Comments	ICAO Doc. xxxx	RTCA/EUROCAE IPS Profiles / MASPS	AEEC PP858
Lower Layer Interfaces	Non-safety SATCOM	STD	Complete		AEEC	KSAT	Track non-safety SATCOM activities to ascertain whether there are concepts/techniques that can be leveraged for IPS	ARINC 791 ARINC 792	Complete										
	HF Next	STD	Planned					TBD	TBD								Same as above	Same as above	Same as above
	VDLm2	STD	Planned	5.4.1.2.3	AEEC	Joint VDL Group	Updates for VDLm2 support of IPS, e.g., modifications to VDL Tech Manual to address connectionless VDLm2 exchange, and accommodate IP packets in VDLm2 as a result of analyses including e.g., reliability mechanisms, access network security, etc.	ARINC 631-9 Doc. 9776 input	Dec-2022	WG-I SSG Security Risk Analysis / A858 (I/F with IPS core functions, multi-link)	2Q-2020 / 2Q-2020	End-2020				Current APIM 17-002A (in progress to extend date to Dec-2020), addressing near-term Broadcast-VDLm2 for OSI. Need new/modified APIM for IPS CL-VDLm2.	Same as above	Same as above	Same as above
		STD	Planned	5.4.4	ICAO	WG-M	Updates for VDLm2 support of IPS, e.g., modifications to VDL Tech Manual to address connectionless VDLm2 exchange, and address IP packets in VDLm2.	Doc. 9776	Dec-2022	WG-I SSG Security Risk Analysis / A858 (I/F with IPS core functions, multi-link)	2Q-2020 / 2Q-2020	End-2020				Expected 6 months after MASPS/MOPS updates			
		STD	Planned	5.4.2	RTCA	SC-214 / VDLSG	Updates for VDLm2 support of IPS, e.g., modifications to VDL Tech Manual to address connectionless VDLm2 exchange, and address IP packets in VDLm2.	DO-224E (MASPS) DO-281D (MOPS)	Dec-2022	WG-I SSG Security Risk Analysis / A858 (I/F with IPS core functions, multi-link)	2Q-2020 / 2Q-2020	End-2020				SC-214 TOR Rev 11 (13-Dec-2018)			
		STD	Planned	5.4.2	EUROCAE	WG-92	Updates for VDLm2 support of IPS, e.g., modifications to VDL Tech Manual to address connectionless VDLm2 exchange, and address IP packets in VDLm2.	ED-92D (MOPS)	Dec-2022	Doc9896 for security / A858 (I/F with IPS core functions, multi-link)	2Q-2020 / 2Q-2020	End-2020				SC-214 TOR Rev 11 (13-Dec-2018)			
	Distributed Radio Architecture	STD	In-Progress	New M07	AEEC	SAI	Focus is mainly hardware, but there may be impact on the overall architecture and interfaces with respect to IPS (e.g., radios on a network)	ARINC TBD	Apr-2020	A858 (I/F with IPS Core functions, multi-link) / Doc. 9896 (multi-link technical provisions TBC)	End-2019 (Assuming that radio is not a network node)	End-2020	EUROCAE/RTCA MASPS?	?	?	APIM 18-003 The initial activity in AEEC SAI will produce hardware architecture recommendations. Any GAP is TBD pending that recommendation. Need to ascertain any impact of new radio architecture on security.			
Naming and Addressing	Naming	STD	In-Progress		ICAO	WG-I	Define naming convention and DNS requirements	Doc. 9896	1Q-2022 (unEd)	INNOVA TF (prefix size) and Coordination with RTCA/EUROCAE	2Q-2019	2Q-2020	RTCA/EUROCAE MASPS	2Q-2020		Job Card: CP-DCIWG.006.02	Doc. 9896: Naming strategy and protocol (e.g., simple name lookup for existing apps). Need a standard mechanism for ground-ground name lookup, and security implications. Need hooks for future apps (e.g., SWIM, Native IP apps).	MASPS: Consider impact on deployment and safety, including impact on non-nominal conditions	Aircraft side responses to non-nominal conditions (e.g., name resolution failure)
	Addressing	STD	In-Progress		ICAO	WG-I	Define addressing	Doc. 9896	1Q-2022 (unEd)	WG-I in Coordination with RTCA /EUROCAE	1Q-2020		RTCA/EUROCAE MASPS	1Q-2020		Job Card: CP-DCIWG.006.02	Doc. 9896: Addressing scheme and port numbers	MASPS: Consider impact on deployment and safety, including impact on non-nominal conditions	Address configuration and storage
	IPv6 Transition Ph1	ANA	In-Progress		AEEC	NIS	Roadmap for IPv6 transition in aviation	ARINC 686	May-2020	None						APIM 17-001 (AEEC NIS activity is for information only)	Doc. 9896: Interconnection of heterogeneous regional ground systems. Regions will be looking to ICAO for guidance.		
	IPv6 Transition Ph2	STD	Proposed		AEEC	NIS	Updates to standards for IPv6 transition as identified during the roadmap activity	ARINC 664pX(other parts and/or new part)	TBD	A858 / RTCA/EUROCAE Profiles	TBD (future APIM) / TBD (future APIM)	End-2019 / End-2020	None			APIM 17-001 - proposed Phase 2 (AEEC NIS activity is for information only)			
	Administration	OPR	*GAP*	5.4.4	ICAO	INNOVA (?)	*Processes for on-going administration of IP names and addresses IP database management/translations*	TBD	TBD				Name/Address Management Entities	4Q-2020	4Q-2020	This will need to be determined for mobility	Doc. 9896: TBD - Potential implementation and deployment guidance in 9896, IF naming is needed	MASPS: Regional-specific naming/addressing guidance	
		OPR	*GAP*	5.4.5	OTHER	IATA	*Same as above but for AOC*	TBD	TBD				Name/Address Management Entities	4Q-2020	4Q-2020	This isn't really WG-I but does need to be done consistently with ICAO or else AOC applications may end up with completely different routing logic			

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Security	Risk Analysis	ANA	In-Progress		ICAO	WG-I SSG	Notional end-to-end risk analysis for IPS	Doc. 10145	4Q-2021 (preliminary) 4Q-2022	IPS Deployment Scenarios (from WG-I, and detail in A858)		Available Now	AEEC IPS/ AEEC Joint VDL	2Q-2020 (preliminary version)	TBD	I think this would be necessary in final determination of use of network-level security (or not)	Doc. 10145: High-level, E2E risk assessment; 9896: security requirements and assumptions	MASPS: Air-ground security perspective with respect to deployment options, traced to high-level	Airborne IPS System security requirements and guidance, traced to high-level
	Certification Guidance	GM	In-Progress		EUROCAE + RTCA	WG-108 / SC-223	Further decompose ICAO security requirements (e.g., regional constraints) on IPS as part of MASPS	ED-TBD DO-TBD	Dec-2021	ICAO WG-I Doc. 10145	2Q-2020 (preliminary version)							MASPS: May point to Doc. 10090, which points to EASA and FAA Special Conditions (as a starting point) and existing cert guidance. Also some description of security implications. MASPS should provide guidance that can be invoked by EASA/FAA for how to demonstrate the appropriate level of security for a secured IPS System. (NOTE: Airbus and Boeing are assuming that security cert will be mandatory for IPS, driven from risk assessment.)	
	End-to-End - Dialogue Service	STD	Complete		ICAO	WG-I / SSG	Secure Dialog Service (SDS), end-to-end Dialogue Service application-layer security applicable to both OSI and IPS	Doc. 10094, Part I	Complete							sDS no longer applicable for IPS		
		GM	In-Progress		ICAO	WG-I / SSG	Secure Dialog Service (SDS) Concept of Operations	Doc. 10094, Part II	Dec-2018							sDS no longer applicable for IPS		
		GM	In-Progress		ICAO	WG-I / SSG	Secure Dialog Service (SDS) guidance material	Doc. 10094, Part III	Jun-2019							sDS no longer applicable for IPS		
		VAL	In-Progress		FAA	WJHTC	sDS validation	Validation Report	Dec-2019							sDS no longer applicable for IPS		
		ANA		NEW M08	ICAO	WG-I / SSG	sDS certificate caching options to minimize bits over the air (e.g., aircraft caches ground cert and indicates cert to ground, which uplinks cert only when there is a change).	Working Papers	TBD							sDS no longer applicable for IPS		
		ANA		NEW M08	ICAO	WG-I / SSG	sDS Certificate revocation options, which may be in-band (i.e., impacts sDS ASN.1) or out-of-band (i.e., needs to be specified, possibly in A858). Options include: short-lived-certs, CRL, OCSP stapling.	Working Papers	TBD							sDS no longer applicable for IPS		
	Application Security Options	ANA	Complete	NEW M08	ICAO	WG-I / SSG	sDS vs. DTLS	Working Papers	Complete				AEEC IPS		Available Now		Doc. 9896: App-layer security provisions specifying DTLS, pointing to IPS Profiles. Address legacy and future applications. Interoperability aspects and required crypto strengths / cipher suites. Pointer to Doc. 10095 for certificate profiles / PKI (IATF CP) to ensure global consistency.	Profiles: Specify the DTLS RFCs MASPS: Recommendations/ guidance on multiple DTLS sessions, and impact on performance (need to specify the scope of the performance work in MASPS). Implications of using the IPS Gateway as a security proxy. Guidance on which profiles should be selected wrt the applications and the results of the security risk analysis.	Specification of filtering (e.g., packet, DPI) Dimensioning (i.e., how many simultaneous DTLS sessions) Specification of DTLS+MIC (is 858 the right place? Move requirement to 9896 and how-to implementation details 858)
	Security Framework	GM	In-Progress		ICAO	WG-I / SSG	Overall security framework	Doc. 10090	TBD-2021	Doc. 10044		Available Now	RTCA/EUROCAE MASPS	TBD		Job Card: CP-DCIWG.007.03 Airbus/Boeing preliminary risk assessment may be an initial input to Doc 10090, 10145	Doc. 10090: Aero Comm Security Services	MASPS: May point to Doc. 10090, which points to EASA and FAA Special Conditions (as a starting point) and existing cert guidance.	
	Ground-Ground	STD	In-Progress		ICAO	WG-I / SSG	Ground-ground IPS security	Doc. 9896	1Q-2022 (unEd)	Doc. 10044		Available Now	RTCA/EUROCAE MASPS	TBD			Doc. 9896: Requirements (common crypto requirements) Ground-ground app security (e.g., VoIP, AMHS, etc.)	Profiles: Ground needs to support IPS Profiles to interact with airborne systems. But, ground-ground may use functionality beyond what's specified for Air-ground. MASPS: Guidance and considerations for ground-ground	

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Security	PKI	STD	Complete		ICAO	WG-S	AeroMACS PKI Certificate Policy, which includes certificate/CRL profiles. Expected to be reusable for SDS.	Doc. 10044	Complete	ATA Spec 42 WMF Certificate Profile & Certificate Policy		Available Now					Doc. 10095: -- Pointer to IATF CP, Certificate profiles/formats, and add more specificity where needed for interop. (e.g., ATN-specific policy OIDs) -- High-level key management requirements (may also point to the IATF CP) -- Overall global PKI architecture (relevant material available in IATF CP) Need further analysis of how to reference IATF CP and the scope of Doc. 10095 (i.e., derived CP	MASPS: Deployment considerations with respect to PKI. Definition of roles and responsibilities for service providers that provide key management services (e.g., air-ground key management protocol per Att4).	Detailed key management messages (Att4) -- need to be considered as part of risk assessment.
		VAL	Complete		WMF	AWG	AeroMACS test certificates	N/A	Complete										
		STD	In-Progress	5.4.4	ICAO	WG-I / SSG	PKI Policy for Aeronautical Communications	Doc. 10095	1Q-2022 (unEd)				AEEC IPS	4Q-2019	Preliminary available now	Does some of this have an impact on IPS security?			
		VAL	Planned	5.4.4	ICAO	WG-I / SSG	Public Key Infrastructure Validation	Doc. 10095	1Q-2022 (unEd)										
		GM	*GAP*	5.4.1.2.8	AEEC	TBD	*Key loading and key management necessary for LRU installation and maintenance (e.g., key replacement) -- updates necessary for IPS (all systems)*	ARINC TBD	TBD	A858 ICAO tech manual	TBD (future APIM, see comment)	?	EUROCAE/RTCA MASPS (ground) & Profiles (new RFCs for PKI?)	?	?	A Security Concept of Operation is expected to provide focus in terms of standards, scope, and timing.			
	Network Layer Security	STD	In-Progress		ICAO	WG-I	Definition of the security solution for the network level, including for AOC traffic	Doc. 9896	1Q-2022 (unEd)	RTCA / EUROCAE Profiles	4Q-2018 (Initial RFCs provided)	Available Now				Airbus analysis suggests that network level security may not be required. Need to protect control plane data. To-be-confirmed by risk analysis in progress.	Doc. 9896: Technical provisions and guidance for protecting control plane traffic. Consider approaches for protecting ground-based networks on output of risk analysis	MASPS: Recommendations and requirements to ensure appropriate security measures for protecting ingress points (assuming aviation overlay network) -- both data plane and control plane.	Packet firewall (mandatory) and DPI (optional) for Airborne IPS System.
	Aircraft Security Reliance on Ground Security	GM	In-Progress		EUROCAE + RTCA	WG-72 / SC-216	Airworthiness Security Methods and Considerations - Trustworthiness considerations in the security environment	ED-203A / DO-356A (Air) ED-205 (Ground cert)	Available now (updates for IPS)									MASPS: Understand requirements, do allocation between air and ground to provide cert guidance on what ground will provide. (NOTE: Reference to ED-205 for general guidance. Clarification as to whether this applies to airline IPS systems.)	Address the way that IPS is implemented onboard (Section 5)
		GM	Planned		EUROCAE + RTCA	WG-108 / SC-223	IPS End-to-End guidance supporting certification (MASPS)	ED-TBD DO-TBD	Dec-2021	ICAO WG-I Risk Assessment	2Q-2020								
		GM	*GAP*	5.2 ?	OTHER	ARAC (?)	*Address this topic and provide recommendations to FAA/EASA*	TBD	TBD										
		GM	*GAP*	5.2	FAA		*FAA/EASA regulation update or new process?? Impact on certification if aircraft has reliance on the ground*	TBD	TBD										
		GM	*GAP*	5.2 ?	EASA		*FAA/EASA regulation update or new process?? Impact on certification if aircraft has reliance on the ground*	TBD	TBD										
	Security Management (Technical)	STD	In-Progress		ICAO	WG-I		Doc. 9896	1Q-2022 (unEd)								Doc. 10090: Security event distribution (ISMS work). Parallel work is being done in ICAO GRAIN that can be leveraged.	MASPS: Guidance on logging, monitoring, event alerts from an end-to-end perspective. Synch with the ISMS work in ICAO.	Airborne IPS System level security event logging, log life cycle management, security configuration and tuning (e.g., firewall rules), crypto agility, continued airworthiness aspects
		STD	In-Progress		EUROCAE + RTCA	WG-108 / SC-223		ED-TBD DO-TBD	Dec-2021										
		STD	In-Progress	5.4.2	AEEC	IPS		ARINC 858	Dec-2020										
	Security Policy (Governance)	STD	Planned		ICAO	WG-I / SSG	ICAO Overall Security Policy Requirements	Doc. 10090	TBD-2021							Job Card: CP-DCIWG.007.03	Doc. 10090: Governance and framework for aviation network.	

							IPS-related Standardization Activities	Artifact		Dependencies								Topic Scope Allocation		
Work Area	Sub-work Area	Work Type	Work Status	A658 Section where Gap is Addressed	Standards Organization	Working Group / Sub-group	Activity Description / *Gap Description*	Document No.	Planned Completion Date (MMM-YYYY)	Input Dependency FROM	Input Need Date	Input Availability Date	Output Dependency TO	Output Need Date	Output Availability Date	Additional Comments	ICAO Doc. xxxx	RTCA/EUROCAE IPS Profiles / MASPS	AEEC PP858
Performance	QoS (IP-level prioritization and packet labeling)	STD	Planned		ICAO	WG-I / MSG	Map ATN QoS to IPS DIFFSERV (should be defined as an end-to-end mechanism)	Doc. 9896	1Q-2022 (unEd)	Doc. 9880 Doc. 10044		Available Now				Doc 9880 is done, so think this is already available?	Doc. 9896: Mapping ATN apps to DSCP codes. Current doc is an example in GM, but should be technical provisions. Consistent QoS signaling in transit (i.e., DSCP may be modified in transit, so alternatives like including traffic type in the address). Capture QoS operation and assumptions in GM (e.g., DSCP values are used consistently at ingress and egress routers)	Profiles - RFCs	Airborne IPS System level mechanisms (e.g., prioritization)
		STD	In-Progress	5.4.1.1	AEEC	IPS	Detailed QoS mechanisms for segregating ATS and AOC traffic (part of ATN/IPS router form factor / architecture??)	ARINC 858	Dec-2020	Doc. 9880 Doc. 10044	4Q-2018	Available Now	EUROCAE/RTCA MASPS?	?	?	Doc 9880 is done, so think this is already available?		MASPS: Apportionment of performance requirements (RCTP) for each traffic type. Address how traffic types get aggregated over subnetworks. Appendix in MASPS includes guidance on how to prioritize downlinks -- maybe some box-level material should move to 858. Address whether end-to-end network engineering is feasible.	
	Compression APP = Application HDR = Header	STD	In-Progress		ICAO	WG-I	ATNPKT update to include compression provisions	Doc. 9896	1Q-2022 (unEd)	RC-IMS Proposal						Do we need to move all this to Doc. 9896, or would this stay in A858?	Doc. 9896: APP - Decision not to include compression in ATNPKT during joint meeting. HDR - Technical provision ("may" --> shall) with reference to IPS Profiles	APP: ACARS compression in adaptation function.
		STD	In-Progress	5.4.1.1	AEEC	IPS	Standardization of proposed compression techniques	ARINC 858	Dec-2020							Assumes compression will be standardized at ICAO level	HDR: IPS Profiles	HDR: Reference IPS Profiles
	RCTP (B2)	STD	Complete		EUROCAE + RTCA	WG-78 / SC-214	SPR	ED-228A / DO-350A ED-122 / DO-306	Mar-2016 Oct-2007				EUROCAE/RTCA MASPS		Available Now			MASPS: Performance requirements (RCTP, as it contributes to RCP)	Pointer to MASPS
	RCTP (Beyond B2)	STD	*TBD/TBS*	NEW M06	ICAO	ODLWG	*RCP/RSP updates for beyond B2*	Doc. 9869	TBD									MASPS: Consider provisions for future (high-level)	
		STD	*TBD/TBS*	5.4.3	EUROCAE	WG-78	*SPR update for beyond-B2 services*	ED-TBD	TBD										
		STD	*TBD/TBS*	5.4.3	RTCA	SC-214	*SPR update for beyond-B2 services*	DO-TBD	TBD										
	Multi-link	STD	Planned		ICAO	WG-I / MSG	Multi-link technical provisions	Doc. 9896	1Q-2022 (unEd)	SESAR PJ14.2.4			EUROCAE/RTCA MASPS?	?	?	The CMU standard would need to refer to the IPS router standard for the specification of the multilink functional specification, i.e., the CMU is one instance of an IPS router.	Doc. 9896: Definition of "multilink" concept and requirements	MASPS: Performance requirements, and any requirements that must be met by the ground end system.	Describe detailed mechanisms for implementing the multilink concept. (How much is implementation specific?) Preference configuration.
		STD	In-Progress	5.4.1.1	AEEC	IPS	Detailed definition of multi-link based on ICAO definition.	ARINC 858	Dec-2020	ICAO WG-I MSG	4Q-2019	Preliminary Info Available Now 1Q-2020 (after next MSG)	EUROCAE/RTCA MASPS?	?	?				
	MASPS	GM	Planned		EUROCAE + RTCA	WG-108 / SC-223	IPS End-to-End guidance supporting certification (MASPS)	ED-TBD DO-TBD	Dec-2021							Work within current RCP info			
Form / Fit / Interfaces	CMU	STD	*GAP*	5.4.1.2.2	AEEC	DLK	*CMU specification updates to support IPS (e.g., including segregation, new interfaces, data logging, traffic shaping/filtering, etc.)*	ARINC 758	TBD	A858	TBD (future APIM, see comment)	End-2020	None			Although A758 is open, the current APIM 17-003 addresses Ethernet interface but does not include IPS; a future APIM will be necessary	None	Subnetwork-specific MASPS: May need updates to subnetwork-specific MASPS documents (e.g., VDLm2)	Provide guidance/examples, but physical interfaces are defined in other documents
	IPS Router & Physical Interfaces	STD	In-Progress	5.4.1.1	AEEC	IPS	Specification for an IPS-specific router or router function (e.g., including segregation, new interfaces, etc.)	ARINC 858	Dec-2020	Doc. 9896 RTCA / EUROCAE Profiles	1Q-2019	2Q-2019				AEEC IPS should review A758 document as a reference for structure and content for current CMF			
Ground Systems	OSI/IPS and ACARS/IPS Gateway	GM	In-Progress	5.4.4	ICAO	WG-I	Technical definition of what needs to maintained between OSI and IPS in order to maintain application correlation. (Ground requirements RTCA/EUROCAE involvement?)	Doc. 9896 and/or ARINC 858 (see comment)	1Q-2022 (unEd)							This could be the gateway definition level, and may be either in A858 or Doc 9896	Doc. 9896: Include cross-reference in GM	MASPS: Deployment options and guidance for deployment. MASPS: Performance considerations for the Gateway	Technical provisions, referenced back to MASPS for the deployment options. (May want to consider making an 858 attachment rather than appendix - discuss in AEEC IPS)
		STD	In-Progress	5.4.1.1	AEEC	IPS	Definition of ACARS-IPS gateway function	ARINC 858	Dec-2020				ICAO WG-I	2Q-2019	2Q-2019				
		STD	Planned	5.4.4	EUROCAE + RTCA	WG-108 / SC-223	Ground system considerations for IPS end-to-end interoperability and performance as part of MASPS	ED-TBD DO-TBD	Dec-2021	AEEC IPS	2Q-2019	2Q-2019							
	IPS NW Topology	ANA	Planned		ICAO	WG-I	Discuss network topologies and proposals (e.g., DSP-centric solution)	Working papers					EUROCAE/RTCA MASPS? AEEC IPS	? 2Q-2019	? 2Q-2019				
		GM	*GAP*	5.4.5	OTHER	Regional CAAs	*Regional implementation of IPS based on the ICAO standard*	TBD	TBD							A858 "guidance" since that's where the gateway will be?			