

*International Civil Aviation Organization*



ICAO

**Sixth Meeting of the Surveillance Implementation  
Coordination Group (SURICG/6)**

Video Teleconference, 24 – 27 August 2021

**Agenda Item 5:** Review of regional requirements for Surveillance in the e-ANP, Seamless ANS Plan and the reported implementation status

**REVIEW OF REGIONAL REQUIREMENTS FOR SURVEILLANCE IN  
APAC E-ANP AND SEAMLESS ANS PLAN**

(Presented by the Secretariat)

**SUMMARY**

This paper consolidates Regional Requirements for surveillance in APAC e-ANP and Seamless ANS Plan (Version 3.0, November 2019) for the meeting to review.

**1. INTRODUCTION**

1.1 This paper reviews and consolidates the Regional surveillance requirements specified in the Regional e-ANP, and the Seamless ANS Plan (Version 3.0, November 2019).

**2. DISCUSSION**

*Regional e-ANP - Regional Specific Requirements for Surveillance*

2.1 The APANPIRG/26 meeting in 2015 endorsed the proposed text parts and tables for Volume I and Volume II of the APAC e-ANP through **Conclusion APANPIRG/26/2- Adoption of the ASIA/PAC e-ANP** including the Surveillance Table and invited ICAO to process the PfAs (Proposal for amendments) for Volume I and Volume II of e-ANP in accordance with the established procedures. The approved e-ANP Volume I and Volume II are available at: <http://www.icao.int/APAC/Pages/APAC-eANP.aspx>.

2.2 All regional priorities and targets adopted through the Conclusion **APANPIRG 25/2 - APAC Regional Air Navigation Priorities and Target** had been added into the e-ANP Volume III. APAC Regional Objectives defined in former Seamless ATM Plan were also incorporated in the e-ANP Volume III, and supporting documents within the APAC main planning table in accordance with the e-ANP template adopted by the Council. As of the date, the adoption of Volume III e-ANP including the regional objectives is pending.

2.3 The major Surveillance related inputs from Member States is summarized in the *approved version of Table CNS II- APAC-3- Surveillance* mentioned in Part III of e-ANP Volume II, under **Specific Regional Requirements** and is provided in **Appendix A** to this Paper.

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*The Seamless ANS Plan and The Regional Surveillance Elements*

2.4 The Asia/Pacific Seamless ANS Plan (known as “the Plan”, formerly Seamless ATM Plan) defines goals and the means of meeting State planning objectives for a Regional seamless ATM performance framework, with a focus on technological and human performance. The version 1.0 of Asia/Pacific Seamless ATM Plan was adopted as **APANPIRG Conclusion 24/54 Asia/Pacific Seamless ATM Plan** in 2013. With reviews and updates in 2016 following the updates in GANP and ASBU framework implementation and referencing to the new Block 1 ASBU and new regional elements, the version 2.0 of the Plan adopted as **APANPIRG Conclusion 27/16 Asia/Pacific Seamless ATM Plan Update** in 2016.

2.5 To match the 6<sup>th</sup> Edition of GANP, APANPIRG/30 reviewed and adopted the Asia/Pacific Seamless ANS Plan Version 3.0 as **APANPIRG Conclusion 30/5 Asia/Pacific Seamless ANS Plan**, which can be accessed by the following link:

<https://www.icao.int/APAC/Documents/edocs/Asia%20Pacific%20Seamless%20ATM%20Plan%20V%203.0.pdf>.

2.6 In the latest version 3.0 of the Plan, there are 16 Priority-1 Regional Seamless ANS Elements identified, an increase from 10 elements compared to version 2.0. Priority-1 items are critical upgrade assignment based on whether the implementation of an element could bring most benefit to the region or regional upgrade by States and is essential to achieve the service level required globally. These 16 Elements are listed as follows, with surveillance-related element highlighted:

- a) Aeronautical Meteorology: AMET-B0/1 – 4;
- b) Aeronautical Information Management: DAIM-B1/1 – 6;
- c) Airport CDM: ACDM-B0/1 – 2;
- d) ANSP human and simulator performance (Regional);
- e) ATS Inter-facility Datalink Communications: FICE-B0/1;
- f) Ballistic launches/space re-entry management (Regional);
- g) Civil-Military Special Use Airspace (SUA) management (Regional);
- h) Civil-Military strategic and tactical coordination (Regional);
- i) Core data communications: VDL Mode O/A and AMHS COMI-B0/3, 7;
- j) Direct and Free Route Operations: FRTO-B0/1 – 4;
- k) Enhanced SAR systems (Regional);
- l) Ground-based Surveillance: ASUR-B0/1 – 3;**
- m) Network Operations: NOPS-B0/1 – 5;
- n) Performance-based Navigation Approach Procedures: APTA-B0/1 – 2;
- o) Runway Sequencing: RSEQ-B0/1 – 2; and
- p) Safety Nets SNET-B0/1 – 4.

2.7 Details of ASUR-B0/1-3, as well as details of all other ASBU elements, could be found on GANP portal (<https://www4.icao.int/ganportal/ASBU>). Details of ASUR-B0/1-3 are also extracted at **Appendix B** to this Paper.

2.8 Other surveillance-related priorities 2 & 3 Regional and Blocks 0 & 1 ASBU elements from the Plan are highlighted below for reference. Details of each item below could be referred to the corresponding PARS/PASL paragraphs stated in the Plan.

**Regional Seamless ANS Element**

Functional Category	Regional Seamless ANS Element	Priority
Operational	Aerodrome management and coordination (PARS 7.1)	2
	Optimization of runway capacity facilities (PARS 7.2)	3
	<b>ADS-B, SSR Mode S and PBN Airspace (PARS 7.8, 7.9, 7.10)</b>	<b>2</b>
	Flight Level Orientation Scheme (FLOS) (PARS 7.15)	2
	Civil-Military SUA management (PARS 7.16)	1
	Unmanned Aircraft Systems (PARS 7.17)	2
	Adjacent ATS sector coordination (PASL 7.24)	2
	Airspace classification (PASL 7.33)	2
	ATC horizontal separation (PASL 7.34)	2
	Flight Level Allocation Schemes (FLAS) (PASL 7.35)	2
	ATC sector capacity (PASL 7.37)	2
	Electronic Flight Progress Strips (PASL 7.39)	2
	Enhanced SAR systems (PASL 7.42)	1
	ANSP human and simulator performance (PASL 7.43)	1
	Civil-Military strategic and tactical coordination (PASL 7.44)	1
Civil-Military common procedures and training (PASL 7.44)	2	
Ballistic launches/space re-entry management (PASL 7.45)	1	
CNS Technology and Services	<b>ATS surveillance data sharing (PASL 7.28)</b>	<b>2</b>
	Civil-Military integrated systems and facilities (PASL 7.44)	2
	Departure Clearance (DCL) (PASL 7.49)	2

**Blocks 0 & 1 ASBU elements with APAC Priorities**

Functional Category	Element	Priority
Information	<b>AMET-B0/1 – 4:</b> Meteorological observations, forecast, warning, climatological and historical products, and dissemination (PASL 7.41)	1
	<b>AMET-B1/1 – 4:</b> Meteorological products supported by automated decision systems or aids using IWXXM (PASL 7.56)	2
	<b>DAIM-B1/1 – 6:</b> Provision of quality-assured digital aeronautical data and information, including AIP, terrain and obstacle, aerodrome and instrument flight procedure data sets (PASL 7.40)	1
	<b>DAIM-B1/7:</b> Provision of digital NOTAM improvements (PASL 7.55)	2
	<b>FICE-B0/1:</b> Automated basic AIDC (PASL 7.26)	1
Operational	<b>ACDM-B0/1-2:</b> ACIS (PARS 7.3)	1
	<b>ACDM-B1/1 – 2:</b> Airport CDM Integration with ATM Network, AOP and APOC (PARS 7.18)	2
	<b>APTA-B0/1 – 2:</b> Basic PBN SID and STAR procedures, PBN non-precision approaches (PARS 7.4, 7.5, 7.10, 7.13, 7.14, 7.21)	1
	<b>APTA-B0/3 and 6:</b> SBAS/GBAS CAT I precision approach procedures, and PBN Helicopter PinS Operations (PARS 7.5, 7.6, 7.10, 7.14, 7.21)	3
	<b>APTA-B0/4 – 5, 7 – 8:</b> CDO (Basic) and CCO (Basic), and performance-based aerodrome operating minima for advanced/basic aircraft (PARS 7.14, 7.19, 7.21)	2
	<b>APTA-B1/1 – 5:</b> advanced capability PBN approaches, PBN SID and STAR procedures and performance-based aerodrome operating minima for advanced aircraft with SVGS, CDO and CCO (Advanced) (PARS 7.14, 7.21, 7.22, 7.23)	3

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	<b>CSEP-B1/1 – 4:</b> basic airborne situational awareness AIRB and VSA, and performance-based horizontal separations (PARS 7.20)	2
	<b>FRTO-B0/1 – 4:</b> Direct routing, Airspace Planning and FUA, Flexible Routings, and basic conflict detection and conformance monitoring (PASL 7.29, 7.31, 7.36)	1
Operational (Con'd)	<b>FRTO-B1/1 – 7:</b> Free Route Airspace, RNP routes, Advanced FUA and Airspace Management (ASM), Dynamic Sectorisation, Enhanced Conflict Detection Tools and Conformance Monitoring, and Multi-Sector Planner Function (PASL 7.29, 7.51)	2
	<b>NOPS-B0/1 – 5:</b> Initial integration of ASM with ATFM, Collaborative Network Flight Updates, Basic Network Operation Planning and Initial Airport/ATFM slots, A-CDM Network Interface and Dynamic Slot Allocation (PASL 7.38)	1
	<b>NOPS-B1/1 – 10:</b> Short Term ATFM measures, Enhanced NOPS Planning, Enhanced integration of airport operations and NOPS planning, Enhanced Traffic Complexity Management, Full integration of ASM with ATFM, Initial Dynamic Airspace configurations, Enhanced ATFM slot swapping, Extended Arrival Management, ATFM Target Times and Collaborative Trajectory Options Programme (PASL 7.52)	2
	<b>OPFL-B0/1:</b> ITP	3
	<b>OPFL-B1/1:</b> CDP	3
	<b>RATS-B1/1 – Remotely Operated Aerodrome Air Traffic Services</b>	3
	<b>RSEQ-B0/1 – 2:</b> Arrival and Departure Management (PASL 7.32)	1
	<b>RSEQ-B0/3 – Point merge</b>	3
	<b>RSEQ-B1/1 – Extended arrival metering (PASL 7.46)</b>	2
	<b>SNET-B0/1 – 4:</b> STCA, MSAW, APW, APM (PASL 7.31)	1
	<b>SNET-B1/1 – 2:</b> Enhanced STCA with aircraft parameters and in complex TMAs (PASL 7.50)	2
	<b>SURF-B0/1 – 3: Basic ATC surface operations tools, comprehensive situational awareness, situational awareness, alerting service (PASL 7.47)</b>	2
	<b>SURF-B1/1 – 5: Advanced surface traffic management visual aids, pilot comprehensive awareness and runway alerting, enhanced ATC alerting, routing service to support ATC and EVS for taxiing (PASL 7.48)</b>	2
	<b>TBO-B0/1:</b> Introduction of time-based management within a flow centric approach (PASL 7.52)	2
	<b>TBO-B1/1 – Initial Integration of time-based decision making processes (PASL 7.52)</b>	2
	CNS Technology and Services	<b>ASUR-B0/1 – 3: ADS-B, MLAT, SSR-DAPS (PARS 7.8, 7.11, PASL 7.26, 7.28, 7.30)</b>
<b>ASUR-B1/1 – Reception of aircraft ADS-B signals from space (SB ADS-B) (PASL 7.54)</b>		2
<b>COMI-B0/1 – 2, 4 – 6:</b> ACARS, ATN/OSI, VDL Mode 2 Basic, SATCOM Class C Data, HF DL (PASL 7.54)		2
<b>COMI-B0/3, 7:</b> VDL Mode O/A, AMHS (PASL 7.25)		1
<b>COMI-B1/1 – 4:</b> VDL Mode 2 Multi-Frequency, SATCOM Class B (SB-S) Voice and Data, ATN/IPS and AeroMACS Ground-Ground (PASL 7.53)		2
<b>COMS-B0/1 – 2:</b> CPDLC (FANS 1/A & ATN B1) for domestic and procedural airspace and ADS-C (FANS 1/A) for procedural airspace (PARS 7.14, PASL 7.29, 7.53)		2
<b>COMS-B1/1 – 3:</b> PBCS approved CPDLC (FANS 1/A+), ADS-C and SATVOICE for domestic and procedural airspace (PARS 7.14, PASL 7.53)		2
<b>NAVS-B0/1 – 4:</b> SBAS, GBAS, ABAS, MON (PARS 7.7)		2
<b>NAVS-B1/1:</b> Extended GBAS		3

2.9 Given that the overall implementation progress of former Seamless ATM/Block 0 elements had been slow, the Asia/Pacific Seamless ANS Plan V3.0 proposed to place greater emphasis on ‘robust’ status National Air Navigation Plans (NANPs), developed by a whole-of-government approach, which was dependent on whether the NANP included the expected NANP Basic Planning Elements (BPEs) of the Regional Air Navigation Plan.

2.10 The next review year for the Asia/Pacific Seamless ANS Plan is scheduled for 2022.

### **3. ACTION BY THE MEETING**

3.1 The meeting is invited to:

- a) note the information in this paper; and
- b) discuss any matters as appropriate.

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**Table CNS II-APAC-3 SURVEILLANCE**

EXPLANATION OF THE TABLE

*Column*

- 1      ATS Units to consider are ACC units and Approach units responsible for International airports and alternate aerodromes, International airports and alternate aerodromes.
- 2      The category may be: R, S, T or AD. Categories R,S, T are defined in the Seamless ATM plan. AD means Aerodrome.
- 3      Indicate Yes if part(s) of the airspace referred to in Column 2 is (are) not covered by surveillance listed in column 6, and in column remarks when such gaps are planned to be bridged
- 4      Indicate Yes or No.  
  
Indicate No in case of standalone displays of ATS surveillance data (should not be used operationally)
- 5      Indicate Yes or No
- 6      List all types of surveillance used:  
  

PSR  
SSRmS  
SSRmAC  
ADS-B  
ADS-C  
MLAT  
WAM  
PRM
- 7      According to the definition in Doc 9830 Appendix B
- 8      Remarks

ATS Units Served	Category of airspace	Surveillance Gaps	Integration of Surveillance Information into ATC Situation Display	Multi-Surveillance Data Processing Capability	Surveillance Used	Level of A-SMGCS Implemented	Remarks
1	2	3	4	5	6	7	8
<b>AUSTRALIA</b>							
<b>International Airports</b>							
<b>Adelaide</b>	C						Adelaide, Summertown
TCU			YES	YES	PSR+SSRmS+SSRmAC		
APP			YES	YES	PSR+SSRmS+SSRmAC		
TWR			YES	YES	PSR+SSRmS+SSRmAC		
<b>Cairns</b>	C						Redden Creek, Hanns Tableland
TCU			YES	YES	PSR+SSRmS+SSRmAC		
APP			YES	YES	PSR+SSRmS+SSRmAC		
TWR			YES	YES	PSR+SSRmS+SSRmAC		
<b>Brisbane</b>	C						Mt Hardgrave, Brisbane, Mt Sommerville
EC			YES	YES	PSR+SSRmAC+SSRmS+ADS-B		
APP			YES	YES	PSR+SSRmAC+SSRmS+		
ACC			YES	YES	PSR+SSRmAC+SSRmS+ADS-B		
TWR			YES	YES	PSR+SSRmAC+SSRmS+A-SMGCS+SMR	2	
<b>Gold Coast</b>	C						Mt Sommerville, Mt Hardgrave
APP			YES	YES	PSR+SSRmS+SSRmAC		
TWR			YES	YES	PSR+SSRmS+SSRmAC		
<b>Melbourne</b>	C						Gelliebrand Hill, Mt Macedon
EC			YES	YES	PSR+SSRmAC+SSRmS+ADS-B+		
APP			YES	YES	PSR+SSRmAC+SSRmS		
ACC			YES	YES	PSR+SSRmAC+SSRmS+ADS-B		
TWR			YES	YES	PSR+SSRmAC+SSRmS+ADS-B+A-SMGCS+SMR	2	
<b>Perth</b>	C						Perth, Kalamunda, Eclipse Hill
TCU			YES	YES	PSR+SSRmAC+SSRmS		
APP			YES	YES	PSR+SSRmAC+SSRmS		
TWR			YES	YES	PSR+SSRmAC+SSRmS+A-SMGCS+SMR	2	
<b>Sydney</b>	C						Sydney, Mt Boyce, Cecil Park
TCU			YES	YES	PSR+SSRmS+SSRmAC+WAM+MLAT		
APP			YES	YES	PSR+SSRmS+SSRmAC+WAM+MLAT		
TWR			YES	YES	PSR+SSRmS+SSRmAC+A-	2	

ATS Units Served	Category of airspace	Surveillance Gaps	Integration of Surveillance Information into ATC Situation Display	Multi-Surveillance Data Processing Capability	Surveillance Used	Level of A-SMGCS Implemented	Remarks
1	2	3	4	5	6	7	8
<b>Darwin</b> APP TWR	<b>C</b>		YES YES	YES YES	SMGCS+WAM+MLAT+SMR  PSR+SSRmS+SSRmAC PSR+SSRmS+SSRmAC		Darwin, Knuckeys Lagoon
<b>Hobart</b> APP TWR	<b>D</b>		YES YES	YES YES	WAM+ADS-B WAM+ADS-B		Hobart
<b>Karratha</b> APP TWR	<b>D</b>		YES YES	YES YES	ADS-B ADS-B		Karratha
<b>Alternate aerodromes</b> <b>Alice Springs</b> APP TWR	<b>D</b>		YES YES	YES YES	ADS-B ADS-B		Alice Springs
<b>Avalon</b> APP TWR	<b>D</b>		YES YES	YES YES	PSR+ SSRm(S)+SSRm(A/C) PSR+ SSRm(S)+SSRm(A/C)		Gellibrand Hill, Mt Macedon
<b>Canberra</b> APP TWR	<b>C</b>		YES YES	YES YES	PSR+ SSRm(S)+SSRm(A/C) PSR+ SSRm(S)+SSRm(A/C)		Mt Majura, Mt Bobbara
<b>Coffs Harbour</b>  APP TWR	<b>D</b>		YES YES	YES YES	SSRm(S)+SSRm(A/C)+ADS-B SSRm(S)+SSRm(A/C)+ADS-B		The Round Mountain, Point Lookout
<b>Kalgoorlie</b>	<b>G</b>	Over aerodrome	YES	YES	-		
<b>Launceston</b> APP TWR	<b>D</b>		YES YES	YES YES	WAM+ ADS-B WAM+ ADS-B		Launceston
<b>Learmonth</b>	<b>G</b>		YES	YES	ADS-B		Learmonth
<b>Port Hedland</b>	<b>G</b>	Over aerodrome	YES	YES	-		
<b>Rock Hampton</b> APP TWR	<b>D</b>		YES YES	YES YES	SSRm(S)+SSRm(A/C) SSRm(S)+SSRm(A/C)		Mt Alma

ATS Units Served	Category of airspace	Surveillance Gaps	Integration of Surveillance Information into ATC Situation Display	Multi-Surveillance Data Processing Capability	Surveillance Used	Level of A-SMGCS Implemented	Remarks
1	2	3	4	5	6	7	8
<b>Tindal</b> APP TWR	C		YES YES	YES YES	PSR+SSRm(A/C) PSR+SSRm(A/C)		Tindal
<b>Townsville</b> APP TWR	C		YES YES	YES YES	PSR+ SSRm(S)+SSRm(A/C) PSR+ SSRm(S)+SSRm(A/C)		Townsville, Tabletop
<b>Other aerodromes</b>  Broome Albury Tamworth Mackay Hamilton Island	D D D D D		YES YES YES YES YES	YES YES YES YES YES	ADS-B Higher level SSR coverage ? SSRm(A/C) SSRm(A/C)		Broome Mt Bobbara The Round Mountain Swampy Ridge Swampy Ridge
<b>BANGLADESH</b> Dhaka APP	C				PSR+SSRm AC		
<b>BRUNEI DARUSALAM</b> Brunei APP					PSR + SSRmAC		
<b>CAMBODIA</b>					SSRmAC		
<b>CHINA</b> Beijing ACC Beijing APP Beijing TWR  Tianjin APP Tianjin TWR  Shijiazhuang APP Shijiazhuang TWR  Taiyuan ACC Taiyuan APP					PSR + SSRmAC PSR + SSRmAC PSR + SSRmAC  SSRmAC  SSRmAC  PSR + SSRmAC		

ATS Units Served	Category of airspace	Surveillance Gaps	Integration of Surveillance Information into ATC Situation Display	Multi-Surveillance Data Processing Capability	Surveillance Used	Level of A-SMGCS Implemented	Remarks
1	2	3	4	5	6	7	8
Taiyuan TWR					PSR + SSRmAC		
Hohhot ACC Hohhot APP Hohhot TWR					SSRmAC  SSRmAC		
Guangzhou ACC Guangzhou APP Guangzhou TWR					PSR + SSRmAC PSR + SSRmAC PSR + SSRmAC		
Shenzhen APP Shenzhen TWR					PSR + SSRmAC		
Zhuhai ACC Zhuhai APP Zhuhai TWR					PSR + SSRmAC PSR + SSRmAC PSR + SSRmAC		
Sanya ACC Sanya APP Sanya TWR					PSR + SSRmAC PSR + SSRmAC PSR + SSRmAC		
Haikou ACC Haikou APP Haikou TWR					PSR + SSRmAC  PSR + SSRmAC		
Changsha ACC Changsha APP Changsha TWR					PSR + SSRmAC  PSR + SSRmAC		
Enshi TWR					SSRmAC		
Wuhan ACC Wuhan APP Wuhan TWR					PSR + SSRmAC  PSR + SSRmAC		
Zhengzhou ACC Zhengzhou APP Zhengzhou TWR					PSR + SSRmAC  PSR + SSRmAC		

ATS Units Served	Category of airspace	Surveillance Gaps	Integration of Surveillance Information into ATC Situation Display	Multi-Surveillance Data Processing Capability	Surveillance Used	Level of A-SMGCS Implemented	Remarks
1	2	3	4	5	6	7	8
Guilin ACC Guilin APP Guilin TWR					PSR + SSRmAC PSR + SSRmAC		
Nanning ACC Nanning TWR					SSRmAC SSRmAC		
Zhanjiang ACC Zhanjiang APP Zhanjiang TWR					SSRmAC SSRmAC		
Shantou ACC Shantou APP Shantou TWR					PSR + SSRmAC PSR + SSRmAC		
Kunming ACC Kunming APP Kunming TWR					PSR + SSRmAC + AC PSR + SSRmAC		
Chengdu ACC Chengdu APP Chengdu TWR					PSR + SSRmAC + ADS-C PSR + SSRmAC		
Guiyang ACC Guiyang APP Guiyang TWR					PSR + SSRmAC PSR + SSRmAC		
Chongqing ACC Chongqing APP Chongqing TWR					PSR + SSRmAC PSR + SSRmAC		
Shanghai ACC Shanghai APP Shanghai TWR					PSR + SSRmAC PSR + SSRmAC PSR + SSRmAC		
Jinan ACC Jinan APP					SSRmAC		

ATS Units Served	Category of airspace	Surveillance Gaps	Integration of Surveillance Information into ATC Situation Display	Multi-Surveillance Data Processing Capability	Surveillance Used	Level of A-SMGCS Implemented	Remarks
1	2	3	4	5	6	7	8
Jinan TWR					SSRmAC		
Qingdao ACC					SSRmAC		
Qingdao APP					SSRmAC		
Qingdao TWR					SSRmAC		
Hefei ACC					PSR + SSRmAC		
Hefei APP					PSR + SSRmAC		
Hefei TWR					PSR + SSRmAC		
Nanjing ACC					PSR + SSRmAC		
Nanjing APP					PSR + SSRmAC		
Nanjing TWR					PSR + SSRmAC		
Lianyungang ACC					SSRmAC		
Lianyungang APP					SSRmAC		
Lianyungang TWR					SSRmAC		
Xuzhou TWR					SSRmAC		
Hangzhou ACC					PSR + SSRmAC		
Hangzhou APP					PSR + SSRmAC		
Hangzhou TWR					PSR + SSRmAC		
Nanchang ACC					PSR + SSRmAC		
Nanchang APP					PSR + SSRmAC		
Nanchang TWR					PSR + SSRmAC		
Fuzhou ACC					PSR + SSRmAC		
Fuzhou APP					PSR + SSRmAC		
Fuzhou TWR					PSR + SSRmAC		
Wenzou TWR					SSRmAC		
Xiamen ACC					PSR + SSRmAC		
Xiamen APP					PSR + SSRmAC		
Xiamen TWR					PSR + SSRmAC		

ATS Units Served	Category of airspace	Surveillance Gaps	Integration of Surveillance Information into ATC Situation Display	Multi-Surveillance Data Processing Capability	Surveillance Used	Level of A-SMGCS Implemented	Remarks
1	2	3	4	5	6	7	8
Shenyang ACC Shenyang APP Shenyang TWR					PSR + SSRmAC  PSR + SSRmAC		
Dalian ACC Dalian APP Dalian TWR  Harbin ACC Harbin APP Harbin TWR  Xi'an ACC Xi'an APP Xi'an TWR  Lanzhou ACC Lanzhou APP Lanzhou TWR  Urumqi ACC Urumqi APP Urumqi TWR					PSR + SSRmAC  PSR + SSRmAC  PSR + SSRmAC  PSR + SSRmAC  PSR + SSRmAC  SSRmAC + AC  SSRmAC  PSR + SSRmAC + AC  PSR + SSRmAC		
<b>HONG KONG, CHINA</b> Hong Kong ACC Hong Kong APP Hong Kong TWR	S T AD		Yes	Yes	PSR + SSRmAC + ADS-B PSR + SSRmAC PSR + SSRmAC + MLAT	2	SMR, A-SMGCS
<b>MACAO, CHINA</b> Macao TWR	AD		Yes	Yes	SSRmS+SSRmAC		SMR
<b>DPR KOREA</b> <b>Pyongyang</b> Pyongyang ACC Pyongyang APP Pyongyang TWR					PSR + SSRmAC + ADS-B PSR + SSRmAC + ADS-B		PAR

ATS Units Served	Category of airspace	Surveillance Gaps	Integration of Surveillance Information into ATC Situation Display	Multi-Surveillance Data Processing Capability	Surveillance Used	Level of A-SMGCS Implemented	Remarks
1	2	3	4	5	6	7	8
<b>FIJI</b> Naid ACC Nadi APP					ADS-B + ADS-C ADS-B		
<b>FRENCH POLYNESIA</b> Tahiti ACC Tahiti APP Tahiti TWR					SSRmAC + ADS-B + ADS-C SSRmAC		
<b>INDIA</b> Chennai ACC Chennai APP Chennai TWR  Delhi ACC Delhi APP Delhi TWR  Kolkata ACC Kolkata APP Kolkata TWR  Mumbai ACC Mumbai APP Mumbai TWR  Bangalore APP Bangalore TWR  Shamshabad ACC Shamshabad APP Shamshabad TWR					PSR + ADS-C PSR + ADS-C PSR + ADS-C  PSR + ADS-C PSR + ADS-C PSR + ADS-C  PSR + ADS-C PSR + ADS-C PSR + ADS-C  PSR PSR  PSR PSR PSR		MI MI A-SMGCS  MI MI A-SMGCS  MI MI A-SMGCS  MI MI  MI MI MI
<b>INDONESIA</b> Jakarta ACC Jakarta APP  Medan ACC					PSR + SSRmAC + ADS-B PSR + SSRmAC + ADS-B  PSR + SSRmAC + ADS-B		ADS-B Trial ADS-C Trial, A-SMGCS

ATS Units Served	Category of airspace	Surveillance Gaps	Integration of Surveillance Information into ATC Situation Display	Multi-Surveillance Data Processing Capability	Surveillance Used	Level of A-SMGCS Implemented	Remarks
1	2	3	4	5	6	7	8
Medan APP					PSR + ADS-B		ADS-C Trial, A-SMGCS
Tanjung Pinang APP					SSRmAC		
Pontianak APP					ADS-B		
Pekanbaru APP					PSR + SSRmAC + ADS-B		
Palembang APP					PSR + SSRmAC + ADS-B		
Ujung Pandang ACC Ujung Pandang APP					PSR + SSRmAC + ADS-B PSR + SSRmAC + ADS-B		
Banjarmasin APP					SSRmAC + ADS-B		
Balikpapan APP					PSR + SSRmAC + ADS-B		
Yogyakarta APP					PSR		A-SMGCS
Surabaya APP					PSR		
Bali ACC Bali APP					ADS-B		
Biak APP					SSRmAC + ADS-B		
Jayapura ACC Jayapura APP					PSR PSR		
Kupang ACC Kupang APP					ADS-B ADS-B		
Tarakan ACC					PSR + ADS-B		
Batam ACC Batam APP					SSRmS SSRmS + ADS-B		
Sorong ACC					SSRmS + ADS-B		

ATS Units Served	Category of airspace	Surveillance Gaps	Integration of Surveillance Information into ATC Situation Display	Multi-Surveillance Data Processing Capability	Surveillance Used	Level of A-SMGCS Implemented	Remarks
1	2	3	4	5	6	7	8
<b>JAPAN</b> Fukuoka ATMC					ADS-C		
Narita APP Narita TWR					PSR + SSRmAC + SSRmS MLAT, PSRMLAT		SMR
Haneda TWR					MLAT		SMR
Chubu APP Chubu TWR					PSR + SSRmAC + SSRmS MLAT		SMR
Osaka APP Osaka TWR					PSR + SSRmAC + SSRmS MLAT		SMR
Kansai APP Kansai TWR					PSR + SSRmAC + SSRmS MLAT		SMR
Fukuoka ACC Fukuoka APP Fukuoka TWR					PSR + SSRmAC + SSRmS PSR + SSRmAC + SSRmS MLAT		SMR
Naha ACC Naha APP Naha TWR					PSR + SSRmAC + SSRmS PSR + SSRmAC + SSRmS MLAT		SMR
Hakodate APP					PSR + SSRmAC		
Sendai APP					PSR + SSRmAC		
Tokyo ACC Tokyo APP					PSR + SSRmAC + SSRmS PSR + SSRmAC + SSRmS		
Niigata APP					PSR + SSRmAC		
Chubu APP					PSR + SSRmAC + SSRmS		
Hiroshima APP					PSR + SSRmAC		

ATS Units Served	Category of airspace	Surveillance Gaps	Integration of Surveillance Information into ATC Situation Display	Multi-Surveillance Data Processing Capability	Surveillance Used	Level of A-SMGCS Implemented	Remarks
1	2	3	4	5	6	7	8
Takamatsu APP					PSR + SSRmAC		
Kochi APP					PSR + SSRmAC		
Matsuyama TWR					SSRmAC		
Kitakyusyu TWR					SSRmAC		
Nagasaki APP					PSR + SSRmAC		
Oita APP					PSR + SSRmAC		
Kumamoto APP					PSR + SSRmAC		
Miyazaki APP					PSR + SSRmAC		
Kagoshima APP					PSR + SSRmAC		
Shimajiri APP					PSR + SSRmAC		
Ishigaki APP					PSR + SSRmAC		
Sapporo ACC					PSR + SSRmAC + SSRmS		
<b>LAO PDR</b> Vientiane ACC Vientiane APP					SSRmAC + SSRmS PSR		
<b>MALAYSIA</b> Langkawi APP					PSR + SSRmAC		
Kuala Lumpur ACC Lumpur APP					PSR + SSRmAC + SSRmS PSR + SSRmAC + ADS-C		
Johor Bharu APP					PSR + SSRmS		
Kota Bharu APP					PSR + SSRmS		

ATS Units Served	Category of airspace	Surveillance Gaps	Integration of Surveillance Information into ATC Situation Display	Multi-Surveillance Data Processing Capability	Surveillance Used	Level of A-SMGCS Implemented	Remarks
1	2	3	4	5	6	7	8
K. Kinabalu ACC K. Kinabalu APP  Kuching ACC Kuching APP Kuching TWR  Miri APP					PSR + SSRmAC PSR + SSRmAC  PSR + SSRmAC  PSR + SSRmAC  PSR + SSRmAC		
<b>MONGOLIA</b> Ulaanbaatar ACC Ulaanbaatar APP					ADS-C ADS-C		
<b>MYANMAR</b> Yangon ACC Yangon APP  Mandalay APP			Yes Yes  Yes	Yes Yes  Yes	SSRmAC + ADS-C SSRmAC + ADS-C  PSR + SSRmAC		
<b>NEPAL</b> Kathmandu APP					PSR + SSRmAC		
<b>NEW CALEDONIA</b> Tontouta ACC  Tontouta APP	A, D  G	Yes	Yes	Not applicable	ADS-B	Not applicable	ADS-B Tier 3 implemented, Tier 2 in progress
<b>NEW ZEALAND</b> Christchurch ACC Christchurch TWR					PSR + SSRmAC + SSRmS		
Auckland ACC Auckland TWR  Wellington TWR					SSRmAC + SSRmS		Auckland A-SMGCS has no SMR

ATS Units Served	Category of airspace	Surveillance Gaps	Integration of Surveillance Information into ATC Situation Display	Multi-Surveillance Data Processing Capability	Surveillance Used	Level of A-SMGCS Implemented	Remarks
1	2	3	4	5	6	7	8
Queenstown TWR							Wide Area MDS planned for Queenstown in 2010
<b>PAKISTAN</b> Karachi ACC Karachi APP Karachi TWR			Yes	Yes	PSR + SSRmAC PSR + SSRmAC PSR + SSRmAC	Nil	
Lahore ACC Lahore APP Lahore TWR			Yes	Yes	PSR + SSRmAC PSR + SSRmAC PSR + SSRmAC	Nil	
Islamabad APP Islamabad TWR			Yes	No	PSR + SSRmAC PSR + SSRmAC	Nil	
<b>PAPUA NEW GUINEA</b> Jacksons APP					PSR + SSRmAC		
Moresby ACC					PSR + SSRmAC		
<b>PHILIPPINES</b> Manila ATM Center					SSRmAC + SSRmS + ADS-B		Planned implementation on Dec. 16
Manila ACC Manila APP					SSRmAC + SSRmS PSR + SSRmAC + SSRmS		
Clark APP					PSR + SSRmAC		
Mactan APP					PSR + SSRmAC		
Kalibo/Caticlan APP					PSR + SSRmAC + SSRmS		Planned implementation on Dec. 16
Bacolod APP					PSR + SSRmAC + SSRmS		Planned implementation on Dec. 16
Davao APP					PSR + SSRmAC + SSRmS		Planned implementation on Dec. 16

ATS Units Served	Category of airspace	Surveillance Gaps	Integration of Surveillance Information into ATC Situation Display	Multi-Surveillance Data Processing Capability	Surveillance Used	Level of A-SMGCS Implemented	Remarks
1	2	3	4	5	6	7	8
<b>REPUBLIC OF KOREA</b>							
Jeju APP	T	No	Yes	Yes	PSR + SSRmAC + SSRmS	2	SMR, A-SMGCS
Jeju TWR	T	No	No	No	PSR + SSRmAC + SSRmS		
Jungwon APP	T	No	No	Yes	PSR + SSRmAC	3	SMR, A-SMGCS
CheongjuTWR	T	No	No	No	PSR + SSRmAC		
Incheon ACC	S	No		Yes	PSR + SSRmAC		
Incheon TWR	T	No	Yes	No	PSR + SSRmAC		
Seoul APP	T	No	Yes	Yes	PSR + SSRmAC		
Gimpo TWR	T	No	Yes	No	PSR + SSRmAC		
Gangneung APP	T	No	No	No	PSR + SSRmAC		
Yangyang TWR					PSR + SSRmAC		
Gimhae APP	T	No	No	Yes	PSR + SSRmAC	SMR	
Gimhae TWR	T	No	No	No	PSR + SSRmAC		
Daegu APP	T	No	No	No	PSR + SSRmAC		
Daegu TWR	T	No	No	No	PSR + SSRmAC		
Gwangju APP	T	No	No	Yes	PSR + SSRmAC		
Gwangju TWR	T	No	No	No			
Muan TWR	T	No	No	No	PSR + SSRmAC		
<b>SINGAPORE</b>							
Singapore ACC	S		Yes	Yes	PSR + SSRmS + ADS-B + ADS-C	2	
Singapore APP	T		Yes	Yes	PSR + SSRmS+SSRmAC		
Singapore TWR	AD		Yes	Yes	PSR+ADS-B+MLAT		
<b>SRI LANKA</b>							
Colombo ACC					SSRmAC + ADS-B + ADS-C		ADS-C Trial
Colombo APP					PSR		
<b>THAILAND</b>							
Bangkok ACC	S		YES	YES	PSR + SSRmAC + SSRmS		

ATS Units Served	Category of airspace	Surveillance Gaps	Integration of Surveillance Information into ATC Situation Display	Multi-Surveillance Data Processing Capability	Surveillance Used	Level of A-SMGCS Implemented	Remarks
1	2	3	4	5	6	7	8
Bangkok APP Suvarnabhumi TWR Don Mueang TWR	T AD AD		YES YES YES	YES YES YES	PSR + SSRmAC + SSRmS SMR + MLAT + A-SMGCS SSRmAC	2	
Chiang Mai APP Chiang Mai TWR	T AD		YES YES	YES YES	SSRmS SSRmS		
Hat Yai APP Hat Yai TWR	T AD		YES YES	YES YES	SSRmS SSRmS		
Phuket APP Phuket TWR	T AD		YES YES	YES YES	SSRmS SSRmS		
Suratthani APP Suratthani TWR	T AD		YES YES	YES YES	SSRmS SSRmS		
Ubonratchathani APP Ubonratchathani TWR	T AD		YES YES	YES YES	SSRmS SSRmS		
Phitsanulok APP Phitsanulok TWR	T AD		YES YES	YES YES	PSR PSR		
Hua Hin APP Hua Hin TWR	T AD		YES YES	YES YES	PSR PSR		
U Taphao					SSRmAC		
<b>TONGA</b>					ADS-B		
<b>UNITED STATES</b> Alaska ACC					ADS-B + ADS-C		
Hilo, Hawaii ACC Hilo, Hawaii APP Hilo, Hawaii TWR					SSRmAC PSR		
Honolulu, Hawaii ACC					SSRmS		

ATS Units Served	Category of airspace	Surveillance Gaps	Integration of Surveillance Information into ATC Situation Display	Multi-Surveillance Data Processing Capability	Surveillance Used	Level of A-SMGCS Implemented	Remarks
1	2	3	4	5	6	7	8
Honolulu, Hawaii APP Honolulu, Hawaii TWR  Kahului, Hawaii APP Kahului, Hawaii TWR  Kokee, Hawaii ACC  Lihue, Hawaii APP Lihue, Hawaii TWR  Mount Kaala, Hawaii ACC  Pahoa, Hawaii ACC  Kunianiau, Hawaii ACC  Guam ACC  Mount Santa Rosa, Guam ACC Mount Santa Rosa, Guam APP Mount Santa Rosa, Guam TWR  Kona, Hawaii ACC					PSR  PSR + SSRmAC  PSR  PSR + SSRmAC  PSR + SSRmAC  SSRmAC  SSRmAC  PSR + SSRmAC  PSR + SSRmS PSR + SSRmAC  SSRmAC		
<b>VIET NAM</b> Hanoi ACC  Noibai APP Noibai TWR  Ho Chi Minh ACC  Danang APP  Hanoi ACC					PSR + SSRmAC + ADS-B  SSRmAC  PSR + SSRmAC + ADS-B +ADS-C  PSR		SMR, A-SMGCS

<b>ATS Units Served</b>	<b>Category of airspace</b>	<b>Surveillance Gaps</b>	<b>Integration of Surveillance Information into ATC Situation Display</b>	<b>Multi-Surveillance Data Processing Capability</b>	<b>Surveillance Used</b>	<b>Level of A-SMGCS Implemented</b>	<b>Remarks</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>
Tansan Nhat APP Tansan Nhat TWR					PSR		SMR, A-SMGCS



## ASBU ELEMENTS

ASUR B0

- Functional Description
- Enablers
- Deployment Applicability
- Performance Impact Assessment

### ASUR

ASUR-B0/1      Automatic Dependent Surveillance – Broadcast      Technology  
 (ADS-B)

**Main Purpose** ? To support the provision of Air Traffic Services and operational applications at reduced cost and increased surveillance coverage.

**New Capabilities** ? ADS-B provides precise position/velocity information in all airspace (accuracy not range-dependent as with radar). It also provides aircraft call sign and precise position/velocity information to nearby aircraft with ADS-B-In receivers.

ADS-B can also support State aircraft airspace access, however it should, when possible, leverage benefits from dual-use of State aircraft capabilities to reduce cost and technical impact.

**Description** ? ADS-B provides an aircraft’s identification, position, altitude, velocity, and other information to any receiver (airborne or ground) within range. The broadcasted aircraft position/velocity is normally based on the global navigation satellite system (GNSS) and transmitted at least once per second.

**Maturity Level** ? Ready for implementation

**Human Factor Considerations**

#### PLANNING LAYERS ?

Tactical-During ops

#### OPERATIONS ?

Taxi-out    Departure    En-route    Arrival    Taxi-in

#### DEPENDENCIES AND RELATIONS ?

Type of Dependencies	ASBU Element
Relation-operational need	NAVS-B0/3 - Aircraft Based Augmentation Systems (ABAS)
Relation-benefit	NAVS-B0/2 - Satellite Based Augmentation Systems (SBAS)

#### 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 standards and guidance material: ICAO Annex 10 Volume IV Chapter 2,3 and 5 ICAO Doc. 9871 Technical Provisions for Mode S Services and Extended Squitter RTCA/EUROCAE MOPS: DO-260/ED-102, DO-260A, or DO-260B/ED-102A EUROCAE ED-129, ED-129A or ED-129B ICAO Doc. 9924 Aeronautical Surveillance Manual	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: Guidance material: ICAO Doc. 9924 Aeronautical Surveillance Manual	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 Surveillance Manual	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 Services and Extended Squitter RTCA/EUROCAE MOPS: DO-260/ED-102, DO-260A, or DO-260B/ED-102A ICAO Doc. 9924 Aeronautical Surveillance Manual	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 and pilot training on the new phraseology is required. If new ANSP equipment is installed, then training for maintenance personnel may be required (see ICAO Doc 8071).	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, or [E]TSO-C196, or [E]TSO-C145/-C146. (Note that the US/Europe and equivalent ADS-B mandates require more – see FAA AC 20-165 or EASA CS-ACNS).	Aircraft manufacturer	2008
				Aircraft operator	

**ASUR-B0/2      Multilateration cooperative surveillance systems (MLAT)      Technology**

**Main Purpose** ? To provide an alternative to radar surveillance by using available aircraft transponders.

**New Capabilities** ? MLAT allows cooperative surveillance in rough terrain such as in mountainous regions or on airport surfaces where surveillance systems requiring a rotating radar dish had performance difficulties. It may also be integrated with ADS-B ground stations to provide a surveillance capability that is more resilient to GNSS function failure.

**Description** ? MLAT is a new technique providing independent cooperative surveillance. The MLAT system interrogates an aircraft and the transponder reply is received by multiple receivers located in different places. The reply's times of arrival difference at the receivers allows the position of the source of signals to be determined, with an accuracy that is dependent on the number of receivers and their location relative to the aircraft. MLAT systems do not require a rotating radar dish and were initially deployed on airports to provide surface surveillance of aircraft. The technique is now used to provide surveillance over wide area (wide area MLAT system - WAM), sometimes in conjunction with ADS-B. MLAT requires more ground stations than ADS-B, but has the early implementation advantage of using existing aircraft transponders.

**Maturity Level** ? Ready for implementation

Human Factor Considerations

**PLANNING LAYERS** ?

Tactical-During ops

**OPERATIONS** ?

Taxi-out    Departure    En-route    Arrival    Taxi-in

**DEPENDENCIES AND RELATIONS** ?

There are currently no dependencies.

**ENABLERS**

Enabler Category	Enabler Type	Enabler Name	Description / References	Stakeholders	Year

Ground system infrastructure	Surveillance	MLAT ground stations	MLAT ground stations interrogate aircraft transponders and receive/process transponder replies to determine aircraft position; this information is then transmitted to Service Delivery Point(s) Reference material: Technical standards and guidance material: ICAO Annex 10 Volume IV Chapters 2,3,5 and 6. ICAO Doc 9871 Technical Provisions for Mode S Services and Extended Squitter RTCA/EUROCAE MOPS: DO-181D/ED-73C or subsequent versions ICAO Doc. 9924 Aeronautical Surveillance Manual	ANSP	2008
Airborne system capability	Surveillance	SSR Mode A, C and S transponders	References: Technical standards and guidance material: ICAO Annex 10 Volume IV Chapter 2,3 and 5 ICAO Doc. 9871 Technical Provisions for Mode S Services and Extended Squitter RTCA/EUROCAE MOPS: DO-181D/ED-73C or subsequent versions ICAO Doc. 9924 Aeronautical Surveillance Manual	Aircraft manufacturer Aircraft operator	2008
Ground system infrastructure	Surveillance	Service Delivery Point (s) for MLAT information	Service Delivery Points(s) receive MLAT information and provide it to ATC automation for display to controller Reference: Guidance material: ICAO Doc. 9924 Aeronautical Surveillance Manual	ANSP	2008
Training	-	Training requirements MLAT implementation	If new ANSP equipment is installed, then training for maintenance personnel may be required (see Doc 8071).	ANSP	2008

ASUR-B0/3

Cooperative Surveillance Radar Downlink of Aircraft Parameters (SSR-DAPS)

Technology

Main Purpose ?

To obtain additional information from an aircraft transponder in support of the provision of Air Traffic Services.

New Capabilities ?

SSR-DAPS enables ATM systems to obtain additional information from an aircraft transponder, via interrogation by a cooperative surveillance system (Mode S radar or MLAT). This additional information can be used to increase controller awareness and reduce the volume of air-ground voice communications, and/or to improve the performance of tracking systems or safety net systems such as STCA and MSAW.

Description 

Downlink of Aircraft Parameters (DAPS) includes both Controller Access Parameters (CAPs) and System Access Parameters (SAPs). Possible CAPs include Magnetic Heading, Indicated Airspeed / Mach Number, Barometric rate of climb/descent, and Selected Altitude (which can also be consider a SAP). SAPs include Roll Angle, Track Angle Rate, True Track Angle, and Barometric Pressure Setting.

Maturity Level 

Ready for implementation

Human Factor

Considerations

### PLANNING LAYERS

Tactical-During ops

### OPERATIONS

Departure

En-route

Arrival

### DEPENDENCIES AND RELATIONS

There are currently no dependencies.

### ENABLERS

Enabler Category	Enabler Type	Enabler Name	Description / References	Stakeholders	Year
Airborne system capability	Surveillance	SSR Mode A, C and S transponders	References: Technical standards and guidance material: ICAO Annex 10 Volume IV Chapter 2,3 and 5 ICAO Doc. 9871 Technical Provisions for Mode S Services and Extended Squitter RTCA/EUROCAE MOPS: DO-181D/ED-73C or subsequent versions ICAO Doc. 9924 Aeronautical Surveillance Manual	Aircraft manufacturer Aircraft operator	2008
Ground system infrastructure	Surveillance	Mode S cooperative surveillance system	Mode S cooperative surveillance system with DAPS capability interrogates aircraft transponders to retrieve data; this information is then provided to the ATC automation system. Reference material: Technical standards and guidance material: ICAO Annex 10 Volume IV Chapter 2,3 and 5 ICAO Doc. 9871 Technical Provisions for Mode S Services and Extended Squitter: RTCA/EUROCAE MOPS: DO-181D/ED-73C or subsequent versions ICAO Doc. 9924 Aeronautical Surveillance Manual	ANSP	2008

Ground system infrastructure	Technical systems	*HMI that supports controller awareness for CAPs and automation processing for SAPs	Reference: Guidance material: ICAO Doc 9924 Aeronautical Surveillance Manual	ANSP	2008
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Training	-	Training requirements SSR-DAPS implementation	Depending on the ANSP implementation, some controller training on new symbology or alerts may be required. If phraseology is changed, or new phraseology is introduced by an ANSP, then controller and pilot training on the new phraseology is required. If new ANSP equipment is installed, then training for maintenance personnel may be required (see Doc 8071).	ANSP	2008
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