



**Agenda Item 4: Report of activities and deliverables of the INTEROP TF and Subgroups  
b) CNS implementation. Advances of the Subgroups**

**ACTIVITIES CARRIED OUT IN THE INTEROP TF SUBGROUPS**

(Presented by the Secretariat)

<b>SUMMARY</b>	
This working paper presents the activities carried out by the Subgroups of the Interoperability Task Force (INTEROP TF) since the last SAM Region Implementation Group Workshop/Meeting (SAM/IG/30), to date.	
<b>References</b>	
- Final Report SAM/IG/29 Meeting (Lima, 15 to 19 May 2023); - Final Report SAM/IG/30 Meeting (Lima, 23 to 27 October 2023); and - Final Report GREPECAS/21 Meeting (Santo Domingo, 14 to 17 November 2023).	
<b>ICAO Strategic Objectives</b>	<i>A – Safety</i> <i>B – Air Navigation Capacity and Efficiency</i>  <i>ASBU: AMET-B0/4 (IWXXM), ASUR-B0/1 (ADS-B), ASUR-B1/1 (SB ADS-B), COMI-B0/7 (AMHS) and FICE-B0/1 (AIDC)</i>

**1. INTRODUCTION**

1.1 The SAM Region Implementation Group (SAM/IG) has formed the Interoperability Task Force (INTEROP GT) to support and promote initiatives to modernize air navigation services and ensure interoperability between automated systems used by AIM, ATM, ATFM, CNS and MET users, with a view to:

- a) facilitate the exchange of information between the systems implemented by the States, reducing the time and problems of interconnection between the systems;
- b) promote a coordinated and homogeneous transition to the new services and elements indicated in the GANP; and
- c) Encourage the multidisciplinary participation of air navigation services professionals in support of the SAM Region Implementation Group (SAM/IG) for the planning and execution of the interconnection work of the systems implemented in the South American Region.

1.2 Currently, 7 subgroups of the INTEROP WG are activated: ATM/AIDC Subgroup, ATM/FPL Subgroup, CNS/AMHS Subgroup, CNS/ANP Subgroup, CNS/SUR Subgroup, CNS/VOIP

Subgroup, and MET/IWXXM Subgroup. The activities carried out since the SAM/IG/30 Workshop/Meeting (Lima, November 23-27, 2023) are summarized below. The Final Report of the SAM/IG/30 Workshop/Meeting can be accessed via the link below:

[https://www.icao.int/SAM/Documents/2023-RLA06901-SAMIG30/1SAMIG30\\_FinalReport.pdf](https://www.icao.int/SAM/Documents/2023-RLA06901-SAMIG30/1SAMIG30_FinalReport.pdf)

## 2. DISCUSSION

### 2.1 ATM/AIDC SUBGROUP

#### *Establishment of AIDC between control centers using the same automation system*

2.1.1 Based on **Action S29/11** of the Report of the Workshop/Meeting SAM/IG/29, Brazil and Paraguay resumed AIDC testing between ACC Asunción and ACC Curitiba, with the support of the manufacturer of the automated system (Atech).

2.1.2 A visit was made to the ACCs of Curitiba and Asunción in the period from October 16 to 20, 2023, with the participation of the Rapporteur of the ATM/AIDC Subgroup, the CNS SAM Officer and an expert from the regional cooperation project EU-LAC APP II of EASA, with the aim of knowing more in detail the situation of implementation of AIDC among the centers and to be able to move forward with the pre-operational tests.

2.1.3 On May 13, 2024, a teleconference was held with the participation of the focal points of the ACCs of Curitiba and ACC Asunción. In this virtual meeting, both parties stated that on May 27 the AIDC interconnection tests between both control centers will be resumed, which are estimated to last a month, after which the pre-operational phase will begin.

2.1.4 Based on **Action S29/12** of the Report of the Workshop/Meeting SAM/IG/29, Brazil and Venezuela resumed AIDC testing between ACC Amazónico and ACC Maiquetía, with the support of the manufacturer of the automated system (Atech).

2.1.5 The tests advanced considerably and, in this phase of implementation, changes will be made to the database in the ACC Maiquetia and ACC Amazónico to finish adjusting the times of some messages and eliminate others that are not necessary, briefings were held to help the training of ATC and AIM personnel, the Letter of Agreement (CAO/LOA) between SVMI and SBAZ is being updated, placing as the main coordination method the AIDC, the monitored operational period began, according to the annex that will be incorporated into the CAO/LOA, it is expected that the user manuals for each job will be prepared by Maiquetia and that will serve for the training of the personnel.

#### *Establishment of AIDC between control centers using different automation systems*

2.1.6 As announced at the SAM/IG/30 Workshop/Meeting, on August 24, 2023, Colombia and Venezuela resumed the AIDC tests between ACC Barranquilla and ACC Maiquetía, which were 95% successful, having found that an error is generated when Barranquilla requests a coordination (CDN), since the CDN message sent from Indra's system to Atech's system contains fields 15 and 18, and Atech's system (SAGITARIO) only handles CDN messages with fields 10 and 14, a situation that indicates the need for Atech to adapt the system, in accordance with the guidelines of the current ICD, so that problems are not generated in the AIDC connection.

2.1.7 In the current implementation phase, the Letter of Agreement (CAO/LOA) between SVMI and SKBQ is being revised, placing the AIDC as the main coordination method, the monitored operational

period has begun, according to the annex (formerly MOU) that will be incorporated into the CAO/LOA. It is expected that the user manuals for each job will be prepared by Maiquetía and that will serve for the training of the personnel.

2.1.8 Likewise, Colombia and Venezuela will begin tests between ACC Bogotá and Maiquetía, with the aim of making the AIDC connection operational by the second half of 2024.

2.1.9 In the period from April 15 to 19, 2024, a support visit was made to the Bogotá (April 15 - 16) and Amazonian ACC (April 18 - 19), for the establishment of the AIDC connection between the two control centers. The visit was attended by the Rapporteur of the ATM/AIDC Subgroup, the CNS Officer of the SAM Office and an EASA expert.

2.1.10 During the visit, the members of the ATM/AIDC Subgroup visited the facilities, familiarized themselves with the operations and met with the personnel involved in the ATM services, both managerial, operational and technical.

2.1.11 As of April 29, 2024, tests began between ACC Amazónico and ACC Bogotá to identify the necessary adjustments in the configuration of the systems, with the pre-operational phase having begun on April 30.

## 2.2 ATM/FPL SUBGROUP

2.2.1 From 02 to 04 April 2024, the Second Workshop/Meeting of the ATM/FPL Subgroup of the WG INTEROP (SG ATM/FPL/2) was held. In this (online) event, the following topics were discussed:

- Activation of an Ad-hoc Group made up of States using CADAS User Agents (UAs) to share best practices and learn about the initiatives taken by each State to establish centralized management of flight plans;
- Harmonization of the publication of information on FPLs and associated messages in AIPs;
- Harmonization of the nomenclature to be used for SID and STAR routes; and
- Review and adaptation of the format of ACK and REJ messages.

2.2.2 Fue activado el Grupo Ad-hoc CADAS, constituido de representantes de Argentina, Chile, Colombia, Perú y Venezuela. Como primera actividad, el Relator del Subgrupo ATM/FPL ha programado un taller que será llevado a cabo de manera virtual (en línea) en 28 de mayo de 2024, con la siguiente agenda:

- Module I – AMHS Context in the SAM Region;
- Module II – CADAS-ATS Central Terminal; and
- Module III – Filters, Data Extraction and Q&A.

2.2.3 With regard to the harmonization of the publication in the AIPs of the information referring to the FPLs and associated messages, in an email dated April 10, 2024, the rapporteur of the ATM/FPL Subgroup has asked the participants for information on the indicators used in the ATS units of each State, specifically the following:

- ZTZX = Tower Control Center
- ZPZX = ARO/AIS Office
- ZAZX = Approach Control Center
- ZRZX = Area Control Center

2.2.4 Information was sent from the following States: Peru, Ecuador, Brazil and Venezuela.

2.2.5 In relation to the Harmonization of the nomenclature to be used for SID and STAR routes, the participants of the Subgroup agreed to obtain more information in order to have subsidies for a better definition for the nomenclature to be adopted.

2.2.6 On the revision and adequacy of the ACK and REJ message format, the Subgroup agreed that it is an ongoing activity and, as necessary changes are identified, they will be proposed for approval by the SAM Region Implementation Group (SAM/IG).

### 2.3 CNS/AMHS SUBGROUP

2.3.1 The progress of AMHS implementation by the States of the SAM Region is at 97%. Only two AMHS interconnections (P1) are pending:

- Caracas COM Center (SVCA) – Curaçao COM Center (TNCC); and
- Georgetown COM Center (SYCJ) – Piarco COM Center (TTPP).

2.3.2 The first interconnection is pending on the implementation of the new CANSNET network of the NAM/CAR States, so that the connection with REDDIG can be established, through a Network-to-Network Interface (NNI) between the telecommunications providers of the two regional networks. The second interconnection is expected to be operational in the first half of 2024.

#### *Fifth Workshop/Meeting of the Supervisors/Operators of COM AMHS Centers of the SAM Region*

2.3.3 From April 23 to 25, 2024, the Fifth Workshop/Meeting of the Supervisors/Operators of COM AMHS Centers of the SAM Region (COM AMHS/5) was held, with the specific objective of reviewing the AFTN/AMHS routing tables.

2.3.4 During the Workshop/Meeting, a routing scheme was proposed and the Supervisors/Operators of the COM Centers of the AM Region were requested to provide their comments and send the routing tables to the Rapporteur of the CNS/AMHS Subgroup (with a copy to the Secretariat).

2.3.5 **Appendix A** to this working paper presents the proposed routing scheme.

#### *Gateway AMHS/SWIM (Online) Workshop/Training*

2.3.6 From May 06 to 10, 2024, the Workshop/Training on AMHS/SWIM Gateway was held with the participation of 2 representatives from each Member State of the Regional Technical Cooperation Project RLA/06/901. The Workshop/Training was contracted by CDI with resources from Project RLA/06/901, being supplied by the company Merideam.

2.3.7 The instructor of the Workshop/Training was Mr. Manuel Garcia who has graciously allowed the expansion of participants in the last 2 modules of the Workshop/Training. In this way, more than 80 people attended a demonstration of the implementation of an AMHS/SWIM Gateway (09/05) and the review of the concepts related to AMHS, SWIM and the strategies for implementing an AMHS/SWIM Gateway.

## 2.4 CNS/ANP SUBGROUP

2.4.1 The CNS/ANP Subgroup was activated at the SAM/IG/26 Meeting (Virtual, September 20-23, 2021) in order to support the review of the information contained in Vol II of the CAR/SAM Air Navigation Plan, as well as to provide support, in the preparation of Vol III of the ANP CAR/SAM, on CNS topics. Likewise, after the activation of the GREPECAS Project for the CAR/SAM Regional Management of the Radio Spectrum for Aviation, the CNS/ANP Subgroup began to support the activities developed within the framework of the GREPECAS Project.

2.4.2 With regard to the updating of the information contained in Part III (CNS) of Volume II of the CAR/SAM ANP, a working paper was presented during the GREPECAS/21 Meeting proposing the consolidation of the information with the CAR States, the adoption of new formats (electronic templates) for the CNS Tables and publication on the website of the ICAO iSTARS/SPACE application. After being approved by GREPECAS and completed the Proposal for Amendment (PfA) process jointly by the Regional Offices (NACC and SAM).

2.4.3 Currently, the NACC Office is coordination with the CAR States, for the consolidation of the tables, in order to request the corresponding amendment to the CAR/SAM Regional Air Navigation Plan (ANP CAR/SAM).

## 2.5 CNS/SUR SUBGROUP

2.5.1 The CNS/SUR Subgroup deals with the exchange of aeronautical surveillance data, and is also responsible for studying and proposing the necessary activities for a regional implementation of ADS-B in the SAM Region.

2.5.2 En 15 de febrero de 2024, fue realizada una teleconferencia del Subgrupo CNS/SUR, en la cual 3 Grupos Ad-hoc fueron activados:

- ADS-B CONOPS Ad-hoc Group;
- ADS-B Regulation Ad-hoc Group; and
- Technical Implementation Ad-hoc Group.

2.5.3 The Coordinator of the CONOPS ADS-B Ad-hoc Group is Mr. Julio Pereira (IATA), who has presented a preliminary proposal to change the current NAM/CAR/SAM ADS-B CONOPS document, adding a new chapter (Chapter 7) to the existing document.

2.5.4 The proposal was forwarded to the members of the ADS-B CONOPS Ad-hoc Group for review (see WP/4.3, submitted by IATA). The working group includes representatives from IATA as well as from the following States: Argentina, Colombia, Peru, Uruguay and Venezuela.

2.5.5 The Coordinator for the work of the Ad-hoc Group on ADS-B Regulation is Mr. Marcos Vignolo (Uruguay), the ad-hoc group has registered representatives from the following States: Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay and Venezuela.

2.5.6 The Ad-hoc Group on ADS-B Technical Implementation is made up of registered representatives from the following States: Argentina, Bolivia, Brazil, Chile, Colombia, Paraguay, Peru, Uruguay and Venezuela. Yet, a Coordinator has not been assigned to the Technical Implementation Ad-hoc Group.

## 2.6 CNS/VOIP

2.6.1 The CNS/VOIP Subgroup was activated during the SAM/IG/30 Workshop/Meeting (Lima, October 23-27, 2023), with the aim of:

- survey the VoIP capabilities implemented by SAM States;
- develop a Syllabus for the training to be contracted on "Interoperability Standards for VOIP ATM Components (Eurocae ED-137)"; and
- coordinate the establishment of the first oral communications based on the EUROCAE ED-137 Standards, via REDDIG.

2.6.2 The First Workshop/Meeting of the CNS/VOIP Subgroup (SG CNS/VOIP/1), was held in Lima, from February 26 to March 01, 2024, with the participation of 09 representatives from Bolivia, Brazil, Chile, Panama, Peru, Uruguay and Venezuela.

2.6.3 Participants in Workshop/Meeting SG CNS/VOIP/1 agreed to the appointment of Mr. Leonardo Alfredo Rodríguez (Uruguay) as Rapporteur and Mr. Raúl Alfredo Contreras Fara (Chile) as Secretary of the CNS/VOIP Subgroup.

2.6.4 During the Workshop/Meeting, a syllabus proposal was analyzed and approved for a training to be contracted with resources from the Regional Technical Cooperation Project RLA/06/901, to be held from June 17 to 21, 2024. **Appendix B** to this study note presents the syllabus for the Workshop/Training on Interoperability Standards for VOIP ATM Components (EUROCAE ED-137).

## 2.7 MET/IWXXM SUBGROUP

2.7.1 The MET/IWXXM Subgroup was formed for the purpose of carrying out tests and exchanging OPMET messages in the new IWXXM format, via Aeronautical Messaging Service (AMHS).

2.7.2 The following SAM States already have the capacity to transmit information in the IWXXM format: Argentina, Brazil, Guyana, Paraguay, Uruguay and Venezuela.

2.7.3 The Administration of Brazil (DECEA) has implemented continuous adaptations in the OPMET Regional Data Bank, in order to meet the amendments disclosed. See the information paper (IP/4.6) submitted by Brazil.

## 3. SUGGESTED ACTION

3.1 The Meeting is invited to:

- a) take note of the activities carried out by the Sub-Groups of the INTEROP WG; and
- b) to consider other considerations that the Meeting deems relevant.

## APPENDIX A

### ROUTING SCHEME FOR OTHER REGIONS

#### APAC Region

- Brasilia (SBBR), Caracas (SVCA) and Lima (SPIM) Centers – main route via Ezeiza (SAEZ), alternating via Atlanta (KATL).
- Panama Center (MPPC) – main route via Lima (SPIM), alternating via Atlanta (KATL).
- Ezeiza Center (SAEZ) – main route via Johannesburg (FAOR), alternating via Lima (SPIM).
- Bogotá Center (SKBO) – main route via Lima (SPIM), alternating Caracas (SVCA).
- Quito Center (SEQU) – main route via Lima (SPIM), alternating via Caracas (SVCA).
- Santiago Center (SCSC) – main route via Ezeiza (SAEZ), alternating via Lima (SPIM).
- La Paz Center (SLLP) – main route via Ezeiza (SAEZ), alternating via Lima (SPIM).
- Asuncion Center (SGAS) – main route via Ezeiza (SAEZ), alternating via Brasilia (SBBR).
- Montevideo Center (SUMU) – main route via Ezeiza (SAEZ), alternating via Lima (SPIM).
- Cayenne (SOCA), Paramaribo (SMJP) and Georgetown (SYCJ) Centers – main route via Brasilia (SBBR), alternating via Caracas (SVCA).

#### AFI Region

- Ezeiza Center (SAEZ) - main route via Johannesburg (FAOR), alternating via Brasilia (SBBR) to the following locations: FBSK; FLKK; FQBR; FVHA; FWLL; FYWH; FZAA; FZNA; HBBA; HKNA; HRYR; HTDA and HUEN.
- Ezeiza Center (SAEZ) – main route via Brasilia (SBBR), alternating via Madrid (LEEE) to all other AFI locations.
- Brasilia Center (SBBR) – main route via Ezeiza (SAEZ), alternating via Dakar (GOOO) to the following locations: FBSK; FLKK; FQBR; FVHA; FWLL; FYWH; FZAA; FZNA; HBBA; HKNA; HRYR; HTDA and HUEN.
- Brasilia Center (SBBR) – main route via Dakar (GOOO), alternating via Madrid (LEEE) to all other AFI locations.
- Caracas (SVCA) and Lima (SPIM) Centers - main route via Ezeiza (SAEZ), alternating via Brasilia (SBBR) to the following locations: FBSK; FLKK; FQBR; FVHA; FWLL; FYWH; FZAA; FZNA; HBBA; HKNA; HRYR; HTDA and HUEN.
- Caracas (SVCA) and Lima (SPIM) Centers – main route via Brasilia (SBBR), alternating via Ezeiza (SAEZ) to all other AFI locations.
- Bogotá Center (SKBO) – main route via Brasilia (SBBR), alternating via Lima (SPIM).
- Quito Center (SEQU) – main route via Lima (SPIM), alternating via Caracas (SVCA).

- Santiago Center (SCSC) – main route via Ezeiza (SAEZ), alternating via Lima (SPIM).
- La Paz (SLLP) Center – main route via Ezeiza (SAEZ), alternating via Brasilia (SBBR) to the following locations: FBSK; FLKK; FQBR; FVHA; FWLL; FYWH; FZAA; FZNA; HBBA; HKNA; HRYR; HTDA and HUEN.
- La Paz (SLLP) Center – main route via Brasilia (SBBR), alternating via Ezeiza (SAEZ) to all other AFI locations.
- Asuncion (SGAS) Asuncion – main route via Ezeiza (SAEZ), alternating via Brasilia (SBBR) to the following locations: FBSK; FLKK; FQBR; FVHA; FWLL; FYWH; FZAA; FZNA; HBBA; HKNA; HRYR; HTDA and HUEN.
- Asuncion Center (SGAS) – main route via Brasilia (SBBR), alternating via Ezeiza (SAEZ) to all other AFI locations.
- Montevideo Center (SUMU) – main route via Ezeiza (SAEZ), alternating via Brasilia (SBBR) to the following locations: FBSK; FLKK; FQBR; FVHA; FWLL; FYWH; FZAA; FZNA; HBBA; HKNA; HRYR; HTDA and HUEN.
- Montevideo Center (SUMU) - main route via Brasilia (SBBR), alternating via Ezeiza (SAEZ) to all other AFI locations.
- Cayenne (SOCA), Paramaribo (SMJP) and Georgetown (SYCJ) Centers – main route via Brasilia (SBBR), alternating via Caracas (SVCA).

### **EUR Region**

- Brasilia (SBBR) and Caracas (SVCA) Centers – main route via Madrid (LEEE), alternating via Atlanta (KATL).
- Ezeiza Center (SAEZ) - main route via Madrid (LEEE), alternating via Brasilia (SBBR).
- Panama Center (MPPC) – main route via Caracas (SVCA), alternating via Atlanta (KATL).
- Bogota Center (SKBO) – main route via Caracas (SVCA), alternating via CENAMER (MHCC).
- Quito Center (SEQU) – main route via Caracas (SVCA), alternating via Lima (SPIM).
- Lima Center (SPIM) – main route via Caracas (SVCA), alternating via Atlanta (KATL).
- Santiago Center (SCSC) – main route via Lima (SPIM), alternating via Ezeiza (SAEZ).
- La Paz Center (SLLP) – main route via Lima (SPIM), alternating via Brasilia (SBBR).
- Asuncion Center (SGAS) – main route via Brasilia (SBBR), alternating via Ezeiza (SAEZ).
- Montevideo Center (SUMU) – main route via Lima (SPIM), alternating via Brasilia (SBBR).
- Cayenne (SOCA), Paramaribo (SMJP) and Georgetown (SYCJ) Centers – main route via Caracas (SVCA), alternating via Brasilia (SBBR).

**MID Region**

- Brasilia (SBBR) and Caracas (SVCA) Centers – main route via Madrid (LEEE), alternating via Atlanta (KATL).
- Panama Center (MPPC) – main route via Caracas (SVCA), alternating via Atlanta (KATL).
- Bogota Center (SEQU) – main route via Caracas (SVCA), alternating via Bogota (SKBO).
- Lima Center (SPIM) – main route via Caracas (SVCA), alternating via Atlanta (KATL).
- Santiago Center (SCSC) – main route via Lima (SPIM), alternating via Ezeiza (SAEZ).
- La Paz Center (SLLP) – main route via Brasilia (SBBR), alternating via Lima (SPIM).
- Asunción Center (SGAS) – main route via Brasilia (SBBR), alternating via Ezeiza (SAEZ).
- Montevideo Center (SUMU) – main route via Brasilia (SBBR), alternating via Lima (SPIM).
- Ezeiza Center (SAEZ) – main route via Brasilia (SBBR), alternating via Caracas (SVCA).
- Cayenne (SOCA), Paramaribo (SMJP) and Georgetown (SYCJ) Centers – main route via Brasilia (SBBR), alternating via Caracas (SVCA).

**NAM/CAR Region**

- Caracas Center (SVCA) – main route via Piarco (TTPP), alternating via Atlanta (KATL) to the following locations: TA, TB, TD, TF, TG, TK, TL, TQ, TR, TT and TV.
- Caracas Center (SVCA) – main route via Atlanta (KATL), alternating via Lima (SPIM) to the other NAM/CAR locations.
- Brasilia (SBBR), Lima (SPIM) and Panama (SKBO) Centers – main route via Caracas (SVCA), alternating via Atlanta (KATL) to the following locations: TA, TB, TD, TF, TG, TK, TL, TQ, TR, TT and TV.
- Brasilia (SBBR), Lima (SPIM) and Panama (SKBO) Centers – main route via Atlanta (KATL), alternating via Caracas (SVCA) for the other NAM/CAR locations.
- Bogota (SKBO) and Ezeiza (SAEZ) Centers – main route via Caracas (SVCA), alternating via Lima (SPIM).
- Quito Center (SEQU) – main route via Caracas (SVCA), alternating via Lima (SPIM).
- La Paz Center (SLLP) – main route via Lima (SPIM), alternating via Lima (SBBR). Santiago Center (SCSC) – main route via Lima (SPIM), alternating via Ezeiza (SAEZ).
- Santiago Center (SCSC) – main route via Lima (SPIM), alternating via Ezeiza (SAEZ).
- Asunción Center (SGAS) – main route via Brasilia (SBBR), alternating via Ezeiza (SAEZ).

- Montevideo Center (SUMU) – main route via Lima (SPIM), alternating via Brasilia (SBBR).
- Georgetown Center (SYCJ) – main route via Piarco (TTPP), alternating via Caracas (SVCA) to the following locations: TA, TB, TD, TF, TG, TK, TL, TQ, TR, TT and TV.
- Georgetown Center (SYCJ) – main route via Brasilia (SBBR), alternating via Caracas (SVCA) to the other NAM/CAR locations.
- Cayenne (SOCA) and Paramaribo (SMJP) Centers – main route via Brasilia (SBBR), alternating via Caracas (SVCA).

## APPENDIX B

### Syllabus for the Training on Interoperability Standards for VOIP ATM Components (EUROCAE ED-137)

#### Basic Telecommunications Review and Overview of a Voice Communication System

- Introduction to Voice Communications;
- Description of the services of a voice communications system and HMI (Human Machine Interface);
- Telephony features;
- Characteristics of radio communication; and
- Operational functions for the operation of the VCS.

#### Overview of an ATS Ground Voice Network (AGVN)

- Concepts of an ATS Terrestrial Voice Network (AGVN);
- Analogue telephony signaling;
- Digital telephony signaling;
- Radio signaling; and
- Scenarios for AGVN implementation.

#### VoIP communication functionalities

- IP packet switching;
- Voice over IP;
- Real-Time Transport Protocol (RTP);
- Quality of Service (QoS);
- Session Initiation Protocol (SIP);
- Session Description Protocol (DSP); and
- Detail of the SIP call.

#### Architecture of an ATC Voice over IP Communication System

- VoIP Documentation and Working Groups (WG);
- Logical entities of a VCS;
- Physical architecture of a VCS;
- Telephone communications;
- Radio communications;
- IP Gateways;
- Recording.

#### ATC Voice (Legacy Systems and VoIP) in ATM Network Architecture

- Description of regional ATC IP network projects;
- Description of circuit emulation functionality that supports legacy ATC voice services;
- Voice services on ATC IP networks;
- Validation activities (SESAR 15.2.10);
- Native VoIP solution on ATC IP networks; and
- Case study for ATC Voice and Data integration.

Legacy ATC Voice System Migration to VoIP and ATC VoIP System Operation

- Migration from legacy ATC voice system (radio and telephony) to VoIP;
- IP VCS operation;
- Evolution of the current ATM application towards VCS integration;
- VoIP deployment status.

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