**INTERNATIONAL CIVIL AVIATION ORGANIZATION**
**AFI PLANNING AND IMPLEMENTATION REGIONAL GROUP (APIRG) PROJECT**

**PROJECT: AIR/GROUND COM PROJECT**

**Coordinator: South Africa**
**DOMAIN : IIM**
(Infrastructure & Information Management)

| AFI Region | PROJECT DESCRIPTION | DP N° C | |
|---|---|---|---|
| *Sub Domain* | **Title of the Project** | **Start** | **End** |
| *Aeronautical Communication* (COM)<br><br>(ICAO Facilitator: *WACAF/ESAF ROs/CNS* | **AIR/GROUND COMMUNICATION: Implementation of Air/Ground communication aimed at ensuring Air traffic control.**<br><br>**Project-Team Coordinator**: *South Africa*<br><br>**Project Team Experts (13):** Côte d'Ivoire, Cameroon, Ghana, Seychelles, Senegal, Kenya, ASECNA, IATA, Nigeria, Botswana, Togo and Uganda | | |
| **Objectives** | In the framework of the technologies Roadmap for Communication defined in the GANP 6<sup>th</sup> edition and the AFI Communication strategy assist States in the implementation of Aeronautical Mobile Service through:<br> a) High Frequency/Very High Frequency (**HF/VHF**) voice Communication<br> b) High Frequency/Very High Frequency Data link communication (**HF/VHF DL**)<br> c) Controller/Pilot Data Link Communication (**CPDLC**)<br><br>In accordance with the operational requirements of ICAO Annex 10 Volumes II & III Aeronautical Telecommunication, Annex 11 Air Traffic Service and the relevant supporting guidance documents (Doc 4444 | | |

| AFI Region | PROJECT DESCRIPTION | DP N° C | |
|---|---|---|---|
| *Sub Domain* | Title of the Project | Start | End |
| | Procedures for Air Navigation Service (PANS--ATM) Doc 9694 Manuel on Air Traffic Services Data Link Applications, Doc 10037 Global Operational Data Link Document (GOLD) | | |
| Scope | The provision of air/ground communication between Pilots and ATCOs will cover all Airspaces and Air Traffic Control Centers involved in the provision of air navigation service for international civil aviation. The implementation scheme will be in accordance with the requirements of the provision of Aeronautical Mobile Service (AMS) as defined by the AFI Air Navigation Plan (AFI/RAN Abuja 1997) | | |
| Metrics | **a) HF/VHF Voice & Data Link:**<br>    i. Number of Routes covered by **HF/VHF** communication: **X**<br>      - Average availability of **HF/VHF** voice: X%<br>    ii. Number of HF/VHF DL station implemented<br>      - Average availability of HF/VHF DL: X%<br><br>**b) CPDLC:**<br>  - Number of ATCs with CPDLC systems installed: **X**<br>  - Average availability of CPDLC Links: **X%** | | |
| Outcome | Air/Ground communication supporting enhanced aeronautical operational safety, capacity and efficiency | | |
| Strategy | All tasks will be carried out by COM experts nominated by AFI States participating in the project, led by the Project-Team Coordinator and under the supervision of the Project Facilitators (ROs/CNS, Dakar and Nairobi) through the IIM SG working methodology.<br>Upon completion of the tasks, the results will be sent to the Project Facilitators as a final document for submission to, and if necessary approval by the APIRG Projects Coordination Committee (APCC).<br>For the purpose of collaborative decision-making, meetings will be held with the areas involved. | | |

| AFI Region | PROJECT DESCRIPTION | | DP N° C | |
|---|---|---|---|---|
| *Sub Domain* | **Title of the Project** | | **Start** | **End** |
| **Rationale/ Justification** | a) **HF/VHF Voice:** The requirements for HF/VHF are contained in the AFI Air Navigation Plan (ANP), FASID TABLE CNS 2A (Aeronautical Mobile Service and Aeronautical Mobile Satellite service-AMS &AMSS and Stations circuits have been implemented in accordance with this AFI Air Navigation Plan. Significant improvements are noted, notably with the implementation of aeronautical satellite telecommunications. However, the non- availability of Remote VHF encountered from time to time results from the obsolescence of some VSAT technologies.<br><br>b) **HF/VHF and Data Link:** The introduction of the regional requirements for HF/VHF Data Link remain to be updated by the project Team<br><br>c) **CPDLC**: The introduction of datalink communication in the region associated with surveillance data processing systems with possible automation of the transfer and coordination of Air Traffic between air traffic centers require an available digital air/ground communication system. The implementation of CPDLC will bring more accuracy in the exchanged messages and increase the availability of message exchanges between ATCOs and pilots. | | | |
| **Related projects** | All APIRG projects specifically related to:<br>- B0/1 - Aircraft Communication Addressing Reporting System (ACARS)<br>- B0/3 - VHF Data Link (VDL) Mode O/A<br>- B0/4 - VHF Data Link (VDL) Mode 2 Basic<br>- B0/5 - Satellite Communication (SATCOM) Class C Data<br>- B0/6 - High Frequency Data Link (HFDL)<br>- B1/2 - VHF Data Link (VDL) Mode 2 Multi- Frequency<br>- B1/3 - SATCOM Class B Voice and Data<br>- B1/4 - Aronautical Mobile Airport Communication System (AeroMACS)<br>- B2/2 - Aeronautical Mobile Aircraft Communication System (AeroMACS) aircraft mobile connection<br>- B2/3 - Link meeting requirements for non-safety critical communication<br>- B0/1 - CPDLC (FANS 1/A & ATN B1) for domestic and procedural airspace<br>- B1/1 - PBCS approved CPDLC (FANS 1/A +) for domestic and procedural airspace<br>- B1/3 - SATVOICE (incl. routine communication) for procedural airspace | | | |

| AFI Region | PROJECT DESCRIPTION | | DP N° C | |
|---|---|---|---|---|
| *Sub Domain* | Title of the Project | | Start | End |
| | - B2/1 - PBCS approved CPDLC (B2) for domestic and procedural airspace <br> - B2/3 - PBCS approved SATVOICE (incl.routine communications) for procedural airspace | | | |

| Project Deliverables | Relationship with the regional performance-Objectives (RPO) and ASBU modules | Responsible Party | Status of Implementation[1] | Date of Delivery | Comments |
|---|---|---|---|---|---|
| | | | HF/VHF/CPDLC | | |
| Implementation status of HF &VHF stations (Voice & data Link) | - COMI-B0 <br> - COMI-B1 <br> - COMI-B2 <br> - COMS -B0 <br> - COMS-B1 <br> - COMS-B2 | AFI COM Project Coordinator | | Quarterly | |

[1] *Grey    Task not started yet*
  *Green    Activity being implemented as scheduled*
  *Yellow    Activity started with some delay, but will be implemented on time*
  *Red    Activity not implemented on time; mitigation measures are required*

| Project Deliverables | Relationship with the regional performance-Objectives (RPO) and ASBU modules | Responsible Party | Status of Implementation[1] | Date of Delivery | Comments |
|---|---|---|---|---|---|
| Implementation/Operation status of CPDLC Circuits | - COMI-B0<br>- COMI-B1<br>- COMI-B2<br>- COMS -B0<br>- COMS-B1<br>- COMS-B2 | AFI COM Project Coordinator | | Quarterly | |
| Teleconferences, Workshops/Seminars, meetings (French and English) on VHF/CPDLC systems operation and their implementation scheme | - COMI-B0<br>- COMI-B1<br>- COMI-B2<br>- COMS -B0<br>- COMS-B1<br>- COMS-B2 | AFI COM Project Coordinator | | Once a month | |
| Implementation/sharing and Operation status of Remote VHF/HF systems | - COMI-B0<br>- COMI-B1<br>- COMI-B2<br>- COMS -B0<br>- COMS-B1<br>- COMS-B2 | AFI COM Project Coordinator | | Quarterly | |

| Project Deliverables | Relationship with the regional performance-Objectives (RPO) and ASBU modules | Responsible Party | Status of Implementation[1] | Date of Delivery | Comments |
|---|---|---|---|---|---|
| Assessment/Reporting on the operation of Air ground communication systems and operation | - COMI-B0<br>- COMI-B1<br>- COMI-B2<br>- COMS -B0<br>- COMS-B1<br>- COMS-B2 | AFI COM Project Coordinator | | Quarterly | |
| Detailed guidance provided to States not complying with the AFI AMS Plan | - COMI-B0<br>- COMI-B1<br>- COMI-B2<br>- COMS -B0<br>- COMS-B1<br>- COMS-B2 | AFI COM Project Coordinator | | Quarterly | |
| List of States with VHF and CPDLC, implemented | - COMI-B0<br>- COMI-B1<br>- COMI-B2<br>- COMS -B0<br>- COMS-B1<br>- COMS-B2 | AFI COM Project Coordinator | | Quarterly | |

| Project Deliverables | Relationship with the regional performance-Objectives (RPO) and ASBU modules | Responsible Party | Status of Implementation[1] | Date of Delivery | Comments |
|---|---|---|---|---|---|
| HFDL / VDL Requirement (Manual / Guidance) | - COMI-B0<br>- COMI-B1<br>- COMI-B2<br>- COMS -B0<br>- COMS-B1<br>- COMS-B2 | AFI COM Project Coordinator | | 2 years | |
| AFI Communication Strategy | - COMI-B0<br>- COMI-B1<br>- COMI-B2<br>- COMS -B0<br>- COMS-B1<br>- COMS-B2 | AFI COM Project Coordinator | | 2 years | |
| Project Costing Report | N/A | AFI COM Project Coordinator | | 2 years | |
| | | | | | |
| **Resources needed** | • Adequate human resources to be appointed by States<br>• Funds to conduct meetings, Workshops, Seminars Missions and to translate reports, regional guides and manuals. Likewise, participants must be given facilities to participate in teleconferences and coordination meetings.<br>• Funds for meetings with project Team Members to assess the results and propose corrective actions. States could use their human resources to conduct the foreseen COM tests and monitoring, and, if necessary, cover the financial costs, since the experience gained will result in an improvement of their own systems. | | | | |

| PROJECT DELIVERABLE COLOUR | MEANING |
|---|---|
|  | *Grey Task not started yet* |
|  | *Green Activity being implemented as scheduled* |
|  | *Yellow Activity started with some delay, but will be implemented on time* |
|  | *Red Activity not implemented on time; mitigation measures are required* |

**DOMAIN: IIM (**Infrastructure & Information Management)

**COM PROJECT.4: Integrated Aeronautical Telecommunication Infrastructure**

**Project Team Coordinator:  Togo**

| AFI Region | PROJECT DESCRIPTION | DP N° C | |
|---|---|---|---|
| *Programme* | **Title of the Project** | **Start** | **End** |
| AFI Integrated Aeronautical Telecommunication Infrastructure | **AFI**<br><br>**Project Coordinador**: *Togo (Mr **AYINA AKILOTAN Cumbi Hugues**, ASECNA HQ)*<br>**Project Team Experts:** *Togo, Benin ,Nigeria, Côte d'Ivoire,  Ghana, Kenya, Mauritania, South Africa, Tanzania, Uganda, ASECNA, IATA, ICAO FISS* | | |
| **Objectives** | Develop an AFI interoperable seamless telecommunication infrastructure to support ATM, AIM, MET and aeronautical telecommunication services | | |
| **Scope** | • Achieve interoperability among the AFI aeronautical VSAT networks<br>• Develop and implement AFI ATN IPS backbone<br>• Provide a common cybersecured IP based managed network and intranet services based in ATN IPS across the AFI region and its adjacent regions<br>• Provide an efficient support to operational data and potentially voice communications | | |
| **Metrics** | Coverage of IP infrastructure with capability to support forthcoming ATM, AIM and MET services | | |
| **Goals** | Ensure that the aeronautical services are provided in compliance with relevant ICAO SARPs | | |

| AFI Region | PROJECT DESCRIPTION | DP N° C | |
|---|---|---|---|
| *Programme* | **Title of the Project** | **Start** | **End** |
| **Strategy** | <ul><li>Upgrade of AFI VSAT networks to support the evolution of the current ATM, MET, AIM services</li><li>Implement in addition a global IP infrastructure in the near future to deploy forthcoming ATM, MET, AIM services including AFI IP backbone architecture and addressing plan able to ensure gateways interoperability with the other region.</li><li>Implement a global security policy for a secured operation</li><li>Training and qualification of Technical and operational staff</li><li>ICAO and Designated Experts to conduct technical workshops to support the development of the project</li></ul> | | |
| **Justification** | The ASBU modules and the future aeronautical services AIM, MET, ATM, are based on IP protocols suites and require shared intranet infrastructure | | |
| **Related projects** | **COM1/B1 (mainly)**<br>B1/1 - Ground-Ground Aeronautical Telecommunication Network/Internet Protocol suite (ATN/IPS)<br><br>**COM1/B2**<br>B2/1 - Air-Ground ATN/IPS<br><br>**COMS/B0**<br>B0/1 - CPDLC (FANS 1/A & ATN B1) for domestic and procedural airspace<br><br>**COMS/B1**<br>B1/1 - PBCS approved CPDLC (FANS 1/A +) for domestic and procedural airspace | | |
| **Resources needed** | Experts from States, and industry with a relevant knowledge of ATN IPS standards, web services, architecture of information systems and States to host workshops, funds, etc. | | |

| Project Deliverables | Relationship with the regional performance-Objectives (RPO) and ASBU B0 modules | Responsible Party | Status of Implementation[2] | Date of Delivery | Comments |
|---|---|---|---|---|---|
| D00] To elaborate and consolidate the terms of reference. | COM1 COMS | PTC | <span style="color:green">[green]</span> | 28/07/2022 | Taking account alignment of ASBU module during IIM/SG5 |
| D01 Update and transmit the questionnaire to states and ANSPs | COMI COMS | PTC | <span style="color:yellow">[yellow]</span> | 30/09/2022 | Taking account the alignment to the ASBU module |
| [D02] Assessment of the current AFI VSAT networks with regard to regard to the ATM requirements | COM1 COMS | Team | <span style="color:yellow">[yellow]</span> | 31/10/2022 | Taking account, report of audit and/or other element available for AFISNET, NAFISAT/SADC, CAFSAT, etc.<br><br>Spectrum issues (5G, etc..) |
| [D03] Assessment of the current and forthcoming need of services with regard to regard to the ATM, AIM, MET requirements | COM1 COMS | Team | <span style="color:red">[red]</span> | | Coordination AIM and MET PTCs of relevant projects, with the facilitation of the secretariat. |
| [D04] Organized Technical workshops to support the development of the project, particularly on new concept of information management | COM1 COMS | Team | <span style="color:red">[red]</span> | 30/11/2022 | Transition of the current network to the forthcoming intranet based on network and IPS environment SWIM, etc… |

---

[2] *Grey        Task not started yet*
   *Green     Activity being implemented as scheduled*
   *Yellow    Activity started with some delay, but will be implemented on time*
   *Red        Activity not implemented on time; mitigation measures are required*

| Project Deliverables | Relationship with the regional performance-Objectives (RPO) and ASBU B0 modules | Responsible Party | Status of Implementation[2] | Date of Delivery | Comments |
|---|---|---|---|---|---|
| [D05] Study and design principle for new AFI Integrated Regional Telecommunication infrastructure | COM1 COMS | Team | | 31/05/2022 | Doc 9896 ATN IPS, DOC 10039 Manuel on SWIM Concept. EUROCAE ED137 VoiP, etc.<br><br>Based on appropriate technology (VSAT, optical fiber, cloud, virtualization, etc.)<br>• IP backbone architecture<br>• IP address scheme definition<br>Assessment of the bandwidth requirements |
| [D06] Developing KPI tools of the AFI Integrated Regional Telecommunication Infrastructure | COM1 COMS | Team | | 15/07/2023 | Tools for monitoring of operational KPI (Systems and Services) and security and cyberthreat assment |
| [D07] develop guidance material for implementation and a global security policy for a secured operation | COM1 COMS | Team | | 15/10/2023 | Manual of ATN IPS implementation in the AFI region |
| [D08] Training and qualification of Technical staff | COM1 COMS | PTC | | 15/11/2023 | TOR to be defined |
| [D09] Develop AFI Communication Strategy | COM1 | PTC | | 30/11/2023 | Team participation and Inputs, with support of steakholders |
| [D10] Develop project costing template | COMS | PTC | | 15/12/2023 | Team Participation and Inputs, in the development of project costing template |
| Resources needed | • Experts from States, specifics expertise from industry/states on network and information system architecture<br>• States to host workshops<br>• Funds | | | | |

# INTERNATIONAL CIVIL AVIATION ORGANIZATION
### AFI PLANNING AND IMPLEMENTATION REGIONAL GROUP (APIRG) PROJECT

**DOMAIN : IIM** (Infrastructure & Information Management)

Project Team Coordinator: **Côte d'Ivoire**

**COM Project 5: Assessment of AFI Air Navigation Services Cyber Safety and Resilience**

| AFI Region | PROJECT DESCRIPTION | DP N° C | |
|---|---|---|---|
| *Programme* | **Title of the Project** | **Start** | **End** |
| Assessment of AFI Aeronautical Networks cyber security | Assessment of AFI Air Navigation Services Cyber Resilience<br><br>**Project coordinador**:  Côte d'Ivoire<br>**Experts contributing to the project**: Côte d'Ivoire, Benin, Gambia, Ghana, Kenya, Nigeria, South Africa, Somalia, ASECNA, IATA, Cameroun, Madagascar, Somalia | 01/08/2017 | 31/12/2022 |
| **Objectives** | In the framework of the technologies Roadmap defined in the 6th edition of the GANP, Develop and implement a global Cyber resilience framework over the AFI region for Air Navigation Services to prevent internal and external threats impacting availability, reliability, integrity and continuity of Air Navigation Services | | |
| **Scope** | The scope of the project includes:<br>• assessment of the cyber threats on Air Navigation Services in Africa;<br>• development of a cyber resilience framework[3] over the AFI region. | | |
| **Metrics** | 1) ANS Cyber resilience policies<br>   Number of AFI States/ ANSPs with an effective cyber resilience policy put in place<br>   % of AFI States/ ANSPs with an effective cyber policy put in place<br><br>2) ANS Cyber resilience training and awareness<br>   Number of Cyber resilience awareness campaign conducted by ANSPs/ CAAs in AFI Region | | |
| **Goals** | Ensure that the Air Navigation Services are provided in compliance with ICAO SARPs, guidelines | | |

---

[3] This framework will be voluntary guidance, based on existing standards, guidelines, and practices for organizations to manage and reduce cybersecurity risk. It would assess all issues including the definition of common cyber threats, training & awareness, response, recovery performances, security studies, systematic process of cyber risk evaluation on all new systems, audits and controls.

| AFI Region | PROJECT DESCRIPTION | DP N° C | |
|---|---|---|---|
| *Programme* | **Title of the Project** | **Start** | **End** |
| **Strategy** | All tasks will be carried out by COM/ IT experts nominated by AFI States participating in the project, led by the Project-Team Coordinator and under the supervision of the Project Facilitators (ROs/CNS, Dakar and Nairobi) through the IIM SG working methodology.<br><br>Upon completion of the tasks, the results will be sent to the Project Facilitators as a final document for submission to, and if necessary, approval by the APIRG Projects Coordination Committee (APCC).<br><br>The project rely on the following phases:<br>• Project Definition (development of project documentation),<br>• ANS cyber risk assessment (through survey)<br>• Regulatory analysis<br>• Development of AFI ANS Cyber safety and resilience framework<br>• AFI ANS Cyber resilience awareness | | |
| **Justification** | The air transport infrastructure is an attractive target for cyber-attacks due to its importance and prominence. The networks and systems, interconnecting the various ANSP are IP-based and are exposed at several levels to cyber-attacks. The cyber threats are real and can take several forms depending on the means of the hackers. Therefore, organizations must identify their critical information systems and implement appropriate cyber security measures in complement to existing cyber security objectives.<br><br>There is a need for a cyber resilience approach for the aviation over the AFI region, which would assess all cyber issues. | | |
| **Related projects** | 1. All APIRG specifically projects related to:<br>• **FICE    B0/1 - Automated basic facility data exchange (AIDC)**<br>• **COMI-B0**<br><br>• **COMI-B1**<br><br>• **COMS - B0**<br><br>• **NAVS-B0**<br><br>• **ASUR-B0**<br><br>Projects related to aeronautical information | | |

| AFI Region | PROJECT DESCRIPTION | DP N° C | |
|---|---|---|---|
| *Programme* | **Title of the Project** | **Start** | **End** |
| | 2. Sub-regional projects and other bilateral initiatives<br><br>• Project of surveillance data exchange between ASECNA, GHANA and NIGERIA | | |

| Project Deliverables | Relationship with the regional performance-Objectives (RPO) and ASBU modules | Responsible Party | Status of Implementation[4] | Date of Delivery | Comments |
|---|---|---|---|---|---|
| [D01] Project Description | FICE B0/1<br>COMI-B0<br>COMI-B1<br>COMS - B0<br>NAVS-B0<br>ASUR-B0 | IIM SG/COM/Project 5 project team | completed | 31/12/2018 | |
| [D02] Project Organization Description | FICE B0/1<br>COMI-B0<br>COMI-B1<br>COMS - B0<br>NAVS-B0<br>ASUR-B0 | IIM SG/COM/Project 5 project team | completed | 31/12/2018 | |

---

[4] *Grey    Task not started yet*
*Green    Activity being implemented as scheduled*
*Yellow    Activity started with some delay, but will be implemented on time*
*Red    Activity not implemented on time; mitigation measures are required*

| Project Deliverables | Relationship with the regional performance-Objectives (RPO) and ASBU modules | Responsible Party | Status of Implementation[4] | Date of Delivery | Comments |
|---|---|---|---|---|---|
| [D03] Terms of reference | FICE B0/1 COMI-B0 COMI-B1 COMS - B0 NAVS-B0 ASUR-B0 | IIM SG/COM/Project 5 project coordinator | completed | 30/06/2018 | |
| [D04] Project linkage | FICE B0/1 COMI-B0 COMI-B1 COMS - B0 NAVS-B0 ASUR-B0 | IIM SG/COM/Project 5 project team | completed | 30/09/2018 | |
| [D05] Project questionnaire | FICE B0/1 COMI-B0 COMI-B1 COMS - B0 NAVS-B0 ASUR-B0 | IIM SG/COM/Project 5 project team | completed | 30/09/2019 | |
| [D06] Assessment of the current ANS cyber resilience and diagnostic of the potential threats to the safe provision of the air navigation service in the AFI region | FICE B0/1 COMI-B0 COMI-B1 COMS - B0 NAVS-B0 ASUR-B0 | IIM SG/COM/Project 5 project team | ongoing | 30/09/2022 | |
| [D07] Global cybersecurity framework for a secured operation of the AFI ANS systems, data and networks | FICE B0/1 COMI-B0 COMI-B1 COMS - B0 NAVS-B0 ASUR-B0 | IIM SG/COM/Project 5 project team | ongoing | 30/11/2022 | |

| Project Deliverables | Relationship with the regional performance-Objectives (RPO) and ASBU modules | Responsible Party | Status of Implementation[4] | Date of Delivery | Comments |
|---|---|---|---|---|---|
| [D08][5] Teleconferences, Workshops/Seminars/webinars, working sessions (French and English) on global cyber resilience policy | FICE B0/1 COMI-B0 COMI-B1 COMS - B0 NAVS-B0 ASUR-B0 | IIM SG/COM/Project 5 project team | | 2021 2022 | |
| **Resources needed** | <ul><li>Adequate human resources to be appointed by States (experts from States)</li><li>Expertise in Aviation Cybersecurity, Cyber resilience, Cyber safety</li><li>Funds to conduct meetings, Workshops, Seminars Missions and to translate reports, regional guides and manuals. Likewise, participants must be given facilities to participate in teleconferences and coordination meetings.</li><li>Funds for meetings with project Team Members to assess the results and propose corrective actions.</li></ul> | | | | |

*Grey Task not started yet*
*Green Activity being implemented as scheduled*
*Yellow Activity started with some delay, but will be implemented on time*
*Red Activity not implemented on time; mitigation measures are required*

---

[5] Objectives:

Working Sessions are an essential tool to:
- Discuss with main African Stakeholders about key essential aspects of Cyber resilience in Aviation
- Network people and contribute to build capacity in Cybersecurity in aviation
- Deliver valuable information to decision makers about Cyber safety and cyber resilience
- Gather best practices from other regional initiatives on Cyberspace issues for Aviation

There is a need for ICAO and Designated Experts to conduct Technical workshops to support the development of the project