

RAPPORT – ATN/TF/2

ORGANISATION DE L'AVIATION CIVILE INTERNATIONALE



**RAPPORT DE LA DEUXIEME REUNION DE L'EQUIPE DE TRAVAIL SUR LA
PLANIFICATION DU RESEAU DE TELECOMMUNICATIONS AERONAUTIQUES DE LA
REGION AFI**

(ATN/TF/2)

Dakar, 5 – 6 avril 2005

Préparé par le Bureau Afrique orientale et australe de l'OACI

Les appellations employées dans cette publication et la présentation des éléments qui y figurent n'impliquent de la part de l'OACI aucune prise de position quant au statut juridique des pays, territoires, villes ou zones ou leurs frontières ou limites.

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Liste des abréviations

ACC	centre de contrôle régional
ADS	surveillance dépendante automatique
AIC	Circulaire d'information aéronautique
AFI	Région Afrique – Océan indien
AFISNET	AFI Satellite Télécommunications Network
ACP	Groupe d'experts en communications aéronautiques
AMHS	Système de messagerie ATS
APANPIRG	Groupe régional Asie/Pacifique de planification et de mise en oeuvre de la navigation aérienne
APIRG	Groupe régional de planification et de mise en oeuvre de la Région AFI
AR	Zone de routes aériennes
ASECNA	Agence pour la sécurité de la navigation aérienne en Afrique et à Madagascar
ATC	contrôle de la circulation aérienne
ATM	gestion du trafic aérien
ATN	réseau de télécommunications aéronautiques
ATNP	Groupe d'experts du réseau de télécommunications aéronautiques
ATS	services de la circulation aérienne
BIS	système intermédiaire limite (<i>Boundary Intermediate System</i>)
BBIS	système intermédiaire limite dorsal (<i>Backbone Boundary Intermediate System</i>)
CIDIN	Réseau commun OACI d'échange de données
CNS	communications, navigation et surveillance
CPDLC	communications contrôleur-pilote par liaison de données
ES	système d'extrémité
EUROCONTROL	Organisation européenne pour la sécurité de la navigation aérienne
FAA	Federal Aviation Administration (États-Unis)
FIR	région d'information de vol
FM	modulation de fréquence
FMC	calculateur de gestion de vol
FMS	système de gestion de vol
HF	hautes fréquences
IATA	Association du transport aérien international
IS	système intermédiaire
ISO	Organisation internationale de normalisation
MODE S	liaison de données SSR Mode S
NSAP	Point d'accès au service réseau
OACI	Organisation de l'aviation civile internationale
OSI	interconnexion de systèmes ouverts
RD	domaine de routage
RSFTA	réseau du service fixe des télécommunications aéronautiques
SARPs	normes et pratiques recommandées
SATCOM	communications par satellite
SFA	service fixe aéronautique
SITA	Société internationale de télécommunications aéronautiques
SMA	service mobile aéronautique
SMA(R)	service mobile aéronautique (Route)
SSR	radar secondaire de surveillance
TCP/IP	protocole de contrôle du transport/protocole Internet
TMA	région de contrôle terminale

VDL
VHF

Liaison de données VHF
très hautes fréquences

Historique

1. Introduction

1.1 La deuxième réunion de l'Equipe de travail sur la planification du réseau de télécommunications aéronautiques (ATN/TF/2) de la Région AFI s'est tenue à Dakar, Sénégal, du 5 au 6 avril 2005.

2. Experts et Secrétariat

2.1 Mr. Amadou Sene, Expert régional en Communications, Navigation et Surveillance (RO/CNS) du Bureau de l'OACI pour l'Afrique orientale et australe (Nairobi), était le Secrétaire de la réunion. Il était assisté de M. Prosper Zo'o – Minto'o et de Mme Mary Obeng, Experts régionaux en Communications, Navigation et Surveillance (RO/CNS) du Bureau de l'OACI pour l'Afrique occidentale et centrale (Dakar). Le Secrétariat a assuré le rôle de modérateur de la réunion.

3. Participation

3.1 Quarante (40) délégués provenant de seize (16) Etats contractants et deux (2) organisations internationales ont participé à la réunion. La liste des participants figure en **Appendice A** à la présente partie du rapport.

4. Langue de travail

4.1 L'Anglais était la langue de travail de la réunion et la documentation était disponible dans cette langue.

5. Ordre du jour

5.1 La réunion a adopté l'ordre du jour ci-après:

Point 1 de l'ordre du jour:	Examen du mandat et du programme de travail de l'Equipe de travail
Point 2 de l'ordre du jour:	Description de la topologie du réseau ATN AFI
Point 3 de l'ordre du jour:	Description des applications sol/sol de l'ATN
Point 4 de l'ordre du jour:	Formulation de propositions visant à assurer l'interopérabilité des réseaux VSAT
Point 5 de l'ordre du jour:	Programme de travail futur et composition de l'Equipe de travail
Point 6 de l'ordre du jour:	Questions diverses

6. Projets de conclusions et projets de décisions

6.1 L'Equipe de travail consigne son action sous forme de projets de conclusions et de projets de décisions ayant la portée ci-après :

6.2 Projets de conclusions

6.2.1 Les projets de conclusions approuvés par l'APIRG ont trait aux questions qui, aux termes du mandat du Groupe, méritent d'être portés directement à l'attention des États, et auxquelles l'OACI donnera la suite qu'il conviendra conformément aux procédures établies.

6.3 Projets de décisions

6.3.1 Les projets de décisions ont trait aux questions intéressant le Sous-groupe CNS et l'Equipe de travail.

6.4 Liste des projets de conclusions

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6.5 Liste des projets de décisions

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Point de l'ordre du jour	Appendice	Titre
Introduction	A	Liste des Participants
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2	2A	Projet de plan d'architecture de routage ATN de la Région AFI
2	2B	Mise en œuvre des circuits entre les BBIS et les BIS du réseau ATN de la Région AFI
2	2C	Diagramme du projet d'architecture ATN de la Région AFI
2	2D	Projet de plan d'adressage NSAP du réseau ATN de la Région AFI
5	5A	Programme de travail futur et composition de l'Equipe de travail sur la planification de l'ATN

**INTERNATIONAL CIVIL AVIATION ORGANIZATION
WESTERN AND CENTRAL AFRICAN OFFICE**

**APPENDIX A
APPENDICE A**

**Second Meeting of the ATN Planning Task Force
(Dakar, 5-6 April 2005)**

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Point 1 de l'ordre du jour: Examen du mandat, du programme de travail et de la composition de l'Equipe de travail sur la planification de l'ATN

1.1 L'Equipe de travail sur la planification de l'ATN de la Région AFI note que la réunion COM/SG/6 (Nairobi, 24-26 septembre 2002) a examiné son premier rapport et a noté que ses travaux n'étaient pas encore achevés. Le Sous-groupe COM a alors adopté un nouveau mandat et un nouveau programme de travail pour l'Equipe de travail sur la planification de l'ATN qui figurent à l'**Appendice 1A** à cette partie du rapport.

1.2 La réunion est d'avis que chaque tâche engendrera la production de plusieurs documents. Les paragraphes ci-après montrent les sous-tâches restant à accomplir afin de mener à terme les tâches du programme de travail, en se basant sur l'expérience de la Région Asie/Pacifique :

Note : Un glossaire des termes figure à l'Appendice 1B de ce rapport

Tâche 1 : Elaborer l'architecture de routage du réseau ATN

1.3 Cette tâche comprendra la rédaction des documents suivants:

- a) Architecture de routage de l'ATN
- b) Plan de transition vers le réseau ATN sol/sol
- c) Plan des routeurs ATN pour le FASID de la Région AFI
- d) Politique de routage du protocole inter-domaine (IDRP) du réseau ATN
- e) Document de contrôle d'interface (ICD) sol/sol de l'ATN
- f) Document de contrôle d'interface (ICD) air/sol de l'ATN

Tâches 2 et 4 : Application ATN (AMHS, AIDC)

1.4 Cette tâche comprendra la rédaction des documents suivants:

- a) Plan de dénomination de l'AMHS
- b) Document de contrôle d'interface (ICD) de l'AMHS
- c) Plan de routage de l'AMHS pour le FASID de la Région AFI
- d) Politique de routage des agents de transfert des messages de l'AMHS
- e) Formulaire d'enregistrement des adresses AMHS
- f) Plan des circuits de l'AIDC pour le FASID de la Région AFI

Tâche 3 : Elaborer un plan d'adressage du réseau ATN

1.5 Cette tâche comprendra la rédaction des documents suivants:

- a) Plan d'adressage NSAP de l'ATN
- b) Formulaire d'enregistrement des adresses du NSAP de l'ATN

Tâche 5: Elaborer des éléments indicatifs

1.6 Cette tâche comprendra la rédaction des documents suivants:

- a) Eléments indicatifs sur la transition vers l'ATN

b) Aperçu de l'ATN

1.7 La réunion note que le Manuel des provisions techniques applicables au réseau de télécommunications aéronautiques (Doc 9705-AN/956 de l'OACI), Troisième Edition, contient des dispositions additionnelles nécessaires à la mise en œuvre de l'ATN :

- a) Gestion système de l'ATN
- b) Service d'annuaire de l'ATN
- c) Service de sécurité de l'ATN

1.8 Ces dispositions devront être ajoutées à la liste des tâches de l'Equipe de travail et nécessiteront la rédaction de documents appropriés pour servir d'éléments indicatifs à la mise en œuvre de l'ATN dans la Région AFI.

1.9 Compte tenu de ce qui précède, la réunion décide d'entreprendre les sous-tâches suivantes, étant entendu que les autres sous-tâches feront l'objet des réunions à venir :

- a) Architecture de routage ATN ;
- b) Plan de transition vers le réseau ATN sol/sol ;
- c) Plan des routeurs ATN pour le FASID de la Région AFI ; et
- d) Plan d'adressage NSAP du réseau ATN.

1.10 La réunion accepte la candidature du Cameroun, de la République démocratique du Congo, du Ghana, du Maroc et de Maurice comme membres de l'Equipe de travail sur la planification de l'ATN. Le projet de décision suivant est adopté :

Projet de Décision 2/1 : Composition de l'Equipe de travail AFI sur la planification de l'ATN

Il est décidé que le Cameroun, la République démocratique du Congo, le Ghana, Maurice et le Maroc soient membres de l'Equipe de travail AFI sur la planification de l'ATN.

TERMES DE REFERENCE ET PROGRAMME DE TRAVAIL DE L'EQUIPE DE TRAVAIL SUR LA PLANIFICATION DU RESEAU DE TELECOMMUNICATIONS AERONAUTIQUES DE LA REGION AFI (ATN/TF)		
TERMES DE REFERENCE		
Planifier la mise en oeuvre du réseau de télécommunications aéronautiques (ATN) dans la Région AFI afin de répondre aux exigences de performance et de capacité des systèmes CNS/ATM.		
PROGRAMME DE TRAVAIL		
TACHE No.	SUJET	DATE CIBLE
1	Finalisation de l'architecture du plan de routage de l'ATN.	APIRG/15
2	Description des applications sol-sol de l'ATN (AMHS, AIDC).	APIRG/15
3	Préparation du plan d'adressage de l'ATN.	APIRG/15
4	Préparation de la nomenclature et du plan d'adressage de l'AMHS	APIRG/15
5	Préparation des lignes directrices pour assister les Etats, selon les besoins.	APIRG/15
6	Mise à jour des lignes directrices sur l'ATN figurant au Plan de mise en oeuvre du CNS/ATM (Doc 003).	APIRG/15
7	Formulation de propositions visant à assurer l'interopérabilité entre les réseaux VSAT existants.	APIRG/15
COMPOSITION		
<i>Algérie, Angola, Burundi, Egypte, Ethiopie, Guinée, Kenya, Malawi, Niger, Nigeria, Sénégal, South Africa/Afrique du Sud, Tunisie, ASECNA et IATA.</i>		

Glossaire

Plan d'adressage	Plan qui fournit une syntaxe d'adresse commune et assure la gestion des adresses globales afin, d'identifier sans ambiguïté tous les systèmes d'extrémité et intermédiaires.
Système d'extrémité (ES)	Système qui contient les sept couches OSI ainsi qu'un ou plusieurs processus d'applications utilisateurs
Système intermédiaire (IS)	Système assurant les fonctions de relayage et de routage et comprenant les trois couches inférieures du modèle de référence OSI.
Système intermédiaire limite (BIS)	Système intermédiaire capable de relayer des données entre deux domaines de routage ou deux domaines administratifs distincts.
Plan de dénomination	Plan qui contient des conventions de dénomination et des désignations communes permettant d'identifier sans ambiguïté tous les systèmes d'extrémité et intermédiaires.
Point d'accès au service réseau (NSAP)	Point de l'architecture des protocoles ISO où les utilisateurs globaux peuvent être identifiés par une adresse unique pour communiquer de bout en bout.
Adresse de point d'accès au service réseau (NSAP)	Adresse globale à structure hiérarchique permettant l'emploi de formats internationaux, géographiques et téléphoniques au moyen d'un identificateur de format d'adresse contenu dans l'en-tête de protocole
Politique de routage	Ensemble de règles régissant le choix de routes et la distribution des informations de routage par les systèmes intermédiaires limites (BIS). Ces règles sont fondées sur des critères de politique plutôt que sur les mesures de performance comme le nombre de bonds, la capacité, le délai de transit, le coût, etc., habituellement appliquées au routage.
Acronymes utilisés :	
AIDC	Communications de données entre installations ATS (<i>ATS interfacility data communication</i>)
AMHS	Système de messagerie ATS (<i>ATS message handling system</i>)
BIS	Système intermédiaire limite (<i>boundary intermediate system</i>)
ES	Système d'extrémité (<i>end system</i>)
FASID	Document de mise en œuvre des installations et services
IDRP	Protocole de routage interdomaine (<i>inter-domain routing protocol</i>)
IS	Système intermédiaire
ISO	Organisation internationale de normalisation (<i>International Organization of Standardization</i>)
OSI	Interconnexion de systèmes ouverts (<i>open systems interconnection</i>)

Point 2 de l'ordre du jour: Description de la topologie du réseau ATN de la Région AFI**2.1 Architecture de routage ATN**

2.1.1 L'Equipe de travail examine un projet révisé de plan initial d'architecture de routage de l'ATN dans la Région AFI. Ce projet avait été présenté par le Secrétariat à la première réunion de l'Equipe de travail.

2.1.2 L'architecture de routage proposée qui est fondée sur le réseau RSFTA actuel est composée :

- a) d'un réseau dorsal de 11 centres qui concentrent le trafic ATN à des emplacements choisis, et qui est éventuellement capable d'appuyer les applications air/sol utilisant l'ATN ; et
- b) des sous-régions de routage autour de chaque système intermédiaire limite (BIS) pour connecter les domaines de routage au réseau dorsal.

2.1.3 La réunion, après des discussions, réduit le nombre de centres dorsaux à 6 et convient du projet d'architecture ATN décrit à l'**Appendice 2A**.

2.1.4 La description de l'architecture de l'élément sol/sol de l'ATN comprend un tableau pour les interconnexions des BIS dorsaux (BBIS) et la connexion des BIS des domaines de routage au réseau dorsal dans la Région AFI.

2.2 Description du réseau ATN sol-sol

2.2.1 Le tableau de mise en œuvre des circuits entre les BBIS et les BIS du réseau ATN figure à l'**Appendice 2B** à cette partie du rapport. L'**Appendice 2C** est une carte du réseau sol/sol de l'ATN pour la Région AFI. Le tableau servira la base pour l'élaboration du Plan de transition vers l'ATN de la Région AFI. Le projet de conclusion suivant est adopté :

Projet de Conclusion 2/2: Projet d'architecture de routage ATN de la Région AFI

Il est conclu que le projet d'architecture de routage ATN décrit aux Appendices 2A, 2B et 2C soit transmis aux Etats pour qu'ils le commentent et complètent les tableaux.

2.3 Plan d'adressage ATN pour la Région AFI

2.3.1 La réunion est informée que selon les SARPs sur l'ATN publiées dans l'Annexe 10 de l'OACI, les Régions devraient élaborer des plans d'adressage et de dénomination. Ces plans régionaux peuvent servir à assister les Etats dans l'assignation et l'enregistrement d'adresses telles que celles de point d'accès au service réseau (NSAP). A cet effet, l'Equipe de travail examine un projet de plan d'adressage de NSAP de l'ATN qui figure à l'**Appendice 2D**.

2.3.2 Les objectifs du document sont de fournir des éléments indicatifs sur :

- a) la spécification des adresses NSAP ; et
- b) la spécification des identifications de domaine de routage (RDI) et de confédérations de domaines de routage (RDC).

2.3.3 A titre d'indication sur la spécification des adresses NSAP, chaque champ de l'adresse NSAP est décrit avec les recommandations sur son utilisation. Ceci est important afin qu'il y ait une consistance dans l'usage des adresses NSAP et que l'efficacité du routage soit maintenue.

2.3.4 La réunion examine en détail la structure d'adressage proposée et convient des recommandations contenues dans le document en vue d'un routage ATN efficace dans la Région AFI. Toutefois, l'Equipe de travail estime qu'il est nécessaire de fournir de plus amples explications sur l'assignation des champs ARS, LOC et SYS de l'adresse NSAP sous forme d'exemples et d'un organigramme. Un groupe de travail (composé de membres désignés par le Ghana, l'Afrique du Sud, la Tunisie, l'ASECNA et l'OACI) est établi en vue d'élaborer les éléments indicatifs supplémentaires. Le projet de Décision suivant est formulé :

Décision 2/3 : Eléments indicatifs sur l'adressage NSAP

Il est décidé que le Groupe de travail élabore des éléments indicatifs sur l'assignation des champs ARS, LOC et SYS de l'adresse NSAP.

Note : le Groupe de travail est composé de membres désignés par le Ghana, l'Afrique du Sud, la Tunisie, l'ASECNA et l'OACI



International Civil Aviation Organization

Second Meeting of the AFI ATN Planning Task Force

Dakar, 5 - 6 April 2005

DRAFT AFI ATN ROUTING ARCHITECTURE PLAN

Summary

This document presents the draft ATN Regional Architecture Plan.

Executive Summary

This document provides technical guidance on the planning and implementation of the transition to the Aeronautical Telecommunication Network (ATN) for ground communication within the ICAO AFI Region.

The routing architecture is based upon the need for a ground-ground infrastructure to eventually replace the existing AFTN infrastructure. For this reason, the routing architecture uses the existing AFTN infrastructure as a guideline for the positioning of ATN equipment.

The routing architecture is designed primarily for the ground-ground environment. It is intended that this architecture will be suitable as the routing architecture for the introduction of the air-ground communication requirements.

1 INTRODUCTION

This paper presents an initial plan for the routing architecture within the AFI Region.

1.1 Terms used

Aeronautical Fixed Telecommunication Network (AFTN): a low-speed network providing the majority of ground-ground data communication services within the ICAO realm. This term is defined in ICAO Annex 10.

Boundary Intermediate Systems (BIS): a router that supports IDRP and routes PDUs to more than one routing domain. This term is defined in ICAO Doc. 9705.

Backbone Boundary Intermediate Systems (BBIS): a router that primarily routes PDUs between routing domains and does not support End Systems.

Note: This definition is similar to that found in ICAO Doc. 9705 and is meant to be consistent with that definition. This definition is made on the assumption that this version of the routing architecture is limited to the ground-ground infrastructure.

Domain: a set of end systems and intermediate systems that operate the same routing procedures and that are wholly contained in a single administrative domain.

End Boundary Intermediate Systems (EBIS): a router that primarily routes PDUs between routing domains and connected End Systems.

End Systems (ES): an ATN system that supports one or more applications and that is a source and/or destination for PDUs.

Inter-Regional Boundary Intermediate Systems (IRBIS): a router that routes PDUs between systems (both End Systems and Boundary Intermediate Systems) within the Region with routers outside of the Region. These routers are the entry points into the Region and exit points from the Region for PDUs.

Network Service Access Point (NSAP) (address): a 20-octet value that uniquely identifies an interface between the Transport Layer and the Network Layer. In the ATN it provides the address of transport entity providing ATN Internet services.

1.2 Acronyms used

AFTN	-	Aeronautical Fixed Telecommunication Network
BIS	-	Boundary Intermediate Systems
BBIS	-	Backbone Boundary Intermediate Systems
CLNP	-	Connectionless Network Protocol
EBIS	-	End Boundary Intermediate Systems
ES	-	End System
IDRP	-	Inter-Domain Routing Protocol
IS	-	Intermediate System
PDU	-	Protocol Data Unit

2 ROUTING DOMAIN FUNDAMENTALS

The ATN consists of a set of End-Systems (ESs) and a set of Intermediate Systems (ISs). ESs are the source and destination of all data and are where the applications reside. ISs are better known as routers and relay PDUs from one system to another.

The ISs and ESs are organized into *Routing Domains*. Routing Domains are used to define sets of systems (that typically operate together under a single administrative authority) into clusters. These clusters have two major properties:

- they are controlled by a single administration/organization, and
- a significant amount of the traffic is internal to the cluster.

The single most important characteristic is that they are controlled by a single administration or organization. This characteristic is manifested in technical terms by mutual trust between all routers in a routing domain. Routing protocols are based on the fact that the information exchanged between *intra*-domain routers can be trusted. No special reliability or trust is required to accept information about advertised routes.

The second characteristic, most traffic is internal to a routing domain, is more an artifact of proper network engineering.

Routing domains may agree to join together, because of the mutual trust between their administrations. They form then a routing domain confederation (RDC).

Routing domains are established through the NSAP addressing conventions established for the ATN in Doc. 9705, Sub-Volume 5. All systems with NSAP addresses defined with the same address prefix are by definition in the same routing domain.

2.1 Intra-Domain Routing

Intra-domain routing is the routing of PDUs from the source to destination where both are in the same domain. Intra-domain routing implies one or more ISs capable of routing PDUs across the domain. Examples of intra-domain routing would be CLNP-capable routers exchanging PDUs between two Local Area Networks.

Since the ATN is specified across State boundaries, there are no SARPs requirements for intra-domain routing. The choice and configuration of internal routers is a local matter.

2.2 Inter-Domain Routing

The central definition of routing in the ATN is concerned with inter-domain routing. This is a particularly difficult problem since by the very nature of inter-domain routing, the information received cannot be fully trusted.

Inter-domain routing is based upon the mutual distrust of the received routing information. First, reliability mechanisms must be built-in to ensure the reliable transfer of the information. Second, the received information must be filtered to ensure that it meets the suitability constraints of the receiving system (in other words, can it be believed.)

After receiving the routing information, the inter-domain router must build routing tables based upon its internal policy about routing its data.

2.3 Types of Routing Domains

There are two basic types of routing domains: end routing domains, and transit routing domains.

An end routing domain routes PDUs to and from end-systems within its routing domain. Figure 1 shows an end routing domain.

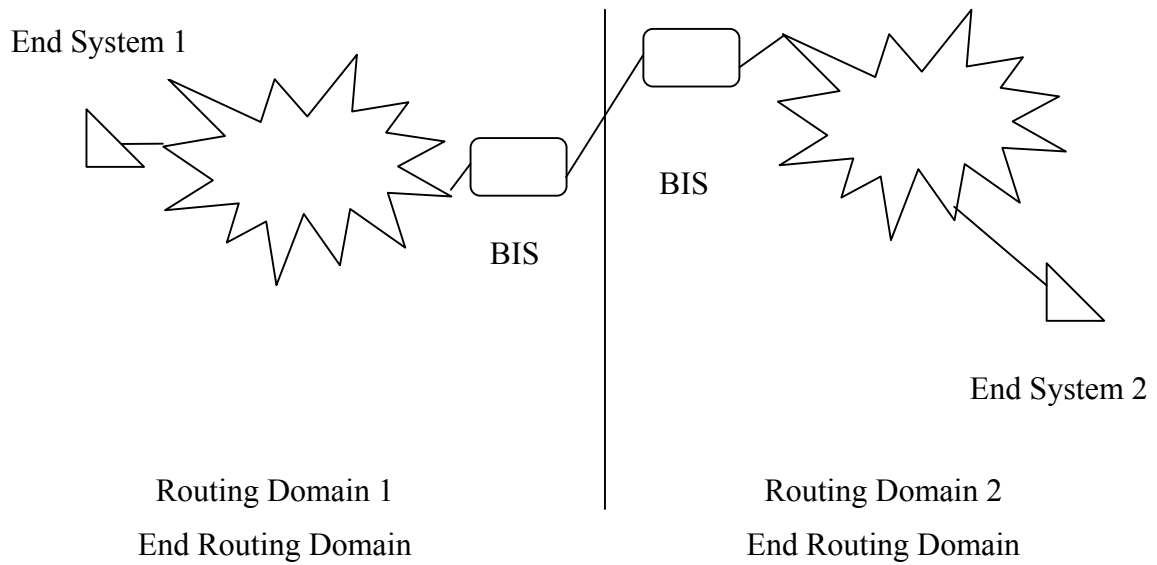


Figure 1 – End Routing Domains

A transit routing domain routes PDUs between two or more routing domains, and may as an option also act as an end routing domain. An example of a transit domain is where a set of backbone routers is configured in their own routing domain with all of the end systems in end routing domains attached to the backbone.

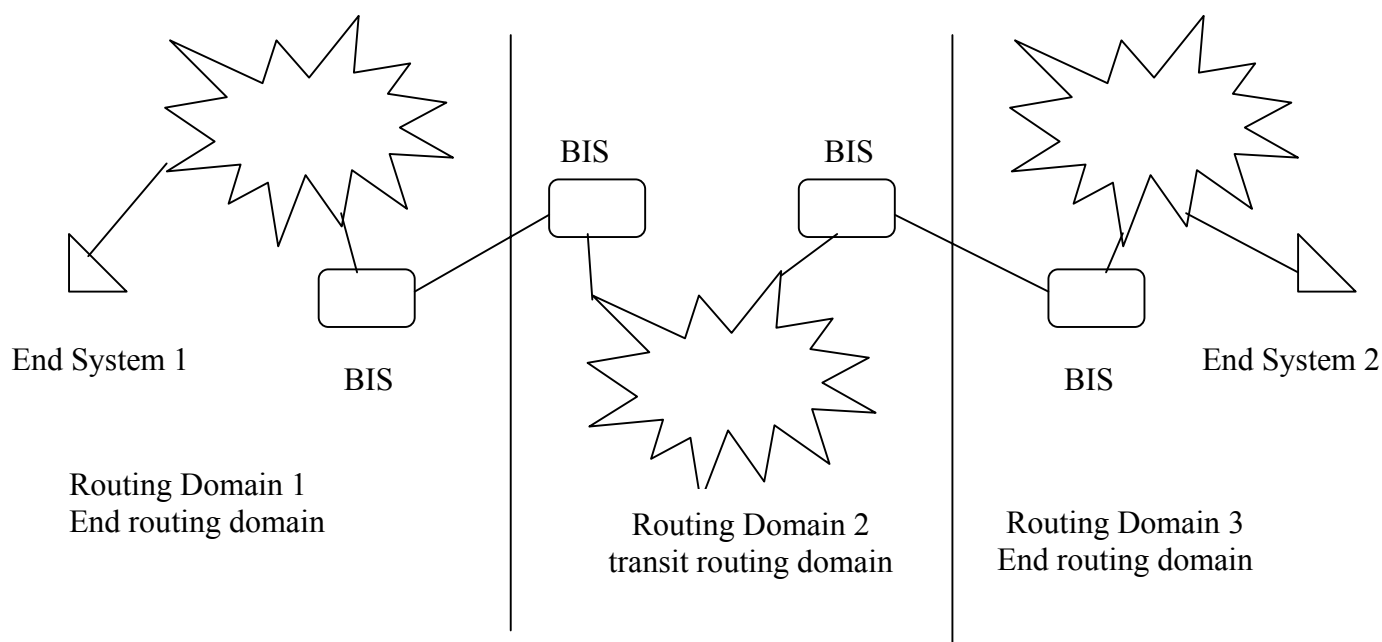


Figure 2 – Transit Routing Domains

2.4 Routing Domain Construction

Based on the above, a routing domain consists of at least one inter-domain router (BIS).

Note: There must be at least one BIS. There is no requirement for any other equipment.

Routing domains are elements of the physical structure of the ATN.

3 ROUTER FUNDAMENTALS

All routers discussed within this document are ICAO Doc. 9705 compliant Boundary Intermediate Systems (BISs).

Note: Individual States may elect to use other routers that do not comply with the ATN IDRP requirements as found in ICAO Doc. 9705 within the limits of their own States. These routers are internal State issues and outside the scope of this document.

3.1 Boundary Intermediate System Overview

Boundary Intermediate Systems comprise the interfaces between sub-networks, and in particular, between different routing domains. The term “Boundary Intermediate System” can often be replaced with the more common term “router”.

An important consideration in developing the routing architecture is the different roles that routers take within the ATN environment.

3.2 Router Types

There will be two primary types of BISs employed within the Region:

- Backbone BISs (BBISs), and
- End BISs (EBISs).

3.2.1 Backbone BBISs

A BBIS is a router that primarily routes PDUs between routing domains. These routers are typically higher performance routers that aid in the efficient flow of data between domains. BBISs may have End-Systems connected to them, but often are limited to only router-to-router connections.

BBISs can be further subdivided into Inter-regional BBISs and Regional BBISs. Inter-regional Backbone BBISs are those backbone routers that connect to BBISs in other regions.

Regional BBISs are backbone routers that only connect to routers within the Region.

Note 1: A single high performance router may act as both a Regional BBIS and an Inter-regional BBIS based upon meeting the requirements for performance and reliability.

Note 2: For completeness of the routing architecture, it must be mentioned that the routers outside of the Region to which Inter-regional Backbone BBISs attach are, in fact, Inter-regional Backbone BBISs in the other Region.

Note 3: The interconnection of backbone BBISs typically require higher capacity communication lines based on the consolidation of traffic through those backbone routers. Even though the architecture takes into account existing AFTN infrastructure facilities, the need to upgrade the communication facilities as traffic through the backbone increases may be necessary.

Note 4: It is possible for some States to provide transit routing from their routing domains to the routing domains of other States using BBISs that are not backbone routers.

3.2.2 End BBISs

End BBISs are connected to one or more BBISs and provide routing services to a single routing domain. Further, End BBISs do not act as a transit router for passing PDUs between other routing domains.

4 AFI REGIONAL ROUTING ARCHITECTURE

The AFI Regional routing architecture is based upon several concepts:

1. from a routing domain point of view, the Region can be considered an “autonomous” area, that is, there is a difference between routers located within the Region and outside the Region.
2. routing domains and confederations of routing domains may be applied to areas within the Region.
3. States will make their own implementation and transition decisions.

The routing architecture can be divided into several distinct parts:

- the definition of the backbone routing structure for passing information between routing domains within the Region;
- the definition of the routing structure between routing domains not on the backbone;
- the definition of the routing structure for use in end-routing domains ; and
- the definition of the routing structure for passing information from this Region to other Regions.

The first component is the definition of the backbone routing structure that supports the exchange of data within the Region. This part defines the interconnection of the major

ATN Routing Architecture (Draft 2.0)

communication facilities in the Region and how they cooperate to link all of the systems in the Region.

The second component is the definition of the structure that allows end routing domains to exchange data across the backbone to another end routing domain. This part defines how the end routing domains connect through the backbone.

The third component defines the routing structure that is used within an end routing domain. This part defines how the individual routing domains may be used to pass data.

The fourth part is needed to define how data will be routed between the systems within the Region with those systems outside the Region. More importantly, the structure describes how all global ATN systems are accessible from systems in the Region.

4.1 AFI Regional Backbone

The definition of a Regional Backbone is based upon a high availability core network of ATN routers supporting, in due course, ATN mobile routing for the AFI Region.

The rationale for defining Regional backbone sites is based upon the identification of routing domains or RDCs that are capable of concentrating ATN traffic and routing it efficiently in the region or to other regions. This may be based on existing main AFTN sites and on the flow of both AFTN traffic and possible future air-ground traffic. The latter could be based on the ATM routing areas of the AFI CNS/ATM plan.

The architecture and communication requirements define a routing plan that incorporates alternate routing and communication paths so that no single backbone router failure can isolate major parts of the Region.

The initial AFI BBISs sites are defined in the following table, based on the expected traffic flows. Additional backbone sites will need to be identified in the future for increased reliability of the interconnections between the networks.

Item	ATN backbone router site	State (Domain)
1	Algiers	Algeria (Algeria)
2	Cairo	Egypt (Egypt)
3	Dakar	Senegal (ASECNA)
4	Johannesburg	South Africa (South Africa)
5	Nairobi	Kenya (Kenya)
6	N'djamena	Chad (ASECNA)

Table 4.1 - Definition of initial AFI ATN Backbone router sites

At each ATN Backbone site, there should be at least one BBIS. States that are to be invited to committing to operate backbone routers are identified in the table above.

4.1.1 AFI Backbone router requirements

The definition of BBIS and the location of these routers may be affected by the requirements for backbone routers. A backbone router must meet several performance and reliability requirements:

- Availability
- Reliability
- Capacity; and
- Alternative routing.

4.1.1.1 Availability

A backbone router must provide a high-level of availability (24 hours a day, 7 days a week).

4.1.1.2 Reliability

A backbone router must be very reliable system that may require redundant hardware or more than one router per site.

4.1.1.3 Capacity

As a communication concentrator site, a backbone router must be capable of supporting significantly more traffic than other ATN routers.

4.1.1.4 Alternative routing

Based upon the need for continuity of service, backbone routers will require multiple communication links with a minimum of two and preferably three or more backbone routers to guarantee alternate routing paths in case of link or router failure.

4.1.1.5 Routing policies

States providing Regional BBISs must be capable of supporting routing policies that allow for Regional transit traffic and for dynamic re-routing of traffic based upon loading or link/router failures.

4.2 Inter-Regional Backbone

The second component of the AFI Regional Routing Architecture is the definition and potential location of Inter-Regional Backbone Routers. The manner in which this architecture was developed was to ensure that the use of the existing communication infrastructure is possible to the greatest degree. The use of the existing communication infrastructure should reduce the overall cost of transitioning to the ATN.

To re-state from the previous section, the Inter-Regional BBISs provide communication from routers within the AFI Region to routers in other regions. These Inter-Regional BBISs provide vital communications across regions and therefore need to have redundant communication paths and high availability. (Note: This can be accomplished through multiple routers at different locations.)

Based upon the current AFTN network environment, the following locations have been identified to initially serve centres outside the AFI Region:

Centre (Domain)	Region served
Algiers (Algeria)	Europe
Cairo (Egypt)	Europe, Middle East
Dakar (ASECNA)	South America
Johannesburg (South Africa)	Asia/Pacific, South America
Nairobi (Kenya)	Asia

Table 4.2 - Centres with circuits to other ICAO Regions

For the transition to the ATN, connectivity to the other Regions should be a priority. This is especially important as other Regions begin the transition to the ATN and begin deploying ATN BISs.

4.2.1 Long Term Implementation

The transition to a fully implemented ATN requires that connectivity amongst the ICAO regions be robust. That is, there is the need to ensure alternate paths and reliable communication. Table 4.2 presents a minimal Inter-Regional Backbone that provides a minimum of 2 circuits to other ICAO regions that communicate directly with the AFI Region. For longer term implementation of the ATN, it would be advisable to have 3 circuits to each Region.

4.2.2 Initial Implementation

Note: Information is needed on the plans of States in implementing ATN.

The initial implementation of the ATN, outside of the AFI Region, will most likely be in North America, Europe and Asia/Pacific. Therefore, initial transition planning in AFI may focus on Europe and Asia/Pacific.

For connecting to Europe, there should be three (3) Inter-Regional BBISs.

For connecting to the Middle East, Inter-Regional BBISs may be located at the locations of the existing AFTN centres. However, these routers would not be needed until such time as ATN traffic is destined for that Region and the location of the routers would be determined at that time.

For connecting to the ASIA/PAC, Inter-Regional BBISs may be located at the locations of the existing AFTN centres, Johannesburg and Nairobi. However, these routers would not be needed until such time as ATN traffic is destined for that Region and the location of the routers would be determined at that time.

For connecting to the SAM Region, Inter-Regional BBISs may be located at the locations of the existing AFTN centres, Dakar and Johannesburg. However, these routers would not be needed until such time as ATN traffic is destined for that Region and the location of the routers would be determined at that time.

4.2.3 Transition Issues

The transition issues relation to the regional architecture are found in the ATN transition plan.

4.2.4 End BISs

It is assumed that naming and addressing (and routing domain definition) will be done on a Regional basis. Further, for areas within the Region that may utilize an End BIS serving more than one State, the naming structure will be based on the Regional NSAP format defined in Doc. 9705. Further, States may choose to either implement the Regional (or Sub-Regional) NSAP format or the State NSAP format based on whether it installs a BIS.

4.3 Routing Domains

Each State is expected to have one or more routing domains. Where a State chooses not to implement an ATN BIS, it may choose to incorporate its systems into a routing domain of another State.

The AFI ATN Backbone will consist of routers from the selected States. Each of these routers will be part of its State's routing domain.

Note: This means that the backbone will not be configured with its own routing domain.

Routing to the backbone and between backbone routers will be controlled through IDRPs policies.

Each State will be responsible for the designation of routing policies for its End Systems and End BISs. Individual States will also be responsible for establishing routing policies for routing to its designated BBIS.

It should be noted that the establishment of routing confederations within the AFI Region could simplify considerably the routing architecture since a routing confederation can be viewed externally as a single routing domain.

5 ATN Transition

Based upon the previous sections, the implementation of the ATN within the AFI Region may require considerable planning for the transition of the AFTN.

5.1 Initial Regional Implementation

The very beginning of ATN implementation will be bilateral testing between States. For this scenario, each State will need at a minimum:

- an ATN-compliant router,
- a means for managing the router,
- an ATN application, and
- a circuit connecting the States.

States involved in bilateral ATN trials should consider the use of the trial infrastructure in expanding the ATN throughout the Region.

Regional ATN Implementation

At a certain time, sufficient bilateral trials will be underway to permit a region-wide ATN network based upon the plan presented above. As each State implements the ATN applications and network infrastructure, it will be added to the Regional infrastructure according to this plan.

AFI ATN BACKBONE BIS AND BIS CIRCUITS IMPLEMENTATION
MISE EN OEUVRE DES CIRCUITS ENTRE BBIS ET BIS ATN DE LA REGION AFI

State/Locations <i>Etat/Emplacements</i>	ATN connection <i>Connexion ATN</i>		Target Date of Implementation <i>Date de mise en oeuvre</i>		Trunk Type <i>Type de ligne</i>	Comments <i>Remarques</i>
	Speed <i>Vitesse</i>	Protocol <i>Protocole</i>	Circuit	BIS		
1	2	3	4	5	6	7
Algeria						
Algiers BBIS						
Cairo BBIS	64 Kbps	X.25			Intra-régional	A mettre à niveau
Dakar BBIS	64 Kbps	X.25			Intra-régional	A mettre à niveau
N'Djamena BBIS	64 Kbps	X.25			Intra-régional	A mettre à niveau
Casablanca	9600 bps	X.25			Intra-régional	A mettre à niveau
Tunis	9600 bps	X.25			Intra-régional	Intra-régional
Tripoli	9600 bps	X.25			Intra-régional	A mettre à niveau
EUR	64 Kbps	X.25			Inter-régional	A mettre à niveau
Chad						
N'Djamena BBIS						
Algiers BBIS	64 Kbps	X.25			Intra-régional	Nouveau circuit
Cairo BBIS	64 Kbps	X.25			Intra-régional	Nouveau circuit
Dakar BBIS	64 Kbps	X.25			Intra-régional	Nouveau circuit
Johannesburg BBIS	64 Kbps	X.25			Intra-régional	Nouveau circuit
Nairobi BBIS	64 Kbps	X.25			Intra-régional	Nouveau circuit
Kano	9600 bps	X.25			Intra-régional	Nouveau circuit
Brazzaville	9600 bps	X.25			Intra-régional	A mettre à niveau
Egypt						
Cairo BBIS						
Algiers BBIS	64 Kbps	X.25			Intra-régional	Nouveau circuit

APPENDICE 2B

State/Locations <i>Etat/Emplacements</i>	ATN connection <i>Connexion ATN</i>		Target Date of Implementation <i>Date de mise en oeuvre</i>		Trunk Type <i>Type de ligne</i>	Comments <i>Remarques</i>
	Speed <i>Vitesse</i>	Protocol <i>Protocole</i>	Circuit	BIS		
1	2	3	4	5	6	7
Nairobi BBIS	64 Kbps	X.25			Intra-régional	A mettre à niveau
Johannesburg BBIS	64 Kbps	X.25			Intra-régional	Nouveau circuit
N'Djamena BBIS	64 Kbps	X.25			Intra-régional	Nouveau circuit
Asmara	9600 bps	X.25			Intra-régional	Nouveau circuit
Khartoum	9600 bps	X.25			Intra-régional	A mettre à niveau
EUR	64 Kbps	X.25			Inter-régional	A mettre à niveau
MID	64 Kbps	X.25			Inter-régional	A mettre à niveau
Kenya						
Nairobi BBIS						
Cairo BBIS	64 Kbps	X.25			Intra-régional	A mettre à niveau
Johannesburg BBIS	64 Kbps	X.25			Intra-régional	A mettre à niveau
N'Djamena BBIS	64 Kbps	X.25			Intra-régional	Nouveau circuit
Addis Ababa	9600 bps	X.25			Intra-régional	A mettre à niveau
Dar es Salaam	9600 bps	X.25			Intra-régional	A mettre à niveau
Entebbe	9600 bps	X.25			Intra-régional	A mettre à niveau
Khartoum	9600 bps	X.25			Intra-régional	Nouveau circuit
Mauritius	9600 bps	X.25			Intra-régional	A mettre à niveau
Mogadishu	9600 bps	X.25			Intra-régional	A mettre à niveau
Seychelles	9600 bps	X.25			Intra-régional	A mettre à niveau
ASIA/PAC ¹	19.2 kbps	X.25			Inter-régional	A mettre à niveau
MID	64 Kbps	X.25			Intra-régional	Nouveau circuit
Senegal						
Dakar BBIS						

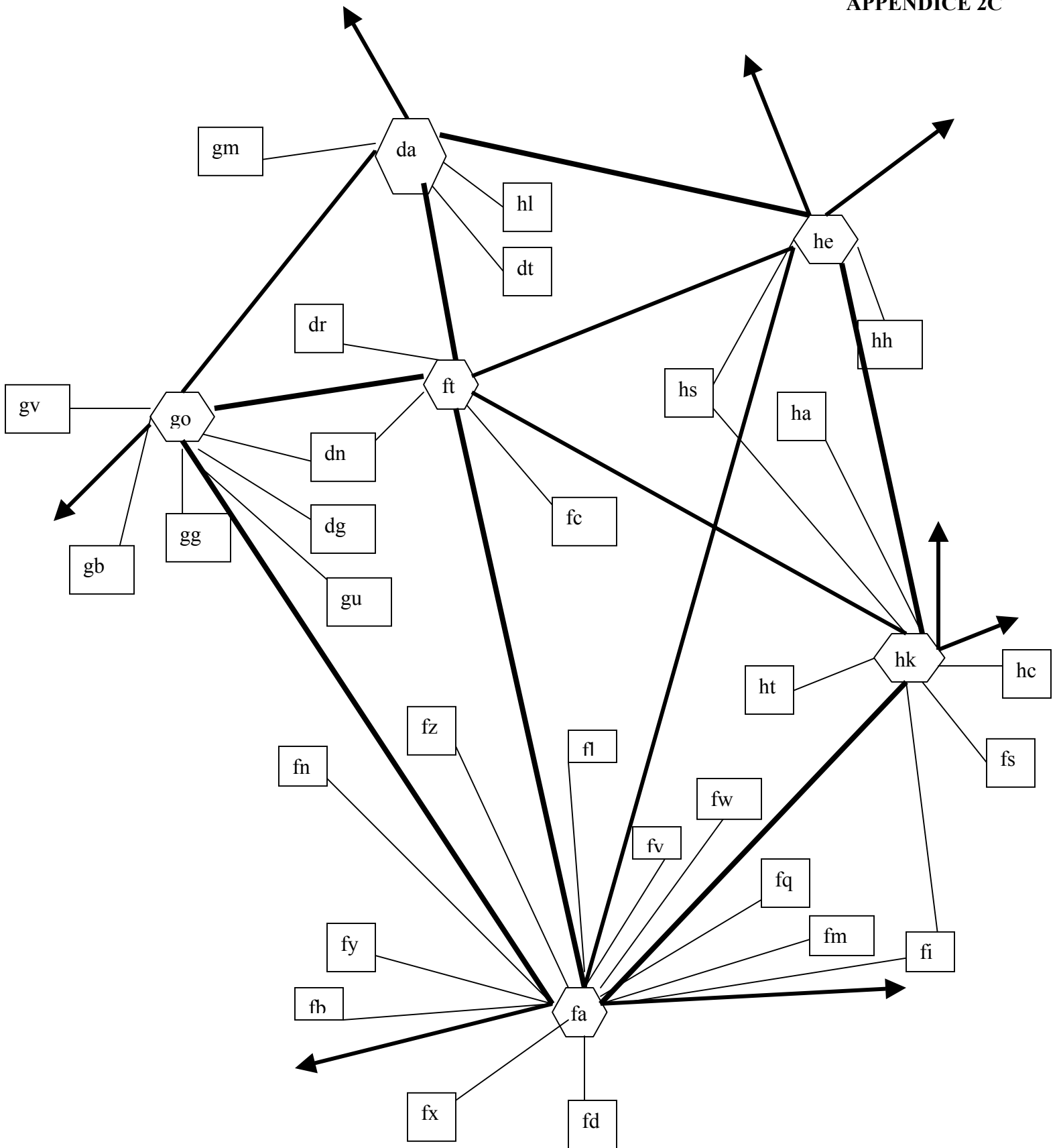
¹ In ASIA/PAC ATN Plan, this circuit is to be upgraded by 2005 to 19.2 Kbps, X.25 protocol and the India BBIS implemented by 2005. *D'après le Plan Asie/Pacifique, ce circuit devrait être amélioré en 2005 à 19.2 kbps, X.25 et le BBIS de l'Inde mis en œuvre en 2005.*

APPENDICE 2B

State/Locations <i>Etat/Emplacements</i>	ATN connection <i>Connexion ATN</i>		Target Date of Implementation <i>Date de mise en oeuvre</i>		Trunk Type <i>Type de ligne</i>	Comments <i>Remarques</i>
	Speed <i>Vitesse</i>	Protocol <i>Protocole</i>	Circuit	BIS		
1	2	3	4	5	6	7
Algiers BBIS	64 Kbps	X.25			Intra-régional	Nouveau circuit
Johannesburg BBIS	64 Kbps	X.25			Intra-régional	A mettre à niveau
N'Djamena BBIS	64 Kbps	X.25			Intra-régional	Nouveau circuit
Abidjan	9600 bps	X.25			Intra-régional	A mettre à niveau
Accra	9600 bps	X.25			Intra-régional	Nouveau circuit
Bamako	9600 bps	X.25			Intra-régional	A mettre à niveau
Banjul	9600 bps	X.25			Intra-régional	A mettre à niveau
Bissau	9600 bps	X.25			Intra-régional	A mettre en oeuvre
Kano	9600 bps	X.25			Intra-régional	Nouveau circuit
Nouakchott	9600 bps	X.25			Intra-régional	A mettre à niveau
Roberts FIC	9600 bps	X.25			Intra-régional	A mettre à niveau
Sal	9600 bps	X.25			Intra-régional	A mettre à niveau
SAM	19.2 kbps	X.25			Inter-régional	A mettre à niveau
South Africa						
Johannesburg BBIS						
Cairo BBIS	64 Kbps	X.25			Intra-régional	Nouveau circuit
Dakar BBIS	64 Kbps	X.25			Intra-régional	A mettre à niveau
Nairobi BBIS	64 Kbps	X.25			Intra-régional	A mettre à niveau
N'Djamena BBIS	64 Kbps	X.25			Intra-régional	Nouveau circuit
Antananarivo	9600 bps	X.25			Intra-régional	A mettre à niveau
Beira	9600 bps	X.25			Intra-régional	A mettre à niveau
Gaborone	9600 bps	X.25			Intra-régional	A mettre à niveau
Harare	9600 bps	X.25			Intra-régional	A mettre à niveau
Kinshasa	9600 bps	X.25			Intra-régional	A mettre à niveau
Lilongwe	9600 bps	X.25			Intra-régional	A mettre à niveau
Luanda	9600 bps	X.25			Intra-régional	A mettre à niveau
Lusaka	9600 bps	X.25			Intra-régional	A mettre à niveau

APPENDICE 2B

State/Locations <i>Etat/Emplacements</i>	ATN connection <i>Connexion ATN</i>		Target Date of Implementation <i>Date de mise en oeuvre</i>		Trunk Type <i>Type de ligne</i>	Comments <i>Remarques</i>
	Speed <i>Vitesse</i>	Protocol <i>Protocole</i>	Circuit	BIS		
1	2	3	4	5	6	7
Manzini	9600 bps	X.25			Intra-régional	A mettre à niveau
Maseru	9600 bps	X.25			Intra-régional	A mettre à niveau
Mauritius	9600 bps	X.25			Intra-régional	A mettre à niveau
Windhoek	9600 bps	X.25			Intra-régional	A mettre à niveau
ASIA/PAC	64 Kbps	X.25			Inter-régional	Mis en oeuvre
SAM	64 Kbps	X.25			Inter-régional	A mettre en oeuvre





International Civil Aviation Organization

Second Meeting of the AFI ATN Planning Task Force

Dakar, 5 - 6 April 2005

DRAFT AFI ATN ADDRESSING PLAN

(Ver.0.0)

Summary

This document presents the draft AFI ATN addressing plan.

Executive Summary

This document provides technical guidance on the Planning and Implementation of the transition of ground communications to Aeronautical Telecommunication Network (ATN) within the AFI region.

The material presented here is technical in nature, and the description is detailed.

The material is intended for Regional Planning. Although the plan itself is mainly left to the States for planning and implementation, it is hard to differentiate the regional planning from State planning.

Background

Based upon the ATN SARPs as published in ICAO Annex 10 and ICAO Doc. 9705, the Regions are advised to develop naming and addressing plans. These Regional Plans may be used to guide States in the assignment and registration of addresses such as Network Service Access Point (NSAP) Addresses.

At its first meeting, the AFI ATN Task Force added to its tasks list the development a draft NSAP addressing plan. This document presents the first draft.

Overview

This document presents recommendations for the assignment of NSAP addresses within the Region. Each field of the NSAP address is presented with the recommended method of assigning values. Fields which are purely local State matters are identified.

1 Introduction

This paper presents the Network Service Access Point (NSAP) address assignment conventions for use in the AFI Region.

1.1 Objectives

The objectives of the document are to provide:

- Guidance in the specification of NSAP addresses,
- Guidance in the specification of routing domain identifiers (RDI) for Routing Domains (RD) and Routing Domain Confederations (RDC).

In providing guidance on the specification of NSAP addresses, each NSAP address field is described with the recommendations on how the field may be used. This is important so that consistency in the use of NSAP addresses is obtained and efficiency in routing is maintained.

The guidance on the specification of RD and RDC identifiers is a continuation to the specification of the NSAP address structure. By applying the rules of the address assignments to the addressing of RDs and RDCs defined herein, States will ensure the efficiency of the routing mechanisms is maintained.

1.2 Scope

The scope of the document includes:

- Describing the NSAP address format, and
- Recommending the values in the fields of the regional NSAP addresses.

The AFI Regional ATN Addressing Plan presented here will comply with the NSAP format as specified in ICAO Doc. 9705 (Reference 1).

The AFI Regional ATN Addressing Plan defines the method for assigning values to each of the fields of the NSAP address. States within the Region may choose to assign their NSAP addresses based upon the recommendations found here.

1.3 Document Structure

Section 2 presents the background information for the formulation of recommendations.

Section 3 presents the assumptions on which the recommendations are based upon.

Section 4 presents the NSAP address structure and the recommended values to be used in AFI region.

Section 5 presents the conclusions.

Section 6 presents the recommendations to AFI ATN/TF members.

1.4 Terms Used

Network Addressing Domain – A subset of the global addressing domain consisting of all the NSAP addresses allocated by one or more addressing authorities.

Network Entity (NE) – A functional portion of an internetwork router or host computer that is responsible for the operation of internetwork data transfer, routing information exchange and network layer management protocols.

Network Entity Title (NET) – The global address of a network entity.

Network Service Access Point (NSAP) Address – A hierarchically organized global address, supporting international, geographical and telephony-oriented formats by way of an address format identifier located within the protocol header. Although the top level of the NSAP address hierarchy is internationally administered by ISO, subordinate address domains are administered by appropriate local organizations.

NSAP Address Prefix – A portion of the NSAP Address used to identify groups of systems that reside in a given routing domain or confederation. An NSAP prefix may have a length that is either smaller than or the same size as the base NSAP Address.

Routing Domain (RD) – A set of End Systems and Intermediate Systems that operate the same routing policy and that are wholly contained within a single administrative domain.

Routing Domain Confederation (RDC) – A set of routing domains and/or routing domain confederations that have agreed to join together. The formation of a routing domain confederation is done by private arrangement between its members without any need for global coordination.

Routing Domain Identifier (RDI) – A generic network entity title as described in ISO/IEC 7498 and is assigned statically in accordance with ISO/IEC 8348. An RDI is not an address and cannot be used as a valid destination of an ISO/IEC 8473 PDU. However, RDIs are like ordinary NETs, assigned from the same addressing domain as NSAP addresses.

1.5 References

- Reference 1 Manual of Technical Provisions for the ATN (Doc 9705-AN/956) Third Edition 2002.
- Reference 2 CAMAL – Comprehensive ATN Manual (Doc 9739-AN/961)
- Reference 3 ACCESS - ATN Compliant Communications European Strategy Study
Define Network topology – Addressing Plan
Addressing Plan of the European ATN Network
- Reference 4 Asia/Pacific ATN Addressing Plan
- Reference 5 ICAO Location Indicators – Document 7910/113

2 Background

2.1 System Level Requirements

The ATN SARPs are divided into a set of System Level Requirements. These requirements are found in the ICAO Annex 10, Volume III, and are repeated in ICAO Doc. 9705 (Reference 1), Sub-Volume 1. The System Level Requirements detail specific requirements that all ATN compliant systems must meet and form the basis for the technical specifications.

Some of the System Level Requirements may best be satisfied through Regional Planning and Regional specification of procedures.

The following list presents the important System Level Requirements and Recommendations that form the basis of the NSAP Addressing Plan.

- System Level Requirement #11 (Annex 10) presents the basis for the definition of NSAP addresses:
“The ATN shall provide a means to unambiguously address all ATN end and intermediate systems.”
- System Level Requirement #13 (Annex 10) presents the basis for the need of Regional Planning:
“The ATN addressing and naming plans shall allow State and organizations to assign addresses and names within their own administrative domains.”

System Level Requirement #11 forms the basis for assigning at least one unique NSAP address for each end system and intermediate system. The assignment of NSAPs to systems enables the unambiguous identification of ATN components and applications.

System Level Requirement #13 forms the basis for Regional Planning in the area of NSAP address assignment. The establishment of Regional plans for assigning addresses assists States and Organizations within a Region to develop consistent address assignment procedures that will result in more efficient routing policies.

2.2 Basis for ATN Address Planning

2.2.1 Regional Planning

At the second meeting of the ATN Panel, it was recognized that the establishment of naming conventions and registration procedures were necessary for the successful deployment of the ATN. Two specific Recommendations were approved at that meeting:

Recommendation 4/1 Advice to States on ATN addressing issues

“That ICAO advise States and international organizations to take the necessary actions for the assignment, administration, and registration of ATN names and addresses within their allocated name/address space, using the information provided.”

Recommendation 4/2 Setting up an ICAO ATN addressing process

“That ICAO take the necessary actions to provide a facility for maintaining an up-to-date repository of ATN addresses and names registered in the Air Traffic Services

Communication (ATSC) domain, and publish the repository entries at usual regular intervals.”

2.2.2 AFI Regional Planning

The AFI ATN Task Force agreed that a consistent plan for naming and addressing is required to simplify the transition to ATN.

3 Assumptions

In developing the recommendations for the AFI Regional ATN Addressing Plan, several assumptions were made about the structure of the Region’s ATN implementation. Some of these assumptions may appear unnecessary, but they tend to guide the development of the recommendations presented in Section 4.

- The AFI Regional ATN Addressing Plan will comply with the rules in ICAO Doc. 9705 (Reference 1). This means that the syntax, semantics and encoding rules of the NSAP address fields as specified in ICAO Doc. 9705 must be observed.
- There will be a number of ATN routers deployed in the Region. This assumption drives the need for multiple routing domains within the Region and the need to develop a plan that allows for efficient routing.
- The regional routing architecture will eventually include RDCs such as Island RDCs and Backbone RDCs. Therefore the AFI Regional ATN Addressing Plan must allow for the addressing of these RDCs.
- The Region will have at least one ATN router in each defined routing domain. This assumption is based on the ATN requirement for the establishment of routing domains.
- The Region will support both ground-ground and air-ground services and applications.

4 NSAP Addressing Plan

4.1 Introduction

The AFI Regional ATN Addressing Plan provides guidance to the States within the Region in assigning NSAP addresses to their ATN systems. The Plan addresses the need for consistency within the Region for address assignment.

To find a suitable ATN addressing convention that would be acceptable for use in the AFI region requires a routing architecture that minimizes routing updates and overheads within the ground ATN infrastructure for both ground-ground and air-ground services and applications.

The ATN addressing convention must allow for an addressing scheme that is:

- Practical - to provide autonomous administration of ATN addresses for States and Organizations, and

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- Flexible - to allow for future expansion and/or routing re-configuration of the ground ATN infrastructure with minimal re-assigning of ATN addresses.

The recommendations proposed in the AFI Regional ATN Addressing Plan take advantage of the work performed by the European ACCESS¹ Project and the Asia/Pacific Region (References 3 and 4).

4.2 NSAP Address Format

The NSAP address format is defined in ICAO Doc. 9705 (Reference 1), Sub-Volume 5. The format is based upon the requirements specified in the base standard (ISO/IEC 8348) and incorporates the specific ATN requirements for addressing both ground and mobile systems.

The structure of the Network Service Access Point (NSAP) address is depicted in Figure 4.2-1.

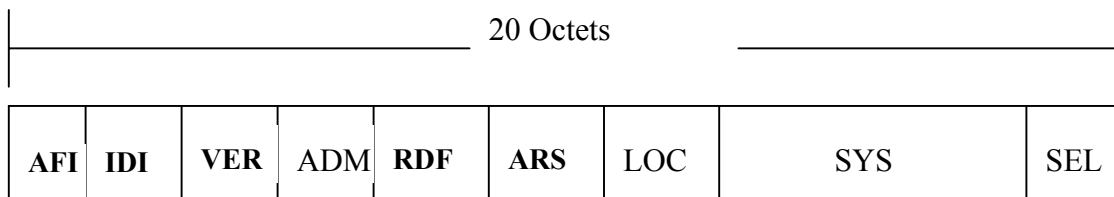


Figure 4.2-1 NSAP Address Format

The NSAP address structure contains 9 fields, which are described in Table 4.2-1.

Field Name	Field Description	Size	Syntax	Number of Characters/Digits	Field Encoding
AFI	Authority and format Identifier	1 Octet	Decimal	2 Digits	BCD
IDI	Initial domain Identifier	2 Octets	Decimal	4 Digits	BCD
VER	Version	1 Octet	Hex	2 Digits	Binary
ADM	Administration Identifier	3 Octets	Alpha or Hex/Alpha	3 Characters 2 Digits/2 Characters	IA-5 Binary/IA-5
RDF	Routing Domain Format	1 Octet	Hex	2 Digits	Binary
ARS	Administration Region Selector	3 Octets	Hex	6 Digits	Binary

¹ ACCESS (ATN Compliant Communications European Strategy Study) is a project funded by the European Commission and jointly produced by the following companies and administrations: National Air Traffic Services (NATS), Deutsche Flugsicherung (DFS) and Service Technique de la Navigation Aerienne (STNA).

Field Name	Field Description	Size	Syntax	Number of Characters/Digits	Field Encoding
LOC	Location	2 Octets	Hex	4 Digits	Binary
SYS	System Identifier	6 Octets	Hex	12 Digits	Binary
SEL	NSAP Selector	1 Octet	Hex	2 Digits	Binary

Table 4.2-1 - Encoding Rules for the ATN NSAP

4.3 Recommendations for NSAP Address Fields Assignments

4.3.1 The AFI and IDI Fields

The ATN Internet SARPs (Reference 1) require allocation of the following values:

- Decimal for the AFI field to indicate the type of NSAP being used. This value has been assigned the character sequence “47”.
- Decimal for the IDI field to designate ICAO. This value has been assigned the character sequence “0027”.

As recommended in Reference 1, ATN NSAP addresses and NETs will be written as the character sequence “470027+” where the “+” is used to separate the Binary Coded Decimal (BCD) fields from subsequent Hexadecimal fields.

Hence the AFI and IDI fields will be set to 470027 for fixed ATSC systems/domains and for mobile ATSC systems/domains.

4.3.2 The VER Field

The VER field is used to partition the ATN Network Addressing domain into a number of sub-ordinate Addressing Domains.

The values currently specified in Reference 1 for the VER field are summarized in Table 4.3.2-1.

VER Field Value	Network Addressing Domain	Common NSAP Address Prefix for Domain	Value to be used by States of AFI Region
[0000 0001]	Fixed AINSC	470027+01	
[0100 0001]	Mobile AINSC	470027+41	
[1000 0001]	Fixed ATSC	470027+81	470027+81 (ATSO ISs and ESs)
[1100 0001]	Mobile ATSC	470027+C1	470027+C1 (General Aviation)

Table 4.3.2-1 - Defined Values for the VER Field

4.3.3 The ADM Field

The ADM field is used to further partition the ATN Network Addressing Domain. The field designates a single State or Organization. Depending on what the VER field is set to will determine what values should be used in the ADM field.

When the VER field is set to “81” (Fixed ATSC), the ATN SARPs permits two possible ways for encoding the ADM field.

The first method recommends that the State’s three character alphanumeric ISO country code is used, as defined in ISO 3166. States may choose this method; however it will provide less flexibility than the second method for the addressing of regional entities (eg regional RDCs or regional organizations that are not country specific).

The second method that is recommended for use in the AFI region is to use the first octet of the field to define the ICAO region. This would permit the reduction of the routing information that would otherwise be generated. It is recommended that the remaining two octets of the field will further identify the country, RDCs and the regional organizations that are not country specific as follows:

- For the identification of a country, it is recommended that States use the ICAO two letter location indicator (Reference 5) instead of the two character alphanumeric ISO 3166 country code. The structure of the ICAO two-letter location indicator allows for a more efficient identification of a location. For example, indicators starting with the same letter “G” designate several countries in the same local region (eg Mali, Morocco, Mauritania, Senegal etc.). The second letter will actually define the specific country within this local region (eg “GA” for Mali, “GM” for Morocco etc.). Where a country has several ICAO two letter location indicators allocated to it, the assigning authority of the ADM field will be responsible in determining the preferred location indicator to represent that country. For example, the indicators “VA”, “VI”, “VO”, “VE” are assigned to India and one of these indicators will be selected to represent India. The encoding of the ICAO two letter location indicators will be upper case alphanumeric values^[MSOffice1].
- For regional organizations that are not country specific (like ASECNA), it is recommended to allocate a lower case alphanumeric value so as there will be no conflict with the ICAO two letter location indicators.
- For the addressing of RDCs (eg Island RDCs, Backbone RDCs), in particular for those that are not country specific, it is recommended to allocate codes with the most significant bit set to 1 in the second octet. Valid values would be in the hexadecimal range [8000 – FFFF].

ICAO AFI Regional Planning Group would be the allocation authority of the ADM field.

In summary, the values allocated for the ADM field is indicated in Table 4.3.3-1.

VER Field Network Addressing Domain	ADM Field Values																		
Fixed AINSC	Derived from the set of three-character alphanumeric characters representing an IATA airline or an Aeronautical Stakeholder Designator.																		
Mobile AINSC	Derived from the set of three-character alphanumeric characters representing an IATA airline or an Aeronautical Stakeholder Designator.																		
Fixed ATSC	<p>To allow for efficient routing information to be exchanged, it is proposed that the ICAO Regional code be used in the first octet of the ADM field followed by the ICAO two letter location indicator for countries.</p> <p>The Regional codes are shown below.</p> <p>Regional Codes:</p> <table border="0"> <tr> <td>[1000 0000]</td> <td>Africa</td> </tr> <tr> <td>[1000 0001]</td> <td>Asia</td> </tr> <tr> <td>[1000 0010]</td> <td>Caribbean</td> </tr> <tr> <td>[1000 0011]</td> <td>Europe</td> </tr> <tr> <td>[1000 0100]</td> <td>Middle East</td> </tr> <tr> <td>[1000 0101]</td> <td>North America</td> </tr> <tr> <td>[1000 0110]</td> <td>North Atlantic</td> </tr> <tr> <td>[1000 0111]</td> <td>Pacific</td> </tr> <tr> <td>[1000 1000]</td> <td>South America</td> </tr> </table> <p>For example Mali would be represented by the following hexadecimal sequence: 804741. Table 4.3.3-2 provides further examples for a selected number of countries.</p> <p>Where a two letter country code is not applicable, the following rules would apply:</p> <p>ICAO would assign lower case alphanumeric characters using a two letter value to organizations that wish to be based in a particular region. For example, if an organization is to be based in the AFI region and wanted to be represented by the characters 'sa', this would be represented by the following hexadecimal sequence: 807361</p> <p>ICAO would assign regional codes for RDCs where a country code or organization code is not applicable. Values would be assigned with the most significant bit set to 1 in the second octet. For example a RDC established in the AFI region would be represented by the following hexadecimal sequence: 808100.</p>	[1000 0000]	Africa	[1000 0001]	Asia	[1000 0010]	Caribbean	[1000 0011]	Europe	[1000 0100]	Middle East	[1000 0101]	North America	[1000 0110]	North Atlantic	[1000 0111]	Pacific	[1000 1000]	South America
[1000 0000]	Africa																		
[1000 0001]	Asia																		
[1000 0010]	Caribbean																		
[1000 0011]	Europe																		
[1000 0100]	Middle East																		
[1000 0101]	North America																		
[1000 0110]	North Atlantic																		
[1000 0111]	Pacific																		
[1000 1000]	South America																		
Mobile ATSC	As for Fixed ATSC																		

Table 4.3.3-1 - Defined Values for the ADM Field

Fixed or Mobile AFI ATSC Addressing Domain	Hexadecimal Code of the ADM Field	Comment
Algeria	804441	AFI Region + 'DA'
Morocco	80474D	AFI Region + 'GM'
Egypt	804845	AFI region + 'HE'
Senegal	80474F	AFI Region + 'GO'
Niger	804452	AFI Region + 'DR'
Nigeria	80444E	AFI Region + 'DN'
Kenya	80484B	AFI Region + 'HK'
Congo	804643	AFI Region + 'FC'
South Africa	804641	AFI Region + 'FA'

Table 4.3.3-2 – Example of Proposed ADM Value Assignment for Selected AFI Entities

4.3.4 The RDF Field

The RDF field is historical and is not used. Therefore the RDF field shall be set to [0000 0000].

4.3.5 The ARS Field

The ARS field is used to:

- Distinguish Routing Domains operated by the same State or Organization (in Fixed Network Addressing domains); and
- Identify the aircraft on which the addressed system is located (in Mobile Network Addressing Domains).

Each State or Organization identified in the ADM field will be responsible for assigning the values for the ARS field.

In accordance with the SARPs, for a Mobile Network Addressing Domain, the 24-bit ICAO Aircraft Identifier is inserted in the ARS field. However, no specific values have been specified for Fixed Network Addressing Domains.

The ARS field shall be assigned in a manner that simplifies the routing of data and makes provision for any potential lower level organizational units that could, in the future, operate an ATN Routing Domain.

The AFI Regional ATN Addressing Plan recommends the ARS field be decomposed into three subfields as shown in Figure 4.3.5-1: Network ID, Network Group ID and Domain ID.

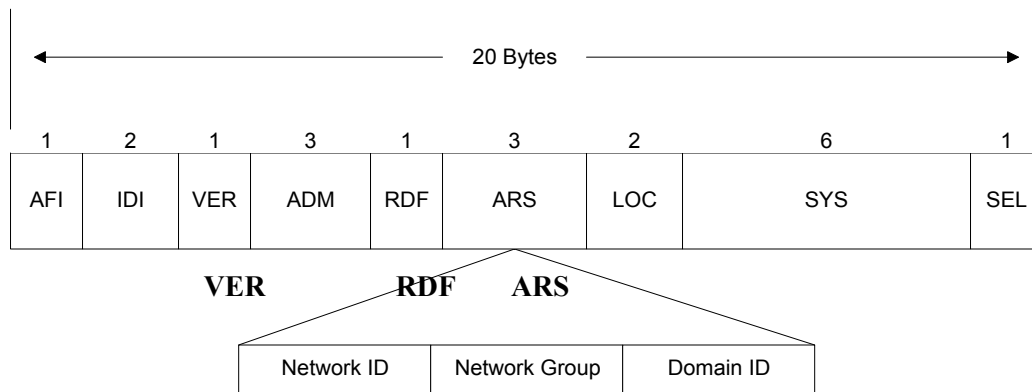


Figure 4.3.5-1 Proposed ARS Field Format

4.3.5.1 Network ID

Potential future operators of an ATN Routing Domain could be:

- A national Air Traffic Service Organization(s) (ATSO);
- A national military organization;
- A national meteorological organization; and
- An airport operator.

At present it is assumed that military organizations and meteorological organizations will not start up their own ATN Routing Domains and will be located within a national ATSO ATN Routing Domain. The same may apply to airport operators.

However in planning for the long term it is deemed necessary that provision is made available for these future possibilities.

In allowing for this possible expansion, it is recommended that the different ranges of values for the Network ID subfield be allocated to the different national organizations as follows:

- Hexadecimal values [00 – 1F] of the first octet of the ARS field be reserved for the addressing of domains and systems operated by the national ATSO.
- Hexadecimal values [20 – 3F] of the first octet of the ARS field be reserved for the addressing of domains and systems operated by the national military organization.
- Hexadecimal values [40 – 5F] of the first octet of the ARS field be reserved for the addressing of domains and systems operated by the national airport operators. (Note: this range matches the ASCII range of alphabetical upper case characters).
- Hexadecimal values [60 – 7F] of the first octet of the ARS field is reserved for the addressing of domains and systems operated by the national meteorological organization.
- Hexadecimal values [80 – FF] are reserved.

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A national organization would then be able to register one or several values for the Network ID subfield within the range that has been reserved for its organization category.

In addition to the Network ID subfield being used for distinguishing the different national organizations, it is proposed that this subfield also be used for the identification of the particular role of the addressed domain. For example, setting the Network ID subfield to the hexadecimal value “01” would represent the set of operational Routing Domains of the national ATSO. Setting the Network ID subfield to hexadecimal “11” would represent the set of non-operational Routing Domains of the national ATSO. In using the Network ID subfield in this manner, allows national ATSOs to provide for a duplicate non-operational network to be used for trials and pre-operational testing. Similar arrangements could be used for the other national organizations.

4.3.5.2 Network Group ID

This subfield can be used to subdivide a ground ATN network into smaller groups. This field is unique within a particular network. This may be useful for future expansion by allowing regions to be formed within a particular network as defined by the Network ID. The formation of regions may be useful in helping contain the routing traffic exchanged within the network.

This subfield is also used to designate an RDC. RDCs can also be used to assist in the formation of regions within an Administrative Domain and they offer an additional level of flexibility when used to combine RDs into a confederation. RDCs are designed by setting the uppermost bit of this field to “1”.

4.3.5.3 Domain ID

This subfield is a unique identifier assigned to each Routing Domain in the Network Group.

Table 4.3.5.3-1 shows possible examples on how the ARS field could be used. In the table two Network Groups “01” and “02” are defined. These two Network Groups can for example represent two FIRs in a country. One of the two Network Group contains two RDs and the other one contains three RDs. These two Network Groups can also address the initial RDs in a country (ie two RDs) with a planned expansion towards five RDs.

Network ID	Network Group ID	Domain ID	Comment
01	01	01	Network ID “01” indicates an ATSO operational network that contain two Network Groups “01” and “02”. Network Group “01” contains two RDs “01” and “02”. Network Group “02” contains three RDs “01”, “02” and “03”.
		02	
	02	01	
		02	
		03	

Table 4.3.5.3-1 – Example of ARS Value Assignment

4.3.5.4 Addressing RDCs in the ARS field

The Network ID subfield is used to segregate the addressing space of actual RDs and RDCs. When the Network ID subfield is set to “1” the second and third octets of the ARS field are assigned from the RDC addressing space (i.e., 8000-FFFF) and must be unique within that addressing domain. Otherwise, the subfields are assigned from the NSAP Address Space as described above for the Network Group ID and Domain ID subfields.

Similar principles as explained in sections 4.3.5.2 and 4.3.5.3 for the addressing of RDs can be applied to the addressing of RDCs, as required:

- The second octet of the ARS field may identify a group of RDCs.
- The third octet of the ARS field identifies RDCs.

4.3.6 The LOC Field

The LOC field is used to:

- Distinguish Routing Areas within Fixed Routing Domains, identified by the ARS field; and
- Distinguish Routing Areas and Routing domains within aircraft identified by the ARS field.

The assignment of the LOC field value is the responsibility of the State or organization that is the addressing authority for the routing domain in which the identified routing area is contained.

To assist States or organizations, it is recommended that the LOC field be decomposed into two subfields as shown in Figure 4.3.6-1: Subdomain Group ID and Subdomain ID.

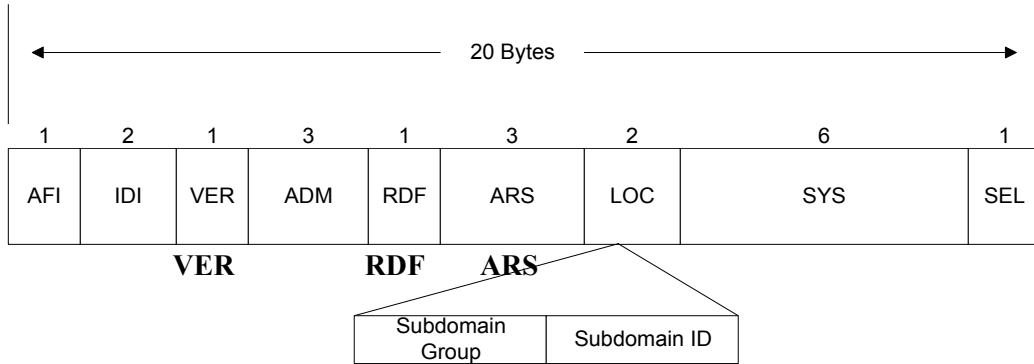


Figure 4.3.6-1 Proposed LOC Field Format

4.3.6.1 Subdomain Group ID

This subfield can be used to subdivide a domain into separate groups. For example, each control centre could be defined as a routing domain. A control centre may contain an En Route facility, Terminal facilities, and Tower facilities. Each of these facilities can be classified as a different Subdomain Group allowing addressing to be delegated to each facility, if desired. For this example, this subfield can be assigned as shown in the Table 4.3.6.1-1.

Value (hex)	Description
00	Reserved
01	No specific group. Used for RDs that do not require subdivision
02	En Route Subdomain
03 - FF	Assigned as required

Table 4.3.6.1-1 – Example of Subdomain Group ID Value Assignment

4.3.6.2 Subdomain ID

This subfield is a unique identifier assigned to each routing area within a Subdomain Group. This subfield allows multiple areas to exist within a subdomain group and must be unique within the subdomain. This subfield could be assigned as shown in the Table 4.3.6.2-1.

Value (hex)	Description
00	Reserved

Value (hex)	Description
01	No specific area. Used for Subdomains that do not require subdivision
02 – FF	Assigned as required by the Subdomain Group Addressing Authority

Table 4.3.6.2-1 – Example of Subdomain ID Value Assignment

4.3.7 The SYS Field

The SYS field is used to uniquely identify an End-System or Intermediate-System. The allocation of the SYS field value is the responsibility of the organization that is the addressing authority for the routing area that contains the identified ATN End-System or Intermediate-System.

The type of values or structure for the SYS field is for individual authorities to choose, as appropriate.

It has been suggested that the 48-bit LAN address of a device attached to an IEEE 802 local area network that is being used as an ATN ES or IS, could be used in this field. However, this may have ramification if the SYS field is tied to a subnetwork dependent information such as the physical network address (eg 48-bit LAN address) that is associated with a particular device. The problem will occur when the device is replaced by another device which will use a different 48-bit LAN address, requiring the NSAP address of the ATN ES or IS to be changed.

It is therefore recommended that the SYS field be used to identify the system without any dependency on physical information. Possible examples of this is to define whether the system is an IS or an ES, the type of function or role the system is used for (eg primary system, hot standby system, cold standby system, etc.), or the type of applications that are running on the system (eg AMHS, AIDC, ADS, CPDLC, Network Management, etc.).

A requirement found in Section 7.1.4.b.1 of ISO 10589 IS-IS states that all Level 2 ISs within a Routing Domain must have a unique SYS field value. In order to enforce this requirement related to IS-IS Level 2 addressing, it is recommended that the values assigned to the LOC subfields also be assigned to the upper two octets of the SYS field. Using this approach enables the addressing authority for each Subdomain Group the flexibility to assign addresses without conflicting with addresses of other groups within the same Routing Domain.

4.3.8 The SEL Field

The SEL field is used to identify the End-System or Intermediate-System network entity or network service user process responsible for originating or receiving Network Service Data Units (NSDUs).

Table 4.3.8-1 identifies the defined values that shall be used in this field in accordance with Reference 1.

SEL Field Value	Usage
[0000 0000]	Used for an IS network entity except in the case of an airborne IS implementing the procedures for the optional non-use of IDRP.
[0000 0001]	Used for the ISO 8073 COTP protocol in the Ground or Airborne End-Systems.
[0000 0010]	Used for the ISO 8602 CLTP protocol in the Ground or Airborne End-Systems.
[1111 1110]	Used for an IS network entity belonging to an airborne IS implementing the procedures for the optional non-use of IDRP.
[1111 1111]	Reserved

Table 4.3.8-1 - Defined Values for the SEL Field

5 Conclusions

The AFI Regional ATN Addressing Plan consists of a set of recommendations for each State to assign regional NSAP addresses in a consistent manner. Using these recommendations, it should be possible to develop efficient routing policies that limit the amount of information exchange while providing comprehensive ATN services. Further, the application of this plan will permit simplified ATN service growth with a minimum of router re-configuration.

6 Recommendations

The members of the second meeting of AFI ATN/TF are invited to review and comment on the AFI Regional ATN Addressing Plan as presented above.

Point 3 de l'ordre du jour: Description des applications sol/sol ATN**Communications de données entre installations ATS (AIDC) – Particularités et fonctionnalités**

3.1 Un aperçu de l'application communications de données entre installations ATS (AIDC) est présenté à la réunion. L'AIDC permet d'échanger des informations ATC entre organes ATS pour appuyer des fonctions ATC telles que la notification des vols approchant une limite de FIR, la coordination des conditions de franchissement des limites et le transfert de contrôle. La réunion note que l'AIDC utilisera le réseau ATN pour assurer un échange de données ATC fiable et en temps utile entre organes ATS. Tous les échanges de messages AIDC entre organes ATS peuvent être considérés comme des dialogues. La plupart des dialogues ne comportent qu'un message. Cependant, les dialogues de coordination et de transfert comportent plusieurs séquences d'échanges de plusieurs messages.

Mise en œuvre de l'AIDC dans la Région AFI***AIDC et automatisation ATS***

3.2 La réunion examine la relation étroite qu'il y a entre l'application AIDC et l'automatisation ATS, notamment le rôle de l'AIDC dans les applications air/sol de l'ATN, en particulier les dialogues liés à la notification, la coordination et le transfert entre organes ATS.

3.3 La réunion se souvient que selon le Plan AFI de mise en œuvre du CNS/ATM (Doc 003), l'application AIDC devrait être progressivement introduite dans la Région entre 2005 et 2008. Elle note qu'un certain nombre d'Etats situés dans l'interface AFI/EUR (Algérie, Cape Vert, Maroc et Tunisie) ont introduit ou bien sont sur le point d'introduire les procédures d'échanges de données en ligne (OLDI) avec leurs correspondants dans la Région EUR.

AIDC et performances des communications

3.4 La réunion reconnaît que l'application AIDC ne serait pas proprement introduite sans des améliorations majeures de l'infrastructure des communications qui continue d'être affectée par des carences graves dans certaines zones. La réunion se souvient de la Conclusion 13/72 de l'APIRG qui recommande une approche étape par étape dans la mise en œuvre des systèmes CNS/ATM dans la Région AFI, en commençant par des objectifs ATM nécessitant un minimum de besoins CNS et en donnant la priorité à l'amélioration du service fixe aéronautique (RSFTA et ATS/DS) et du service mobile aéronautique (extension de la couverture VHF) afin d'appuyer la fourniture du service de contrôle et la réduction des minima de séparation. La réunion reconnaît cependant les efforts significatifs faits par les Etats de la Région dans l'extension de la couverture VHF, et note que la procédure IFBP de l'IATA est encore appliquée dans certaines parties de la Région en raison de certaines zones de silence résiduelles.

3.5 La réunion adopte le projet de conclusion suivant :

Projet de Conclusion 2/4 : Mise en œuvre de l'application de l'AIDC dans la Région AFI

Il est conclu que lorsque les Etats et les organisations envisagent d'appliquer l'AIDC, qu'ils :

- a) **adoptent une approche étape par étape dans la mise en œuvre des systèmes CNS/ATM en donnant la priorité à l'élimination des carences et à l'amélioration des performances de l'infrastructure des communications existante ;**
- b) **mettent en œuvre des programmes d'automatisation des systèmes ATS ;
et**
- c) **prennent toutes dispositions utiles pour mettre en œuvre une infrastructure capable de soutenir l'application AIDC.**

Point 4 de l'ordre du jour: Formulation de propositions pour réaliser l'interopérabilité des réseaux VSAT

Développement des réseaux VSAT dans la Région AFI et les régions adjacentes

4.1 La réunion note que des Etats ou groupes d'Etats de la Région AFI ont mis en oeuvre des réseaux de communications ATS dédiés et que la plupart de ces réseaux ATS dédiés qui ont été mis en oeuvre au cours de la dernière décennie, sont fondés sur le concept de la technologie de terminaux à très petite ouverture (VSAT) offrant plus de souplesse et de facilité dans l'installation, l'utilisation, le fonctionnement et la maintenance. Elle passe en revue les développements régionaux et interrégionaux survenus dans le domaine des réseaux VSAT (AFISNET, SADC, CAFSAT), y compris les nouveaux réseaux (NAFISAT, MID VSAT), et note que des questions portant sur leur *interconnexion* et leur *interopérabilité* sont en cours d'examen dans la Région AFI, un environnement caractérisé par de nombreux fournisseurs. La réunion souligne l'importance d'une bonne coordination entre les projets NAFISAT, MID VSAT et SADC/2.

Consolidation des réseaux VSAT

4.2 La réunion rappelle la Conclusion 14/12 d'APIRG sur la consolidation des réseaux aéronautiques VSAT existants ou prévus qui servent d'appui aux communications du SFA, pour réaliser une connectivité totale et optimiser l'infrastructure au sol en utilisant un segment spatial unique sur le satellite de nouvelle génération d'Intelsat IS 10-02 à 359 degrés Est, sur le transpondeur 20/20 EH.

4.3 La réunion note la migration réussie du réseau AFISNET vers le satellite IS 10-02 in octobre/novembre 2004, étant entendu que les autres réseaux VSAT (notamment CAFSAT et SADC/2) seront établis sur les mêmes satellite et transpondeur dans un proche avenir. Par conséquent, elle recommande que les Etats concernés et le Secrétariat prennent les mesures nécessaires avec INTELSAT pour sécuriser la bande passante requise.

Interopérabilité des réseaux VSAT

4.4 La réunion reconnaît les avantages potentiels et les économies que procurerait la consolidation des réseaux VSAT existants et prévus sur le satellite IS 10-02 et prend conscience de la nécessité de réaliser l'"interopérabilité" entre ces réseaux pour aboutir à un réseau intégré et transparent.

4.5 La réunion reconnaît le besoin d'une compréhension commune des notions d'"interopérabilité" et "transparence" dans le cadre du futur système ATM basé sur le concept opérationnel d'ATM, tel que défini par le panel *ATMCP*. Elle note aussi que le panel ATNP (devenu ACP) définit l'"interopérabilité comme étant la capacité de l'ATN à fournir au minimum un service de transfert de données entre systèmes d'extrémité malgré la diversité des sous-réseaux constitutifs de l'ATN. La capacité des systèmes d'extrémité à interopérer peut également s'appliquer aux protocoles des couches supérieures." (voir Doc 9705).

4.6 A la suite de discussions approfondies et en tenant compte des spécificités des systèmes basés sur les satellites, la réunion adopte le projet de conclusion ci-après:

Projet de Conclusion 2/5: Interopérabilité des réseaux VSAT

Il est conclu que les Etats concernés:

- a) **Acceptent de poursuivre les actions visant à établir les réseaux CAFSAT, MID VSAT, NAFISAT, SADC/2 sur le satellite IS 10-02 à 359° Est, Transpondeur 20/20 EHA;**
- b) **Soient encouragés à tirer parti de la plate-forme des nouvelles fonctionnalités offertes par la technologie VSAT en termes d'utilisation du spectre de fréquences des réseaux, de souplesse, de gestion de la qualité de service, etc.;**
- c) **S'efforcent de réaliser l'interopérabilité au niveau de la bande de base lorsque les techniques d'accès sont différentes en raison de l'introduction de technologies VSAT émergentes, en tenant compte des critères de performance et de qualité de service convenus pour les services fixe et mobile aéronautiques (y compris les services de liaisons de données); et**
- d) **Effectuent la coordination nécessaire au cas par cas pour prendre en compte suffisamment à l'avance les besoins d'interopérabilité avant la mise en oeuvre des systèmes VSAT.**

Point 5 de l'ordre du jour: Programme de travail futur

5.1 Sous ce point de l'ordre du jour, la réunion adopte le programme de travail futur et la composition de l'Equipe de travail sur la planification de l'ATN. Le projet de décision ci-après est adopté :

Projet de Décision 2/6 : Programme de travail futur et composition de l'Equipe de travail sur l'ATN

Il est décidé que le programme de travail et la composition de l'Equipe de travail sur l'ATN soient tels qu'indiqués à l'Appendice 5A au présent rapport.

MANDAT, PROGRAMME DE TRAVAIL ET COMPOSITION DE L'EQUIPE DE TRAVAIL SUR LA MISE EN ŒUVRE DU RESEAU DE TELECOMMUNICATIONS AERONAUTIQUES DANS LA REGION AFI (ATN/TF)		
MANDAT		
Planifier la mise en oeuvre du réseau de télécommunications aéronautiques (ATN) dans la Région AFI afin de satisfaire les besoins de performance et de capacité du système CNS/ATM.		
PROGRAMME DE TRAVAIL		
Tache No.	OBJET	DATE CIBLE
1	Raffinement de l'architecture de routage de l'ATN	CNS/SG/2
1.1	Finaliser l'architecture dorsale et le plan d'interconnection des systèmes intermédiaires limites (BIS)	CNS/SG/2
1.2	Elaborer le plan de transition sol/sol vers l'ATN	CNS/SG/2
1.3	Elaborer le plan des routeurs ATN en vue de son inclusion dans le FASID de la Région AFI	CNS/SG/2
1.4	Elaborer le document de contrôle d'interface (ICD) sol/sol de l'ATN	CNS/SG/3
1.5	Elaborer le document de contrôle d'interface (ICD) air/sol de l'ATN	A déterminer
1.6	Finaliser le plan d'adressage du NSAP de l'ATN	CNS/SG/2
1.7	Elaborer le formulaire d'enregistrement des adresses du NSAP de l'ATN	CNS/SG/2
2	Description des applications sol/sol de l'ATN (AMHS, AIDC)	CNS/SG/2
2.1	Elaborer un plan de dénomination de l'AMHS	CNS/SG/2
2.2	Elaborer le document de contrôle d'interface (ICD) de l'AMHS	CNS/SG/2
2.3	Elaborer le plan de routage de l'AMHS en vue de son insertion dans le FASID de la Région AFI	CNS/SG/3
2.4	Elaborer la politique de routage des agents de transfert des messages de l'AMHS	CNS/SG/3

2.5	Elaborer le formulaire d'enregistrement des adresses AMHS	CNS/SG/3
2.6	Elaborer le plan des circuits de l'AIDC en vue de son inclusion dans le FASID de la Région AFI	CNS/SG/3
3	Elaborer des éléments indicatifs pour assister les Etats, selon les besoins	CNS/SG/2
3.1	Finaliser le document d'architecture de l'ATN dans la Région AFI	CNS/SG/2
3.2	Elaborer des éléments indicatifs sur la transition vers l'ATN des éléments au sol	CNS/SG/3
3.3	Aperçu de l'ATN	CNS/SG/3
4	Mise à jour des éléments indicatifs relatifs à l'ATN du Plan de mise en œuvre du CNS/ATM (Doc 003)	CNS/SG/2
COMPOSITION		
<i>Algérie, Angola, Burundi, Cameroun, RD du Congo, Egypte, Ethiopie, Ghana, Guinée, Kenya, Malawi, Maurice, Maroc, Niger, Nigeria, Sénégal, Afrique du Sud, Tunisie, ASECNA et IATA.</i>		

Point 6 de l'ordre du jour: Questions diverses

Néant.

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