International Civil Aviation Organization
Asia and Pacific Office

Asia/Pacific Regional ATN Implementation System Management Operational Procedures

SUMMARY

This document is intended to provide initial direction and guidance in the identification, development, and selection of ATN administrative management tools, agreements and documents necessary to facilitate and continue operation required for transition from current systems and methods to the ATN.

Version 1 – August 2004

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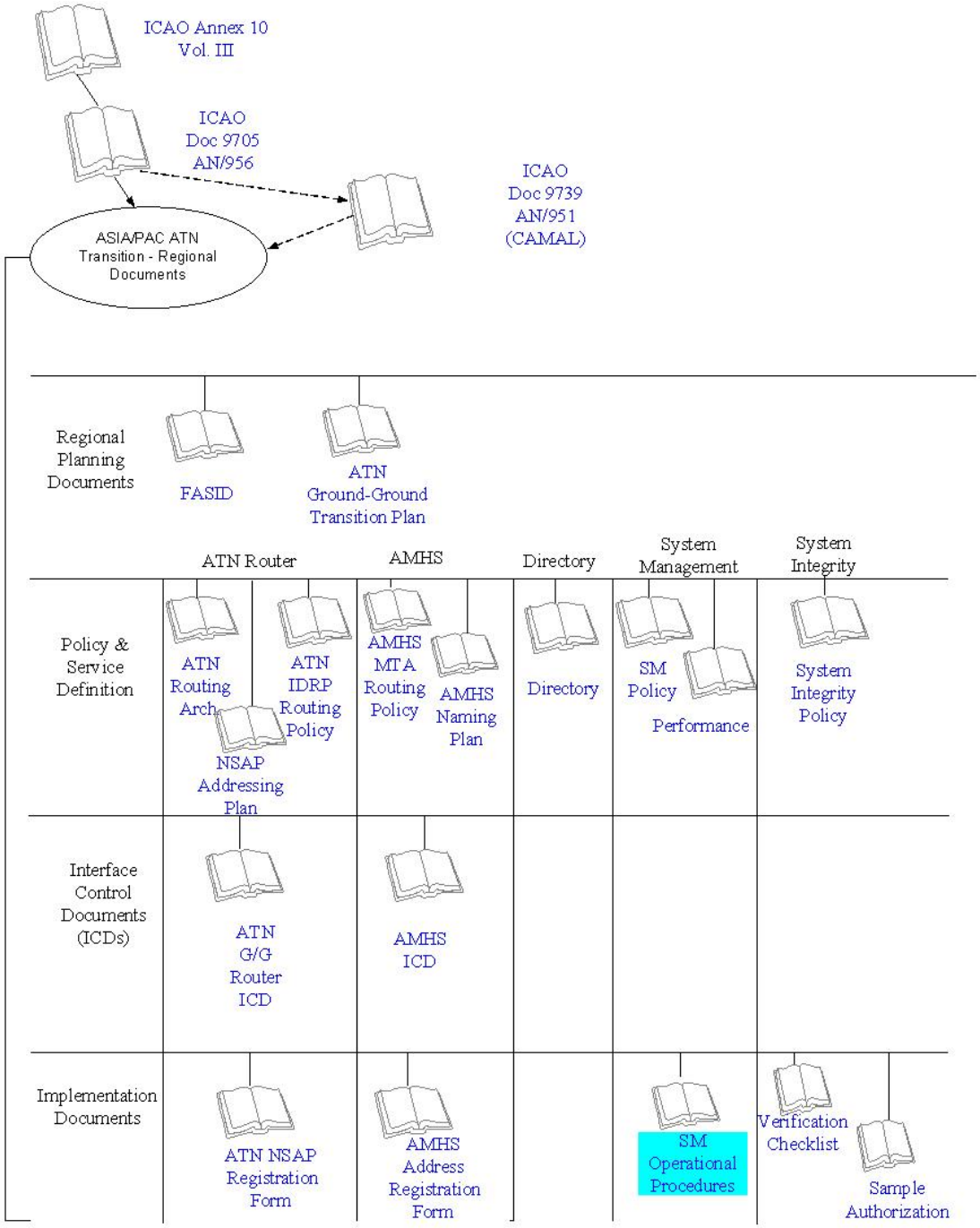
1.0 Location in Documentation Tree



2. Introduction:

The Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG) develops documents that will facilitate and guide the Asia and Pacific regions in the introduction and implementation of ATN in the region. This document is developed as a reference guideline for the introduction of necessary administrative ATN management guidelines and documents supporting the development, deployment, and administrative operation of the ATN/AMHS. In-depth technical provisions and specifications that support ATN management are referenced but not included and considered beyond the scope of this document.

ICAO SARPs, technical documentation and CAMALs effectively describe the technical requirements for ATN ***system*** management and ***system*** conceptual operations. It is the intent of this document to identify documents and policies that will facilitate the effective deployment and continued efficient operation of the ***service***.

2.1 Objectives

The objective of this document is the facilitation and establishment of ATN management practices that augment operational practices, policies, and procedures within the region.

2.2 Scope

Scope includes:

- Introduction of applicable management concepts
- Establishment of documents governing ATN ***service*** management
- Activities performed
- Definition of management information

2.3 References

References include:

- Manual of technical provisions for the ICAO ATN (Doc 9705-AN/956) Third Edition
- ICAO ATN CAMAL (Doc 9739-AN/961)
- ISO/IEC and ITU-T International standards for the OSI environment

2.4 Definitions for the purpose of this document:

- ***Administration*:**
  An entity that governs and controls most aspects associated with the support and operation of specific business functions.

- ***Application***
  A practical use of software (computer code) designed and written to achieve specific or multiple tasks employing physical elements to accomplish the direction.
  ***Authority*:**
  An ***Administration***, ***Institution***, or individual that has the weight to govern and direct compliance with guidelines and directives.
- ***Boundary device*:**
  A ***system*** element or device that is located logically between and used by multiple ATN ***system*** owners or operators**.** The efficient operation of the ***boundary device*** could effect the efficient operation of more than one ***domain***. Simply a device such as a router shared by multiple ***domains***.
- ***Domain*:**
  A set of resources under the control of a single entity.
- ***Institution*:**
  A single regional body having ultimate responsibility for operation and compliance of the Region. ***Institutions*** may delegate, by agreement, responsibility for actual ***administration***. This does not imply that ***Institutions*** are managers of a hierarchy of managers.
- ***Organization*:**
  An ***Administration*** that controls a set of resources that support, provide, and operate a ***service***, such as an ATN BIS router.
- ***Participant***:
  An ***Administration***, ***Institution***, ***system*** owner, ***system*** operator, or agency that connects and operates an ATN ***system*** in the global, or regional network environment, ATN ***system*** owners or operators.
- ***System*:**
  A union of physical and software elements designed and maintained to perform specific tasks and provide ***service***.
- ***Service*:**
  The overall result achieved from the consolidated interaction of ***applications,*** operational ***administrations***, and physical elements providing support of commerce, and safe and efficient air traffic management.

3.0 General Requirements for ATN *Service* Management

Performance of the ATN depends on the effective and efficient exchange of ATN information derived from machine sources as well as the operational procedures and guidelines of those using, operating and maintaining the ATN ***systems***. To properly monitor and maintain the ATN to provide the necessary quality of ***service*** (QoS) general provisions of what is exchanged in what manner and when must be determined and agreed. General requirements for ***service*** management should be defined. There is a minimum set of ***systems*** management requirements which applies to each type of ATN ***system*** (End ***System*** (ES), Boundary Intermediate ***System*** (BIS), Backbone Boundary Intermediate ***System*** (BBIS), Intermediate ***System*** (IS), etc.).

In general:

- ***System*** management events shall be logged locally for subsequent processing report generation and performance requirements.
- ***Systems*** shall have the capability of notifying local ***systems*** of relevant events to ***systems*** management ***subsystems***.
- ***Systems*** shall have the capability to share information among ***domains*** internally and externally to the administrative area.
- ***Systems*** management shall have the capability to manually and automatically configure ATN elements to optimise performance and mitigate failures.
    - This is a local matter for independent ***domains***.
    - Boundary intermediate ***systems*** (BIS) will require some designation of responsibility for configuration, monitoring, and intervention between independent ATN ***systems***.

4.0 Supporting Management and Implementation Agreements

These are agreements developed within and between ATN ***administrations*** that formalize the purpose of ICAO Standards and Recommended Practice concerning ***system*** management in the ATN Global environment.

4.1 ***Service*** Level Agreement (SLA) definition;

- Those documents developed between and internally among ATN ***system*** owners or operators (***domains***) that identify and commit the ATN ***system*** owners or operators to effective and efficient management and operation of the ATN once commissioned. These documents minimally will be bilateral and with the expansion of ATN expected to be multilateral.
- **See Example: Appendix A**

4.2 Memorandum of Agreement (MOA) definition;

- Documents developed between Authorities and other ATN ***system*** owners or operators governing requirements and commitments that promote the efficiency of the ***service*** and provide information necessary to achieve a mutually agreed objective or commitment.
- **See Example: Appendix B**

Recommendation: ATN ***system*** owners and operators shall develop Memorandum of Agreement to support efficient operation and maintenance of deployed and operational ATN elements. Critical points-of-contact and organizational roles and responsibilities should be defined and documented. Equipment should be described and methods of restoration, testing, and coordination clearly described, agreed and documented.

Recommendation: ATN ***system*** owners or operators shall develop and share ***Service*** Level Agreements between independent ***domains***, states, and ***service*** providers to facilitate performance and restoration.

Recommendation: SLA's shall be developed internally within ***domains*** to assure ***domain*** performance supports and makes possible the global ATN.
Recommendation: ***Service*** level agreements (SLA) should depict the ***domain*** responsible for configuration, monitoring, and intervention of shared ***boundary devices*** (routers) utilized by the entire ATN. This does not necessarily designate maintenance or repair responsibility only the operation and configuration in the dynamic in-***service*** environment.

4.3 Technical Memorandum of Cooperation (TMC) definition;

- Documents developed bilaterally, and multilaterally governing the commitment and responsibility of ATN ***system*** owners or operators during the development, implementation, and testing phases of the ATN deployment before operational commissioning. These documents will logically be replaced by SLA's and MOA's governing responsibility after operational integration and commissioning.

Recommendation: States and ***Organization***s that develop and deploy ATN ***systems*** in the Asia Pacific region should develop and publish TMC's that outline their activities and formalize their intent.
Recommendation: Achievements, problems, and lessons learned from activities associated with the TMC should be published and shared among interested parties

5.0 Managing Legacy *Systems*

To meet fully the requirements to provide distributed ***systems*** management across the full range of ATN ***systems*** that comprise the ATN; it is necessary to integrate the management of legacy (proprietary) ***systems***.

Legacy (proprietary) ***systems*** are characterized by their use of management ***systems*** based on non-conformant protocols and interfaces. Obsolescent legacy ***systems*** can fail to conform to ATN standards and practices, but transitionally they require consideration.

6.0 Informational Knowledge Base *System* Management Elements for ATN:

6.1 Information Objects: Objects refer to physical elements such as routers, hubs and switches and also includes administrative information such as telephone numbers, primary offices of responsibility, mailing addresses, and priorities of preemption. Many of these items can be maintained as Informational Objects in the Management Information Base (MIB), and Cross-***Domain*** MIB (CDMIB) of ***system*** management ***application***s. This information can be shared and distributed by cross-***domain*** distribution of Informational Objects.

ATN ***system*** owners or operators responsible for ATN management shall make available to other ATN ***administration***s these informational items.

- Points of Contact

- Offices of responsibility
- Generation of performance reports
- Publication of performance reports
- Distribution of performance reports

Recommendation: Principle and supporting ***Organization***s, businesses, and states should at a minimum gather, retain, and keep current the items identified as Basic Operational Knowledge Base Elements. Availability and currency of these items will facilitate repair, and efficient performance of the ATN ***service***.

7.0 Summary of Recommendations:

Recommendation: ATN ***system*** owners or operators will develop ***Service*** Level Agreements between independent ***domains***, states, and ***service*** providers to facilitate performance and restoration.

Recommendation: SLA's will be developed internally within ***domains*** to assure ***domain*** performance supports and makes possible the global ATN.

Recommendation: ***Service*** level agreements (SLA) should depict the ***domain*** responsible for configuration, monitoring, and intervention of shared ***boundary device***s utilized by the entire ATN. This does not necessarily designate maintenance or repair responsibility only the operation and configuration in the dynamic in-***service*** environment.

Recommendation: States and ***Organization***s that develop and deploy ATN ***systems*** in the Asia Pacific region should develop and publish TMC's that outline their activities and formalize their intent.

Recommendation: Achievements, problems, and lessons learned from activities associated with the TMC should be published and shared among interested parties

Recommendation: Participating states should develop Memorandum of Agreement to support efficient operation and maintenance of deployed and operational ATN elements. Critical points-of-contact and organizational roles and responsibilities should be defined and documented. Equipment should be described and methods of restoration, testing, and coordination clearly described, agreed and documented

Recommendation: Principle and supporting ***Organization***s, businesses, and states should at a minimum gather, retain, and keep current the items identified as Basic Operational Knowledge Base Elements. Availability and currency of these items will facilitate repair, and efficient performance of the ATN ***service***.

8.0. Examples of Management Procedural Agreements.

8.1. Example *Service* Level Agreement

Appendix A

Service level agreement

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***Service* Level Agreement:**

1 Purpose

This agreement is between **ATN LOCATION A and ATN LOCATION B.** This document outlines ***service*** level roles, responsibilities, and objectives of **ATN LOCATION A and ATN LOCATION B** in support of the **ATN.**

1 Scope of *services*

Location A and Location B support the day-to-day operations of **ATN** through the maintenance and support of hardware and software elements, objects and ***application***s that comprise the **ATN** and the physical and operational interfaces between **ATN** individual ***domains*** that operate in an interdependent environment.

1.1 Service* offerings include*:

• ***Systems*** Operations	Access to and operation of a network data distribution environment for the ATN, including data handling, switching, routing, message handling, message and information distribution, backup, and recovery
• Backups	Provision for regular backups
• Recovery	All hardware and software problems will be covered by operational management agreements. Data recovery, when required, will be completed in accordance with ATN recommended standards and practices.
• Infrastructure	Shall be maintained and operated in accordance with ATN recommended standards and practices.
• First Level Support	Provisions for operational support of existing ***application*** software, and hardware to facilitate troubleshooting and correction of information management and information distribution problems
• Consulting	Provide expertise to support ATN operation and consult on operational requirements, performance objectives and planning needs

2 Performance goals

Performance guidelines and what are agreed to by the signatories of this agreement that will determine these goals.

3 Performance measures

Performance guidelines and what are agreed to by the signatories of this agreement that will determine these goals.

4 Constraints

Performance guidelines and what are agreed to by the signatories of this agreement that will determine these goals.

5 Maintenance schedules

- Routine posted and shared maintenance schedules
  - Hours of Operation
  - Hours of available technical support
- As scheduled and agreed in advance with affected units

6 Terms of agreement

The signatures of this document indicate agreement to its content, that it is valid, has achievable objectives, and represents the intent of the parties to meet the ***system*** needs, report performance, and achieve cooperative performance goals as identified above. This document is controlled by **Location A, responsible director and Location B, responsible director.** These directors or their duly authorized representatives are the primary signatories of this agreement. Any modifications to this agreement require the review and approval of both parties. Inputs relative to the content or distribution of this document should be forwarded to the director(s).

This document will remain in effect until replaced with an updated version. It will be reviewed annually for currency, accuracy, and completeness. The next review is scheduled for **(Month, day).**

7 Approval

Signature	(Print Name)	Date

Title/Position, ***Organization***, and location.

Signature	(Print Name)	Date

Title/Position, ***Organization***, and location.

8 Addendum A: Technical support availability schedule

Described here times, dates, hours, and offices that supports the operation of the ***service***. Preferred Points of Contact POC's are responsible offices and ***Organization***s rather than individuals.

9 Addendum B: Response and restoration commitments

Agreement between the parties in regard to mutually agreed response and restoration of failed elements or processes. This is the basic commitment of the parties regarding their obligation to respond and restore degraded operations or elements.

10 Addendum C: Critical reports

Described here the performance reports that will be produced by ATN ***system*** owners or operators, frequency, and distribution. How the reports will be delivered, to whom and in what manner, method or form.

11 Addendum D: Performance Measure

Described here the performance measures that the parties mutually agree to apply as a basis to determine effective operation of resources within the local ***administration*** and the resources shared to achieve the global goal.

12 Addendum E: Contact list

A list of hierarchical contacts, timeframes for contact nature of contact, and time to escalate to the next level for action.

8.2. Example Memorandum of Agreement

Appendix B

Organization A
Network Operations Center

And

Organization B
Network Operations Center

Memorandum of Agreement

Operational Procedures
For
ATN Network
Management, Operation, and Maintenance

Month, Day, Year

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1.0 INTRODUCTION

Network management and operation ***services*** between ***Administration A*** and ***Administration B*** Network Operations Center (NOC) whether government, civilian, contractor, vendor, ***service*** provider, or others require coordination, information sharing and clearly defined responsibilities to ensure that ***services*** are effectively transported and maintained to meet user requirements. The recognized criticality regarding delivery of aviation related information insures safety and cost effective operation and the significance is vital. As part of this effort, the following memorandum of agreement outlines and describes the required coordination among the ***administration***s and the responsibilities of each ***administration***.

1.1 Purpose

This document establishes the division of responsibilities and required procedures between ***Administration A*** and ***Administration B*** for the management, operation, and maintenance of information and messages transported between each network. It is understood that any reference to ***Administration A*** or ***Administration B*** in the context of this document, shall include any agent (government, civilian, contractor, vendor, ***service*** provider, and others) designated by the ***Administration***s to act on their behalf for the purpose of fulfilling this agreement.

This document identifies whom, when, and under what conditions allowable actions can be taken. Typical actions include:

- Troubleshooting
- Trouble reporting
- Maintenance actions (preventive, routine scheduled, emergency)
- Division of maintenance authorization
- Coordination of maintenance activities
- Changes to the network
- Configuration of the network
- Failure or non-availability notification
- Monitoring of traffic loading
- ***System*** back-up procedures and the conditions under which they are to be invoked are also established in this document.

The actions described above require the existence of a single point of contact for ***Administration A*** and ***Administration B.*** ***XXXXXX*** shall be the single point of contact for provisioning maintenance and network ***services*** for ***Administration A. XXXXXX.*** ***YYYYYY*** shall be the ***Administration B*** single point of contact. ***XXXXXX*** coordinate activities with ***YYYYYY,*** vice-versa.

1.2 Scope

This document will describe the following, as they relate to ***Administration A*** and ***Administration B*** networks:

- Network Overview
- Maintenance and Trouble Reporting
- Network Security and Access
- Technical Assets

1.3 Reference Documents

- ICAO SARP's
- Technical Manuals
- Technical documentation related to the equipment and ***application***s in use by the ATN ***system*** owners or operators

2.0 *Administration* A Network Overview

The ***Administration A*** Network is a ***system*** of leased and owned transmission facilities connecting network equipment resources (Routers, Hubs, Switches, etc.). The network (equipment and telecommunication lines) has a mean time between failure (MTBF) of .9999 or better. The operational management ***system*** is **XXXXX version x.x.** The network is centrally managed at **LOCATION A and Alternate Location B (if provided).**

2.1 Transmission Facilities

The network nodes are linked together with a minimum of two trunks creating a diverse network.

2.2 Clocking Scheme

Clocking for the ***Administration*** A Network is as follows:

- Number of Master Clock Sources.
- Describe how the clocking is distributed.

2.3 Operational *Domains*

In order to maintain operational integrity, ***domain*** separation is implemented between nodes in a particular area or between networks. Firewalls allow seamless communications among the ***domains***, but prevents non-certified, authenticated, or authorized operators from accessing the other ***domains*** within the ATN Network, and total isolation between the ATN and non-ATN networks.

The capability should exist to allow inter-nodal and inter-***domain*** operator and maintenance access. This capability is negotiated between **ATN *Administration*s** and other non-ATN administrators as required supporting mission requirements while maintaining operational integrity concerns.

2.4 Preemption and Priority Scheme

With the use of routing algorithms, the ATN shall always attempt to place a call over a primary path first. A primary path is defined as the shortest route, with the least nodal hops. In the event, the primary path is not available; the network will place the call over an alternate route. Call routing on the ATN will be automatic,

requiring the establishment of a priority and preemption scheme. See Table 1a for the list of ATN priorities.

Table 1a.

ATN Network
Call Priority/Preemption Plan

Service Category	Priority/ Preemption	Types of ***Services***
Lowest priority = 0 Highest priority = n		
1. Critical (.99999 Availability, 6 second restoration)		
Priority 1 (Primary)	13	
Priority 1 (Backup)	12	
Priority 2 (Primary)	11	
Priority 2 (Backup)	10	
Priority 3 (Primary)	9	
Priority 3 (Backup)	8	
2. Essential (.999 Availability, 10 minute restoration)		
	7	
	6	
	5	
	4	
3. Routine (.99 Availability, 1.68 hour restoration)		
	3	
	2	
	1	
4. Network OT&E	0	Testing, temporary evaluation

References:

3.0 *Administration* B Network Overview

The ***Administration B*** Network is a ***system*** of leased and owned transmission facilities connecting network equipment resources (Routers, Hubs, Switches, etc.). The network (equipment and telecommunication lines) has a mean time between failure (MTBF) of .9999 or better. The operational management ***system*** is **XXXXX version x.x.** The network is centrally managed at **LOCATION A and Alternate Location B (if provided).**

3.1 Transmission Facilities

The network nodes are linked together with a minimum of two trunks creating a diverse network.

3.2 Clocking Scheme

Clocking for the ***Administration*** A Network is as follows:

- Number of Master Clock Sources.
- Describe how the clocking is distributed.

3.3 Operational *Domains*

In order to maintain operational integrity, ***domain*** separation is implemented between nodes in a particular area or between networks. Firewalls allow seamless communications among the ***domains***, but prevents non-certified, authenticated, or authorized operators from accessing the other ***domains*** within the ATN Network, and total isolation between the ATN and non-ATN networks.

The capability should exist to allow inter-nodal and inter-***domain*** operator and maintenance access. This capability is negotiated between **ATN *Administration*s** and other non-ATN administrators as required supporting mission requirements while maintaining operational integrity concerns.

3.4 Preemption and Priority Scheme

With the use of routing algorithms, the ATN shall always attempt to place a call over a primary path first. A primary path is defined as the shortest route, with the least nodal hops. In the event, the primary path is not available; the network will place the call over an alternate route. Call routing on the ATN will be automatic, requiring the establishment of a priority and preemption scheme. See Table 1a for the list of ATN priorities.

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Service Category	Priority/ Preemption	Types of ***Services***
Lowest priority = 0 Highest priority = n		
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Priority 1 (Primary)	13	
Priority 1 (Backup)	12	
Priority 2 (Primary)	11	
Priority 2 (Backup)	10	
Priority 3 (Primary)	9	
Priority 3 (Backup)	8	
2. Essential (.999 Availability, 10 minute restoration)		
	7	
	6	
	5	
	4	
3. Routine (.99 Availability, 1.68 hour restoration)		
	3	
	2	
	1	
4. Network OT&E	0	Testing, temporary evaluation

References:

4.0 *ADMINISTRATION*S AND RESPONSIBILITIES

This section details the guidelines, structure, and duties of individuals and groups of the established ATN Network and ATN ***system*** owners or operators identified in this MOA. Contact person(s) for parties are identified.

4.1 *Administration* A network Operations Mission

Allocations of resources and responsibilities relating to ***services*** of the ATN Network are governed by the following guidelines:

- Simplify the Network operations while accommodating the general Air Traffic Control (ATC) operations and maintenance philosophy.

- Provide high responsiveness to end-users at all locations and central management to eliminate the need for 24-hour, local, on-site operation and maintenance dedication.
- Minimize the time for localization and correlation of failures in end-user equipment or individual transmission ***systems*** attached to the Network with the Network Management ***System*** (NMS) ability to aid in trouble localization.

4.1.1 *Administration* B network Operations Mission

Allocations of resources and responsibilities relating to ***services*** of the ATN Network are governed by the following guidelines:

- Simplify the Network operations while accommodating the general Air Traffic Control (ATC) operations and maintenance philosophy.
- Provide high responsiveness to end-users at all locations and central management to eliminate the need for 24-hour, local, on-site operation and maintenance dedication.
- Minimize the time for localization and correlation of failures in end-user equipment or individual transmission ***systems*** attached to the Network with the Network Management ***System*** (NMS) ability to aid in trouble localization.

4.2 Organizational Structure

This section describes the basic organizational construction of the ATN ***system*** owners or operators, and initial points of contact and offices of responsibility.

4.2.1 *Administration* A Structure

The structure of the ***Administration A's*** Network Management Group is designed to provide maximum response to the end user. The following Network Management ***administration***al structures are described in this section.

- ATN Engineering and Implementation Group
- ATN Configuration Management Group.
- ATN Network Operations Center(s)

4.2.1.1 ATN Engineering and Implementation Group

The ATN Engineering and Implementation Group structure consists of the following:

- International Telecommunications Office
- POC Phone # Office
- Program/Project Office
- POC Phone # Office
- Network Engineering Group
- POC Phone # Office

4.2.1.2 ATN Network Operations Center (NOC)

The ATN NOC structure consists of the following:

- Location A Network Center Manager
  - POC Phone # Office
- Location A Technical POC's
  - POC 1 Phone # Office
  - POC 2 Phone # Office

4.2.2 *Administration* B Structure

The structure of the ***Administration B's*** Network Management and ***Administration*** Groups is designed to provide maximum response to the end user. The following Network Management ***administration***al structures are described in this section.

- ATN Engineering and Implementation Group
- ATN Configuration Management Group
- ATN Network Operations Center(s)

4.2.2.1 ATN Engineering and Implementation Group

The ***Administration B*** Engineering and Implementation Group structure consists of the following:

- Engineering and Development Unit
  - POC 1, Phone #, Organizational Identifier
  - POC 2, Phone #, Organizational Identifier
  - POC n, Phone #, Organizational Identifier

4.2.2.2 ATN Operations POC

The ***Administration B*** Operations POC information is as follows:

- POC 1, Phone #, Organizational Identifier
- POC 2, Phone #, Organizational Identifier
- POC n, Phone #, Organizational Identifier

4.2.2.3 ATN Network Operations Center (NOC)

The ATN NOC structure consists of the following:

- Location B Network Center Manager
  - POC Phone # Office
- Location B Technical POC's
  - POC 1 Phone # Office
  - POC 2 Phone # Office

4.3 Organizational Responsibilities

This section describes the responsibilities of the ***administration***s and personnel involved in the networks. The ***Administration*** *A* NOC ensures that ***service***-related problems are resolved and works directly with the ***Administration*** *B* NOC as necessary.

4.3.1 Network Planning

Network planning is the responsibility of the network engineering group of each network and includes the following:

- Proposing recommendations regarding network configuration changes and increasing or decreasing infrastructure resources.
- Reviewing and recommending new and/or revised Management, Operational, and Maintenance procedures.
- Analyzing regional performance data.
- Providing recommendations for network improvements.

4.3.2 Network Analysis

Network analysis is the responsibility of the network engineering group of each ***administration*** and accomplishes the following:

- Evaluates data from the NOC and the NMS to identify network improvement areas.
- Analyzes reports on network events and usage, and distributes monthly reports via email to all ATN ***system*** owners or operators.
- Provides coordination for all network related activities
- Coordinates with other telecommunications ***service*** managers to ensure optimum performance.
- Examines the communications needs and the expandability of current configurations for integration into the network.
- Determines which circuits and ***services*** to implement on the network.

4.3.3 Network Operations Centers (NOC)

The NOC functionality as described in Section 4.3.2 provides the basic requirements of what is essentially required to operate and maintain a functional and efficient network operation. This basic functionality can be provided by participating states, Civil Aviation Authorities, or contract ***service Organization***s. It is essential that the functionality described herein be provided.

The Network Operations Center is required in order to ensure there is a central focus for network operations. The NOC is made up of network experts at one or more locations and is responsible for internal network operations and ***boundary device system*** elements. The NOC gathers information for future analysis and monitors network performance, security, and integrity.

The NOC is equipped with a Network Management ***System*** (NMS), which provides the network operators the capabilities to monitor performance and availability of the network, and the ability to control and test network elements and circuits as required.

Configuration of user circuits required for transmission to or from the network is coordinated according to procedures stated in this agreement. The NMS provides a real-time view of the network down to the card and port levels of the equipment. The NMS provides fault notification, isolation, and restoration capabilities to the Network Operators

The NOC operates 24 hours a day, 7 days a week with the following responsibilities:

- Provide a single point of contact for the Network
- Provide first-level ***service*** support.
- Perform operations and direct maintenance activities.
- Continuously monitor activities and utilization.
- Monitor and localize network problems.
- Maintain a Trouble Report ***System***.
- Ensure trouble resolution.
- Perform escalation.
- Report trouble status.
- Coordinate with points of contact.
- Coordinate maintenance activities.
- Coordinate ***service*** establishment.
- Implement configurations.
- Maintain logs.
- Manually route traffic, as required, to maintain network operations.
- Provide information for the development of monthly network traffic statistic reports.
- Provide configuration management.

The above bullets are expanded below in Paragraphs 4.3.2.1 through 4.3.2.17

4.3.3.1 Provide a Single Point of Contact for the ATN Network

The NOC is the central point of contact for all network-related issues. The NOC is the single point of contact for issues relating to the ATN Network. Telephone numbers, FAX numbers, and Email addresses for the NOC are provided in Table 1b.

Table 1b.

	TELEPHONE No.	**FAX No.**	**Email Address**
POC 1			
POC 2			
POC 3			
POC n			

4.3.3.2 Provide First-Level *Service* Suppo*rt*

The ATN NOC is the first level of ***service*** support for all ATN Network-related issues. This ***service*** support includes all Network-related equipment problems.

4.3.3.3 Perform Operations and Direct Maintenance Activities

The ATN NOC shall perform operations and coordinates the maintenance activities for the Network and all associated equipment with users that will be affected. The performance of operations and the direction of the maintenance activities will ensure that the ATN Network is as efficient as possible.

4.3.3.4 Continuously Monitor Activities and Utilization

The ATN NOC shall continuously monitor the utilization of the ATN Network and its related equipment. The NOC shall ensure that all ATN Network ***services*** are performing properly and all trunks are operating within specifications. The NOC also monitors all logged-on user activities.

4.3.3.5 Monitor and Localize Network Problems

The ATN NOC shall monitor the network for any trouble. Adjacent networks will assist in troubleshooting performance issues. Trouble(s) shall be localized and maintenance shall be coordinated where appropriate. Direction of maintenance will include calling the points of contact and the ***service*** providers.

4.3.3.6` Maintain the Trouble Report *System*

The ATN NOC shall maintain the trouble report ***system*** by recording network impairments reported by users or identified through the NMS. The NOC will ensure that trouble tickets are initiated properly, that the information is continuously updated, and the trouble tickets are properly closed. Once the trouble tickets have been closed, the NOC will notify all concerned parties of their resolution. Trouble reports shall be shared as required.

4.3.3.7 Ensure Trouble Resolution

The ATN NOC shall ensure that all identified troubles are resolved.

4.3.3.8 Perform Escalation

The ATN NOC shall perform all escalation procedures necessary for the resolution of network troubles

4.3.3.9 Report Trouble Status

The ATN NOC shall provide status reports of troubles reported to them relating to other points of contact in accordance with agreed schedules. For priority 1 troubles, the NOC, as well as all affected users, will be notified automatically when the trouble is detected, and again when the trouble is repaired and ***service*** restored.

4.3.3.10 Coordinate with Points of Contact

The ATN NOC shall coordinate with the proper points of contact for trouble resolution. The user points of contact shall contact the ATN NOC (as appropriate) as soon as network troubles are experienced.

4.3.3.11 Coordinate Maintenance Activities

The ATN NOC shall coordinate all ATN Network-related maintenance activities. These activities include preventive, routine, and emergency maintenance. The NOC shall initiate all requests for maintenance time periods, will ensure that all affected network sites are aware of the requests, and will ensure maintenance is completed.

4.3.3.12 Coordinate *Service* Establishment

The ATN NOC, in cooperation with the AFL POC, shall coordinate the establishment of all related inter-network ***services***. The ATN NOC will ensure that the ***service*** is operational and will update all their databases.

4.3.3.13 Implement Configurations

The NOC shall implement configurations as required. Coordination with users potentially impacted shall be done prior to any changes.

4.3.3.14 Maintain the Log

The ATN NOC shall maintain a log of all Network-related queries, by telephone, E-mail, or any other contact, unless a trouble ticket is generated. This information will be made available to those that require it once a request has been received.

4.3.3.15 Manually Route Traffic

The NOC shall manually route traffic, as required, to better utilize or to place traffic on a preferred path. This will be done only on a case-by-case basis, and in concert with affected users whenever possible.

4.3.3.16 Provide Monthly Network Traffic Statistic Reports

The ATN NOC shall provide monthly reports of ATN's BWM Network traffic statistics to users that need the information and have submitted a request. These reports are to be used to ensure that there is adequate bandwidth in the network.

4.3.3.17 Provide Configuration Management

To preserve the integrity of the ATN BWM Network, changes to hardware, software, or operational procedures shall first be presented in proposal form to the Engineering group at least 30 days in advance of the proposed implementation date. This will ensure that their impact on the network can be ascertained. Differences regarding the implementation of the proposed changes will be subject to negotiation between the ATN ***system*** owners or operators.

4.4 Specific Responsibilities for *Administration* A and *Administration* B POC's

4.4.1 ATN NOC

The ATN NOC is responsible for all activities relating to the network elements in their ***domain*** and all circuits that are connected to that network. They are also responsible for coordinating with other networks and users for problem resolution.

5.0 MAINTENANCE OBJECTIVES

A maintenance plan is critical to the successful operation of the ATN Network. This section describes the objectives, procedures, and priorities for maintaining the ATN Network. The maintenance objectives of the ATN Network are to accomplish the following:

- Provide a single point of contact for maintenance
- Control trouble localization from one point
- Provide procedures for maintenance activities
- Set priorities for accomplishing maintenance

The NOC is equipped with a Network Management ***System*** (NMS) that provides monitoring and control points for the network. The NMS provides a complete, real-time view of the network down to the trunk and ports. The NMS provides fault notification, isolation, and restoration capabilities to the BWM Network Operator. The NMS allows alarms to be prioritized to network severity and provides thresholds to meet the operational needs of the network.

The NOC has the primary responsibility for initiating, coordinating, and escalating the maintenance activities. It is the single point of contact for provisioning maintenance ***services***. The NOC is available 24 hours a day, 7 days a week.

5.1 Trouble Reporting

The network monitoring functions will alarm for events that happen on the ATN Network. However, any user of the Network, at the first sign of abnormal or unsatisfactory operations, should contact their responsible NOC.

5.2 Logging Calls

All informational and trouble calls related to the ATN Network shall be entered into the daily logs maintained at the NOC. All calls relating to unsatisfactory operation of the Network shall be entered into the daily log and, monthly reports will be prepared for exchange between ATN ***system*** owners or operators. The method of exchange shall be via e-mail, fax, or telephone, as appropriate.

The NOC has an automated trouble ticket ***system*** that provides a speedy and organized response to ***service*** disruption on the network.

5.3 Maintenance Priorities

5.3.1 ATN Maintenance Priorities

ATN ***system*** owners or operators as shown below will perform maintenance on a priority basis. Table 5-1 provides the action to be taken for each priority level.

Priority 1:

- Loss of critical ***service*** (critical user or trunk ***service***)
- Loss of 50 percent or more of the ***service*** at one location
- Failure of the NMS to function correctly.

Priority 2:

- Loss of essential ***service***
- Inability to clear alarms after troubles cease.

Priority 3:

- Troubles identified by trend analysis not covered in Priorities 1 or 2
- Single-incident quality trouble

Priority 4

- Request for monitoring
- Request for research

5.3.1.1 Repair Status

Reporting time for status of trouble calls shall be based on priority shown in Table 5-1. All clearances on the trouble calls associated with Table 5-1 shall be within 4 hours from escalation. Trouble reports on all non-cleared ***service***-affecting faults should be exchanged among network managers on an hourly (at a minimum) basis until the fault is cleared. Trouble reports on all other non-***service***-affecting faults should be exchanged among network managers at four (4) hour intervals.

Table 5-1 Reporting Time for Trouble Calls

Priority[1]	**Action**
1	Within 30 minutes Every 30 minutes thereafter
2	Within 1 hour Every 1 hour thereafter
3	Within 4 hours Daily status update will be given
4	Within 24 hours Daily status update will be give

NOTE 1: The Priority definitions are identified in paragraph 5.3.1.

5.3.1.2 Escalation

The NOC shall perform escalations as necessary in concert with other networks and users affected. Faults detected and isolated will be escalated after the elapsed time exceeds twice the initial response time in according to the levels shown in Table 5-1. Points of Contact for the escalation process are listed in Appendix 2. Further, all faults detected will be relayed to the respective network managers as follows:

- All ***system*** faults within 1 hour from detection
- All major trunk faults within 30 minutes from detection

Standard escalation procedures will require trouble tickets to be escalated according to the following levels:

Table 5-2. Standard Escalation Levels

Level	Standard Escalation Levels
First	NOC
Second	NOC Supervisor
Third	TBD
Fourth	TBD
Fifth	TBD

5.3.1.3 Back-up Procedures in the Event of a Total Node Failure

Back-up procedures shall be in accordance with those outlined in the contingency plans for the facility.

5.3.1.4 Node-to-Node Trunk Failures

In case of node-to-node trunk failure, all network traffic shall be automatically re-routed and restored by the Network to the non-failed trunk within four (4) to six (6) seconds of failure detection. Bandwidth contention shall be resolved via a preempt/priority scheme to assure delivery of the highest priority messages.

If there is insufficient bandwidth available to re-route the traffic without interrupting other ***service***, bandwidth shall be made available automatically based on the priority ***services*** in accordance with the pre-empt priority scheme, to be considered at a later date, until the trunk becomes available again.

5.4 Configuration Changes

Whenever a configuration change is made to a primary ATN/AMHS element, the configuration of any standby element must also be updated.
Configuration that may effect other ATN ***system*** owners or operators must be communicated and shared between ATN ***system*** owners or operators.

6.0 TECHNICAL ASSETS

To assist with the operation and maintenance of the ATN Network, the following tools should be available:

- Network Management ***System*** (NMS)
- Trouble Management ***System*** (TMS) with Trouble Ticket Tools
- Standard Network Test Equipment that is already in the inventory
- Reports

6.1 Network Management *System* (NMS)

The NOC uses a Network Management ***System*** (NMS) to monitor the health and status of the elements and devices installed in the network. The NMS provides a graphical user interface that incorporates all elements of the Network into a user-friendly platform that provides clear access to the operational status of the network.

The workstation gives the NMS operators a graphical display of each Network. The NMS will constantly monitor the operational status of the network and provide real time display updates. Operational updates include changes to ***system*** alarms and failures as well as changes in configuration.

In case of a performance degradation, or loss of a trunk or an entire site, the Network will automatically switch to a different trunk to go around the effected element, independent of the NMS. The loss of an NMS will not affect the operation of the Network; the Network will operate independently of the NMS.

6.2 Trouble Management *System*

The Trouble Management ***System*** (TMS), which includes a Trouble Ticket Tool, is an automated trouble ticket handling ***system*** with a centralized database. The NOC uses the TMS for efficient and timely trouble handling. The NOC records certain information obtained from the user into the TMS. This information includes:

- The name and callback number of the individual reporting the trouble
- Contact name and number at the trouble site location
- Network circuit or channel number
- Failed device or element
- Time of initial degradation or ***service*** disruption
- Description of ***service*** impairment and current status
- Release for circuit testing

All entries made in a TMS trouble ticket are required to be computer stamped with the date, time, and initials of the operator making the update. TMS shall play a major role in trouble handling by providing a means to:

- Record Network impairments reported by users or identified through the NMS.
- Assign the proper priority and trouble codes for timely resolution of the impairment.
- Refer the reported impairment to the appropriate Network operations location for resolution.

- Provide regional central points where corrective actions can be progressively followed and resolution status is maintained.
- Provide a computerized database of trouble histories for trend analysis.

6.3 Network Testing

Because of the disruptive nature of network testing, the Network operators and users shall employ stringent coordination procedures prior to initiating network tests.

6.3.1 Standard Test Equipment

No unique test equipment will be required to maintain the ATN Network.

7.0 AGREEMENT

This agreement constitutes the entire Agreement between the parties and supersedes all previous statements or representations, whether oral or written, with respect to the subject matter of the Agreement. Any change or modification must be in writing and signed by duly authorized representatives or both parties hereto.

6.1 *Authority*

WITNESS that the parties have read this Agreement, including the attached schedules, and agree to be bound by its terms and have therefore caused this agreement to be executed by their duly authorized representative as set forth below.

***Administration* A**	***Administration* B**
By: _____	By: _____
Printed Name: _____	Printed Name: _____
Title: _____	Title: _____
Date: _____	Date: _____
Witness: _____	Witness: _____
Printed Name: _____	Printed Name: _____
Date: _____	Date: _____
_____	_____
Company Stamp	Company Stamp

APPENDIX 1: Points of Contact

Location	POC	Telephone No.	FAX No.	Email Address

APPENDIX 2: Escalation Level POCs

***Administration* A Escalation Level POCs**

	Location	POC	Telephone No.	FAX No.	Email Address
1					
2					
3					

***Administration* B Escalation Level POCs**

	Location	POC	Telephone No.	FAX No.	Email Address
1					
2					
3					