**ATNP WG3**
**WP 6-15**
**Revision A**
**JWG WP___**

Aeronautical Telecommunication Network Panel (ATNP)
Applications and Upper Layer Work Group (WG3)
Joint Working Group (JWG)
Brussels, Belgium
15-26 April 1996

# Proposed WG3 Inputs on Validation for JWG WP to ATNP/2

Presented by the WG3 Rapporteur

**It was agreed at the ATNP WG1 meeting in Brisbane that WG1 would take the lead in drafting a working paper describing the CNS/ATM-1 Package SARPs validation efforts and recommending panel approval of the proposed SARPs based on the results of the validation efforts. The working paper would be reviewed at the Joint Working Group meeting in Munich (June 1996). This paper, as revised by the JWG, would then be submitted to the ATNP secretary for translation. This WP would reference an attached validation report which would not be finalized, nor submitted to the ATNP secretary, until the conclusion of the October 1996 JWG meeting. The following material is proposed as a WG2/WG3 input into the WG1 members that will be drafting the WP for the Munich JWG meeting.**

**References:**

Flimsy 10, fifth meeting of ATNP WG3 (Brisbane), Feb. 1996

Flimsy 12, fifth meeting of ATNP WG3 (Banff), October 1995

Report of the fourth meeting of ATNP WG1 (Brisbane), February 1995

## 1. Background

As reported in the meeting report of the fourth meeting of ATNP WG1, in Brisbane:

> *The meeting then continued discussion on WP4-17, and in particular the recommendations dealing with the development of documentation to be submitted to ATNP/2 with respect to the SARPs being produced by all 3 Working Groups. It was agreed that WG1 would develop the overall Working Paper for submission to ATNP 2 which would describe the approach taken for validating the entire CNS/ATM-1 SARPs. It was also agreed that a special JWG1/2/3 meeting would be called in October 96, hosted by the US, which will focus on finalizing the detailed validation reports required to be attached to the previously mentioned paper to be submitted to ATNP/2. The meeting decided that the Rapporteur of WG1 would advise both WG2 and WG3 of the decisions reached at this meeting on these matters. The communiqué to the other WGs is attached as Appendix I.*

WG3, at its fifth meeting in Brisbane, reviewed several working papers related to SARPs validation and produced Flimsy 10 as a results of these discussions. The attached draft working paper has subsequently been prepared as the proposed initial draft of the JWG WP on validation for ATNP/2. This WP assumes the successful conclusion of the CNS/ATM-1 Package SARPs validation activites and proposes that ATNP/2 approve the proposed SARPs.

## 2. Proposal

The material in attachment 1 to this working paper includes draft text based on the contents of Flimsy 10 from the fifth meeting of WG3 (Brisbane) as well as a number of WG2 working papers. It is proposed that this material be endorsed by WG3 and provided to WG1 and WG2 with a recommendation that it be used as the basis for the working paper on CNS/ATM-1 Package SARPs validation that will be reviewed at the JWG meeting in June 1996, in Munich.

# Attachment 1

# Draft Working Paper for ATNP/2

**ATNP/2**
**WP____**

Aeronautical Telecommunication Network Panel (ATNP)
Second Meeting
Montreal, Canada
5-15 November, 1996

# Proposed CNS/ATM-1 Package SARPs

Presented by the ATNP WG Rapporteurs

**Three working groups were formed by ATNP/1. These working groups were tasked with the development of CNS/ATM-1 Package SARPs and Guidance Material for review at ATNP/2. ATNP/1 also tasked the working groups with reporting the results of activities to validate these proposed SARPs. This working paper summarizes the methodology adopted by the ATNP working groups and the member organizations conducting validation programs for the proposed CNS/ATM-1 Package SARPs. The successful validation of the proposed CNS/ATM-1 Package SARPs is reported and it is proposed that ATNP/2 approve the proposed CNS/ATM-1 Package SARPs based on the positive results from the validation activities.**

## References:

1. Report of the first meeting of the Aeronautical Telecommunication Panel.
2. Proposed CNS/ATM-1 Package SARPs

## Attachments

1. Report of CNS/ATM-1 Package 1 SARPs Validation Activities

## 1.0 Background

Three working groups were formed by ATNP/1. These working groups were tasked with the development of CNS/ATM-1 Package SARPs and Guidance Material for review/approval at ATNP/2. ATNP/1 also tasked the working groups with reporting the results of activities to validate these proposed SARPs.

This working paper summarizes the methodology adopted by the ATNP working groups and the member organizations conducting validation projects against the proposed CNS/ATM-1 Package SARPs.

## 2.0 Discussion

The three working groups of ATNP adopted the approach described below for the validation of the CNS/ATM-1 Package SARPs.

In order to undertake an cooperative international program for the validation of the CNS/ATM-1 Package SARPs, a common operational scenario was defined. The working groups endorsed a common system-level scenario that was used by the States and organizations participating in the ATNP working groups as a common basis to validate the CNS/ATM-1 functionality. In some cases, these States and organizations also employed additional operational scenarios representative of the application of the CNS/ATM-1 Package SARPs within their operational domains. The common operational scenario evaluated the use of the CNS/ATM-1 Package applications, upper layers, and internetwork services in test environments. Sub-Volume 1 of the CNS/ATM-1 Package SARPs provides the tracability from the functional requirements, defined in Sub-Volumes 2 through 5 of the CNS/ATM-1 Package SARPs, to the system level requirements and from the system level requirements to the operational and institutional requirements.

### 2.1 Define Validation objectives and means

The objective of the validation tests and simulations were to validate the technical and functional requirements of the proposed SARPs (Sub-Volumes 2 through 5) and to validate the system level requirements (Sub-Volume 1) that were derived directly from the operational and institutional requirements. With this approach the ability of CNS/ATM-1 Package SARPs to satisfy the operational and instructional requirements has been successfully demonstrated.

The objectives of SARPs validation are to ensure that the draft CNS/ATM-1 Package SARPs are:

a) Complete and self-consistent;
b) Unambiguous;
c) Mutually consistent, and
d) that they achieve the declared operational and/or institutional requirement.

Validation Objectives (VOs) have been defined for each SARPs Sub-Volume. Each VO corresponds to a specific validation activity (e.g., test, simulation exercise, analysis, etc.) intended to validate a specific functional requirement, for SARPs Sub-Volumes 2 through 5, or a system level requirement, for SARPs Sub-Volume 1.. A functional requirement is

supported by a collection of one or more lower-level technical requirements (expressed as 'shall' statements). The term "requirement" in the following material refers to an ICAO standard or recommended practice (i.e., "shall" or "should" statement). The SARPs requirements have been defined in a hierarchical structure consisting of the following from highest-level to lowest-level:

a) System-level requirement

A system level requirement is considered to be validated when it has been examined and preferably tested to determine that:

- the collection of functional requirements supporting that system level requirement do in fact collectively provide the specified system capability; and

- the specification of the system level requirement is true and accurate, unambiguous and not in conflict with any other system level requirements.

b) Functional requirement

A functional requirement is considered to be validated when it has been examined and preferably tested to determine that:

- the collection of technical requirements supporting that functional requirement do in fact collectively provide the specified functional capability; and

- the specification of the function is true and accurate, unambiguous and not in conflict with any other technical function.

c) Technical requirement

Technical requirements represent the lowest level requirements of the CNS/ATM-1 Package SARPs. Such requirements are assoicated with "shall" and "should" statements in Sub-Volumes 2 through 5 of the the CNS/ATM-1 Package SARPs. A technical requirement is considered to be validated when it has been examined and preferably tested to determine that it is a true and accurate specification, unambiguous and not in conflict with any other technical requirement.

A operational or institutional requirement is considered to be satisfied when it has been examined to determine that the collection of validated supporting system level requirements do in fact provide the stated operational capability to the extend that is within the scope of the CNS/ATM-1 Package SARPs.

### 2.2 Create a Validation Data Base tracing requirements at the level necessary to achieve the validation objective

The ATNP working groups recommended the development of Validation Data Base (VDB) for each SARPs Sub-Volume, or each Part within a given SARPs Sub-Volume . States and organizations participating in the validation activities developed these VDBs and the ATNP

working groups used these VDBs as tools for tracking the status and results of the validation activities.

For Sub-Volume 1 SARPs the VDB comprises the VOs and the following two levels of requirements:

System level requirements
Functional Requirement(s)

For Sub-Volumes 2 through 5 the VDB comprises the VOs and the following two levels of requirements:

Functional Requirements
Technical Requirements (SHALL' statement level)

### 2.3 Define requirements for validation tools

A combination of inspection, analysis, simulation and laboratory test tools were used to validate the CNS/ATM-1 Package SARPs. The validation tools were defined as appropriate to support the intended level of validation. A common approach was adopted by the ATNP working groups to provide a uniform method of defining the validation tools. At the most comprehensive level of validation, test bed implementations of ATN end systems supporting CNS/ATM-1 Package applications, upper layer and internetwork communications services were interconnected through real ATN intermediate systems (i.e., routers) and real (and emulated) ATN subnetworks. The limited use of test aircraft also provided an increased level of fidelity for the validation tests.

### 2.4 Prepare a validation specification to meet objectives

The ATNP working groups identified the levels of acceptable validation methods in descending order of preference. For validation methods a) through e) below, simulation, analysis and/or inspection were used in combination validation tests using the identified level of implementation.

a. Two or more independently developed interoperating implementations validated by two or more states/organizations.

b. Two or more independently developed interoperating implementations validated by one state/organization.

c. One implementation validated by more than one state/organization.

d. One implementation validated by one state/organization

e. Partial implementation validated by one or more state/organization

f. Simulation, analysis and inspection only (e.g., verify the ASN.1 compiles correctly, the use of modeling tools, etc.)

g. Analysis and/or Inspection only

*Note: items a) through e) above involve prototype implementations.*

The minimum acceptable validation method applicable to a given VO varied depending on the criticality and technical risk of the requirements associated with the VO.

### 2.5 Conduct validation exercise

Hierarchical validation was used. For example, technical functions were first validated then the functional requirements, that were supported by these lower level technical requirements, were validated.

### 2.6 Perform analysis and report results

A joint validation subgroup was formed composed of ATNP WG1/WG2/WG3 members. This joint validation subgroup was responsible for ensuring consistent and complete identification of the VOs. Validation subgroups were also formed within each working group. The results of the overall validation activities was reviewed and approved by a joint meeting of the three ATNP working groups.

## 3.0 Proposal

Based on the comprehensive and successful validation of the CNS/ATM-1 Package SARPs as documented in Attachment 1, it is proposed that the ATN Panel:

a) approve the CNS/ATM-1 Package SARPs; and
b) recommend the CNS/ATM-1 Package SARPs for inclusion in Annex 10.