ATNP/WG3

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AERONAUTICAL TELECOMMUNICATIONS NETWORK PANEL(ATNP)

WORKING GROUP 3 - APPLICATIONS AND UPPER LAYERS

Honolulu, 19 January 99 – 22 January 99 (fifteenth meeting)

Agenda Item 10 : Any Other Business

Proposed amendment to the ATN Lexicon

Ver. 02

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Presented by the author

Summary

In order to avoid confusion among experts resulting from different interpretation of specific terms, ATN-related documents often contain definitions of terms. The aim of the ATN-lexicon is the collection and amalgamation of the most important ATN-related definitions.

As endorsed by the 14th meeting of WG3, this WP is periodically issued and reflects only updates to the already existing lexicon (see WP14-09).

The whole existing ATN-lexicon can be obtained with the electronic copy of this WP.

This WP seeks for comments and contributions by the working group, the author welcomes also written comments and contributions (write to tbelitz@compuserve.com).

ATNP Lexicon

Explanations of Terms in Support of ATNP Work

DRAFT Version 0.2

20. January 1999

The material presented here is based on established definitions within ATNP- and ADSP- working groups and derived from other sources.

As endorsed by the 14th meeting of ATNP-WG3 (see WP14-09), an updated version of this document is periodically issued. The hardcopy of these issues contains only those definitions that are still under discussion. The softcopy additionally comprises widely agreed definitions of terms.

The "stages of stability" (see table) reflect the solidity of a certain definition. Once a listed definition has passed a review (-a WG3-meeting), the "stage of stability" drops down to a more stable status until the definition automatically becomes agreed and will not be listed in the hardcopy again.

Contributions and comments to this document are welcomed by tbelitz@compuserve.com.

Contents

REFERENCES

/4444_96/

Procedures for Air Navigation Services, Rules of the Air and Air Traffic Services, Doc 4444-RAC/501, Thirteenth Edition, 11/96

/A10-3_97/

International Standards and Recommended Practices, Aeronautical Telecommunications, Annex 10 to the Convention on International Civil Aviation, Volume 3, First Edition, Amendment 72, 11/97

/A2_96/

International Standards, Rules of the Air, Annex 2 to the Convention on International Civil Aviation, Ninth Edition, Amendment 32, 4/96

/ADSP.WGB.WP127.F/

ADSP WG/B WP127 Appendix F, Manual on Required Communications Performance, Draft Revision 0.6

/ADSP_Manual_d0.4_96/

Draft ICAO Manual of Air Traffic Services (ATS) Data Link Applications, draft version 0.4, ICAO ADS Panel, 20 September 1996
[DG_ADS] = (Message) Data Glossary ADS
[DG_ADS-B] = (Message) Data Glossary ADS-B
[DG_AIDC] = (Message) Data Glossary AIDC
[DG_ATIS] = (Message) Data Glossary ATIS
[DG_CPDLC] = (Message) Data Glossary CPDLC
[DG_DLIC] = (Message) Data Glossary DLIC

/ATNI2_d1/

Report for the DG7, European Commission, Deliverable 1; "ATNI2-report" Scenarios for the ATN - Non-technical Implementation Issues, ver 1.2, Annex 2, June 1998, SIRIUS

/CAMAL_99.01/

ICAO Comprehensive ATN Manual, editors draft, January 99

/ET1.ST03_v0.8/

EATCHIP OPR.ET1.ST03.1000-ORD-02-00, Working draft ver. 0.8

/ET1.ST05_v1.0/

EATCHIP OPR.ET1.ST05.1000-ORD-01-00, OPERATIONAL REQUIREMENTS FOR AIR TRAFFIC MANAGEMENT (ATM) AIR/GROUND DATA COMMUNICATIONS SERVICES, version 1.0; ODIAC January 1998

/SM_CONOPS_1.0/

ATN System Management Concept Of Operations, Ver.1.0, ATNP/JWG/WP9-4, James Moulton, 09/29/98

/WG3.WP14.19/

ATNP WG3 WP 14-19, Proposed PDUs for package 2 CM server considerations, G.Saccone, 09/30/98

mark legend: ☹ – definition under construction/ 😐 – definition complete but not full agreed/ ☺ – agreed definition

Terms and Explanations	Stability of Definition		
	Early Draft	Draft	stable
Addressing (logical) /CAMAL_99.01/ Logical addressing means that the address defined in the addressing plan and used to locate the addressed object is a virtual address which is a substitute of the actual (physical) address of an object. Address mapping functions have to fulfill this substitution, carefully maintaining unambiguity of identification of objects.			☺
Addressing (physical) /CAMAL_99.01/ Physical addressing means that the address defined in the addressing plan and used to locate the addressed object is the physical, i.e. hardwired, hard-coded, or configured address of the object. An example of a physical address is the ICAO 24-bit Aircraft Address used for the SSR Mode S Transponder.			☺
Air Applications /ADSP_Manual_d0.4_96/ [DG_DLIC] An indication of 1 - 256 airborne data link applications. Consists of *Application Name*, *Version Number*, and, when required for ground initiated applications*, Application Address* data.			😐
Air Traffic Services Unit (ATSU) /A2_96/ A generic term meaning variously, air traffic control unit, flight information centre or air traffic services reporting office.			😐
Aircraft Address /A10-3_97/ /ADSP_Manual_d0.4_96/ [DG_DLIC][DG_AIDC] A unique combination of 24 bits available for assignment to an aircraft for the purpose of air-ground communications navigation and surveillance.			😐
Aircraft Identification /4444_96/ A group of letters, figures or a combination thereof which is either identical to, or the coded equivalent of, the aircraft callsign to be used in air-ground communications, and which is used to identify the aircraft in ground-ground air traffic services communications. /ADSP_Manual_d0.4_96/[DG_DLIC][DG_ADS][DG_ADS-B][DG_CPDLC][DG_AIDC] A group of letters, figures or a combination thereof which is identical to or the code equivalent of the aircraft callsign. It is used in Field 7 of the ICAO Model flight plan.			😐
Application Information /WG3.WP14.19/ Refers to the application names (e.g. ADS, CPDLC), version numbers, and addresses (the long or short TSAP, as required) of each applications. *Note:* If no applications are supported or the application information is not available, then the application information field will be null.	☹		
ATN Communication Services /CAMAL_99.01/ The ATN communication services are provided to ATN users that require ground-ground or air-ground data communication. The ATN accomodates different grades of services which can be expressed by Quality of Service parameters and by communication priorities.			☺
ATN Manual Edition 2 /CAMAL_99.01/ The second edition of the ATN Manual approved at the SICASP/5 Meeting (not to be published by ICAO). The ATN Manual Edition 2 is derived from the material developed by the SICASP in the form of the ATN Manual (Version 2) and recommended for publication at the fifth meeting of this panel.			😐

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Terms and Explanations	Stability of Definition		
	Early Draft	Draft	stable
ATN System Applications /CAMAL_99.01/ System Applications support the operation of the ATN communication services and are either not directly or not at all used by ATN users but rather by the service providers, operators or other ATN applications. Typical examples of ATN system applications are the ATN directory service, ATN context management or ATN systems management.			☺
Availability (RCP-Parameter) /ADSP.WGB.WP127.F/ RCP availability expresses the probability that the communication system is ready for operation at the start of a transaction. It is anticipated that a system indicator, which informs the user that the system is available for use, will be available to system users. Availability is the ratio of actual operating time to specified operating time. Availability is defined between end users. RCP availability includes all elements within the end systems, networks, intermediate systems and subsystems.	☹		
CM Server /WG3.WP14.19/ This is an ATS Facility that is capable of providing *application information* relatiing to other ATSUs to requesting aircraft or ATSUs.	☹		
Collaborative Decision Making /ATNI2_d1/ Both the collective requirements of all airspace users and the individual aircraft operator's preferences will be taken into account in determining solutions to events. The open systems environment and better information management will allow a permanent dialogue between the various parties (ATM, aircraft operations centers, pilots and airport operations) before departure, and as the flight processes through the ATM system. This exchange of information will enable the various organizations to continuously update each other on relevant events in real-time and provide the basis for more efficient decision making. Aircraft operators will have up-to-date and accurate information on which to base decisions about their flights, and will be able to apply factors which are not known to ATM, such as fleet management priorities, fuel consumption figures and other aircraft operating parameters, when determining solutions.	😐		
Communications Front End placeholder; definition needed	☹		
Congestion /CAMAL_99.01/ In the ATN Internet sense, congestion describes the state where the network is overloaded. Typical effects of congestion are extended transit delays, drastically reduced throughput, and the loss of data packets.			☺
Congestion Avoidance /CAMAL_99.01/ Techniques that regulate the data flow into the network in order to prevent the network from getting overloaded. These encompass both open-loop techniques which ensure that a traffic contract specified by the source is respected, and closed-loop techniques which monitor signals generated by the network and adapt the traffic generated by the sources accordingly.			☺
Congestion Management /CAMAL_99.01/ This term refers to a set of rules and techniques which prevent congestion , e.g. by monitoring actual network load. Co-operative interaction of <u>all</u> end systems is required in order to prevent individual end-systems taking up the throughput saved by well-behaving systems.			☺
Congestion Recovery / Congestion Control /CAMAL_99.01/			☺

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Terms and Explanations	Stability of Definition		
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This term refers to a mechanism which reacts to congestion after it has occurred in order to remove the overload condition. Congestion Recovery can be initiated only after congestion has been experienced, and is not able to safely prevent congestion in the network.			
Continuity of Function (RCP-Parameter) /ADSP.WGB.WP127.F/ RCP continuity of function expresses the probability of the successful completion of a transaction, assuming the transaction has been initiated.	😐		
Directory Service /CAMAL_99.01/ The ATN Directory Service provides the ATN user with the addressing information which is associated with the application process title or application entity title used as input to the directory. The addressing information provided by the directory service includes the network address as well as further technical addresses on the layers above, as required or applicable. Furthermore, the ATN Directory Service resolves generic application process titles or application entity titles, i.e. names which may be incomplete or contain "don't care" elements, into the corresponding (list of) non-generic application process titles or application entity titles.			☺
Edition placeholder, definition needed Edition of SARPS	☹		
Engineering Trials /CAMAL_99.01/ In contrast to operational trials, engineering trials may be based on pre-operational, prototype or experimental equipment. Aim is to demonstrate the technical feasibility and correctness of applied techniques, concepts and specifications.			☺
Implementation placeholder, definition needed	☹		
Institutional Issues /CAMAL_99.01/ Issues related to ownership, control and responsibility for correct implementation and operation of systems which involve more than one state or organization.			☺
Interoperability placeholder, definition needed	☹		
Maximum Dialogue Time (T_{MD}, RCP-Parameter) /ADSP.WGB.WP127.F/ The Maximum Dialogue Time (T_{MD}) specifies the maximum time for the completion of a two-way dialogue between the originating user and the receiving user. T_{MD} is the primary RCP parameter. This parameter is an indication of the time criticality of the message transactions to which it is applied. It serves to qualify a communications method for use in a particular procedure in a given airspace. It will immediately separate less time critical communications services such as FIS, from very time critical services such as CPDLC in the terminal area. It is a goal for the RCP concept to include the minimum number of T_{MD} parameter values, consistent with the proper characterization of the operational requirements of the various applications.	☹		
Message /ADSP.WGB.WP127.F/ A message is a sequence of voice or data information elements, intended as a package, to accomplish an organized information transfer between end users.	😐		
Message /ADSP.WGB.WP127.F/ A message is a sequence of voice or data information elements, intended as a package, to accomplish an organized information transfer between end users.	😐		

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Terms and Explanations	Stability of Definition		
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Operational Trials /CAMAL_99.01/ Operational trials are based on operational environment. This includes operational systems and operational equipment, e.g. routinely scheduled flights in an operational ATS environment. Aim is to demonstrate the operational acceptance and correctness of applied mechanisms, applications and concepts.			☺
Package placeholder, definition needed	☹		
Required Communication Performance (RCP) /ADSP.WGB.WP127.F/ RCP specifies the operational characteristics of the communications means used to support a service or procedure. RCP-parameters comprise (1) the Maximum Dialogue Time T_{MD}, (2) the RCP integrity, (3) RCP availability and (4) the RCP continuity of function.	☹		
Required Communication Performance (RCP) /ADSP.WGB.WP127.F/ RCP integrity is the quality which relates to the trust that can be placed in the correctness of the message delivered for an intended operation. RCP integrity is the probability that a message received by the intended recipient contains an undetected, system induced error. In other words, it is the ratio of good messages to total messages received.	☹		
Service /ET1.ST05_v1.0/ An abstract noun which is used to designate functions, or a service rendered. In the context of this document, 'Service' refers to a set of actions, both system supported and manual, which have a clearly defined operational goal and which begin and end on an operational event	😐		
Subset of ATN SARPS placeholder, definition needed	☹		
System capability placeholder, definition needed Operational Technical	☹		
Systems Management (SM) /SM_CONOPS_1.0/ SM provides mechanisms to monitor, control and coordinate communications, applications and other resources with the goal of achieving a seamless communications service in support of air traffic operations. To achieve this goal, specific management information functions and protocols are designed and built into supporting communications networks in order to provide deterministic and controllable network behaviour.	☹		
Systems Management Domain /SM_CONOPS_1.0/ In the context of ATN Systems Management, a *Domain* is a generic term that is used to define a set of resources under the control of a single entity. A <*name*>*Domain* defines the particular set of resources characterized by the value of <*name*> (e.g. administrative domain, management domain, addres domain).	☹		
Trajectory /ET1.ST03_v0.8/ A trajectory is a representation of the path of an aircraft, describing the horizontal and vertical profile over time. The representation may also allow identification of points on the route such as sector boundaries and penetration of special use airspace. Typical ATM systems may represent	😐		

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Terms and Explanations	Stability of Definition		
	Early Draft	Draft	stable
trajectories as a sequence of annotated 4-D points, although this is not the only representation.			
Version placeholder, definition needed General definition Criteria for the update of Version Nmb	☹		

DEFINITIONS

The aim of this WP is the maintenance of the ATN-lexicon. In order to achieve this it incorporates material that is already comprised by the CAMAL (see /CAMAL_99.01/) and it contains supplementing material. The CAMAL-structure distinguishes abbreviations, definitions and ATNP-lexicon entries. In order to avoid multiple occurence of the same entries in different sections, the CAMAL-definitions are repeated in the following table.

Address Domain. An Address Domain is a set of address formats and values administered by a single address authority. Under the ISO plan, any address authority may define subdomains within its own domain, and delegate authority within those subdomains.

Addressing Authority. An Addressing Authority defines formats and/or values of NSAP addresses within its jurisdiction.

Administrative Domain. A collection of end systems, intermediate systems, and subnetworks operated by a single organization or administrative authority. An administrative domain may be internally divided into one or more routing domains.

Aeronautical Administrative Communications (AAC). Communications used by aeronautical operating agencies related to the business aspects of operating their flights and transport services. These communications are used for a variety of purposes, such as flight and ground transportation bookings, deployment of crew and aircraft, or any other logistic purposes that maintains or enhances the efficiency of overall flight operation.

Aeronautical Mobile Satellite Service (AMSS). AMSS provides packet-mode data and circuit-mode data and voice service to aircraft and ground users provided by a satellite subnetwork which comprises satellites, Aircraft Earth Stations (AESs), Ground Earth Stations (GESs), and associated ground facilities such as a network co-ordination center.

Aeronautical Operational Control (AOC). Communication required for the exercise of authority over the initiation, continuation, diversion or termination of flight for safety, regularity and efficiency reasons.

Aeronautical Passenger Communications (APC). Communications relating to the non-safety voice and data services to passengers and crew members for personal communications.

Aeronautical Telecommunication Network (ATN). The Aeronautical Telecommunication Network is an internetwork architecture which allows ground, air-to-ground, and avionics data subnetworks to interoperate by adopting common interface services and protocols based on the International Organization for Standardization (ISO) Open Systems Interconnection (OSI) reference model.

Air Traffic Control (ATC). ATC is a service operated by an appropriate authority to promote the safe, orderly, and expeditious flow of air traffic.

Air Traffic Management (ATM). ATM consists of a ground and air part, both needed to ensure the safe and efficient movement of aircraft during all phases of operation.

Air Traffic Services Communications (ATSC). Communications related to air traffic services including air traffic control, aeronautical and meteorological information, position reporting, and services related to safety and regularity of flight. This communication must involve one or more air traffic service administrations. This term is used for purposes of address administration.

Application Entity (AE). Part of an application process that is concerned with communications within the OSI environment. The aspects of an application process that need to be taken into account for the

Application process (AP). A set of resources, including processing resources, within a real open system which may be used to perform a particular information processing activity.

Application service. The abstract interface between the (N)-service and the (N)-service user, where N refers to the Application layer; thus it is the boundary between the ATN-App-AE and the Application-user.

Application. Software providing services to its users, in the guise of a consistent set of functionality; example given,

the ATC related functions implemented in the server(s) and/or controller work position host computers.(from EATCHIP Glossary of Terms/COPS/CWP Report)

ATM/ATS Applications. These are applications supporting ATM or other ATS functions and do not necessarily correspond to ATN applications. The term is usually used to distinguish between ATM functions and other non-ATM functions using the same communication service.

ATN Applications. Refers to applications that support ATM or aeronautical industry functions and that are designed to operate across an OSI communications system. ATN applications are always distributed applications, i.e. peer processes are hosted by different end systems which are interconnected.

ATN Environment. The term ATN environment relates to functional and operational aspects around the ATN as a complete end-to-end communication system.

ATN Internet (ATNI). An implementation of the ISO OSI network layer services and protocols for support of interprocess data communication between aeronautical host computers. It is defined to be the collection of the connected internetwork routers and subnetworks that conform to ATN internetwork requirements.

ATN Network Operating Concept. An ATN Network Operating Concept will address the administrative, operational, institutional, and policy issues and additional (non-SARPs) technical aspects to enable the efficient and correct operation of the ATN.

ATN Router. The communication element that manages the relaying and routing of data while in transit from an originating ATN host computer to a destination ATN host computer. In ISO terms, an ATN router comprises an OSI intermediate system and an end system supporting a systems management agent.

ATN Routing Domain Confederation(RDC). The ATN RDC is the set of interconnected routing domains that together form the ATN internetwork.

ATN Services. The ATN services are provided to ATN users that require ground-ground or air-ground data communication. The ATN internet service is provided at the transport layer (service access point). The ATN accommodates different grades of services which can be expressed by Quality of Service parameters.

ATN Systems Management. The ATN Systems Management provides mechanisms for monitoring, control and co-ordination of resources necessary to provide ATN services. ATN Systems Management is based on OSI System Management principles and may be distributed, centralized, or local.

ATS message handling services (ATSMHS). Procedures used to exchange ATS messages over the ATN such that the conveyance of an ATS message is in general not correlated with the conveyance of another ATS message by the service provider. There are two ATS message handling services. They are the ATS message service and the ATN pass-through service.

Automatic Dependent Surveillance (ADS). A technique in which aircraft automatically provide, via a data link, data derived from on-board navigation and position-fixing systems, including aircraft identification, four-dimensional position, and additional data as appropriate. ADS is a data link application.

Boundary Intermediate System (BIS). An intermediate system that is able to relay data between two separate routing or administrative domains.

Context Management (CM). Refers to an ATN application. This application implements an ATN logon service allowing initial aircraft introduction into the ATN. The logon service also allows indication of all other data link applications on the aircraft. CM also includes functionality to forward addresses between ATC centres. Thus, CM is a logon and simple directory service. Note: ”Context Management” is a recognised OSI presentation layer term. The OSI use and the ATN use have nothing in common.

Domain. A set of end systems and intermediate systems that operate according to the same routing procedures and that is wholly contained within a single Administrative domain.

End System (ES). A system that contains the seven OSI layers and contains one or more end user application processes.

Functional Requirements. Operational requirements that determine what function a system should perform. They can usually be expressed by a verb applying to a type of data, e.g. display aircraft position.

Gateway. A system used to interconnect dissimilar networks. A gateway may contain all seven layers of the OSI

reference model.

Integrated Services Digital Network (ISDN). A public telecommunications network that supports the transmission of digitised voice and data traffic on the same transmission links.

Intermediate System (IS). A system comprising the lower three layers of the OSI reference model and performing relaying and routing functions.

Internetwork. A set of interconnected, logically independent heterogeneous subnetworks. The constituent subnetworks are usually administrated separately and may employ different transmission media.

Management Domain. Resources that for systems management purposes are represented by managed objects. A management domain possesses at least the following quantities: a name that uniquely identifies that management domain, identification of a collection of managed objects that are members of the domain, and identification of any inter-domain relationships between this domain and other domains.

Mobile Subnetwork. A subnetwork connecting a mobile system with another system not resident in the same mobile platform. These subnetworks tend to use free-radiating media (e.g. radio) rather than "contained" media (e.g. wire); thus they exhibit broadcast capabilities in the truest sense.

Network Management. The set of functions related to the management of various OSI resources and their status across the Network Layer of the OSI architecture.

Operating Concept. The technical functionality of a system and its inherent capabilities regarded from the system operator's point of view. This includes the interaction between user and system, the services provided by the system as well as the internal operation of the system.

Operational Concept. Describes, from the user's point of view, the operational requirements, constraints, and prerequisites within which a technical system is supposed to work as well as the inherent capabilities of the system. It describes the interaction between the user and the system as well as the services the user may expect from the system. Broad outline of an operational structure able to meet a given set of high level user requirements. It comprises a consistent airspace organisation, general operational procedures, and associated operational requirements for system support.

Performance Requirements. Requirements with respect to the performance of a system (e.g. reliability, availability, response time, processing delay, etc.) and are derived from Operational Requirements. In general, they describe the minimum performance figures that a system must provide in order to fulfil the operationally required functions.

Quality of Service (QoS). Information relating to data transfer characteristics (for example, requested throughput and priority) used by a router to perform relaying and routing operations across the subnetworks which make up a network.

Router. The communication element that manages the relaying and routing of data while in transit from an originating end system to a destination end system. An ATN router comprises an OSI intermediate system and end system supporting a systems management agent.

Routing Domain. A set of end systems and intermediate systems that operate the same routing protocols and procedures and that are wholly contained within a single administrative domain. A routing domain may be divided into multiple routing subdomains.

Routing Policy. A set of rules that control the selection of routes and the distribution of routing information by ATN Boundary Intermediate Systems (BISs). These rules are based on policy criteria rather than on performance metrics such as hop count, capacity, transit delay, cost, etc. which are usually applied for routing. There are two groups of routing policy in the ATN: (1) general routing policy specified in the ATN Internet SARPs in order to ensure necessary connectivity in the ATN at a reasonable routing information update rate and (2) user specified routing policy, i.e. individual policy rules which may be additionally implemented in ATN BISs by administrations and organizations to meet their specific operational and policy needs. The set of rules in a BIS that determines the advertisement and use of routes is known as a Routing Policy. Each organizational user of the ATN must determine and apply their own Routing Policy.

Routing. A function within a layer that uses the address to which an entity is attached in order to define a path by wich that entity can be reached.

Safety Case. An analysis presenting an overall justification for the declaration that a particular systems satisfies its

safety requirements.

Security Management. To support the application of security policies by means of functions which include the creation, deletion and control of security services and mechanisms, the distribution of security-relevant information, and the reporting of security-related events.

Subnetwork. An actual implementation of a data network that employs a homogeneous protocol and addressing plan, and is under control of a single authority.

Systems Management. The set of functions related to the management of various OSI resources and their status across all layers of the OSI architecture.

User Requirements. A discription of what users expect to obtain from the system (not how the system should do it). They are usually expressed on a high level and do not include technical details. The direct user of the ATN is an application within an end system supporting Air Traffic Management or Aeronautical Industry functions. The Air Traffic Controller, other ground staff, or the Pilot are the human beings using directly, or indirectly, the ATN. The user may also be seen more on the abstract level as an organization, e.g. airline or air navigation service provider.

Validation. In the ICAO context, a process that ensures that systems meet user requirements to an agreed level of confidence and can be produced from written SARPs and Guidance material. One has to distinguish between performance based and functional validation. Single subsystems of the ATN, like routers, may be validated on a functional basis; validation of the ATN's suitability with respect to network performance etc. requires definition of performance requirements.