EUROPEAN ORGANISATION
FOR THE SAFETY OF AIR NAVIGATION

LINK2000+
ATN Naming and Addressing Plan

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The following table records the complete history of the successive editions of the present document.

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1. EXECUTIVE SUMMARY

1.1 References

[NPD]	LINK2000+ Network Planning Document (NPD)
[NAP]	LINK2000+ Naming and Addressing Plan (NAP)
[ASRD]	LINK2000+ ATM System Requirement Document (ASRD)
[OSD]	LINK2000+ Operational Scope Document (OSD)
[ACCESS_206]	ACCESS WP206 – ATN Compliant Communications European Strategy Study – Addressing Plan of the European ATN Network - April 1998.
[ICAO_A10]	ICAO Annex 10 – Aeronautical Telecommunications – Volume III – Part I: Digital Data Communication Systems – Appendix to Chapter 9: A world-wide scheme for the allocation, assignment and application of aircraft addresses.
[ICAO_9739]	ICAO Document 9739 – Comprehensive ATN Manual (CAMAL) .
[ICAO_9705]	ICAO Document 9705-AN/956 – Technical Provisions for the Aeronautical Telecommunication Network (ATN).
[ICAO_7910]	ICAO Document 7910/78 – Location Indicators – 78th Edition – May 1995.
[ICAO_8585]	ICAO Document 8585/94 – Designations for Aircraft Operating Agencies, Aeronautical Authorities and Services – 94th Edition – March 1995.
[ICAO_9664]	ICAO Document 9664 – AN/955 - Manual of Air Traffic Services Data Link Applications.
[ISO_3166]	Codes for the representation of names of countries and their subdivision.
[ISO_7498/3]	Information Technology – Open Systems Interconnection – Basic Reference Model : Naming and Addressing.
[ISO_8348]	Information Technology – Open Systems Interconnection – Network Definition.
[RTCA-EUROCAE_28]	RTCA SC-189/EUROCAE 53 – Initial Interoperability Requirements for Baseline 1 ATN ATS Applications.

1.2 General requirements

1. The non-time critical air-ground datalink services defined in the LINK 2000+ Operational Scope Document [OSD] will be implemented in ATM systems as described in the LINK 2000+ ATM System Requirements Document [ASRD]. The airborne and ground ATM systems within the geographical scope of LINK 2000+ will be interconnected by the LINK 2000+ communications infrastructure.
2. The Aeronautical Telecommunications Network (ATN) fulfils the LINK 2000+ requirement for validated, global, reliable and ICAO SARPs [ICAO_9705] compliant air-ground communication infrastructure. The ATN has therefore been selected as the communication network to support the LINK 2000+ services. This is in line with the EATCHIP Communications Strategy. Different air-ground subnetworks can be used in the future, but LINK 2000+ will rely on ICAO SARPs compliant VHF Data Link Mode 2 (VDL Mode 2) and Satcom (AMSS).
3. A TCP/IP Ground network will be used for the ground distribution of ATC related information using the Online Data Interchange (OLDI) protocols.
4. Airline requirements for AOC message delivery between airline hosts and the aircraft will be met using existing ACARS communications services, or by VDL Mode 2 used in the ACARS over AVLC (AOA) mode.
5. Both OLDI and AOA addressing are outside of the scope of this document.

1.3 Overview of the documents related to the communication infrastructure

6. LINK 2000+ communication infrastructure is a pan-European infrastructure incrementally deployed by integration of network segments implemented by different partners in the timeframe 2002...2002+. Each partner is involved at different levels in the network design, network deployment and network operations.
7. In order to design, deploy and operate the communication infrastructure in a multi-organisation context, a top-down approach is proposed. The network topology is defined at the highest level by a SARPs-compliant open inter-networking framework to be further refined during the detailed network design.
8. The Network Planning Document [NPD] is a high level description of the LINK 2000+ communications infrastructure. It provides an inter-networking and inter-connection framework for ATS providers, airlines, and Aeronautical Communication Service Providers. It does not prescribe any detailed technical solutions for a particular user or a specific geographical location. This framework represents a baseline for the detailed network design.
9. The Naming and Addressing Plan [NAP] provides generic rules for the definition of names and addresses of the network elements. These rules are exemplified on the basis of the network geographical coverage. The [NAP] also gives organisational recommendations regarding administration of names and addresses. The [NAP] is consistent with the [NPD].
10. The [NAP] has been elaborated with the following assumptions:

- The proposed addressing scheme complies with the ICAO SARPs [ICAO_9705] ;
- The proposed addressing scheme is derived from the ATN Compliant Communications European Strategy Study (ACCESS) and from lessons learnt from PETAL II operations ;
- The proposed naming scheme is an enlargement of the best practices used in the context of the PETAL II programme ;
- The proposed naming and addressing scheme applies to the Air Traffic Services Communications fixed and mobile domains ;
- The detailed network design and in particular, the routing topology is to be further defined ;
- The names and addresses are hierarchically defined down to the point where information from the detailed network design is available ;
- The initial geographical coverage is as of mid May 2004.

11. The [NAP] is organised with two main parts; the naming and addressing plan of the ATN Internet, and the naming and addressing plan of ATN upper layers and applications.
12. The [NAP] will be updated and completed to reflect the detailed network design (new properties of the network topology might give rise to additional generic rules and the list of names and addresses is to be completed with all of the network elements).

2. INTRODUCTION

13. The SARPs [ICAO_9705] Sub-Volumes IV, V and IX specify naming and addressing rules for the ATN Internet layers, upper layers and applications. These rules are common to any ATN SARPs-compliant network. The LINK 2000+ naming and addressing plan is strictly compliant with the SARPs. It augments the SARPs addressing rules by defining the naming and addressing elements more specific to the LINK 2000+ communications infrastructure.

3. OBJECTIVES OF THIS DOCUMENT

14. The objectives of this document are to:

- Specify and exemplify addressing rules identifying the elements of the ATN Internet, ATN upper layers and ATN applications ;
- Specify and exemplify a naming facility complementing the addressing plan for administration purposes ;
- Provide a list of names and addresses embracing the network elements deployed throughout the LINK 2000+ geographical coverage ; and
- Propose an organisational scheme to administer the LINK 2000+ naming and addressing plan.

4. MANAGEMENT OF THIS DOCUMENT

15. To be defined with Eurocontrol.

5. PRELIMINARY DEFINITIONS AND ATN CONCEPTS

16. In this document, the following definitions being used:

17. Administration of network address domains

18. A network address domain represents a finite set of values that can be assigned to a network address field used to delineate an address domain. For each network address domain, the choice of values relies upon addressing rules stemming from the SARPs and from this document.
19. The administration of a network address domain comprises the following operations:

- Definition of sub-rules, the scope of which is limited to the boundary of the network address domain (these sub-rules are local matters outside the scope of this document, they shall be consistent with domain's rules) ;
- Identification of addressable network elements, integrated in the communication infrastructure and belonging to the administered address domain ;
- Choice of appropriate values in compliance with the domain rules and assignment of these values to the relevant address fields of these network elements.

20. ATN NSAP Address

21. An ATN NSAP address is a 20-octet string used to uniquely identify and locate a given NSAP (i.e. a network service user) within the context of the ATN.

22. Network Entity Title (NET)

23. An ATN NET is a 20-octet string used to uniquely identify and locate a network layer entity of an ATN system (router or end system), and thus, in networking terms, is used to identify the system itself. Thanks to the global nature of the ATN inter-network addressing plan defined in [ICAO_9705] chapter 5.4, a system's NET can be used to locate it anywhere within the ATN.
24. The syntax of an ATN NET is equivalent to that of an ATN NSAP address. It differs from the NSAP addresses assigned to the same system only in the last octet, i.e. the network selector (N-SEL) field value.

25. Routing Domain and Routing Domain Confederation Identifier

26. Each Routing Domain (RD) and Routing Domain Confederation (RDC) whose BIS(s) implement the IDRP protocol shall have an unambiguous identifier.
27. An RDI is an identifier the syntax of which is equivalent to the one of a NSAP or of a NSAP prefix. This means that RDIs are octet strings of up to 20 octets, and which are assigned statically according with [ISO_8348/2].
28. An RDI uniquely identifies a routing domain or a confederation, but does not necessarily convey any information about its policies or the identity of its members. Its main purpose is to allow the routers to determine, during IDRP connection establishment, whether the adjacent routers are members of the same Routing Domain and/or of the same Routing Domain Confederation.

29. Note that an RDI is a name and not an address. Therefore it conveys no location information about an RD or RDC. Conventionally, the RDI for a Routing Domain may be assigned using the same NSAP Address Prefix as used for the NSAP Addresses within the RD. An RDI for an RDC is assigned relative to an NSAP Address Prefix assigned to the Addressing Authority that assigns the RDI, but otherwise need have no relationship to the RDI's assigned to its member RDs.

30. ATN Island RDC

31. The ground ATN Internet shall consist of one or more ATN Island RDCs. Each ATN Island shall comprise one or more ATN RDs forming a single Island RDC. An ATN Island RDC shall not contain any ATN Mobile RDs. ATN Island RDCs comply with the same naming and addressing rules than RDCs.

32. ATN Island backbone RDCs

33. A global ATN backbone shall comprise at least one ATN RD from each ATN Island, interconnected either directly or indirectly via other members of the global ATN backbone. Within each ATN Island, those ATN RDs that are members of the global ATN backbone should form a single RDC, which is referred to as the ATN Island backbone RDC. An ATN Island backbone RDC, when present, shall be nested within an ATN Island RDC.
34. The Figure 1 below illustrates these concepts.
35. In practice, the LINK 2000+ topology will be a simplified implementation of the ATN goal architecture. Air/Ground communications using VDL Mode 2 will be provided by Service Providers (i.e. ARINC and SITA) who will effectively form the ATN Island Backbone for the single ATN Island that comprises the LINK 2000+ domain.

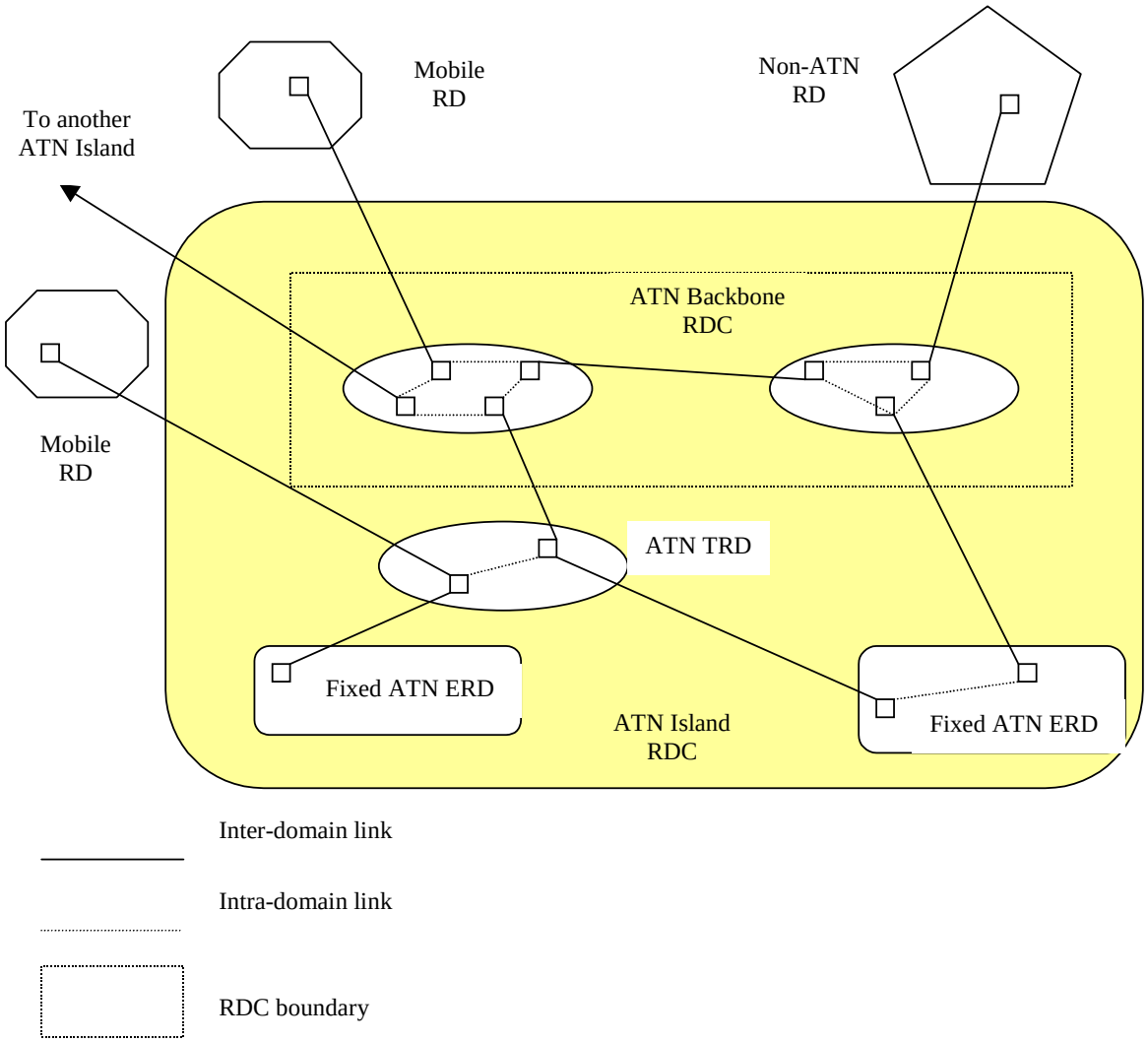

Figure 1 : Example ATN Island Routing Domain Confederation Structure

36. Home domain

37. Aircraft for which inter-island communications are required shall have a “Home” domain, which is a Routing Domain in an ATN island. This “home” does not need to be in either the ATN Island through which the aircraft is currently reachable, or in the ATN Island with which communication is required. The role of the “Home” domain is to advertise a default route to all the aircraft belonging to an airline, or the General Aviation aircraft of a given country of registration. This default route is advertised to the ATN Global Backbone in line with the routing policies specified in [ICAO_9705] section 5.3.7. “Home” domains comply with the same naming and addressing rules as RDs.
38. There is no provision for the “Home Domain” in the LINK 2000+ topology as this concept only applies when multiple ATN Islands are interconnected.

39. ATN Application

40. An ATN Application provides application users with the communication services required by a particular operational task. These services are for example retrieval of aircraft generated data for

ADS, management of pilot/controller message exchange for CPDLC or retrieval of ground generated flight information for DFIS.

41. Address Domain

42. An (ATN) 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 sub-domains within its own domain, and delegate authority within those sub-domains.

43. Addressing Authority

44. An (ATN) Addressing Authority defines formats and/or values of (ATN) addresses within its jurisdiction (i.e. an ATN Addressing Domain).

45. Data Link Service

46. A Data Link Service is an operational task provided to final users requiring a communication task. The communication service required by the Data Link Service may be provided by an ATN Application.

47. ICAO Ground Facility Designations

48. ICAO Ground Facility Designations (described in [ICAO_7910]) are 4-letter codes used to identify aerodromes and aeronautical facilities around the world. The code starts by dividing the world into a series of regions, and allocating each region a letter. Most regions contain several countries, while some regions are considered large enough to have a letter allocated to a single country. The second letter then indicates the country within the region, while the third and fourth letters are then used to identify the particular facility within the country. There are four characters added to the indicator to determine the destination agency at the location.

49. **Callsigns and Flight Ids**

50. The current model of Air Traffic Control identifies aircraft by their Callsign (e.g. Speedbird 123) and which is synonymous with their Flight ID (e.g. BAW123). Both are recorded on an aircraft's Flight Plan, and this model remains unchanged with the introduction of data link.

51. For commercial operators, the link between Flight ID and an aircraft is dynamic and often only lasts for a short time (i.e. the duration of a single flight). However, for other operators (e.g. General Aviation), the Flight ID is often fixed and corresponds to the Aircraft Registration Number. The system shall be able to cope with both transient and permanent relationships between the Flight ID and an aircraft.

52. **Aircraft Registration Identifiers**

53. The Aircraft Registration Identifier (a.k.a Tail Number) is a fixed identifier for an aircraft and is used by ACARS to identify the destination for uplink messages and the source of downlink messages.

54. **ICAO 24-bit Aircraft Address**

55. The ICAO 24-bit Aircraft Address is also a fixed identifier for an aircraft and was originally developed as a unique SSR code for Mode S. It is used by the ATN as a permanent identifier for an aircraft. The combination of Flight ID and ICAO 24-bit aircraft address is used to uniquely identify the aircraft operating a given Flight.

6. SCOPE OF THE NAMING AND ADDRESSING PLAN

56. This document addresses the naming and addressing plan throughout two views:

- A network architecture view ; and
- An administration view.

57. ATN network architecture view

58. The generic ATN architecture comprises:

- Network of ATN routers interconnected by mobile aeronautical and fixed ground subnetworks
- Distributed ATN end systems (Ess), hosting applications, connected to the ATN internet and using built-in ATN communication services to set up end-to-end communications.

- Service Providers operating air/ground communication networks.

59. The ATN network architecture view is completely defined in the ICAO SARPs and the relevant ISO/IEC protocols standards. The routers and ESs are identified by their NSAP addresses. The NSAP address is structured to reflect:

- the hierarchical nesting of the address domains,
- the identification of the Routing Domains and Routing Areas,
- and the unambiguous identification of an ATN system lying in a given Routing Area.

60. In practice complementary properties might influence the addressing plan with the definition of advanced addressing facility (address prefix alias, collective address, redundant systems sharing a common address, etc). These addressing facilities are not specified in the ISO/IEC and the SARPs neither. Local solutions may be implemented provided that they are hidden from the outside and remain consistent with the rules of this addressing plan, there are considered as local matters.
61. The addressing of the subnetwork entities is outside the scope of this document. Each subnetwork is backed by addressing rules of its own with specific recommendations for integration in the ATN environment. The CAMAL document [ICAO_9739] provides useful information about the addresses of the subnetwork entities integrated in an ATN network.
62. The LINK 2000+ communication infrastructure directly supports ATSC users only. AISC users are supported through legacy ACARS, and AOA using the same VDL Mode 2 networks as used to support ATN communications This addressing plan applies to the network elements dedicated to ATSC.

63. Administration view

64. The administration of the communication infrastructure addresses requires another identification scheme more understandable and readable for humans than an addressing scheme representing identifiers used internally by network systems. For administration purpose, a system shall be described with the following items:

- its exploitation mode (test environment or operational environment),
- its basic functions (router, end systems, gateways combining ATN protocols with other protocols),
- its geographical location,
- the organisation responsible for the system.

65. An administrative naming scheme is defined for LINK 2000+ with a compact notation to provide this information.
66. Hence, the naming and addressing plan is articulated in 3 main parts:

- Names and addresses of the ATN internet (section 8.1),
- Names and addresses of the ATN upper layers and applications (section 9),
- System administrative name of ATN routers and end systems (section 8.2).

7. GEOGRAPHICAL COVERAGE

67. The list of airports and ATCCs accommodating systems integrated with the LINK 2000+ communication infrastructure is as follows:

- Brest, Bordeaux, Aix, Paris and Reims for France,
- Brussels for Belgium,
- Berlin, Bremen, Dusseldorf, Frankfurt, Karlsruhe and Munchen for Germany,
- Dublin and Shannon for Ireland,
- Brindisi, Milan, Rome and Padua for Italy,
- Amsterdam for Netherlands,
- Lisbon for Portugal,

- Barcelona, Canarias, Madrid, Palma and Seville for Spain,
- London, Manchester and Scottish for the United-Kingdom.

68. The list of organisations operating these systems is as follows:

- Eurocontrol,
- DGAC,
- NATS,
- DFS,
- ENAV,
- AENA,
- IAA, and
- NAV.

69. New countries and organisations will be added to these lists whenever they will integrate the LINK 2000+ programme.

8. NAMING AND ADDRESSING PLAN FOR THE ATN INTERNET

70. The ATN naming and addressing scheme is based on the OSI Reference Model [ISO_7498-3] which supports the principles of unique and unambiguous identification of information objects and global address standardisation which are essential features for an international, mixed-user communications system such as the ATN.
71. Unambiguity of ATN names and ATN addresses is achieved through the use of naming/addressing domains with firmly allocated naming/addressing authorities.
72. According to [ISO_7498-3], naming/addressing domains may be hierarchically decomposed into subsets which are known as naming/addressing sub-domains. Each subset (sub-domain) is under the control of an individual naming/addressing authority and does not intersect with other subsets (sub-domains) administered by different naming/addressing authorities. The top of this hierarchical structure is the global OSI domain.
73. The ATN naming/addressing domains, i.e. the sets of all possible names/addresses of objects within the ATN, are sub-domains of the global OSI naming/addressing domain. Several such ATN naming/addressing domains exist, as there are different types of ATN objects which have to be named or assigned addresses respectively.
74. The naming/addressing authority for the ATN naming/addressing domains is ICAO which controls and manages these domains through the ATN SARPs.
75. In order to facilitate the address assignment and registration in the ATN, which is expected to comprise several thousands of objects, the ATN SARPs further decompose the ATN naming/addressing domains into a set of hierarchical sub-domains. Each address sub-domain is a set of address formats and values which are administered by a single addressing authority. Each addressing authority is responsible for its own address sub-domain and may further partition it into several subordinate sub-domains and delegate authority for these sub-domains. This principle allows the establishment of sub-address spaces (i.e. the set of values within an addressing sub-domain) in a hierarchical fashion without the need to co-ordinate between sub-address spaces.
76. The global OSI network addressing domain (which is itself a sub-domain of the global OSI addressing domain) is partitioned into several sub-domains, one of which is the ATN NSAP address sub-domain. This sub-domain is itself decomposed into a number of subordinate addressing sub-domains in a recursive fashion. Each such sub-domain is associated with an NSAP addressing authority which is responsible for this sub-domain, and may further delegate authority for those sub-domains into which it has partitioned its own addressing sub-domain. This principle allows to construct ATN addresses as a sequence of individual address fields (see Figure 2 and section 8.1.1), with each field corresponding to an addressing sub-domain. As these sub-domains are individually administered, the address field formats and values can be assigned without the need to co-ordinate between addressing authorities.

Naming addressing authorities

77. The overall naming and addressing authority for the ATN naming/addressing domains is ICAO which controls and manages these domains through the ATN SARPs. Besides partitioning the ATN naming/addressing domains into appropriate sub-domains and specifying the syntax, semantics and encoding for these sub-domains, the ATN SARPs also directly allocate and register names/addresses within these sub-domains, where appropriate or required. Furthermore, provisions have been made within the ATN SARPs which delegate full or partial responsibility for certain sub-domains (i.e. certain address fields) to organisations other than ICAO, such as IATA, regional ATS organisations and national civil aviation authorities.
78. Within a hierarchy of naming/addressing domains, the operation of each naming/addressing authority is independent of that of the other naming/addressing authority at the same level, subject only to any common rules established by the procedures of the parent authorities.

8.1 Addressing scheme

8.1.1 Structure of an ATN network address

79. An ATN NSAP address is a 20-octet string used to uniquely identify and locate a given NSAP (i.e. a network service user) within the context of the ATN.
80. The ATN NSAP address format is illustrated in Figure 2. This address format starts with the Initial Domain Part (IDP) which comprises the Authority Format Identifier (AFI) and Initial Domain Identifier (IDI) fields and is followed by the Domain Specific Part (DSP).

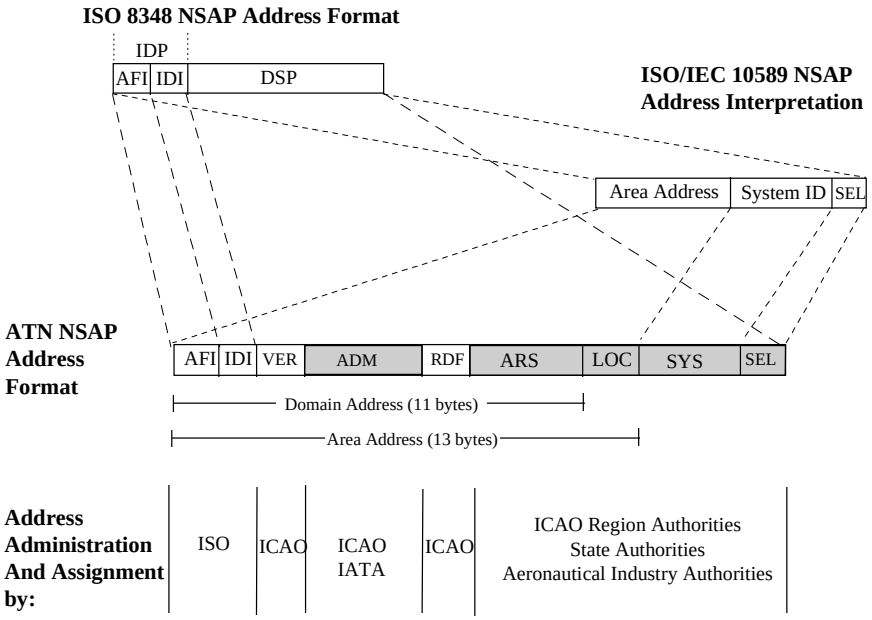

Figure 2: ATN NSAP Address Format

81. The (decimal) IDP value 470027 forms the common, initial part of all ATN NSAP addresses and NETs, i.e. it is the common fixed address prefix of these addresses. This address prefix defines the ATN Network Addressing Domain as a sub-domain of the Global OSI Network Addressing Domain, as depicted in Figure 1, under addressing authority of ICAO and using a binary format for the DSP.

82. The Domain Specific Part (DSP) of the ATN NSAP address format is structured into seven individual address fields which allow to co-ordinate the allocation of ATN NSAP addresses and NETs according to the hierarchical approach described in section 8.
83. The Table 1 below outlines the ATN NSAP addressing plan. This table describes the complete ATN NSAP address format, semantics and field contents from which NSAP addresses, NETs, NSAP address prefixes and Routing Domain Identifiers (RDIs) are derived. Furthermore, the table shows the addressing and registration authorities for each of the address fields as specified in Chapter 5.4 of the ATN SARPs.

Field Name	Size (Octets)	Value / Range	Semantic	Contents	Value Assignment	Addressing Authority	Registration Authority
AFI	1	47 (decimal)	ISO 6523 ICD IDI and binary DSP format	47	Fixed	ISO	ISO/IEC 8348
IDI	2	00 27 (decimal)	ATN NSAP Address	00 27	Fixed	ISO	British Standards Institute (BSI)
VER	1	01 (hex) 41 (hex) 81 (hex) c1 (hex)	Ground AINSC NSAP Address Mobile AINSC NSAP Address Ground ATSC NSAP Address Mobile ATSC NSAP Address	01 41 81 c1	Fixed Fixed Fixed Fixed	ATN SARPs Subvolume 5	ICAO (ATN SARPs, Appendix 5, Chapter 5.4)
ADM	3	*00 00 00 - ff ff ff (hex)*	ATN Network Address (Sub-) Domain Authority	ISO Country Code, or ICAO Region Identifier, or ICAO Airline Designator	Fixed Fixed/Variable 1 Fixed	ATN SARPs Subvolume 5	ISO 3166 ATN SARPs Subvolume 5
RDF	1	00	Unassigned	00	Fixed	ATN SARPs Subvolume 5	ATN SARPs Subvolume 5
ARS	3	*00 00 00 - ff ff ff (hex)*	Routing Domain (in Ground Network Addressing Domains) Aircraft or Routing Domain (in Mobile Netw. Addr. Domains)	Not defined (for Ground Netw. Addressing Domains) ICAO 24-bit Aircraft Address (for Mobile Netw. Addressing Domains)	Variable Fixed	Administration	ATN Network Addressing (Sub-) Domain Authority defined in ADM field ICAO
LOC	2	*00 00 - ff ff (hex)*	Routing Area (in Ground Network Addressing Domains) Routing Domain or Routing Area (in Mobile Netw. Addr. Domains)	Not defined Not defined	Variable	Administration	ATN network Addressing (Sub-) Domain Authority which contains the parent Routing Domain
SYS	6	*00 00 00 00 00 00 - ff ff ff ff ff ff (hex)*	ATN System	Not defined	Variable	Administration	ATN Network Addressing (Sub-) Domain Authority which contains the parent Routing Area
N-SEL	1	*00 - ff (hex)*	Network Entity or Network Service User	fe (NE implementing optional non-use of IDRP) 00 (all other NEs) Remaining values not defined	Fixed Fixed Variable	Administration	ATN SARPs Subvolume 5 ATN SARPs Subvolume 5 Locally

Table 1 : ATN NSAP Address Definition

1 When used to identify an ICAO Region, only the first octet of the ADM field contains the fixed ICAO Region Identifier, while the values of the remaining two octets are assigned by the identified ICAO Region.

8.1.2 Rules governing the network address fields defining the nesting of the address domains

84. The European ATN inter-network addressing plan shall conform to the ATN Addressing plan specified in the ATN SARPs.
85. As shown in Table 1, four of the nine fields of an ATN NSAP address or NET have already fixed values allocated by the ATN SARPs. The values of the remaining five fields, marked as variable in Table 1 and highlighted by grey boxes in Figure 2, remain to be allocated. This is the main purpose of the following chapters.
86. At the upper level, the ATN SARPs identify the following four ICAO sub-ordinate addressing Domains:

- The fixed Air Traffic Services Communications domain(ATSC fixed), i.e. the set of ground network addressing (sub-)domains administered by ATSC authorities
- The mobile Air Traffic Services Communications domain(ATSC mobile), i.e. the set of airborne network addressing (sub-)domains administered by ATSC authorities.
- The fixed Aeronautical Industry Service Communications domain(AINSC fixed)), i.e. the set of ground network addressing (sub-)domains administered by members of the Aeronautical Industry.
- The mobile Aeronautical Industry Service Communications domain(AINSC mobile), i.e. the set of airborne network addressing (sub-)domains administered by members of the Aeronautical Industry.

87. The allocation of values to the remaining five ATN NSAP fields depends in the first place on the membership of the addressed element to one of these ICAO sub-ordinate addressing domains.

88. The Table 2 below is a simplified version of Table 1, summarising the rules for the allocation of values to the different NSAP fields, depending on the ICAO sub-ordinate addressing domain to which the addressed element belongs.

Domain field	ATSC-fixed	ATSC-mobile	AINSC-fixed	AINSC-mobile
AFI	47	47	47	47
IDI	0027	0027	0027	0027
VER	81	C1	01	41
ADM	the first octet shall be set to an ICAO Region identifier *and the remainder is assigned by the region*, or the field identifies an ICAO State	the first octet shall be set to an ICAO Region identifier *and the remainder is assigned by the region*, or the field identifies an ICAO State	*ICAO Airline designator (3 character identifier)*	*ICAO Airline designator (3 character identifier)*
RDF	00	00	00	00
ARS	*assigned by the state/organisation identified by the ADM field*	shall be the 24-bit ICAO Aircraft Identifier	*assigned by the organisation identified by the ADM field*	shall be the 24-bit ICAO Aircraft Identifier
LOC	*assigned by the addressing authority of the Routing Domain identified by the ARS field*			
SYS	*assigned by the addressing authority of the Routing Area identified by the LOC field*			
SEL	00 for the NET of IS of Class 1,2,3,4,5 and 6 fe for the NET of Class 7 IS ff is reserved any other value may be assigned to NSAPs			

Table 2 : Assignement of values to the ATN NSAP address fields

89. The sections 8.1.3 and 8.1.3.4.1 below proposes additional rules for the allocation of field values to ATN internetwork addresses of European fixed or mobile ATSC systems or domains.
90. The definition of rules for the allocation of field values to ATN internetwork addresses of European fixed or mobile AINSC systems or domains is considered to be out of the scope of this document (this falls within the competence of IATA and the European airlines).

8.1.3 Rules governing the network address fields identifying the routing domains

91. As described in the Figure 2: ATN NSAP Address Format, the routing domains address is structured into seven individual address fields . The following chapters describe such fields.

8.1.3.1 AFI, IDI, VER and RDF fields

92. For compliance to the SARPs, the AFI, IDI, VER and RDF fields of the ATN internetwork addresses of European fixed ATSC systems or domains will be respectively set to **47**, **0027**, **81** and **00**.
93. The AFI, IDI, VER and RDF fields of the ATN internetwork addresses of European mobile ATSC systems or domains will be respectively set to **47**, **0027**, **C1** and **00**.

8.1.3.2 Rules governing the ADM field

8.1.3.2.1 ADM field encoding method

94. The ADM field is used to further break down the Ground and Mobile ATSC NSAP Addressing Domains and the Ground and Mobile AINSC Addressing Domains into a set of subordinate network addressing (sub-)domains to allow devolved administration of each resulting (sub-) domain by an ICAO Region, State, airline or aeronautical organisation. The value of the ADM field, combined with the values of the preceding fields, forms the NSAP address prefix of each such ATN NSAP addressing (sub-) domain and consequently of all NSAP addresses and NETs administered by a given ICAO Region, State, airline or aeronautical organisation.
95. The ADM field is three octets long.
96. In the case of the ATSC addressing domains the ADM field should contain the one-octet ICAO Region Identifier (equal to 83HEX for Europe), with the remaining two octets assigned within the responsibility of the identified ICAO Region, which is then responsible for the relevant addressing sub-domain.
97. States and ATS organisations within an ICAO Region should register (a subset of) their systems under the network address space associated with the relevant ICAO Region. This allows ICAO Regions to allocate ADM field values in the ATSC Network addressing Domains to States and Organisations within the ICAO Region, in a structured manner.
98. This method for encoding the ADM field presents some advantages. First, it allows all fixed ATSC domains (as well as all mobile ATSC domains), within a region, to share one common NSAP address prefix: as an example, the common prefix to all fixed European ATSC domains would be, with such encoding, 4700278183, and the common prefix to all mobile European ATSC domains would be 470027C183. This permits potential routing information reduction and efficient advertisement of routing information: it makes possible to form one single route to the Region keeping the overhead of inter-regional communications down to a minimum.
99. The second advantage of having the ADM field encoded with the one-octet ICAO Region Identifier at the start, is that the 2 remaining octets can be used independently by the ICAO Regions. This permits the addressing of States, but also of specific organisations within the region. This may also allow to take into account regional particularities such as the routing organisation of the regional ATN.
100. **It is therefore recommended that the ADM field of European ATN ATSC domains be encoded with the one-octet ICAO Region Identifier, followed by the remaining two octets under the responsibility of a European body (such as the Regional ICAO office) or of a European organisation (such as Eurocontrol), in accordance with the national organisation responsible for the operation of the domain.**
101. However, it is noted that individual European States may still prefer to use the ADM field to identify their addressing domain using the three character country code format permitted by the ATN SARPs.

8.1.3.2.2 ADM field structuring principles

102. The ADM field has been proposed to be encoded with the European ICAO Region Identifier (i.e. 83HEX) as first octet.
103. With regard to the assignment of values to the remaining two octets of the ADM field, the addressing plan first considers the different (sub-)domains that will be distinguished with different ADM field values.
104. The ADM field shall be used to distinguish the following (sub-)domains:

- the different European States,
- the different supra-national organisations (e.g. Eurocontrol, NATO),

105. The ADM field should be used to distinguish the supra-national Routing Domain Confederations such as the backbone RDC or any RDCs grouping several European organisations and/or several European States.
106. Additionally, depending on the extent in scope that is assigned by the Regional addressing authority to the ADM field, the field could be used to distinguish the different national ATSC organisations (e.g. the French Meteorological organisation, the German military organisation, the Italian ATSO, etc...).

107. The addressing plan, and more particularly the assignment of value to the ADM field, shall also consider the hierarchies between these sub-domains that are desirable to be reflected in the address structure.

108. In conclusion, the hierarchical model that is proposed to be reflected in the address structure of the ADM field is the one illustrated by Figure 3.

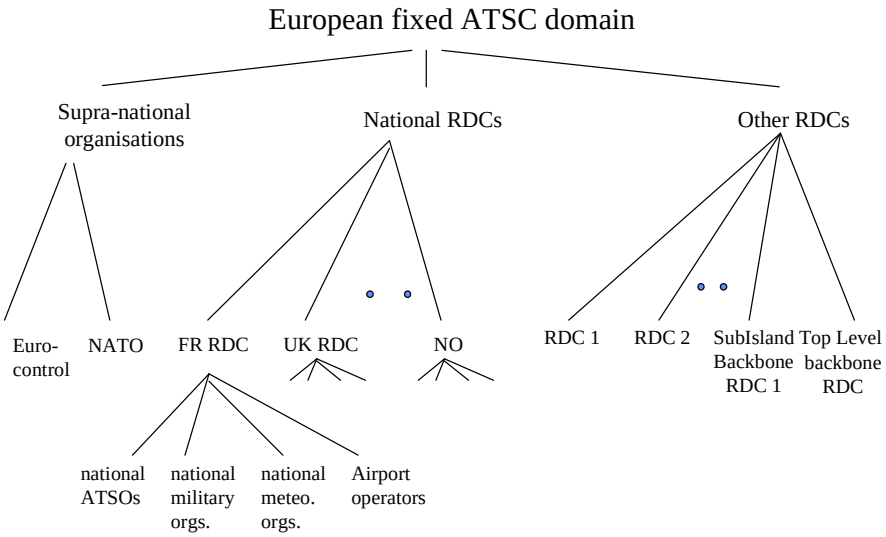

Figure 3 : Hierarchical model proposed to be reflected in the address structure

8.1.3.2.3 ADM field values assignment principles

109. Before proposing any ADM field value assignments, the extent in scope of the ADM field remains to be specified.

110. The ADM field shall allow the unambiguous identification of the different European States (i.e. the national RDCs), of the supra-national organisations, and of the supra-national RDCs.

111. On the other hand, the identification, at the ADM field level, of the national ATSC organisations is questionable. Although the two remaining octets of the ADM field allow, in principle, the identification of 65535 distinct domains, and are therefore sufficient for this purpose, it is considered that the identification (and addressing) of the national organisations fall within the responsibility of States, rather than within the responsibility of a European body or organisation. For this reason, it is proposed that national organisations be not distinguished at ADM field level, and be rather identified at ARS field level.

112. Having defined the scope and the hierarchical structuring principles for the ADM field of fixed and mobile ATSC internetwork addresses, principles for the assignment of values can be expressed.

113. Concerning the allocation of values to the 2 remaining octets of the ADM field, the following approach is proposed:

1. For the National RDCs, the two remaining octets of the ADM field are derived from the State's two character alphanumeric ISO 3166 Country Code, represented as upper case characters.
2. For the supra-national organisations, the two remaining octets of the ADM field are set to a two character alphanumeric code, registered with the European ICAO group and represented as lower case characters.

3. For other RDCs, the two remaining octets of the ADM field are set to a two octets numeric code in the hexadecimal range [8000-ffff], allocated by European ICAO group.

114. On the basis of these principles, Table 7 in Appendix A : Guidance to implementers proposes specific value assignment for States and organisations being in the scope of the LINK2000+ study and for RDCs that have been identified.

8.1.3.3 Rules governing the ARS field

8.1.3.3.1 General

115. In Ground Network Addressing Domains the purpose of the ARS field is to distinguish routing domains operated by the same State, airline or organisation. In this case, the value of the ARS field, when combined with the values of the preceding fields, identifies a network addressing sub-domain that corresponds to an ATN routing domain. Each ICAO Region, State, airline or other aeronautical organisation identified by the value in the ADM field will be responsible for establishing one or more such network addressing sub-domains according to their local routing requirements and for the assignment of appropriate ARS field values to the corresponding routing domains.

116. In Mobile Network Addressing Domains the purpose of the ARS field is to identify the aircraft on which the addressed ATN system is located. In the case of a Mobile Network Addressing Domain the ARS field value is the aircraft's ICAO 24-bit aircraft address encoded as a hexadecimal value. When the ATN systems onboard an aircraft form a single routing domain, then the ARS field also identifies the routing domain. When the systems onboard an aircraft form multiple RDs, then part of the LOC field is used to distinguish them.

8.1.3.3.2 Guidelines for the allocation of values to the ARS field of fixed ATSC inter-network addresses

117. Each State or organisation or RDC identified by the value in the ADM field is free to assign its own values to the ARS field. The aim of this section is therefore not to propose having fixed ARS values for all States and organisations, but to provide some guidelines and recommend some common practices for the assignment of ARS values.

118. The ARS field shall allow the addressing of the different Routing Domains operated by the State or the organisation but shall also allow the addressing of the Routing Domains of any other possible lower level organisational units of the State or the organisation.

119. It is therefore recommended to States and organisations that provision be made, in the assignment of ARS field values, for any potential lower level organisational units that could, in the future, operate an ATN Routing Domain.

120. As far as the States are concerned, the following categories of organisations have been identified as potential future operators of an ATN Routing Domain:

- The national ATSO(s),
- The national military organisation,
- The national meteorological organisation(s),
- The airport operators.

121. As a possible approach for the provision of ATN internet addresses to the different national organisations, it is proposed that different ranges of values for the first octet of the ARS field be allocated to the different national organisations. As an example, it is proposed that:

- values [00-1f] of the first octet of the ARS field be reserved for the addressing of domains and systems operated by the national ATSO.
- values [20-3f] of the first octet of the ARS field be reserved for the addressing of domains and systems operated by the national military organisation.

- values [40-5f] of the first octet of the ARS field be reserved for the addressing of domains and systems operated by the national airport operators. (Note: this range matches the ASCII range of alphabetical upper case characters).
- values [60-7f] of the first octet of the ARS field be reserved for the addressing of domains and systems operated by the national meteorological organisation
- values [80-ff] be reserved.

122. A national organisation will then be required to register one or more values for the first octet of the ARS field within the range that has been reserved for its organisation category, and to freely allocate values to the remaining 2 octets of the ARS field.

123. In addition to be used for distinguishing the different national organisations, the first octets of the ARS field is proposed to be used for the identification of the particular role of the addressed domain. It is indeed a common practice in the ATC networking environment to have, in parallel to the operational networks, duplicate non-operational networks used for the trials and the pre-operational experiments. This double networking environment approach is likely to be followed for the ATN infrastructure of the national ATSOs (and possibly of other national organisations) and the first octet of the ARS field appears to be hierarchically well suited for distinguishing operational domains from other non-operational domains.

124. The remaining 2 octets of the ARS field should then be used to further distinguish between the Routing Domains of the same national organisation and of the same operational nature. The recommendation concerning the allocation of these 2 octets is to anticipate the possible evolution of the routing organisation and to allocate different values of the ARS field to different zones if these zones are perceived as subject to become independent Routing Domains in a further re-structuring of the routing organisation.

125. This recommendation requires some explanations, and is proposed to be illustrated by an example. Consider the French ATSO, and assume that its initial ATN infrastructure is planned to consist of one single RD covering the whole French territory. Assume then that this initial French ATN topology is expected to evolve toward a new routing organisation consisting of five RDs, one RD being formed around each of the five French ACCs and covering the related FIR.

126. A first solution for addressing the initial single French Routing Domain, would be to simply assign a single ARS field value for the identification of this Routing Domain. As an example, the ARS field value 000001 could be assigned. This would result in having all French ATN ESs and ISs within this RD configured with addresses the common prefix of which would be something like: 4700278183465200000001. At the time of the French ATN routing reorganisation, it would be necessary to allocate different ARS values to the new five different RDs. As an example, we may assume that these five different RDs could be respectively identified by the following ARS field values 00000a, 00000b, 00000c, 00000d and 00000e. One of the impact of the routing reorganisation, would consequently be the necessity to reconfigure every French ATN ESs and ISs, to have their internetwork address prefixes changed from 4700278183465200000001 to respectively 4700278183465200000000a, 4700278183465200000000b, 4700278183465200000000c, 4700278183465200000000d and 4700278183465200000000e.

127. The purpose of the recommendation, with this example would have been to invite the French ATSO addressing authority to assign directly at the initial stage of the French ATN network, different ARS field values to the five different zones covering the French FIRs. As an example, the application of this recommendation could have resulted in having directly form the start, one of the following five different prefixes respectively used in each FIR for the addressing of the French ATN ESs and ISs: 4700278183465200000001, 4700278183465200000002, 4700278183465200000003, 4700278183465200000004 and 4700278183465200000005. In the initial period where the French ATN consists of one single RD used in an operational context, the 9-octets-long prefix 470027818346520000 which is common to these five 11-octets-long prefixes could then have been used as the Routing Domain Identifier and as the routing information advertised to adjacent Routing Domain (so meeting the requirements for information reduction). Then, at the time of the routing re-organisation with 5 routing domains, it would not be necessary to reconfigure every French ESs and ISs. The only change to be applied to the addressing would be to change the French RDI length from ten to eleven octets.

8.1.3.3.3 Rules governing the ARS field values assignment

128. On the basis of the recommendations expressed in the previous section, this section proposes a specific common approach for the assignment of ARS values by States. This is to be considered as a reference example, which could be looked at as a basis, and re-engineered taking into account the national particularities.

129. The States are proposed to reserve ranges of values of the first octet of the ARS field to the different national organisations as illustrated by the example of the previous section. It is proposed that the range matching the ASCII range of alphabetical upper case characters (i.e. [40-5F]) be allocated to airport operators.

130. It is proposed that national ATSOs, military organisations and meteorological organisations identify with each value of the first octet of the ARS field, a different set of Routing Domains as well as the operational nature of this set of Routing Domains. The following specific allocations are proposed for the value of the first octet of the ARS field:

- 01 for the set of operational Routing Domains of the national ATSO,
- 11 for the set of non-operational Routing Domains of the national ATSO,
- 21 for the set of operational Routing Domains of the national military organisation,
- 31 for the set of non-operational Routing Domains of the national military organisation,
- 61 for the set of operational Routing Domains of the national meteorological organisation,
- 71 for the set of non-operational Routing Domains of the national meteorological organisation.

131. It is proposed that the 2 remaining octets of the ARS field be used to contain a two alphabetical characters code identifying one particular zone, in the ATN topology of the organisation. As far as the ATSOs are concerned, it is proposed that this 2 alphabetical characters code be used to identify a FIR. Considering that the 4-letter ICAO location indicators are well known codes in the aeronautical community and that the 2 last characters identify unambiguously a FIR or ACC in the context of a given country, it is proposed that these 2 last characters of the 4-letter ICAO location indicators associated with each FIR or ACC be used as value for the 2 last characters of the ARS field. The Table 8 in Appendix A : Guidance to implementers illustrates this proposal.

132. For the Airport operators, it is proposed that the ARS field value be derived from the three-character alphanumeric international code of the airports (e.g. ‘CDG’ for Paris-CDG Airport operator)

133. When used to identify a mobile ATSC Routing Domains, the ARS field will be set to the 24-bit ICAO Aircraft Identifier as specified in the ATN SARPs.

8.1.3.4 Rules governing the LOC field

8.1.3.4.1 General

134. In Ground Network Addressing Domains (i.e. for the ATN NSAP address prefixes 47 0027 01 and 47 0027 81) the purpose of the LOC field is to distinguish routing areas within the same routing domain. In Mobile Network Addressing Domains (i.e. for the ATN NSAP address prefixes 47 0027 41 and 47 0027 c1) the purpose of the LOC field is to distinguish routing areas within the same routing domain, if only one routing domain exists onboard the aircraft. When more than one RD is located on a single aircraft, the LOC field distinguishes each such RD and the routing areas contained within them.

135. The assignment of the LOC field value is under the responsibility of the organisation which constitutes the addressing authority for the routing domain in which the identified routing area is contained. The assignment of the LOC field value is entirely a matter local to the organisation and mainly depends on the intra routing domain organisation; it is therefore difficult to recommend a common approach.

8.1.3.4.2 Rules governing the LOC field value assignment

136. A routing area corresponds generally to one site, although it may happen that several areas are formed in one site or that one single area covers several sites.

137. The LOC field value shall unambiguously identify an area in the context of one Routing Domain, but does not necessarily need to be unambiguous in the context of a group of Routing Domains. That means that an organisation operating several Routing Domains may assign the same LOC field value (e.g. 0001) to 2 different areas if these areas belong to different routing domains. However, it is generally preferred to assign well known sites/areas identifiers that are unambiguous in the context of the whole organisation rather than being only unambiguous in the context of a particular Routing Domain. Another common practice is to allocate different ranges of values to different categories of sites/areas. As an example, an ATSO may be willing to assign different ranges of LOC field values to en-route ACC areas, TMA and airports areas, technical services areas, and other areas. The Table 9 Appendix A : Guidance to implementers summarises the various recommended values.

8.1.4 Recommendations governing the network address fields identifying a system lying within a routing domain

8.1.4.1 SYS field

138. The SYS field is used to uniquely identify an ATN end or intermediate system within a given routing area. The assignment of the SYS field value is under the responsibility of the organisation which constitutes the addressing authority for the routing area in which the identified ATN system is contained.

139. The SYS field should be assigned a meaningful value within the context of the given routing area. For example, if the ATN system is attached to an IEEE 802 local area network, then a common approach is to use the LAN address of the system as the value of the SYS field. However this is generally not considered as being a good practice: one important criterion in selecting a Network address format is indeed the likely future stability of the resultant Network address, and this stability is best achieved by allocating a Network address which does not contain any subnetwork dependent information; use of physical subnetwork addresses in the SYS field, may mean that the NSAP address will have to be changed, if the hardware supporting the addressed system is replaced (e.g. replacement of an ethernet card or of the whole computer),

140. In addition to constitute the unique identifier of a system within a routing area, the 6 octets of the SYS field may be used to encode different information on the system. Possible examples of the information that can be encoded in the SYS field are:

- Whether the system is an IS or an ES,
- The class (1 to 7) of an IS,
- The standby role of the system (primary system, Hot standby system, cold standby system),
- The type of the applications running on the system (e.g. Network Management station, AMHS User Agent, Air/Ground application server, etc...).

8.1.4.2 SEL field

141. The N-SEL field is used to identify either the network layer entity or a network service user within the context of a given ATN system. The assignment of the N-SEL field value is a matter local to the administrator of the ATN system, except for the cases of the NET of an intermediate system. For these cases, Chapter 5.4 of the Manual of Technical Provisions for the ATN has assigned appropriate N-SEL field values:

- 00 shall be used as selector value for the NET of all ATN ISs, except for the case of airborne ISs implementing the procedures for the optional non-use of IDRP
- FE shall be used as selector value for the NET of all airborne ISs implementing the procedures for the optional non-use of IDRP
- the value FF is reserved and shall not be allocated.

8.1.5 Examples of network addresses

142. The address

143. 470027+818345830011434202000101050502020O

144. designates the router lying in the Barcelona RD administered by Spanish ATSO. This RD belongs to the Spanish RDC. This router is operated in test mode.

145. The address

146. 470027+8183444500615757030001010505020200

147. designates the router lying in the Bremen RD administered by German meteorological organisation. This RD belongs to the German RDC. This router is operated in operational mode.

8.2 Administrative Naming scheme

148. The proposed administrative naming scheme is a facility to identify a LINK 2000+ network element for general administration purpose. It applies to the ATSC fixed and mobile elements. It is a concise notation identifying a network element and revealing its role and position in the overall architecture. The naming scheme is not intended for automated, on-line addressing and naming services.

8.2.1 Structure of a LINK 2000+ system administrative name

149. A *System Administrative Name* is a system identifier defined with 4 elementary labels:

1. The label of the administration authority identified by the ADM NSAP field *Administration Authority Label,*
2. the label of the routing domain hosting the system, *Routing Domain Label,*
3. the label of the routing area hosting the system, *Routing Area Label,* and
4. the label of the system hosting the system, *System Label*.

150. The LINK 2000+ System Administrative Name is the concatenation of these 4 labels. The left most part corresponds to the administration authority label. Each label is separated from the preceding label by a dot. In order to underline the attachment of a national administration authority to a higher nesting authority, it is suggested concatenate the prefix “eur.” to the administrative name.

151. This definition fits with the NSAP address structure. The NSAP address / system administrative name relationship is a one-to-one relationship. It is a translation of the NSAP address into a compound name providing administrative information about the target system.

152. A system administrative name is uniquely associated with a NSAP address.

153. In order to adopt an homogeneous approach to elaborate the system administrative names, the following sections define rules to elaborate the labels.

8.2.2 Rules governing the administration authority label

154. The administration authority label corresponds to the country code as defined in [ISO_3166]. Each country code is represented by 2 letters in lower case.

155. The attachment of a national administration authority to higher nesting authorities is always the same and do not need to be reflected in administrative names. The administrative names start with the national administration authority.

156. Examples: it (Italy), nl (Netherlands), gb (United Kingdom).

8.2.3 Rules governing the routing domain label

8.2.3.1 Rules governing the ATSC fixed routing domain label

157. The ATSC fixed routing domain label is a compound label. It includes:

- the label of the organisation operating the RD, and
- the geographical name of the FIR/ACC or airport associated to the RD.

158. The label of the organisation operating the routing domain is {ATSO, MILO, ARPO , METO}. These labels stand for respectively Air Traffic Service Organisation, National Military Organisation, National Airport, and National Meteorological Organisation.

159. The geographical name corresponds to an European city or an European airport. It is assumed that an administration authority, defined by the ADM field, operates one and only one RD for a given location. In case many RDs are deployed over a given location, they are administered by different authorities. This constraint allows to simplify the rule to assign a label to an RD. The length of an RD label is variable.

160. Examples: ATSO_Amsterdam, METO_Barcelona.

8.2.3.2 Rules governing the ATSC mobile routing domain label

161. The ATSC mobile routing domain label is a compound label. It includes:

- the label of the organisation operating the mobile
- the tail tag of the aircraft, if it is an actual a/c or "pseudo_mob".

162. This applies particularly well in cases where the ICAO 24-bits address is automatically derived from the aircraft tail number.

163. The label of the organisation operating the mobile is {ATSO}.

164. Examples: ATSO_pseudo_mob, ATSO_F-GITA.

8.2.4 Rules governing the routing area label

165. The definition of routing areas within routing domains is not driven by any common rule. For administration purpose, the knowledge of the dissemination of network elements between different buildings is rather irrelevant. In practice, experience gained by PETAL II shows that RD labels are already specific enough to identify the network elements with respect to their geographic location and their membership RD. Consequently, there is no specific label for the routing areas.

166. The routing area label is irrelevant for an aircraft or a pseudo mobile.

8.2.5 Rules governing the system label

167. The system label is a compound label. It includes:

- the ATN system type {is, es},
- the local system label, free text limited to 6 letters in length, and
- the system exploitation mode {tst, ope}.

168. Examples: is_nodeu_ope, es_hostv_tst.

169. This rule applies to the ATSC fixed and mobile elements. In practice, the system label is unique for each RD and therefore, the routing area is not a key element to identify a system lying within a RD.

8.2.6 Examples of system administrative names

170. eur.es.atso_Barcelona.is_nodec_tst

171. Designates the router node C lying in the Barcelona RD administered by Spanish ATSO. This RD belongs to the Spanish RDC. This router is operated in test mode.

172. eur.tb.atso_Barcelona.is_nodeu_ope

173. Designates the router node U lying in the Barcelona RD administered by Spanish ATSO. This RD belongs to the top level backbone. This router is operated in operational mode.

174.

175. A system administrative name is uniquely associated to an NSAP address.

8.3 Operations to administer the ATN internet addresses

176. The following defines the minimum set of operations used to administer the ATN internet addresses:

- Registration of a network address prefix defining the nesting of the network address domains,
- Registration of a network address prefix identifying a routing domain,
- Registration of a network address prefix identifying a routing area, and
- Registration of a network address identifying a system lying within a routing area.

177. A registration operation includes a validation procedure and the publishing of the registered item for use by the LINK 2000+ community.

178. Registration of a network address prefix defining the nesting of the network address domains

179. The nesting of the network address domains is defined in section 8.1.2. The prefixes listed in Table 7 Appendix A : Guidance to implementers correspond to the initial geographic coverage. These prefixes are fixed and may not be modified.

180. Registration of a network address prefix identifying a routing domain

181. These prefixes are built up by suffixing the prefixes identifying the administration authorities with the ARS field. Although the routing topology will be refined and detailed during the network design, an initial list of prefixes is given in Appendix A / list 2. This list is based on the following assumptions:

- There is one RD, member of the national RDC for each FIR/ACC or airport included in the LINK 2000+ geographic coverage,
- There is one RD per Service Provider.
- The top level backbone comprises the Service Providers only.
- There is one RDC, with routers deployed in Barcelona, London, Maastricht, Munich, Paris, using the top level backbone routers for air/ground communications,
- No sub-island backbone is proposed for an initial deployment,
- Ground/Ground communications are not explicitly supported but may be possible.
- The integration of home domains is not addressed. The detailed network design is necessary to assign RDIs to home RDs.

182. This list is updated with the inter-domain routing topology. It is noteworthy, the same values of ARS and LOC fields might be assigned to different routers installed in the same geographic locations although they belong to different islands or island backbones. In other words, the knowledge of the ADM fields is necessary to identify the RD containing a network element. For a complete description of the network address prefix, refer to Table 8 in Appendix A : Guidance to implementers.

183. Registration of a network address prefix identifying a routing area

184. These prefixes are built up by suffixing the prefixes identifying routing domains with the LOC field. Although the intra routing domain topology will be refined and detailed during the network design, an initial list of prefixes is given in Table 11 Appendix A : Guidance to implementers. This list is based on the following assumptions:

- Value 0000 is reserved for the LOC field,
- A routing area is bounded by a building,
- Four categories of buildings are encoded with the first two bytes of the LOC field.

185. This list is updated with the intra-domain routing topology.

8.4 Operations to administer the system administration names

186. Registration of the administration authority label

187. The list of national administration authorities is fixed and is updated when a new country is joining the LINK 2000+ communication infrastructure. The initial list is given in Table 10 Appendix A : Guidance to implementers. This list is fixed and may not be modified.

188.

189. Registration of the routing domain label

190. The routing domains labels are listed in Table 11 Appendix A : Guidance to implementers. This list is updated to reflect the network topology.

191. The labels corresponding to the routing areas and systems will be further defined upon completion of the detailed network design of each routing domain.

192.

193. The relationship between the administrative labels and the addresses prefixes is fixed during the registration operation.

194. From an address prefix, it is possible to retrieve the administrative labels matching conceptually with the address prefix and vice versa.

9. NAMING AND ADDRESSING PLAN FOR THE ATN APPLICATIONS AND UPPER LAYERS

9.1 ATN Application naming and addressing framework

9.1.1 Baseline for LINK2000+ Application Naming and Addressing

195. Interoperability requirements put on LINK2000+ systems are specified in [RTCA_EUROCAE_28]. This document identifies the minimum set of functionalities which have to be supported by Baseline-1 compliant airborne and ground systems in order to guaranty the technical and operational interoperability. This set of functionality is documented in the " Baseline-1 profile". A similar profile will be produced for Baseline-2 to cover the functional extensions of Baseline-1 services (e.g. new CPDLC messages in ACL) and new services (DCL and D-ATIS).

196. Baseline-1 and Baseline-2 profiles mandate compliance to [ICAO_9705] Edition 1 plus the support of the resolution of the ICAO Proposed Defect Reports (PDRs) impacting interoperability. [ICAO_9705] Edition 2 full compliant systems are consistent with these profiles.

197. It is important to note that these profiles do not include the provisions for extended ATN upper layers naming and addressing as documented in (ICAO_9705] Edition 3. As a consequence, the facilities provided by the Naming and Addressing enhancements are not provided in LINK2000+, namely:

a) ATN naming and addressing to handle multiple instances of the same application type at a given location[2],

b) ATN upper layers to handle AE titles from name spaces other than the ICAO naming tree[3], and

c) Non-native ATN Application access to the ATN (via GACS).

198. The [NAP] document does not address these ATN naming and addressing enhancements.

9.1.2 General

199. In real life, people are usually characterised by name and address attributes:

[2] A typical example is the Systems Management application when running at the same time in two separate physical systems (e.g. an ATN router (IS) and an ATN end system (ES)) located in the same aircraft or in the same ground facility.

[3] This extension allows AINSC ATN applications to use the ATN dialogue communication service.

- The *name* identifies a person in a given context. Name attributes are successively added to make unambiguous the identification in the considered context. For instance, the name "Mr Dupont Jean, Eurocontrol" identifies a man ("Mr"), with name "Dupont", surname "Jean" working in "Eurocontrol". If the risk of namesake exists, other attributes like "ECC/EHQ", "Administration Dept" can be added.
- The *address* provides a means to locate a person using a given means of transport: a post address using the surface mail, an email address via Internet, a fax or a telephone number using the public telephone network, etc...
- The *directory name* is the entry key used to retrieve information related to a given person from a given directory service: the sequence "town, name and address" in the phone book, the social security number, etc...

200. Data link applications follow the same naming and addressing framework, based on an application names, application addresses and application directory names.

201. For Air Traffic Service Communications (ATSC) ATN Applications, ICAO has specified a standardised use, syntax and semantic for each of these attributes and has defined procedures for assigning or retrieving values. The application names are called "Application Entity Titles" (or AE-title) in both OSI and ATN frameworks. As the ATSC ATN Registration authority, ICAO insures the uniqueness and unambiguity of the name and address attributes and binds these attributes to specific ATN applications.

202. For Aeronautical Industry Service Communications (AINSC) ATN Applications, IATA is designed as the AINSC ATN Registration authority. No format for the Application Entity Titles is defined so far.

203. ATN Application Entity Title

204. ATN application entity titles are used by application users to identify the peer application users they want to communicate with. Only the variable part of the ATN application entity title is directly used by the final users, i.e. the aircrew, the controller through the HMI (and indirectly via the Flight ID) or the air or ground automation. Indeed, the format of the name is much clearer and easier to manipulate than the format of an ATN address ("CPDLC in LFPO" vs. "0x47002781465241004154 4F001100180011A002214849").

205. In initial implementations, ATN application entity titles are transferred transparently by the ATN upper layer protocols from sending to receiving application users. They are used locally in the ATN end systems to manage the application addressing databases. In the future, ATN application entity titles will support the authentication mechanisms of the ATN security framework in being directly used in the digital signature computation.

206. ATN Application Addresses

207. ATN application addresses are used by the ATN communication service provider to locate an ATN application in terms of ATN routing domains, routing area, end system and transport entity to which the ATN application is attached.

208. ATN application addresses are not directly used by the ATN applications and application users. However, since the ATN Presentation layer does not understand ATN application entity titles, the ATN Application have to translate ATN application entity titles into ATN application address when interfacing with the ATN Presentation Service Provider.

209.

210. ATN Application Directory Names (or Distinguished Name)

211. An application Directory is a distributed repository of application identifiers and attributes. Each object entry known to the Directory is distinguished from all other objects by its name. Thus each entry is said to have a Distinguished Name (or a Directory Name).

212. Directory service providers are responsible for disseminating the name and address attributes and providing the name-to-address resolution function required to map ATN application entity titles

used by ATN application users to ATN application address used by the ATN Communication Service Provider (CSP).

213. Name to Address resolution is required for both dynamic and static relationships i.e. between Flight ID and the application on board a given aircraft, and the application entity title and the Presentation Address on board the aircraft.

214. In the first stage of the ATN where no global directory will be in place (e.g. in LINK 2000+), the Flight ID and/or ATN Application entity titles will be used as the main entry key of the addressing data bases managed in the ATN End Systems. No Application Directory Name will be defined for ATN Applications. The Context Management application will support the data exchanges between air and ground systems to make all systems aware of the Flight Ids, ATN application entity titles and addresses supported by the other systems. This information will also be distributed on the ground by OLDI.

215. In the longer term, the ATN Directory application - in co-operation with the CM application - may also provide these name-to-address resolving services based on an extended application naming tree.

216. Document [ICAO_9739] Part II Chapter 4 provides a very detailed description of the ATN application entity title for ATSC ATN applications and of the ATN address structure. A short summary is provided below.

9.1.3 ATN Application Entity Title

9.1.3.1 Application Entity Title for ATSC ATN Applications

217. An *ATN Application Entity Title* for ATSC Applications is composed of both fixed and variable attributes.

218. The fixed attributes identify:

- the upper name space: **ISO,**
- the organisation name space: **ICAO**,
- the application category: **operational**, **system**, **administration**, etc... The category of all air/ground ATN applications defined in the LINK2000+ Baseline is "operational".
- the location of the hosting system: **atn-end-system-air** or **atn-end-system-ground,** and
- the application type: **CM**, **ADS**, **CPDLC**, **DATIS,** etc...

219. The variable attributes identifies the application location: a **24 bit address** for airborne systems or a **ICAO ground facility designator** ground-based systems.

220. The ATN application entity title is a hierarchical structure which allows to name any ATN application as a ordered sequence of textual values. To each attribute textual value is assigned a single attribute numeric value used by automate system to encode an ATN application entity title.

221. For instance,

222. {iso identified-organisation ICAO atn-end-system-ground LFBOZTZX operational cpc}

223. identifies the CPDLC ATN application located in the Toulouse ground-based Control Tower. The numeric form will be:

224. {0 3 27 2 <n> 0 2},

225. where n is the integer encoding of the "LFPOZTZX". This example does not identify a particular system in the Toulouse Control Tower. This may be done by adding at the end a "sys-id" component.

226. Note that the ATN application entity title is a "technical" name, represented as an ASN.1 OBJECT IDENTIFIER type and mainly used by the automation. Since this type has not an user-friendly format, final users will prefer rather to use ATN application directory names.

227.

228. The LINK2000+ ATN naming structure is illustrated in Figure 4.

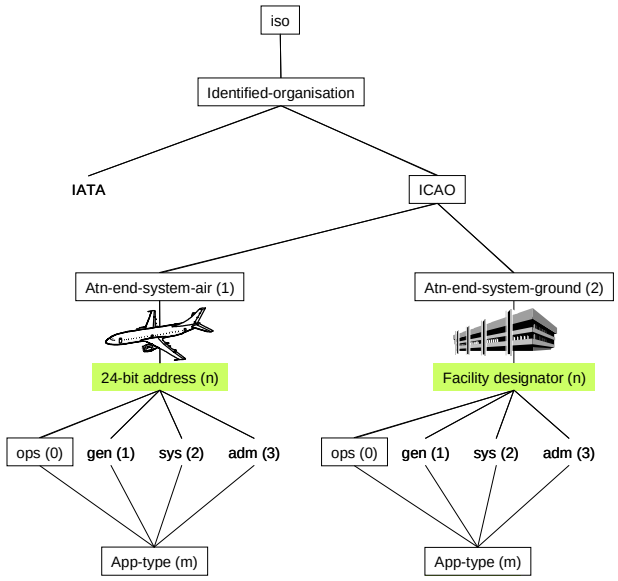

Figure 4 : LINK2000+ ATN Naming Structure

229. Note -. The ATN Application Entity Title is actually composed of an "ATN Application Process Title" and an "ATN Application Entity Qualifier". The ATN application process title corresponds in Figure 4 to the name from the root to the application category. The application entity qualifier is the application type.. These objects are handled by the ATN applications protocols dealing with naming and addressing (ACSE and CM).

9.1.4 ATN Application Address

230. The ATN Application Address is used to locate an ATN application service running on a given system.

231. The ATN Application Address is a functional address, in that it does not contain any technology or sub-network dependent component. As the ATN application entity title, the ATN application address will be valid for the whole lifetime of the ATN Application, and will not evolved with the emerging of new technology.

232. The ATN Application Address is composed of two elements:

- the **ATN NSAP Address** element locates both the system hosting the ATN Application within the ATN and the Transport Entity within the system. The format of the ATN NSAP address is discussed in Chapter 8.
- the **ATN TSAP Selector** element (TSEL) locates the Transport Service User within the ATN System. In ATN, as the Session and Presentation address selectors are not used, the ATN TSAP Selector directly locates the ATN Application within the ATN System.

233. The ATN TSAP Selector is a one- or two-octet long hexadecimal string. TSEL values have only a local scope and do not need global registration.

234. Note. The ATN Application Address also contains a Session selector (SSEL) and a Presentation selector (PSEL) used in an OSI system to identify respectively the session-user and the presentation-user. In ATN, this local addressing facility is not used, and SSEL and PSEL are always empty.

235. Both air and ground instances of an application have an ATN application address. However, only the called systems' addresses need to be made public (the same way as for a phone call: the phone number of the calling person is not necessary).

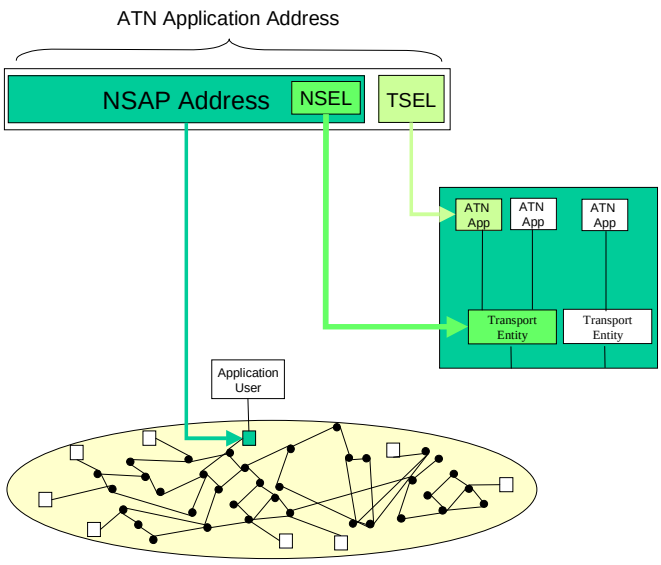

Figure 5 : ATN Application Address

9.1.5 ATN Directory Name

236. The ATN directory is a logical entity used to store ATN name and address information and to provide lookup functions to retrieve address or other information on the associated ATN application. The ATN Directory Name is the lookup key used in the operations of the Directory; the directory name syntax depends therefore of the Directory used:

- The Context Management (CM) application, together with its associated data link service DLIC (Data Link Initiation Communication), is a simple form of an ATN Directory Service Provider. In that case, the ATN Directory Name used is the Flight ID and/or ATN Application entity title.
- The ATN Directory (DIR) application is the ISO X500 based form of the ATN Directory Service Provider. The abstract and transfer syntaxes of the associated ATN Directory Name is specified in [ICAO_9705] Edition 3 Sub-Volume VII.

237. The CM Application will be the ATN Directory used in LINK 2000+. The implementation of the ATN DIR Application will be envisaged later, when the number of communicating parties and the amount of data stored will require a more sophisticated directory system.

9.1.6 ICAO Registration Authority

238. Names and addresses are assigned according to a hierarchical tree structure, each tree level representing a naming/addressing domain and being administrated by a naming/addressing authority.

239. The top naming/addressing authority for the ATN is ICAO. ICAO defines the syntax, the semantic and the value assignment/release procedures within the ICAO naming/addressing space.

240. The following ICAO documents act as the repository of standardised values for the variable name attributes:

- Assignment of **ICAO 24bit addresses** to aircraft is managed in two steps. Document [ICAO_An10] Table 1 – allocates aircraft 24bits address values segments to States. Each

segment is under the control of the national CAA and does not intersect with other segments administered by different CAAs. ICAO delegates value assignment within each segment to CAAs.

- The **ICAO ground facility designator** to ATC ground facility are identify and assigned in documents [ICAO_7910] for the first 4 letters and [ICAO_8585] for the remaining letters.
- **Application type** values are assigned to ATN applications in document [ICAO_9705] Sub-Volume IV (Editions 1 and 2).

241. **System identifier** values results from the concatenation of the two ATN Address components LOC and SYS assigned to the system hosting the ATN Application. Assignment procedures for those fields were discussed in chapter 8.

9.1.6.1 Scheme for the allocation and assignment of 24-bit aircraft address

242. An aircraft address identifies a single aircraft world-wide and is composed of 24 bits. At any one time, no address is assigned to more than one aircraft. The assignment of aircraft addresses is based on a comprehensive scheme providing for a balanced and expandable distribution of aircraft addresses applicable world-wide.

243. ICAO acts as the 24-bit address registration authority. It assigns blocks of consecutive addresses available to States for assignment to aircraft. Each block is defined by a fixed pattern of the first 4, 6, 9, 12 or 14 bits of the 24-bit address. Thus, blocks of different sizes (1 048 576, 262 144, 32 768, 4096 and 1 024 consecutive addresses) are made available.

244. ICAO then delegates address allocation within each block to the associated State.

245. Table 3 provides some examples of 24-bit address prefixes for several LINK 2000+ States.

State	Number of addresses in block					Allocation of blocks of addresses
	1024	4096	32768	262144	1048576	
Belgium			*			0100 01 001 --- -- ----------
France				*		0011 10 --- --- -- ----------
Germany				*		0011 11 --- --- -- ----------
Luxemburg	*					0100 00 010 000 00 ----------
Spain				*		0011 01 --- --- -- ----------
The Netherland			*			0100 10 000 --- -- ----------
United Kingdom				*		0100 00 --- --- -- ----------

Table 3 : Examples of allocation of aircraft addresses to States

9.1.6.2 Scheme for the allocation and assignment of ICAO Facility Designator

246. The facility designator component of the ground ATN Application entity title gives some information on the physical location of the application. ICAO Facility Designators are composed of a four-letter location indicator optionally followed by a three-letter designator.

247. The first letter of the location indicator is the letter assigned to the AFS routing area within which the location is situated. For Europe, the letter is 'L' for South Europe, and 'E' for North Europe. The second letter of the location indicator is the letter assigned to the State within which the location is situated. States assign third and fourth letters.

State	Location Indicator		
	1st letter	2nd letter	Additional codes
Belgium	E	B	
France	L	F	
Germany	E	D	ET
Luxemburg	E	L	
Spain	L	E	GC, GE
The Netherland	E	H	
United Kingdom	E	G	

Table 4 : Example of Location Indicator Prefixes in Europe

9.1.6.3 Scheme for the allocation and assignment of Application Type

248. The application type component of the ATN application entity title gives the nature of the application. Textual and numeric values are standardised by ICAO, as listed in Table 5 (grey entries are not applicable to LINK 2000+).

ATN ASE type	ATN app-type name and numeric value
Automatic Dependent Surveillance	ADS (0)
Context Management Application	CMA (1)
Controller Pilot Data Link Communication	CPC (2)
Automatic Terminal Information Services (ATIS)	ATI (3)
Type A Gateway	GWA (4)
Systems Management Application (SMA)	SMA (5)
ATS Inter-Facility Data Communications (AIDC)	IDC (6)
ATS Message Application	AMS (7)
AFTN-AMHS Gateway	GWB (8)
ATS Message User Agent	AUA (9)
ADS Report Forwarding	ARF (10)
Aviation Routine Weather Report (METAR)	MET (11)
Generic ATN Communication Service AE (GACS)	GAC (12)
Protected Mode CPDLC (PCPDLC)	PCDC (22)

Table 5 : Assigned Application Type and Values

9.2 LINK 2000+ Naming and Addressing Requirements

9.2.1 General Requirements

249. [REQ] Airlines and ATSOs participating in LINK 2000+ shall assign ATN application entity titles and ATN addresses in accordance with the data link services they decided to support.

250. Table 6 summarizes for each data link service which ATN application entity titles and addresses have to be defined.

Service	Required AE title	Required ATN address	Remark
DLIC	Air and ground CM AET	Air and ground CM ATN address	CM link air initiated for logon and ground initiated for contact
ACM	Air and ground CPDLC AET	Air CPDLC ATN address	CPDLC link always ground-initiated
ACL	Air and ground CPDLC AET		The CPDLC link is assumed to be already established
AMC	Air and ground CPDLC AET		The CPDLC link is assumed to be already established
FLIPCY	Air and ground ADS AET	Air ADS ATN address	ADS link always ground initiated
CAP	Air and ground ADS AET	Air ADS ATN address	ADS link always ground initiated
DCL	Air and ground CPDLC AET	Air and ground CPDLC ATN address	Both air and ground CPDLC link initiation are allowed.
DSC	Air and ground CPDLC AET	Ground CPDLC ATN address	DSC link always air-initiated
D-ATIS	Air and ground FIS AET	Ground FIS ATN address	FIS link always air-initiated

Table 6 : Required LINK 2000+ ATN AE Titles and Addresses

251. [REQ] All air or ground ATC entities participating in LINK 2000+ shall be identified by a 24-bit address or an ICAO Facility Designator.

9.2.2 CM Service related Requirements

252. [REQ] States participating in LINK 2000+ shall define the organisation of their ground space in terms of application addressing areas, or CM contexts[4].

253. A "CM context" is the basic naming and addressing reporting unit to the aircraft: it identifies which ATN applications are available on the ground and the application protocol version operated. It may contain in addition the ATN application address, when used by the peer to establish a dialogue with this application.

254. The definition of the ground topology should follow the following basic rules:

1. There should be a single CM application per CM context, responsible to send to peer systems the context through the CM-logon and CM-update data exchanges.
2. Except for the CM application itself, an ATN Application may belong to more than one CM context; this may be the case for an DFIS Application shared by several States.
3. Several instances of the same version of an ATN application can be operated in the same CM context as far they are hosted in separate systems; for instance, the data link services DCL and ACL could be supported in an ATCC by 2 different CPDLC applications. In that case, the initiator system shall be able to know which system it needs to contact.

255. Note. Although several CM contexts may in theory be supported in the aircraft, it is supposed that aircraft in LINK 2000+ will represent a single CM context.

[4] The term "context" is used instead of "domain" or "areas" to make clear that application addressing is fully disconnected from network addressing but is related to the "context" management (CM) application.

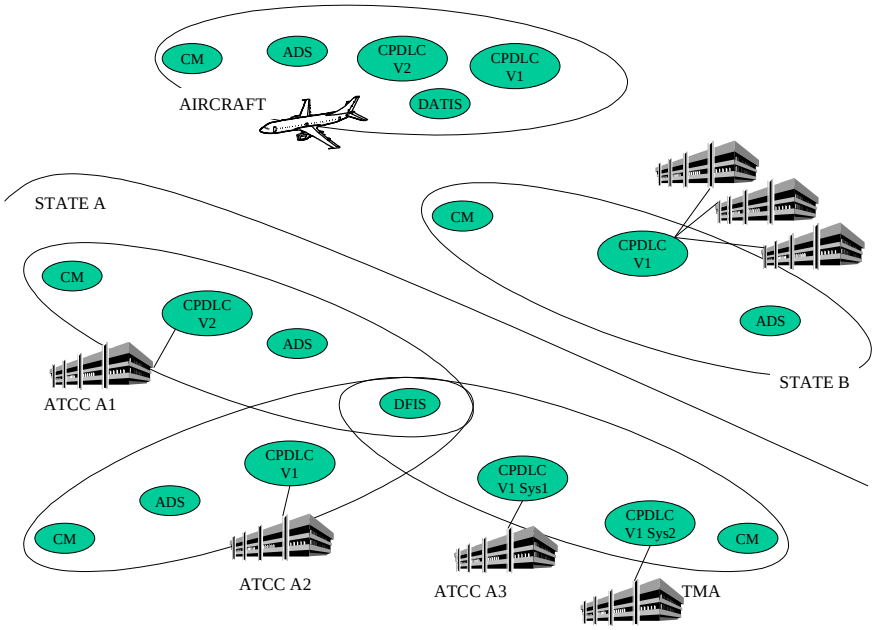

Figure 6 : Exanples of CM contexts

256. Any aircraft entering the LINK 2000+ area or departing from an airport of the LINK 2000+ area will establish communication with the appropriate CM addressing server to initiate the data link capability with the ground.

257. [REQ] A procedure shall be defined by each ATSO to make the aircrew aware of which CM server to contact first when entering the ATSO's airspace and for the purpose of initiating Data Link Service..

258. The addresses of the initial CM servers available in this area should have been previously loaded in the avionics system by the aircraft operators.

259. [REQ] Each ATSO participating in LINK 2000+ shall register at least one ATN address corresponding to a CM application operated in its data link domain.

260. Note1. These addresses could be published in [ICAO_9705] Edition 3 - Sub-Volume IX "ATN Identifier Registration" in section 9.3.1 "State Addresses".

261. Note 2 . Because the ICAO publication process is long and not flexible, it is recommended that a LINK 2000+ registration authority be established to maintain this CM Address data base and interface with ICAO when required.

262. An ATSO can operate more than one CM server in its data link area.

263. [REQ] The procedure by which the aircraft identifies the appropriate CM server when entering the area of an ATSO shall be clearly defined by the ATSO.

264. [REQ] The ATSO is responsible for providing the aircraft with the addressing information required to initiate the data link capability with the next ATSOs along the flight path, if the CPDLC Transfer of Communications function is not available or fails to transfer the aircraft to the next ATSO.

10. ADMINISTRATION ASPECTS

265. The NSAP address is conceptually re-shaped with two parts:

- A NSAP prefix, NSAP_prefix, giving the hierarchy of the administration authorities administrating the nested network address domains and the container RDs
- A NSAP suffix, NSAP_suffix, containing the routing area and the local system identifier.

266. This document devolves administration of NSAP address allocation to the Addressing Domains identified in this document by the NSAP Address Prefix assigned to them.

267. The NSAP fields defining the routing area and the local system identifier are locally assigned and shall be assigned relative to an the NSAP_prefix assigned to the Addressing Domain.

268. The assignment of individual NSAP Addresses is otherwise a local matter by each Addressing Domain Authority and are exchanged on a bilateral basis when there is a need to communicate.

269. The LIT will operate an informal central database of all assigned names and addresses during the Link2000+ Programme. Addressing Domains should report all name and address assignments to the LIT.

11. APPENDIX

11.1 Appendix A : Guidance to implementers

11.1.1 Proposed ADM value assignment for European entities

fixed or mobile European ATSC Addressing Domain	hexadecimal code of the ADM field	comment
Belgium	834245	European Region + ‘BE’ (‘BE’ is the 2-letters ISO 3166 country code of Belgium)
France	834652	European Region+’FR’
Germany	834445	European Region+’DE’
Ireland	834945	European Region+’IE’
Italy	834954	European Region+’IT’
Luxemburg	834C55	European Region+’LU’
Netherlands	834E4C	European Region+’NL’
Portugal	835054	European Region+’PT’
Spain	834583	European Region+’ES’
UK	834742	European Region+’GB’
Eurocontrol	836575	European Region+’eu’
NATO	836E61	European Region+’na’
Top Level Backbone	8380BB	

Table 7 : Proposed ADM value assignment for selected european entities

11.1.2 Proposed ARS value assignment for fixed ATSO entities

Country/organisation	FIR/ACC	proposed ARS field value	comment
Belgium	Brussels	014255	ATSO+operational+’BU’
France	Brest	015252	ATSO+operational+’’RR’
	Bordeaux	014242	ATSO+operational+’BB’

	Aix	014D4D	ATSO+operational+’MM’
	Paris	014646	ATSO+operational+’FF’
	Reims	014545	ATSO+operational+’EE’
Germany	Berlin	014242	ATSO+operational+’BB’
	Bremen	015757	ATSO+operational+’WW’
	Dusseldorf	014C4C	ATSO+operational+’LL’
	Frankfurt	014646	ATSO+operational+’FF’
	Karlsruhe	015555	ATSO+operational+’’UU’
	Munchen	014D4D	ATSO+operational+’MM’
Ireland	Dublin	014442	ATSO+operational+’DB’
	Shannon	01534E	ATSO+operational+’SN
Italy	Brindisi	014242	ATSO+operational+’BB’
	Milan	014D4D	ATSO+operational+’MM’
	Rome	015252	ATSO+operational+’RR’
	Padua	015050	ATSO+operational+’PP’
Netherlands	Amsterdam	014141	ATSO+operational+’AA’
Portugal	Lisbon	015043	ATSO+operational+’PC’
Spain	Barcelona	014342	ATSO+operational+’CB’
	Canarias	014343	ATSO+operational+’CC’
	Madrid	01434D	ATSO+operational+’CM’
	Palma	014350	ATSO+operational+’’CP’
	Seville	014353	ATSO+operational+’CS’
UK	London	015454	ATSO+operational+’TT’
	Manchester	014343	ATSO+operational+’CC’
	Scottish	015058	ATSO+operational+’PX’
Eurocontrol	Maastricht	014459	ATSO+operational+’DY’

Table 8 : proposed ARS value assignment for fixed ATSO entities

11.1.3 Recommended LOC field values

Recommended LOC field range	Area type
01xx	En-route ACC areas
02xx	TMA and airports areas
03xx	Technical services areas
04xx	Other areas

Table 9 : Recommended LOC field values

11.1.4 Administrative labels for administration authorities

Fixed or mobile ATSC addressing domains	ADM (hex code)	Comment	Administrative name

Belgium	834245	Europe Region + BE	eur.be
France	834652	Europe Region + FR	eur.fr
Germany	834445	Europe Region + DE	eur.de
Ireland	834945	Europe Region + IE	eur.ie
Italy	834954	Europe Region + IT	eur.it
Luxemburg	834C55	Europe Region + LU	eur.lu
Netherlands	834E4C	Europe Region + NL	eur.nl
Portugal	835054	Europe Region + PT	eur.pt
Spain	834583	Europe Region + ES	eur.es
UK	834742	Europe Region + GB	eur.uk
Eurocontrol	836575	Europe Region + eu	eur.eu
NATO	836E61	Europe Region + na	int.na
Top level backbone	8380BB		eur.tb

Table 10 : Administrative labels for administration authorities

11.1.5 Administration labels for routing domains

Fixed or mobile ATSC addressing domains	ADM	ARS	LOC	Administrative name
Belgium	834245			eur.be
Brussels		014255	{01xx, 02xx, 03xx, 04xx}	eur.be.atso_brussels
France	834652			eur.fr
Brest		015252	{01xx, 02xx, 03xx, 04xx}	eur.fr.atso_brest
Bordeaux		014242	{01xx, 02xx, 03xx, 04xx}	eur.fr.atso_bordeaux
Aix		014D4D	{01xx, 02xx, 03xx, 04xx}	eur.fr.atso_aix
Reims		014545	{01xx, 02xx, 03xx, 04xx}	eur.fr.atso_reims
Paris		014646	{01xx, 02xx, 03xx, 04xx}	eur.fr.atso_paris
Germany	834445			eur.de
Berlin		014242	{01xx, 02xx, 03xx, 04xx}	eur.de.atso_berlin
Bremen		015757	{01xx, 02xx, 03xx, 04xx}	eur.de.atso_bremen
Dusseldorf		014C4C	{01xx, 02xx, 03xx, 04xx}	eur.de.atso_dusseldorf
Frankfurt		014646	{01xx, 02xx, 03xx, 04xx}	eur.de.atso_frankfurt
Karlsruhe		015555	{01xx, 02xx, 03xx, 04xx}	eur.de.atso_karlsruhe
Munchen		014D4D	{01xx, 02xx, 03xx, 04xx}	eur.de.atso_munchen
Ireland	834945			eur.ie
Dublin		014442	{01xx, 02xx, 03xx, 04xx}	eur.ie.atso_dublin
Shannon		01534E	{01xx, 02xx, 03xx, 04xx}	eur.ie.atso_shannon
Italy	834954			eur.it
Brindisi		014242	{01xx, 02xx, 03xx, 04xx}	eur.it.atso_brindisi
Milan		014D4D	{01xx, 02xx, 03xx, 04xx}	eur.it.atso_milan
Rome		015252	{01xx, 02xx, 03xx, 04xx}	eur.it.atso_rome
Padua		015050	{01xx, 02xx, 03xx, 04xx}	eur.it.atso_padua

Netherlands	834E4C			eur.nl
Amsterdam		014141	{01xx, 02xx, 03xx, 04xx}	eur.nl.atso_amsterdam
Portugal	835054			eur.pt
Lisbon		015043	{01xx, 02xx, 03xx, 04xx}	eur.pt.atso_lisbon
Spain	834583			eur.es
Barcelona		014342	{01xx, 02xx, 03xx, 04xx}	eur.es.atso_barcelona
Canarias		014343	{01xx, 02xx, 03xx, 04xx}	eur.es.atso_canarias
Madrid		01434D	{01xx, 02xx, 03xx, 04xx}	eur.es.atso_madrid
Palma		014350	{01xx, 02xx, 03xx, 04xx}	eur.es.atso_palma
Seville		014353	{01xx, 02xx, 03xx, 04xx}	eur.es.atso_seville
UK	834742			eur.uk
London		015454	{01xx, 02xx, 03xx, 04xx}	eur.uk.atso_london
Manchester		014343	{01xx, 02xx, 03xx, 04xx}	eur.uk.atso_manchester
Scottish		015058	{01xx, 02xx, 03xx, 04xx}	eur.uk.atso_scottish
Eurocontrol	836575			eur.eu
Maastricht		014459	{01xx, 02xx, 03xx, 04xx}	eur.eu.atso_maastricht
NATO	836E61			int.na
Top level backbone	8380BB			eur.tb

Table 11 : administration labels for routing domains

11.2 Appendix B : Terms and acronyms

Item	Meaning
ACC	Area Control Centre
ACSE	Association Control Service Element
ACL	ATC Clearances
ACM	ATC Communication Management
ADS	Automatic Dependant Surveillance
AET	Application Entity Title
AFS	Aeronautical Fixed Services
AINSC	Aeronautical Industry Service Communications
AMC	ATC Microphone Check
ASN.1	Abstract Syntax Notation Number One
ASRD	ATM System Requirements Documents
ATC	Air Traffic Control

ATCC	Air Traffic Control Centre
ATIS	Automatic Terminal Information Service
ATN	Aeronautical Telecommunication Network
ATSC	Air Traffic Services Communications
ATSO	Air Traffic Services Organisation
BIS	Boundary Intermediate System
CAA	Civil Aviation Authority
CAP	Controller Access Parameter
CM	Context Management
CPDLC	Controller Pilot Data Link Communications
CSP	Communication Service Provider
DATIS	Data Link ATIS
DFIS	Data Link FIS
DCL	Departure Clearance
DLIC	Data Link Initiation Capability
DSC	Downstream Clearance
ES	End System
FIS	Flight Information Services
FLIPCY	Flight Plan Consistency
GACS	Generic ATN Communication Service
IATA	International Air Transport Association
ICAO	International Civil Aviation Organisation
IS	Intermediate System
LIT	LINK2000+ Integration Team
NAP	Naming and Addressing Plan
NET	Network Entity Title
NPD	Network Planning Document
NSAP	Network Service Access Point
OSD	Operational Scope Document
OSI	Open Systems Interconnection
PDR	Proposed Defect Report
PETAL II	Preliminary Eurocontrol Tests of Air-ground dataLink phase-II
PSEL	Presentation Selector
RD	Routing Domain
RDC	Routing Domain Confederation
RDI	Routing Domain Identifier
SARPs	Standards And Recommended Practices
SSEL	Session Selector
TSEL	Transport Selector