AERONAUTICAL TELECOMMUNICATION NETWORK (ATN)

WG3 - ATN Applications and Upper Layers

Naples (Italy), 18th – 21st May 1999

ATN Upper Layer Architecture
-
Use of the Application Context Name in the application version negotiation process

Prepared by F. Picard

Summary

Adding new functionality in the existing Package-1 Applications cause the application version to be rolled out and the ASN.1 description to be modified. These modifications cause a lot of interoperability problems and force an efficient version number negotiation process to be performed by the ATN ASEs themselves.

An alternative solution based on the use of the ACSE Application Context Name would allow to avoid these problems. However, the current version of the ATN ULA SARPs need to be modified to support a real Application Context Name identification and negotiation.

WG3/SG3 discussed this proposal at its Palo Alto meeting in April 99 and decided to review it again with other interested WG3 sub-groups.

1 INTRODUCTION

A functional extension to the Version 1 ATN Context Management Application is currently being addressed by ATNP/WG3/SG2. The resulting enhanced CM application would support the "CM server" concept, which allows an aircraft to request information for up to four different facilities, and the ground system to return that information either in response to that request or unrequested in the form of a modified update.

The server capability must not be considered as a modification of the current CM functionality but as an additional functionality, i.e. as a new functional unit which would be run optionally in addition to the core CM functionality (Package-1 CM).

In the OSI Application Layer Structure model, such an application functional unit can be represented in an ASO by a new ASE, identified here as the CMS ASE (CM Server ASE). The CM Application Entity could be formed by two co-existing ASEs, namely the CM ASE and the CMS ASE**, only one being activated on an open association**. The selection of the "active ASE" would be negotiated by the upper layers via the Application Context Name carried by the ACSE APDUs.

The main advantage of this approach is to keep the current CM ASE unchanged, meaning in particular that the CM protocol version is not rolled. Since a CM ASE would never talk to a CMS ASE, the interoperability between CM application entities is guaranteed by the ATN ULA.

The Package-1 ATN ULA described in ICAO Doc. 9705 Edition 1 does not manage the Application Context Name very well. Because the ACSE Application Context Name parameter is used to transfer to the other side the Dialogue Service User version number, there is a confusion between Application Context Name and Version Number. The consequence is that in practice there is no way to identify in the current ULA more than one application context per ATN application. As a consequence, there is no real possible negotiation in the ATN ULA of the application context to be in use over the association being established.

This document identifies the changes needed in the ATN Upper Layers to support both Application Context identification and negotiation.

This method is described here for evaluation by WG3/SG3.

2 PROPOSED CM FUNCTIONAL MODEL

Figure 1 shows the proposed functional model of the enhanced CM Application Entity.

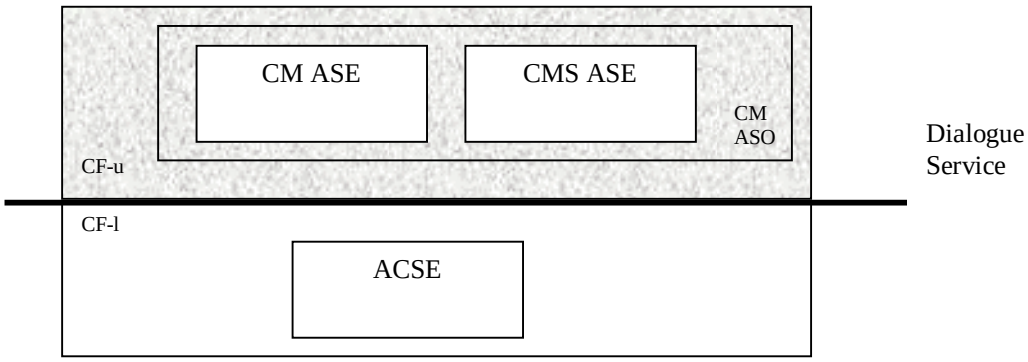

Figure 1: Proposed CM Functional Model

Two CM AEs establish an association by agreeing on an application context, which identifies the initial shared management knowledge for that association, including the various application service elements used. For the

purpose of CM, two application contexts could be defined (see Annex A). The "basic" application context identifies an association used by CM for the Package-1 functions (logon, update and contact). The "server" application context identifies an association used by CM for the server functions.

The CM AE is still identified by a unique AE-Qualifier (CMA(1)) and a unique ATN Presentation address. Compared to the Package-1 CM AE, the main change is the activation upon instantiation of the CM AE of either the CM ASE or the CMS ASE based on the Application Context identified in the A-ASSOCIATE indication.

The Control Function specified in Doc 9705 Edition 1 need to be modified to support the effective identification of the application context and its negotiation. Indeed, in the current specification, the application context received in the A-ASSOCIATE is simply ignored, only the DS-User Version Number attached to it is processed. There is an arc in the ATN Naming Tree for the application contexts {iso(1) identified-organisation(3) icao(27) atn-ac(3) but there is no sub-arc defined for identifying each application context. The next sub-arc identifies the DS-User Version Number. A consequence is that no particular requirement on the CF for handling application contexts has been specified in the ULA SARPs.

The identification and the negotiation of the Application Context in use for the association by two communicating AEs implies the following ULA changes:

1. the syntax of the Application Context Name parameter should allow to differentiate several application contexts,

2. the initiator CF should be able to retrieve the Application Context Name associated with the dialogue being established and to encode it properly,

3. the responder CF should be able to retrieve the Application Context Name(s) supported locally, to compare them with the received Application Context Name, to reject the association if none is supported or to create the relevant ASE instance if the requested one is supported.

4. the initiator CF should abort the dialogue if the responder CF has established a dialogue using an Application Context different of that proposed in the request.

5. PROPOSED MODIFICATIONS TO THE ULA SARPS

3.1 Structure of the ULA Naming Tree

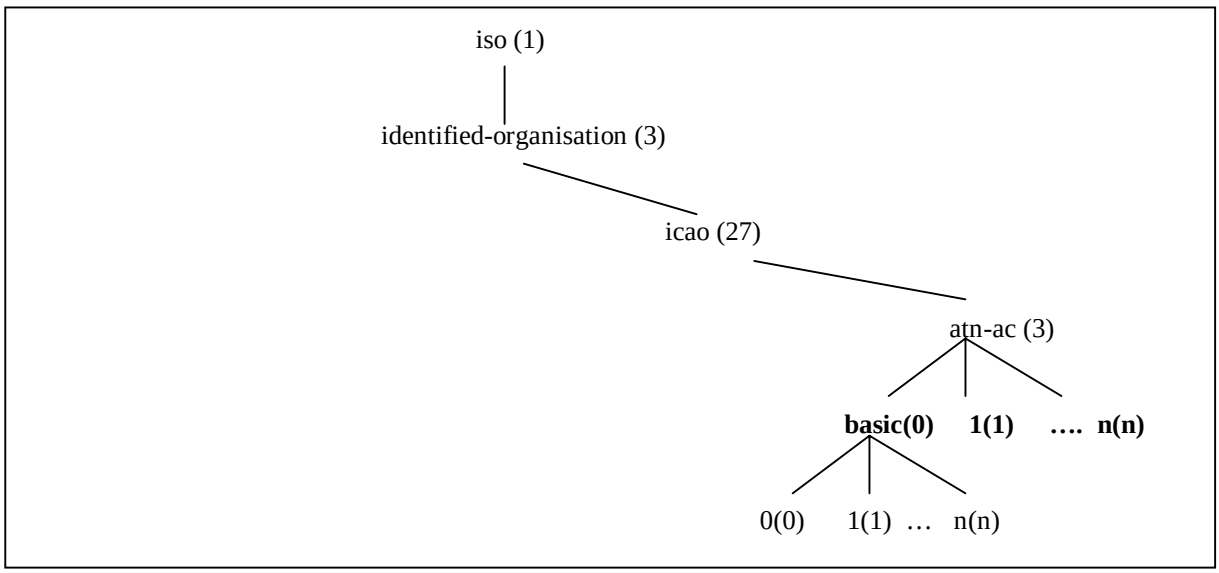

Figure 2: Proposed ULA Naming Tree

The current naming tree does not allow to identify application contexts. The last arc of the A-ASSOCIATE Application Context Name is used to encapsulate the DS-User version number, not to differentiate application contexts.

A new arc must be created for the Application Context Name identifier. The last arc will still be used to carry the DS-User version number. The proposed naming tree is depicted in Figure 2.

Important note: this change would require an upgrade of all CNS/ATM-1 compliant systems in order to encode the new arc value (0) in the Application Context Name.

3.3 ACSE

The Application Context Negotiation ACSE functional unit is not proposed to be used. Only a limited negotiation is proposed to the ACSE service users:

- The requestor (i.e. the association-initiator) uses the application Context Name parameter to identify a single application context name that it proposes for the association.
- The acceptor (i.e. the association-responder) uses the Application Context Name parameter to select the application context name for this association. The acceptor may return any value in the response primitive. The offer of an alternative application context name by the acceptor provides a possible mechanism for limited negotiation. If the requestor cannot operate in the returned application's application context name, it may issue an A-ABORT request primitive.

3.4 Control Function

This section describes the way the Control Function (lower part) must handle the Application Context Name parameter of the D-START service primitives. The Control Function (upper part) is not modified since the CM AE in any case contains a single active ASE. The Control Function (upper part) should map transparently the server AE-service to the CMS ASE service.

D-START Request

Section 4.3.3.3.2.2.1 b) should require the CF to construct the Application Context Name with the following parameters:

- the value of the application context in use, and
- the value of the final arc set equal to the DS-User Version Number parameter if provided, and set to zero otherwise.

Note. The way the application context name to be used on the dialogue is retrieve is a local matter. For instance, the identity of the ASE initiating the D-START request (CM ASE or CMS ASE) could be used to identify implicitly the application context name.

A-ASSOCIATE Indication

The CF shall check that the association can be effectively established. The association establishment request must be rejected if the application context identified in the AARQ is not locally supported. If the association is accepted, the ASO instance created upon receipt of the A-ASSOCIATE indication shall contain the ASE (CM ASE or CMS ASE) as identified in relevant application context. The D-START indication is then sent to this ASE as described in 4.3.3.4.1.2.1.

A new section in 4.3.3.4.1.2 should be added to cover the case the Application Context is not acceptable, as follows:

4.3.3.4.1.2.x When an A-ASSOCIATE Indication primitive is validly invoked but the Application Context identified in the Application context Name is not supported by the Application Entity, the CF shall:

a) Construct the Application context Name with the value of one of the application context supported locally, and with the value zero as the final arc value,

b) Retrieve the responding Presentation address,

c) Construct a A-ASSOCIATE Response primitive with the following parameters:

A-ASSOCIATE Response parameter	**ISO Status**	**ATN Value**
Application Context Name	M	As derived in a) above
Application Context Name List	C	Not used
Responding AP Title	U	Not used
Responding AE Qualifier	U	Not used
Responding AP Invocation-identifier	U	Not used
Responding AE Invocation-identifier	U	Not used
ACSE Requirements	C	Not used
Authentication-mechanism Name	U	Not used
Authentication-value	U	Not used
User Information	U	Not used
Result	M	"rejected(permanent)"
Diagnostic	U	"application context name not supported"
Responding Presentation Address	M	As derived in b) above
Presentation Context Definition Result List	C	Not used
Default Presentation context Result	C	Not used
Quality of Service	M	tbd
Presentation Requirements	U	Not used (default value)
Session Requirements	M	NOR, Duplex
Initial Synchronisation Point Serial Number	C	Not used
Initial Assignment of Tokens	C	Not used
Session-connection Identifier	U	Not used

d) invoke A-ASSOCIATE Response primitive with the Result parameter set to "rejected(permanent)", and remain in the ASSOCIATION PENDING state.

Note. The way that the application contexts supported by the responder AE are known is a local implementation matter.

D-START Response

Section 4.3.3.3.3.2.1 a) should require the CF to construct the Application Context Name
- with the value of the application context supported for the association, and
- with the value of the final arc set equal to the DS-User Version Number parameter if provided, and set to zero otherwise. This is still true, considering that the Application Context Name

A-ASSOCIATE Confirmation

A new section in 4.3.3.4.2.2 should be added.

4.3.3.4.2.2.x When an A-ASSOCIATE Confirmation primitive is validly invoked, and the Result parameter has the abstract value "accepted" and the Application context identified in the Application Context Name is not identical to the one requested the CF shall:

a) construct an A-ABORT Request primitive with the following parameter values:

A-ABORT Request parameter	**ISO Status**	**ATN Value**
Diagnostic	U	"no reason given"
User Information	U	Not used

b) invoke the A-ABORT Request primitive; and

c) remain in the same state.

6. PROPOSED CHANGES TO THE CM SARPS

Section 2.1 becomes 2.1.1 Context Management Application (CM). The specification of this ASE is not modified at all since it works completely independently from the new CMS ASE.

Section 2.1.2 contains the 8 usual SARPs chapters for the Context Management Server Application Service Element (CMS ASE). It specifies the version 1 of the CMS ASE.

7. CONCLUSION

WG3/SG2 invites WG3/SG3 to evaluate the impact of the proposed ULA modifications and, if appropriate, to raise a PDR to the CCB. The result of this analysis will impact the way WG3/SG2 is modifying CM to incorporate the "concept" functions, either as the specification of a completely new ASE or as a modification of the current ASE.

ANNEX A APPLICATION CONTEXTS FOR ATN CONTEXT MANAGEMENT

A.1 Background

This annex describes the application contexts that are available for an association in the ATN context management environment.

The support of one of these application contexts is required to guarantee successful establishment of an association for ATN context management.

A.2 Basic ATN Context Management Application Context

A.2.1 ASEs

This application context consists of the following ASEs and referential relationships:

– ACSE, and

– CM ASE.

The CM ASE provides logon, contact, update, user and provider abort services to the users of the Context Management Application Entity (CMAE). The CM ASE uses the Dialogue Service provided by the CF which, in turn, uses ACSE. The CF provides the management dialogue services to the CM ASE and uses ACSE.

The CM ASE abstract syntax in defined in ICAO Doc 9705 Edition 1, section 2.1.4.

A.2.3 Application context name

The Application Context Name of this application context shall have the following object identifier value:

{iso(1) identified-organisation(3) icao(27) atn-ac(3) basic(0)}

and the following object descriptor value:

"Basic ATN Context Management Application context".

A.3 Server ATN Context Management Application Context

A.3.1 ASEs

This application context consists of the following ASEs and referential relationships:

– ACSE, and

– CMS ASE.

The CMS ASE provides server facility query services to the users of the Context Management Application Entity (CMAE). The CMS ASEs use the Dialogue Service provided by the CF which, in turn, uses ACSE. The CF provides the management dialogue services to the CMS ASE and uses ACSE.

The CMS ASE abstract syntax in defined in ICAO Doc 9705 Edition x, section 2.x.4.

A.2.3 Application context name

The Application Context Name of this application context shall have the following object identifier value:

{iso(1) identified-organisation(3) icao(27) atn-ac(3) one(1)}

and the following object descriptor value:

"Server ATN Context Management Application context".

A.4 Rules for establishing associations

A.4.1 Application context negotiation

The initiator of the association uses one of the ATN Context Management Application context names to propose the establishment of an association for CM logon queries or CM server queries.

If the responder accepts the association and responds with the same application context name, then the association is established with the requested CM Application Context application context.

Table A-1: Authorised Application Context Name in the AARE

Application Context Name Proposed by the Initiator	**basic-CM (0)**	**server-CM (1)**
Application Context Name Supported by the Responder		
basic-CM (0) only	basic-CM (0)	association is rejected
server-CM (1) only	association is rejected	server-CM (1)
basic-CM(0) and server-CM(1)	basic-CM (0)	server-CM (1)

If the responder accept the association but respond with a application context name not defined in this Annex, then an association with a different application context is established. The association-initiator shall abort the association.

If the responder rejects the association request then no application association is established.