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An Overview of the Eurocontrol extension to the EOLIA Project

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SUMMARY

The EOLIA project has objectives to develop and evaluate a set of user-oriented ATN compliant, pre-operational ATC datalink services in the European environment to enable the improvement of Air Traffic Management, taking into account the interests of the users and the European Industry. This paper outlines some of the major aspects of the Eurocontrol extensions to the EOLIA project. This paper is provided for information.

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1. INTRODUCTION

1.1 Scope

This paper provides an overview of the project, funded by Eurocontrol, to extend the EC (European Commission) funded EOLIA (European pre-Operational dataLInk Applications) project. In doing so it also covers some of the aspects of the EC funded EOLIA project.

1.2 Overview

EOLIA is a European Commission sponsored project which has the objectives to develop and evaluate a set of user-oriented ATN compliant, pre-operational ATC datalink services in the European environment to enable the improvement of Air Traffic Management, taking into account the interests of the users and the European Industry.

Eurocontrol has funded an extension to this project which covers the following areas:

- the development of additional datalink services;
- the development of a stand-alone datalink system;
- the integration of the datalink services with other systems;
- the integration of the Upper Area Control (UAC) centre at Maastricht into the EOLIA topology.

2. PROJECT STRUCTURE

2.1 Organisation

The EOLIA project was initiated as one of the EC 4th Framework Transport Telematics projects. Following its initiation it received further funding from Eurocontrol. The EOLIA consortium which is running the project consists of the following members:

- Aérospatiale
- Airbus Industrie
- NATS
- NLR
- Sofréavia
- Thomson-CSF

EOLIA makes use of a user forum which is consulted in order to discuss the requirements for the different services which are implemented, and to prioritise them. The developed requirements are consistent with the requirements defined by the ODIAC (Operational Development of Initial Air/ground data Communications) group at Eurocontrol.

2.2 Work Structure

The work is broken down into the following work packages:

- WP1 - Project Management
- WP2 - User Forum

- WP3 - Systems engineering and prototype integration
- WP4 - Airborne development and integration
- WP5 - Ground development and integration
- WP6 - Evaluation

The project plans to deliver software and final reports to Eurocontrol by the end of 1998, including a demonstration of the services in operation.

3. RELATIONSHIP TO PROATN

The EOLIA project provides an additional layer of functionality on top of the CNS-ATM-1 air-ground applications. The EOLIA software will make use of the CM (Context Management), ADS (Automatic Dependent Surveillance), CPDLC (Controller Pilot DataLink Communications) and FIS (Flight Information Services) applications being developed as part of the ProATN (Prototype Aeronautical Telecommunications Network) project.

Figure 1 shows the structure of the systems being developed. The ProATN software will provide the functionality of CM, ADS, CPDLC and FIS as defined in the SARPs (Standards and Recommended Practices). The EOLIA service layer will add value to this functionality. A series of services will be implemented that provide functionality more closely coupled to typical operational procedures. These are overviewed in section 4.

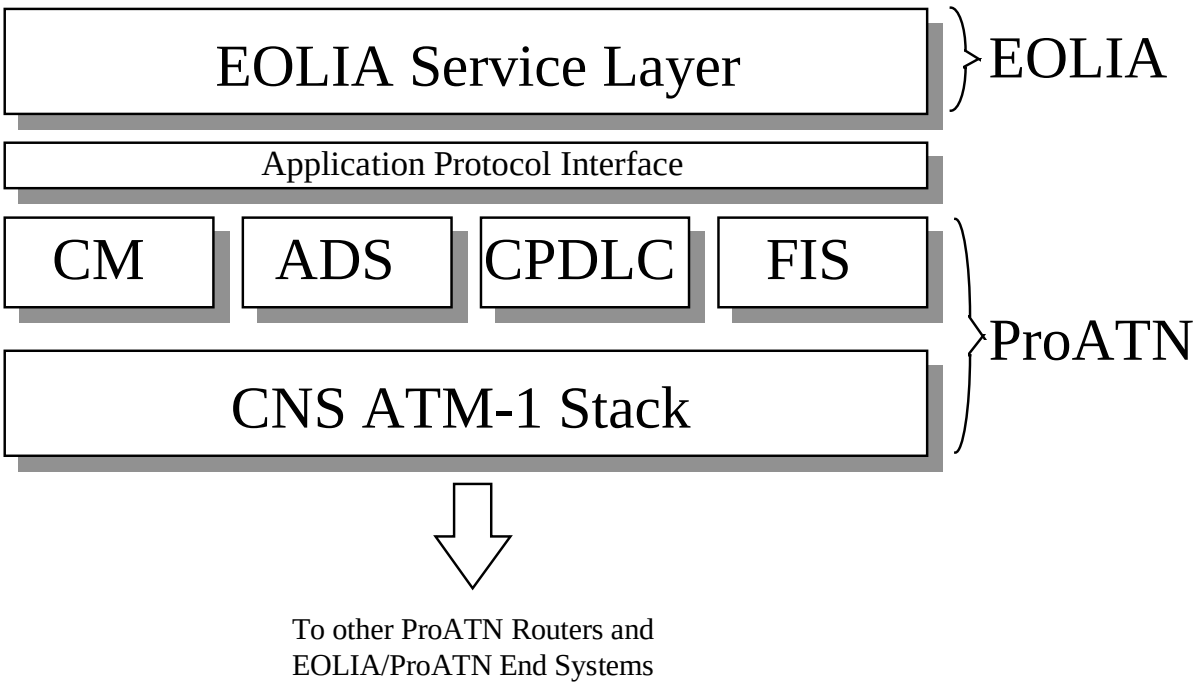

Figure 1: The structure of the EOLIA Software

4. SERVICES

4.1 Introduction

A number of services have been defined and discussed by the user forum. The initial project, funded under the EC 4th framework programme, aims at the development of six

services. The additional funding from Eurocontrol has allowed a further two services to be included in the project.

4.2 Services Sponsored by Eurocontrol

4.2.1 DSC

Downstream Clearance - This provides automated assistance to the Aircrew for requesting and obtaining clearances and information using air/ground datalink, from ATSUs which may be responsible for control of the aircraft in the future, but are not yet in control of the aircraft.

This service makes use of the downstream clearance features of CPDLC.

4.2.2 ATIS

Automatic Terminal Information Service - This supplements the existing availability of ATIS as a voice broadcast service, provided at aerodromes world-wide. All variations of ATIS currently in use are encompassed (i.e. arrival, departure and combined). Semantic contents of voice and data ATIS will be identical and updated simultaneously. The pilot will have the capability of requesting ATIS information for more than one airport, including automatic updates when the ATIS information changes.

This service makes use of the ATIS provisions of the FIS application.

4.3 Services Sponsored under 4th Framework

4.3.1 DLIC

Datalink Initiation Capability - This service provides the necessary information to enable datalink communication between ground ATC and aircraft systems. The service will typically be initiated when an aircraft is either at the gate in the pre-departure phase of flight, or when entering a new ATC sector supporting data communications.

This service makes use of the CM application.

4.3.2 ACM

ATC Communication Management - When a flight is about to be transferred from one sector to another, the aircrew is instructed to change to the voice R/T channel of the next sector or ATSU to take control of the flight. The ACM service provides automated assistance to the aircrew and current and next controllers for conducting the transfer of ATC communications. It encompasses the transfer of all controller/aircrew communications, both the R/T voice channel and the data communications channel.

This service makes use of the CPDLC application.

4.3.3 ACL

Aircraft clearances en-route - This service will enable the controller to transmit altitude, speed, heading and direct-to clearances to the flight crew. A clearance can be immediately applicable or can have conditional applicability. The service also allows the flight crew to initiate a transaction by sending altitude, heading, speed and direct-to requests to the ground system. These requests may include a triggering condition.

This service makes use of clearance messages within CPDLC.

4.3.4 DYNAV

Dynamic Route Availability - The ground system will send information about the possible improvements of route each time they become available (this can be applied also on a first datalink contact). The acceptance by the pilot or onboard system will be made known to the ground through the downlinking of the new route.

Such route improvements include:

- anticipated weekend route;
- directs available due to the state of the airspace.

The increasing use of the EATCHIP concept of the "flexible use of airspace" broadens the cases and occurrence of such improvements.

This service makes use of the CPDLC application.

4.3.5 FLIPCY

Flight Plan Consistency - On first datalink contact and on significant changes of the route on board, this service will verify the consistency of the route in the FMS (Flight Management System) with that in the ground system. In case of discrepancy, a warning indicating the incorrect section of the route will be issued to both pilot and controller.

This service makes use of the ADS and CPDLC services.

4.3.6 APR

Aircraft Position Reporting and surveillance in non-radar areas - The aircraft avionics systems automatically send the necessary information to enable the ATC system to display an air situation in a non-radar area.

This service makes use of the ADS application.

5. STAND-ALONE DATA LINK SYSTEM

The services developed in the EOLIA project will be integrated into a stand-alone datalink-only controller position, allowing the testing and evaluation of datalink services. A typical use of this system could be the installation of this position in an ATC en-route operational centre with a standalone ATC position from which it will be possible to test datalink services with EOLIA equipped aircraft.

The system will be highly modular in its construction, with a well-defined API (Application Programmer Interface) between the EOLIA services and the user interface. The user interface will be focused on datalink services only, and will allow customisation of the presentation of the data.

In order to be a fully functional controller position, a mock-up of a flight data processing system will be created so that the EOLIA service layer can get flight plan information. Again, this will be accessed through a well defined API.

The system will be implemented with the DLIC, APR, ACL, ACM and FLIPCY services. If funding permits the DYNAV service will also be implemented.

6. INTEGRATION OF DATALINK SERVICES

6.1 PEACH

An objective of the project is to integrate datalink services into an operational ATC environment. It is the aim of the Air Traffic Management Development Centre in the UK,

to develop an initial operational data link service with a user interface, upon its PEACH (Prototyping Environment for ATC HMI) platform. This will provide live datalink communication with one or more suitably equipped trial aircraft in an operational ATC environment.

This work will result in a live demonstration of the datalink services within a realistic ATC environment.

6.2 Cross Integration

The air-borne service software is being developed by Aérospatiale and NLR, and will be integrated by them into their own aircraft platforms. Thus, those services developed by Aérospatiale will be implemented on Aérospatiale's aircraft platform, and those services developed by NLR will be implemented in NLR's aircraft platform.

In order to ensure that all aircraft platforms have the same functionality, the task of porting the developed services from one platform to the other will be undertaken. This process is known as cross integration. The resulting aircraft platforms will thus have the full range of services implemented.

Cross integration of the DYNAV and FLIPCY services will be performed under Eurocontrol funding. Cross integration of APR, ACL, ACM and DLIC will be performed as part of the EC sponsored project.

7. UAC MAASTRICHT

Eurocontrol operates the UAC (Upper Area Control) centre at Maastricht in the Netherlands. One of the objectives of the project is the integration of the UAC into the EOLIA topology, and the end-to-end testing of the UAC with the EOLIA services. The scope of the end-to-end testing covers both those services funded by the EEC and those funded by Eurocontrol.

This task should result in a demonstration of the EOLIA services running between UAC and both a ground simulation of an aircraft and a flying aircraft.

8. CONCLUSIONS

By the introduction of additional funding to the EOLIA consortium, Eurocontrol has added the following major objectives to the project:

- the additional development of two major services as part of the pre-operational software suite - DSC and ATIS;
- the development and demonstration of a stand-alone, pre-operational datalink system;
- the integration of the services into an operational environment and the cross integration of two further services between aircraft platforms;
- the integration of the Maastricht UAC into the EOLIA topology and its subsequent demonstration.

The Eurocontrol funding will significantly enhance the current programmes for the implementation of data link services in Europe. This, in turn, will add weight to the impetus driving the deployment of datalink applications on a world-wide operational basis in the future.