ASTERIX Format Analysis and Monitoring Tool

Requirements Document

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Introduction

Purpose

This document details the requirements for a software tool for the analysis and monitoring of the ASTERIX data over ATC data networks. The aim in such a monitoring and analysis is to detect problems in the transmission of ASTERIX data and identify the defective data sources on the network.

The analysis and monitoring software tool will be referred to simply as the tool in this document.

Scope

This document covers all the aspects from the target platform on which the tool will run, to the definition of the functionality and performance level of the tool.

Acronym and Abbreviation Definitions

ARTAS: ATC Radar Tracker and Server. New generation multi-radar tracker developed by EUROCONTROL

ASCII: American Standard Code for Information Interchange

ASTERIX: All-purpose Structured EUROCONTROL Radar Information Exchange
Overview of the Document

Section 2 gives the general description and the context of the tool within the general framework of the surveillance tools. Section 3 details the requirements with respect to the specific domain they are concerned.

General Description

Project in Perspective with other Projects

The tool will serve to check the data integrity and validity of ASTERIX messages on a ATC data network. The types of physical interfaces and transmission protocols are detailed in Section 3.3.2. The tool is not planned to have a major operational usage. It will be used to check correctness of operation of new ASTERIX applications and to track down the data level problems that may arise in an operational environment.

Summary of Product Functions

The tool is intended for evaluation of data streams to and from operational equipment. But the evaluation is not required to be real-time. The anticipated operation mode will be recording of all network data and an off-line analysis of the recorded data to track down the problem sources. It is also foreseen that the tool can be used for the on-line monitoring of the ATC data quality.

User Characteristics

The potential users of the tool will be either a dedicated person whose main task is to analyse ATC data networks and track down any problems, or an ATC
engineering unit member who is responsible for the overall performance of the
ATC surveillance system. Therefore, the tool should support both the mainstream
analysis of the ASTERIX data with automated error reporting facilities and should
also assist an expert to analyse the ASTERIX data in finer detail by selection
filters, low-level data displays.

**General Constraints**

Not applicable.

**Assumptions and Dependencies**

Not applicable.

**Specific Requirements**

**Capability Requirements**

**System Overview**

The main functional modules of the system are depicted in Figure 1. This block
diagram is given for explanatory purposes, and it does not constitute any
restrictions on the architecture of the tool. The HMI interaction, different network
interface and protocols are not shown in the figure for simplification. The most
important functions are Filtering, Recording and Analysis of the ASTERIX
messages.

The ASTERIX data is contained in the Storage pool shown in the figure, which
might be spanning several permanent and/or removable storage media
(harddisk, tapes, CD-ROM, etc.). The Inventory keeps the parameters related to
all the sessions (recordings, simulated data), like the date of recording, storage
location, etc, easing the task of the user. The access to the ASTERIX data is
arbitrated by the inventory for consistency.
Recording and Editing Functions

[1] The tool shall allow recording and editing of the ASTERIX messages for all the ASTERIX categories. Filters can be specified for the message types to be recorded. For editing functionality, the message structure can be displayed for modification of individual fields.

[2] The ASTERIX messages shall be displayed in textual representation as hexadecimal codes and/or as ASCII text decoding on user selection.

[3] The tool shall be able to record and edit the erroneous messages.

[4] The tool shall be able to monitor the network continuously, generate statistics and allow on-line analysis. The statistics shall be made by the analysis functions of the tool as described in the following requirement.

[5] The analysis functions shall allow format checking of messages. The specific checks for the message content are:

the message syntax,
the encoding rules (including user specific rules),
the missing fields,
the validity of all fields.

[6] Functionality to record all data on the network interfaces **shall** be available in order to check framing and random bit errors excluding the lower layer errors, like protocol based, or physical interface errors.

**Data Generation and Feed Functions**

[7] The tool **shall** allow feeding of the previously recorded and/or edited ASTERIX messages.

[8] The tool **shall** be able to feed the erroneous messages.

[9] The tool **shall** be capable of updating the time-stamps during replay on user request. Therefore, it **shall** also be possible to replay without time-stamp correction. The purpose of time-stamp update is to replay previously recorded/edited data in real-time.

[10] The tool **shall** allow generation and playback of simulated data for testing the robustness of the overall system.

**Configurability Issues**

[11] The ASTERIX categories 1, 2, 8, 17, 18, 34, 48 and ARTAS specific 30, 31 **shall** be supported by the tool. The support for these categories has first priority for short term delivery if there is not a compliant tool on the market.

[12] The support for categories 0, 3, 9, 10, 32, 252 and user definable 253 **shall** be available. In the case, there is not a compliant tool available on the market, these categories are to be implemented during the later stages of development.

[13] ASTERIX allows definition of new categories according to the specific requirements of an application. Such definitions are to be given in simple ASCII text files. Therefore, the tool **shall** perceive the message structure and contents from the description files. The format and structure of these files are to be determined by the bidder. The documentation **shall** be provided on the format and structure of these files by the bidder.

[14] The tool **shall** be configurable in order to adapt to modified ASTERIX standards and new ASTERIX categories without compilation or linkage. The tool should come with clear detailed documentation and all the tools necessary to
perform the integration, in case the integration of new ASTERIX decode information requires some basic processing.

[15] Users shall be able to describe new ASTERIX categories, each category being defined in a separate file.

![Diagram of ASTERIX Tool and Category Definitions]

Figure 2 - Access to ASTERIX category definition via ASCII files

**Performance Requirements**

[16] For off-line analysis purposes, the tool shall be able to record up to 72 hours of continuous data.

[17] The time to retrieve the contents of a ASTERIX message from such a recording shall be less than 30 seconds.

**Interface Requirements**

**User Interfaces**

[18] The tool shall have an easy to use Graphical User Interface. The design of the GUI should gather the logically or functionally related parameters and operations in a common component, like the network hardware/protocol settings, recording/replay parameters. Context sensitive on-line help should be available.

[19] The statistics shall provide graphics and allow display of time-varying statistics of the data validity.

[20] The user shall be able modify the adjustable parameters for the physical network interfaces via the UI (Section 3.3.2).
The user shall be able modify the adjustable parameters for the transmission protocols via the UI (Section 3.3.2).

The management of recordings shall be performed through a GUI (Section 3.3.3).

The user interface language shall be the English language.

All the documents related to the tool shall be provided in English.

Hardware Interfaces

The software tool shall run on a portable and low-cost computer platform. The machine shall weigh less than 20 kg packed and 15 kg unpacked, which would enable easy transportation by a single person. There are no specific requirements for the operating or windowing system of the target platform.

The tool shall support the following physical interfaces:

- Ethernet interfaces 10B5, 10B2 and 10BT,
- Serial line interfaces, RS232C and X21,
- FDDI network interface.

The tool shall support the following network transmission protocols:

- UDP and TCP,
- HDLC-LAPB, HDLC-FRAME and HDLC Datagram,
- LLC1,
- TP4,
- PDC,
- X25,
- IEEE 802.3

Multiple network interfaces shall be supported for simultaneous access for recording or playback.

Software Interfaces

The recorded data shall be stored in files in raw ASTERIX or a documented format. The management of the recordings shall be made by the tool for consistency purposes.

Operational Requirements

Not applicable.
Resource Requirements

The requirements specified in this document are expected to be achieved in a prioritised manner. For example, the requirements that are corresponding to on-line monitoring, statistics generation and simulated data use are on a low priority. Also, the availability of the second list of categories specified in Section 3.4 are of low priority.

Quality Requirements

None

Design Constraints


[31] The tool shall be year 2000 compliant.