საქართველოს საჰაერო ნავიგაცია
GEORGIAN AIR NAVIGATION

# Part I

# FunctionalandTechnicalRequirements of theAutomated Management System for Air Traffic Services

**Tbilisi**
**2014**

| 1. | | **INTRODUCTION** |
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| **1.1** | | **OVERVIEW** |
| | | The requirements to the ATS Automated Management System (hereafter referred as Requirements) contain the functional and technical specifications for the ATS Automated Management System at Tbilisi ATC Centre and at KutaisiReserve ATC Centre, which will be used for operational air traffic control and technical maintenance of new system. |
| | | Additionally the Requirements define the order and procedure for staff preparation, test and acceptance of ATC Systems in Tbilisi ATC Centre and KutaisiReserve ATC Centre. |
| **1.2** | | **SCOPE** |
| | | This document is used during the preparation the tender requirements of the New Automated Management System for Air Traffic Services in Georgia. |
| **1.3** | | **ORGANIZATION OF THE DOCUMENT** |
| | | **Chapter 1** (this chapter) provides an overview of the system being procured and describes its context under the umbrella of existing strategic basics for ATS development.<br>**Chapter 2** puts the system in its operational context by providing an overview of the operational environment and the air traffic services provide by it.<br>**Chapter 3** provides an overall description of the system, its context, and the missions to which it is assigned.<br>**Chapter 4** describes the functional requirements of the system to fulfil its assigned missions.<br>**Chapter 5** provides a description of the physical aspects of the system, stating the roles performed in support of each mission, the types and quantities of equipment to be provided for each mission, and the configurability of equipment in support of multiple missions as necessary.<br>**Chapter 6** defines the requirements for system documentation to support the proper use and maintenance of the system.<br>**Chapter 7** defines the requirements to quality control and assurance and supporting procedures including the description of test stages and acceptance of system. It determinates the order of interaction with Supplier and responsibility of sides.<br>**Chapter 8** describes the requirements for training process of Customer staff. It covers the requirements for operational and technical training to enable correct use, operation and maintenance of the upgraded System. |

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| **1.4** | | **CONFORMANCE OF THE FUNCTIONAL AND TECHNICAL REQUIREMENTS FOR ATM SYSTEM WITH THE ATM STRATEGIES** |
| | | For performance of item for measuring of actual and expected air traffic capacity of ATC sectors, of ATC zones and civil aerodromes the Requirements include the specification of recording, storing and extraction of statistic data connected with flights execution. |
| | | The Requirements include the functional possibilities for SID and STAR application with P-RNAV procedures. |
| | | In frame of implementation of EUROCONTROL Flexible Use of Airspace concept the specifications of Air Space Management and civil-military coordination have been included into the Requirements. |
| | | The Requirements expect the possibility to receive and process the data from Secondary Surveillance Radars with mode S (EHS). |
| **1.4.1** | | **Local Single Sky Implementation Plan (LSSIP)** |
| | | The Local Single Sky Implementation Plan (LSSIP) constitutes the medium-term plan of Georgiafor achieving the performance targets, safety improvements and capacity profiles identified in the European Single Sky Implementation Plan (ESSIP). |
| | | The following specifications which cover the possibility to realize the tasks of the LSSIP, were included into the Requirements:<br>- «Harmonize Operational Air Traffic (OAT) and General Air Traffic (GAT) handling»;<br>- «STCA Level 2»;<br>- «MTCD and conformance monitoring»;<br>- «Area Proximity Warning (APW) – Level 2»;<br>- «Minimum Safe Altitude Warning (MSAW) - Level 2»;<br>- «Enhanced tactical flow management services»;<br>- «Implement collaborative flight planning»;<br>- «P-RNAV»;<br>- «Mode S elementary surveillance». |
| **1.4.2** | | **The Concept of reorganization of Tbilisi ACC's** |
| | | The Requirements expect the availability of the System to dynamically change the sectorisation of the AoR of ACC online, in such way it provides the quick change of the working positions configuration and adaptation of the System to changing of their number and the regulation of the number of working positions involved into ATS. |

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| | | For improvement of terminal and en-route airspace design the Requirements conclude the specifications for recording, storing and report of statistic data of performed flights. |
| | | The implementation of air space management tools specifications will provide the more effective planning of airspace use and distribution of airspace between users and control of use in accordance to valid priorities. |
| **1.5** | | **REFERENCE DOCUMENTS** |
| - | | The following documents were used for these requirements:<br>[1] – EUROCONTROL GUIDELINES FOR IMPLEMENTATION SUPPORT, Part 6 "AIR TRAFFIC DATA PROCESSING AND AIR TRAFFIC CONTROL", Chapter 1 "ATM DATA PROCESSING SYSTEM", Edition 3.0;<br>[2] – EUROCONTROL Standard for Online Data Interchange (OLDI) Edition 4.2;<br>[3] - Operational Requirements for Flight Data Processing and Distribution Core Functions (Area Control), Edition 4.1;<br>[4] - Operational Requirements for Flight Data Processing and Distribution Core Functions (Aerodrome and Approach Control), Edition 1.0;<br>[5] - Operational Requirements for EATCHIP Phase III ATM Added Functions, Volume 5: Medium Term Conflict Detection, Edition 1.4;<br>[6] - Functional Specifications for System Support to Airspace Data Distribution and Civil/Military Co-ordination, Edition 1.0.<br>[9] – Guide to ATFM Message Exchange EUROCONTROL Document Ref. TACT/USD/MSGGUID, edition 6.0, effective March 1998<br>[10] – Manual of Codes, WMO-No.306, 2012 edition<br>[11] – CAT062 - ASTERIX - System Track Data (Part 9), CAT062 - ASTERIX - Coding Rules for "Reserved Expansion Field" (Part 9, Appendix A), CAT063 - ASTERIX - SDPS Status Messages (Part 10)<br>[12] – IFPS USER MANUAL Edition 13.0<br>[13] – EUROCONTROL STANDARD DOCUMENT for ATS Data Exchange Presentation (ADEXP), Edition 2.1<br>[14] – EUROCONTROL HANDBOOK FOR AIRSPACE MANAGEMENT, Edition 2.0<br>[15] – CAP - Supplement to Part VI of ICAO Document 7754 -European Air Navigation Plan<br>[16] – CCAMS User Requirements Document Volume 2 ATS Unit Requirements<br>[17] – amendment to the document "PROCEDURES FOR AIR NAVIGATION SERVICES AIR TRAFFIC MANAGEMENT (Doc 4444)" (State letter AN 13/2.1-08/50 refers)<br>[18] –EUROCONTROL Specification for Short Term Conflict Alert (Edition 1.0 dated 22 Nov 2007)<br>[19]–EUROCONTROL Guidance Material for Minimum Safe Altitude Warning (Edition 1.0 dated 19 May 2009)<br>[20] –EUROCONTROL Guidance Material for Approach Path Monitor (Updated: Edition 1.0 dated 19 May 2009)<br>[21] –EUROCONTROL Specification for Area Proximity Warning (Updated: Edition 0.5 dated 19 May 2009) Draft |

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| | | The references to following documents were applied:<br>[7] – ICAO Doc. 4444, Rules of the Air and Air Traffic Services;<br>[8] - EUROCONTROL IFPS Interface Specification. |
| | | While preparation of the Bid the tenderer **shall** use the latest editions of the documents existingat the date when the Bids are accepted. |

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| **2.** | | **DESCRIPTION OF THE AUTOMATION OBJECTS** |
| **2.1** | | **OPERATIONAL ENVIRONMENT** |
| | | The operational environment is described in terms of the airspace designation, the traffic types and flows, and the organization of air traffic services. |
| **2.1.1** | | **Airspace** |
| ***2.1.1.1*** | | ***Current situation*** |
| **2.1.1.1.1** | | **Airspace organization** |
| | a) | Employer is the main ATS provider in Georgia. Its responsibilities include en-route and terminal air traffic control, flight information services, communications, navigation and surveillance facilities, air navigation publication.<br>The Current organization of airspace in the Georgia consists of 1 FIR (Tbilisi)<br>Controlled airspace comprises also 3 Control Zones (CTRs) at aerodromes and 3 Terminal Control Areas (TMAs).<br>Georgian airspace includes:<br>– Prohibited areas 2;<br>– Danger areas nil;<br>– Restricted areas 7;<br>– Training areas 7.<br>Employer delivers services from one Area Control Centre and 3 Control Towers.<br>The airspace of Georgia are classified in accordance with ICAO Annex 11 - Appendix 4 provisions as follows:<br>a) Class A - IFR flights are permitted and all flights are subject to air traffic control service. IFR flights are separated from other IFR.<br>b) Class C - IFR and VFR flight are permitted. All flights are subject to air traffic control service and IFR flights are separated from other IFR flights and from VFR flights. VFR flights are separated from IFR flights and receive traffic information in respect of other VFR flights.<br>c) Class G - IFR and VFR flights are permitted and flight information service provided if requested.<br>The following general criteria are applied for class A, C and G airspace:<br>a) From GND up to 2000 ft AGL (included) , excluding ATZof controlled aerodromes, CTRs, TMAs and regulated (P,R,D) areas : Class G;<br>b) From FL 85 up to FL 195 (included): Class C; |

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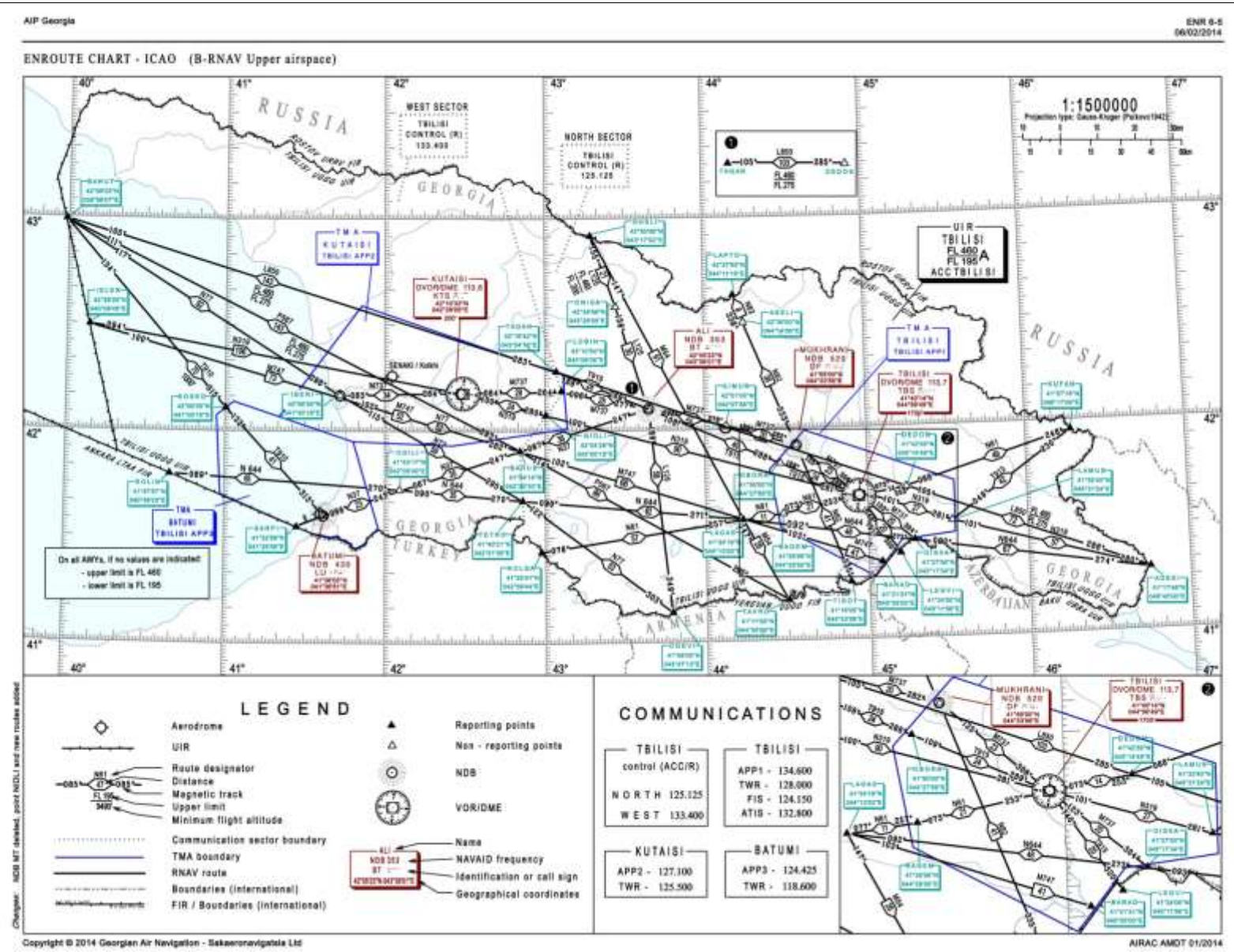
| | | c) From FL 195 (excluded) up to FL 460 (included): Class A;<br>d) Above FL 460 (excluded) on standard pressure: Class G;<br>e) ATZs of non-controlled aerodromes: Class G;<br>f) CTRs and TMAs : Class C |
| **2.1.1.1.2** | | **FIR and Area of Interest (AoI) boundaries** |
| | | TBILISI FIR/CTA/UIR/UTA |
| | | The provision of ATS in the Tbilisi FIR from the ground till FL460 is the responsibility of Tbilisi ACC.<br>Tbilisi ACC consists of only civil branch, which operate in one ops-rooms. |
| | | Tbilisi FIR lateral and vertical limits:<br>4118N 04501E – then along the state border with Armenia to 4108N 04328E – then along the state border with Turkey to – 4131N 04133E – 4136N 04117E – 4154N 04020E – 4311N 03955E – 4323N 04001E – then along the state border with Russia to – 4154N 04627E – then along the state border with Azerbaijan to – 4118N 04501E from GND to UNL. |
| | | **FIR:** FL 195/GND<br>**CTA:** FL 195/FL 85 or 2000 FT AGL<br>**UIR:** UNL/FL 195<br>**UTA:** FL 460/FL 195<br>**Class of Airspace:**<br>**G:** UNL/FL 460<br>**A:** FL 460/FL 195<br>**C:** FL 195/FL 85 or 2000 FT AGL<br>**G:** FL 85/GND or 2000 FT AGL |
| | | Airspace within the lateral limits of Tbilisi FIR between FL 290 and FL 410 inclusive is the EUR RVSM airspace where RVSM transition tasks are carried out. |
| | | Picture 2-1shows the map of Tbilisi FIR |


AIP Georgia
ENR 6-5
06/02/2014
ENROUTE CHART - ICAO (B-RNAV Upper airspace)
1:1500000
RUSSIA
GEORGIA
TURKEY
ARMENIA
AZERBAIJAN
WEST SECTOR
TBILISI
CONTROL (R)
133.400
NORTH SECTOR
TBILISI
CONTROL (R)
125.125
UIR
TBILISI
FL460
A
FL195
ACC TBILISI
TMA
KUTAISI
TBILISI APP2
TMA
BATUMI
TBILISI APP2
TMA
TBILISI
TBILISI APP2
On all AWYs, if no values are indicated:
- upper limit is FL 460
- lower limit is FL 195
LEGEND
Aerodrome
UIR
Route designator
Distance
Magnetic track
Upper limit
Minimum flight altitude
Communication sector boundary
TMA boundary
RNAV route
Boundaries (international)
FIR / Boundaries (international)
Reporting points
Non - reporting points
NDB
VOR/DME
Name
NAVAID frequency
Identification or call sign
Geographical coordinates
COMMUNICATIONS
TBILISI
control (ACC/R)
NORTH 125.125
WEST 133.400
TBILISI
APP1 - 134.600
TWR - 128.000
FIS - 124.150
ATIS - 132.800
KUTAISI
APP2 - 127.100
TWR - 125.500
BATUMI
APP3 - 124.425
TWR - 118.600
Changes: NDB MT deleted, point NIDLI and new routes added
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AIRAC AMDT 01/2014

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| *2.1.1.1.2.1* | | *Tbilisi Area of Interest* |
| | | Area of interest is the area in which the ATS Unit concerned has correlated radar data coverage and makes an about 100 miles from FIR boundary. |
| **2.1.1.1.3** | | **CTA, TMA, CTR boundaries** |
| | | Tbilisi FIR includes:<br>- Tbilisi ATC centre: 2 civil ACC sectors, 3 APP sectors, FIS sector (not covered by system) and Tbilisi TWR<br>- Kutaisi TWR<br>- Batumi TWR |
| | | The following table provides the coordinates of Tbilisi CTA, TMA and CTR sectors: |

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| **CTA TBILISI FIR Sector NORTH** | |
| 4135N 04252E – 4154N 04251E – 4211N 04306E – 4217N 04304E – 4310N 04243E – then alongthe state border with Russia to – 4154N 04627E – then along the state border with Azerbaijan to4118N 04501E – then along the state border with Armenia to 4108N 04328E – then along the stateborder with Turkey to – 4135N 04252E | FL460/GND<br>Class C |
| **CTA TBILISI FIR Sector WEST** | |
| 4135N 04252E – then along the state border with Turkey up to – 4131N 04133E – 4136N 04117E – 154N 04020E – 4311N 03955E – 4323N 04001E – then along the state border with Russia up to – 4310N 04243E – 4217N 04304E – 4211N 04306E – 4154N 04251E – 4135N 04252E | FL460/GND<br>Class C |
| **TBILISI TMA** | |
| 414430N 0453230E – 412950N 0453255E –<br>412736N 0451233E – 411727N 0450002E –<br>413150N 0442830E – 414800N 0442400E –<br>415910N 0443650E – 414430N 0453230E | Class C |
| **TBILISI TMA Sector 1** | |
| 415230N 0445430E – 414610N 0450730E –<br>414140N 0453235E – 412950N 0453255E –<br>412736N 0451233E – 411727N 0450002E –<br>412814N 0443627E – 414500N 0443640E –<br>415050N 0444530E – 415230N 0445430E | FL 115/4500 FT AMSL<br>Class C |

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| **TBILISI TMA Sector 2** | |
| 415910N 0443650E – 414430N 0453230E – 414140N 0453235E – 414610N 0450730E – 415230N 0445430E – 415050N 0444530E – 414500N 0443640E – 414946N 0442601E – 415910N 0443650E | FL 115/6000 FT AMSL<br>Class C |
| **TBILISI TMA Sector 3** | |
| 414946N 0442601E – 414500N 0443640E – 412814N 0443627E – 413150N 0442830E – 414800N 0442400E – 414946N 0442601E | FL 115/7000 FT AMSL<br>Class C |
| **TBILISI TMA Sector 4** | |
| 414500N 0443640E – 414811N 0442935E – 415549N 0444103E – 415230N 0445430E – 415050N 0444530E – 414500N 0443640E | FL 115/5000 FT AMSL<br>Class C |
| **TBILISI CTR** | |
| 415230N 0445430E – 413530N 0451400E – 412740N 0450720E – 413000N 0445740E – 414310N 0444110E – 415230N 0445430E | 4500 FT MSL/GND<br>Class C |
| **KUTAISI TMA** | |
| 421550N 0430700E – 420055N 0430815E – 415600N 0422550E – 415659N 0414755E – 420400N 0412010E – 423525N 0415110E – 421550N 0430700E | Class C |
| **KUTAISI TMA Sector 1** | |
| 421550N 0430700E – 421309N 0430714E – 421610N 0424835E – 422347N 0423643E – 421550N 0430700E | FL 115/3000 FT AMSL<br>Class C |
| **KUTAISI TMA Sector 2** | |
| 421309N 0430714E – 420609N 0430749E – 420535N 0424645E – 421610N 0424835E – 421309N 0430714E | FL 115/2500 FT AMSL<br>Class C |
| **KUTAISI TMASector 3** | |

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| 420609N 0430749E – 420055N 0430815E –<br>415600N 0422550E – 420530N 0422000E –<br>420420N 0422904E – 420535N 0424645E –<br>420609N 0430749E | FL 115/5000 FT AMSL<br>Class C |
| **KUTAISI TMA Sector 4** | |
| 415600N 0422550E – 415652N 0415301E –<br>420650N 0420230E – 420530N 0422000E –<br>415600N 0422550E | FL 115/3000 FT AMSL<br>Class C |
| **KUTAISI TMASector 5** | |
| 422347N 0423643E – 421610N 0424835E –<br>420535N 0424645E – 420420N 0422904E –<br>420530N 0422000E – 420650N 0420230E –<br>415652N 0415301E – 415659N 0414755E –<br>420400N 0412010E – 423525N 0415110E –<br>422347N 0423643E | FL 115/1500 FT AMSL<br>Class C |
| **KUTAISI CTR** | |
| Circle, radius 6 NM centred on 421036N 0422857E | 1500 FT MSL/GND<br>Class C |
| **BATUMI TMA** | |
| 420819N 0410250E – 415659N 0414755E – 413128N 0415756E – then along the state border with Turkey up to – 413100N 0413255E – 413600N 0411655E – 414151N 0405843E – 420426N 0405703E – 420819N 0410250E | Class C |
| **BATUMI TMA Sector 1** | |
| 414544N 0415223E – 413128N 0415756E –<br>Then along the state border with Turkey up to –<br>413100N 0413255E – 413240N 0414245E –<br>414544N 0415223E | FL 115/6000 FT AMSL<br>Class C |
| **BATUMI TMA Sector 2** | |
| 420819N 0410250E – 415659N 0414755E–<br>414544N 0415223E–413240N 0414245E–<br>413100N 0413255E–413600N 0411655E–<br>414151N 0405843E–420426N 0405703E– | FL 115/1500 FT AMSL<br>Class C |

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| | | 420819N 0410250E | |
| | | **BATUMI CTR** | |
| | | Circle, radius 5 NM centred on 413636N 0413559E | 1500 FT MSL/GND<br>Class C |
| **2.1.1.1.4** | | **ATS routes** | |
| | - | All ATS routes in the Georgian airspace are divided into lower routes (from FL100 till FL195) and upper routes (from FL195 till FL460). There are 4 categories of ATS routes:<br>- conventional routes<br>- RNAV routes;<br>- standard instrument departure routes (SID);<br>- standard arrival routes (STAR). | |
| **2.1.1.1.5** | | **ATS units** | |
| | - | Tbilisi FIR consists of the following ATS units:<br>- Tbilisi ACC (North, West)<br>- Tbilisi APP<br>- Batumi APP<br>- Kutaisi APP<br>- Tbilisi TWR;<br>- Kutaisi TWR;<br>- Batumi TWR | |
| ***2.1.1.2*** | | ***Future situation*** | |
| | - | According to the future concept of reorganization of Tbilisi ACCsectorizaton, two additional ACC sectors are planned to be implemented in upper airspace. | |

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| **2.1.2** | | **Air Traffic** |
| ***2.1.2.1*** | | ***General Air Traffic (GAT)*** |
| | - | *104,895flights wereperformedduring 2011 overtheTbilisi FIR fromwhich:*<br>- *Overflights - 82.19%;*<br>- *InternationalFlightswithlandingordepartingin Tbilisi FIR – 16.49%;*<br>- *Domesticflights – 1.32%.* |
| **2.1.2.1.1** | | **Main traffic directions** |
| | | The major flows are:<br>ADEKI – BANUT, ROLIN – BARAD, ROLIN - ADEKI which are East-West bound routes linking Europeand Asia. Since 2000, traffic has constantly increased over these routes.<br>GUSLI – OGEVI, GUSLI – TAVRO, TAVRO – LAPTO which are South-North bound routes linking North Europe, Russia and Middle East,<br>BANUT – UGTB, LAPTO – UGTB, ROLIN – UGTB, GUSLI – UGTB, ADEKI – UGTB, LEGVI – UGTB which are linking Tbilisi with Middle East, Turkey, Europe, Russia and Asia Since 2000, traffic has constantly increased over these routes. |
| **2.1.2.1.2** | | **Annually/Monthly/Daily traffic variations** |
| | | In 2012 overall traffic decreased by 2% in comparison to 2011. During the year minimum number of flights is in February and maximum is in August. Daily between 300 and 400 flights are operated within Tbilisi ACC with peaks about 00:00-02:00UTC and 13:00-15:00UTC. The night traffic mainly consist of transit flights, departing and arriving flights are operate during the night time. |
| **2.1.2.1.3** | | **Traffic profiles** |
| | | 80% - 85% are overflight (depending from season) all others – departing and arriving flights. Most of overflights operate between FL330 and FL400. |
| **2.1.2.1.4** | | **IFR/VFR flights** |
| | | IFR flights number nearly 95% from overall traffic, all others VFR flights. |
| **2.1.2.1.5** | | **Traffic forecast** |

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| | | In accordance with Eurocontrol medium-term forecast from 2015 till 2020, the forecast is nearly same. |
| ***2.1.2.2*** | | ***Operational Air Traffic (OAT)*** |
| **2.1.2.2.1** | | **Airspace description** |
| | | OAT flights in the Tbilisi FIR are executed in the areas of airports, training areas – management is not carried out by local ATC Units |
| **2.1.2.2.2** | | **Traffic description** |
| | | Local flights, test flights and practices (in areas for training) are carried out day time and night time as well |
| **2.1.2.2.3** | | **Traffic profiles** |
| | | Most flights are executed between GND and FL250 with a variable flying profile |
| **2.1.2.2.4** | | **Traffic forecast** |
| | | Substantial changes are not expected in the nearest future. |
| **2.2** | | **AIR TRAFFIC SERVICE** |
| | | The services are provided in accordance with the provisions contained in the following ICAO documents:<br>- Annex 2 - Rules of the Air;<br>- Annex 11 - Air Traffic Services;<br>- Doc. 4444/ATM/501/15 - PANS-ATM – Procedures for Airnavigation Services ;<br>- Doc. 8168 - PANS OPS - Aircraft Operations;<br>- Doc. 7030 - Regional Supplementary Procedures (SUPPS). |
| **2.2.1** | | **Aerodrome ATS** |
| | | Aerodrome ATS in Tbilisi CTR is provided by Tbilisi Aerodrome Control Tower. |
| | | Aerodrome ATS in KutaisiCTR is provided by Kutaisi Aerodrome Control Tower. |
| | | Aerodrome ATS in BatumiCTR is provided by Batumi Aerodrome Control Tower. |

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| | | Tbilisi, Batumi and Kutaisi Aerodrome Control Towers issue information and clearances to aircraft under their control to achieve a safe, orderly and expeditious flow of air traffic on and in the vicinity of an aerodrome with the object of preventing collision(s) between<br>a) aircrafts flying within the designated area of responsibility of the control tower, including the aerodrome traffic circuits;<br>b) aircraft operating on the manoeuvring area;<br>c) aircraft landing and taking off;<br>d) aircraft and vehicles operating on the manoeuvring area;<br>e) aircraft on the manoeuvring area and obstructions on that area. |
| | | For providing of the aerodrome control service on Tower Tbilisi working positions as follows are organized:<br>- Tbilisi TWRhas two controller positions – the executive controller (EXE) and a planner controller (PLN) |
| | | For providing of the aerodrome control service on Tower Kutaisi working positions as follows are organized:<br>- Kutaisi TWRhas two controller positions – the executive controller (EXE) and a planner controller (PLN) |
| | | For providing of the aerodrome control service on Tower Batumi working positions as follows are organized:<br>- Batumi TWRhas two controller positions – the executive controller (EXE) and a planner controller (PLN) |
| **2.2.2** | | **Approach control service** |
| | | Approach control service in TMA Tbilisi is provided as follows: After airborne to FL115 and from FL115 to altitude 4500 feet. |
| | | Outbound aircraft climb to FL110 at which level they are transferred to the appropriate ACC sector.<br>The responsibility for the control of outbound aircraft is transferred to the appropriate ACC sector before reaching the upper limit of the TMA or the SID point. |
| | | Approach control service in TMA Kutaisi is provided as follows: After airborne to FL115 and from FL115 to altitude 1500 feet. |
| | | Outbound aircraft climb to FL110 at which level they are transferred to the appropriate ACC sector.<br>The responsibility for the control of outbound aircraft is transferred to the appropriate ACC sector before reaching the upper limit of the TMA or the SID point. |
| | | Approach control service in TMA Batumi is provided as follows: After airborne to FL115 and from FL115 to altitude 1500 feet. |

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| | | Outbound aircraft climb to FL110 at which level they are transferred to the appropriate ACC sector.<br>The responsibility for the control of outbound aircraft is transferred to the appropriate ACC sector before reaching the upper limit of the TMA or the SID point. |
| | | All APP sectors have two controller positions per sector – the executive controller (EXE) and a planner controller (PLN) |
| ***2.2.2.1*** | | ***Approach Radar ATS*** |
| | | Radar data used to perform the following functions:<br>a) provide vectoring of arriving traffic on to pilot-interpreted final approach aids<br>b) provide vectoring of arriving traffic to a point from which a visual approach can be completed;<br>c) provide flight path monitoring of other pilot-interpreted approaches;<br>d) provide separation between: succeeding departing and arriving aircraft, departing aircraft and a succeeding arriving aircraft. |
| **2.2.3** | | **Area control service** |
| | | Area control service is provided by the ACC Tbilisi sectors as follows:<br>- sectors Tbilisi WEST and Tbilisi NORTH– from FL85 (or 2000FT AGL whichever is higher ) to FL460 (airspace classes C and A). |
| | | ACC sectors control the en-route flights, climbing/descending flights from/to aerodromes situated in Tbilisi Flight Information Region (Tbilisi FIR). |
| | | All ACC and APP sectors have two controllers per sector – executive and planner controllers. |
| ***2.2.3.1*** | | ***Area Radar ATS*** |
| | | Area radar service is provided by the ACC Tbilisi sectors as follows:<br>- CTA Tbilisi NORTH;<br>- CTA Tbilisi WEST; |

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| | | The information provided by ATS radar systems and presented on a situation display is used to perform the following functions in the provision of air traffic control service:<br>a) provide ATS radar services as necessary in order to improve airspace utilization, reduce delays, provide for direct routings and more optimum flight profiles, as well as to enhance safety;<br>b) provide vectoring to departing aircraft for the purpose of facilitating an expeditious and efficient departure flow and expediting climb to cruising level;<br>c) provide vectoring to aircraft for the purpose of resolving potential conflicts;<br>d) provide vectoring to arriving aircraft for the purpose of establishing an expeditious and efficient approach sequence;<br>e) provide vectoring to assist pilots in their navigation;<br>f) provide separation and maintain normal traffic flow when an aircraft experiences communication failure within the area of coverage;<br>g) maintain flight path monitoring of air traffic. |
| **2.2.4** | | **Interoperation with adjacent ATC Units** |
| | | The ACC Tbilisi has the following adjacent ATS units:<br>- ACC Rostov, Russia;<br>- ACC Baku, Azerbaijan;<br>- ACC Yerevan, Armenia;<br>- ACC Ankara, Turkey;<br>- TMA Ganja, Azerbaijan;<br>- TMA Gyumri, Armenia<br>- TMA Sochi, Russia;<br>- TMA Tbilisi, Georgia;<br>- TMA Kutaisi, Georgia;<br>- TMA Batumi, Georgia. |

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| | | Exchange of flight, coordination and control data between ACC Tbilisi and adjacent ACC Ankara, ACC Rostov, ACC Baku and ACC Yerevan are effected by means of the On-Line Data Interchange (OLDI) System ( According to LSSIP Georgia will be implemented from 2015) |
| | | Flight plan data distribution between ACC Tbilisi, TWR Kutaisi and TWR Batumi is effected by AFTN/AMHS and AMHS. |
| | | Exchange of flight plan data, estimates and control messages between ACC Tbilisi and all the other adjacent ATS units is carried out verbally by telephone. |
| | | The transferring control unit **shall** communicate to the accepting control unit the appropriate parts of the current flight plan and any control information pertinent to the transfer requested. |
| | | Where transfer of control is to be effected using radar data, the control information pertinent to the transfer **shall** include information regarding the position and, if required, the track and speed of the aircraft, as observed by radar immediately prior to the transfer. |
| | | If the receiving unit has not received a flight plan, the sending air traffic control unit **shall** verbally inform the receiving unit of whether or not the aircraft is RVSM approved. |
| **2.2.5** | | **Flight Information Service** |
| | | Flight information service is provided to all aircraft which are likely to be affected by the information and which are provided with air traffic control service or otherwise known to the relevant air traffic services units. |

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| | | Flight information service is provided by:<br>the flight information sectors – within FIR Tbilisi; and<br>ACC Tbilisi – within controlled airspace (CTA, TMA). |
| | | Flight information service **shall** include the provision of pertinent:<br>a) SIGMET and AIRMET information;<br>b) information concerning pre-eruption volcanic activity, volcanic eruptions and volcanic ash clouds;<br>c) information concerning the release into the atmosphere of radioactive materials or toxic chemicals;<br>d) information on changes in the serviceability of navigation aids;<br>e) information on changes in condition of aerodromes and associated facilities, including information on the state of the aerodrome movement areas when they are affected by snow, ice or significant depth of water;<br>f) information on unmanned free balloons;<br>g) weather conditions reported or forecast at departure, destination and alternate aerodromes;<br>h) collision hazards, to aircraft operating in airspace Classes C and G;<br>i) for flight over water areas, in so far as practicable and when requested by a pilot, any available information such as radio call sign, position, true track, speed, etc., of surface vessels in the area;<br>j) prohibition and restrictions in using of the airspace likely to affect safety when NOTAM is not issued. |
| | | The information presented on a situation display may be used to provide identified aircraft with:<br>a) information regarding any aircraft observed to be on a conflicting path with the identified aircraft and suggestions or advice regarding avoiding action;<br>b) information on the position of significant weather and, as practicable, advice to the aircraft on how best to circumnavigate any such areas of adverse weather;<br>c) information to assist the aircraft in its navigation. |
| **2.2.6** | | **Alerting service** |
| | – | Alerting service is provided:<br>– for all aircraft provided with air traffic control service;<br>– in so far as practicable, toallotheraircrafthavingfiled a flightplanorotherwiseknowntotheairtrafficservices; and<br>– toanyaircraftknownorbelievedtobethesubjectofunlawfulinterference. |

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| | | Alerting service is provided by:<br>- by all ATS units within their area of responsibilities. |
| | | ACC Tbilisi and flight information sectors serve as the central point for collecting all information relevant to a state of emergency of an aircraft operating within Tbilisi flight information region or control area and for forwarding such information to the appropriate rescue coordination centre. |
| | | When an emergency is declared by an aircraft, the ATS unit **shall** notify the appropriate rescue coordination centre and authorities as specified in local instructions by sending the messages ALR or RCF. |
| | | The ALR & RCF notification contain such of the following information:<br>a) INCERFA, ALERFA or DETRESFA, as appropriate to the phase of the emergency;<br>b) agency and person calling;<br>c) nature of the emergency;<br>d) significant information from the flight plan (type of aircraft, flight number, call sign, number people on board and others depending on circumstances);<br>e) unit which made last contact, time and means used;<br>f) time of communication and frequency used;<br>g) last position report and how determined;<br>h) colour and distinctive marks of aircraft;<br>i) dangerous goods carried as cargo;<br>j) any actions taken by reporting office. |
| | | The progress of an aircraft in emergency **shall** be monitored and (whenever possible) plotted on the situation display until the aircraft passes out of coverage of the ATS surveillance system, and position information **shall** be provided to all air traffic services units which may be able to give assistance to the aircraft. Transfer to adjacent sectors **shall** also be effected when appropriate. |
| | | If no radar control or from the moment when the target of the aircraft in emergency has vanished in radar indicator, appropriate ATS unit should be able to indicate last known position ( reported by pilot or derived from radar indicator ) . |
| **2.2.7** | | **Search and Rescue service** |
| | | Management of Search and Rescue service and coordination of performing SAR operations carry out by the Search and Rescue Services Unit. |

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| | | For providing functions related to the search and rescue the Search and Rescue Services Unit (SRSU) is informed by ATS unit about the following:<br>- type of aviation situation or accident;<br>- flight plan data (aircraft type, flight number, callsign, route of flight);<br>- aircraft position. |
| | | Information is provided from ATS Unit to the rescue coordination centre by means of telephone and by sending ALR message. |
| **2.3** | | **AUXILIARY SERVICE** |
| **2.3.1** | | **Training** |
| | | Controller training comprises schedule training and system familiarization for experienced controllers. In addition, the training environment **shall** be used to test new procedures, routes, etc. |
| | | The purpose to enable the training of controllers without affecting the operational control of air traffic , the system **shall** be capable to provide separate facilities for the Training Mission. |
| | | The Training Mission comprises the distinct tasks of Data Preparation, Training Execution and Training Evaluation. The task of Data Preparation consists of defining the environment, traffic and other data necessary for the performance of the training exercise. |
| **2.3.2** | | **Meteorological Services** |
| | | Meteorological Services for Tbilisi ACC are provided by the Meteorological Services Unit which was implemented and used by "Sakaeronavigatsia" as its integral part. |

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| | | All ACC controller working positions are equipped with SALI web-based meteorological system displays.This system is the main operational source of information and is connected to the VAISALA AWOS servers. VAISALA displays are also provaided at ACC working positions and serve as backup for SALI. |
| | | Aerodrome Tbilisi is equipped with VAISALA automated weather observation system, thus whether data are provided directly to the whether displays at all controllers working positions. |
| | | Batumi TWR controller working positions are equipped with SALI web-based meteorological system displays.This system is the main operational source of information and is connected to the VAISALA AWOS servers. VAISALA displays are also provaided at TWR working positions and serve as backup for SALI. |
| | | Aerodrome Kutaisi is equipped with TELVENT automated whether observation system and whether data are provided directly to the whether displays (main and backup) at the TWRcontroller working position. |
| | | All meteorological reports (SIGMET, TAF, AIRMET, METAR, etc.) relaited to Georgia FIR, adjaicent FIRs and other FIRs should be made available at ATC working positions. |
| **2.3.3** | | **Analysis of the recorded data** |
| | | Analysis of the recorded data is performed by the Sakaeronavigatsia Safety and Quality Management Unit. |
| | | Analysis of the recorded data is used for:<br>- incident investigation and analysis;<br>- detection of flight rules infringement;<br>- detection of phraseology infringement;<br>- analysis of the safety nets alerts (STCA, MSAW, APW); |
| | | Sakaeronavigatsia Safety and Quality Management Unit provides recorded data storing during not less than 30 days for detailed analysis purposes. |
| **2.3.4** | | **Traffic Analysis/Statistics** |
| | | With aim to analyse and publish actual traffic data for Georgian airspace the statistic data as follows are monthly submitted by ATM system to Air Navigation Charges Department:<br>- overflights through FIR (IFR/VFR);<br>- arrival flights to aerodromes within FIR (IFR/VFR);<br>- departure flights from aerodromes within FIR (IFR/VFR); |

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| | | - Domestic flights within FIR (IFR/VFR). |
| **2.3.5** | | **Route Charging Service** |
| | | The Air Navigation Charges Department is responsible for route charging service. |
| | | The main Air Navigation Charges Department tasks are:<br>- calculating the actual traffic amount for Georgian FIRs;<br>- billing service;<br>- recovery charges. |
| **2.4** | | **FLEXIBLE USE OF AIRSPACE** |
| **2.4.1** | | **Air Space Management (ASM)** |
| | | Airspace management logically comprises three levels as follows:<br>- Strategic level - the high level definition and review of the national airspace policy;<br>- Pre-Tactical level - the day-to-day allocation of airspace and the communication of airspace allocation to parties involved;<br>- Tactical level - the dynamic activation, de-activation or real-time re-allocation of airspace to resolve specific airspace problems. |
| | | System support to Airspace Management is defined at the pre-tactical and tactical level. Thus the specification contained herein describes the system support at the pre-tactical level and tactical level. |
| | | The system support required for pre-tactical airspace management addresses the processing of Airspace Use Plans (AUPs) and Airspace Use Plan Updates (UUPs). |
| | | AUPs are sent daily at a pre-defined time from "AS CENTER" system of the national Airspace Management Body. |
| | | From a civil ATM point of view, UUPs contain only improvements to the airspace situation described in the corresponding AUPs. |
| | | Conditional Route Availability Messages (CRAMs) lay down beyond interest of system users thus will not process. |
| **2.4.2** | | **Civil-Military coordination** |
| | | The system support required for civil-military co-ordination addresses the following functions:<br>- a flight data exchange function;<br>- an airspace crossing function. |

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| | | Whereas the same flight database is available for civil and military sectors the flight data exchange function is not used for civil-military co-ordination. |
| | | The airspace crossing function consists of a message exchange triggered by the controller. |
| | | The controller has the option either to notify the military unit that a flight under his control is intending to cross the airspace controlled by military unit, or to request the permission to cross that airspace. |
| | | The message exchange mechanism is similar to the ones used for On-Line Data Interchange (OLDI) messages. |

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| **3** | | **System Description** |
| | | This chapter provides an overall description of the system, defining the missions in which the system is to serve.<br>Two distinct missions are identified; the primary mission is that of support to air traffic control (ATC) and air traffic management (ATM); a secondary mission is a technical mission of analysis and system maintenance. These missions are termed "Operational" and "Analysis and Maintenance" respectively. |
| **3.1** | | **OPERATIONAL MISSION** |
| **3.1.1** | | **Purpose** |
| | | The purpose of the system in the operational mission is to provide assistance to operational personal in their task of controlling air traffic. |
| | | The following functions are performed by the system:<br>- collation and fusion of surveillance data for presentation to controllers of the current traffic situation;<br>- collation and distribution of flight data, including interchange of data with adjacent ATS units for silent coordination of flights;<br>- warning and alerting functions (termed "ATC Tools");<br>- maintenance of environment information (aeronautical and meteorological);<br>- data recording and archiving for replay and statistical analysis. |
| **3.1.2** | | **External systems** |
| ***3.1.2.1*** | | ***The Integrated Initial Flight Plan Processing System (IFPS)*** |
| | | Georgia is the EUROCONTROL member. The IFPS is one component of the Flight Data Operations division of the EUROCONTROL Network Management (NM). There are two IFPS units, located in Bretigny-sur-Orge, Paris and in Haren, Brussels. The division of responsibility between the two units is relatively dynamic, and is transparent to the user.<br>Since the IFPS became operational, flight operators address their flight plans and repetitive flight plans to the two IFPS Units for the GAT IFR portion of the flight conducted in the Network Management (NM) participating states. The IFPS distributes flight plans and subsequent messages to individual addresses on the route of flight after having checked the message for errors.<br>The IFPS also outputs flight plans corresponding to a repetitive flight plan on its day of operation. This obviates the need for individual ATS units, which are connected to the IFPS to maintain an RPL file and perform the activation themselves. For units, which are outside of the IFPS area there is still a need to maintain the RPL file and perform the activation.<br>It is possible that, during a flight, a change is made to the flight plan, previously not processed by the IFPS, that makes it now of interest to the |

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| | | IFPS (i.e. change from VFR to IFR or OAT to GAT). In these cases, the updated flight plan is notified to the IFPS.<br>Flight message output from the IFPS to ATS Units is currently performed in two formats: ICAO format messages on the AFTN/AMHSand ADEXP format. Both formats will be available.<br>The interface with the IFPS is described in the EUROCONTROL IFPS Interface Specification (reference [8]). |
| ***3.1.2.2*** | | ***EUROCONTROL Traffic Flow Management System (ETFMS)*** |
| | | The ETFMS is the main system of the Central Executive Unit of the Network Management (NM) , calculating traffic forecasts and allocating take-off slots as necessary.<br>The ETFMS system uses flight plans from the IFPS in conjunction with strategic flight planning information (STRAT system) and an ATS Environment Database (ENV system) in the calculation of traffic forecasts for use in the preparation of an ATFM pre-tactical plan. The Pre-Tactical Plan contains temporary adjustments to the routing schemes, details of the opening of special routes, and rerouting of specific flights, in order to help resolve forecast capacity problems.<br>The Pre-Tactical Plan is issued a day before the day of operation as an ATFM Notification Message (ANM) for mandatory procedures, and/or an ATFM Information Message (AIM) for advisory procedures. Note, the pre-tactical plan is issued to Network Management (NM) terminal users and, as such, is not processed by the data processing system.<br>The Computer-Assisted Slot Allocation (CASA) process determines a Calculated Take-Off Time (CTOT) for each flight departing within the Network Management (NM) participation area and entering a region in which flow control measures are in force. The CTOT is calculated according to the order in which the flights were estimated to enter the regulated region and is transmitted to the Aircraft Operator and the departure control tower.<br>In order to provide the ETFMS system with optimum flight data for the purpose of load calculation, a notification of "First System Activation" (FSA) is sent upon activation of a flight in the first participating state in the form of an ACT or DEP message.<br>The protocol for data exchange with the ETFMS is described in the EUROCONTROL Guide to ATFM Message Exchange (reference [9]). |
| ***3.1.2.3*** | | ***Aircraft Operator/ARO*** |
| | | Georgia is a Network Management (NM) participating state and, as such, the reception of flight plans on AFTN/AMHS directly from the aircraft operator and ARO will be normally limited to automatic processing of OAT and VFR flight plans only. All other flight plans **shall** be subject to manual processing.<br>The messages are defined in ICAO Doc. 4444, Rules of the Air and Air Traffic Services (reference [7]). |
| ***3.1.2.4*** | | ***Air Defence Unit*** |
| | | The system **shall** provide the surveillance data to Air Defence units as ASTERIX Category 062/063 messages. |

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| | | Flight messages are sent to the Air Defence unit as INF messages on respective events. |
| ***3.1.2.5*** | | ***AIS System*** |
| | | AIS is responsible for publication of Georgia AIP (including the information for Tbilisi FIR). |
| ***3.1.2.6*** | | ***Surveillance Sensors*** |
| | | The Surveillance sensors comprise Primary Surveillance Radar (PSR) and Secondary Surveillance Radar (SSR), . The location and types of connected and anticipated sensors are listed in the Table 3.1.2-1. |

Table 3.1.2-1.

| Site | Equipment Type | Transmission Format |
|---|---|---|
| Current radar head | Primary/secondary Tbilisi Airport MODE S | CAT1,2,8,34,48 |
| Current radar head | Secondary MODE S 1100m point | CAT1,2,34,48 |
| Current radar head | Secondary MODE S Poti | CAT1,2,34,48 |
| Current radar head | Secondary MODE S Senaki | CAT1,2,34,48 |
| Future radar head 1 | Meteo radar | CAT8 |
| Future radar head 2 | Secondary MODE S | CAT1,2,34,48 |
| ADS-B ES1090 ground station 1 | Kutaisi | Full support of CAT20, 21, 23, 147 |
| ADS-B ES1090 ground station 2 | Poti | Full support of CAT20, 21,23, 147 |
| Future ADS-B ground station 3 | Tbilisi | Full support of CAT21, 23, 147 |
| Future RADAR/MLAT/ADS-B station 1 | | Full support of CAT1,2,34,48, 19, 20, 21, 23, 147 |

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| | | | Future RADAR/MLAT/ADS-B station 2 | | Full support of CAT1,2,34,48, 19, 20, 21, 23, 147 |
| | | | Future RADAR/MLAT/ADS-B station 3 | | Full support of CAT1,2,34,48, 19, 20, 21, 23, 147 |
| | | | Future RADAR/MLAT/ADS-B station 4 | | Full support of CAT1,2,34,48, 19, 20, 21, 23, 147 |
| ***3.1.2.7*** | | ***World Area Forecast Centre (WAFC) data*** | | | |
| | | The WAFC serving the European region located in Bracknell, UK, supplies upper wind and temperature forecasts to the ATM system from the SADIS FTP server. | | | |
| ***3.1.2.8*** | | ***Aerodrome Meteorological Office*** | | | |
| | | Meteorological offices located in domestic aerodromes deliver meteorological information to the ATM system providing auxiliary information to the system users. This information is transported in METAR, SPECI (if the particular aerodrome issues METARs only hourly), SIGMET/AIRMET, GAMET and TAF messages by the AFTN/AMHS. | | | |
| ***3.1.2.9*** | | ***Voice Communication System*** | | | |
| | | The Voice Communication System is not the object of these Requirements. | | | |
| ***3.1.2.10*** | | ***Adjacent and Subjacent ATS Units*** | | | |
| | | Adjacent and subjacent ATS Units communicate with the system for the purpose of performing silent flight co-ordination.<br>The message protocol to be used to support flight co-ordination is that defined by the EUROCONTROL Standard for Online Data Interchange (OLDI) (reference [2]).<br>Within this standard, three phases of transfer are defined: the Notification Phase, Coordination Phase, and the Transfer Phase. The Coordination Phase may be conducted using either a Basic Procedure (one-way transmission of flight details) or a Dialogue Procedure, in which coordination conditions may be negotiated. In addition, messages are categorized as either Mandatory or Complementary, independently for transmission and reception. | | | |

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| | | Messages for the Notification and Coordination Phases are defined in both ICAO and ADEXP formats, described in references [2, 15]. Messages for the Transfer Phase are defined only in ADEXP format. The type of used protocol will be defined for each direction of coordination on base of LoA with adjacent ATS unit.<br>For the broadcast of the system track picture to subjacent units, the ASTERIX format (Category 062/063) is used, as specified in the EUROCONTROL Proposed Standard for Radar Data Exchange (reference [11]). |
| ***3.1.2.11*** | | ***"GCAA ATD" System*** |
| | | GCAA ATD provides the tasks of collection, processing of airspace user requests and planning of Georgian airspace use. The result of system operation is AUP for next day, which is destributed to users and ATS units. The changes and amendments to AUP are sent on operation day to users as UUP (upgraded use plan). The AUP and UUPs are transmitted to ATC Centres by AFTN/AMHS in ADEXP format. |
| | | The ATC systems provide the processing of Airspace Use Plans (AUPs) and Airspace Use Plan Updates (UUPs) for pre-tactical airspace management procedures. |
| ***3.1.2.12*** | | ***Route Charging System*** |
| | | Air Navigation Charges Data System is implemented to support route charging service that is provided by Air Navigation Charges Department. |
| | - | The basic Air Navigation Charges Data System functions are:<br>- collecting, processing and analyses planned and actual traffic data;<br>- preparing and submitting data to Central Route Charging Office (CRCO EUROCONTROL);<br>- processing COR and CLA requests from CRCO EUROCONTROL;<br>- analyses and publishing of statistic traffic data for GeorgianFIRs. |
| | | The Air Navigation Charges Data System receives data for actual passing Tbilisi FIR boundary, landing and departure from ATM system via INF messages on the AFTN/AMHS. |
| | | INF messages are correlated with flight plan information in Air Navigation Charges Data System by means of aircraft identification (ARCID), aerodrome of departure (ADEP), destination aerodrome (ADES) and EOBT/EOBD data. |
| | | Identification the type of aircraft provided by means of aircraft registration number. |
| | | It is expected that Air Navigation Charges Data System will be upgraded to use IFPS identification number (IFPLID) for correlation purposes and 24-bit aircraft address for type identification. |
| | | Information for mixed flights (IFR/VFR) with indication of change point are stored and submitted by ATM system to Air Navigation Charges |

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| | | Data System to support billing service. |
| | | Additionally, emergency information is provided by ATM system for Air Navigation Charges Data System via ALR messages. |
| ***3.1.2.13*** | | ***Centralised SSR Code Assignment And Management System (CCAMS)*** |
| | | The Centralised SSR Code Assignment and Management System (CCAMS) will be a system that receives flight plan data for all IFR/GAT flights that are about to enter the CCAMS Area |
| | | The exchange of information between CCAMS and ATS Units will be done using dedicated messages (SSR Code Management Messages) in ADEXP format that will be sent via the PENS network. |
| | | CCAMS will assign an SSR Code to the flights; either automatically or on request from an ATS Unit. CCAMS will send this SSR Code to all the ATS Units concerned. |
| | | The system will receive the CCAMS Code from CCAMS and will be responsible for assigning the CCAMS Code to the flight. This will be applicable for all IFR/GAT flights (i.e. for all flights for which the flight plan has been received from IFPS). |
| | | Normally ATS units will receive the CCAMS Code automatically from CCAMS a parameter time before the code is required (based upon flight plan data). |
| | | However, for ATS Units at the boundary of the CCAMS area it may be required to retain the SSR Code of the flight (e.g. due to ORCAM rules). In such cases, the ATS unit will send a request for SSR Code to CCAMS, including the SSR code to be retained. |
| | | Each ATS Unit will have a pool of Local Codes (i.e. non-CCAMS Codes) for assignment to all other flights i.e. for which no flight plan has been received from IFPS. |
| | | In case, for whatever reason, a CCAMS code was not available for an IFR/GAT flight, the ATS Unit is expected to assign an SSR code from its pool of Local Codes. |
| | | The ATS Unit may have to assign a Local Code to a flight for example in case of CCAMS failure or of failure of the link between CCAMS and the ATS Unit. |
| ***3.1.2.14*** | | ***Contingency Mission*** |
| | | According to contingency concept Kutaisi Reserve ATC Centre operates independently from Tbilisi ATC Centre. |
| | | Tbilisi ATC Centre and Kutaisi Reserve ATC Centre operate with identical Automated Management Systems. |
| **3.1.3** | | **Operator Roles** |

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| | | The system supports operators performing the following services:<br>• Area and Approach Control Service;<br>• Aerodrome Control Service;<br>Operator roles are described below for each service provided. |
| ***3.1.3.1*** | | ***Area and Approach Control*** |
| **3.1.3.1.1** | | **Area and Approach Supervisor** |
| | | The Supervisor is responsible for:<br>• activation and deactivation of Special Procedures within the area of his responsibility;<br>• providing, when necessary, the appropriate restrictions for air traffic operations because of equipment failures within his area of responsibility;<br>• providing, when necessary, the Flow Management Position (FMP) with the request for Air Traffic Restrictions;<br>• delegating responsibilities as necessary to the Senior Controller, when they themselves are not available;<br>• establishingin conjunction with the Tower Controller the active runway(s)-in-use and informing the relevant en-route control and flight information sectors.<br>• managing the planning of all activities in FIR airspace;<br>• coordinating with the airspace users;<br>• providing, when necessary, the appropriate restrictions for air traffic operations because of some users activities in airspace;<br>• providing shift management; |
| **3.1.3.1.2** | | **Area Controllers** |
| | | Area control is provided by Executive Controllers (EXE), supported by Planning Controllers (PLN). |
| *3.1.3.1.2.1* | | *Executive Controller, General Air Traffic (EXE)* |
| | | The EXE has executive authority, and responsibility, for the Air Traffic Management within the airspace/sector delegated to him. The EXE is responsible for fulfilling the following specific tasks:<br>• monitoring the sector frequency(s), and performing all R/T communication;<br>• identification of aircraft which are not identified when entering his airspace/sector; |

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| | | • identification and acceptance of aircraft being transferred from adjacent sectors;<br>• applying manual correlation to an identified flight and its system flight plan when necessary due to loss of correlation or failure of automatic correlation;<br>• clearance of aircraft within his sector in accordance with the overall plan, and the co-ordination agreements, established by the Planning Controller (PLN);<br>• monitoring of aircraft within his sector to ensure that they do not deviate from the clearance;<br>• providing radar separation between all IFR flights within the sector;<br>• co-ordination, when required, with other controllers who are authorized to perform air traffic control within the same airspace;<br>• initiation of transfer of aircraft leaving the sector for the next adjacent sector;<br>• maintaining an awareness of pertinent weather information which might influence the conduct of flights within the sector.<br>In undertaking these tasks, the EXE also performs the following:<br>• ensures that the display set-up provides adequate coverage of the sector, and that the selected display complies with a 'Minimum Required Data' defined to support the duties of an EXE;<br>• maintains an awareness of significant system downgrades which affect the actual radar range, operational coverage and system behaviour;<br>• routine checks of the accuracy of the displayed label information on all flights for which he is responsible, particularly when establishing initial contact;<br>• ensures that all radar tracks, in respect of known traffic, within the sector, are correctly correlated;<br>• keeps the Supervisor informed of any irregularities, e.g. air mission, loss of separation, breach of regulations, etc., and where appropriate, submits a report;<br>• delegates tasks, when appropriate, to the PLN to ensure an even distribution of the workload within the sector. |
| *3.1.3.1.2.2* | | *Planning Controller (*PLN*)* |
| | ◊ | The PLN will be responsible for fulfilling the following specific tasks:<br>• the initial prediction of potential traffic conflicts within the sector;<br>• making an assessment of potential conflicts before the traffic enters the sector, and the appropriate acceptance, or amendment of the traffic's entry configuration;<br>• modifying established planning clearances and/or co-ordination exceptionally, and only when circumstances require immediate action;<br>• effecting co-ordination according to laid down (local) criteria, with adjacent/subjacent sectors or units;<br>• ensuring that appropriate the ATM system is kept updated with regard to control instructions within the sector; |

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| | | • applying manual correlation to an identified flight and its system flight plan when necessary due to loss of correlation or failure of automatic correlation;<br>• assistance to the EXE as required;<br>• keeping the Supervisor informed of any:<br>◊ malfunctions of equipment or facilities;<br>◊ potential traffic overloads of the airspace/sector;<br>◊ circumstances occurring in which any aircraft might be endangered, e.g. emergency, hi-jack, etc. |
| ***3.1.3.2*** | | ***Flight Information Service*** |
| | | The Flight Information staff has the responsibility of providing a Flight Information Service to aircraft operating in ICAO Class G airspace in Georgia and who have specifically requested such a service. The Flight Information Sectors will not covered by this system. |
| ***3.1.3.3*** | | ***Alerting Service*** |
| | | When no report from an aircraft has been received within a reasonable period of time (which may be a specified interval prescribed on the basis of regional air navigation agreements) after a scheduled or expected reporting time, the ATS unit **shall**, within the stipulated period of thirty minutes, endeavour to obtain such report in order to be in a position to apply the provisions relevant to the "Uncertainty Phase" should circumstances warrant such application.<br>When alerting service is required and the position of the aircraft is in doubt, responsibility for coordinating such service **shall** rest with the ATS unit:<br>a) within which the aircraft was flying at the time of last air-ground radio contact;<br>b) that the aircraft was about to enter when last air-ground contact was established at or close to the boundary of two FIRs or control areas;<br>c) within which the aircraft's intermediate stop or final destination point is located:<br>- if the aircraft was not equipped with suitable two-way radio communication equipment; or<br>- was not under obligation to transmit position reports.<br><br>The unit responsible for alerting service **shall**:<br>a) notify units providing alerting service in other affected FIRs or control areas of the emergency phase or phases, in addition to notifying the rescue coordination centre associated with it;<br>b) request those units to assist in the search for any useful information pertaining to the aircraft presumed to be in an emergency, by all |

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| | | appropriate means and especially those indicated in 5.3 of Annex 11 (Use of communication facilities);<br>c) collect the information gathered during each phase of the emergency and, after verifying it as necessary, transmit it to the rescue coordination centre;<br>d) announce the termination of the state of emergency as circumstances dictate.<br><br>In obtaining the necessary information as required under 5.2.2.1 of Annex 11, attention **shall** particularly be given to informing the relevant rescue coordination centre of the distress frequencies available to survivors, as listed in Item 19 of the flight plan but not normally transmitted. |
| ***3.1.3.4*** | | ***Aerodrome Control Service*** |
| **3.1.3.4.1** | | **Aerodrome Controller** |
| | | Aerodrome Control Unit has executive authority and responsibility for the Air Traffic Management on the runways and within the manoeuvring area of the aerodrome and the airspace in the vicinity of the aerodrome, including that which may be delegated from Approach Control.<br>Aerodrome Control Unit is Represented by:<br>• Tower Control; |
| | | The Tower control position is responsible for performing the following tasks:<br>• ensuring that pilots have received up-to-date and accurate departure information (usually from Automatic Terminal Information System – ATIS);<br>• verification and modification of the current FPL;<br>• obtaining flight data from the IFPS when no already available;<br>• handling slot and flight plan messages received (e.g. via AFTN/AMHS);<br>• issuing Standard ATC clearances;<br>• passing allocated SSR codes to the pilot;<br>• issuing essential aerodrome information and information on navaid and departure aid serviceability;<br>• coordinating with other controllers or agencies (e.g. airport authority) as required in local instructions. |
| | | • issuing clearance for aircraft to pushback and/or start-up; |

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| | | • issuing taxi instructions to aircraft on the Manoeuvring Area. (including Runways)<br>• issuing clearances to vehicles to tow aircraft within the Manoeuvring Area<br>• issuing clearances to vehicles to operate on the Manoeuvring Area<br>• maintaining full awareness of all vehicles operating on the manoeuvring area ;<br>• operating relevant visual signalling equipment for the control of non-radio aircraft and vehicles operating on the manoeuvring area,;<br>• alerting the aerodrome (and designated outside) emergency services in the event of an aircraft incident in the vicinity of aerodrome;<br>• controllingrelevant aerodrome lighting system,; |
| | | • issuing takeoff, landing clearances to aircrafts;<br>• providing information to VFR aircraft in order for pilots to provide adequate wake vortex separation;<br>• coordinating all actions associated with the maintenance of runways and taxiway areas (e.g. snow removal, repairs, birds, etc.). |
| ***3.1.3.5*** | | ***Flight Data Operator (FDO)*** |
| | | The FDO is responsible for the ensuring that flight data, aeronautical data within ATM system remains current and complete. In particular, this consists of the following tasks:<br>• correcting of corrupted (or invalid) messages (AFTN/AMHS, OLDI) and re-entry into the system as necessary;<br>• obtaining flight data from the IFPS when not available within the system;<br>• entry of aeronautical data into the system if it can not be automatically processed;<br>• assignment of SSR codes to flights when not performed automatically;<br>• perform SFPL activation in case OLDI connection is not provided.<br>• monitor air traffic flow prediction. |
| ***3.1.3.6*** | | ***Technical Supervisor, Monitoring and Control*** |
| | | The Technical Supervisor is responsible for the overall maintenance of the operational system. For this purpose, he will receive status information of all components of the system and depending on the technical situation he will determine in close collaboration with the Operational Supervisor the more suitable system configuration and the various maintenance actions to be undertaken by the technical staff. |
| | | The CNS/ATM Support functional block represents the operational and technical management of the system. Three CNS/ATM Support functions are identified within the Operational Mission as follows: |

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| | | · Operational Monitoring and Control - the operational management of the system and the operational tasks;<br>· Technical Monitoring and Control - the technical management of the system; |
| | | The purpose of the operational monitoring and control and technical monitoring and control capability is to permit automatic and manual configuration of system components according to operational or technical need, and to provide system status information to users.<br>The capability comprises a function to monitor the status of system components, and a function to control the configuration of the system. Also described is the synchronization of the system time with that received from an external time system. |
| **3.2** | | **ANALYSIS AND MAINTENANCE MISSION** |
| | | The purpose of the Analysis and Maintenance mission is to perform analyses of operational or system events, and technical maintenance, whilst not affecting the operational control of air traffic and to perform system adaptations in order to support its features up-to- date. .<br>Analysis and Maintenance carried-out in accordance with technical documentation and supplier's recommendation. |
| **3.2.1** | | **Goal** |
| | | The purpose of the Analysis and Maintenance mission is to perform analyses of operational or system events, and technical maintenance, whilst not affecting the operational control of air traffic. |
| **3.2.2** | | **Analysis and Maintenance Context** |
| ***3.2.2.1*** | | ***Billing System*** |
| | | The Billing System is a part of Air Navigation Charges Data System that is used by Air Navigation Charges Department. |
| ***3.2.2.2*** | | ***Analysisof the recorded data*** |
| | | Replay of the recorded data is performed on the basis of documented in operational mission information (video and audio) concerning air traffic. |
| | | As result of analyses the appropriate reports and/or information papers may be produced. |
| ***3.2.2.3*** | | ***Traffic Analysis*** |
| | | Traffic analysis is performed on the basis of recorded data, in order to evaluate major traffic flows, trends, etc. |

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| ***3.2.2.4*** | | ***Operational Maintenance and Support*** |
| | | Operational maintenance and support concerns the tuning and adaptation of the system according to updated procedures, functions or to better respond to the needs of the users. The effects of the tuning or adaptation are assessed by testing the modified system prior to any modification of the operational mission. |
| ***3.2.2.5*** | | ***Technical maintenance*** |
| | | Technical maintenance covers the tasks performed to ensure the technical operation of the system. |
| | | The Technical maintenance concludes the following:<br>The planning, taking into account and reporting of the maintenance actions;<br>The technical service of System equipment;<br>The maintenance of System SW;<br>The repairing and adjustment of the System equipment;<br>The upgrading and modernization of the System;<br>Flight checking;<br>The stafftraining and access to the operation for System maintenance. |
| ***3.2.2.6*** | | ***Training data preparation*** |
| | | ItisnotapplicableincurrentSystem.<br>The System will only provide the possibility to store the flight data selected by different filters on media for using it in training exercise. |

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| **4** | | **FUNCTIONAL REQUIREMENTSFOR THE SYSTEM TO BE PURCHASED** |
| **4.1** | | **OPERATING MISSION FUNCTIONALITY** |
| **4.1.1** | | **Surveillance Data Processing** |
| ***4.1.1.1*** | | ***General Requirements*** |
| | | As a minimum, the SDPS **shall** include the following units:<br>• Surveillance Multi-Radar Tracker (SMRT)<br>• Surveillance Front End (SFE)<br>• External system track interfaces, including ARTAS<br>• Sensor Bypass Facility (SBF)<br>The various functions listed and described in this chapter **shall** be performed by duplicated systems or be distributed in a number of units communicating and interworking through the ATC System interconnecting medium.<br>The SDPS **shall** work in two modes of operation:<br>• SMRT<br>• Surveillance Fallback System (SFS), i.e. ARTAS<br>The SFS **shall** include a Multi Sensor Tracking (MRT) function and serve as fallback in the SMRT mode.<br>The Bidder may include its own fallback tracker in addition to ARTAS system. **The ARTAS system delivery is out of skope of this tender**. The Bidder **shall** provide an interface and integrate ARTAS data into the ATC system.<br>The system **shall** make all necessary provisions (i.e. format conversions in front end processing, etc.) to ensure that SMRT and the SFS receive all surveillance data from all current and future surveillance data sources in the correct protocols and formats.<br>In SMRT mode, the SFS **shall** always be operative but the output data flow **shall** be disabled.<br>In SFS mode, the MRT **shall** be the main tracking system. The SMRT output data flow **shall** be disabled.<br>Switchover between SMRT and SFS mode **shall** be seamless without any loss of surveillance data, which requires an alignment |

between SMRT and SFS.

In addition to the two main modes of operation, the SDPS **shall** be equipped with the Sensor Bypass Facility (SBF) to deliverdirectly the sensor data to the all CWPs.

Redundancy is not required for the Sensor Bypass Facilities (SBF)

The SDPS **shall** perform the weather data processing in both modes of operation (SMRT and SFS).

The SDPS **shall** be capable of processing Mode-S reports, ADS-B and MLAT reports.

The SDPS **should** have separate input line from both semi-modules of each surveillance sensor.

*4.1.1.1.1* *Environment Definition*

The SDPS **shall** have the capacity to receive and process surveillance and weather datafrom the following sources (with the corresponding formats):

**Table I: Data Sources to feed the SDPS**

| Site | Equipment Type | Transmission Format |
|---|---|---|
| Current radar head | Primary/secondary Tbilisi Airport (MODE S) | CAT1,2,8,34,48 |
| Current radar head | Secondary (MODE S) 1100m point | CAT1,2,34,48 |
| Current radar head | Secondary (MODE S) Poti | CAT1,2,34,48 |
| Current radar head | Secondary (MODE S) Senaki | CAT1,2,34,48 |
| Future radar head 1 | Meteo radar | CAT8 |
| Future radar head 2 | | |
| Future radar head 3 | | |
| Future radar head 4 | | |
| Future ADS-B ground station 1 | Kutaisi | Full support of CAT: 21, 23, 147 |

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| Future ADS-B ground station 2 | Poti | Full support of CAT: 21, 23, 147 |
| Future ADS-B ground station 3 | Tbilisi | Full support of CAT: 21, 23, 147 |
| Future MLAT station 1 | | |
| Future MLAT station 2 | | |
| Future MLAT station 3 | | |
| Future MLAT station 4 | | |

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| *4.1.1.1.2* | | Data Classes |
| | | **Input Data**<br>The following classes of input data are identified and **shall** be received or generated and processed by the SDPS:<br>• Surveillance Data (Primary plots, SSR plots, Mode-S plots and combined PSR/SSR plots, ADS-B reports, MLAT reports)<br>• Mono-sensor tracks<br>• System tracks<br>• Weather Data<br>• Status Data<br>**Output Data**<br>The following classes of output data are identified and **shall** be sent by the SDPS to external systems/users/clients: |

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| | | • Data to ODS<br>• Data to the TMCS;<br>• Data to ETFMS ( correlated position reports ASTERIX cat 62/63) in SMRT and SFS mode of operation; update rate to be defined;<br>• Data to military sites for co-ordination purposes in SMRT and SFS mode of operation;<br>• Data to the external users (ASTERIX 62/63/65) directly from SMRT update rate 4-5 seconds in SMRT mode of operation;<br>• System Data;<br>• Data for recording;<br>• Alert messages;<br>The surveillance data towards ETFMS **shall** be sent in a form of correlated position reports (ASTERIX cat.62/63).<br>The data to ETFMS **shall** be dispatched in both mode of operation (SMRT and SFS)<br>The surveillance data to the external users **shall** be sent in either mode of operation.<br>These surveillance data **shall** be sent to the external users with the SMRT internal update rate (4-5 seconds) in ASTERIX cat.62/63 or/and cat.30 format. |
| *4.1.1.2.1.2* | | *Processing Area* |
| | | The processing area for surveillance data **shall** be a square of side at leasat 1024 NM, centred at ACC. This area covers the ANSP FIR, extended by 30 NM beyond the area of responsibility according to EATM requirements. |
| *4.1.1.2.1.3* | | *FUNCTIONAL REQUIREMENTSFOR THE SYSTEM TO BE PURCHASED* |
| | | *Main Functions* |
| | | System time information **shall** be received from an external clock deviceand distributed to all depending nodes of the system. In case of outage the external clock synchronisation, system shall maintain synchronisation from an internal clock source;<br>Plot/track validity checks, plot/track reception, invalid plot/track reception and a failure to receive plots/tracks on a specific line **shall** be signalled to the TMCS; |

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| | | Filtering out of SSR reflections and split plots **shall** be performed if required;<br>Input/output geographical filtering **shall** be performed;<br>For each sensor integrated into the SDPS, the filter zones **shall** be defined within which sensor information of the corresponding sensor will be processed by the system. Sensor information falling outside the chosen zones will be ignored;<br>The actual configuration of the sensors in use **shall** define the filtering zones sets to be used at any time;<br>A re-configuration of the sensors **shall** entail a reallocation of filtering zone sets;<br>The exact delineation of these plot filter zones and configurations **shall** be defined once the necessary sensor evaluation has been carried out;<br>Conversion/correction **shall** be performed in order to achieve the optimum correspondence between the real and the displayed position of the aircraft within the processing area;<br>Slant range correction **shall** be performed if required by the SDPS;<br>Polar to Cartesian co-ordinate conversion **shall** be performed if required by the SDPS;<br>Conversion to reference to magnetic North **shall** be performed.<br>An automatic on-line plot registration facility **shall** be provided in order to compensate for inaccuracies in setting up and drift of azimuth and range bias in incoming plot and strobe data.<br>The registration software **shall** estimate these errors and automatically correct the incoming data.<br>The correction function **shall** be selectable.<br>The current corrections applied to each sensor **shall** be displayed at the TMCS.<br>Bidders may choose to correct range and azimuth or sensor position or both. Bidders **shall** state the time required for the plot registration to settle to a stable value;<br>Overload conditions **shall** be handled, e.g. suppression of weather data, suppression of plots falling outside the FIR+30 NM;<br>Stereographic projection and co-ordinate translation related to the system origin **shall** be performed;<br>Mode C readings give pressure altitude as measured by an altimeter set to the standard barometric pressure of 1013.25 hPa. In the ANSP TMA, mode C readings **shall** be compensated whenever an aircraft's altitude is expressed by reference to the local pressure (QNH). This is the case of arriving aircraft below fixed transition level (TL) and for departing aircraft up to the fixed transition altitude (TA ).;<br>Mode C conversion **shall** be performed;<br>The system **shall** be capable of re-distribution of surveillance input data to the external users. |
| *4.1.1.2.1.4* | | *Plot Display* |

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| | | Unassociated plots (i.e. plots not used to update a track) **shall** be sent for display.<br>Since the software has to be able to process data from several sensors with overlapping coverage, a means **shall** be provided to ensure that for each target (e.g. aircraft, birds, temperature inversions, rain clouds, etc.) generating a return (or set of returns) to more than one sensor, only one plot (or set of plots) from one sensor is actually displayed.<br>Plots from all available sensor sources **shall** be selectable for display on dedicated positions for analysis and other purposes. |
| *4.1.1.2.1.5* | | *Mono Sensor Tracking* |
| | | The Surveillance Front End (SFE) **shall** perform mono sensor tracking to the incoming plot data for the SBF. This function may be physically located within the SFE or distributed in other units.<br>As a minimum, the SFE tracking module **shall** comprise the following functions:<br>• Plot track correlation<br>• Track initialisation<br>• Smoothing and predication<br>• Termination |
| *4.1.1.2.1.6* | | *SMRT* |

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| | | The Bidder **shall** provide all required SMRT LINUX based hardware baseline in redundant configuration, the system software shall be provided with lifetime licence in open configuration.<br>The system **shall** provide the SMRT unit with the plot or track data with measured position in ASTERIX category 1 and 48, ASTERIX category 21/23 concerning ADS-B inputs, ASTERIX Category 19,20 concerning MLAT inputs and the radar service messages in ASTERIX category 2 and 34.<br>The system may provide to the SMRT unit mini-plan information in ASTERIX category 32 or use another method for associating flight plan and coordination information with the sensor tracks. The bidder **shall** describe the chosen method for each output data flow.<br>The system **shall** be capable of receiving ARTAS Track message in ASTERIX 30/ 31/ 62/63 and 65 category data from the external data sources.<br>The SMRT services **shall** be composed of a broadcast service of update rate SP1 (e.g. 4 seconds) for ACC<br>The SMRT services **shall** be included either a broadcast service of an update rate of SP2 (e.g. 2 seconds) for APP/TWR CWPs or a service synchronised with the antenna revolution period.<br>The SMRT services for the other SMRT users (Safety nets, ETFMS) **shall** be configured during the Critical Design Review (CDR).<br>The system tracks synchronised with the PSR/MSSR **shall** be based on measured target reports if the PSR/MSSR is operating, otherwise they **shall** be based on SMRT extrapolated positions.<br>The ODS **shall** be able to use a different position symbols for those two cases.<br>The SMRT communication with the users **shall** be done through a broadcast service. System **shall** foresee sending data to remote users.<br>The Bidder **shall** integrate ARTAS into his own architecture of multi-radar data processing in the best way in order to get advantage of all the benefits arising from its deployment and be responsible to fine-tune the radar data processing sub-system, including ARTAS interface.<br>The Bidder **shall** be responsible for SMRT fine-tuning and compliance of SMRT output data to the tracking performance requirements stated in chapter 5.<br>Radar data from ARTAS may be used as an input of surveillance fallback system. |
| *4.1.1.2.2* | | *Surveillance Fallback System (SFS)* |
| | | In case of failure of SMRT, a system backup **shall** be foreseen, the Surveillance Fallback System (SFS).<br>The SFS **shall** be a duplicated system utilising its own dedicated hardware entirely independent of the other parts of the ATC system.<br>The SFS sensor data fusion software **shall** differ from the SMRT multi sensor trackingsoftware.<br>The system **shall** switch over automatically to the SFS upon detection of failure of the SMRT.<br>Switch back to SMRT**shall** always be initiated manually.<br>A warning of the SFS operation **shall** be suitably displayed to controllers on their CWPs.<br>The Technical staff**shall** have the possibility to manually override the automatic initiation of the SFS and be able to manually activate the SFS function when according to his judgement the SMRT does not function correctly (and there is no automatic SFS activation) |

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| | | SFS **shall** perform the sensor data fusion of the incoming sensor data and generate the system tracks and the by-pass data flow consisting of mono-sensor tracks and uncorrelated plots. |
| *4.1.1.2.3* | | *Multi-Sensor Tracking* |
| | | The SDPS adnd SFS**shall** comprise a multi-sensor tracking function for PSR, MSSR, Mode-S, ADS-B and MLAT inputs i.e. normally data of several sensors is used to track one target.<br>The bidder **shall** describe the mathematical algorithms used in the tracking process, including initiation and cancellation.<br>The tracking algorithms **shall** be such that full advantage is taken of the multi-sensor coverage. If an aircraft is seen by more than one (i.e. by two, three or more) sensors, then all data has to be used. A Kalman filter with a common track updated by a number of sensors is thus acceptable. Mono-Sensor tracking per sensor followed by a weighted track combination algorithm is also acceptable.<br>Track positions **shall** be recalculated every variable system parameter time which is less than 5 seconds.<br>Track initiation **shall** be automatic for 4 digit and 2 digit SSR plots and for primary plots.<br>It **shall** be possible to deactivate automatic primary initiation on a per sensor basis.<br>In the event that no sensor update is received the tracking function **shall** provide an extrapolated track position.<br>Updates from extrapolations **shall** be qualified by a flag to be transmitted for appropriate display to the controller.<br>Tracks **shall** be cancelled at the boundary of the processing area or if after n (system parameter) update cycles no position report update has been received.<br>Once established the tracks including label, speed vector and derived ground speed **shall** automatically be maintained as long as the combined sensor coverage of the various sensors permits.<br>The MRT algorithm(s) **shall** meet the tracking performance requirements. |

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| | | *Mode-C Tracking* |
| | | The SFS **shall** perform mode C tracking based on aircraft derived altitude information.<br>The Bidder **shall**provide a fully description of the Mode-C tracking algorithm.<br>The mode C tracking **shall** be used for the purpose of, inter alia:<br>• presentation of target attitude (descent/climb attitude indicator);<br>• support of the STCA and the MSAW (Minimum Safe Altitude Warning) function;<br>• calculation of rate of climb and descent;<br>• detection of invalid mode C;<br>• calculation of aircraft height in the case of a missing mode C response.<br>Suitable smoothing **shall** be provided to avoid fluctuation of the attitude indicator, especially during FL transition states.<br>The smoothing **shall** not cause significant delays in presenting the actual situation. |
| *4.1.1.2.4* | | *Tracking for Terminal Area* |
| | | Within the SFS (or SFE) module, a separate mono-sensor tracking module **shall** perform tracking on sensor data (plots and/or tracks) derived by the PSR/MSSR and MLAT stations (which also contributes to the multi-sensor tracking). |
| | | The tracking function for APP **shall** be provided for primary/ secondary and MLAT information in order to permit the presentation of a speed vector (and ground speed value) and the uninterrupted carriage of a label on the APP Displays. |
| | | Speed vector and label **shall** be maintained as long as the responsible TAR/MLAT configuration permits and by extrapolation for two consecutive TAR scans when no data exists. |
| | | The aircraft position sent for display **shall** be the position measured by the TAR. Smoothing **shall** only be used for filtering false data. |
| | | The data update period **shall** be equal to PSR/MSSR revolution period or to the system internal update period (e.g. 4 seconds). |
| | | Mode C tracking for APP **shall** include mode C compensation with respect to the standard barometric pressure of 1013.25hPa. |
| | | In the TMA, the mode C readings **shall** be compensated whenever an aircraft's altitude is expressed by reference to the local pressure (QNH). QNH correction **shall** be applied per each individual approach/tower sector. |
| | | In case of the loss of data detection from the PSR/MSSR, the multi-sensor track positions **shall** be displayed to the APP controllers with a suitable indication. |

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| | | *Sensor Bypass Facility (SBF)* |
| | | The SBF **shall** feed the CWPs with the mono-sensor data using a separate interconnection means. |
| | | The SBF **shall** be activated for display automatically upon failure of SMRT and SFS. |
| | | A manual transition capability to SBF **shall** be available for the technical staff. |
| | | The SBF **shall** be able to feed the CWP with all available surveillance data input connected to SFE. |
| *4.1.1.2.4.1* | | *Processing Weather Information* |
| | | The system **shall** be capable of receiving weather contours or vectors at up to six intensity levels. |
| | | The system **shall** be capable oftransmitting the received weather picture or producing the integrated weather picture to the working position in all modes of operation. |
| **4.1.2** | | **Repetitive Flight Plan Processing** |
| | | The purpose of Repetitive Flight Plan Processing function is to maintain a database of Repetitive Flight Plans (RPLs) from which a System Flight Plan is created on the days of operation.<br>RPLs are loaded into the system from a media supplied by the aircraft operator. They may also be created and amended manually by the Flight Data Assistants. RPLs are verified upon creation and amendment to ensure that a valid System Flight Plan will be created.<br>At an adaptable time prior to the expected time of the flight in the Area of Interest, a System Flight Plan is created from the RPL. A System Flight Plan may also be manually created from an RPL.<br>An RPL is deleted following expiry of its validity period. |
| ***4.1.2.1*** | | ***RPL Entry From Disk*** |
| | | The system **shall** permit creation of RPLs from RPL files supplied in the format specified in document ICAO Doc. 4444, Rules of the Air and Air Traffic Services. |
| ***4.1.2.2*** | | ***RPL Maintenance*** |
| | | The system **shall**permit manual creation, amendment and deletion of RPLs. |

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| | | The system **shall**permit manual temporary cancellation of an RPL for a specified period. |
| | | The system **shall**permit mass deletion of RPLs from the database following expiry of their validity period. |
| ***4.1.2.3*** | | ***RPL Activation*** |
| | | At an adaptable time prior to EOBT on the days of operation, the system **shall**create a System Flight Plan from the contents of an RPL. |
| | | The system **shall**permit manual creation of a System Flight Plan from an RPL. |
| | | The system **shall** permit to disable/enable creation a System Flight Plan from an RPL. |
| **4.1.3** | | **Flight Data Processing** |
| | | The purpose of Flight Data Processing (FDP) is to provide Air Traffic Controllers with accurate and up-to-date flight information, in a timely fashion, for use in flight planning, coordination and control. |

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| | | In order to clarify the specification of the processing of a system flight plan (e.g. input validation, data presentation, function activation, etc.) throughout the different stages of its life, a conceptual state model is described. |
| | | The model identifies the states Initial, Notified, Active and Terminated, and are defined as follows:<br>• A System Flight Plan (SFPL) is considered in the Initial state from the time that the filed flight plan is received until an operational indication is made that the flight is confirmed.<br>• The Notified state describes an SFPL for which an operational confirmation has been entered (e.g. start-up/taxi, notification prior to coordination, etc.), but which is not active. An active SFPL may revert to the Notified state once the aircraft has left the system area of interest; if it is due to re-enter the area of interest (i.e. is re-entrant). Such flights may include aircraft departing the AoI to perform some kind of maneuvers abroad (e.g. photographic, practice touch-and-goes, etc) prior to returning, and mixed rule IFR-VFR-IFR flights.<br>• An SFPL is considered active when the flight becomes of direct operational concern in a sector. This may be upon flight coordination, assumption of communications, or upon indication of departure from an aerodrome within the area of interest. An SFPL may be created directly in the Active state if it corresponds to an air-filed flight plan or it is created from a coordination input. An active SFPL is characterized by having a system sector designated as the "responsible" sector for the SFPL.<br>• A flight is considered Terminated when it is no longer of any operational significance within the context of the system, e.g. it has left the area of interest and is not due to return, has landed or has been cancelled. |
| | | It should be noted that the actual existence of these states is not itself a requirement upon the system and the Tenderer is free to design his own solution to the requirements to which they pertain.The Bidder shall describe his designin details. |
| ***4.1.3.1*** | | ***Initial Message Handling*** |
| | | The Initial Message Handling Function accepts messages from various sources, applies syntax and semantics checks to the messages, and then forwards them to the appropriate function. Similarly, the output of messages to external entities is also described in this function. |
| **4.1.3.1.1** | | **Communication Entities** |
| *4.1.3.1.1.1* | | *Initial Flight Plan Processing System (IFPS)* |

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| | | The system **shall**be capable of receiving FPL, CHG, CNL, DLA, DEP and ARR messages in ICAO format from the IFPS. |
| | | The system **shall**be capable of receiving IFPL, ICHG, ICNL, IDLA, IDEP and IARR messages in ADEXP format from the IFPS. |
| | | The system **shall**be capable of sending AFP and RQP messages to the IFPS. |
| | | The system **shall**be capable of receiving an Operational Reply Message (ACK, MAN, REJ) in response to an AFP. |
| | | The system **shall**be capable of receiving APL and ACH messages from the IFPS in ICAO and ADEXP format. |
| *4.1.3.1.1.2* | | *Adjacent and Subjacent ATS Units* |
| | | The system **shall**be capable of performing the OLDI Dialogue Procedure including both Co-ordination and Transfer Phases, using ICAO and ADEXP format messages where applicable. |
| | | The system **shall** permit the selection of messages and their parameters exchanged with each external ATS unit in support of transfer of communications as described in EUROCONTROL OLDI specification edition 4.2 |
| | | The system **shall** be capable of performing OLDI communication with up to 10 external co-ordination partners. |
| | | The system **shall** be capable of processing all mandatory messages of the OLDI Basic Procedure Notification and Coordination phases, (i.e. ABI, ACT, REV, and LAM) in ICAO/ADEXP format, including the amendments for RVSM and 8.33 Channel Spacing fields. |
| | | The system **shall** be capable of sending and receiving the complementary messages, PAC and MAC in ICAO/ADEXP format. |
| | | The system **shall** be capable of performing the OLDI Dialogue Procedure including both Co-ordination and Transfer Phases, using ICAO and ADEXP format messages where applicable. |
| *4.1.3.1.1.3* | | *Network Management (NM) Traffic Flow Management System (*ETFMS*)* |
| | | The system **shall**be capable of receiving SAM, SRM, SLC messages in ADEXP format from the ETFMS.(The system **shall** be capable of receiving SAM, SRM, SLC, FLS, DES messages in ADEXP format from the ETFMS system.) |
| | | The system **shall**be capable of sending a FSA message to the ETFMS automatically. |
| *4.1.3.1.1.4* | | *Aircraft Operator/ ARO* |
| | | The system **shall**be capable of receiving FPL, CHG, CNL, DLA, DEP and ARR messages in ICAO format on the AFTN/AMHS directly from the aircraft operator/ ARO. |
| | | The system **shall**be capable of sending FPL, CHG, CNL, DLA, DEP and ARR messages in ICAO format on the AFTN/AMHS. |
| *4.1.3.1.1.5* | | *Air Defense Unit* |

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| | | The system **shall**be capable of sending INF messages to the Air Defense Unit in ICAO format. |
| *4.1.3.1.1.6* | | *Human-Machine Interface* |
| | | The system **shall** permit manual creation, update and cancellation of flight plans and repetitive flight plans. |
| | | The system **shall**permit manual entry of flight coordination, progress and control instructions. |
| *4.1.3.1.1.7* | | *Georgian Civil Aviation Agency Air Transportation Department (GCAA ATD)* |
| | | The system **shall** be capable of receiving AUP and UUP messages from *GCAA ATD* by the AFTN/AMHS. |
| *4.1.3.1.1.8* | | *Charging System* |
| | | The system **shall** be capable of automatic sending of INF messages by the AFTN/AMHS/AMHS to the Charging System. |
| **4.1.3.1.2** | | **Message Verification** |
| | | Messages are verified in terms of their syntax and semantics. |
| | | Syntax checking is dependent on the message format and may not be applicable for messages between internal functions |
| | | Semantics checking verifies the logical content of messages and is thus generally applicable to both internal and external communication. |
| | | Messages from external sources that fail syntax or semantics checks are distributed to Flight Data Operator work positions where they may be corrected and re-submitted or deleted |
| | | Due to the abnormal situation of flight plans arriving via the AFTN/AMHS directly from the aircraft operator, in addition to creating an SFPL, the message is notified to the Flight Data Operator for any necessary further processing. |
| *4.1.3.1.2.1* | | *Syntax Checking* |

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| | | The system **shall** verify that the syntax of ICAO ATS messages is in accordance with that specified in reference [7] including Amendment 1 to the PANS-ATM specified in reference [18]. |
| | | The system **shall** verify that the syntax of ADEXP messages is in accordance with that specified in reference [13]. |
| | | The system **shall** verify that the syntax of messages from the IFPS conform to reference [7, 11]. |
| | | The system **shall** verify that the syntax of OLDI messages conform to reference [2]. |
| | | The system **shall** verify that the syntax of ATFM messages conform to reference [12]. |
| | | The system **shall** verify that the syntax of CCAMS messages conform to reference [**16**]. |
| | | The system **shall** verify that the syntax of airspace management messages conform to reference [14]. |
| | | The system **shall** verify the syntax of UAC permission messages.<br>***Note**: The UAC permission messages format will be provided by Customer additionally.* |
| *4.1.3.1.2.2* | | *Semantics Checking* |
| | | The system **shall** verify that the information in flight messages is consistent with the environment data such that only valid SFPLs are created. |
| | | The system **shall** check whether the equipment fit (RVSM operating status, 8.33 channel spacing, RNAV and P-RNAV navigation capability) is compliant with the requirements of the airspace traversed by the trajectory and, if not, whether the aircraft has State aircraft status. |
| | | The system **shall** verify that, for an SFPL in the active state, the source of the input is either the currently assigned sector, or a sector/unit involved in the future control of the flight. |
| | | The system **shall** verify that, for an SFPL in the active state, a change to the SFPL at a sector work position does not affect the SFPL at a point upstream from the point at which the sector is responsible for the SFPL. |
| *4.1.3.1.2.3* | | *Manual Message Processing* |

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| | | Messages received from external sources that are unrecognized or that fail syntax or semantics checking **shall** be stored with an indication of the error(s), for manual correction.<br>*Note: Unrecognized external source means message originator that not defined in system parameters.* |
| | | Messages failing the syntax and semantics checking with the indication of error(s) **shall** be sent to the FDO for manual correction.<br>*Note: Indication of the error means providing the reason of error and visual place of error in message text.* |
| | | The system **shall** permit the designation of message types that are always forwarded for manual processing. |
| | | The system **shall** forward incorrect messages for SFPL in the Active state to the current sector responsible for the SFPL. |
| | | The system **shall** permit the manual correction and re-submission or deletion of an erroneous message. |
| | | Erroneous data entered using the system HMI **shall** cause an error response, containing a description of the error(s), to be generated to the work position from which the input was made. |
| **4.1.3.1.3** | | **Message Transmission** |
| | | Upon notification of a message received directly from the aircraft operator, or on entering SFPL information manually, the Flight Data Operator may decide that the IFPS requires a copy of the information. |
| | | The system helps the FDO by filling in a requested message from the fields of the SFPL. The FDO is able to amend the system-proposed message fields before transmitting the message. |
| *4.1.3.1.3.1* | | *Message Compilation and Transmission* |
| | | The system **shall**permit the transmission of ATS messages, including free-text messages, on the AFTN/AMHS upon manual request. |
| | | On request to transmit a message, the system **shall**be capable of automatically compiling the message from the applicable fields of the SFPL. |
| | | The system **shall**permit manual amendment of the system-compiled fields prior to message transmission. |
| | | The system **shall** permit the transmission of AFP and RQP messages to the IFPS upon manual request |
| | | The system **shall** permit saving new, loading or deleting previously saved free-text AFTN/AMHS messages (with addresseses) |
| ***4.1.3.2*** | | ***System Flight Plan Processing*** |
| | | System Flight Plan Processing pertains to the maintenance of a system record of a filed flight plan, termed a System Flight Plan (SFPL). |

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| | | The IFPS represents the main source of flight plans, though SFPL may also be entered manually or from the Aircraft Operator via the AFTN/AMHS. |
| | | In addition, full or partial SFPL may be created upon receipt of ABI or ACT/PAC messages in cases where no matching SFPL exists. |
| | | Once created, data may be received to modify, cancel, indicate delay, and indicate departure or arrival. |
| | | In certain circumstances, e.g. upon a free-call by a pilot or upon notification or coordination of a flight for which no SFPL exists, an SFPL is created with incomplete information. In the case of a free-call, the information entered may be simply aircraft identification and SSR code, whereas a notification or coordination will also contain details pertaining to route and the transfer conditions. Subsequent inputs may be made to complete the SFPL. |
| | | Although the aircraft identification of a flight is normally unique, there are instances where multiple flight plans are filed for the same flight number. Therefore, a combination of aircraft identification, departure and destination aerodromes, and estimated off blocks time are used to uniquely identify an SFPL, and therefore to correlate it with incoming messages. |
| | | System flight plans are deleted a parameter time after entry to the terminated state. This allows the recovery of an SFPL that has been erroneously terminated. |
| | | All updates to the SFPL, including the deletion, are recorded and archived. |
| **4.1.3.2.1** | | **System Flight Plan Identification** |
| | | The system **shall**be capable of maintaining multiple SFPLs with identical aircraft identification provided that they can be uniquely identified |
| | | As an integral part of each SFPL, the system **shall**maintain a copy of all ATS messages which have been correlated to the SFPL. |
| | | The system **shall**uniquely identify an SFPL by a combination of aircraft identification, aerodromes of departure and destination, and off-blocks time/date within a tolerance. |
| | | The system **shall**uniquely identify an SFPL by an IFPS identification number (IFPLID) for messages that received from IFPS in ADEXP format. |
| | | The system **shall**correlate a received ATS message with a stored SFPL if the SFPL forms a unique match with the message according to the identification criteria specified above. |
| **4.1.3.2.2** | | **System Flight Plan Deletion** |
| | | A system flight plan **shall**be deleted at a predefined time after entry to the terminated state. |
| **4.1.3.2.3** | | **Flight Message Processing** |

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| | | The following describes the processing of a system flight plan upon receipt of flight planning, flow management, progress and coordination messages. |
| | | It should be noted that, although message names belonging to a recognized message protocol (e.g. ICAO, OLDI, etc.) are used, the specification applies equally to inputs made manually via the HMI. |
| *4.1.3.2.3.1* | | *Flight Planning Messages* |
| *4.1.3.2.3.1.1* | | *Filed Flight Plan / ATC Flight Plan* |
| | | If a filed flight plan message from an external source is correlated with an existing SFPL, the message **shall**be queued for manual handling. |
| | | Upon entry of a filed flight plan for which no SFPL is identified, an SFPL **shall**be created and considered in the Initial state. |
| | | The trajectory **shall**be calculated and validated, as specified in paragraph 4.1.3.4, Trajectory Prediction. |
| *4.1.3.2.3.1.2* | | *Delay* |
| | | Upon entry of Delay message or input a delay indication for an SFPL in the Initial state **shall**cause the update of the EOBT in the corresponding SFPL. |
| | | The flight trajectory **shall**be re-calculated with the new EOBT. |
| | | If a Delay message from an external source can not be correlated with a unique SFPL, or is correlated with an SFPL in a state other than Initial, the message **shall**be queued for manual handling. |
| *4.1.3.2.3.1.3* | | *Modification/ ATC Flight Plan Change* |
| | | A Modification message **shall**cause the SFPL to be updated with the changed information, subject to the source eligibility specified in paragraph 4.1.3.1.2.2, Semantics Checking. |
| | | A change to the flight type (GAT/OAT), rules (IFR/VFR), aircraft type, EOBT, cruising speed, cruising level, destination aerodrome or route **shall**cause the re-calculation of the flight trajectory. |
| | | A change to the destination aerodrome or route of an SFPL that has been assigned an SSR code **shall**cause re-validation and re-assignment of the SSR code if necessary. |
| | | If a Modification message from an external source can not be correlated with a unique SFPL, the message **shall**be queued for manual handling. |
| *4.1.3.2.3.1.4* | | *Cancellation* |

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| | | Upon entry of a Cancellation for an SFPL in the Initial state, the SFPL **shall**subsequently be considered to be in the Terminated state. |
| | | Upon reception of a Cancellation message for an SFPL not in the Initial state system **shall**forward such message for manual processing. |
| | | The system **shall**permit the undoing of a cancellation until such time that the SFPL is deleted (see paragraph 4.1.3.2.2, System Flight Plan Deletion). |
| | | An SFPL for which a cancellation has been undone **shall**be considered in the Initial state. |
| *4.1.3.2.3.1.5* | | *Departure Indication* |
| | | Entry of a Departure Indication **shall**cause update of the departure time and status in the corresponding SFPL. |
| | | The flight trajectory **shall**be re-calculated with the actual departure time. |
| | | If no SFPL is identified for the Departure Indication the message **shall**be queued for manual handling. |
| | | If the departure is from an aerodrome within the Area of Interest, the SFPL **shall**be considered in the Active state. |
| *4.1.3.2.3.1.6* | | *Arrival Indication* |
| | | Entry of an Arrival Indication **shall**cause update of the arrival time, aerodrome and status in the corresponding SFPL. |
| | | Upon entry of an Arrival Indication, the SFPL **shall**be subsequently considered in the Terminated state. |
| | | The system **shall**permit the undoing of an Arrival Indication until such time that the SFPL is deleted (see paragraph 4.1.3.2.2, System Flight Plan Deletion). |
| | | Following removal of the Arrival Indication, the SFPL **shall**be reverted to its state prior to the input. |
| *4.1.3.2.3.1.7* | | *Minimum Flight Plan* |
| | | The system **shall**permit the creation of an incomplete SFPL upon entry of minimum flight data (aircraft identification and SSR Code). |
| | | If an SSR Code is requested, SSR Code Assignment **shall**be performed (see paragraph 4.1.3.6, SSR Code Management) |
| | | Following entry of a Minimum Flight Plan, the SFPL **shall**be considered as in the Active state. |
| | | The system **shall**permit subsequent manual entry of the complete SFPL. |
| | | The system **shall**permit subsequent entry of the complete SFPL from a received FPL/APL message. |
| | | Upon entry of sufficient information into a Minimum Flight Plan, the trajectory **shall**be calculated. |
| *4.1.3.2.3.2* | | *Flow Management Messages* |

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| *4.1.3.2.3.2.1* | | *Slot Allocation/ Slot Revision* |
| | | Upon receipt of a Slot Allocation or Slot Revision for an SFPL in the Initial state, the Calculated Take-Off Time (CTOT) **shall**be stored in a dedicated field of the SFPL (i.e. separately from the EOBT). |
| | | The flight trajectory **shall**be re-calculated using the new CTOT. |
| | | A Slot Allocation or Slot Revision received for an SFPL in the Active or Terminated state **shall** be queued for manual handling. |
| | | Slot Allocation or Slot Revision that can not be correlated with a unique SFPL **shall**be queued for manual handling. |
| *4.1.3.2.3.2.2* | | *Slot Requirement Cancellation* |
| | | Upon entry of a Slot Requirement Cancellation for an SFPL in the Initial state, the CTOT **shall**be removed from the SFPL. |
| | | A Slot Requirement Cancellation erroneously entered for an SFPL in the Notified, Active or Terminated state **shall**be queued for manual handling. |
| *4.1.3.2.3.2.3* | | *Flight suspension messages* |
| | | Upon reception of a FLS message the system **shall** update the related SFPL and assign to SFPL status “Flight Suspended”. |
| *4.1.3.2.3.2.4* | | *Flight de-suspension messages* |
| | | Upon reception of a DES message the system **shall** cancel status “Flight Suspended” and remove CTOT time from corresponding SFPL if it was previously allocated. |
| | | Upon reception of a SAM message the system **shall** cancel status “Flight Suspended” and assign new CTOT time to the corresponding SFPL. |
| *4.1.3.2.3.2.5* | | *READY message* |
| | | The system **shall** allow compile and transmit REA messages to the ETFMS/Network Management (NM) upon manual request for selected departure flight. |
| | | The system **shall** allow modification of the REA message before transmitting. |
| *4.1.3.2.3.3* | | *Flight Coordination Messages* |
| *4.1.3.2.3.3.1* | | *Advance Boundary Information / Taxi* |

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| | | Upon receipt of an ABI message for which no corresponding SFPL is identified, a new SFPL **shall**be created. |
| | | The incomplete SFPL and the message **shall**be presented to the Sector Planner for insertion of any missing data. |
| | | If an SFPL corresponding to the ABI message or Taxi indication is identified, recalculation of the flight trajectory **shall**be performed. |
| | | If the SFPL was in the Initial state, following the entry of the ABI message or Taxi indication it **shall**be considered as in the Notified state. |
| *4.1.3.2.3.3.2* | | *Flight Activation/Pre-Activation/Estimate* |
| | | Upon receipt of an ACT/PAC message or Estimate for which no corresponding SFPL is identified, a new SFPL **shall**be created. |
| | | The incomplete SFPL and the message **shall**be presented to the Sector Planner for insertion of any missing data. |
| | | If an SFPL corresponding to the ACT/PAC message or Estimate is identified, recalculation of the flight trajectory **shall**be performed. |
| | | If the ACT/PAC message or Estimate contains an SSR Code different to that in the SFPL, or no code is assigned in the SFPL, SSR Code Assignment **shall**be performed (see paragraph 4.1.3.6, SSR Code Management). |
| | | Following entry of an ACT/PAC message or Estimate, the SFPL **shall**be considered as in the Active state. |
| *4.1.3.2.3.3.3* | | *Abrogation of Co-ordination* |
| | | Upon receipt of a MAC message for an SFPL for which an ABI has been received and for which an ACT has not yet been received, the SFPL **shall**be reverted to the Initial state. |
| | | Upon receipt of a MAC message for an SFPL for which an ACT has been received but which is not yet assumed at a sector, the SFPL **shall**be reverted to the Notified state. |
| | | A MAC message received for an SFPL that is already assumed at a sector **shall**be forwarded to the sector without updating the SFPL. |
| ***4.1.3.3*** | | ***Flight Data Handling*** |
| | | Flight Data Handling describes the sector determination and distribution for a flight, the application of tactical ATC constraints and the maintenance of RVSM status. |
| **4.1.3.3.1** | | **Flight Data Distribution** |
| | | The basis upon which flight data distribution is performed is a list of sectors that are determined from the trajectory. |

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| | | Flight data is distributed to a sector at the time that it becomes of interest to the sector, which itself is dependent upon the context of the sector in the flight. |
| | | For the first ACC sector in the sector list, the distribution is performed upon entry of the SFPL to the Notified state. |
| | | This corresponds to an input departure clearance or ABI message of an inbound flight received. |
| | | For subsequent sectors in the sector list, including tower and approach "sectors", the distribution is performed at an adaptable time prior to the estimated time at the sector boundary (roughly corresponding to the time at which sector coordination would take place). |
| | | For a flight leaving the FIR, this time may be different than for internal sectors. |
| | | Distribution of data to the tower and approach facilities may be performed a parameter time before EOBT or upon request. |
| | | Once an SFPL is distributed to a sector, all updates to the SFPL are distributed to the sector until the flight is no longer of concern to the sector. |
| | | Minimum amount of flight data is available at all sectors for the purpose of inclusion in the track label. |
| | | In addition, a sector not penetrated by the trajectory, and therefore not on the standard distribution for the flight, may request the full SFPL. |
| | | In addition to this sector posting of flight data, ATS messages are automatically generated by the system to external entities. These messages comprise AFP to the IFPS, and FSA to the ETFMS system, and to other external units like military units if required. |
| *4.1.3.3.1.1* | | *Distribution Rules* |

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| | | The system **shall**determine the list of sectors to which to post a flight according to distribution rules defined for distribution points or volumes (see 4.2.2.1.5, Flight Distribution, Co-ordination and Transfer Data). |
| | | The sectors to which an SFPL, created from a Pre-Activation, Activation or Estimate (see 4.1.2.2.2.2.2, Flight Activation/Pre-Activation/Estimate) and containing no route information, is distributed **shall**be determined from the entered coordination point. |
| | | The system **shall**distribute an SFPL to the first ACC sector upon entry of the SFPL to the Notified state, or upon entry to the Active state if the Notified state is bypassed. |
| | | The system **shall**distribute an SFPL to subsequent ACC, APP and TWR sectors (including the remote APP/TWR) at the defined lead time prior to the estimated time at the distribution point. |
| | | The system **shall**be capable of distributing an SFPL a predefined distance before the distribution point. |
| | | Upon coordination or transfer to a sector not in the list of sectors, distribution **shall**be performed to that sector. |
| | | The system **shall**distribute an SFPL to a sector upon manual request, regardless of whether the sector is in the sector list. |
| | | Distribution to the TWR and APP sectors for flights (IFR and VFR) departing from their aerodrome of responsibility **shall**take place at predefined times (independent for TWR and APP) prior to EOBT, or upon manual request. |
| | | Upon change to the estimated times in the trajectory by more than a predefined amount, or change to pre-defined SFPL fields, the system **shall**distribute the updated SFPL to all sectors to which the SFPL is currently distributed. |
| | | The system **shall**ensure that the data distributed for an SFPL is distributed consistently to all its recipients, both internal and external. |
| | | Distribution to a sector of updates to an SFPL **shall**be continued at least until such time that the flight has left the airspace of the sector and control has been released from the sector, and coordination for re-entry to the sector has not been initiated. |
| | | Upon change to the sector configuration the system **shall**determine the new list of sectors to which the flight is to be distributed. |
| | | Upon change to the trajectory such that it no longer penetrates a sector, and the SFPL has not yet been distributed to the sector, the sector **shall**be removed from the list of sectors. |
| | | Upon change to the trajectory such that a new sector is penetrated, the sector **shall**be added to the list of sectors. |
| | | Upon change to the trajectory such that it no longer penetrates a sector to which the SFPL is currently distributed, and the sector is not currently controlling the flight, a distribution removal **shall**be sent to the sector, and the sector removed from the sector list. |
| | | The SFPL items callsign, aircraft type, current flight rules, controlling sector, current clearance (level, heading, direct, hold), as a minimum, **shall**be distributed to all sectors for all SFPLs correlated with a track. |
| *4.1.3.3.1.2* | | *ATC flight plan proposal message (AFP)* |

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| | | The system **shall**be capable of automatically sending an AFP message to the IFPS in ADEXP format for missing flight plan cases upon conditions as follows:<br>- SFPL has been automatically created from ABI/ACT/PAC message;<br>- SFPL in "Active" status has been manually created. |
| | | The system **shall**be capable of automatically sending an AFP message to the IFPS in ADEXP format for existing SFPL if flight data as follows has been changed:<br>- entry point to FIR;<br>- exit point from FIR;<br>- type of aircraft;<br>- fight rules;<br>- type of flight;<br>- requested flight level (RFL);<br>- destination aerodrome. |
| *4.1.3.3.1.3* | | *First System Activation (FSA)* |
| | | The system **shall** automatically compile and send an FSA message to the ETFMS/Network Management (NM) system upon recognition of IFR/GAT flight departure from all internal aerodromes situated in the Tbilisi FIR. |
| | | The system **shall** automatically compile and send an FSA message to the ETFMS system for IFR/GAT flights inbound from external FIRs, upon entry of estimate or coordination details. |
| *4.1.3.3.1.4* | | *Output to external Military Unit* |
| | | The system **shall**automatically send an FPL message in ICAO format to an external military Unit upon SFPL creation. |
| | | The system **shall**automatically send a CHG message in ICAO format to an external military Unit upon change to the flight plan |
| | | The system **shall** automatically send a DEP message in ICAO format to the external military unit upon receipt of a departure indication (DEP/IDEP message, manual input or automatic departure detection). |
| | | The system **shall** automatically send an external military unit INF message upon passing by aircraft FIR boundary. |
| *4.1.3.3.1.5* | | *Output to Route Charging System* |

<table>
<tr><td></td><td></td><td>The system shall automatically send INF message to Route Charging System upon passing by aircraft the FIR boundary.</td></tr>
<tr><td></td><td></td><td>The system shall keep the log files of all sent messages at least for 30 dyas and shall provide export log on demand.v</td></tr>
<tr><td></td><td></td><td>The INF message to Route Charging System shall include 24-bit address of aircraft derived from mode S radar data.<br>At least the following information shall be available for route charges
<table>
<tr><td>1</td><td>Flight Date</td></tr>
<tr><td>2</td><td>Flight ID</td></tr>
<tr><td>3</td><td>Aircraft Type</td></tr>
<tr><td>4</td><td>Registration</td></tr>
<tr><td>5</td><td>Departure aerodrome</td></tr>
<tr><td>6</td><td>Departure Date and Time</td></tr>
<tr><td>7</td><td>Destination aerodrome</td></tr>
<tr><td>8</td><td>Destination Date and Time</td></tr>
<tr><td>9</td><td>Entry Point</td></tr>
<tr><td>10</td><td>Entry Date and Time</td></tr>
<tr><td>11</td><td>Exit Point</td></tr>
<tr><td>12</td><td>Exit Date and Time</td></tr>
<tr><td>13</td><td>Route</td></tr>
</table></td></tr>
<tr><td>4.1.3.3.2</td><td></td><td>ATC Tactical Constraints</td></tr>
<tr><td></td><td></td><td>An ATC Tactical Constraint represents a controller’s instructions or clearance for a flight. The purpose of entering tactical constraints into the system are twofold; they act as an aide memoir for the controller in the absence of paper strips, on which they would traditionally be annotated, and they inform the system of the expected behavior of the aircraft.</td></tr>
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| | | Tactical Constraints are considered as either open or closed. An open constraint is one in which further instructions are required in order to complete the description of the flight profile (e.g. a guidance order such as a tactical heading). A closed constraint is one in which the description of the flight profile remains complete (e.g. proceed direct to a further point on the route). |
| | | Thus, a closed constraint may be applied to the trajectory calculation, whereas an open constraint, though it may be applied to other functions (e.g. conflict detection, progress monitoring, etc.), does not update the trajectory. |
| | | The following ATC Constraints are described; Hold, Cancel Hold, Cleared Level, Assigned Heading, Assigned Speed and Direct Clearance. |
| | | The hold instruction is considered a closed instruction as, although the explicit entry of an expected end of hold time is not necessary, in such cases a default end of hold time is assumed. |
| | | Additionally, a route point may be entered at which the holding pattern is to be entered. The entry of a flight into a holding pattern affects the progress/conformance monitoring functions and conflict prediction. The removal of hold is explicitly entered by means of a cancel hold instruction, regardless of whether an expected end of hold time was entered. |
| | | The cleared level instruction is generally considered as an open instruction, as it is unknown how long the aircraft will remain at that level, or indeed, if it will actually reach the level at all before a further cleared level is given. |
| | | However, a cleared level is used to remove strategic constraints in cases where it can be seen as overriding the strategic constraint (e.g. when it is greater than the strategic level during the climb phase). A situation to be avoided is for an initial level given on climb-out to be applied as a cruising level to the complete trajectory. |
| | | An assigned heading instruction may be open or closed depending upon whether a point at which the aircraft will return to its original route is entered. In such cases, for the purpose of the trajectory calculation, the instruction may consider as a route amendment. In the case that the instruction is open, the heading may be applied to conformance monitoring calculations. |
| | | A direct clearance is considered closed, providing the clearance is to a point that is already on the trajectory. |
| *4.1.3.3.2.1* | | *Hold* |
| | | The system **shall**permit the entry of a hold instruction. |
| | | The hold constraint **shall**be applied to the trajectory, either by use of an expected end of hold time, if entered, or a default time if none was entered. |
| | | Upon entry of a hold instruction, the flight **shall**be assigned a status of "HOLD". |
| | | The system **shall**permit the entry of a holding point *(name or coordinates)* in a hold instruction. |
| | | If a holding point is included in the hold instruction, the status "HOLD" **shall**be applied once the flight arrives at the holding point. |
| *4.1.3.3.2.2* | | *Cancel Hold* |

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| | | The system **shall**permit the entry of a cancel hold instruction. |
| | | Upon entry of a cancel hold instruction, an immediate end of hold time **shall**be applied to the trajectory. |
| | | The "HOLD" status**shall**beremovedonlyuponentryofthecancelholdinstruction. |
| *4.1.2.3.2.2* | | *Cleared Level (CFL)* |
| | | Thesystem**shall**permittheentryof a clearedlevelfor a flight. |
| | | Cleared level greater than strategic levels constraining the climb profile, or lower than strategic levels constraining the descent profile, **shall**result in the removal of these strategic constraints on the flight. |
| | | If a cleared level is applied as a level-off in the trajectory, it **shall**only influence that portion of the trajectory within the issuing sector (i.e. the sector exit level remains unchanged). |
| *4.1.3.3.2.3* | | *Assigned Heading* |
| | | The system **shall**permit the entry of an assigned heading for a flight as a numerical value and/or via graphical tool. |
| | | The system **shall**permit the optional entry of the points at which the aircraft will turn and subsequently rejoin its planned route. |
| | | If these points are entered, the instruction is considered closed and **shall**be applied to the trajectory. |
| *4.1.3.3.2.4* | | *Assigned Speed* |
| | | The system **shall**permit the entry of an assigned speed for a flight as a Mach numbers and Knots. |
| | | The assigned speed **shall**be applied to the trajectory from the current position of the aircraft until the next route point with a strategic speed constraint. |
| *4.1.3.3.2.5* | | *Direct Clearance* |
| | | The system **shall**permit the entry of a clearance to proceed direct to a point. |
| | | If the point is a further point on the trajectory, the instruction is considered closed and **shall**be applied to the trajectory. |
| **4.1.3.3.3** | | **RVSM Status Maintenance** |
| *4.1.3.3.3.1* | | *RVSM Approval Status* |
| | | The system **shall** identify the RVSM approval status from the flight plan and any subsequent amendments. |
| *4.1.3.3.3.2* | | *RVSM Operating Status* |

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| | | The system **shall**derive the RVSM operating status initially from the RVSM approval status. |
| | | The system **shall**permit the changing of RVSM operating status, according to information received in coordination messages and manual input. |
| *4.1.3.3.3.3* | | *RVSM Airspace Authorization* |
| | | The system **shall**check each flight's trajectory, RVSM operating status and flight type in order to distinguish the following RVSM-authorization cases:<br>- Flight outside of RVSM airspace;<br>- Flight through RVSM airspace, RVSM-able;<br>- Flight through RVSM airspace, RVSM-unable, state aircraft;<br>- Flight through RVSM airspace, RVSM-unable, non-state aircraft. |
| ***4.1.3.4*** | | ***Trajectory Prediction*** |
| | | The function of Trajectory Prediction is to identify the portion of the flight route within a defined Area of interest and the subsequent calculation of a 4-dimensional trajectory over that route portion. |
| | | A route portion is categorized as GAT if it is conducted within airspace currently assigned for civil use. |
| | | For aircraft flying VFR out of controlled airspace, the route of flight is often neither known nor required and thus, such portions of flight can be ignored by the system. |
| | | For mixed rules flights, the IFR entry points and the subsequent route to the next VFR transition, AoR exit point or destination must be known. Thus, sector entry or exit points may be respectively at the IFR or VFR transition point if this occurs within the bounds of the sector. |
| | | The description of the trajectory calculation makes use of a concept of target conditions which the flight is attempting to reach. The target conditions are, in the simplest case, those requested in the flight plan (requested speeds, levels, etc.). However, these are regularly overridden by strategic constraints such as maximum speed below a certain level, boundary crossing conditions, assigned SID/STAR etc. During the course of the flight, tactical ATC constraints may further override the target conditions. |
| | | The trajectory of the flight in reaching its target conditions is determined according to the performance of the aircraft and meteorological conditions. |
| | | The trajectory is checked to ensure that permanent and temporary route or airspace restrictions are not infringed. |
| **4.1.3.4.1** | | **Route Processing** |
| | | The system **shall**recognize and accept the route elements specified in reference [7]. |

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| | | The system **shall**be capable of distinguishing between VFR and IFR portions of the route. |
| | | The system **shall** accept re-entrant flights (i.e. flights that leave the Area of Interest and subsequently re-enter). |
| | | The system **shall**forward for manual processing ATS messages that containroutes within which the logical order of route elements within the Area of Interest does not constitute a valid route. |
| | | The system **shall**categorize a route portion as GAT if it is conducted within airspace currently assigned for civil use, on a civil ATS route, or an available conditional route (see paragraph 4.2.2.1.2, Aeronautical and Airspace Data). |
| | | The system **shall**categorize a route portion as OAT if the route is through airspace currently assigned for military use or on an active OAT route. |
| | | An off-route portion through airspace assigned for joint use **shall**be assigned the category of the previous route portion. |
| | | The system **shall**recognize GAT or OAT designators in the flight plan filed route and categorize the route segments accordingly, overriding the airspace-derived categorizations described above. |
| | | The system **shall** forward for manual processing ATS messages with routes containing unrecognized elements in an IFR GAT segment of the route portion within the Area of Interest. |
| | | The system **shall**accept SFPLs containing VFR routes, or portions therein, for which the flight path can not be determined. |
| | | The system **shall**generate a warning for routes that violate temporary airspace restrictions or include unavailable conditional routes. |
| | | The system **shall** be capable of automatically proposing defined alternative routes for flights planned through temporary restricted airspace or unavailable conditional routes. |
| **4.1.3.4.2** | | **Trajectory Calculation** |
| | | The system **shall**calculate a 4-dimensional trajectory of flights through the Area of Interest, derived from the aerodromes of departure and destination and the route of flight as specified in the SFPL. |
| | | The appropriate SID and STAR for the route and the runway in use, if known, at the departure and destination aerodrome, or entered manually for the flight, **shall**be included in the trajectory. |
| | | The target speeds and levels in the trajectory **shall**be derived from defined strategic constraints applicable to the route of flight. |

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| | | In the absence of applicable strategic constraints, the target speeds and levels **shall**be those specified in the SFPL. |
| | | The target level at a transfer point **shall**be updated upon entry of new transfer conditions at that point. |
| | | The estimated trajectory **shall**be calculated according to aircraft performance data, and the winds and temperature aloft (if available). |
| | | The system **should** also be capable of using QNH (for correct calculation of the vertical distance from the ground to top of climb) and the track state vector (actual position and velocity) for further refinement of the trajectory calculation. |
| | | The system **shall**determine the transfer of control points, and associated time/level, in the trajectory according to pre-defined on-route transfer points, off-route FIR/sector entry points, vertical sector entry points/levels, and IFR/VFR and GAT/OAT transition points. |
| **4.1.3.4.3** | | **Trajectory Distance** |
| | | The system **shall** calculate distance from the actual position of the arrivalto an aerodrome within the Tbilisi FIRaircrafts till touchdown according to predicted trajectory. |
| | | The system **shall**be able to displaycalculated trajectory distance on the lables and/or system tracks for each working position (On/Off). |
| ***4.1.3.5*** | | ***Coordination and Transfer*** |
| **4.1.3.5.1** | | **External Coordination and Transfer** |
| | | System **shall** be capable provide automatic GROUND–GROUND coordination between adjacent/subjacent ATC units for "BASIC PROCEDURE","DIALOGUE PROCEDURE - CO-ORDINATION", "DIALOGUE PROCEDURE - TRANSFER OF COMMUNICATION","AIRSPACE CROSSING" phasesaccording to rules described in [2, 15] (Eurocontrol Specification for On-Line Data Interchange) |
| | | System **should** be capable provide automatic GROUND–GROUND situational awareness messages exchange with external units according to rules described in [2] including OLDI messages as follows:<br>- BASIC FLIGHT DATA MESSAGE (BFD);<br>- CHANGE TO FLIGHT DATA MESSAGE (CFD). |
| **4.1.3.5.2** | | **Internal Coordination and Transfer** |
| | | Internal flight coordinationand Transfer **shall** take place between internal sectors according to the OLDI Standard.. |
| ***4.1.3.6*** | | ***SSR Code Management*** |

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| **4.1.3.6.1** | | **ORCAM code assignment method** |
| | | The procedure for SSR Code assignment is in accordance with the Originating Region Code Assignment Methodology (ORCAM) is specified in reference [16].<br>The principle of ORCAM is to specify the codes that may be assigned or retained within defined regions, thus minimizing both the duplication of a code in a region and the frequency with which the code is changed during a flight.<br>The allocation of codes to categories is defined within the Environment Data (see paragraph 4.2.3.1.7, SSR Code Categorization). |
| *4.1.3.6.1.1* | | *SSR Code Category Determination* |
| | | For a flight within Tbilisi FIR, the system **shall**assign an SSR code from the "Domestic" category. |
| | | For a flight departing from the Tbilisi FIR destined for an any FIR the system **shall**assign an SSR code from the "International" category. |
| | | From any of the automatic assignment categories, the code assigned **shall**be that code within the category that has been available for assignment the longest time. |
| | | The system **should** generate a warning when the utilization of codes within a category exceeds a threshold. |
| *4.1.3.6.1.2* | | *SSR Code Assignment* |
| | | For flights departing from an aerodrome within the Tbilisi FIR, the system **shall**assign an SSR code upon transition SFPL to the "Notified" status. |
| | | For flights inbound to the Tbilisi FIR, the system **shall**assign the code contained in ABI or ACT message, or passed in an estimate, if it belongs to a further retainable category and is not currently assigned to another flight. |
| | | Otherwise, a code **shall**be assigned from the category according to the rules stated in paragraph 4.1.3.6.1.1, SSR Code Category Determination, for the further route of flight. |
| | | In cases where the code contained in the ABI/ACT/estimate can not be retained, the system **shall**maintain both the non-retainable code (termed 'current') and the newly assigned code (termed 'next'). |
| | | The system **shall**permit manual assignment of a specified SSR code, regardless of whether it has already been assigned to another SFPL. |
| | | The system **shall**permit manual request for an SSR Code to be assigned to a flight from the appropriate category. |
| | | The SSR code **shall**be released upon transition appropriate SFPL to the «Terminated» or "Initial" state or upon assignment of a new code to that SFPL. |
| **4.1.3.6.2** | | **CCAMS assignment** |

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| | | CCAMS will provide the assigned SSR code to the ATS Units along the route of the flight plan. The first ATS Unit in the CCAMS Area will assign the CCAMS Code to the flight concerned. |
| | | The Centralized SSR Code Assignment and Management System (CCAMS) will be a system that receives flight plan data for all IFR/GAT flights that are about to enter the CCAMS Area |
| | | CCAMS will assign an SSR Code to the flights; either automatically or on request from an ATS Unit. CCAMS will send this SSR Code to all the ATS Units concerned. |
| | | The exchange of information between CCAMS and ATS Units will be done using dedicated messages (SSR Code Management Messages) in ADEXP format that will be sent via the AFTN/AMHS network. |
| | | The ATS Units will process the CCAMS messages and assign the CCAMS Code to the corresponding system flight plans. |
| | | CCAMS will assign SSR Codes to flights, distribute them to the ATS Units and release the codes from the flights at the appropriate time. |
| | | ATS Units will receive the CCAMS Code from CCAMS and will be responsible for assigning the CCAMS Code to the flight. This will be applicable for all IFR/GAT flights (i.e. for all flights for which the flight plan has been received from IFPS). |
| | | Normally ATS units will receive the CCAMS Code automatically from CCAMS a parameter time before the code is required (based upon flight plan data). |
| | | However, for ATS Units at the boundary of the CCAMS area it may be required to retain the SSR Code of the flight (e.g. due to ORCAM rules). In such cases, the ATS unit will send a request for SSR Code to CCAMS, including the SSR code to be retained. |
| | | Each ATS Unit will have a pool of Local Codes (i.e. non-CCAMS Codes) for assignment to all other flights i.e. for which no flight plan has been received from IFPS. |
| | | In case, for whatever reason, a CCAMS code was not available for an IFR/GAT flight, the ATS Unit is expected to assign an SSR code from its pool of Local Codes. |
| | | The ATS Unit may have to assign a Local Code to a flight for example in case of CCAMS failure or of failure of the link between CCAMS and the ATS Unit. |
| | | During CCAMS outage upon CCAMS operational supervisor command the local ATS unit supervisor manually assigned status «CCAMS Outage» and then local ATS system activate and start assign the local codes from specific category. |
| | | In addition local ATS system may use the aircraft identification received from mode «S» data as a primary identification feature if corresponding functionality has been activated. |
| *4.1.3.6.2.1* | | *Messages from CCAMS* |
| | | If present the IFPLID **shall**be the main key for association of CCAMS messages to a SFPL. |

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| | | When the IFPLID is not available at the ATS Unit, the ATS system **shall**use the following association keys: ARCID, ADEP, ADES, EOBD / EOBT. |
| | | Any CCAMS message that cannot be associated to existing flight data **shall**forward to a flight data assistant (FDO) for manual processing with possibility to compile and submit flight plan request (RQP) to IFPS. |
| | | System **shall** allow manual association CCAMS messages with SFPL in case CCAMS messages have been received before the IFPS flight plan. |
| | | If a message received from CCAMS cannot be associated to flight plan data, the ATS System **shall**record an entry in a Log File, specifying the ARCID+ADEP+ADES+EOBT/EOBD or ARCID+IFPLID (if present) of the received message. |
| | | An ATS system **shall**verify the Time-Stamp of the received message. It **shall** ignore any CCAMS message if it has a Time-Stamp which is before the Time-Stamp of the last received and processed CCAMS message for the same system flight plan. |
| | | CCAMS messages format **shall** comply with [17]. |
| *4.1.3.6.2.1.1* | | *Code Assignment Message (CAM)* |
| | | The ATS system **shall**be able to process CAM. |

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| | | If a CAM is received for a flight for which a CCAMS code was received previously, the ATS system **shall**interpret it as a revision of the previous CCAMS code. |
| | | System **shall** distinguish between "current" (actual) code received verbally or in the co-ordination message and "next" (new) the CCAMS code or local code.<br>***Note**. When processing the amendments (newer CAM or REV), the system must make sure that the CAM updates the CCAMS code and ABI/REV updates the actual code.* |
| | | For Departures from the ATSU AoR if the SFPL is not in an "Active" status at the time of the CAM reception, the CCAMS Code contained in the CAM **shall**be inserted in the corresponding SFPL as a current SSR code. |
| | | For Inbounds and/or Overflights if the SFPL is not in an "Active" status at the moment when the CAM is received, the CCAMS code **shall**be assigned to the corresponding SFPL as new SSR code and displayed at appropriate working position.<br>***Note.** New SSR code needs to be displayed only if it differs from current SSR code.* |
| | | If the SFPL is in an "Active" status the received CCAMS Code **shall**be assigned to the corresponding SFPL as a new SSR code and displayed at appropriate working position.<br>***Note.** New SSR code needs to be displayed only if it differs from current SSR code.* |
| | | The CCAMS code **shall**become the current SSR code only after the SSR code change procedure is successfully finished.<br>***Note:** From a system point of view the code change can be considered finished when the system automatically detects that the flight is squawking the new SSR code or when the controller has manually confirmed it.* |
| | | The SSR code **shall**remain unchanged if the SSR code change procedure is not successfully finished or received CCAMS SSR code already assigned to another flight. Corresponding ERR messages **shall** be sent to CCAMS. |
| | | The SSR code **shall**remain unchanged if the CCAMS code is identical to the current one. |
| *4.1.3.6.2.1.2* | | *Code Cancellation Messages (CCM)* |

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| | | The ATS system **shall**be able to process CCM. |
| | | When a CCM is received for a flight that is not in an "Active" status when a CCM is received, the SSR code previously assigned to a SFPL **shall**be released. |
| | | When a CCM is received for a flight that is in an "Active" state the ATS System **shall**assign a local code as new SSR code and displayed at appropriate working position. |
| | | If a Local Code is assigned for a flight for which CCAMS has sent a CCM, the ATS system **shall** sent appropriate ERR message to CCAMS. |
| | | The same code change procedure as for a code revision **shall**apply. |
| | | The system **shall** ignore the CCM messages that received for flights that already assumed by controller and for that CCAMS or local code was previously assigned. |
| | | The CCAMS Code **shall**not be released from the corresponding already correlated SFPL before the code change procedure is completed.<br>***Note:*** *From a system point of view the code change can be considered completed when the system automatically detects that the flight is squawking the new SSR code or when the controller has manually confirmed it.* |
| | | When a CNL message is received from IFPS for a flight for which a CCAMS code was received previously system **shall**release the code from that flight. |
| *4.1.3.6.2.1.3* | | *Error Messages* |
| | | The ATS system **shall**be able to receive and process ERR message. |
| | | These messages **shall**be recorded and be available for extraction and further external analysis. |
| | | If a CCAMS message cannot be processed because it presents syntax errors or because the message cannot be associated with the corresponding SFPL the ATS system **shall**forward this message to FDO position for manual processing andtransmit an appropriate ERR message to CCAMS. |
| *4.1.3.6.2.2* | | *Messages to CCAMS* |
| *4.1.3.6.2.2.1* | | *COde Request (COR) message* |
| *4.1.3.6.2.2.1.1* | | *Automatic Code Assignment* |
| *4.1.3.6.2.2.1.1.1* | | *For Departures flights* |
| | | System **shall**automatically trigger and send a COR message for departures flights from aerodromes within its AoR if CCAMS code was expected at defined time before EOBT but no SSR code has been received from CCAMS during the system parameter time. |
| *4.1.3.6.2.2.1.1.2* | | *For Inbound and Overflights* |

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| | | System **shall**automatically trigger and send a COR message for inbound and over-flights if CCAMS code was expected at defined time before entry in AoR but no SSR code has been received from CCAMS during the system parameter time. |
| *4.1.3.6.2.2.1.2* | | *Code Assignment On-Request* |
| *4.1.3.6.2.2.1.2.1* | | *For Departures flights* |
| | | System **shall**automatically trigger and send a COR message for departures flights from aerodromes within its AoR at the time before EOBT defined in system parameters.<br>***Note:*** *In case a Code Cancellation Message is received for a flight (i.e. a DLA/CHG message is received for that flight) the system is expected to retransmit a COR when a CCAMS code is required for that flight according to new EOBT.* |
| *4.1.3.6.2.2.1.2.2* | | *For Inbound and Overflights* |
| | | System **shall**automatically trigger and send a COR message for inbound and over-flights at the moment of SFPL activation (either the manual input of a verbal estimate or the reception of an automated ACT/PAC message) if CAM was not received before that moment. |
| | | If available, the Code Request (COR) message **shall**contain the SSR Code from the verbal or automatic (ACT/PAC) coordination. |
| | | For flights that use a special SSR code (A7500, A7600, A7700, A1000, A2000, A7000 and etc) the COR message **shall** be sent only if the previously assigned CCAMS code is no longer known in the ATS Unit. |
| | | The system **shall** be capable automatically trigger and send a COR message for overflights and inbound flights eligible for A1000 if this code cannot be used because of an Aircraft Identity discrepancy |
| *4.1.3.6.2.2.1.2* | | *Code Request auxiliary cases* |
| | | ATS system **shall** allow send COR message for selected flight upon manual request. In case of manual sending COR message **shall** contain empty “current SSR code” field. |
| | | System **shall** automatically trigger and send COR message to CCAMS after AFP message was sent to IFPS for missing FPL cases (See SPR0025). |
| *4.1.3.6.2.2.2* | | *Code Release (CRE) message* |
| | | The ATS system **shall**send a CRE message to CCAMS when SFPL status changed into “Terminated” if CCAMS code was previously assigned for that flight and flight leave CCAMS area. |
| | | The ATS system **shall**allow activate/deactivate automatic CRE message sending. |
| *4.1.3.6.2.2* | | *Addressing Requirements* |

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| | | ATS system **shall**be capable to send CCAMS related messages to two different CCAMS AFTN/AMHS addresses (primary and back-up). |
| | | CCAMS messages received from external sources that are unrecognized **shall**be forward for manual processing.<br>***Note:*** *Unrecognized external source means message originator that different from CCAMS AFTN/AMHS addresses defined in system parameters.* |
| *4.1.3.6.2.4* | | *Local Codes assignment* |
| | | System **shall** distinguish category of local SSR code as follows:<br>- «Domestic codes»;<br>- «VFR codes»;<br>- «Contingency codes». |
| | | System **shall** allow modification (update, amendment and deletion) of local SSR codes in each category. |
| | | System **shall** assign local SSR codes from "Domestic codes" category:<br>- for flights, for which CCAMS SSR code was expected but CCAMS code haven't received or received not in time;<br>- for flights, for which have been received ERR message from CCAMS with comments «NO MORE SSR CODES AVAILABLE FOR THIS FLIGHT»;<br>- for flights that fully performed within Tbilisi FIR;<br>- for selected flight upon manual request. |
| | | System **shall** assign local SSR codes from "VFR codes" category:<br>- for flights that fully performed within AoR as VFR according to flight plan;<br>- for flights that partly performed as VFR upon manual assignment to the flight of VFR rules. |
| | | System **shall** assign local SSR codes from "Contingency codes" category for all IFR/GAT flights while system in "CCAMS Long-term Outage" status (see paragraph *4.1.3.6.2.6.1.2*). |
| *4.1.3.6.2.5* | | *Special requirements* |

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| | | ATS system **shall** provide recording and archiving of all CCAMS related messages. |
| | | ATS system **shall** provide the extraction of recorded CCAMS messages according to type and/or time criteria |
| | | System **shall**provide warning to the controller working positions for SSR duplication for SFPL in "Active" status. |
| | | ATS system **shall** provide determination and recording CCAMS response times for replies to COR messages. |
| *4.1.3.6.2.6* | | *Contingency & Recovery Requirements* |
| *4.1.3.6.2.6.1* | | *CCAMS Outage* |
| *4.1.3.6.2.6.1.1* | | *CCAMS Short-term Outage (up to 20 minutes)* |
| | | System **shall**be using the SSR codes that CCAMS had assigned to the flights before the outage. |
| | | System **shall**process all CCAMS messages for flights that are exist in ATS system as system flight plans. |
| | | During the CCAMS recovery period system **shall**transmit a COR message for each IFR/GAT SFPL in "Active" status for which CCAMS codes were not received. |
| *4.1.3.6.2.6.1.2* | | *CCAMS Long-term Outage (more than 20 minutes)* |

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| | | System **shall**allow “on-line” activation/de-activation “CCAMS Long-term Outage” status from operational supervisor position upon manual request. |
| | | System **shall** provide availability of SSR codes from “Contingency codes” category during not later than 15 minutes after “CCAMS Long-term Outage” status assignment. |
| | | System**shall**release all SSR codes that were assigned by CCAMS before CCAMS Long-term Outage from not-assumed fights and assign codes from “Contingency codes” category for that flights. |
| | | System**shall** continue to assign codes from “Contingency codes” category while “CCAMS Long-term Outage” status is active. |
| | | System **should** not send COR message to CCAMS while “CCAMS Long-term Outage” status is active. |
| | | It **shall** be possible to define per adjacent FIR for entering flights which codes will be changed (local codes) during “CCAMS Outage” status |
| | | For departures or overflights on a code that has to be changed which will leave the AoR of the ATSU, the system **shall** assign A1000 (where applicable) or a code from the “Contingency codes” category corresponding with the destination of the flight. |
| | | For flights entering with a code that can be retained, the system **shall** retain the code received in the ACT message or via verbal coordination. |
| | | In order to achieve the directional assignment, the system **shall** provide for at least 4 different pools of “Contingency codes”. |
| | | The system **shall** be capable of grouping ICAO location indicators into at least 4 different destination groups |
| | | Each destination group **shall** consist of one or several regions, countries, FIRs or airports to be defined by the first, the first two, the first three or all four letters of an ICAO location indicator. |
| | | In case of Contingency State red, the system **shall** compare the flight’s ADES with the ICAO location indicators in the destination groups and assign the first code from the “Contingency codes” corresponding to the respective destination group. |
| | | The system **shall** block the assigned code and release it when the flight leaves the AoI of the ATSU. |
| | | When the last code in a pool has been assigned, the system **shall** assign the code from the same pool which has been released and which has the earliest release time to the next flight. |
| | | If no “Contingency codes” is available, the system **shall** assign a «Domestic codes» using the same logic as for the assignment of «Contingency codes». |
| | | The system **shall** allow define and update the destination groups as changeable system parameters. |
| *4.1.3.6.6.2* | | *CCAMS Link Outage* |

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| | | In case of AFTN/AMHS Link Outage between an ATS Unit and CCAMS, system **shall**be using the SSR codes that CCAMS had assigned to the flights before the outage. |
| | | After AFTN/AMHS Link becomes available system **shall**process all CCAMS messages that have been queued by AFTN/AMHS in order to assign CCAMS codes to as many flights as possible. |
| | | After AFTN/AMHS Link become available the ATS system **shall**transmit a COR message for each SFPL in "Active" status for which CCAMS codes were not received. |
| *4.1.3.6.6.2* | | *FDPS Outage* |
| | | During a failure of the local FDPS system **shall**allow manual assignment of local codes or CCAMS codes that are available from any other source (FMP terminal, verbal co-ordination with CCAMS, verbal coordination with adjacent ATC unit, etc.) |
| | | After FDPS system become available the ATS System **shall**process all CCAMS messages that have been queued by AFTN/AMHS in order to assign CCAMS codes to as many flights as possible. |
| | | After FDPS system become available the ATS system **shall** transmit a COR message for each SFPL in "Active" status for which CCAMS codes were not received. |
| *4.1.3.6.6.4* | | *RDPS Outage* |
| | | When the RDPS fails system **shall**continue message exchange with CCAMS as before. |
| | | During the failure of correlation function, but where radar data is still available, system **shall**provide possibility for manual correlation. |
| | | The SSR codes that will be used for the manual correlation **shall**be the SSR codes provided by CCAMS or the local codes. |
| ***4.1.3.7*** | | ***Aircraft Identification*** |
| | | The function of Aircraft Identification is the correlation of a track with an SFPL, the purpose of which is to augment the surveillance picture with information from the SFPL and to enable the monitoring and update of the SFPL with actual progress. |

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| | | The basis upon which correlation is established is a match between the SSR codes in the track with that assigned to the SFPL. |
| | | However, due to errors in the code allocation or shortage of available SSR codes, even a discrete code in a track can not be considered unique, and therefore a further check is made to ensure that the track position is in conformance with the SFPL trajectory. |
| | | Particularly in the case of inbound aircraft, the SFPL may have a "current" SSR code, for use up to the xx FIR, and a "next" SSR code for use once in the Tbilisi FIR. Thus, correlation may be performed on either of these codes, with association of a particular code with a portion of the trajectory added to the position verification. |
| | | Once established, correlation is maintained regardless of SSR code change, or loss, in the track. |
| | | However, if the track code changes to a non-emergency code that is not assigned in the SFPL (i.e. neither current nor next code), a warning is generated such that the correlation may be manually cancelled. |
| | | A manual correlation facility is required for that tracks/SFPL that can not be automatically correlated (i.e. PSR tracks or non-discrete SSR codes) or for overriding a mismatch in SSR code between the track and SFPL. |
| **4.1.3.7.1** | | **Mode A Correlation** |
| | | The system **shall**be capable of automatic SFPL/track correlation for system tracks containing a discrete code. |
| | | The system **shall**be capable of manual SFPL/track (PSR and SSR) correlation and de-correlation. |
| | | Correlation between a track and SFPL **shall**be achieved if there is a match in SSR code between the track and SFPL and the track is in conformance, within pre-defined limits, with the trajectory. |
| | | The system **shall**take into account both current and next SSR code assigned to same SFPL when checking for a code match. |
| | | Correlation **shall**be attempted for an uncorrelated SFPL upon assignment or update of a discrete code in the SFPL. |
| | | Correlation **shall**be attempted for an uncorrelated SFPL that failed the correlation position check, upon update to the trajectory. |
| | | Correlation **shall**be attempted for an uncorrelated track upon change of a discrete code in the track. |
| | | Correlation **shall**be attempted for an uncorrelated track that failed the correlation position check, upon update to the track position. |
| | | An SFPL-track pair that has been manually de-correlated **shall**not be automatically re-correlated. |
| **4.1.3.7.2** | | **De-correlation** |
| | | Once correlation is established between an SFPL and a track, it **shall** be broken only upon manual de-correlation request, track cancellation or transition of the SFPL to the Terminated state. |

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| **4.1.3.7.3** | | **Use of Modes A and S in Combination** |
| *4.1.3.7.3.1* | | *Correlation Process* |
| | | In this Method a discrete code is assigned to all flights (including codes retained for flights entering the mode S area) and correlation is initiated in accordance with current Mode A procedures. |
| | | The actual Mode S equipage of the flight is then determined by surveillance on entering coverage.<br><br>For mode S flights for which the reported aircraft identification matches the aircraft identification in the flight plan:<br>- Correlation is maintained using, inter-alia, the aircraft identification throughout the Mode S area;<br>- The code is released for re-assignment and the flight continues to respond on the same code for conspicuity purposes.<br><br>***Note:*** *This is to maintain interoperability with any non Mode S equipped units within whose coverage the aircraft will pass.* |
| | | If the flight is not equipped with mode S aircraft identification reporting capability or a discrepancy with the flight plan aircraft identification is identified, the code retains its discrete status. |
| | | At the code assignment event flights **shall** be assigned codes in accordance with paragraph *4.1.3.6.1.2*SSR Code Assignment. |
| | | Correlation for all flights **shall**be initiated utilizing Mode A in accordance with paragraph *4.1.3.6.1.1*SSR Code Category Determination. |
| | | Correlation **shall** be maintained using Mode S surveillance whilst the flight remains in the Mode S area for flights which have been correlated using Mode A but which are reporting an aircraft identification which matches the aircraft identification in the flight plan. |
| | | The code for an aircraft correlated **shall**be made available for re-assignment to another flight. |
| *4.1.3.7.3.2* | | *Conditions for Re-assignment* |
| | | This paragraph described the re-assignment conditions for a code released in accordance with requirement described in paragraph *4.1.3.7.3.1*. |
| | | In some cases, service providers are not able to accept multiple flights on the same discrete code. Thus code protection must be applied in respect of flights entering surveillance coverage of such service providers. |
| | | The re-use of a code made available for re-assignment to another flight in accordance with requirement described in paragraph *4.1.3.7.3.1* **shall**be on the basis of the code that has been made available for the greatest length of time. |
| | | Code protection **shall** be applied in respect of flights crossing the boundary of the airspace of a downstream ATSU (irrespective of level). |
| *4.1.3.7.3.3* | | *Re-routes and Diversions* |

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| | | It is a general requirement that any action that may invalidate the current assignment of an SSR code for a flight results either in confirmation of the validity of the existing code, or assignment of a new code. |
| | | If a flight is re-routed or is subject to any change that affects code assignment or retention, the code assignment process **shall** be performed again and the assigned code confirmed, or modified, and associated code protection recalculated. |
| | | Where code assignment re-processing is performed and a code modification is needed, the new code **shall** be promulgated. |
| **4.1.4** | | **ATC Tools** |
| | | ATC Tools are usedtodescribe a setoffactionsinadditiontothecorefunctionality, providingmonitoringandalertingfacilities. |
| | | The ATC Toolsdescribedhereincomprise:<br>- MonitoringAids<br>- SafetyNets (STCA, MSAW, APW);<br>- MediumTermConflictDetection. |
| ***4.1.4.1*** | | ***Monitoring Aids*** |
| | | The purpose of the monitoring aids is to update the SFPL with actual flight progress and to warn the controller of deviations of the track from the SFPL. |

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| | | The monitoring aids described here comprise a lateral, longitudinal, vertical and SSR code conformance checks. |
| | | The lateral conformance check verifies that the track is within a certain distance of its expected flight path. |
| | | Lateral non-conformance may signify incorrect correlation, failure of the controller to update the SFPL with a change of route, or deviation of the aircraft from its intended path. |
| | | In the case of an SFPL being given an assigned heading that does not constitute a closed constraint, the deviation check may still be performed against the trajectory, as it is assumed that the heading assignment is of a temporary nature, for the purpose of traffic avoidance. |
| | | However, the designation of airspace in which lateral conformance checking is not applied is necessary in order to avoid unwanted deviation warnings where many tactical headings are assigned (e.g. in TMA). |
| | | Longitudinal conformance checking uses the track state vector to re-evaluate the estimated times on the trajectory, thus allowing more precise conflict checking, coordination, etc. |
| | | In addition, the detection of arrival at certain significant points on the route allows further update to the SFPL (e.g. departure detection, FIR entry/exit, rules change, arrival, etc.). |
| | | The vertical conformance check may comprise two aspects;<br>- a cleared level monitor verifies that the level in the track tends towards the cleared level and does not pass through it,<br>- and a trajectory check may update the trajectory with the climb/descent profile observed in the track and verify that the exit conditions can be achieved. |
| | | Due to the speed at which an aircraft may pass through its cleared level, the cleared level monitor is performed upon every track update. The other conformance checks may be performed less frequently. |
| | | The SSR code conformance check verifies that the SSR Code in the track is in conformance with that assigned to the SFPL. |
| | | Both the SSR code in use prior to entry into the Tbilisi FIR (termed the current code), and, if applicable, the SSR code to which the aircraft must change upon entry to the Tbilisi FIR (termed the next code) may be valid codes for the aircraft to transpond according to the context. |
| | | Flights not yet assumed are expected to be transponding the current code, but may have changed to the next code prior to assumption. |
| | | Assumed flights are expected to have changed to the next code and therefore an indication is generated until such time that the code is changed. |
| **4.1.4.1.1** | | **Lateral Conformance** |
| | | For SFPLs in the Active state, performing an IFR leg, the system **shall** periodically check the position of the correlated track for conformance with the SFPL trajectory. |

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| | | If the perpendicular distance of the track from the trajectory path is greater than an adaptable limit, a warning of deviation from the route **shall** be generated. |
| | | For an SFPL containing an assigned heading constituting an open constraint, the system **should** check adherence to this heading. |
| | | The system **shall** permit the designation of airspace in which the lateral deviation warnings are not generated. |
| **4.1.4.1.2** | | **Longitudinal Conformance** |
| | | For SFPLs in lateral conformance, the System **shall** be capable of amending the estimated times in the trajectory in accordance with the track state vector. |
| | | The system **shall** avoid erroneous trajectory updates in the case of unstable track state vectors (e.g. during aircraft turn or acceleration) and in the terminal phases of flight. |
| **4.1.4.1.3** | | **Progress Monitoring** |
| | | Upon correlation of an SFPL in the Notified state, for a flight departing from an aerodrome within the Tbilisi FIR, the SFPL **shall** be considered in the Active state and automatic departure detection applied to the flight. |
| | | An SFPL in the active state **shall** be considered in the Terminated state upon detection of the correlated track leaving the Area of Interest, Tbilisi FIR, providing it is not planned to re-enter. |
| | | The system **shall** differentiate between estimated and actual times in the flight trajectory. |
| | | For active flights inbound to the AoR, the system **shall** be capable of generating a warning of overdue aircraft if correlation with a track is not established within a certain time of expected AoR entry time. |
| **4.1.4.1.4** | | **Vertical Conformance** |
| | | The system **shall** be capable of updating the vertical profile of the trajectory according to the track level and vertical rate. |
| | | The system **shall** generate a warning if the co-ordinated sector/FIR exit level is not achievable according to current track position and nature of aircraft moving. |
| **4.1.4.1.5** | | **Cleared Level Monitoring** |
| | | Upon each update to a track for which a cleared level has been assigned, the system **shall** generate a warning if either:<br>- the track indicator shows climb and the current level is more than a predefined limit above the cleared level;<br>- the track indicator shows descent and the current level is more than a predefined limit below the cleared level. |

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| | | System **shall** generate a potential level bust warning whenever a flight's current climb/descent rate exceeds the threshold parameter that corresponds to the current altitude difference between the flight and its cleared level. |
| | | System **shall**generate a warning if, upon assignment of a cleared level, the track level does not indicate movement towards that level within an adaptable time. |
| **4.1.4.1.6** | | **SSR Code Conformance** |
| | | Upon each update to a track that is correlated to an SFPL, the System **shall**check that the SSR code in the track matches either the current or next code assigned to the SFPL or a non-discrete special purpose code. |
| | | For an unassumed track, the system **shall**generate a warning if the track SSR Code does not match either the current or next SSR code in the SFPL or a non-discrete special purpose code. |
| | | For an assumed track, the system **shall**generate a warning if the track SSR Code does not match the next SSR code in the SFPL or a non-discrete special purpose code. |
| ***4.1.4.2*** | | ***Safety Nets*** |
| | | Safety Nets describe a series of tools based on the use of surveillance information, detecting conflict situations in the short term and comprise:<br>- Short Term Conflict Alert (STCA) tool;<br>- Minimum Safe Altitude Warning (MSAW) tool;<br>- Area Proximity Warning (APW) tool.<br>Safety Nets functions **shall** be in accordance to the Eurocontrol specifications [18], [19], [20], [21]and particulary, **shall** aply to the following reqvirements: |
| **4.1.4.2.1** | | **Short Term Conflict Alert (STCA)** |
| | | The purpose of STCA is to alert the controller to current and predicted separation conflicts involving aircraft under his control. This implies establishing a balance between the two opposing objectives of providing adequate warning time and minimizing nuisance alerts. |

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| | | An STCA is generated if comparison of the state vectors of two tracks indicates that the aircraft are, or will be, in separation conflict within a certain look-ahead time. The path prediction may be both a linear and, for tracks that indicate the aircraft is turning, an extrapolation based on maintaining the turn at a given rate. |
| | | To reduce the number of nuisance alerts, a confirmation stage is introduced to determine whether the alert is operationally necessary before generating the alert. This is intended to eliminate alerts caused by transient, spurious track data, and to delay the generation of an alert when standard or expected manoeuvres may be anticipated. |
| | | In order to ensure that STCA is responsive to the characteristics of differing airspace types, STCA parameters (separation, look-ahead time, aircraft performance) are defined in conjunction with a specified applicability region. These regions may be dynamically activated either explicitly by the supervisor, or implicitly if linked to another environment feature (e.g. runway in use). |
| | | A controller-entered cleared level is used indirectly by STCA for supplementing surveillance data in determining whether an aircraft is in the process of levelling-off at cleared level. Due to the frequency of level busts as a cause of loss of separation, the vertical extrapolation of the track state vector is continued through the cleared level unless the aircraft is detected to be leveling-off at cleared level. |
| | | Individual control of the STCA prediction facility and the STCA current proximity facility for defined regions allows the inhibition of the facility if it is not able to provide a useful service in that region. |
| *4.1.4.2.1.1* | | *Track Eligibility* |
| | | A pair of tracks **shall**be eligible for STCA if at least one of the tracks is either under control of an internal sector or is in the process of coordination or handover to a sector, and both tracks contain a calculated vertical position and rate. |
| *4.1.4.2.1.2* | | *Conflict Prediction* |

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| | | The parameters used in the determination of a conflict for a pair of tracks **shall**be those defined for the region of the highest priority in which the tracks are located, taking into account each aircraft's RVSM capability when in RVSM airspace. |
| | | A conflict **shall**be declared between an eligible track pair if the current proximity of the track state vectors is within a defined limit. |
| | | A conflict **shall**be declared between an eligible tracks pair if a linear extrapolation of the track state vectors, over a defined look-ahead time, indicates the predicted proximity of the tracks is within a defined limit. |
| | | The system **shall**be capable inhibit to declare alerts for diverging track pairs. |
| | | A conflict **should** be declared between eligible tracks pair if a curvilinear extrapolation of a track through a detected turn indicates the predicted proximity of the tracks is within a defined limit. |
| | | The system **should** delay the declaration of an alert derived from a linear extrapolation if, through extrapolation of either track through a turn at a defined "standard rate", the resultant predicted proximity does not fall below a defined limit. |
| | | The system **shall**inhibit alerts caused by spurious track data (e.g. reflections, split tracks). |
| | | If CFL meaning is relevant for STCA calculation the system **shall**continue the vertical extrapolation of the track state vector through the cleared level unless the Mode C is within a pre-defined tolerance of the cleared level and the vertical speed is below a pre-defined limit. |
| *4.1.4.2.1.3* | | *STCA Control* |
| | | The system **shall** provide the possibility to inhibit STCA alerts for predefined volumes of airspace by the Supervisors. |
| | | Activation and de-activation **should** be individually controllable by the Supervisors for conflicts derived from an extrapolation and those due to the current proximity. |
| **4.1.4.2.2** | | **Minimum Safe Altitude Warning (MSAW)** |
| | | The purpose of MSAW is to warn the controller when an aircraft is at - or predicted to be heading towards - a level that is not considered to give sufficient terrain or obstacle clearance. |

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| | | Two aspects to the MSAW capability are identified; a terrain and obstacle proximity monitor, and a glideslope protection monitor. |
| | | The terrain and obstacle proximity monitor detects track state vectors that are either currently below - or predicted to be below - a designated minimum safe altitude. |
| | | For wide areas of relatively flat terrain, the terrain map may take the form of a grid with a minimum altitude defined for each cell. |
| | | In more mountainous terrain, or where there exist many obstacles to air traffic, a finer mapping of the terrain/obstacle contours is desired. The definition of the terrain map is specified in paragraph 4.2.2.1, Data Reduction Tool. |
| | | The glideslope protection function detects, for aircraft on final approach, track state vectors that are significantly lower than an ILS glideslope. It may also be defined for use with SIDs, STARs and missed approach procedures. This mechanism must be responsive to aircraft that have been vectored away from the standard approach/departure route, or are performing a visual approach. |
| *4.1.4.2.2.1* | | *Track Eligibility* |
| | | A track **shall**be eligible for MSAW if it is either under control of an internal sector or is in the process of coordination or handover to the sector, and the track contains a vertical position. |
| *4.1.4.2.2.2* | | *Terrain Proximity Warning* |
| | | An MSAW **shall**be declared for an eligible track if the track is below the minimum altitude defined for the cell or obstacle contour in which the track is currently located. |
| | | An MSAW **shall**be declared for an eligible track if the predicted position of the track, derived from an extrapolation of the track state vector over a defined time, is below the minimum altitude defined for a cell or obstacle contour on the extrapolated path. |
| | | The system **should** delay the declaration of an MSAW derived from an extrapolation if, through extrapolation of the track through a detected turn at a defined "standard rate", the resultant path does not penetrate the cell or obstacle beneath the minimum level. |
| | | If CFL meaning is relevant for MSAW calculation the system **shall**continue the vertical extrapolation of the track state vector through the cleared level unless the Mode C is within a pre-defined tolerance of the cleared level and the vertical speed is below a pre-defined limit. |
| | | The system **shall**inhibit alerts caused by spurious track data (e.g. reflections). |
| | | The system **shall**inhibit MSAW alerts for aircraft which are established on the glideslope and for which the Glideslope Protection function is applied. |
| *4.1.4.2.2.3* | | *Glideslope Protection* |

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| | | An MSAW **shall**be declared for an eligible track on a glideslope if the track is below the minimum altitude defined for that position on the glideslope. |
| | | Activation of glideslopes to be protected **shall**be according to the runway in use. |
| *4.1.4.2.2.4* | | *MSAW Control* |
| | | The system **shall**permit the activation and de-activation of the MSAW functions by the Supervisors. |
| **4.1.4.2.3** | | **Area Proximity Warning (APW)** |
| | | The purpose of APW is to alert controllers of predicted aircraft penetrations into a region of airspace which has been designated as protected. |
| | | Protected airspace comprises published permanently prohibited, danger and restricted airspace, published temporarily restricted/segregated airspace, and ad hoc protected airspace designation. |
| | | The applicability of an airspace restriction may depend on the context of the flight. For example, a military training area is protected for all aircraft except those that are supposed to fly within it. Therefore a means for inhibiting alerts in such cases is required. This may be automatically accomplished by determining from the flight plan that the flight is permitted to fly in the airspace, a manual designation, or by simply de-activating the alert for the selected flight. |
| *4.1.4.2.3.1* | | *Track Eligibility* |
| | | A track **should** be eligible for APW if it is either under control of an internal sector or is in the process of coordination or handover to the sector, and the track contains a vertical position. |
| *4.1.4.2.3.2* | | *Area Proximity Designation* |
| | | An APW **shall**be declared for an eligible track if the track is currently inside an active APW Protected Airspace. |
| | | An APW **shall**be declared for an eligible track if the predicted path of the track, derived from an extrapolation of the track state vector over a predefined time, penetrates an active APW Protected Airspace. |
| | | The system **shall**delay the declaration of an APW derived from an extrapolation if, through extrapolation of the track through a detected turn at a defined “standard rate”, the resultant path does not penetrate an active APW Protected Airspace. |
| | | If CFL meaning is relevant for APW calculation the system **shall**continue the vertical extrapolation of the track state vector through the cleared level unless the Mode C is within a pre-defined tolerance of the cleared level and the vertical speed is below a pre-defined limit. |
| | | The system **shall**inhibit alerts caused by spurious track data (e.g. reflections). |
| *4.1.4.2.3.3* | | *APW Control* |

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| | | The system **shall**permit the activation and de-activation of the APW function by the Supervisor. |
| | | The system **shall**provide a means of inhibiting APW declaration for aircraft that are permitted to enter an APW Protected Airspace. |
| | | All Safety Nets alert and warnings **shall** be recorded and archived in a human readable format for further investigation use. All archived messages **shall** be time stamped and **shall** allow to identify the arcraft involved as well as a reson of the alert/alarm appearance. |
| ***4.1.4.3*** | | ***Medium Term Conflict Detection (MTCD)*** |
| | | *Additional Source – "Operational Requirements Document for EATCHIP Phase III ATM Added Functions Volume 5 - Medium Term Conflict Detection"* |

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| | | The basic MTCD described below is intended for use both in planning sector entry and exit conditions, and as a "scanning" aid to executive control. |
| | | MTCD will detect:<br>- loss of separation between probable positions of two aircraft, based on system trajectories and uncertainty areas,<br>- loss of the required distance between probable positions of an aircraft and a special use airspace,<br>- probable positions of an aircraft are below the lowest usable flight level. |
| | | MTCD is foreseen to cover all phases of flight. In arrival, departure and cruising phases, different separation criteria may apply. |
| | | The specification makes use of the term "problem" to denote a loss of separation between two trajectories. |
| | | The problem is classified as a conflict if the loss of separation occurs in the level band between the current level and cleared level of each aircraft; otherwise it is classified as a risk. |
| | | In order to minimize the number of nuisance problems declared, the separation criteria are varied according to the probable errors (termed "uncertainty") in the trajectories. |
| | | Uncertainty is individually defined in the lateral, longitudinal and vertical axes, taking into account the error characteristics in each. For example, lateral uncertainty will normally remain fixed with time as it is governed by the navigation accuracy of the aircraft, whereas longitudinal uncertainty is likely to grow with time. Vertical uncertainty is normally fixed whilst in level flight, but may grow during climb and descent. |
| | | As an enhancement for assistance in conflict resolution, context aircraft pertinent to a particular conflict are also identified. |
| | | Context aircraft are those whose trajectories do no not meet the criteria to be classed as a conflict or risk, but which are in the proximity of the conflicting aircraft such that they may constrain the conflict resolution strategy. |
| | | To aid in decision making, the submission of a tentative, "what if?" trajectory to the MTCD tool is also specified. |
| | | The implementation of the MTCD requirements mainly should be based working experience of the Tenderer with aim to provide conformity between number of conflicts situations detected by MTCD and number of conflicts that were really requested by controllers. Thus number of nuisance (from the controller point of view) MTCD "conflicts" and "risks" should be reduced to minimum rate. |
| **4.1.4.3.1** | | **Conflict Determination** |
| | | MTCD **shall** perform conflict detection for all eligible flights. |

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| | | MTCD **shall** allow excluding phases-of-flights. |
| | | MTCD **shall** allow excluding types-of-flights. |
| | | MTCD **shall** allow excluding airspaces within the area of operation. |
| | | The system **shall** provide an MTCD function to warn controllers of conflicts between IFR portions of flight trajectories. |
| | | A problem **shall**be declared between a pair of flights if the following conditions are met:<br>1. the 2d positions on the trajectories infringe predefined horizontal and vertical separation criteria at any moment within a predefined prediction horizon;<br>2. the conflict occurs within the MTCD airspace. |
| | | Within MTCD area of operation the system **shall** detect all special use airspace penetrations in the special use airspace penetration prediction horizon (MTCD). |
| | | Within MTCD area of operation the system **shall** detect all descents below lowest usable flight level in the descent below lowest usable flight level prediction horizon (MTCD). |
| | | MTCD conflict detection **shall** be smooth.<br>MTCD **shall** avoid status chasing behavior. This behavior occurs when the distance between the uncertainty areas (MTCD) of two flights is approximately the required separation (MTCD). Because of small changes in the trajectories of the flights, subsequent calculations of MTCD might result in frequent changes between conflict situations and no-conflict situations. This kind of behavior is a nuisance to controllers and should be avoided. |
| | | The system **should** classify problems that occur within the vertical band from the current level to the cleared level of each flight as a conflict, and those that occur beyond the cleared level as risks. |
| | | The system **shall** vary the separation criteria according to uncertainty over time in the longitudinal, lateral and vertical axes. |
| | | The system **should** inhibit the declaration of a problem if the aircraft are on route segments that are designated as separated. |
| | | It **shall** be possible to disable MTCD on-line by authorized users. |
| **4.1.4.3.2** | | **Context Traffic** |
| | | The system **shall**identify context traffic of a conflict, i.e. flights whose trajectories pass in the proximity (horizontal and vertical) of the trajectories of aircraft in conflict, without infringing the conflict/risk criteria. |
| **4.1.4.3.3** | | **MTCD Operation** |

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| | | An SFPL **shall** become eligible for MTCD upon transition to the Active state. |
| | | Thereupon, the MTCD criteria **shall** be applied to the SFPL at a defined rate, and/or upon change to any item affecting the declaration of a conflict, until the SFPL enters the Terminated state. |
| | | Whenever a trajectory (new or re-calculated) of a flight is received, MTCD **shall** perform complete conflict detection (MTCD) for eligible flight. |
| | | Whenever a flight leaves the MTCD area of operation MTCD **shall** end all existing conflicts for this flight. |
| | | Whenever a flight is deselected for MTCD calculations, MTCD **shall** end all existing conflicts for this flight. |
| | | Whenever a flight is re-selected for MTCD calculations, MTCD **shall** perform complete conflict detection (MTCD) for this flight. |
| | | Whenever special use airspace data (MTCD) changes, MTCD **shall** perform special use airspace penetration calculations for all eligible flights (MTCD). |
| | | Whenever lowest usable flight levels (MTCD) change, MTCD **shall** perform descent below lowest usable flight level calculations for all eligible flights (MTCD). |
| | | Whenever separation criteria (MTCD) change, MTCD **shall** perform aircraft conflict calculations for all eligible flights (MTCD). |
| | | Whenever the navigational capabilities of a flight change, MTCD **should** perform complete conflict detection (MTCD) for this flight. |
| | | Whenever a flight changes phase-of-flight (MTCD), MTCD **shall** perform complete conflict detection (MTCD) for this flight. |
| **4.1.4.3.4** | | **Conflict Probe** |
| | | MTCD **shall** be able to process tentative 4D trajectories. |
| | | MTCD **shall** exclude conflict detection between the system trajectory and a tentative trajectory of the same flight, and between two tentative trajectories of the same flight. |
| | | MTCD **shall** allow to update conflicts (MTCD) in which a tentative trajectory is involved. |
| **4.1.4.3.5** | | **Separation criteria** |
| | | MTCD **shall** allow the definition of airspaces (MTCD) in which different separation criteria (MTCD) have to be applied. |

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| | | MTCD **shall** allow the definition of different separation criteria (MTCD) between two flights depending on the phase-of-flight (MTCD) of these flights. |
| | | MTCD **shall** allow the definition of different separation criteria (MTCD) between two flights depending on the type-of-flight (MTCD) of these flights. |
| | | MTCD **shall** allow the definition of different separation criteria (MTCD) between flights on parallel ATS routes. |
| **4.1.4.3.6** | | **Uncertainty areas** |
| | | MTCD **shall** allow the definition of airspaces (MTCD) in which different uncertainty areas (MTCD) have to be applied. |
| | | MTCD **shall** allow the definition of different uncertainty areas (MTCD) between two flights depending on the phase-of-flight (MTCD) of these flights. |
| | | MTCD **should** allow the definition of different uncertainty areas (MTCD) between two flights depending on the navigational capabilities of these flights. |
| **4.1.4.3.7** | | **Lowest usable flight levels** |
| | | MTCD **shall** allow the definition of airspaces (MTCD) in which lowest usable flight levels (MTCD) are separately defined. |
| **4.1.4.3.8** | | **Special use airspaces** |
| | | MTCD **shall** be able to detect penetrations of permanently special use airspaces (MTCD). |
| | | MTCD **shall** be able to detect penetrations of temporarily special use airspaces (MTCD). |
| ***4.1.4.4*** | | ***Arrival Manager (AMAN)*** |
| | | The AMAN assists the controllers in providing the best arrival sequencing on a given airport |
| | | AMAN calculates the optimized Arrival Sequence ensuring a safe separation between two consecutive landings on a constraint point (Initial Approach Fix, aerodrome or runway) and ensures optimum runways utilization and the quickest landing time for aircraft. The sequence elaboration takes into account the 4D Trajectory, the Environment Data provided by the FDP, the Wake Turbulence Category (WTC) and the controller orders. |
| **4.1.4.4.1** | | **General Requirements** |

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| | | AMAN **shall** support the controllers' work, the utilization of the ATC system's capacity and efficiency and increase and smooth the inbound traffic flow accordingly while maintaining air traffic safety. (Mission Statement) |
| | | AMAN **shall** provide services to planning and executive controllers. |
| | | AMAN **should** provide services to external Systems (adjacent FIR/UIR System) |
| | | AMAN **shall** serve one or several airports/runways. |
| | | AMAN **shall** manage all eligible flights approaching the served runways, while taking into consideration flights departing from there. |
| | | AMAN **shall** delete a flight from sequence if the flight becomes ineligible. |
| | | AMAN **shall** interface to the environmental data processing. |
| | | AMAN **shall** interface to FDP and Trajectory Prediction. |
| | | AMAN **shall** interface to the Human Machine Interface. |
| | | AMAN **should** interface to the Departure Manager. (When this function is available) |
| | | AMAN functions **shall** be configurable by a set of parameters that can be adjusted manually by using a dedicated HMI. |
| | | AMAN **shall** allow certain parameters being examined and changed on-line by system users, e.g. input of runway acceptance rates |
| **4.1.4.4.2** | | **AMAN Data Sources** |
| | | AMAN requires data for airspace and airport description, aircraft performance and rules and requirements |
| | | AMAN **shall** accept environmental data and their up-dates. |
| | | AMAN **shall** accept eligible system trajectory data as established by Trajectory Prediction. |
| | | AMAN **should** accept departure constraints (slots) as established by DMAN. (When this function is available) |
| | | AMAN **shall** accept controller constraints as supported by the HMI. |
| **4.1.4.4.3** | | **AMAN Sequencer** |
| | | AMAN **shall**start flight arrival planning, when an eligible system trajectory is available. |

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| | | AMAN **shall** accept different runway acceptance rates. (manual input) |
| | | AMAN **shall** establish the sequence according to the different runway acceptance rates. |
| **4.1.4.4.4** | | **Natural sequence (AMAN)** |
| | | Natural sequence - a sequence of arriving flights calculated for controller planning purposes based on estimate time at the constraint point using first-come-first-served principle. |
| | | AMAN **shall** establish and maintain one natural arrival sequence per constraint point (AMAN). |
| | | AMAN **shall** use System trajectories which are eligible for AMAN processing for establishing and maintaining the natural arrival sequence. |
| | | AMAN **shall** use the rule first-come-first-served for establishing and maintaining the natural arrival sequence per constraint point (AMAN). |
| | | AMAN **shall** use the rule adjustable runway acceptance rate and separation minima. |
| **4.1.4.4.5** | | **Optimised sequence (AMAN)** |
| | | AMAN **shall** establish and maintain one optimized arrival sequence per constraint point (AMAN). |
| | | AMAN **shall** execute metering (AMAN) of the optimised arrival sequence and use the needs for adopted runway allocation. |
| | | AMAN **shall** use System trajectories and AMAN trajectories which are eligible for AMAN processing for establishing and maintaining the optimized arrival sequence. |
| | | Establishing and maintaining the optimized arrival sequence, AMAN **shall** use the rule for wake turbulence category. |
| | | Establishing and maintaining the optimized arrival sequence, AMAN **shall** use the rule for choice of optimum runway. |
| | | Establishing and maintaining the optimized arrival sequence, AMAN **shall** use the rule for minimum total delay (AMAN), maximum use of available runway capacity. |
| **4.1.4.4.6** | | **Re-sequencing (AMAN)** |
| | | AMAN **shall** re-sequence an aircraft, if it performs a missed approach. |
| | | AMAN **shall** re-sequence one or more aircraft in case of manual re-sequencing input by the controller. |
| **4.1.4.4.7** | | **Runway Allocation, Multiple-Runway Configuration** |
| | | AMAN **shall** allocate the appropriate runway to the arriving flights in case of multiple runway configurations. |

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| | | AMAN **shall** take into consideration mutual runway occupation duration in case of multiple runway configurations. |
| | | AMAN **shall** be able to handle runway balancing in case of multiple runway configurations. |
| | | AMAN **shall** consider and establish a ratio between landing and departing traffic for given runway(s) (e.g. one departure after two landings) |
| **4.1.4.4.8** | | **Change of Runway-in-use** |
| | | AMAN **shall**, upon manual input of change of runway for the eligible trajectories, re-sequence the arrival flow to the newly assigned runway based on the natural sequence. |
| **4.1.4.4.9** | | **Manual Inputs** |
| | | AMAN **shall** allow the change of the established arrival planning results by means of dedicated manual input messages moving an aircraft's position in the sequence. |
| | | AMAN **shall** allow the change of the established arrival planning results by means of dedicated manual input messages adding or canceling a runway slot for an arriving - or departing (if applicable) - flight. |
| | | AMAN **shall** allow the change of the established arrival planning results by means of dedicated manual input messages allocation of priority to a flight. |
| | | AMAN **shall** allow input of such condition changing messages from corresponding authorized HMI only. |
| **4.1.5** | | **AIS data processing** |
| | | The Aeronautical Environment Processing functional block encompasses the definition of the aeronautical data, strategic ATC constraints, meteorological conditions and various configuration parameters. |
| | | This functional block divided into the preparation of static data and the dynamic amendment of it. The preparation of static data is considered a maintenance task as is therefore described in paragraph 4.2.3.1, System Environment Adaptation. |
| | | This paragraph describes the input and management of dynamic environment data. This comprises the maintenance of NOTAMs and meteorological data, and the dynamic entry and amendment of data that forms part of the controllers' Paged Information Display. |
| ***4.1.5.1*** | | ***NOTAM and SNOWTAM Maintenance*** |
| | | The system **shall** be capable of receiving New NOTAM (NOTAMN), Replacement NOTAM (NOTAMR) and Cancel NOTAM (NOTAMC) messages from the external AIS system. |

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| | | The system **shall** support AIXM 5.1 data base format for digital NOTAM reception. |
| | | Upon receipt of a NOTAMN message, or upon manual entry, the system **shall** store the NOTAM. |
| | | Upon receipt of a NOTAMR message, or upon manual replacement, the system **shall** amend the NOTAM. |
| | | Upon receipt of a NOTAMC message, or upon manual cancellation, the system **shall** delete the NOTAM. |
| | | The system **shall** support SNOWTAM massages reception and store according to OPADD amendment 37 requirements. |
| | | The system **shall** support X-SNOWTAM reception as a future option. |
| ***4.1.5.2*** | | ***Meteorological Data Processing*** |
| | | The system **shall** permit the entry of upper wind speed and direction and temperature for each cell in the grid.<br>Data **shall** be supplied in GRIB2 codes, defined in the WMO Manual on Codes (reference [10]). The information **shall** be input to the System from SADIS FTP Server automatically in GRIB2 codes. |

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| | | The system **shall** be capable of extracting upper wind and temperature data from messages received in the GRIB2 code. |
| | | The system **shall** permit the entry of upper wind speed and direction and temperature for each cell in the respective grid |
| | | The system **shall** give possibility to:<br>- Select measurement units for wind speed (knots, mps, kmph);<br>- Select desirable area;<br>- Select desirable layers (Flight Levels);<br>● Space between two different layers (Flight Levels);<br>● One desirable layer (Flight Level);<br>- On the basis of made selections the system **shall** create grid and fill the appropriated cells with wind direction/wind speed data;<br>- The system **shall** give possibility to operator manually to maintain grid cells, if necessary;<br>- The content of the grid **shall** be:<br>● Printable;<br>● Convertible to excel file; |
| | | The trajectories of SFPLs in the Active state **shall** be calculated with the latest wind/temperature values within 60 seconds of their entry/amendment. |
| | | The system **shall** support XML/GML format for OPMET messages display. The system also **shall** support Eurocontrol Meteorological Exchange Model (WXXM) requirements<br>The system **shall** support receiption and display of the following meteorological messages:<br>- Meterological Routine Weather Report (METAR) with every 30 min refresh. Every next report **shall** replace previous;<br>- Correctives to Meteorological Routine Weather Report (METAR COR) immnediately after issuing with present report replacement;<br>- Retarded Meteorological Routine Weather Report;<br>- Short Term Weather Forecast (TAF FC) reports with every three hours refresh in accordance with report issuing timetable. Every next report **shall** replace previous;<br>- Correctives to Short Term Weather Forecast (TAF FC COR) reports immediately after issuing with present report replacement;<br>- Amendments to Short Term Weather Forecast (TAF FC AMD) reports immediately after issuing with present report replacement;<br>- Retarded Short Term Weather Forecast;<br>- Long Term Weather Forecast (TAF FT) reports with every six hours refresh in accordance with report issuing timetable. Every next report **shall** replace previous;<br>- Correctives to Long Term Weather Forecast (TAF FT COR) reports immediately after issuing with present report replacement; |

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| | | - Amendments to Long Term Weather Forecast (TAF FT AMD) reports immediately after issuing with present report replacement;<br>- Retarded Long Term Weather Forecast;<br>- Significant Meteorological Information (SIGMET) reports immediately after issuing with present report replacement;<br>- Airmen's Meteorological Information (AIRMET) reports immediately after issuing with present report replacement;<br>- Ground Area Forecasts |
| | | The system **shall** permit entry of regional and aerodrome QNH values. |
| | | The system **shall**support global QNH and local QNH per corresponding sectors (i.e. metar for Batumi should provide QNH for Batumi app sector, etc.) The system **shall**highlight QNH changes more than 1 HPa. |
| | | The system **shall** be capable of automatically extracting QNH from received meteorological messagesand/or manually entered.<br>The system **shall**highlight QNH changes for configurable time period. |
| | | All meteorological data **shall** have a validity period, except of METAR reports |
| | | All meteorological data is subdivided into 2 categories:<br>- Scheduled (METARs, short (FC) and long (FT) TAFs);<br>- Non-scheduled (METAR COR, TAF FC COR, TAF FT COR, TAF FC AMD, TAF FT AMD, Retarded METAR, Retarded TAF FC, Retarded TAF FT, SIGMET, AIRMET, GAMET) |
| | | All scheduled meteorological data **shall**have corresponding issuing timetable; |
| | | All scheduled meteorological data **shall**be refreshed in strict accordance with the corresponding timetable |
| | | All non-scheduled meteorological data **shall** be refreshed immediately after issuing, despite of data validity period |
| | | For non-scheduled meteorological data with numbering (SIGMET, AIRMET) system **shall** have sparate numbering for each type of data. The numbering **shall** begin with "1" and increase with step, equal to "1" for each following data. With coming of the new day/night the number of data **shall** become equal to "1". |
| | | The system **shall**be capable of automatically extracting data from the local Automatic Weather Observation Systems (AWOS-es) and put them into the corresponding cells |
| | | The system **shall** support OPMET messages received automatically as well as manually. |
| | | The system **shall** store all received OPMET messages |
| **4.1.6** | | **Airspace Management** |

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| ***4.1.6.1*** | | ***Pre-tactical airspace management*** |
| | | The system support required for pre-tactical airspace management addresses the processing of Airspace Use Plans (AUPs) and Updated Airspace Use Plan (UUPs). |
| | | AUPs are sent daily at a pre-defined time by GCAA ATD of the national Airspace Management Cell. |
| | | UUPs are sent by GCAA ATD of the national Airspace Management Cell if changes to AUP are necessary. |
| | | From a civil ATM point of view, UUPs contain improvements as well as complications to the airspace situation described in the corresponding AUPs. |
| | | The system **shall** be capable to receive and automatically process the Airspace Use Plan messages (AUP) and Updated Airspace Use Plan (UUPs). |
| | | The system **shall** provide warning when the AUP has not been received within the specified time. |
| ***4.1.6.2*** | | ***Tactical Airspace Management*** |
| | | The system **shall** permit manual entry of departure and arrival runways in use for configured aerodromes. |
| | | The system **shall** provide the automatic activation and de-activation of temporary airspace restrictions according to AUP/UUP messages. |
| | | The system **shall** permit manual activation and de-activation of temporary airspace restrictions. |
| **4.1.6.2.1** | | **Airspace and Route Activation** |
| | | A change to the status of airspace restrictions **shall** change the status of any referenced APW Protected Airspace accordingly. |
| | | The system **should** permit manual re-designation of GAT/OAT airspace category. |
| | | Entry/change of runway in use and activation or de-activation of airspace and route restrictions **shall** cause re-validation and calculation of flight trajectories. |
| **4.1.6.2.2** | | **Safety Net Regions Activation** |
| | | The system **shall** permit manual activation and de-activation of STCA parameter regions. |

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| | | The system **shall** permit manual activation and de-activation of APW protected airspace. |
| | | The system **shall** permit manual definition of ad hoc APW protected airspace. |
| **4.1.7** | | **CNS/ATM Support** |
| ***4.1.7.1*** | | ***Technical Monitoring and Control*** |
| **4.1.7.1.1** | | **General requirements** |
| | | The TMCS **shall** provide the means for the Technical Staff to manage and supervise all subsystems of the Operational environment (including two remote locations). |
| | | The TMCS **shall** allow remotely checking of the operational status (continuously 24h/24h) of each equipment. |
| | | The TMCS **shall** allow for system reconfiguration, automatic routine checking, data logging and remote program loading. |
| | | TMCS staff will advise appropriate maintenance and/or operational staff on further actions in case of malfunction or reconfiguration. |
| | | Standards, as well as de-facto standard protocols, such as TCP/IP, SNMP (Simple Network Management Protocol) **shall** be used. |
| | | The TMCS **shall** be SNMP based. |
| | | The TMCS **shall** provide access to fault analysis and diagnostic facilities resident in the subsystems. |
| | | It **shall** be possible to manually impose transitions in subsystem status via the TMCS, or via a Local Control Terminal (LCT). |
| | | Each subsystem **shall** have monitoring and control facilities embedded within it. |
| | | TMCS **shall** gather information from and exercise control through its facilities embedded within the subsystems. |
| | | The TMCS **shall** carry out centralised collection, storage and presentation of the system status and performance information. |
| **4.1.7.1.2** | | **Local monitoring and control requirements** |
| | | All system elements **shall** have "built-in test" (BITE) such that there is a continuous monitoring of the operating state of the equipment by analysis of critical system parameters. |
| | | The local monitoring functions may generally be split up between those available on the local equipment and those available at the local terminal. |
| | | An indication **shall** be given on the equipment of its status (if such an indication is available). |

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| | | A synopsis of the system status **shall** be presented, preferably in graphical form, otherwise in text form. |
| | | The selection of any system element **shall** be possible from the presentation for more detailed status information. |
| | | The graphical representation **shall** preferably be identical for all terminals used and as far as possible be identical to the one used at the TMCS. |
| | | The terminal **shall** provide for each element mentioned above all details on the type of element, status etc. |
| | | As a minimum, on/off control functions **shall** be available at equipment level. |
| | | The local monitoring terminal **shall** have the capability of controlling all major elements of the local subsystem. |
| | | The "remote" control facility from the TMCS **shall** only be operational if the "remote control" mode of operation is selected. |
| | | Selection of "local control" **shall** inhibit all remote control actions from the TMCS. |
| | | It **shall** however not inhibit the feasibility to monitor system status at the TMCS and logging of all commands continues. |
| **4.1.7.1.3** | | **System Monitor** |
| | | The system monitors both internal components and external entities (or the communication with those entities).<br>Components are organized in two levels;<br>- at a physical level, the components comprise hardware and software elements (e.g. processes, processors, LANs, etc.),<br>- whilst at a logical level, a component is an exclusive group of hardware and/or software elements (e.g. FDP, RDP, etc.). The logical components are defined by the system design as the level at which a component can be controlled (start, stop, switchover, etc.).<br><br>Logical components themselves may be grouped to form higher level logical components, i.e. components may be individually controlled, or as a group.<br><br>Logical components are categorized as either centralized, if there is only a single active version of the component and normally a standby, or autonomous if multiple versions of the component execute independently.<br>By monitoring the status of physical components that make up a logical component, the overall status of the logical component is determined, which is as the basis of the control function (see below).<br>In addition to this qualitative monitoring of component state, quantitative measuring of system components is performed (e.g. processor load, resource utilization, data throughput, error counts, etc.). |
| *4.1.7.1.3.1* | | *Monitored Components* |

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| | | The system **shall**monitor the status of the following items, considered Physical Components, that are in the operational system configuration: |
| | | · Software Processes, |
| | | · Hardware Processors and Peripherals, |
| | | · LAN elements (concentrators, bridges, routers, etc.), |
| | | · Communications with External Entities. |
| | | -UPS |
| | | The system **shall** provide a quantitative measure of the following items: |
| | | · Processor *Utilization*, |
| | | · Memory *Utilization*, |
| | | · Disk *Utilization*, |
| | | · LAN Utilization and error count, |
| | | · External Communications Utilization, |
| | | · Database Utilization (at least Flight, Track and related databases). |
| | | The system **shall**be capable of grouping physical components into individually controllable logical components according to the system design. |
| | | The system **shall**assign a status to a logical component derived from the statuses of its physical components. |
| | | Upon each change in status of a monitored component the system**shall** print a message, containing a description of the event, at a designated printer. |
| | | Display of the airspace picture. |
| | | Users Control (passwords, different roles, etc). |
| *4.1.7.1.3.2* | | *External Entities Monitoring* |
| | | The monitoring of external entities is performed at the level of the communications with the entity and, for certain entities, at the level of application message exchange. The availability status of an end system application is derived from both the status of the communications media and the application itself.<br>Radar sensors are monitored by means of the status messages applicable to the particular message protocol.<br>Monitoring of the AFTN/AMHS application is performed by verifying that Channel Check messages are forwarded from the AMSS at the |

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| | | expected interval, and by verifying that messages are received in the correct sequence.<br>The OLDI applications are monitored by means of verifying that messages are received in the correct sequence. |
| | | AMHS application **shall** be monitored by the LAN. |
| *4.1.7.1.3.2.1* | | *Radar Monitoring* |
| | | The system **shall** report missing radar status messages if not received within a tolerance of the expected time for the particular message type. |
| | | The system **shall** report radar line missing status masseges and show graffical indication. |
| | | The TMC **shall** monitor and display the statuses of data feed coming from SDPS subsystem ( including SMRT and ARTAS) |
| | | The TMC **shall** interface the ARTAS system and receive the diagnostics messages from ARTAS according to the SNMP standard |
| *4.1.7.1.3.2.2* | | *AFTN/AMHS Monitoring* |
| | | The system **shall** have 2 AFTN/AMHS lines for information receiving – one main and one for redundancy |
| | | The system **shall** report AFTN/AMHS channel failure if a channel check message is not forwarded from the AFTN/AMHS switch within a tolerance of the expected time. |
| | | The system **shall** give check messages in AFTN/AMHS channels during certain time |
| | | The system **shall** report missing or invalid AFTN/AMHS channel sequence numbers in received AFTN/AMHS messages. |
| | | The system **shall** provide graphical indication of AFTN/AMHS channel failure. |
| | | The system **shall** indicate, which line is active in the current time |
| *4.1.7.1.3.2.3* | | *OLDI Monitoring* |
| | | The system **shall** report missing or invalid sequence numbers in received OLDI messages. |
| | | The system **shall** provide OLDI lines failure graphical indication. |
| *4.1.7.1.3.2.4* | | *AMHS Monitoring* |
| | | The system **shall** report AMHS channel failure. |
| | | The system **shall** provide AMHS channel failure graphical indication. |
| **4.1.7.1.4** | | **System Control** |
| | | The description of system control encompasses the configuring of the system both in response to operational and technical criteria. |

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| | | Operational criteria comprise the allocation of system resources to particular missions (see paragraph***5.2.6.1*** System Configuration).<br>Watcher criteria comprises only monitoring of the system statuses function.<br>Technical criteria comprise the switch over of a failed logical component to its standby, the re-entry of a logical component into the configuration, and the control of logical components that are causing an adverse effect on system performance. |
| *4.1.7.1.4.1* | | *System Reconfiguration* |
| | | The system **shall** permit manual designation of logical components that are to form the operational system configuration. |
| | | The system **shall** permit logical components to be added to or removed from the operational system configuration, and assigned to another mission, according to manual command. |
| | | A centralized logical component that is joining a configuration in which no instance of the component is already active, **shall** immediately act as the main. |
| | | A centralized logical component that is joining a configuration in which an instance of the component is already active, **shall** act as the standby. |
| | | An autonomous logical component that is joining a configuration **shall** immediately become active. |
| | | Upon detection of a failed centralized logical component, the system **shall** automatically switchover to the standby component, if available. |
| | | Upon failure of a component, the system **should** attempt to re-activate the component. |
| | | There **shall** be no loss of data as a consequence of switchover of a component. |
| | | The system **should** ensure that incompatible versions of software are not activated. |
| | | Upon re-availability of a failed data source, the data **should** only be processed following manual re-activation. |
| | | The Monitoring System **shall** be able to configure Radars (radars alignment, angular correction, each input source control, etc.) |
| | | The Monitoring System **shall** have capability to configure TCA Functions. |
| | | The Monitoring System **shall** have Recording/Playback management functions. |
| | | The Monitoring System **shall** provide switching of the working position(s) Operative/Watcher/Playback statuses. |
| | | The Monitoring System **shall** have TCA-tools starting function. |
| | | The Monitoring System **shall** have Working Positions and Servers management function (reboot, start/stop application, etc.) |
| | | The Monitoring System It **shall** be possible to manage each subsystem individually via a Local Control Terminal (LCT) |
| | | An LCT **shall** also be able to control the local hardware diagnostic routines. |

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| | | LAN management operations **shall** have multiple paths such that LAN monitoring and control is not invalidated by a single failure. |
| *4.1.7.1.4.1* | | *Reporting* |
| | | It is an activity of summarising status information of the environment under surveillance according to predefined criteria and perspectives.<br>This reporting **shall** be instantaneous about the actual situation or post factum concerning statistical and historical views. |
| *4.1.7.1.4.2* | | *TMCS workstation HMI requirements* |
| | | The level of displayed information **shall** match to the requirements of the users, with detailed information only presented when requested. |
| | | Self-testing and sufficient protection **shall** be included to prevent any TMCS fault affecting or being attributed to the monitored equipment. |
| | | The TMCS **shall**:<br>• provide graphical and tabular information presentation;<br>• provide a context sensitive on-line help;<br>• provide statistics on reliability, availability, failures, line load, CPU load, etc. In particular, the TMCS maintain a continuous "real time quality control" of all system elements and parameters using BITE techniques;<br>• provide facilities for remote display and control so that the TMCS supervisor can re-configure the appropriate equipment;<br>• immediately warn the Technical Staff of any deviation from the specified operating capabilities of the equipment;<br>• maintain a record of all major equipment status parameters, equipment failure(s), the equipment configuration and a log of all significant events and changes which affect the equipment;<br>• perform supervision and control of the system from a number of windows;<br>• provide a fully menu-driven picture selection;<br>• provide the capability to manually enter predefined events which to be processed as the automatic reported ones;<br>• provide upon request, details of the last X events in the system (X being a system parameter);<br>• enable one single operator to supervise the operation of all the subsystems. |
| | | The current time (as UTC), provided by the Central Clock System, **shall** be displayed at the TMCS in a digital hours, minutes, and seconds format. |
| | | In case of failure of Central Clock systems, the workstation **shall** remain operational continuing to display the time using its own clock. |
| | | The high level information of all the systems **shall** always be present in a window which can never be overlapped nor iconized. |
| | | The access rights of the TMCS over the monitored and controlled equipment and data items **shall** be predetermined on a role basis. |
| | | TMCS Roles **shall** have access to all monitored data and monitoring facilities available within their configuration. |

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| | | The capabilities of the TMCS **shall** be grouped for the purposes of control into operational capabilities and technical capabilities. |
| | | These capabilities **shall** be allocated to TMCS users at workstations according to their assignment. |
| | | The TMCS **shall** provide the Operational Supervisors and Technical Supervisors with facilities to:<br>a) notify on system status;<br>b) monitor the system from a global, high-level perspective;<br>c) display selected TMCS alerts;<br>d) query system performance/configuration; |
| | | An audible alarm **shall** be provided on the TMCS position for major faults. |
| | | Selected alerts at the TMCS **shall** cause the Operational Supervisor positions to be notified. |
| | | Selected TMCS alerts relating to a CWP/SWP **shall** cause the CWP to be notified |
| | | The TMCS **shall** filter the alerts on the basis of detecting repeated occurrences of the same alert from the same object. |
| | | Commands **shall** be provided to acknowledge alerts and alarms. |
| | | Different types of alert and the associated text messages **shall** be customisable. |
| | | The TMCS **shall** enable an authorised operator to define messages to indicate the event(s) causing an alarm. |
| | | Alerts may be indicated to the Technical Staff by flashing the appropriate element icons on the mimic diagrams, changing the icon to the appropriate colour and addition of a small alert window forced into the centre of the display. |
| | | The TMCS **shall** not discard alerts without Technical Staff acknowledging them. |
| | | A mimic element which is flashing or which causes an audible alarm as a result of an alert **shall** remain displayed until the Technical Staff has acknowledged that alert. |
| **4.1.7.1.5** | | **Time Synchronization** |
| | | Each sub-system **shall**be capable of autonomously maintaining the time with a maximum drift of 50 ms. |
| | | The system **shall**periodically synchronize it’s time to that received from an external time system such that the maximum drift from the time system is 50 ms. |
| | | The system **shall**synchronize the time between the sub-systems (including those in the remote APP/TWRs) such that the maximum deviation is 5 00 ms. |

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| | | If, when performing time synchronization, the reference time and the system or sub-system time differ by more than a preset time, a warning **shall**be generated. |
| | | The system **should** provide possibility of satellites availability monitoring |
| ***4.1.7.2*** | | ***Technical Supervisor*** |
| | | The system **shall** be equipped with a dedicated technical supervisor position from which all aspects of system monitoring and control **shall** be possible to perform. |
| | | The HMI for monitoring **shall** be graphical and logical. |
| | | The HMI **shall** provide login procedures where the supervisor **shall** log in using a personal identification and a password as well as level of access requested, shift engineer or |
| | | The technical supervisor workstation **shall**:<br>• provide graphical and tabular information presentation;<br>• provide a context sensitive on-line help;<br>• Provide statistics on reliability, availability, failures, line load, CPU load, etc. In particular, the SMC maintain a continuous "real time quality control" of all system elements and parameters using "built-in test" BITE techniques;<br>• provide facilities for remote display and control so that the SMC supervisor can re-configure the appropriate equipment;<br>• immediately warn the Technical Staff of any deviation from the specified operating capabilities of the equipment;<br>• maintain a record of all major equipment status parameters, equipment failure(s), the equipment configuration and a log of all significant events and changes which affect the equipment;<br>• perform supervision and control of the system from a number of windows;<br>• provide a fully menu-driven picture selection;<br>• Enable one single operator to supervise the operation of all the subsystems. |
| | | The current time (as UTC), provided by the Central Clock System, **shall** be displayed at the SMC in a digital hours, minutes, and seconds format. |
| | | In case of failure of Central Clock systems, the workstation **shall** remain operational continuing to display the time using its own clock. |
| | | The high level information of all the systems **shall** always be present in a window which can never be overlapped nor iconized. |
| | | When logging in the system **shall** check that the person logging in is authorized for the level of access requested. |
| | | The system engineer **shall** have full access to the system. |

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| | | The system **shall** allow the system engineer to specify which functions that **shall** be available for the shift engineer. |
| | | The information **shall** be organized in a tree structure with error/warning propagation. |
| | | It **shall** be possible to have access to the adaptation parameters. |
| | | It **shall** be possible to open terminal windows for any computer in the system. |
| | | Generally Technical Superviser position **shall** be based on the Technical Monitoring and Control position and the functions **shall** be configurable by system engineer and depended on the loged in user. |
| ***4.1.8.1*** | | ***HMI Principles*** |
| | | The presentation management described herein is based on the use of windows, permitting the grouping and selective presentation of the diverse data managed by the system. Standard window operations are specified (open, close, move, resize). However, due to the nature of the ATC function, additional safeguards are valuable to ensure that critical data is not erased or obstructed. |
| | | A key factor governing the ease of learning how to use the system, and the safety of its use, is the consistency of its presentation and input methodology across all windows. As such, a style guide is necessary, detailing generic features such as colour usage, window layout and decoration, pointer button operation, orientation of field label relative to a field, etc., that is used in the design of the HMI. |
| | | The consistency of the presentation of a common data object in multiple windows is specified by describing the use of a "Conceptual Object", containing the "real world" representation of an entity. From a conceptual object, "Presentation Objects" may be created to display the entity in various windows. Any change to the conceptual object is reflected in all of its presentation objects. Similarly, a conceptual object may be updated by operating on any one of its presentation objects. |
| | | Additionally, a consistent presentation method for depicting object statuses (alerts, warnings, coordination, etc.) between different presentation objects and windows, provides an intuitive appreciation of the condition. |
| | | The HMI functionality at a particular working position is tailored for the role being performed at that position. In some cases, functions that are not normally performed in a particular role are, nevertheless, available at the working position. This allows, for roles that are normally performed in pairs (e.g. the executive and planning controllers at a suite), one work position to take on the additional role of the other. |
| | | Thus, the HMI at a work position is configurable in terms of the functions available for the work position role, and the default layout and accessibility of the functions for the role. Commands, unavailable in a particular role, are never displayed for that role. In addition, an operator may have preferences for a certain presentation scheme that he can save and recall. |
| | | The optimum organization of data into windows is such that, in performing a single task, the user only has to look in a single window/area of the screen. In addition, the ability to change a data item by operating directly on it, rather than having to operate through a separate control bar, permits a rapid, intuitive interaction, and avoids a diversion of the focus of concentration |
| | | To avoid cluttering the screen, only the data needed by the user is automatically displayed. However, the user is able to select the display of additional information as necessary. Input of commands/data and the management of windows is achieved by the use of a pointing device with a |

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| | | number of buttons. |
| | | Input functions are categorized (e.g. window management, command input, information retrieval, etc.), with each function assigned to a dedicated button. Operations that are performed frequently are achieved through the use of a minimum number of actions. The use of default values, such that the "expected" value to be entered in a command is presented to the controller upon initiation of the command, permits rapid entry of items for which a logical sequence is expected to be followed (e.g. the presentation of the exit level or cruising level when entering a cleared level command). |
| | | In addition to being able to subsume the functions of another work position, the executive and planning work positions of a suite are interoperable. As such, the controller is able to access the other controller's display using his own pointing device. |
| **4.1.8.1.1** | | **Data Presentation and Input** |
| | | Data **shall** be presented in windows, characterized by a title bar and border. |
| | | The window presentation **shall** clearly indicate which window is focused. |
| | | Input **shall** only be possible through the focused window. |
| | | The system **should** be capable of automatically re-sizing tabular windows up to a defined maximum size, to fit exactly the data contained in them. |
| | | If the amount of data to be displayed in a window exceeds the defined maximum size, scroll bars **shall** be provided. |
| | | The system **shall** permit the user to open, close, move and resize all required windows. |
| | | Whilst a window is being moved or resized, the new window extent **shall** be constantly displayed (e.g. in the form of an outline or the complete window and contents). |
| | | The system **shall** present opened window in the last known position. |
| | | The update of data in a window **shall** be performed in a manner such that flickering is avoided. |
| | | The system **shall** provide a mechanism whereby windows/data critical to the control function cannot be closed or obstructed. |
| | | The system **should** be capable of printing the contents of any displayed window (graphical or tabular) upon operator command. |
| | | User input **shall** be available via the pointing device and/or alphanumeric keyboard. |
| | | All frequently used functions of the system **shall** be quickly accessible by using hotkeys or pre-defined combination |
| | | The display space reserved for permanently available commands and menu buttons **shall** be kept to a minimum. |
| | | The system **shall** permit the input of selected, commonly used commands via dedicated function keys. |
| | | Such keys **should** be clearly marked with the function that they perform. |

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| | | The function of each button of the pointing device **shall** be defined and used consistently throughout the HMI. |
| | | The cursor symbol **shall** be definable according to data entry modes such that the type of input expected at any time is indicated. |
| | | The system **shall** provide feedback during command entry even during input of secure data (e.g. by display of ****). |
| | | The system **shall** provide an indication of acceptance or rejection of a command immediately following input. |
| **4.1.8.1.2** | | **HMI Functional Configurability** |
| | | A user **shall** obtain access to the system by logging in, supplying a user name and password. |
| | | Upon verification of the login details, the work position **shall** be configured for its particular role, such that only the commands valid for that role are available. |
| | | The system **shall** permit adjustment to the overall display brightness and the brightness of individual features (e.g. routes, waypoints, border lines, labels, etc). |
| | | The system **shall** permit the user to save a preferred display configuration (window locations, size, filter settings, scale/centre and brightness) for user of a particular role. |
| | | After login, the system **shall** be capable to select for display preferred configuration according to the saved preferences if they exist for the user/role. |
| | | Upon login to an Operational Supervisor role, the work position **shall** be configured to provide access to the following capabilities (see paragraph Presentation Capabilities, for a description of the capabilities):<br>- Traffic Situation Display<br>- Flight Plan Maintenance<br>- Operations Room Management<br>- System Management.<br>- MTCD Display. |
| | | Upon login to the Executive/Planner Controller role, the work position **shall** be configured to provide access to the following capabilities:<br>- Traffic Situation Display<br>- Flight Plan Maintenance (for flight plan creation)<br>- Operational Status<br>- Sector Planning Display<br>- MTCD Display |
| | | Upon login to the Technical Supervisor role, the work position **shall** be configured to provide access to the following capabilities:<br>- Operations Room Management |

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| | | - System Management<br>- Traffic Situation Display |
| | | Upon login to the Flight Data Assistant role, the work position **shall** be configured to provide access to the following capabilities:<br>- Flight Plan Maintenance Presentation<br>- Meteorological Information Presentation<br>- Aeronautical Information Presentation<br>- Operational Status |
| **4.1.8.1.3** | | **Data Organization and Access** |
| | | The HMI **should** be organized such that all the information required for a user task is available in a single window/area. |
| | | The presentation objects pertaining to a single conceptual object **shall** provide a consistent depiction of the entity. |
| | | The system **shall** permit the input of commands or data to a conceptual object by operating directly on any of its presentation objects. |
| | | Display attributes depicting alerts, warnings, statuses, etc. **shall** be consistent across all windows. |
| **4.1.8.1.4** | | **Input Optimization** |
| | | Where a menu is used to enter commands via an object, only the commands valid for the current state of the object **shall** be available (e.g. initiate transfer is not applicable for a flight assumed at a different sector). |
| | | However, in order to provide a consistent menu presentation, the invalid commands **should** be displayed but with attributes that show that they are unavailable. |
| | | Upon selecting a menu, the menu **shall** appear with an item selected as default, dependent upon the current state of the object (e.g. for a flight for which transfer has been initiated, the assume command might be defaulted at the receiving sector). |
| **4.1.8.1.5** | | **Interoperability** |
| | | The system **shall** permit the executive and planner controllers working together in a sector suite, to access each-other's functions using their own input devices. |
| **4.1.8.1.6** | | **Display Replication** |
| | | The system **shall** be capable of replicating the display of a selected local work position onto the display of the Supervisor work position. |

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| ***4.1.8.2*** | | ***Presentation Capabilities*** |
| | | This section describes the specific capabilities pertaining to the presentation and manipulation of conceptual objects. |
| | | The capabilities are organized according to the user tasks and therefore, although they may not each necessitate presentation in a single window, they are used as a single logical entity by the user to perform his task. |
| **4.1.8.2.1** | | **Traffic Situation Presentation** |
| | | The Traffic Situation Presentation constitutes the primary tool by which the executive controller provides radar services, and is a secondary tool for other users (planning controllers, tower controllers, supervisor, etc.) to obtain situation awareness. |
| | | The Traffic Situation Display is composed of selectable maps, upon which the traffic and weather, if available, are projected. Traffic data will consist of a representation of the track/plot complemented by the label. It contains all the information available in the correlated system track. This information can be made available to the controller. |
| | | In order to meet the needs of both ACC and APP controllers, the traffic display can be selected from either the multi-radar track picture or from a picture based on a single source. This latter, exploiting on APP working positions the higher radar data update rate and increased accuracy of the approach radar. |
| | | A number of graphical tools (graphical flight leg projection, range and bearing) and the presentation of the ATC tools (Monitoring Aids, , Safety Nets,…) are also incorporated in the Traffic Situation Display. |
| | | Map configurations are defined as part of the offline environment (see 4.2.3.2.2, ATC Maps). Each configuration comprises a number of map elements and defines their presentation attributes. A user is able to choose a particular map configuration and then select for display individual elements within the configuration. Maps may also be defined online and distributed to other users. |
| | | The display also contains tabular depictions of flight data and coordination messages. |
| | | In order to achieve efficient use of the screen, a user is able to select up to four independent Traffic Situation Displays, thus permitting a main display of the area of responsibility plus three auxiliary displays showing inbound traffic flows. |
| *4.1.8.2.1.1* | | *ATC Maps* |
| | | The system **shall** permit the selection of a map configuration to be used at a work position. |
| | | The system **shall** permit individual selection of the map elements within the chosen map configuration. |
| | | The system **shall** permit the online definition of maps within the Traffic Situation Display. |
| | | The system **shall** be capable of distributing maps created online to selected work positions. |

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| | | The system **shall** be capable of automatically displaying the activation status of temporary airspace elements. |
| | | The system **should** permit presentation of additional information about different objects displayed on the map by using pointer (fix, nav aids, sectors, airways, any geographical fixes, etc) |
| *4.1.8.2.1.2* | | *Weather* |
| | | The system **shall** be capable of displaying weather from selected radar at a minimum of six distinguishable intensity levels. |
| | | The presentation of weather **shall** be such that it does not hide map features or traffic data. |
| *4.1.8.2.1.3* | | *Traffic* |
| | | The system **shall** permit the display of tracks and uncorrelated plots in such a way that they are not obscured by maps or weather. |
| | | If the asynchronous track display is selected, the system **shall** present tracks with an update rate of 5 seconds (variable system parameter), the display position meeting the accuracy requirements for en-route airspace. |
| | | If the synchronous track display is selected, the presentation of data **shall** be synchronized with the reception of data from the selected source, the display position meeting the accuracy requirements for terminal airspace. |
| | | The system **shall** be capable of either augmenting the synchronous track display with multi-radar tracks not detected by the selected source, or with extrapolated (coasted) tracks in the case of missed target returns, suitable attributes distinguishing these from the tracks from the selected source. |
| | | The traffic presentation **shall** consist of the following elements where applicable to target type:<br>- position symbol;<br>- history symbols;<br>- velocity leader;<br>- label leader;<br>- label. |
| | | The position symbol displayed for a plot or track **shall** be that configured according to the plot/track attributes. |
| | | The history symbols **shall** depict a controller-selectable number (0 to 10) of previous positions |
| | | The velocity leader **shall** be a straight line from the position symbol to a position extrapolated using the track velocity over a selected time. |
| | | Velocity vector extrapolation time **shall** be controller-selectable from 0 to 10 minutesby 1 minute step. |
| | | The system **should** permit velocity vector selection (on/off) globally for all tracks and individually for selectable tracks. |

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| | | The system **shall** permit to highlight locally selected track label by pointer |
| | | The label leader **shall** be a line joining the position symbol and the label. |
| | | The label **shall** be displayed with the layout and attributes pre-defined according to the sector type and the context of the target within the sector. |
| | | The system **shall** permit the user to select the label font size from the predefined selections. |
| | | The system **shall**permit display additional information of the flight on the label |
| | | The system **shall** display the following warnings and alerts via pre-defined attributes of the label:<br>- Radio Failure, Hijack or Emergency;<br>- Special Pulse Identification (SPI);<br>- Safety Nets (STCA. MSAW, APW);<br>- Duplicate SSR code;<br>- Conformance Warnings (Monitoring Aids);<br>- Equipment status (RVSM, 8.33 channel spacing, RNAV, RNP).<br>- The presentation of warning about ACAS alarm with the Resolution Advisory (RA) (optional). |
| | | System **shall** be capable to display Safety Nets alerts (STCA. MSAW, APW) in different method for current proximity and prediction phases of conflict calculation. |
| | | The system **shall** continue to provide Safety Nets (STCA. MSAW, APW) alerts as long as the alert conditions exist. |
| | | System **should** provide possibility to represent Safety Nets (STCA. MSAW, APW) settings for particular regions on operational working positions. |
| | | Safety Nets (STCA. MSAW, APW) alerts **shall** attract the controller's attention and identify the aircraft involved in the conflict. |
| | | The system **shall** present status information to supervisor and controller working positions in case Safety Nets (STCA. MSAW, APW) are not available. |
| | | Safety net and conformance warnings **shall** only be displayed at a sector working position for flights which are assumed at the sector, or in the process of transfer to the sector and at the supervisor position. |
| | | For a short term conflict alert, the system **should** be capable of displaying current and predicted minimum separation. |
| | | For flights below the Transition Level, the system **shall** display the Mode C value corrected for the current QNH. |
| | | The display of such corrected Mode C values **shall** be clearly distinguishable from normal Mode C display. |
| | | The current state in the coordination and transfer process **shall** be indicated in the label. |

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| | | In order to reduce the size of the label, certain items (e.g. tracked heading, next sector frequency and ground speed)**shall** be individually selectable by the controller. |
| | | These items **shall** be selectable for all flights or for individual flights. |
| | | To reduce the size of the label, certain fields **shall** only be displayed where they indicate actions still to be performed (e.g. the display of cleared level or transfer level only if they differ from the Mode C or cleared level respectively). |
| | | The Mode 3/A code **shall** only be displayed for plots and tracks that are not correlated with a flight plan. |
| | | The system **shall** permit rapid access to the complete flight plan of a displayed flight. |
| *4.1.8.2.1.4* | | *Graphical Tools* |
| | | The following graphical tools are identified:<br>- Range and Bearing Readout,<br>- Flight Leg and Medium Term Conflict Display,<br>- Pointout,<br>- Lat/Long Readout, |
| *4.1.8.2.1.4.1* | | *Range and Bearing Readout* |
| | | The system **shall** provide relative range and bearing readout between two selected points, one, both or neither of which may be a track. |
| | | If either or both points selected are tracks then the range and bearing readout **shall** be updated on each track update until de-selection. |
| | | If one of the selected points is a track and the other is a static point, the system **shall** provide the extrapolated time abeam the point, derived from the track velocity. |
| | | If both of the selected points are tracks, the system **should** provide the time at which the separation of the extrapolated track positions will reach a defined limit, and an indication of which track will pass ahead. |
| | | In addition, the system **should** provide resolution advisories for each track, comprising a left and right turn heading such that the defined minimum separation is not breached. |
| | | The system **shall** permit display of at least eight distinguishable concurrent range and bearing readouts. |
| *4.1.8.2.1.4.2* | | *Flight Leg and Medium Term Conflict Display* |

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| | | The system **shall** provide a graphical display of the horizontal path (as obtained from the trajectory) of a selected flight. |
| | | For flights for which a correlated track is displayed, the flight leg **shall** commence at the track position. |
| | | For flights outside the AoI, or for which no correlated track exists, the flight leg **shall** commence not later than the AoI entry point or departureaerodrome if inside the AoI. |
| | | The flight leg **shall**terminate not before the AoI exit point or destination aerodrome if inside the AoI. |
| | | At each fix displayed in the flight leg, the system **shall** display estimated time and level at the fix. |
| | | The system **shall** display estimated time and level at the point that is crossing point of the flights legs. |
| | | The system **shall** display estimated time and level at the points that are crossing points of the flights leg and restricted areas boundaries. |
| | | The system **should** be capable of displaying graduation marks at predefined intervals of flying time or distance along the path. |
| | | The system **should** be capable of automatically displaying the flight leg for a short period as a controller assumes control of a flight. |
| | | In addition to the flight leg of the selected flight, the system **shall** also display the paths of other flights which are in conflict according to the MTCD as well as any context traffic identified for the conflict. |
| | | The system **shall** allow the flight route correction by means of graphic tool via interaction with flight legs that are displayed. |
| *4.1.8.2.1.4.3* | | *Pointout* |
| | | The system **should** permit selection of a track and destination sector at which a track is to be pointed out. |
| | | A pointed out track **should** be displayed with special attributes at the source (sector at which the command was entered) and destination sectors. |
| | | The system **should** permit the pointout to be cancelled at either the source or destination sector. |
| *4.1.8.2.1.4.4* | | *Lat/Long Readout* |
| | | The system **shall** provide the lat/long co-ordinates of the cursor upon request. |
| *4.1.8.2.1.5* | | *Flight Lists* |

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| | | The following types of flight lists are described:<br>- Sector Inbound List<br>- Executive Control List<br>- Departures List<br>- Arrivals List<br>- Hold List<br>- Coast List<br>- STCA List<br>- Flight Directory List |
| | | The Departures List and Arrivals List are only for use by the appropriate APP working positions for coordination with the TWR. |
| | | The system **shall** be capable of indicating warnings and alerts for a flight in any flight list in which it is displayed. |
| | | Colours of data presentation in the lists **shall** be the same as in labels accordingly. |
| | | The system **shall** be capable of sortingany list (ascending and descending) by used fields (e.g. callsign,ADEP, ADES, entry point, entry time, entry level,) and any combination of them. |
| *4.1.8.2.1.5.1* | | *Sector Inbound List* |

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| | | The Sector Inbound List **shall** list flights entering a sector at defined entry points. |
| | | Background color fill of the list **shall** be transparent. |
| | | A flight **shall** be entered on the list corresponding to its sector entry point upon distribution of the flight to the sector. |
| | | A flight **shall** be removed from the list after assumption of control of the flight at the sector, or upon posting removal from the sector. |
| | | For each entry in the list, the system **shall** permit display of the following information: |
| | | Aircraft Identification, |
| | | Sector Entry Time, |
| | | Sector Entry Level, |
| | | Sector Entry Coordination Point, |
| | | Departure Aerodrome, |
| | | Sector Exit Coordination Point, |
| | | SSR Code |
| | | The system **should** permit a check mark to be appended to the flight entry by the controller to indicate acknowledgement of the flight. |
| | | The system **shall** be capable of automatically presenting the Sector Inbound List upon entry of the first aircraft to the list, and removing it upon exit of the last entry from the list. |
| *4.1.8.2.1.5.2* | | *APP Departures List* |

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| | | The APP Departures List **shall** list flights departing from aerodromes within the approach sectors. |
| | | A flight **shall** be entered on the list upon distribution of the flight to the Approach sector. |
| | | The system **shall** permit entry of a departure clearance (including the departure route and initial cleared level) for a flight on the list. |
| | | For each entry in the list, the system **shall** permit display of the following information: |
| | | Aircraft Identification, |
| | | EOBT, ETOT/ATOT and CTOT |
| | | Departure Route, |
| | | Cleared Level, |
| | | Flight rules, |
| | | Sector exit point, |
| | | Flight progress indication ( start-up, taxi, line-up, etc), |
| | | FIR exit point, |
| | | SSR code, |
| *4.1.8.2.1.5.3* | | *APP Arrivals List* |
| | | The APP Arrivals List **shall** list flights arriving at aerodromes within the approach sectors. |
| | | A flight **shall** be entered into the list upon distribution of the flight to the Approach sector. |
| | | For each entry in the list, the system **shall** permit display of the following information: |
| | | Aircraft Identification, |
| | | Aircraft Type and Wake/Turbulence category, |
| | | Estimated Arrival Time, |
| | | Arrival Route and Transfer Level, |
| | | Flight rules, |
| | | Sector entry conditions (point, level, time). |
| *4.1.8.2.1.5.4* | | *Hold List* |

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| | | The Hold List **shall** list flights that are in hold. |
| | | The system **should** permit multiple Hold Lists to be displayed at a sector, corresponding to pre-defined holding points. |
| | | A flight **shall** be entered into the list corresponding to its holding point upon entry of the hold status. |
| | | A flight **shall** be removed from the list upon termination of the hold status. |
| | | For each entry in the list, the system **shall** permit display of the following information: |
| | | Aircraft Identification, |
| | | Holding Point, |
| | | Cleared Level, |
| | | Actual level (mode "C"), |
| | | Expected End of Hold Time, if entered, |
| | | Destination. |
| | | The system **shall** be capable of sorting flights by holding point and cleared level. |
| | | Upon entry of a flight in a Hold List, the track label **should** be deleted until termination of the hold, to avoid clutter. |
| | | The system **shall** be capable of automatically presenting the Hold List upon entry of the first aircraft to the list, and removing it upon exit of the last entry from the list. |
| *4.1.8.2.1.5.5* | | *Coast List* |
| | | The Coast List **shall** list the flights assumed at a sector that have a coast status. |
| | | For each entry in the list, the system **shall** permit display of the following information: |
| | | Aircraft Identification, |
| | | Last Reported Mode A. |
| | | Last Reported Mode C. |
| *4.1.8.2.1.5.6* | | *STCA List* |

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| | | The STCA list **shall** list the conflicts detected by the STCA tool for flights that are either assumed at the sector or in the process of coordination to the sector. |
| | | The system **shall** prevent the obstruction or closure of the STCA list, it remaining open but empty when there are no conflicts. |
| | | For each entry in the list the system **shall** be capable of displaying the following information: |
| | | Aircraft Identification of each aircraft; |
| | | Controlling sector ID of each aircraft; |
| | | Mode C and attitude (climb/descent/level) of each aircraft. |
| | | Current separation; |
| | | Predicted minimum separation. |
| *4.1.8.2.1.5.7* | | *Executive Control List* |

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| | | The system **shall** be capable of presenting a list of flights currently assumed at a sector. |
| | | The system **shall** be capable to combine “Executive Control List” and “Sector Inbound List” upon user request. |
| | | Background color fill of the list **shall**be transparent. |
| | | For each entry in the list the system **should** be capable of displaying the following information: |
| | | Aircraft Identification; |
| | | SSR Code; |
| | | Aerodromes of departure and destination; |
| | | Aircraft type; |
| | | Sector exit conditions (point, level, time); |
| | | FIR Exit Point (if different from sector exit point); |
| | | Coordination status marking; |
| | | The system **should** be capable of indicating direction of flight via attributes of the list entries (denotes eastbound or westbound, odd or even level assignment). |
| *4.1.8.2.1.5.8* | | *Flight Directory List* |
| | | The system **shall** be capable of presenting all flights concerned in the Flight Directory List |
| *4.1.8.2.1.6* | | *Command Entry* |

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| | | The system **shall** permit rapid entry of control instructions (cleared level, assigned heading, assigned speed, hold, cancel hold, direct routing, STARs) by operation on the track (label). |
| | | For flights in hold, the system **shall** permit entry of cleared level via the entry in the hold list. |
| | | The system **shall** permit rapid entry of coordination and transfer commands by operation on the track (label) or a flight list in which the flight is displayed. |
| | | The system **shall** permit rapid entry of changes of existing route trajection by inputting the new re-routing proposals (such as: selecting FPL's COPs and/or user defined COPs, new points on the map, drag and drop trajection lines and/or points on the map) using the pointer |
| | | The system **shall** permit rapid entry of change of RVSM, 8.33 spacing, RNAV, RNP operating status by operation on the track (symbol or label) or a flight list in which the flight is displayed. |
| | | Selection of a flight for command entry **shall** be either explicit (e.g. via clicking on a representation of the flight) or implicit (e.g. moving the cursor over a representation of the flight). |
| | | Upon selection, the flight **shall** be depicted with highlighted attributes in all of its presentation objects. |
| | | If entering a command by operation on fields in the track label, the label or input menu **shall** remain static whilst the flight is selected.<br><br>If the entry is via a menu, then the menu **shall** remain static, but the label can move. If however, the input is made directly on a label field, then the label **shall** remain static whilst it is selected. |
| *4.1.8.2.1.7* | | *Display Control* |
| | | Display controls are described for selecting the plot/track display source, weather selection, function selection, traffic filters, display centre and scale, and for selecting multiple traffic situations displays. |
| *4.1.8.2.1.7.1* | | *Radar Source Selection* |
| | | The system **shall** permit selection of either an asynchronous MRT display or a synchronized track display from a selected source. |
| | | The system **shall** be capable of automatically selecting the synchronized plot/track display from a source, predefined for the sector, upon unavailability of the MRT capability. |
| | | The current source **shall** always be indicated. |
| | | Upon interruption to the receipt of tracks from the selected source, the system **should** freeze the display of the last presented picture, with an indication that the display is frozen. |
| *4.1.8.2.1.7.2* | | *Weather Selection* |

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| | | The system **shall** permit the selection of sources for display of weather data. |
| | | The system **shall** permit individual selection of weather intensity levels. |
| *4.1.8.2.1.7.3* | | *Function Selection* |
| | | The system **shall** permit the selection of the display of the individual ATC tools both individually for selected flights, and for all flights at the work position. |
| *4.1.8.2.1.7.4* | | *Traffic Filters* |
| | | The system **shall** permit selection of an upper and lower level, outside of which plots and tracks are filtered-out from displayaccording to the saved user configuration after login. |
| | | Tracks without Mode C **shall** bypass the level filter. |
| | | The system **shall** permit designation of Mode 3/A codes (individual and blocks of codes) to be filtered out from display. |
| | | The system **should** permit designation of a level band for the application of a Mode 3/A code filter. |
| | | Tracks which have an alert status (i.e. having a Mode A code of 7500, 7600, or 7700, or the subject of a safety net alerts), are in the process of coordination, transfer or pointout to a sector, or are assumed at a sector, **shall** bypass the filters at the sector. |
| | | The system **should** permit the designation of additional Mode 3/A codes to bypass the filters at a sector. |
| | | The system **shall** provide a filter bypass for operator-selected tracks or all tracks. |
| | | The system **shall**permit clear presentation of an active filter. |
| *4.1.8.2.1.7.5* | | *Display Centre and Range* |

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| | | The system **shall** permit rapid selection for display centre and range according to the saved user configuration after login. |
| | | The system **shall** permit rapid off-centering and re-centering of the display. |
| | | The system **shall** permit rapid way to drag-and-drop off-centering of the display. |
| | | The system **shall** permit selection of range scale between pre-defined values. |
| | | The system **shall** permit rapid re-selection of the original display centre and range. |
| | | The system **shall** be capable of presenting a scale marker on the situation display, showing the current range scale. |
| | | The system **shall** be capable of presenting range rings and pre-defined intervals, centered on pre-defined locations. |
| | | The system **shall** be capable of presenting a compass rose, centered at predefined locations. |
| *4.1.8.2.1.8* | | *Label Positioning* |
| | | The system **shall** permit manual re-positioning of target labels, both individually for a selected label and for all labels. |
| | | The label position **shall** be adjustable both in terms of its orientation around the position symbol and its distance from the position symbol. |
| | | The system **shall** be capable of automatically avoiding label overlap. |
| | | Distraction caused by the automatic movement of labels in resolving overlap **should** be avoided. |
| | | The automatic label overlap avoidance function, if provided, **shall** be selectable (on/off) at each work position. |
| *4.1.8.2.1.9* | | *Multiple Situation Presentations* |
| | | The system **shall** permit the concurrent selection of up to four Traffic Situation Presentations. |
| | | For each Traffic Situation Presentation, the system **should** permit independent source selection, weather selection, traffic filters, center/range and label positioning. |
| | | The system **shall** present traffic warnings and highlights consistently on each Traffic Situation Presentation. |
| | | The input mechanism through each Traffic Situation Presentation **shall** be identical. |
| **4.1.8.2.2** | | **Sector Planning Presentation** |
| | | The role of the Sector Planner is to plan and coordinate the entry and exit conditions of traffic entering and leaving the sector. An important aid to the Planning Controller is the Traffic Situation capability, as described in paragraph *4.1.8.2.1*, Traffic Situation Presentation. However, due to the lead time necessary for the planning task, the traffic situation display cannot be considered the primary mechanism. |

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| | | Thus, the Sector Planning Presentation capability is envisaged as encompassing a list of flights entering and leaving the sectors for which the Planning Controller is responsible. |
| | | For each flight, the entry/exit conditions are presented and may be amended either manually, or upon exchange of silent coordination messages (OLDI). Through the list entries, the Planning Controller is able to access the medium term conflict detection tool. |
| | | In addition to the Planning Flight List, the Planning Controller also requires a mechanism for manually entering estimates for flights (and thus activating them) for which automatic flight notification is not enabled. |
| *4.1.8.2.2.1* | | *Planning Flights List* |
| | | Upon posting of a flight to a sector (see paragraph Flight Data Distribution) the data **shall** be presented to the Planning Controller. |
| | | For each entry in the list the system **should** be capable of displaying the following information: |
| | | Aircraft identification; |
| | | Flight rules and type; |
| | | Aerodromes of departure and destination; |
| | | Requested flight level; |
| | | Sector entry and exit conditions (points, levels, times); |
| | | Aircraft type. |
| | | The current phase of coordination and handover for both entry and exit **shall** be indicated (Coordination status marking) |
| | | The system **shall** permit manual entry of transfer conditions. |
| | | Transfer conditions that have been amended at a sector **shall** be indicated as such at the other sector involved in the transfer until acknowledgement at that sector. |
| | | The system **shall** be capable of sorting the flights by entry/exit points, entry/exit times and entry/exit levels, and any combination of these criteria. |
| | | The system **should** be capable of indicating direction of flight through attributes of the list entry. |
| *4.1.8.2.2.2* | | *Flight Pre-Activation* |
| | | The system **shall** provide a mechanism by which an estimate can be rapidly entered for a flight for which automatic coordination is not available (e.g. no OLDI link with upstream ATSU) |
| **4.1.8.2.3** | | **Medium Term Conflict Presentation** |

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| | | The purpose of the Medium Term Conflict Presentation capability is to present the results of the MTCD tool in such a way as to provide useful assistance to the sector team in determining the conflicts that will require their attention. |
| | | For the Executive Controller, the presentation of conflicts is an integral part of the Traffic Situation capability. For the Planning Controller however, earlier presentation of conflicts is required. |
| *4.1.8.2.3.1* | | *MTCD Conflict Presentation* |
| | | For each flight that is presented to the Planning Controller at a sector the system **shall** present detected MTCD conflicts. |
| | | For each conflict, the system **shall** indicate the time to the start of the conflict and the calculated minimum horizontal separation. |
| | | The system **shall** indicate the trend in the calculations of conflict start time and minimum separation. |
| | | The system **shall** present any context traffic identified for a conflict. |
| | | The system **shall** be capable of presenting horizontal and vertical views of a selected flight's trajectory, giving also those of any conflicting of contextual aircraft. |
| | | The system **should** present status information to supervisor and controller working positions in case MTCD is not available. |
| | | MTCD **shall** allow the exclusion of an individual flight from MTCD. |
| | | MTCD **shall** allow the re-inclusion of an excluded flight. |
| | | MTCD **shall** acknowledge exclusions, and re-inclusions, of an individual flight. |
| | | For each conflict (MTCD) detected, MTCD **shall** provide HMI with conflict data (MTCD). |
| | | For each conflict (MTCD) ended, MTCD **shall** provide HMI with an end-of-conflict notification. |
| | | MTCD **shall** enable to start and stop MTCD. |
| | | MTCD **shall** enable to configure MTCD, before starting it, by setting the configuration parameters (MTCD). |
| | | MTCD **shall** enable to view the current values of the configuration parameters (MTCD). |
| | | System **shall** be capable to provide suggestions how to solve predicted conflicts. (Calculating new headings, adjusting rate of descend/climb, etc.) |
| **4.1.8.2.4** | | **Tower Electronic Strips Display** |
| | | Electronic Strips Display is used by the Tower Controllers at Tbilisi (UGTB), Batumi (UGSB) and Kutaisi(UGKO) airports both as an aid to the task of controlling aircraft in the CTR and as a means of performing flight coordination with the APP. Electronic strips are provided on separate |

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| | | display. Electronic Strips are organized in following status bays:<br>- Pending – for SFPLs of Departing aircrafts from current airport before configurable time of EOBT<br>- Active – for active SFPLs of Departing , Arriving, Overflying aircrafts for current airport<br><br>Departing , Arriving, Overflying electronic strips are distinguished by configurable colors.<br>Paper strips could be used at any time of TWR control.<br>The ATCO will be assisted by a surveillance service as additional information for its visual observation by using a separate situation display.<br>Major fields for working on electronic strips are:<br>- departure/arrival time,<br>- departure/landing runway,<br>- departure route (SID),<br>- arrival route (STAR),<br>- flight rules,<br>- SSR code,<br>- cleared level,<br>- free text,<br>- parking position,<br>- start up/ taxi/line-up indication, |
| *4.1.8.2.4.1* | | *Departure Strips* |
| | | For each strip of departing aircraft the system **shall** be capable of displaying at least:<br>- aircraft identification<br>- callsign,<br>- aircraft type,<br>- destination aerodrome,<br>- wake turbulence,<br>- speed,<br>- departure time,<br>- RWY for departure,<br>- departure route(SID),<br>- flight rules,<br>- assigned SSR code,<br>- filed flight level, |

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| | | - cleared level,<br>- ATFM Calculated Take-Off Time,<br>- 3 or 4 way points from the flight plan route with corresponding times over this points,<br>- RVSM status,<br>- free text field,<br>- registration number,<br>- ATC departure clearance issuance indication,<br>- start-up/taxi indication,<br>- wingspan (optional) |
| | | The system **shall** permit entry of progress indication of a start-up/taxi/line-up for departing aircraft. |
| | | The system **shall** permit entry and change of a departure route indication by the tower controller. |
| | | The system **shall** permit distribution of latest (updated) departure route indication for configurable next sectors. |
| | | The system **shall** permit manual paper printing for any strip. |
| | | The system **shall** permit automatic printing of all departure strips on configurable time before EOBT. |
| | | The system **shall**permit entry and change of major fields manually and with predefined values. |
| *4.1.8.2.4.2* | | *Arrival Strips* |
| | | For each strip of arriving aircraft the system **shall** be capable of displaying at least:<br>- aircraft identification,<br>- callsign,<br>- aircraft type,<br>- departure aerodrome,<br>- destination aerodrome,<br>- landing RWY,<br>- wake turbulence,<br>- arrival time,<br>- flight rules,<br>- parking position,<br>- arrival route (STAR), |

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| | | - 3 or 4 way points from the flight plan route with corresponding times over this points,<br>- registration number,<br>- landing clearance issuanceindication,<br>- assigned SSR code,<br>- free text field,<br>- wingspan (optional) |
| | | The system **shall** permit manual paper printing for any strip. |
| | | The system **shall** permit the coordination between the tower and approach of a missed-approach/go-around. |
| | | The system **shall**permit entry and change of major fields manually and with predefined values. |
| *4.1.8.2.4.3* | | *Overflight Strips* |
| | | For each strip of overflight aircraft the system **shall** be capable of displaying at least<br>- aircraft identification,<br>- callsign,<br>- aircraft type,<br>- departure aerodrome,<br>- destination aerodrome,<br>- wake turbulence,<br>- flight rules,<br>- 3 or 4 way points from the flight plan route with corresponding times over this points,<br>- registration number,,<br>- speed,<br>- assigned SSR code,<br>- free text field,<br>- route. |
| | | The system **shall** permit manual paper printing for any strip. |
| | | The system **shall**permit changes of major fields manually and with predefined values. |

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| *4.1.8.2.4.4* | | *Pending Strip Bay* |
| | | The system **shall** permit sorting of electronic strips in the bay by means of EOBT, flight level, aircraft identification, etc. |
| | | The system **shall** permit change sorting by manually drag-and-drop of electronic strips. |
| *4.1.8.2.4.5* | | *Active Strip Bay* |
| | | The system **shall** permit sorting of electronic strips in the bay by means of EOBT, flight level, aircraft identification, etc. |
| | | The system **shall** permit change sorting by manually drag-and-drop of electronic strips. |
| **4.1.8.2.5** | | **Tower Display** |
| | | The Arrivals and Departures Lists capability could be used by the Tower Controllers at Tbilisi (UGTB), Batumi(UGSB) and Kutaisi(UGKO) airports both as an aid to the task of controlling aircraft on the ground and as a means of performing flight coordination with the APP. The display consists of lists of flights arriving and departing from current aerodrome. |
| | | The ATCO will be assisted by a surveillance service which completes its visual observation by displaying on a screen:<br>• The airport traffic context (Airport layouts);<br>• Position of all vehicles in the manoeuvring area;<br>• Position of all aircraft in the movement Area;<br>• Identity of all aircraft in the movement Area;<br>• Identity of all cooperative vehicles.<br>Since ATC is responsible for the manoeuvring area, the surveillance service should cover all mobiles on this area. In the same way, the surveillance service should also cover aircraft in the apron area as controllers deliver push-back clearances when aircraft are on the apron area. The aircraft and vehicles are expected to be cooperative, so the surveillance service will automatically provide their identity.<br>However, it should also be possible for ATC to cope with a VERY limited number of non-cooperative mobiles (grass cutting vehicle, aircraft with transponder out of service). These non-cooperative mobiles will not be labelled. |
| *4.1.8.2.5.1* | | *Departures List* |

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| | | A flight departing from Tbilisi (UGTB), Kutaisi (UGKO) and Batumi (UGSB) airports **shall** be posted on the Departures List upon distribution to the Tower. |
| | | Flights on the Departures List **shall** be organized according to the take-off runway. |
| | | The system **shall** be capable of displaying<br>- aircraft identification,<br>- aircraft type,<br>- wake turbulence,<br>- departure time,<br>- departure route(SID),<br>- flight rules,<br>- assigned SSR code,<br>- cleared level and<br>- ATFM Calculated Take-Off Time<br>on the Departures List. |
| | | The system **shall** permit entry of a start-up/taxi indication of a flight. |
| | | The entry of an ATC departure clearance by the APP **shall** be displayed in the flight list entry. |
| | | The system **shall** permit entry of a departure indication by the tower controller. |
| *4.1.8.2.5.2* | | *Arrivals List* |

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| | | A flight arriving at Tbilisi (UGTB), Kutaisi (UGKO) and Batumi (UGSB) airports **shall** be posted on the Arrivals List upon distribution to the tower. |
| | | For each flight on the Arrivals List the system **shall** be capable of displaying<br>- aircraft identification,<br>- aircraft type,<br>- wake turbulence,<br>- transfer level,<br>- arrival time,<br>- flight rules,<br>- parking position<br>- and arrival route (STAR). |
| | | The system **shall** permit entry of a landing time by the tower controller. |
| | | The system **shall** permit the coordination between the tower and approach of a missed-approach/go-around. |
| *4.1.8.2.5.3* | | *Overflights List* |

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| | | A flight passing through the Area of Responsibility of Tower Tbilisi (UGTB), Kutaisi (UGKO) and Batumi (UGSB) aerodromes**shall** be posted on the Overflights List upon distribution to the tower. |
| | | For each flight on the Overflights List the system **shall** be capable of displaying<br>- flightcallsign,<br>- aircraft type,<br>- wake turbulence,<br>- transfer level,<br>- arrival time,<br>- flight rules,<br>- departure and destination aerodromes and<br>- route. |
| | | The system **shall** be capable of displaying the status of each logical component. |
| | | The system **shall** permit manual activation and de-activation of logical components. |
| | | The system **shall** permit manual switchover of logical components. |
| | | The system **shall** permit re-configuration of system components from one role to another. |
| | | The system **shall** permit the management (retrieval, archive, etc.) of recorded data. |
| **4.1.8.2.6** | | **Technical Management** |
| | | The system **shall** be capable of displaying the status of each physical component. |
| | | The display of technical status **should** be organized according to the hierarchical structure of the physical and logical components. |
| | | The system **shall** display a list of technical warnings generated within the system. |
| | | The system **shall** be capable of indicating the arrival of a technical warning even if the Technical Management data is not displayed. |
| | | The system **should** be capable of removing a warning upon operator acknowledgment. |
| | | The system **should** be capable of providing an aural indication upon generation of a warning. |
| **4.1.8.2.7** | | **Flight Plan Maintenance Presentation** |
| | | The Flight Plan Maintenance Presentation capability provides the means by which the Flight Data Assistants are able to maintain a complete and |

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| | | accurate database of flight plans. |
| | | As such, it provides a mechanism for entering and amending repetitive flight plans (RPLs), viewing and "repairing" messages from external sources that failed the syntax and semantics checks, and compiling and transmitting messages to external destinations. |
| | | The repairing of external messages comprises the presentation of the message, determination of why it failed the checking, and the taking of the remedial action. |
| | | The particular course of remedial action depends upon the type of error; for syntactical errors the message may either be corrected and resubmitted, or the data entered directly into the SFPL; other errors may involve the creation of a new SFPL, or the submission of a flight plan request to the IFPS. |
| | | In addition to the requesting of data from the IFPS described above, flight plans and amendments may also be sent to the IFPS in cases where the creation or amendment is originated by a system operator. |
| *4.1.8.2.7.1* | | *Repetitive Flight Plan Maintenance* |
| | | The following command functions **shall** be available for the management of RPLs: |
| | | Read RPLs from Disk, |
| | | Manually Create RPL, |
| | | View/Update RPL, |
| | | Cancel RPL for a specified duration, |
| | | Delete RPL, |
| | | Create a System Flight Plan (SFPL) from a specified RPL. |
| | | The system **shall** prevent multiple users from simultaneously updating the same RPL. |
| *4.1.8.2.7.2* | | *SFPL Creation, Viewing and Amendment* |

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| | | The system **shall** permit the following SFPL actions: |
| | | create/view/update/cancel an SFPL; |
| | | Assign an SSR Code to SFPL; |
| | | Recover a terminated SFPL. |
| | | The system **shall**be capable of presenting the complete set of ATS messages that have been applied to an SFPL. |
| | | The system **shall** prevent multiple users from simultaneously updating the same SFPL. |
| | | The system **shall** prevent the situation whereby an operator can erroneously lock an SFPL for a long period. |
| *4.1.8.2.7.3* | | *External Message Repair* |
| | | The system **shall** have the capability of presenting a list of ATS messages that have failed verification checks or are selected for manual processing. |
| | | Messages **shall** be ordered first according to a priority and secondly according to time received. |
| | | The priority **shall** be user-defined per message type. |
| | | The following command functions **shall** be available for the manipulation of the messages: |
| | | - View message and its reason for manual processing,<br><br>***Note:*** *Indication of the error means providing the reason of error and visual place of error in message text.* |
| | | - Delete message, |
| | | - Repair message, |
| | | - Request flight plan from IFPS (RQP). |
| | | The repairing of messages **shall** be permitted either by correcting the content/format of the message or by direct entry of the message data into the corresponding SFPL. |
| *4.1.8.2.7.4* | | *Message Compilation and Transmission* |

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| | | The system **shall** permit the compilation and transmission of an ATS message for a designated SFPL. |
| | | The system **shall** automatically extract the data from the SFPL appropriate for the message type. |
| **4.1.8.2.8** | | **Meteorological Information Presentation** |
| | | At certain control positions (e.g. in the APP), the meteorological information of certain aerodromes may be permanently displayed. Therefore, any change to the information is immediately displayed and highlighted to the controller. |
| *4.1.8.2.8.1* | | *Aerodrome Meteorological Information* |
| | | The system **shall** permit the display of meteorological information for operator-selected aerodromes. |
| | | Upon amendment of the meteorological data for an aerodrome currently displayed at a work position, the system **should** immediately display and highlight the changed information. |
| *4.1.8.2.8.2* | | *Area Meteorological Information* |
| | | The system **shall** permit entry, viewing and amendment of upper wind and temperature data for designated levels. |
| | | The system **shall**provide the automatic selection and upgrading of the wind data from GRIB message. |
| *4.1.8.2.8.3* | | *Meteorological Message Repair* |
| | | The system **shall** have the capability of presenting a list of meteorological messages that have failed verification checks. |
| | | The following command functions **shall** be available for the manipulation of the messages: |
| | | View message and error indication, |
| | | Delete message, |
| | | Repair message. |
| **4.1.8.2.9** | | **Aeronautical Information Presentation** |
| | | The Aeronautical Information Presentation permits authorized users to enter aeronautical (environment) information and NOTAMs, for use in the processing of flight data and for display as auxiliary information for controllers. |
| | | The Aeronautical Information Presentation also provides a means for authorized operators to manually view and repair aeronautical messages that were not processed automatically and other unrecognized messages. |
| *4.1.8.2.9.1* | | *Aeronautical Environment Information* |

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| | | The system **shall** permit designated users to enter the following environment information: |
| | | - TSA/CDR/CBA activation schedule and status; |
| | | - runways and associated SIDs and STARs in use for designated aerodromes. |
| | | The system **shall** permit display of operator-selected environment data. |
| | | Upon amendment of environment data that is currently displayed at a work position, the system **should** immediately display and highlight the changed information. |
| | | The system **should** permit the operator to enter an acknowledgement of changed information, thus returning it to its original attributes. |
| *4.1.8.2.9.2* | | *NOTAMs* |
| | | The system **shall** permit the display of NOTAMs according to given selection criteria. |
| *4.1.8.2.10* | | *Operational Status Presentation* |
| | | Each user requires information regarding the operational status of the system, in terms of the available functionality, and other miscellaneous information (time, QNH, etc.). The particular items displayed may be customized for the particular user. |
| *4.1.8.2.10.1* | | *Operational Status Information* |

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| | | The system **shall** permit selection of the following data items for display: |
| | | Work Position Identity; |
| | | Mission/Mode of Operation; |
| | | Available/Unavailable System Capabilities (STCA, MRT, FDP, etc.); |
| | | Available/Unavailable External Communications (Radars, OLDI links, AFTN/AMHS, etc.); |
| | | Display Configuration (Range, data source, filter settings, ATC tool settings etc.); |
| | | Time; |
| | | QNH, |
| | | Lowest Usable Flight Level. |
| | | Transition Level |
| **4.2** | | **FUNCTIONALITY OF THE SUPPORT MISSION FOR ATC SYSTEM** |
| **4.2.1** | | **Recording and Replay** |
| ***4.2.1.1*** | | ***Introduction*** |
| | | The facilities described in this section refer solely to "data" recording and replay. |

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| | | Facilities **shall** be provided to continuously record the data flow entering/leaving the data processing systems, their components and interfaces (including HMI). The recording of the data may be used for:<br>- Incident and accident investigations<br>- Search and rescue operations<br>- Traffic load analysis<br>- ATC procedures evaluation<br>- Statistical analysis<br>- Checking completeness and correctness of information<br>- System performance and efficiency analysis<br>- System testing<br>- Error tracing, debugging of hardware/software<br>- Training |
| | | It **shall** be possible to reconstruct from the recorded data the original live traffic and events at CWP(s)/SWP(s) or sectors, including internal and external CWP/SWP message interactions as necessary for this function. |
| | | The re-construction **shall** take place at specific CWPs/SWPs within TDS environment. |
| | | An ability to re-inject the recorded data stream into the replay environment **shall** be offered. This operation covers both the replay of past live or simulated air traffic situations with all associated events, and the re-use of recorded data in support of controller training, software development and testing. |
| | | Each such replay action is hereafter referred to as a "session". |
| | | The Recording and Replay System (RRS) **shall** permit concurrent (simultaneous) recording and replay processing. |
| | | It **shall** be possible to run a replay session without any specific offline pre-processing. |
| | | RRS **shall** be equipped with all functionalities listed hereafter-deferred replays inclusively. |
| ***4.2.1.2*** | | ***Data Flow Characteristics*** |
| **4.2.1.2.1** | | ***General Aspects*** |
| | | The data flows entering/leaving and internal to the system, may be classified in two major groups:<br>- Operational data flow<br>- Technical data flow |

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| ***4.2.1.3*** | | ***Recording and Replay System*** |
| | | The purpose of recording is to permit playback and offline analysis. As such, the requirements of the Recording capability are derived from those of Playback and Reduction. |
| | | The performance requirements regarding the recording of audio channels. |
| | | The system **shall** provide various playback speed function.<br>The immediate replay of recorded voice communications forms an important capability for the use primarily of the Distress and Diversion service. Voice and Data recording **shall** be synchronised and **shall** have simultaneous replay function. This is considered an "online", operational task and, as such, is described here as part of the Operational mission. |
| **4.2.1.3.1** | | ***General*** |
| | | The recording of data in the ONL environment **shall** be protected from failures by processing and storage redundant systems. |
| | | Such redundancy **shall** cater for the continuous recording in case of failure. |
| | | As for all other subsystems, the Recording and Replay System (RRS) **shall** have a functional connection with the TMCS in order to allow monitoring and control from the TMCS, such as communication of status-reports and exchange of RRS control commands (start, stop, etc.). |
| | | The recording and storage of data **shall** be designed so as to facilitate the replay data retrieved from a short term and a long-term storage media. |
| | | Deferred replay: A facility to replay data retrieved from a long-term storage medium, which must be accessible for a longer period (several months) **shall** be provided and described in detail. |
| **4.2.1.3.2** | | ***Recording of Data*** |
| *4.2.1.3.2.1* | | *General* |
| | | Under the general data recording, five major items can be considered :<br>- Recording functionality<br>- Recording media<br>- Recording capacity<br>- Retention and analysis of data<br>- Recording media management |
| *4.2.1.3.2.2* | | *Recording Functionality* |

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| | | In order to achieve a general-purpose and flexible recording facility the recording processing will provide the following general features:<br>Time Stamping of messages **shall** be provided.<br>In case of failure of the external clock, the recording **shall** continue with time signals provided by the internal clock of the recording system.<br>Time stamping **shall** include date and time on the recording medium.<br>General enabling/disabling of recording **shall** be provided (only for the replay environment)<br>Basic recording file management **shall** be provided. |
| | | A sorted recording grouped in different files or classes **shall** be provided to facilitate a particular replay mode . |
| | | The system **shall** provide continuous recording of the following items of data: REC056: up to 128 duplex analogue audio channels; all sensor data entering the system;<br>all flight data entering or leaving the system;<br>all alerts and warnings generated by the system;<br>equipment and component availability, configuration, role (including operator logins) and status;<br>all data at each executive, planner, tower and supervisor work position sufficient to permit passive.<br>all data within the system sufficient to permit interactive replay and data.<br><br>All data recorded **shall** be time-stamped to the granularity required such that events are re-generated correctly during a replay.<br>For all recorded system inputs, the system **shall** also record the identity of the originator of the input.<br>Snapshots **shall** be taken as necessary such that commencement of playback can be specified down to five minute intervals. |
| | | Data recording node should have ability to provide recorded data in AVI format. System **shall** have ability to archive data on DVDs. |
| *4.2.1.3.2.3* | | *Recording Media* |
| | | Selection criteria for the recording media are:<br>• Reliability and accuracy. It **shall** be possible to record continuously all received messages without corruption, loss or duplication;<br>• The long term storage media **shall** permit storage for several months (with a physical volume change when full and an appropriate standby facility); |
| | | It **shall** be possible to record the data flow classes, which are relevant for a particular replay possibility, simultaneously on a unique physical data medium in order to avoid the handling and administration of various sets of data volumes (for a replay of a particular time slice). |
| | | For the long-term storage a suitable medium **shall** be proposed (optical disk, tape, cartridge, WORM type medium etc.) |
| *4.2.1.3.2.4* | | *Recording Capacity* |
| | | The capacity of the RRS **shall** be such that all data streams can be recorded and retrieved in real time (according to the above |

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| | | paragraphs). |
| | | A "Continuous' recording facility **shall** be provided for the ONL system ("continuous" being defined as recording with no operator intervention, e.g. for medium change-over over a 24 hours period). |
| | | The possibility of other data management tasks such as classification or blocking/de blocking of messages (for economic use of recording media space), **shall** also be considered. |
| *4.2.1.3.2.5* | | *Recording Media Management* |
| | | Means **shall** be provided to uniquely identify each recording produced, by listing the input source(s) recorded, along with details of where, when and on which equipment the recording was made. |
| | | Medium identification information **shall** be available for display, on request, during replay |
| | | Facilities **shall** be provided to archive recordings such that they can subsequently be easily recovered for copying or replay. |
| | | A facility **shall** be provided to copy the contents of a recorded data medium. |
| | | The system **shall** permit a continuous recording over a 24 hour period without necessitating any operator involvement (for changing media, etc.). |
| | | The system **shall** be capable of continued recording over an indefinite period. |
| | | The system **shall** permit the archiving of recorded files. |
| | | The system **shall** provide sufficient archive media for storage of 30 days' data recording. |
| | | The system **shall** permit the retrieval of recorded data for the purposes of playback or data reduction without interrupting the recording process. |
| **4.2.1.3.3** | | ***Replay of Data*** |
| *4.2.1.3.3.1* | | *General* |
| | | The replay **shall** consist of the re-introduction of the recorded data, at a functional place similar to the place where the data had been recorded on the ONL environment.<br>There **shall** be two modes of replay:<br>- passive replay mode, where the display is re-created as it was presented at the time of recording;<br>- and interactive replay mode, where the system situation is recreated allowing the user to interrogate system functions. |
| | | In Passive replay mode, the replayed data **shall** be reproduced with respect to the sequence of all events, and including all the originally used dialogue objects as explained in the outstanding points and the relevant clarifications. |
| | | No inaccuracies introduced by the RRS subsystem **shall** be perceivable. |
| | | It **shall** be possible to replay in both modes the recorded data at different speeds, real-time or slower/faster than normal and to freeze the replay in order to permit a detailed examination of the displayed information. |

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| *4.2.1.3.3.2* | | *Replay Functionality* |
| | | In order to achieve a general and flexible replay facility, some limited RRS-internal processing **shall** be incorporated in order to provide a complete data retrieval with the following features:<br>- Data type/class selection possibilities<br>- Rigorous respect of the original chronology of events<br>- General enabling/disabling the replay function (only in offline environment)<br>- Permit a flexible time selection (see further below)<br>- Permit various replay modes (see further below) |
| | | All directives necessary for these functions **shall** be controllable from any CWP/SWP replay window in the off-line environment. |
| *4.2.1.3.3.3* | | *Replay types and Usage* |
| *4.2.1.3.3.3.1* | | *Deferred Replay* |
| | | Deferred replay is the replay of data retrieved from a long-term storage medium (archived volumes), which is accessible for a longer period (several months). This type of replay will be applied for incident analysis as well as for more general purposes such as simulation and training, software testing, etc.<br>A facility for deferred replay **shall** be provided.<br>The deferred replay facility **shall** only be initiated upon receipt of the necessary start-up parameters (launch dialogue).<br>Deferred replay **shall** be activated within 5 minutes of the completion of the Launch dialogue.<br>Deferred Replay **shall** be password protected and therefore may be launched for start-up by an authorised staff member.<br>Deferred replay **shall** provide facilities to manually switch from the current recording media to release them for replay, but will continue recording on other media without interruption. |
| *4.2.1.3.3.3.2* | | *Replay Usage* |
| | | A capability **shall** be provided to replay on any CWP or SWP in the off-line environment, using data which is retrieved from archived volumes. Manual intervention may be required since the wanted data volume has to be physically located and mounted onto the relevant Replay system. |
| *4.2.1.3.3.4* | | *Replay Modes* |
| | | Two replay modes **shall** be available: |
| *4.2.1.3.3.4.1* | | *Passive Replay* |
| | | In this mode, the HMI input devices **shall** be disabled, except those needed for the replay control itself, and the original situation (including the emulation of all inputs) of the selected controller working position **shall** be presented. |
| | | Data flows E and F (excluding those inputs described in the outstanding points and the relevant clarifications) **shall** be used. |

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| *4.2.1.3.3.4.2* | | *Interactive Replay* |
| | | In this mode, all HMI input devices **shall** be available to manipulate the presentation of the replay information. |
| | | All data stored at the time of recording **shall** be available for display. |
| | | It **shall** be possible to query and display sections of the available traffic data. |
| | | Only the data flow from class E is required, a replay and emulation of the original controller inputs deduced from class F **shall** be prevented. |
| ***4.2.1.4*** | | ***Synchronisation of Data and Voice Replay*** |
| | | The existing Voice Recorder System **shall** be reused.<br>The system **shall** allow for the synchronised replay of voice and data so that a complete situation of a controller's working position is achieved. |
| | | After contract signature, ANS CR will supply the Contractor with Voice Recorder System ICD and the minimum requirements to enable the Purchaser to issue the relevant tender.<br>The Contractor **shall** be responsible for the synchronisation of the data and voice replays.<br>The simultaneous replay of data and voice recordings **shall** be synchronised such that the time difference between the two **shall** not exceed 1 sec. |
| | | The system **should** permit capturing of the screen (screenshot) and printing at a designated printer.<br>The system **shall** store screenshots at the designated folder and allow to copy them to removable media. |
| **4.2.2** | | **Data Reduction** |
| | | The production of reports for route charging, statistics, analysis of contravention of noise abatement procedures, and the evaluation of operational procedures and system performance are all facilitated by the use of a data reduction capability, permitting extraction of data according to selection criteria (message type, flight callsign, departure point, etc.) and graphical or tabular presentation of that data (e.g. plotting of flight path).<br><br>The definition of the query mechanism is intended to provide the maximum flexibility in selecting data to be extracted, and thus the maximum of possible uses. As a particular example of a single use of the tool, reports will be made for the purpose of route charging. Such a report must contain an entry for each IFR flight within the Tbilisi FIR within the specified period, with each entry containing callsign, aircraft type, FIR entry point and time or departure aerodrome and time, and FIR exit point and time or arrival aerodromeand time. |
| ***4.2.2.1*** | | ***Data Reduction Tools*** |

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| | | The system **shall** provide tools to extract recorded items according to selection criteria and to present them in a graphical or textual form. |
| | | The system **shall** be capable of extracting the following data for analysis: |
| | | · all flight data and updates thereto; |
| | | · all plot and track data; |
| | | · all external messages received and transmitted; |
| | | · all warnings and alerts generated by the system; |
| | | · environment data and amendments thereto; |
| | | · sector configuration and changes thereto; |
| | | · equipment and component availability and status. |
| | | Permitted selection criteria **shall** include any combination of the following:<br>1. time period;<br>2. message type or data category (track, flight, OLDI message, STCA alert, etc.);<br>2. data update event (take-off, landing, SFPL-Track correlation, arrival at an en-route point, etc.);<br>4. data item value (track number, callsign, etc.). |
| | | For extracted items containing positional information, the system **should** permit the plotting of this data over a background of selected map features. |
| | | The system **shall** permit storing of the extracted data in a file such that it may be stored for further consultation. |
| | | The system **shall** permit the printing out of extracted data at a designated printer. |
| | | The system **shall** be capable of storing frequently used queries for re-use. |
| | | In order to support the preparation of statistical data, the system **shall** count all the extracted items fulfilling one selection criteria |
| **4.2.3** | | **SystemMaintenance** |
| | | System maintenance comprises the adaptation of the system environment data, adaptation of the human-machine interface, software |

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| | | development, hardware fault finding, and system testing.<br><br>System environment adaptation is performed in response to a change in the operational environment (new routes, new OLDI partner, LOAs updated, etc.). The function comprises a capability to enter the data in an intuitive, user-friendly manner, and to verify that the changed data forms a complete and consistent definition of the environment. The adaptation of both the system environment and the HMI is carried out by operational personnel without the necessity for knowledge of programming languages.<br>Hardware fault finding is performed in order to determine faults at the level of the LRU if monitoring to such a level can not be performed using the system monitoring facility. Such faults are diagnosed by means of built-in-test equipment (BITE), the Operation and Maintenance Technical Manual(s) and general purpose test equipment.<br>In order to verify correct operation of the system following any of the maintenance items described above, a facility to test the system is required. This comprises all the system components plus an external environment simulator/data generator (possibly also used as the training simulator). |
| ***4.2.3.1*** | | ***System Environment Adaptation*** |
| | | The System Environment Adaptation capability corresponds to the Static Data Operations function of the Aeronautical Environment Processing functional block.<br>The purpose of the function is to permit user-definition of the environment data, and then to ensure consistency as the data is propagated through the system. The intention is that a parameter (e.g. route definition) is entered once and then used by many functions (e.g. FDP, HMI, ATC Tools, etc.).<br>Static environment data includes permanent airspace and aeronautical elements, letters of agreement, function tuning data and text and charts that are used solely as supplementary information for display. |
| **4.2.3.1.1** | | **Data Management and Promulgation** |
| | | The system **shall** provide a mechanism for creating and amending the environment data defined in the following paragraphs. |
| | | The system **should** be capable of importing environment data from files in AIXM format. |
| | | The system **shall** perform context checks to ensure that the environment data is complete and consistent. |
| | | The system **shall** provide a mechanism to ensure that environment data, once amended, is promulgated consistently and completely through the system wherever needed. |
| **4.2.3.1.2** | | **Surveillance Data** |
| | | The system **shall** permit the definition of a surveillance processing area covering at least 20 NM beyond the extent of the Area of Responsibility. |

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| | | The system **shall** permit the definition of radar configuration data. |
| | | The system **shall** permit the definition of tracking parameters necessary for tuning the system for the operational environment. |
| | | The system **shall** permit the definition of filter areas for each radar. |
| **4.2.3.1.3** | | **Aeronautical and Airspace Data** |
| | | The system **shall** permit the definition of the following aeronautical elements: |
| | | · Aerodromes, |
| | | · Beacons and Significant Points, |
| | | · ATS Routes, SIDs and STARs, |
| | | · OAT Routes, |
| | | · Conditional Routes, |
| | | · FIRs, TMAs, control zones, |
| | | · Prohibited, Danger and Restricted Areas, |
| | | · Cross Border Areas (CBA), Temporary Segregated Areas (TSA) and Reduced Coordination Airspace (RCA). |
| | | The system **shall** permit the definition of strategic constraints in the form of level and speed restrictions over a point or boundary or in a volume of airspace. |
| | | The system **shall** permit the definition of an Area of Interest in which the preceding aeronautical elements can be defined and throughout which the SFPL trajectory is computed, extending beyond the limits of the area of responsibility. |
| | | The system **shall** permit the assignment of blocks of airspace for either civil use, military use or joint use, for determination of traffic category. |
| | | The system **shall** permit the definition of sectors comprising multiple subsectors, each defined by an area and vertical extent (i.e. thus permitting a sector to have differing upper and lower boundaries for particular areas). |
| | | In such a way, the system **shall** permit multiple vertical sectors defined over superimposed or overlapping areas. |
| **4.2.3.1.4** | | **Meteorological Data** |
| | | The system **shall** permit the definition of a three-dimensional grid for entry of upper wind and temperature. |

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| | | The horizontal and vertical resolution of the grid **shall** be adaptable with up to ten individual levels vertically, and sufficient horizontal resolution to cover the Area of Interest at a maximum of one degree intervals in latitude and longitude. |
| **4.2.3.1.5** | | **Flight Distribution, Co-ordination and Transfer Data** |
| | | The system **shall** permit the definition of distribution rules defining the following parameters according to flight rules, characteristics (departure, arrival, overflight) for a level band over a route point or volume:<br>1. Sectors to which the flight is posted,<br>2. Lead time for posting (i.e. time before expected time at the point). |
| | | The system **shall** permit the definition of distribution areas, each with a focal point defining the elements described above, for use with off-route flights. |
| | | The system **shall** permit the definition of coordination points, defining the following elements for a level band over a point:<br>1. ATS Unit with which coordination is performed,<br>2. Silent (OLDI) or Telephone Coordination,<br>2. Designation of OLDI messages to be used in inbound and outbound coordination,<br>4. Message transmission lead times,<br>5. Conditions for re-transmission or sending of a revision. |
| | | The system **shall** permit the definition of sector transfer rules, defining the following items for a point or sector boundary:<br>1. Receiving Sector (coordination partner),<br>2. Transfer lead time. |
| **4.2.3.1.6** | | **Aircraft Performance Data** |
| | | The system **shall** permit the definition of aircraft performance parameters necessary for the calculation of the aircraft trajectory. |
| | | For each aircraft type, the parameters **shall** be defined such that the performance may be accurately modeled at different levels and phases of flight. |
| | | The system **should** be capable of defining parameters to individual aircraft operators for the same aircraft type. |
| **4.2.3.1.7** | | **SSR Code Categorization** |
| | | The following requirements are based on the ORCAM as described in the Code Allotment Plan (CAP - Supplement to Part VI of ICAO Document 7754 -European Air Navigation Plan) |

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| | | The system **shall** be capable of organizing SSR codes into, at least, Domestic and International categories for automatic assignment. |
| | | The system **shall** be capable of managing a set of manually assignable codes (i.e. codes that are never automatically assigned but may be manually assigned). |
| | | The system **shall** be capable of managing a set of retainable codes (i.e. those codes that may be retained by the aircraft on entering the xx FIR if not already in use). |
| | | Each automatic assignment category **shall** be identified by the category type and destination/next enroute FIRs for which the category is applicable. |
| **4.2.3.1.8** | | **STCA Regions** |
| | | The system **shall** permit the designation of the airspace in which STCA is to be performed. |
| | | The system **shall** permit the definition of STCA parameter regions (including exclusion regions), defined by an area with vertical limits. |
| | | The system **shall** permit the definition of STCA regions that are completely enclosed by other, larger STCA regions. |
| | | The system **shall** permit the definition of the following STCA parameters for each region: |
| | | - Look-ahead times, separation limits, etc. separately, where required, for RVSM-equipped and non-equipped aircraft; |
| | | - Current Proximity parameters (separation limits and alert confirmation parameters); |
| | | - Linear Prediction parameters (look-ahead times, separation limits, warning times, alert confirmation parameters); |
| | | - Fast Diverging Conditions (separations, velocities); |
| | | - Cleared Flight Levels applicability; |
| | | -Turning prediction parameters (look-ahead times, separation limits, warning times, alert confirmation parameters, if used in the STCA algorithms); |
| | | - Type of Airspace (A, B, C, D etc.) regarding to the types of flight (GAT/OAT, IFR/VFR, RVSM/NON-RVSM) which are eligible for generation of STCA alerts; |
| | | -Aircraft Performance Data (standard turn rates, level-off rates, etc. if used in the STCA algorithms). |
| **4.2.3.1.9** | | **MSAW configuration and Terrain Map** |
| | | The system **shall** permit the definition of a grid with a minimum safe altitude defined for each cell. |

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| | | The system **should** additionally permit the definition of obstacles in the form of contours. |
| | | The system **shall**permit the definition of linear prediction parameters (look-ahead times, warning times, alert confirmation parameters) for MSAW calculations. |
| | | The system **shall**permit the definition of Cleared Flight Levels applicability for MSAW calculations. |
| | | The system **shall**permit the definition of turning prediction parameters (look-ahead times, warning times, alert confirmation parameters) for MSAW calculations. |
| | | The system **shall**permit the definition of aircraft performance data (standard turn rates, level-off rates, etc.) for MSAW calculations. |
| | | The system **shall**permit the definition of type of Airspace (A, B, C, D etc.) regarding to the types of flight (GAT/OAT, IFR/VFR) which are eligible for generation of MSAW alerts. |
| **4.2.3.1.10** | | **APW Protected Airspace Parameters** |
| | | The system **should** permit the definition of APW Protected Airspace, defined by an area with vertical limits. |
| | | The system **should** be capable of allowing APW Protected Airspace Definition by simple reference to a CBA (cross-border area), TSA, or predefined airspace restrictions. |
| | | The system **shall**permit the definition of linear prediction parameters (look-ahead times, warning times, alert confirmation parameters) for APW calculations. |
| | | The system **shall**permit the definition of Cleared Flight Levels applicability for APW calculations. |
| | | The system **shall**permit the definition of turning prediction parameters (look-ahead times, warning times, alert confirmation parameters) for APW calculations. |
| | | The system **shall**permit the definition of aircraft performance data (standard turn rates, level-off rates, etc.) for APW calculations. |
| | | The system **shall**permit the definition of the types of flight (GAT/OAT, IFR/VFR) which are eligible for generation of APW alerts. |
| **4.2.3.1.11** | | **MTCD Airspace and Parameters** |
| | | To increase flexibility, and to enable fine-tuning of the function, MTCD will make use of the configuration parameters (MTCD) mentioned below, which can be set and maintained by an authorised user. |

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| | | The authorized user must have the possibility to change these values. MTCD will be based on the assumption that changing values of configuration parameters will be done off-line, i.e., the MTCD function is stopped, and re-started with the new set of parameter values |
| | | There are several separation criteria within MTCD. The criteria may vary between airspaces, phases of flight, types of flight, and geometry of flight. The MTCD separation criteria are not necessarily equal to the standard radar separation minima. For example, larger MTCD separation criteria will result in a higher number of warnings for MTCD conflict detections, with consequently detections of less severe conflict situations. |
| | | The uncertainty areas used in MTCD conflict calculations may vary between airspaces, phases of flight, and navigational capabilities of flights. Although these parameters can be set freely, their values may best be evaluated from the deviation of an aircraft to its calculated track, depending on the airspace, the phase of flight of the aircraft or the aircrafts equipment. |
| | | The prediction horizons mark the ultimate times at which conflicts can be detected in advance. |
| | | The minimum notification times mark the latest times at which conflicts are passed to HMI for notification to the controller. Their values can depend on the average times needed for a controller to resolve the conflicts specific for each conflict type. The minimum notification times may also be set to zero in which case all conflicts will be shown to the controllerwithout delay. |
| | | The cycle time denotes the maximum time between two subsequent MTCD calculations. Its value is related to the deliverance frequency of the trajectory predictions. |
| | | The system **shall** permit the definition of the airspace in which MTCD is performed. |
| | | The system **shall** permit the definition of MTCD parameters for particular regions within the MTCD airspace. |
| | | The system **should** permit the designation of segments of close routes as “separated”. |
| ***4.2.3.2*** | | ***Human Machine Interface Adaptation*** |
| | | HMI adaptation permits a degree of development to the HMI to respond to updated procedures, system environment data and system capabilities. The HMI configurable items comprise the window attributes, decoration and layout of push-buttons/menus, etc., definition of the ATC maps, definition and layout of the plot and track labels and the electronic flight lists, and the layout of electronic flight strips. |
| **4.2.3.2.1** | | **Display Configuration and Attributes** |
| | | The system **shall**permit definition of the attributes and decoration of windows, including the following items: |

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| | | border colour and thickness; |
| | | background colour and fill style; |
| | | sub-window/widget location (e.g. push buttons, menus, scroll bars, etc.); |
| | | · title bar; |
| | | · default dimensions and location, and minimum size. |
| | | The system **shall** have an HMI adaptation tool available for authorised users. |
| **4.2.3.2.2** | | **ATC Maps** |
| | | The system **shall** permit the definition of map configurations applicable for user tasks. |
| | | Each map configuration **shall** be capable of defining the presentation attributes of the following categories of items:<br>· airspace features (FIR, TMA, etc.);<br>· adjacent sector boundaries;<br>· "own" sector extent;<br>· airspace limitations (restricted, prohibited, danger areas, etc.);<br>· beacons and waypoints;<br>· routes and airways;<br>· aerodromes;<br>· extended runway centrelines;<br>· geographical features (landmass, coastline, rivers, etc.). |
| | | The system **shall** be capable of associating text with graphics such that the position of the text in relation to the graphic remains constant throughout changes of scale and centre. |
| | | The system **shall** be capable of representing area features (TMA, airways, etc.) either in the form of an outline or as a filled area. |
| | | The system **shall** permit the organization of the map elements in a configuration into layers such that filled areas do not obscure line or text features. |
| | | The system **shall** be capable of creating the effect of translucency such that otherwise obscured features are visible with altered attributes "through" a translucent feature. |
| **4.2.3.2.3** | | **Traffic Display** |
| | | The system **shall** permit definition of the target position symbol for use on the Traffic Situation Display, for all combination of the following |

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| | | target attributes:<br>1. target response type (primary, secondary, MLAT, combined),<br>2. RDP categorization (plot/track),<br>2. SPI,<br>4. distress and emergency squawks. |
| | | The system **shall** permit the definition of the plot/track label format, individually for use in APP sectors, ACC sectors and the tower. |

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| | | The system **shall** permit the definition of the default label orientation and distance relative to the position symbol. |
| | | The label orientation **shall** be individually definable according to direction of flight. |
| | | The format and attributes of the label **shall** also be individually definable for flights of interest at the sector (assumed, in transfer, etc.), and those of no interest. |
| | | The system **shall** permit the user to configure the label to include any of the following information:<br>· Aircraft identification;<br>· Mode 3/A code;<br>· Mode C;<br>· Attitude Indication;<br>· Cleared Level;<br>· Assigned Heading;<br>· Assigned Speed;<br>· Current Sector;<br>· Next Sector;<br>· Destination;<br>· Exit Point;<br>· Transfer Level and supplementary condition;<br>· Tracked Heading;<br>· Tracked Ground Speed. |
| | | In addition, the system **shall** permit the definition of the label attributes for display of the following warnings and alerts:<br>· Radio Failure, Hijack or Emergency;<br>· Safety Nets (see 4.1.4.2, Safety Nets);<br>- Resolution advisory (RA)<br>· Conformance Warnings (see 4.1.4.1, Monitoring Aids);<br>· Equipment status not compatible with airspace and designation of status aircraft (RVSM-authorization [see paragraph 4.1.3.3.3, RVSM Status Maintenance], 8.33 channel spacing). |
| | | The system **shall** permit the specification of the label in at least two selected fonts/sizes. |
| | | The system **shall** permit the definition of the layout and content of the flight lists (see4.1.8.2.1.5 Flight Lists). |

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| | | The system **should** permit the definition of flight lists in both a full and an abbreviated format, for selection at the work position. |
| | | The system **shall** permit independent definition of the layout and content of the electronic flight strips according to print destination (tower, APP and ACC) and flight type (arrival, departure, overflight). |
| | | The system **shall** be permit the configuring of the flight strips for presentation of all fields of the flight plan, departure slot time, and estimated times. |
| | | The system **shall** be capable to present traffic situation adjusted with magnetic deviation per sector. |
| ***4.2.3.3*** | | ***Hardware Fault Finding*** |
| | | The system **shall** provide built-in test equipment (BITE) and auxiliary test equipment sufficient to diagnose faulty equipment to the level of the Line Replaceable Unit (LRU). |
| ***4.2.3.4*** | | ***System Test - TDS*** |
| | | TDS **shall** be fully functional copy of real system without redundancy. |
| | | Off -line environment **shall** comprise Database Management (DBM) function, Test and Development System (TDS) and Software Maintenance and Development Environment (SMDE). The TDS **shall** include KVM switch to switch-on between servers. |
| | | The database management subsystem **shall** provide interactive, menu-driven platform for creation and modification of adaptation database for the operational subsystems and **shall** be used as off-line (non operational task). |
| | | This subsystem **shall** be equipped by data storage (disks) and data presentation media (monitors). |
| | | DBM function **shall** include two primary functions:<br>• Adaptation and Generation<br>• Data analysis<br>The DBM function **shall** support the following activities:<br>• Version management - support of maintenance of various versions of off-line parameters database (dossier), including version control of each element (file) and the whole batch (dossier)<br>• Capability to install certain version on TDS, operational and SIMU platforms.<br>• Capability to re-validate (restore) flight data database after new dossier installation<br>• Capability to archive and restore ENV data batches |
| | | The Test and Development System **shall** provide an environment in which testing of modification to the application software can be carried out prior to installation in the on-line system |
| | | The primary purpose of the SMDE **shall** be to support the software maintenance and development tasks. |

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| | | The preparation of the site adaptation data that are related to system's operations, geographic location and hardware configuration **shall** be performed. |
| | | This subsystem **shall** be able to support data adding, modification and deletion of the environment data defined in the following paragraphs from the database. |
| | | The DBM system **shall** allow to database operator a graphical presentation of these parameters and easy review and modification. |
| | | The system **shall** perform context checks to ensure that the environment data is complete and consistent. |
| | | The system **shall** provide a mechanism to ensure that environment data, once amended, is promulgated consistently and completely through the system wherever needed. |
| | | The system **shall** be able to support full back-up of the database |
| | | The system should provide graphical interface for database analysis |
| | | DBM system **shall** produce a wide variety of reports (summary) from the database and **shall** perform various types of date base integrity checks. |
| | | This function **shall** provide the capability for formatting and interpreting operational recorded data. |
| | | This subsystem **shall** produce a wide variety of reports to facilitate analysis of operational situations like surveillance summary reports, system status change reports, operator input reports, specified track(s) history reports, MTBF/MTTR etc. |
| | | This subsystem **shall** provide a tool for the export of recorded data in CSV (Excell) format. |
| | | The Test and Development System (TDS) together with DBM and SMDE **shall** support ANSP's policy to acquire the necessary tools and proper training of its own staff to maintain the ATM system application software using own resources. |
| | | The TDS **shall** have identically all the reconfiguration capabilities of the on-line system and in addition those specific to TDS functionalities. |
| | | Physically located outside of ACC operational rooms, the TDS environment **shall** be able to be attached to the on-line environment through maintenance action. Work Stations should be located inside ACC operational rooms, but on special positions. |
| | | The TDS equipment and functionalities **shall** be identical to the equivalent equipment and functionality of each subsystem of the on-line environment. |
| | | The only difference between the sub-systems of the two environments is that the corresponding functionalities in the TDS environment **shall** be performed by single and not duplicated systems. |
| | | In addition, the Air Traffic Generator **shall** be provided for the validation and optimisation of the System Performances. |
| | | The Air Traffic Generator **shall** act as an additional surveillance input. |
| | | The following major functions **shall** be available in the TDS:<br>• Test and verification of new and updated software modules<br>• Performance evaluation of the system,<br>• Test and verification of modified environmental data |

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| | | • Verification of hardware equipment,<br>• Test and verification of new operational procedures,<br>• Human Machine Interface (HMI) updating and modification (i.e. prototyping),<br>• Recording and playback data with or without synchronised voice, |
| | | The live surveillance data (received from the surveillance heads) and external flight data (e.g. AFTN/OLDI) **shall** be distributed to the TDS so as to replicate the same inputs as in the on-line environment.<br>Such data inputs **shall** be used for and realistic testing of new system settings and environmental data changes. |
| | | The TDS **shall** support the same external interfaces as for the Operational Systems. |
| | | The HMI display and functional controls for ODS working positions used for testing (i.e. the En-Route suite, TWR suite) **shall** be identical to those provided in the OPS.<br>The software built and configured for OPS **shall** also be loadable and executable in the TDS without altering the configuration of the software. |
| | | The software used in the TDS **shall** be built from the same source modules that provide the functions for the on-line system.<br>This **shall** permit maintenance of the TDS and the on-line system software from a single source. |
| | | The Test and Development System (TDS) **shall** replicate the configuration of the on-line Operational System. |
| | | The auxiliary equipment (communication modules and hardware) required for interconnection of TDS hardware **shall** be provided, identical to these data communication solutions provided for on-line system. |
| | | It **shall** be possible to reconnect the TDS nodes to the on-line system (and vice versa). |
| | | The TDS **shall** be connected to the SMDE system. |
| | | This link **shall** be used for downloading the new and updated software modules from the SMDE to the TDS. |
| | | The TDS **shall** run the same software as in the on-line system, i.e. same operating systems with the same application software modules. |
| | | The application software **shall** be the same as per on-line system, but newer software versions can be installed on the TDS for test and verification |
| | | The TDS workstations (i.e. CWP and SWP) **shall** in addition to the OPS also include the Interface Editor System (IES) application to be used for HMI customisation. |
| | | It **shall** be possible to load the different test tools and performance analysis software on the TDS. |
| | | The TDS **shall** be capable to test and verify new and updated software modules |
| | | The facilities **shall** be provided for installation of new software modules (delivered by the Contractor or produced on the SMDE) on TDS for evaluation before final installation and use in the on-line system. |
| | | The TDS **shall** be used for testing and verification of new software modules the real data input (surveillance and flight plan data, the controller commands) as in the on-line system. |

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| | | The test and verification **shall** be performed on a hardware platform identical to the one used in the on-line system. |
| | | The TDS **shall** be used to evaluate the performances of both of the existing software version and of a new software version. |
| | | The evaluation **shall** be based upon the real surveillance/flight plan data received from the connected sources. |
| | | The analysis programmes **shall** permit the replay of selected CWP/SWP windows and messages. |
| | | TDS **shall** provide the facilities in which testing of modified environmental data managed by DBM function can be carried out prior to the installation to the on-line system. |
| | | The verification of modified environmental database **shall** be based on real surveillance/ flight plan data and required ODS input. |
| | | The TDS **shall** be used for verification of hardware equipment and hardware units. |
| | | The software maintenance and development equipment SMDE **shall** provide three major functions:<br>• Facilities for program generation , compilation , building and first order testing<br>• Automatic or manual mechanism for downloading of new software loads to the operational processors<br>• Automatic configuration control of the software at various phases of its development and maintenance |
| | | The SMDE **shall** exhibit:<br>• Data security.<br>• Data integrity<br>• Appropriate reliability |
| | | The Bidder **shall** propose its own suitable SMDE configuration (including hardware and software). |
| | | This subsystem **shall** include various types of hardware (processors, disks, printers, monitors, memories, the same type as for OPS) and software tools (compilers, linkers, graphic oriented software package) which **shall** enable the ANSP software team development and maintenance of system and application software |
| | | The software development **shall** permit software production and test activities on this subsystem without using operational hardware. |
| ***4.2.3.5*** | | ***System Security*** |
| | | Access to the system **shall** only be available upon entering a valid user name and password. |
| | | The system **shall** permit the designation of access permissions to system files and functions by a System Manager. |
| | | A user **shall** be able to access files and functions according to the access permissions that he has been granted. |

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| **5** | | **TECHNICAL REQUIREMENTS** |
| | | This chapter describes the physical characteristics of the system in terms of its components, its performance, and certain design principles to be followed. |
| | | The criteria governing the technical characteristics of the system are the following:<br>- system availability;<br>- system maintenance and upgrade. |
| | | The high availability required of an operational ATC/ATM system is addressed by the system design in its component reliability, the component redundancy, and a strategy of graceful degradation in the event of component failure. |
| | | End-user maintenance and future upgrade of the system is facilitated with a modular design and the adoption of an open systems architecture. This allows portability of software to more performing processors, and the future replacement or addition of components into the system. |
| | | The Common Operational Performance Specification (COPS) for the Controller Working Position although specifically intended for the CWP specification, in many respects applies equally to all system components, and is therefore used as a reference for many of the requirements specified below. |
| | | This specification is intentionally left as open as possible to allow Tenderers the maximum flexibility in determining their own compliant solutions. |
| **5.1** | | **OPERATIONAL ENVIRONMENT** |
| | | This section describes the working positions and the consoles to be provided, and their configurability into suites. |
| | | In the chapters below, the following distinctions have been used to split the requirements for the specification of a Working Position (WP), a console and a suite:<br>- a **WP**is the set of Output and Input devices (display, keyboard, mouse) to be provided by the supplier and integrated at a specific position (dedicated to a type of activity). This does not include the voice communications devices; During System Design process the Supplier **shall** agree with the Buyer on the Voice Communication devices interfacesand integration conditions, which **shall** be reflectedin therelevant WP layout design.Voice communication devices **shall** be integrated in agreed system design;<br>- a **Console**is the furniture to be provided by the supplier that will house the WP, the voice communications devices and the auxiliary equipment (seating, illumination, cooling,...). ;<br>- a **Suite**is a set of consoles which are assembled together according to ATC tasks and rules. |
| | | The terms “Slant Area”, “Working Surface” and “Tablet” are used in the following paragraphs and are defined according to the diagram below. |

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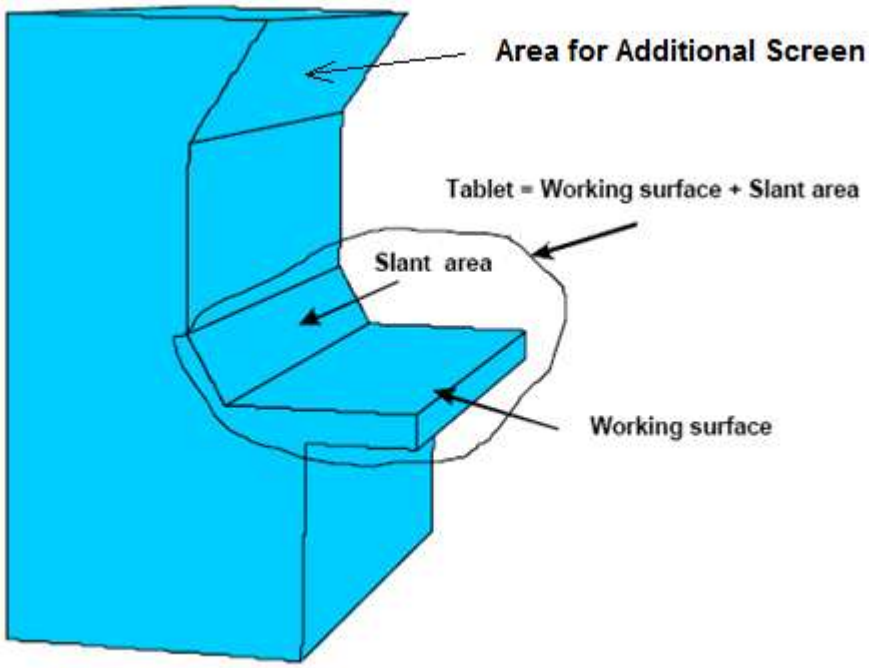
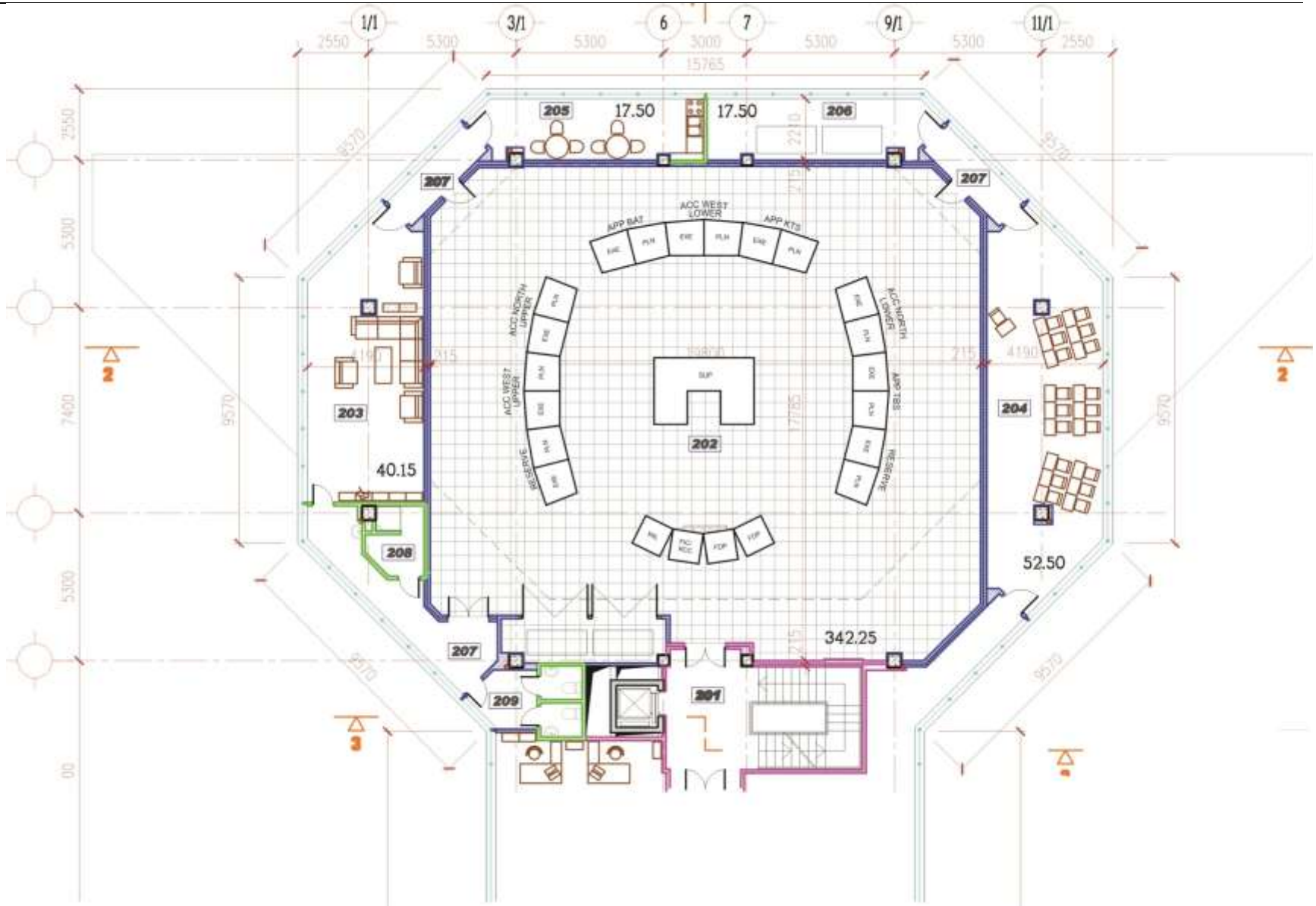
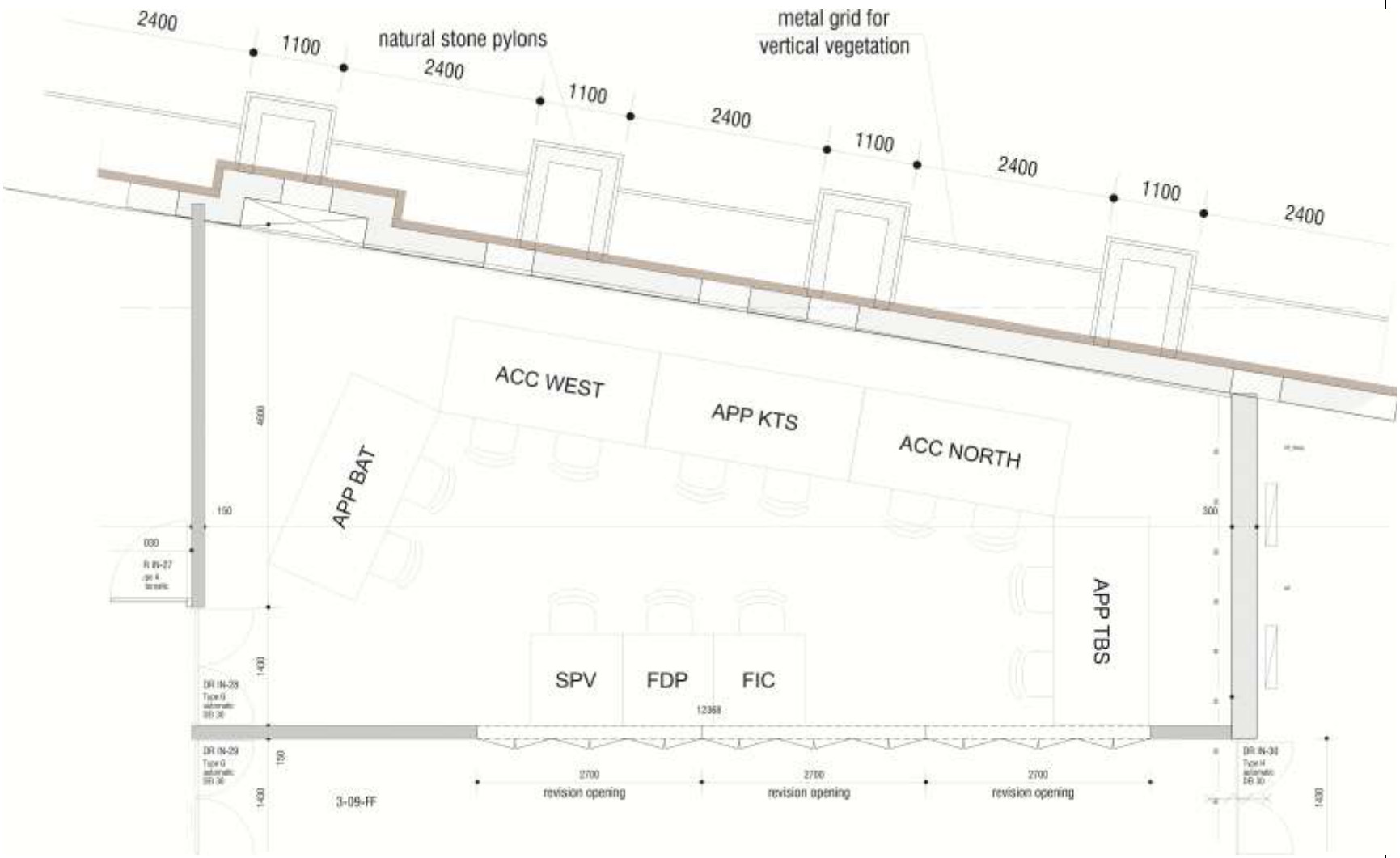
|---|---|---|
| | |  |
| **5.1.1** | | ***Working Positions*** |
| | | Three types of Working Position (WP), named arbitrarily Type-1, Type-2 and Type-3, are defined, addressing the particular needs of the various system users. |
| | | The following paragraphs describe the common characteristics of all WPs and the specific characteristics of each WP type. |
| | | **Picture 5.1-1 and 5.1-2**represent the Working Positions of the System and their allocation.<br>Picture 5.1-1 Tbilisi ATC Hall |


1/1
3/1
6
7
9/1
11/1
205
17.50
17.50
206
207
207
APP BAI
ACC WEST LOWER
APP KTS
ACC NORTH UPPER
ACC WEST UPPER
RESERVE
ACC NORTH LOWER
APP TBS
RESERVE
203
202
204
40.15
208
52.50
207
342.25
209
201
2
2
3

Picture 5.1-2 Kutaisi ATC Hall

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| ***5.1.1.1*** | | ***General characteristics*** |

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| | | Internal access to any WP devices for maintenance action **shall be from the rear side of the console** cabinet (except for the input device and the pointing device). |
| | | Each WP **shall**be composed of input and display devices with the following characteristics:<br>- be used for the presentation of synthetic data;<br>- be a multi-purpose display providing dynamic window presentation based;<br>upon predefined settings and selection made by the user;<br>- be equipped with an anti-reflective filter-glass;<br>- be equipped with Input and Pointing Devices to interact with the screen.<br>- be equipped with dimmable lights |
| | | A complete failure of any WP **shall**not lead to any other WP failure. |
| ***5.1.1.2*** | | ***Input Devices*** |
| | | The Input and Pointing Device **should** be composed of a three-button mouse. |
| | | To allow for the rapid replacement of the mouse, the cable connection point(s) of the mouse to the WP **shall**be easily accessible to the user without the need for technical staff intervention. |
| | | In addition to this mouse, a backlit keyboard (with a basic alpha-numeric keypad only) **shall**be provided as a backup input device for access to certain text-oriented functions. |
| ***5.1.1.3*** | | ***Console Type 1(High Profile)*** |
| | | The display of the WP type-1 **shall**<br>1. be a single high resolution raster scan colour display with a resolution of 2Kx4K of distinguishable and individually addressable pixels;<br>2. have a radar display area of not less than 50cms x 50cms |
| ***5.1.1.4*** | | ***Console Type 2 (Low Profile)*** |
| | | The display of the WP type-2**shall**:<br>1. be a single high resolution raster scan colour display with a resolution of at least 1Kx1K of distinguishable and individually addressable pixels;<br>2. have a display area of not less than 60cms diagonally; |

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| | | 3. be capable of use in both very high (summertime daylight) and very low (night-time) ambient lighting conditions;<br>4. be adjustable by the Controller to take account of extremes in ambient light conditions. |
| ***5.1.1.5*** | | ***Console Type 3 (Computer Desk)*** |
| | | The display of the WP type-3**shall**:<br>1. be a single high resolution raster scan colour display with a resolution of at least 1Kx1K of distinguishable and individually addressable pixels;<br>2. have a display area of not less than 60 cms diagonally. |
| ***5.1.1.6*** | | ***The following consoles shall be used in the System.*** |
| **5.1.1.6.1** | | **Console Type 1** |
| | | The following Working positions<br>- Tbilisi ATC Centre: Executive Controller (4ACC+3APP), Planning Controller (4ACC+3APP), 2 Back-Ups for Executive Controller, 2 Back-Ups for Planning Controller **shall** be allocated in the High profile consoles Type 1.<br>- Kutaisi Reserve ATC Centre: Executive Controller (2ACC+3APP), Planning Controller (2ACC+3APP), Back-Up for Executive Controller,Back-Up for Planning Controller **shall** be allocated in the High profile consoles Type 1. |
| **5.1.1.6.2** | | **Console Type 2** |
| | | The following Working positions<br>- **Tbilisi Tower:** Tower Executive Controller, Tower Planner Controller **shall** be allocated in the Low profile consoles Type 2.<br>- **Kutaisi Tower:** Tower Executive Controller, Tower Planner Controller **shall** be allocated in the existing Low profile consoles Type 2<br>- **Batumi Tower:**Tower Executive Controller, Tower Planner Controller **shall** be allocated in Low profile consoles Type 2<br>- Operational Supervisor, Flight Information Service Operator, Military Coordinator, Flight Data Operator (GAT)**shall** be allocated in Low profile consoles Type 2 for Tbilisi ATC Centre.<br>- Operational Supervisor, Flight Information Service Operator, Military Coordinator, Flight Data Operator (GAT)**shall** be allocated in Low profile consoles Type 2 for Kutaisi Reserve ATC Centre. |
| **5.1.1.6.3** | | **Console Type3** |
| | | The following Working positions<br>- Technical Supervisor **shall** be allocated in console Type 3 for Tbilisi ATC Centre. |

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| | | - Technical Supervisor **shall** be allocated in console Type 3 for Kutaisi Reserve ATC Centre. |
| **5.1.2** | | **Consoles** |
| ***5.1.2.1*** | | ***Introduction*** |
| | | The aim of the console design is to achieve a commonality of appearance of consoles for all users whilst being adapted for the particular role of each user.<br>As such, consoles are divided into two broad categories- high profile consoles used by sector controllers (executive and planning) and low profile consoles used by other staff (supervisor, Miltiary Coordinator, Flight Information Service Operator, FDO, tower).<br>Within the High Profile Console category, only one configuration has been identified.Within the Low Profile Console category, two slightly different configurations have been identified due to different equipment needed by the various users.<br>In the following chapters (from 5.1.2.2 to 5.1.2.8) are listed all the common characteristics of the consoles.<br>The Equipment of WP **shall** be installed into the new consoles. |
| ***5.1.2.2*** | | ***Design*** |
| | | All the consoles **shall**be designed, manufactured and equipped in such a way that any integrated WP can be both easily used by the operators and easily accessed by the maintenance technicians. |
| | | All the consoles **shall**be capable to adjust height of the working surfaces in relation to the floor. |
| | | Adequate space **shall**be available on both sides of the working surface to allow the left and right handed staff to move a mouse. |
| | | Adequate space **shall**also be available on the working surface for a keyboard. |
| | | It **shall**be possible for this keyboard to be either placed on the top of the desk if needed, or concealed beneath the desk surface without disconnection, or removed from the console and without forming an obstacle for the controller. |
| | | It **shall**be possible to arrange the consoles:<br>1. either directly side-by-side in order to form “in-line” sectors,<br>2. or indirectly side-by-side via predefined corner elements (wedges) of the same appearance in order to form “banana” shaped sectors. |
| | | The console design **shall**take into account the most recent anthropometric figures and ergonomic criteria applicable to working positions. |
| | | The console design desirable to minimize reflections from daylight or any other type of light source onto the console screens and voice communications panels. The consoles framework and equipment **shall**contain no sharp edges, nor corners. |

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| | | In case of a closed airco system the console housing **shall**be air tight and be one compartment free space inside. |
| | | The structure of the consoles **shall**remain stable, without any fixing, whilst standing on the floor and with a weight of 150 kg ± 10 kgplaced on the work surface. |
| | | To facilitate future enhancements use **shall**be made of the DIN41494 or ,,similar"standard, inside the console body as well as in the slant area |
| | | Nothing **shall** impede the lateral movement of the chair at the console. |
| | | All Type 1(High Profile) consoles**shall** be capable to mount additional monitor displays not less than 22' (16:9)(according to picture of point 5.1.) |
| | | A footrest **shall**be provided at the lower front part of each console. |
| | | Each console **shall**be equipped with a power distribution unit (PDU) which houses an AC power filter and the necessary circuit breakers. |
| ***5.1.2.3*** | | ***Ergonomics and technical aesthetics*** |
| | | The console **shall**house the work position displays appropriate to the user role as specified in 5.1.1 |
| | | Internal access to any device for maintenance action **shall**, as the general rule, be via airtight doors (in case of a closed airconditioning system) at the rear of the console cabinet. |
| | | The console housings **shall**permit:<br>a) an easy access, installation and removal of the equipment;<br>b) the possibility for one person to carry out, without disturbance for the operator, the replacement of any console equipment;<br>c) the switching off inside power network during maintenance of the console. |
| ***5.1.2.4*** | | ***Cooling*** |
| | | The consoles **shall** be capable of maintaining a temperature sufficient to permit installed equipment to stay operational for a period of at least one hour in case of a failure of the external air conditioning system. |
| | | The air condition system **shall** have the possibilityto work inan environments parameters:<br>Temperature- +10° C - +35° C;<br>Related humidity – 40% - 50%. |

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| ***5.1.2.5*** | | ***Console lighting*** |
| | | All consoles **shall** be equipped with fully dimmable light fixtures to provide, when desired, illumination of the working surface. |
| | | The illumination provided by these light fixtures **shall** be limited to the working surface. |
| | | The lights **shall** be flicker free. |
| | | The lights **shall** cause no thermal nor acoustic discomfort for the staff seated in front of the consoles. |
| | | The console illumination **shall** match the Operations Room ambient light colour |
| ***5.1.2.6*** | | ***Electromagnetic Interference*** |
| | | All electronics, electrical or electro-magnetic equipment used by the console manufacturer **shall** have a EMI certificate. |
| | | All equipment installed in the consoles **shall**be conformed to the European EMC, EN 50081-1 and EN 500082-1, or ,,similar" directives. |
| | | EMU density **shall not** exceed 25 uWt/sm$^2$ in band of 200Mhz-200Ghz |
| ***5.1.2.7*** | | ***Acoustical Noise*** |
| | | Noise levels generated in each console by the operating equipment and by the forced air ventilation **shall** not exceed the curve N25 (noise rating) defined by ISO 7779 when measured at a distance of one meter from the console. |
| | | Noise level created by all equipment installed of each console and by cooling air flows **shall** not exceed 65dBA |
| ***5.1.2.8*** | | ***Material*** |
| | | All consoles **shall** have an absolute matt finish that prevents glare and reflections. |
| | | The console finish **shall** be resistant to rubbing, solvents, corrosive liquids, impact-proof and easy to clean with mild detergent products. |
| | | The material of the working surface **shall** be non reflecting, non scratchable and matt coloured, providing a good thermal insulation and a feeling of comfort. |
| | | The console materials used **shall** meet appropriate fire retarding standards, BS 5852 1992 ignition source 5, DIN 4102-B1, or any successor or ,,similar" standard existing in the bidder's country. |
| | | When burning, the type of console material, including its finishing coating, **shall** not emit toxic gas. |

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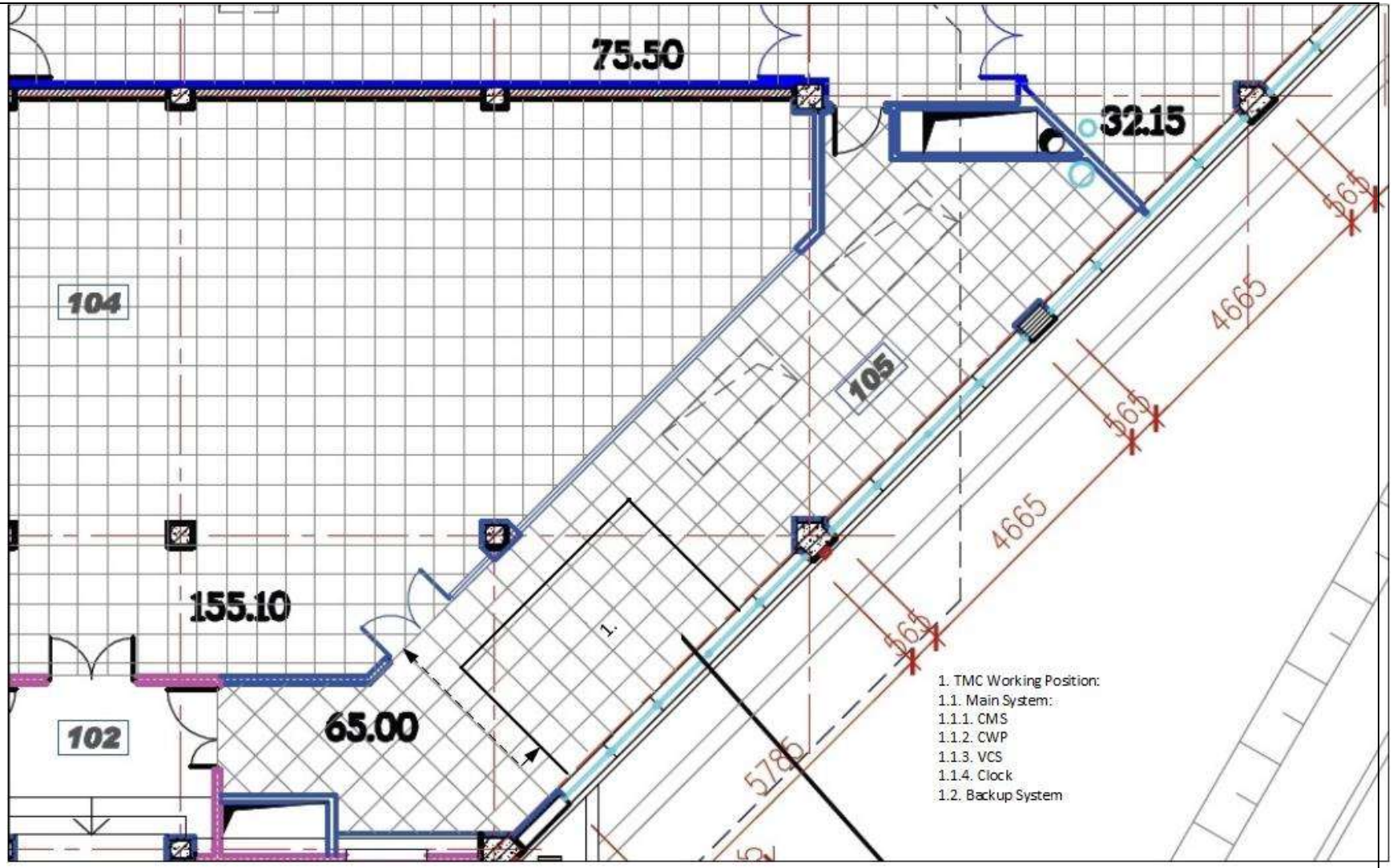
| **5.1.3** | | **Working Positions Allocation** |
| | | The set of System Working positions for Tbilisi ATC Centre **shall** be responsible to the list defined in Pictures5.1-1 |
| | | The set of System Working positions for Kutaisi Reserve ATC Centre **shall** be responsible to the list defined in Pictures5.1-2 |
| ***5.1.3.1*** | | ***Working positions in Operational Room*** |
| | | The allocation of System Working Positions **shall** be responsible for Picture 5.1-1**ATC room scheme)** |
| | | Each controller working position (executive and planner) **shall** be equipped with2Kx4K monitors. |
| ***5.1.3.2*** | | ***Working positions in Technical Room*** |
| | | Working positions and layout of equipment allocation of the System for Tbilisi ATC Centre Technical Room is shown in Picture 5.1-3 |


75.50
32.15
104
105
155.10
65.00
102
4665
4665
565
565
565
5786
1.
1. TMC Working Position:
1.1. Main System:
1.1.1. CMS
1.1.2. CWP
1.1.3. VCS
1.1.4. Clock
1.2. Backup System

### *5.1.3.3 Control Tower*

The following equipment **shall**be provided for use in the Control Towers:

| Suite | No. Suites | Console Type | TypeWP | No. Consoles | No. Working Positions | Mission | Role |
|---|---|---|---|---|---|---|---|
| TWR Tbilisi | 1 | Type 2 | CWP | 2 | 2 | Operational | Executive+Planner controller + FDO |
| TWR Kutaisi | 1 | Type 2 | CWP | 2 | 2 | Operational | Executive+Planner controller+FDO |
| TWR Batumi | 1 | Type 2 | CWP | 2 | 2 | Operational | Executive+Planner controller+FDO |

The System **shall** include 2 remote working positions at Tbilisi tower, 2 remote working positions at Kutaisi tower and 2 remote working positions at Batumi tower.

The System **shall** provide access to Main and Reserve LAN for remote working positions.

Data exchange with remote working positions **shall** provide surveillance data displaying and FDPS functionalities.

Tbilisi, Kutaisi and Batumi TWR working positions **shall** be equipped with two monitors at least 24 inch for presenting of radar data and electronic strips accordingly. The monitors **should** be controlled from one processing unit, one keyboard and one pointing device

### *5.1.3.4 FDO, FIS and Military Coordinator WP allocation*

FDO,FIS and Military CoordinatorWP**shall** be allocated in accordance to Picture 5.1-1 and 5.1-2 in console Type 3.

### *5.1.3.5 Safety analyses room*

The playback working position **shall**beinstalled in data analyses room into console Type 3.

Playback working position **shall**beconnected to Main and Reserve System LAN.

Playback working position **shall**havepossibility of local replay control of Playback presentation (start, stop, forward/backward, PLB speed adjustment).

### 5.1.4 Auxiliary Equipment

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| | | The System **shall** include following printing devices:<br>a) 5 paper strip printers.<br>b) Colour laserjet printer for Analysis and Maintenance subsystem (printing of playbacked data) 1 psc<br>c) 1 per WP Monochrome laserjet printer for FDO FMU WP. |
| | | The supplier **shall** provide mounted racks for housing the processing equipment. |
| | | Processing equipment housings **should** be lockable to prevent unauthorized access. |
| | | Network switches **shall** support 10/100/1000 mb/s communication speed. |
| | | In case of few network switches linking inside of single LAN 1Gb/s ports **shall**be used. |
| | | Each LAN **shall** have spare portsin quantity of 10% from total number. |
| **5.1.5** | | **Equipment of the System** |
| ***5.1.5.1*** | | ***System Equipment allocation*** |
| | | Technical System means **shall**be located to provide fast and suitable access to all System components. |
| | | Technical means design **shall** provide capabilities of technical maintenance for each System unit. |
| | | Technical means locations **shall not** prevent to operative observation of diagnostics LEDs. |
| ***5.1.5.2*** | | ***central System equipment allocation*** |
| | | Shall be specified with the Bidder at the stage of System Design |
| ***5.1.5.3*** | | ***Power Supply System*** |
| | | Power supplying of System**shall**be provided by dual UPS working in parallel. |
| | | Each node of the system **shall** have dual power source capability. |
| | | Each UPS **shall** provide System operation not less than 15 minutes in case of absence of external power supplying. |
| | | The admissible deviations of the AC voltage **shall**be plus 10% and minus 15% from the nominal value. |

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| | | The power supply system **shall** have a spare capacity (at least 25%) for possible further expansion and installation of additional equipment. |
| | | The System's equipment characteristics as specified in this document **shall** be maintained during an unlimited period with the voltage deviation as specified above. |
| ***5.1.5.4*** | | ***Acoustical noise*** |
| | | The level of the acoustic noise produced by the System's equipment at the distance of 1 m **shall not** exceed 65 dB (A) in the frequency range from 20 Hz to 20 kHz. |
| ***5.1.5.5*** | | ***Equipment grounding.*** |
| | | System **shall** use TN-C-S (4 wires) type for equipment groundingor better. |
| **5.2** | | **TECHNICAL REQUIREMENTSFOR TECHNICAL EQUIPMENT AND SOFTWARE** |
| **5.2.1** | | **Working Positions (WP)** |
| | | Three types of Working Position (WP), named arbitrarily CWP, SWP and TWP, are defined, addressing the particular needs of the various system users.<br>The following paragraphs describe the common characteristics of all WPs and the specific characteristics of each WP type. |
| ***5.2.1.1*** | | ***General Characteristics*** |
| | | Internal access to any WP devices for maintenance action **shall**, as the general rule, be via the rear of the console cabinet (except for the input device and the pointing device). Workstations **shall** be situated in the technical room. |
| | | Each WP **shall** be composed of separate processing unit, dedicated digital graphics controller, associated display and printing devices as per defined WP. |
| | | Each WP **shall** be composed of input and display devices with the following characteristics:<br>• be used for the presentation of synthetic data;<br>• be a multi-purpose display providing dynamic window presentation based upon predefined settings and selection made by the user;<br>• be equipped with an anti-reflective filter-glass;<br>• be equipped with Input and Pointing Devices to interact with the screen. |

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| | | A complete failure of any WP **shall** not lead to any other WP failure. |
| | | The WPs **shall** allow a remote installation of screens/input devices and CWP processing computers – up to 200 m – by means of extenders or other technical solutions. |
| | | Each working station **shall** have redundant HDD (raid 1, etc.). |
| | | Each working station **shall** have redundant Power Unit with hot replacement capability |
| | | All working stations **shall** be industrial level equipment. |
| ***5.2.1.2*** | | ***WP Unit*** |
| | | The WP-Unit is the elementary design unit of the WP. It may be considered as the building block that can provide a complete function in an autonomous manner, and in addition can be combined with additional common building block(s) to achieve a particular WP functionality |
| | | The WP-Unit **shall** function independently, and differ in performance, as a function of the application(s) software. |
| | | The WP-Unit **shall** correspond to a basic work-station supporting the X-Window System standard. |
| | | The hardware configuration of the WP-Unit **shall** consist of the central processing unit, the memory and basic input/output, (a) graphics generator(s), the associated input devices, some general purpose processing capabilities, a communication path to the network and interfaces for special devices. |
| | | The configuration of a WP-Unit **shall** be an autonomous LAN-connected workstation which has input/output devices and a display(s) connected with workstation via extender. |
| | | The CWP SW configuration **shall** consist of:<br>• the X server(s)<br>• the X client(s)<br>• other services<br>• the air traffic control application software. |
| ***5.2.1.3*** | | ***Input Devices*** |
| | | The Input and Pointing Device **shall** be composed of a three-button mouse and Qwerty keyboard. |
| | | To allow for the rapid replacement of the mouse, the cable connection point(s) of the mouse to the WP **shall** be easily accessible to the user without the need for technical staff intervention |

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| | | In addition to this mouse, a small keyboard **shall** be provided as a backup input device for access to certain text-oriented functions |
| ***5.2.1.4*** | | ***CWP Hardware*** |
| | | The CWP hardware **shall** include:<br>• a processing units;<br>• a digital graphic controllers;<br>• a screen - single high resolution raster scan colour display with a resolution of 2Kx4K of distinguishable and individually addressable pixels; a radar display area of not less than 50cms x 50cms, or, in the case of a rectangular screen, a display surface in excess of 2000sq. cms.<br>• a KVM ( keyboard, Video, Mouse) switch;<br>• an extender |
| ***5.2.1.5*** | | ***SWP Hardware*** |
| | | The SWP hardware **shall** include:<br>• a processing units<br>• a digital graphic controllers<br>• a single high resolution raster scan colour display with a resolution of at least 24" (16:9) of distinguishable and individually addressable pixels; a display area of not less than 50cms diagonally<br>• a KVM switch;<br>• an extender; |
| ***5.2.1.6*** | | ***TWP Hardware*** |
| | | The TWP hardware **shall** include:<br>• a processing units<br>• a digital graphic controllers<br>• a single high resolution raster scan colour display with a resolution of at least 24" (16:9)of distinguishable and individually addressable pixels; a display area of not less than 50cms diagonally;<br>• the display to be capable of use in both very high (summertime daylight) and very low (night-time) ambient lighting conditions;<br>• the display to be adjustable by the Controller to take account of extremes in ambient light conditions.<br>• a KVM switch; |

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| | | • an extender; |
| **5.2.2** | | **ODS Software** |
| ***5.2.2.1*** | | ***The WP Unit Layered Model*** |
| | | The model **shall** be based on the concept of separating the application layer completely from the hardware and service layers |
| | | Only conceptual objects, (flight object, SSR target object, map object) **shall** interface between the application layer and the other layers. |
| | | The WP **shall** essentially be composed of:<br>• the Hardware layer<br>• the Service layer<br>• the Application layer |
| | | This layered architecture **shall** allow for:<br>• the highest possible hardware modularity to ensure flexibility for initial design and later adaptations (part of the services can be exchanged more easily e.g. for implementations of new standards without affecting other services or the application itself).<br>• separation of services from application. The service layer deals with all interface problems. The services and their use **shall** be configured within the service layer. Some of the changes at the service level are held flexible, i.e. parametric: they may be changed for local adaptation offline by means of IES. |
| ***5.2.2.2*** | | ***Hardware Layer*** |
| | | It **shall** be composed of processor elements with an operating system which meets the POSIX requirements. |
| | | The use of proprietary solutions, device drivers etc. which circumvent the layered software architecture, to interface to the hardware **shall** be avoided. |
| ***5.2.2.3*** | | ***Service Layer*** |
| | | A collection of services (e.g. for graphics, communications) **shall** be supported, built on top of the operating system and available for all applications. |
| | | These services **shall** be adapted to ATC needs through a configurable service shell (or glue layer). |
| | | An integral part of the service layer **shall** be the provision of graphic services or interfaces which comprises: |

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| | | • Presentation processing<br>• User Interface<br>• Graphical User Interface<br>• Window manager |
| | | A graphical interface is necessary to free applications from all graphical contingencies (e.g. clipping, window management, screen handling). |
| | | The application **shall** be able to manipulate ATC objects without knowing their various visual representations. |
| ***5.2.2.4*** | | ***Application Layer*** |
| | | This layer **shall** be divided into:<br>• The conceptual objects which make use of the services described previously. The conceptual object is the entity of ATC information, ready for processing and presentation to the user in a suitable format.<br>• The applications, required to support the functionalities is further detailed. Each application may manage a collection of conceptual objects. |
| | | This layer **shall** allow the customization of graphical attributes of the objects on the air traffic awareness window without change of the source code. |
| | | This layer **shall** allow the customization of windows system attributes of the objects on the air traffic awareness window without change of the source code. |
| | | In order to allow the GUI prototyping and functional behaviour (including emulation of background processing based on prepared scenarios and on-line control), an adequate tool **shall** be provided. |
| **5.2.3** | | **Interface Editor System** |
| | | An Interface Editor System **shall** be available for use by the ANSP staff (with limited support of programming staff), on any WP, to define or update the dialogue and graphic resources related to the conceptual ATC objects (defined by the application programs) at CWPs/SWPs and TWP. |
| | | The IES, **shall** be able to facilitate:<br>• the customisation of the various services, e.g. Graphical User Interface, Communication Interface, etc.<br>• the production of resource files to be used in the WP Unit run-time environment |
| | | The IES **shall** consist of two parts:<br>• Main part: the parametric IES-body, used by the technical programming staff to create new, customise existing interface environments, via modification of parameters as pre-determined by the IES-programs.<br>• Secondary part: prepared/programmed by technical programming staff to generate the necessary objects (or widgets, graphical widgets) |

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| | | needed by the main part, and to generate/modify the user interface of the IES itself. |
| **5.2.4** | | **System nodes HW/SW requirements** |
| | | All system nodes **shall** be equipped with COTS workstations. |
| | | The operating system of all system nodes workstations **shall** be LINUX based. |
| | | The system nodes workstation **shall** be equipped with screen, keyboard and mouse (for local maintenance purpose). |
| | | The system nodes peripheral equipment might shared by several workstations located in the cabinet. |
| | | Each workstation **shall** have a SNMP agent with standard MIB, support FTP servers and TELNET servers, covering OS and middleware resources. |
| **5.2.5** | | **Suites Configuration** |
| | | In this paragraph, each room and office where WPs will be available is described with a specific table including 3 parts, each part providing the following information:<br>1. the allocation of WP types to user-roles and to missions,<br>2. the number and type of WPs required in each suite, with the type of console required to house these allocated WPs,<br>3. the organization of consoles into suites, and the location and number of the suites. |
| | | As is shown in the table, certain WPs are allocated to multiple roles of separate missions. These roles **shall** be configurable by authorized users. The sharing of WP in the way specified is expected to achieve a cost benefit over procuring dedicated equipment, and also reduce the clutter caused by largely redundant equipment. However, if the Tenderer can demonstrate that dedicated equipment does not present an increase in cost (including maintenance and services) nor any undue clutter, the offer will be considered as acceptable. |
| **5.2.6** | | **SYSTEM ARCHITECTURE** |
| | | The characteristics of the system architecture that are described hereunder derive from the high availability requirements of the system. As such, they cover the need for redundancy and a strategy for graceful degradation. |
| | | The description of the system components above identifies work positions that are not dedicated for use in a single mission, but which may be configured for use in one of a number of mission. This configuration is achieved through one of the Supervisor work positions and, in the case of configuring components to replace failed components, must be achieved rapidly. Thus a partitioning of the components between missions, that may be dynamically amended at the Supervisor work position, is required. Such a facility, however, must at all times guarantee that the equipment providing the operational mission can never be influenced by the other missions. |
| | | The system architecture is required to be such that the RMA requirements are respected. However, in recognition of the fact that components inevitably fail, redundancy of all components serving the operational mission is required. |

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| | | For individual components that serve the complete system, redundancy is achieved by duplicating each component such that there is a standby component able to take over from the main as and when necessary. |
| | | For components that work together for a particular function, redundancy may be achieved by providing sufficient components such that the function may continue to be provided after a certain number of the components have failed. |
| | | For Controller Work Positions, redundancy is achieved in the first instance by means of the second work position in the suite. In addition, an unused sector suite may be rapidly configured for use in place of the failed work position. |
| | | Operational scenarios describe the ability of the system to continue operation with a reduced capability upon unavailability of a function. This requires that the propagation of failures is prevented, and that the system provides multiple transaction paths. Thus, upon failure of a function, a reduced service is maintained by using a separate transaction path (for example, by allowing a plot/track display from a single source upon unavailability of the MRT capability). As such, a situation whereby a single point of failure exists is prevented. |
| | | The ATM system architecture **shall** permit the integration of legacy back-up system. |
| | | The ATM system **shall** received data by the existing time reference system which will be reused. |
| | | The display of the back-up surveillance and flight plan data **shall** be implemented on CWP/SWP/TWP screens via KVM switch |
| ***5.2.6.1*** | | ***System Configuration*** |
| | | The ATM system configuration **shall** encompass one central location. |
| | | All central processing units (including the CWP/SWP/TWP processing units) **shall** be located at ACC/APP technical room. |
| | | The system **shall**permit re-configuration of the Operational mission componentsonly from the Operational Supervisor (subject to the operational concept) position within the Operational mission. |
| | | The system **shall** permit entry/re-entry of any repaired or re-started component into an operating configuration. |
| | | System components allocated to a mission **shall**be logically partitioned from components assigned to other missions such that no adverse influence can be effected across missions. |
| | | Further, transmission of data from the training or maintenance missions to the operational mission **shall**be prevented. |
| | | The system **shall**permit re-configuration of a component from one mission/role to any other of its permitted mission/roles via simple command entry at a supervisor work position. |
| | | The system **should** permit re-configuration of components in the Maintenance and Training mission from both the Supervisor work positions dedicated to their mission, and from the Supervisor work positions of the Operational mission. |

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| | | The system **shall** be flexible, manageable, **shall** support additional unlimited working positions installation |
| | | The system **shall** support the configuration of the system components in an easy and user-friendly way; |
| | | The input and modification of configuration parameters **shall** be via menus, intuitive, and syntactically and semantically checked; |
| | | The system **shall** provide an "undo" function for configuration parameter changes. The parameter change history **shall** be retrievable for a selectable period; |
| | | The system **shall** provide "save set" and "load set" function for configuration parameter changes; |
| | | All changes to be revoked **shall** be selectable from the retrieved parameter change history; |
| | | All modifications of the configuration **shall** be logged in an appropriate database. |
| | | The system **shall** be flexible, manageable, **shall** support additional unlimited working positions installation |
| | | The system **shall** support the configuration of the system components in an easy and user-friendly way; |
| | | The input and modification of configuration parameters **shall** be via menus, intuitive, and syntactically and semantically checked; |
| | | The system **shall** provide an "undo" function for configuration parameter changes.The parameter change history **shall** be retrievable for a selectable period; |
| | | The system **shall** provide "save set" and "load set" function for configuration parameter changes; |
| | | All changes to be revoked **shall** be selectable from the retrieved parameter change history; |
| | | All modifications of the configuration **shall** be logged in an appropriate database. |
| **5.2.7** | | **Redundancy** |
| | | Each component operating singly in the provision of a function in the operational mission **shall** be duplicated such that the function may be performed on either of the two components. |
| | | Components that operate as a group to provide a function in the operational mission **shall** be sufficient such that the function may be completely provided upon failure of any one of the components. |
| | | Controller work positions operating as a pair in a suite **shall** be such that each position constitutes a standby upon failure of the other |
| | | Controller work positions **shall** be capable of autonomous operation such that a limited capability can be provided in case of failure of a central resource. |

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| **5.2.8** | | **Operational Scenarios** |
| | | The propagation of failures through system components and functions **shall** be prevented. |
| | | The system architecture **shall** be such that, upon non-availability of any system function, the remaining, available system functions provide a reduced capability. |
| | | Single point of failure**shall** be avoided as far as possible. |
| | | After re-introduction of a system function, the function **should** be initialized with data that was available at the time of the failure, if appropriate, updated according to any inputs made during the period of reduced capability; |
| | | The system architecture **shall**be such that the operational effect of the loss of power from a Local redundant UPS feeding the operations room is minimized |
| | | The system architecture **shall**be such that any loss of power from a redundant Local UPS in the equipment room does not cause a loss of a system capability. |
| | | The system **shall**be supplied with redundant Local UPS working in parallel mode with internal and external By-Pass functions. |
| **5.2.9** | | **System reduced capability operations** |
| | | In case of complete system outage, the back-up system **shall** provide the air picture data to ODS. |
| | | The presentation of back-up system data at CWPs/SWPs/TWPs **shall** be triggered by a manual action on the CWP/SWP/TWP KVM switch. |
| | | The ODS **shall** indicate when the displayed air situation data is derived from the back-up system. |
| **5.2.10** | | **External Interfaces** |
| | | The system **shall** provide the following external interfaces to each of the end-system identified. . For most of the end-systems listed below, an Interface Control Document (ICD), providing more details about their existing interfaces, may be made available to the Tenderer on request or are part of the call-for–tender. |
| | | For most of the end-systems listed below, an Interface Control Document (ICD), providing more details about their existing interfaces, may be made available to the Tenderer on request. |

| End Systems | Physical Interface | Line Speed (Kbps) | Communication Protocol | Data Format | No. |
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| | | Radarsensors:<br>-xxMSSR<br>-xxPSSR<br>-xx METR<br>- xx ADS-B<br>- xx MLAT | LAN | 10/100 | synchronous | ASTERIX | |
| | | AMHS | LAN | 10/100 | X400/ | | 4 |
| | | ATSdataexchangewith eachneighboringcountry | LAN | 10/100 | X25/FMTP | OLDI | 4 |
| | | AFTN/AMHStrafficswitching system | RS-232, LAN | 10/100 for lan, 1200 boud for byte | TCP/IP, byte | AFTN/AMHS/IA-5, IA-5(zczc) ITA-2 +ITA2 | 4 |
| **5.2.11** | | **RELIABILITY, MAINTAINABILITY AND AVAILABILITY** | | | | | |
| | | The Reliability and Maintainability requirements stated below are derived from the operational requirements for the system availability which, for the operational mission, are approaching 100%. The availability of the system in the training and development mission is less critical, though the equipment is to have a similar reliability. | | | | | |
| | | For the purpose of assigning reliability and availability figures, a number of system configurations are identified**.** | | | | | |
| | | Reliability figures provided below represent the minimum number of continuous operating hours of a specific service; a service can be provided by:<br>either the functionality of a complete sub-system (i.e. hardware and software elements), or a hardware element only. | | | | | |
| | | An availability figure is assigned to a functional capability that is required as a minimum in order to maintain safety over a short period. | | | | | |
| | | RMA figures presented by the Tenderers should be derived from a Failure Modes and Effects Analysis performed in accordance with DoD-STD-1629A or equivalent, and any discrepancy between the proposed figures and the figures requested in the following chapters explained. | | | | | |
| ***5.2.11.1*** | | ***Reliability*** | | | | | |
| | | The probability of simultaneous failure of all CWP/SWP, comprising the functional requirements specified in chapter 3 paragraph and all hardware resources needed to provide the capability at one work position, **shall** not be greater than 1x10-6/h.. | | | | | |
| | | The maximum failure rate of the SDP capability, comprising the requirements specified in chapter 1, and all hardware resources needed to | | | | | |

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| | | provide the capability, **shall** not be greater than 1x10-5/h. |
| | | The maximum failure rate of the FDP capability, comprising the requirements specified in chapter 2, and all hardware resources needed to provide the capability, **shall** not be greater than 4x10-5/h. |
| | | The maximum failure rate of each of the ATC Tools/Safety Nets/ Data Link subsystem comprising the requirements specified in chapter 4, 5 and 8 and all the hardware resources needed to provide the capability, **shall** not be greater than 4x10-5/h . |
| | | The maximum failure rate of the mouse **shall** be one failure per 30000 hours. |
| | | The maximum failure rate of the keyboard **shall** be one failure per 10000 hours |
| | | The probability of auxiliary system failure **shall** not be greater than 1.10-5/h. |
| | | The probability of LAN failure **shall** not be greater than 1.10-5/h. |
| | | The total loss of data communication AFTN/AMHS, CFMU or OLDI/SYSCO) **shall** not occur more frequently than 1.10-4/h |
| | | The failure of OLDI/SYSCO communication equipment **shall** not occur more frequently than 1.10-4/h |
| | | The probability of OPS supervisor position (SWP) disconnecting from LAN **shall** not be greater than 1.10-4/h |
| | | The probability of FDPS local control failure **shall** not be greater than 4.10-5/h. |
| | | The probability of total TMCS failure **shall** not be greater than 1.10-4/h |
| | | The probability of one or few CWP/SWP failure **shall** not be greater than 1.10-4 |
| | | The maximum failure rate of the HMI capability, comprising the requirements specified in paragraph 4.1.8, Human-Machine Interface, and all hardware resources needed to provide the capability at one work position, **shall** be one failure per 26 weeks. |
| ***5.2.11.2*** | | ***Maintainability*** |
| | | The Mean Time To Repair, comprising the failure isolation, replacement and subsequent restart and performance tests, at the level of the LRU **shall** not exceed 30 minutes. |
| ***5.2.11.3*** | | ***Availability*** |
| | | The availability of a depiction of the current traffic situation, comprising at least a plot display from a selected source and background maps, at one out of two work positions on each suite **shall** be at least 0.99999. |
| | | The availability of the complete ATM system (i.e. providing the complete capability as stated in this functional/technical specification) **shall** not be less than 0.9995; |

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| | | The system **shall** be available 24/7/365; |
| | | The hardware **shall** be deployed in a redundant way that allows exchange of components of the operational system without interruption of service; |
| | | In case of loss of power on either main (potentially backed by UPS) all individual components of the complete system **shall** be switched automatically to the other mains (or UPS); |
| | | This automatic switchover **shall** be performed internally by the system; |
| | | This automatic switchover **shall** be performed without interruption of the power supply to the affected equipment, the affected components of the system **shall** not reboot after the switchover |
| | | It **shall** be possible to perform switchover manually by a corresponding command |
| **5.2.12** | | **System Management Principals** |
| | | The system **shall** implement a consistent system management framework for the unified management of all components in one application and provide; |
| | | A system management interface that supports the management of the system configuration; |
| | | Managements of message handling functions; |
| | | The management of system functions (re-initialization, reboot, etc.); |
| | | The monitoring, logging, retrieval, inspection of faults, and erroneous situations encountered |
| | | The gathering of statistics; |
| | | The management of access control. |
| **5.2.13** | | **System Monitoring** |
| | | The system **shall** record any change of the system status including all components and peripherals (servers, routers, switches, physical interfaces, circuits, application software, etc.) as well as any command entered and its context in form of an event. |
| | | All events **shall** be indicated online to the operator and logged in an appropriate event log and **shall** include but not limited to:<br>• Date and time of event generation;<br>• Event type/commands with their results/statuses; |

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| | | Additional Event type-specific information **shall** be provided that shows:<br>• The object concerned;<br>• Software module that issued the event;<br>• Name of the operator who entered a command;<br>• Event text (comprehensive and clear description); |
| | | It **shall** be possible to retrieve events from the event log using at least the following message selection criteria and any combinations of them<br>• Date and time range;<br>• Event type;<br>• Object;<br>• Software module;<br>• Event text parts; |
| | | It **shall** be possible to associate a specific alarm with an event; |
| | | The type of alarm (visual, acoustical) **shall** be configurable; |
| | | The system **shall** provide individual configuration as well as activation and deactivation of alarms; |
| | | The system **shall** indicate to operator only alarms, for which this operator has been declared responsible; |
| | | The system **shall** provide alarms manual acknowledgement possibility and corresponding alarm indication remove; |
| | | The system **shall** provide an interface for exporting the event log in a human-readable format |
| **5.2.14** | | **System Diagnostics and Statistics** |
| | | The system **shall** collect diagnostic and statistical information of the various system components; |
| | | The diagnosis facilities implemented by the system **shall** serve for online system inspection; |
| | | When requested by the operator, the diagnosis information of a given system component **shall** be displayed and updated with a configurable rate; |
| | | Based on the diagnostic data, the system **shall** automatically calculate statistical data per minute, hour, day, month and year; |
| | | The statistical data **shall** be stored in statistics database for retrieval and inspection; |
| | | Diagnostic and statistical data **shall** be provided at least for the following object levels: |

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| | | • Messaging (overall, AFTN/AMHS-specific);<br>• Communication protocols;<br>• Overall, circuit, software item, interface (physical or logical) load;<br>• Physical interfaces (availability, number of link failures); |
| | | Diagnosis and statistics **shall** be provided for the system performance, usage of system resources, usage of component resources and availability of the system components; |
| | | The system **shall** provide an interface for exporting diagnostic and statistical data in human-readable format; |
| | | The system **shall** provide an interface exporting statistical data to excel format, the filename and the pass **shall** be selectable |
| **5.2.15** | | **Fault and Error Handling** |
| | | The system **shall** implement continuous supervision of the health state of all system components |
| | | The system **shall** implement fault and error management and **shall** log faults and errors in an appropriate log; |
| | | This log **shall** comprise a configurable period of time (not less one month); |
| | | The system **shall** be able to automatically switchover or re-assign resources upon detection of a fault; |
| | | A switchover or re-assignment **shall** not take longer than ten seconds; |
| | | Pending message transactions **shall** not get lost; |
| | | The system **shall** be able to perform automatic re-initialization (for ex. reboot of the affected system component) upon detection of a fault; |
| | | A complete re-initialization **shall** (for ex. after power failure) **shall** not take longer than ten ‘minutes |
| | | Limited and pre-configured internet access **shall** be available through firewall providing the users with data/messages exchange |
| **5.2.16** | | **Access to the System** |
| | | Access to the system **shall** be controlled by a username and password combination. Every user **shall** be allowed to change his/her password; |
| | | The system **shall** allow a System Administrator to change the system’s default password policy (minimum length, contain at least one number, etc.) Changing user’s password **shall** then be possible only if the new password meets the defined policy; |
| | | It **shall** be possible to assign one or more access rights to each user. These rights **shall** control the content and presentation of the HMI by showing only those parts of the application that the user is configured to have access to; |

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| | | It **shall** be possible to have different combinations of access rights for different users (System administrator, Tower Controller, Briefing officer, etc.); |
| **5.2.17** | | **Archiving** |
| ***5.2.17.1*** | | ***Manual Archiving*** |
| | | The system **shall** be able to generate on request (system management function) archives of system event logs of a definable day; |
| | | The system **shall** create a general archive (possibly covering more than a day) based but not limited on the following definable parameters:<br>• time range;<br>• selection of log (system events, commands/results, messages, etc.); |
| | | The system **shall** be able to maintain several archives simultaneously; |
| | | It **shall** be possible to delete existing archives or export them to external media; |
| | | It **shall** be possible to import/view archives from external media; |
| ***5.2.17.2*** | | ***Automatic Archiving*** |
| | | The system **shall** be able to automatically generate daily archives of received information and system event logs in binary, .xls format; |
| | | The system **shall** provide "read archive" tools for archive viewing from any PC; |
| | | The archive creation time **shall** be configurable |
| | | At creation time the creation of the archive of the previous day **shall** be initiated |
| | | The system **shall** be able to automatically export the archives to an external media. The method of exporting **shall** be configurable:<br>• local hard disk;<br>• DVD disk;<br>• USB device;<br>• remote file server |
| **5.2.18** | | **Performance and Capacity** |

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| ***5.2.18.1*** | | ***System Capacities*** |
| | | The system **shall** provide the following minimum capacity in the operational facility<br>Number of SSR Sources - 16<br>Number of PSR Sources - 3<br>Number of Adjacent/Subjacent ATS Units - 6<br>Real PSR Plots Received Per Radar Per Revolution - 300<br>False PSR Plots Received Per Radar Per Revolution - <20<br>Real SSR Plots Received Per Radar Per Revolution - 300<br>False SSR Plots Received Per Radar Per Revolution - <0,1%<br>Weather Vectors Received Per Source - 256.<br>Concurrent System Tracks - 2000<br>Concurrent Active SFPLs - 2000<br>Number of Aerodromes - 10<br>Number of Beacons and Significant Points - 600<br>Number of Coordination Points - 100<br>Number of Prohibited, Danger and Restricted Areas -30.<br>Number of Aircraft Performance Specifications - in accordance with BADA<br>Number of Display Map Configurations – 1000<br>Number of positions supported for data display - 40<br>Number of sectors to be supported within the Georgia (UGGG) airspace - 20<br>Number of traffic situation presentations simultaneously displayable on the<br>CWP screen – 5<br>Number of TSAs - 30<br>Number of tracks displayable in the traffic situation presentation – 2000<br>Recording archive period – 30 days..<br>Number of NOTAM messages - 1000 per day<br>Number of SNOWTAM messages –1000 per day<br>Number of ASHTAM messages - 1000 per day |

Number of METAR messages - 500 per day
Number of TAF messages – 250 per day
Number of SIGMET messages – 250 per day
Number of AIRMET messages – 250 per day
Number of free text messages – 2000 per day
Number of ATS INFO messages – 1000 per day
Number of Editorial Positions the system is capable of interfacing with - 10
Size of the system area – 1024nm x 1024nm

The system **shall**meet or exceed t the following input Radar parameters:

| | |
|---|---|
| number of processed radars | 16 |
| Types of processed sources | - PSR<br>- (M)SSR (ICAO standard incl. Mode 4 and Mode S, UVD standard)<br>- PSR+(M)SSR<br>- PAR<br>- ADSB<br>- MLAT |
| Character of input data from surveillance radars | Plots or tracked plots or local tracks, plots are preferred |
| Character of input data from PAR | Plots |
| Input surveillance data formats | - ASTERIX category 1, 2,<br>- ASTERIX category 34, 48<br>- ASTERIX category 19, 20<br>- ASTERIX category (full support) 21, 23, 247 |

| | | | |
|---|---|---|---|
| Input PAR data format | ASTERIX category 34, 48 with SDI | | |
| number of processed plots / local tracks from each surveillance radar per one antenna sweep | Configurable within the range 100-500, when exceeding max. set value the source error is indicated | | |
| number of processed plots from PAR per one antennas cycle | 200 | | |
| Max. number of input plots/tracks processed per one second | 2500 | | |
| Accuracy requirements for input surveillance data from radars | In accordance with Eurocontrol Standard Document for Radar Surveillance in En-Route Aerospace and Major Terminal Areas, EUROCONTROL, March 1997.<br>The following exceptions are acceptable:<br>- azimuth standard deviation up to. 20´<br>- distance standard deviation up to 250 m. | | |
| Requirement for time stamping in input data | Sources with time stamping (UTC synchronized by GPS) are preferred. Time stamping accuracy may not be inferior to +/- 50 ms. It is also possible to process the sources without time stamping. | | |
| permissible delay at receive data compared to time camping | 2.5 s | | |
| Data processing parameters: | | | |
| Input data delay compensation | - according to time stamping<br>- on the basis of configuration constants calculated by off-line statistical methods and corrected by on-line statistical methods | | |
| Main methods of data processing | IMM – Interactive Multiple Model EKF – Extended Kalman Filter PDA – Probabilistic Data Association An aircraft detected by multiple sensors | | |

| | | | | | |
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| | | | | results in system track formed from merging of data from each sensor. Tracking in vertical plane is performed by means of barometric altitude (Mode C, S) and/or geometric altitude (Mode S, 3D radars, triangulation). | |
| | | | Compensation of biases/systematic errors in input data from radars | Independently for each radar: 1. Off-line initial adjustment<br>- „time bias“<br>- „slant range bias“, „slant range gain“ and „azimuth bias“ valid for the whole range of the source scan<br>- local deviations „slant range bias“, „slant range gain“ and „azimuth bias“ from the ones stated above<br><br>Automatic on-line refinement of the off-line entered values in course of activity in case of multiple overlapping of monitored tracks 3. Manual on-line setting by means of HMI | |
| | | | Clutter maps | For individual PSR and PSR+SSR<br>- Off-line initial adjustment<br>- On-line automatic map evaluation<br>- Manual on-line refinement by means of HMI | |
| | | | Statistical parameters of radars accuracy | Independently for each radar<br>- Off-line initial adjustment of values valid for the whole range of scan and local deviations from those values<br>- On-line automatic refinement of the values stated above | |

| | | | | |
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| | | | - Manual on-line setting by means of HMI | |
| | | Exceptions when processing data | Independently for each surveillance radar it is possible to define areas in which the following exceptions from normal data processing algorithm can apply:<br>- suppression of system track initialization by a given source<br>- suppression of system track position update by a given source<br>- suppression of system track altitude update by a given source<br>- suppression of system track mode 1, 2, 3/A, S update by a given source | |
| | | Modes of radar data processing | For individual radars it is possible to set on-line the following modes:<br>- Full (full processing without any limitation)<br>- TestSync (processing of synchronization data only)<br>- TestData (processing of data without inclusion into system tracks renewal)<br>- Off (data from the source are not processed) | |
| | | Reference system applied for transformation between local systems of coordinates and system of coordinates of the system. | WGS-84 | |
| | | Method of system tracks positions presentation | Stereographic projection | |

| | | | | |
|---|---|---|---|---|
| | | number of processed system tracks | 1000 | |
| | | Extent of dynamic characteristics of system track | altitude 0 .. 30.000 m velocity<br>- horizontal 25 .. 1000 m/s<br>- vertical 0 .. 250 m/s<br><br>acceleration<br>- transversal 3.5 g<br>- longitudinal 5 g for velocity < 200 m/s,<br>- longitudinal 7.5g for velocity >200 m/s | |
| | | Accuracy of system track position | Given by data sources accuracy | |
| | | Evaluated characteristics of system tracks | - Calculated track position (Cartesian)<br>- Calculated track velocity (Cartesian)<br>- Track mode 1 code<br>- Track mode 2 code<br>- Track mode 3/A code<br>- Aircraft derived data (COMM-B)<br>- Target address<br>- Target identification<br>- Magnetic heading<br>- True airspeed<br>- Selected altitude<br>- Final state selected altitude<br>- Communication/ACAS capability and flight status<br>- Barometric vertical rate<br>- Geometric vertical rate<br>- Roll angle<br>- Track angle rate<br>- Track angle<br>- Ground speed | |

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| | | | - Meteorological data<br>- Geometric altitude data<br>- Indicated airspeed<br>- Mach number<br>- Barometric pressure setting<br>- Track status (incl. Mode 4)<br>- System track update ages<br>- Mode of movement<br>- Track data ages (for all aircraft derived data)<br>- Measured flight level (mode C)<br>- Calculated track geometric altitude<br>- Calculated track barometric altitude<br>- Calculated rate of climb/descent | |
| | | System tracks output parameters: | | |

| **Characteristics** | **Value** |
|---|---|
| DSA (Data Storage Area) | configurable parameter, 1024nm x 1024nm |
| Number of independently configured system track outputs | 8 |
| Parameters configured for each system track output | - data format (incl. SAC/SIC item)<br>- system tracks update mode |
| Data format | - ASTERIX category 62, 65 |
| System tracks update mode | - periodically in horizontal slots of DSA, |

| | | | | |
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| | | | number of slots is configurable within the limits 1…32 and the update period of time is configurable within the limits 4–12 sec<br>- periodically in sectors of selected master radar with period of update given by the antenna turn period of this radar1)<br>- non-periodically immediately after system track update by some of surveillance data sources. | |
| | | | | |
| ***5.2.18.2*** | | ***Response Times*** | | |
| | | The system **shall** provide the following response times, to the 95th percentile, whilst at the maximum capacity specified above:<br>Refreshcycleforcursormovement — 30ms<br>Menudisplayfollowinginputon thecorrespondingsymbol — 50ms<br>Re-displayfollowingwindowre-configuration (scrolling,resizing,overlapping,etc.) — 250ms<br>DisplayofClass1*datafollowingselection — 250ms<br>DisplayofClass2*datafollowingselection — 3000ms<br>Inputacknowledgment(indicationof acceptanceor rejection) — 250ms<br>*Class1dataisdefinedasalltraffic-related (radarandflightplan)visual representationsfortrafficcurrentlypostedto thesector(see4.1.2.4.1Flight DataDistribution)andsystemstatuswarnings.<br>*Class2dataisdefinedasunpostedtraffic,nontraffic-relatedaeronautical dataandmanagementdata. | |
| ***5.2.18.3*** | | ***Component Loading*** | | |
| | | The maximum loading of any component **shall** be 50% of available capacity whilst providing the maximum capacity specified above. | | |
| | | The maximum memory occupancy in any processor memory **shall** be 50% | | |

| | | |
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| | | whilst providing the maximum capacity specified above. |
| ***5.2.18.4*** | | **Start-up and Switchover Times** |
| | | The time required for complete system start-up from cold (i.e. switched-off)<br>such that full system capabilities are available, **shall** not exceed 30 minutes. |
| | | The time required for switchover of a failed component of the radar processing chain (radar interfaces and tracking) **shall** not exceed 20 seconds. |
| | | The time required for automatic switchover of any other failed component to its standby **shall** not exceed 25 seconds. |
| | | The time required to configure a controller work position, already powered-up and allocated to the Operational Mission, for operation at a sector **shall** not exceed 25 seconds |
| | | The 25 seconds include the time between the instant that the Supervisor enters the reconfiguration command and the instant that the reconfigured WP is available for operation |
| | | The time required for complete start-up of a work position from a powered-off state to operation at a sector **shall** not exceed 5 minutes. |
| **5.2.19** | | **Design Principals** |
| | | The design principles stated hereunder address the portability and maintainability of the system and concern the equipment for each mission. As such, the principles cover the programming languages, operating system, communications standards and the use of COTS products.<br>For describing the use of COTS software, the following categories of software are identified: Category A Software - commercially available off-the-shelf (COTS) product line items,<br>available with a commercial maintenance contract;<br>Category B Software - modified COTS software; Category C Software - pre-existing, re-used software; Category D Software - developmental software.<br>For the purpose of this specification, COTS describes software products that are sold<br>unmodified to many customers. As such, the application software of an ATM system is normally considered Category C and/or D.<br>The tenderer **shall** describe the actual attributes of the design of the proposed system. |
| ***5.2.19.1*** | | ***Software*** |
| | | All software **shall** must fully meet with ESSAR 6 requirements |

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| | | The software **shall** be written in high level languages for which compilers are widely available for many platforms. |
| | | Application software **shall** be portable at source level onto comparable (or larger) scale equipment, and between equipment of different vendors. |
| | | The source code should contain detailed comments in English language in order to allow an easy reading and understanding of the functions performed. |
| | | The software submitted by the Bidder **shall** be compatible with the submitted hardware minimum 10 years, which means the following: when hardware is needed to be updated software shall be updated too. |
| ***5.2.19.2*** | | ***Operating System*** |
| | | LINUX based Operating System(s) **shall** be used, permitting at least the category "conforming LINUX applications". |
| | | The use of operating systems features that are not LINUX functions **shall** be kept to a minimum |
| ***5.2.19.3*** | | ***Communications Standards*** |
| | | The communication protocols used by the system for local or remote communications **shall** be based on international open standards. |
| ***5.2.19.4*** | | ***Use of COTs*** |
| | | The maximum use of Category A Software (unmodified COTS) **shall** be made for general purpose functions (database management, windows, etc.). |
| | | No use **shall** be made of Category B Software (modified COTS). |
| ***5.2.19.5*** | | ***Environment Conditions*** |
| | | The system **shall** operate from a power supply system with the following characteristics: |

| **characteristics** | **Nominal** |
|---|---|
| 3phasesvoltage | 380 |
| Frequency | 50 |
| Formfactor | sinusoid |

| | | |
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| | | The noise production of the system in the operations room and tower **shall** not exceed the curve of the Noise Rating 35 as defined by ISO, measured in accordance with the Noise Declaration in ISO 7779. |
| **5.2.20** | | **Extension and Upgrade capabilities** |
| | | The System **shall** provide the capability to accommodate extra interfaces for a total of **unlimited** incoming surveillance sources . |
| | | For each of the remaining types of interface stated in the above table, the System **shall** provide the capability to support an extension of 30 % additional interfaces for future needs. |
| | | This extension of the interface capability **shall** require no other piece of equipment, software nor services but the communication interface boards. |
| | | It **shall** be possible to connect 30% extra local Working Positions and one extra remote Working Position at each remote site to be connected from the start to the System. |
| **5.3** | | **FDP TECHNICAL REQUIREMENTS** |
| **5.3.1** | | **FDP Servers Architecture** |
| | | The FDP **shall** be running in two dual redundant servers: Active and Standby servers for on-line reconfiguration, fallback capability, availability, and data integrity; |
| | | Each of servers **shall** be equipped with a redundant disk array (RAID 1 or RAID 5 configuration); |
| | | The standby server **shall** maintain its data structures updated, ready to perform a switch-over; |
| | | The active server **shall** communicate each database modification to the standby server in order to maintain the standby server database updated; |
| | | Switch-over of the FDP **shall** be performed without loss of the existing messages, or information stored in the flight plan databases; |
| | | In the event of a total failure of the FDP (both operational and standby servers), it **shall** be possible to restart the FDP either without any loss of existing data prior to the failure |
| **5.3.2** | | **FDP Switch-over** |
| | | Failures of the FDP subsystems **shall** trigger an immediate switchover to the corresponding standby unit;<br>It **shall** also be possible to perform a manual switchover of the FDP. |

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| **5.3.3** | | **FDP System Configuration Data Management Process** |
| | | The FDP **shall** be capable of receiving the following configuration data from the Control and Monitoring System (CMS):<br>• FDP computer operational mode (Active/Standby);<br>• Modification of parameters. |
| **5.3.4** | | **Archives Generation** |
| | | The system **shall** be able to automatically generate daily archives of traffic and system event logs in .dbf and .xls format; |
| | | The system **shall** be able to automatically export the archives to an external media; |
| | | The method of exporting **shall** be configurable:<br>• Local hard disk;<br>• DVD;<br>• USB device |
| | | The archive creation time **shall** be configurable; |
| | | It **shall** be possible to import archives from external media; |
| | | System **shall** allow a manual backup of all or chosen messages; |
| | | The maximum period **shall** not be limited by the software and only be constrained by configuration or available system resources. |
| **5.3.5** | | **LOGs Generation** |
| | | All operator input **shall** be logged and available for retrieval for a configurable period of time (not less than one month); |
| | | The system **shall** implement fault and error management and **shall** log all faults and errors in an appropriate log; |
| | | All modifications of the configuration **shall** be logged in an appropriate database; |
| | | The system **shall** implement fault and error management and **shall** log all faults and errors in an appropriate log; |
| | | All logs **shall** comprise a configurable period of time (not less than one month). |
| **5.3.6** | | **Error Messages Generation** |

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| | | The FDP **shall** send a message to the Control and Monitoring System (CMS) whenever a software error occurs; |
| | | The FDP **shall** provide a mechanism to automatically switch to the standby (if available) in case of an uncontrolled software error is detected. |
| **5.3.7** | | **User Management** |
| | | It **shall** be possible to add new users; |
| | | It **shall** be possible to change privileges of users. |
| **5.3.8** | | **FDP Start-up** |
| | | Two different start-up modes **shall** be provided:<br>• Cold start-up: Without taking into account the data stored in the disk;<br>• Warm start-up: Taking into account all data stored in the disk; |
| **5.3.9** | | **FDP Shutdown** |
| | | The FDP **shall** receive a shutdown notice message from the SMC in order to perform a controlled FDP shutdown; |
| | | Upon receiving such a message the FDP **shall** save its data structures to disk, so as to recover them when a later warm start-up is requested. |
| **5.3.10** | | **FDP Operator Positions** |
| | | The number and locations of operator positions **shall** not be limited by the system; |
| | | Each operator position **shall** be able to support all system management functions, this support being only restricted by the user and security management; |
| | | Access to FDP functions **shall** be protected by means of passwords; |
| | | The System **shall** allow no actions to be performed unless a login with its corresponding password has been authorized; |
| | | Likewise, a logout function **shall** be provided to inhibit the access to the FDP functions. |
| ***5.3.11*** | | FDP **shall** have AMHS and AIXM 5.1 protocols capability. AIXM 5.1 **should** be used only for import. |

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| **5.4** | | **TECHNICAL MAINTENANCE AND SUPPORT** |
| **5.4.1.** | | **Technical Maintenance** |
| | | The uninterrupted power supplying **shall** be provided for normal operation of the System. |
| | | The Technical documentation of vender **shall** include all needed information for proper organization of periodical maintenance of System Equipment. |
| | | The procedures and aids for periodical testing and checking of the System Equipment including the working positions, servers, network equipment and cables, UPS **shall** be foreseen |
| | | It **shall** be possible to perform the trouble shooting, preventive repairing and recovering of operation of the equipment on basic of testing results. |
| | | The detail instruction from equipment vender for trouble shooting and recovering of operation on LRU level **shall** be provided |
| | | The Plan of actions for reserve SW copy preparation **shall** be provided by Supplier before introduction of the System into the operation. |
| | | The allocation of the Equipment **shall** response to the valid requirements of safety, medical norms and fire protection requirements of Georgia |
| | | The System Technical documentation **shall** include the qualification requirements to maintenance personal. |
| **5.4.2.** | | **The tools and instruments for maintenance** |
| | | The System **shall** include the tools and measurement instruments needed for maintenance performance. |
| | | The List of the tools and measurement instruments **shall** be provided by vendor in Technical documentation. |
| **5.4.3.** | | **Guaranty conditions and procedures of application** |
| | | The Supplier **shall** warrant that the delivered Equipment and Software are free of defects caused by errors in design and assembly of the Equipment and Software, use of improper materials and failure to observe the quality requirements during manufacture, in the technical devices and software of the Supplier and Services performed by the Supplier. |
| | | The Supplier **shall** warrant the delivered Equipment and Software for a period of 18 months from Site Acceptance Test (SAT) or 24 months from the date of the signing of the Factory Acceptance Test (FAT), whichever is earlier. Within the above mentioned warranty period, Supplier **shall**agree to replace or repair within the period of warranty at Supplier's cost and no charge to the Customer of any item, materials or part thereof which are found to be defective as to software, material or workmanship, or which fails to comply with the description, specification or drawings as set forth in this requirements or System documentation. |

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| | | The Supplier **shall** guarantee availability of all the spare units and modules of the equipment proposed for supply for a period of at least 12 years. |
| | | The Supplier **shall** guarantee the maintenance of System application software during at least 12 years. |
| | | The Customer **shall** notify the Supplier of the defects in writing or by fax after the defects are discovered, and the notice **shall** describe the defective item (part and serial no) and give the description under which the defect has arisen in order to facilitate the diagnostic of the defect. |
| | | Upon receipt of the written notification the Supplier **shall** immediately and at its own cost consult with the Customer and agree on actions, as might be necessary to deal with the defects, repair or replace of the non-compliant Equipment or renew the Equipment or SW by other means (as the Supplier should consider most appropriate), and repair all damage to the Equipment of SW in a period not exceeding fifteen (15) working days or any other period reasonably required. |
| | | The repaired or replaced Equipment or item **shall** be returned within sixty (60) days after receipt of the defective Equipment by the Supplier. |
| | | The Customer **shall** provide all available facilities for the Supplier to verify any defect of the Equipment and Software. The Customer **shall** ensure access by the Supplier to the Systems and operation site for the Supplier to carry out its responsibilities in accordance with this paragraph. |
| **5.4.4.** | | **Providing of the SW licenses and patent cleanness** |
| | | The requirements in relation to a patent cleanness **shall**be fulfilled at stage of System introduction. If necessary to utilize Performer intellectual property that does not belong to him it **shall**besucceed in accordance with a legislation and international law. |
| | | Supplier **shall** provide to Customer the licenses or any other documents which confirmed the legal use of intellectual property for all SW products used in System. |
| **5.4.5.** | | **SW maintenance procedures** |
| | | The control of SW proper operation **shall** be provided continuously during the operation of the System. |
| | | The possibility to change the configuration of the electronic strips and lists dependently from WPs role **shall** be provided |
| | | The user interface for input, upgrade and correction of database **shall** be provided. |
| | | The mechanism of postponed input into operation of edited data base (the changes are interred in advance but start to be used only after input of special order) **shall** be provided. |
| | | The configuration file **shall** be good commented in English**.** |

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| **5.4.6.** | | **Copies of SW** |
| | | The following copies of SW for each System component **shall** be provided:<br><br>a) Operating system for servers;<br>b) Operating system for WPs;<br>c) The application SW for servers (including the configuration files for each server);<br>d) The application SW for WP (including the configuration files for each WP);<br>e) Data base;<br>f) Data base structure;<br>g) Archives of Data base tables. |
| | | One copy of previous SW version, which changed, and one reserve copy of SW currently in use **shall** be kept on System for reliable operation of System SW. |
| | | All needed licenses for operating system, Data base management system, operative application SW **shall** be provided. |
| **5.4.7.** | | **Spares** |
| | | The initial spare parts **shall** be recommended by the Supplier and **shall** be sufficient for maintenance of all the equipment during a three-year period, excluding the warranty period. It **shall** be necessary to provide spare parts for all the Systems supplied and all equipment including testing and ancillary equipment. |
| | | The recommended sparing level **shall** be determined depending on the reliability characteristics of the System's equipment to be supplied, which have been specified by the Supplier, and which conform to the real reliability characteristics expected in the operation conditions at the Customer work sites. The Supplier **shall** state such reliability characteristics in its Proposal. |
| | | The spare units **shall** be removable modules of the lowest level of the equipment's components and removable blocks of the lowest level of the equipment's components, as well as consumable materials and units required for the System's operation, including, but not limited to, fuses, electrical lamps, consumables for printing devices and special information carriers. |
| | | The quality of all spare units **shall** be the same as that of the original units installed. If spare units have been manufactured by the manufacturer of the original units of the equipment, the Customer's permission to use such spare units **shall** have to be procured. |
| | | The list of recommended spare units **shall** include the position numbers of the units in accordance with the equipment unit catalogue, as well as the price of each unit. This list **shall** be included as part of the Proposal. |

| | | |
|---|---|---|
| | | The Supplier **shall** guarantee availability of all the spare units and modules of the equipment proposed for supply for a period of at least 12 years. |
| | | The following parts **shall** be obligatory delivered as spare parts for System:<br>– one set of server equipment for each type used in System advisable with installed SW;<br>– one set of WP equipment for each type used in System (CWP, FDO, CMS, others)advisable with installed SW;<br>– modems in amount of 10% from total quantity in System;<br>– two monitors of each type installed in System;<br>– two System printers;<br>– advisable to include the HDD with installed SW for each sub system;<br>– one power supply unit for each server type;<br>– 2 keyboards and pointers of each used type;<br>– 2 fans and processor cooling fan for each type of processing unit used in System.<br>The spare parts can be used for Test Bed assembling. |
| **5.4.8.** | | **Standardization and unification** |
| | | The System **shall**be developed, mainly, with the use of serial equipment created by domestic and foreign. |
| | | The exchange of data with external objects and systems **shall**be provided in the standardized formats (protocols) of exchange of information. |
| | | The same type details and assembly units **shall**be interchangeable. |
| | | Substituting of hardware by their analogical functional analogues **shall**be carried out without the structural changes of hardware. |
| **5.4.9.** | | **Protection from unauthorized access** |
| | | The following accesses right levels **shall** be provided by System:<br>– Administrative (accesses to all System components and SW configuration);<br>– Technical (the level for duty technical staff with possibility to control and maintain of SW proper operation);<br>– User level (the level of access to functions needed for ATS providing);<br>– Supervisor level (the level for operative supervision supporting). |

| | | |
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| | | The cleardifferentiation**shall** be provided for Administrative and User level of access. |
| | | The User **shallnot** access to operating system of WP (he **shall** interact only with application HMI). |
| | | Theaidsforrecordingofuserregistrationon WP**shall**beprovided.for each WP. |
| | | The correction of air navigation data base and System parameters **shall** be accessed only by authorized persons. |
| **6.** | | **Documentation** |
| **6.1.** | | **Introduction** |
| | | This chapter gives detailed information of the documentation required for technical maintenance, technical system operation, and operational use of the system and sub systems.<br>Requirements for the documentation of software are included.<br>Documentation requirements associated with acceptance testing are in chapter 7 QUALITY ASSURANCE AND CONTROL.<br>Training documentation requirements are in chapter 8 TRAINING. |
| **6.2** | | **General requirements for documentation quality** |
| | | The documentation **shall** be enough for maintenance of the System, for overview of system components construction, for studying of System maintenance rules (proper use, technical maintenance, repairing) and contain the information, which confirms the volume of main parameters and performance characteristics guaranteed by vender |
| | | The information contained in documentation **shall** be enough to provide the proper and safety use and maintenance of System during the assigned life cycle. |
| | | The documentation **shall** be completely responsible to the delivered System. |
| | | The documentation for the System **shall** conform to the modern standards, and texts of the documents **shall** be in clear and in English language. Diagrams, drawings and other graphic materials **shall** be used as Supplements to the text. |
| | | The documentation delivered with the System **shall** include:<br>a) Assemblydrawings<br>b) Operatingandperformancecharacteristics<br>c) Theoryofoperation<br>d) Instructionfortheinstallation, start-up, operation, andmaintenance<br>e) Completenomenclatureofthedifferentpartsandcomponents |

| | | |
|---|---|---|
| | | f) Detailedblockdiagramofthesystem<br>g) Workpositionuser/operatordocumentationincludingusermanuals<br>h) Detailedmaintenanceproceduresforbothpreventiveandunscheduledmaintenanceactions<br>i) Proceduresformodificationofvariablesystemparameters<br>j) Detailedemergencyprocedures<br>k) Completewiringandconnectiondrawings<br>l) Completesoftwaredesigndescriptions |
| | | Thedocumentation**shall**:<br>a) be written in English language;<br>b) contain information in a clear and logical manner;<br>c) contain cross-references between diagrams, drawings and text;<br>d) contain technical drawings using standard symbols;<br>e) contain indexes and glossaries. |
| | | All documentation **shall** be delivered both in printed form and as computer readable files |
| | | The documentation **shall** be bound in a durable way to resist 5 years of wear and tear. |
| | | All documentation **shall** be covered by strong folders with easy unlocking mechanism and reliable locking for A4 paper format. The folders **shall** possess the transparent keeper on front and side surface for including a printed label of volume |
| | | In each folder the following **shall** be included:<br>a) title page;<br>b) the list of main structural elements of document;<br>c) table of contents;<br>d) change registration list;<br>e) glossary. |
| | | Employer **shall** check all documentation delivered for correctness and completeness prior to Acceptance. |
| | | All changes or corrections resulting from these checks **shall** be introduced into the documents without extra cost for the Employer. |
| | | All documentation **shall** be subject to Employer approval. Employer reserves the right to review and comment on all draft versions of documentation prior to printing. |

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| | | All documentation **shall** be delivered both in printed form and as computer readable files. |
| | | The draft documentation **shall** be delivered no later than the time the equipment is shipped from the Supplier's factory. |
| | | Customer **shall** reserve the right to copy and to use the delivered documentation in performing, for instance, training. |
| **6.3** | | **DOCUMENTATIONCONTENT** |
| | | Each System's documentation set **shall** include::<br>a) description of the System;<br>b) technical description of the equipment;<br>c) software description;<br>d) installation manuals;<br>e) operation instructions (user manuals);<br>f) technical maintenance instructions;<br>g) component catalogs;<br>h) documentation for the equipment supplied by subcontractors. |
| **6.3.1** | | **System Design Document (SDD)** |
| | | SDD **shall** be worked out to give a full overview of the System and integration of the various sub-systems. |
| | | SDD **shall** give an outline of the complete system as delivered. |
| | | It **shall** be adapted to the engineering staff and describe composition and functions of the system. |
| | | SDD **shall** give a general overview of the sub-systems and outline the structure of associated documentation. |
| | | Cross-reference to further documentation **shall** be included. |
| **6.3.2** | | **SubSystem Design Document (SSDD)** |
| | | Separate sets of documentation **shall** be worked out for each of the main sub systems. |
| | | The documentation for each sub system **shall** follow the outline structure given below. |
| | | This manual **shall** give a broad outline of the complete relevant sub system. |

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| | | It **shall** be written for the engineer staff and describe composition and functions of the sub system. |
| | | It **shall** give an overview of hardware and software, give main technical data and interfaces and outline the structure of associated documentation. |
| | | Cross-referencetoapplicableEquipmentManuals**shall**beincluded. |
| | | The documentation for Subsystem SW **shall** comprise the following chapters:<br>– General.<br>– Program function (function, program possibilities, main characteristics, restrictions).<br>– The logical structure description (program algorithm, methods which are used in program, program structure with description of functions of components and theirs interoperation. Program interface with other System programs).<br>– The conditions of use (conditions needed for operation of program namely: requirements to the hardware and other programs. General performances for input and output data and so on).<br>– Loading and calling of SW (types of calling of program from respective media).<br>– Input and output data description. |
| **6.3.3** | | **Operational System Description** |
| | | The information in the System's description **shall** give a complete picture of the System and be sufficient for correct evaluation of the Systems proposed. |
| | | The System's description **shall** conform to the design and characteristics of the System at the moment of its shipment. |
| | | The documentation **shall** be intended for engineer staff and contain description of equipment and functions of the System. |
| | | The System's description **shall** contain information about the remote control and monitoring subsystem and document for that subsystem. |
| | | The subsystem’s documentation **shall** contain information about the software and hardware, technical details of the main equipment and interfaces, as well as information about the documents, which concern the subsystem. |
| **6.3.4** | | **System Operator's Manual** |
| | | This manual **shall** give a detailed description of all system operation functions, including input actions and error responses. |
| | | The System Operator's Manual **shall** consist from following sections:<br>– The purpose and use conditions of System (purpose, functions and conditions, which are needed for proper operation of equipment (equipment list, requirements to the peripheral equipment, sw modules)).<br>– The SW and HW characteristics (the description of the main specifications and features of SW and HW (time performances, modes of operation, |

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| | | proper operation control aids and self-recovering possibility etc.).<br>– System HMI (sequence of operator's actions, which provide the loading, start and proper operation both SW and HW, performing of needed functions, termination of operation, description of functions, formats possible order inputs and System responses for it and other).<br>– Input and output data (the description of data structure and the coding facilities where used).<br>– The messages to operator (message structure and text which can be generated by programs, the description of its means and expected actions of operator). |
| **6.3.5** | | **User's Manual** |
| | | Thismanuals**hall**give a detaileddescriptionofallfunctionsseenfromtheATSuser'sworkingposition. |
| | | User's Manual**shall** include the description of the application of System functions on all stages of ATC service for flight from departure upto landing. |
| **6.3.6** | | **Maintenance Manual** |
| | | The operation instructions (user manuals) **shall** contain detailed descriptions of all operation functions of each type of equipment, input commands and error responses. |
| | | Full descriptions of how to maintain the systems in a preventive and corrective manner **shall** be included. |
| | | The sections associated with preventive maintenance **shall** include preventive maintenance checklist and guidelines on how to verify performance of the equipment. |
| | | The sections associated with corrective maintenance which may include repair of faults **shall** include details about:<br><br>a) methods of assessment of the equipment's error and fault signals;<br>b) errors, faults and alarms, as well as necessary testing instruments;<br>c) tools, appliances and consumables required for particular maintenance procedures;<br>d) instructions for operation and maintenance log keeping. |
| | | The maintenance manuals **shall** include functional description of implemented hardware functions for the support of maintenance. The objective **shall** be to enable fault location to lowest replaceable module (LRM) level. |
| | | The documentation **shall** include functional block diagrams and fault tracing trees. |
| | | Applicable cabling information **shall** exist. |

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| | | The Maintenance Manual **shall** include the following sections:<br><br>– General information (purpose and functions, the information about SW and HW needed for operation of System component).<br>– The structure (specification of HW needed for operation; SW structure, its component parts, interoperation of them, connections with others).<br>– Tuning of SW (description of actions for tuningof SW in real environment? SW installation, which provided in clear and sequential form).<br>– Test procedures (test description, which make possible to do the general conclusion about proper operation, the examples and expected results).<br>– Additional possibilities (the description of additional functional possibilities and order to select it).<br>– The messages for System programmer (message text, description of its content and respective actions which need to perform as response). |
| **6.3.7** | | **Installation Manual** |
| | | The installation manual **shall** include full details on the physical installation, including drawings and diagrams for external connections and system's internal interconnection. |
| | | The technical descriptions of the System's equipment **shall** include the following detailed information about subsystems and units of the equipment:<br>a) general description;<br>b) complete block diagrams;<br>c) complete logical diagrams;<br>d) mechanical and electrical data;<br>e) interfaces data;<br>f) configurations and parameter/switch settings. |
| | | The equipment units' catalogs**shall** include a list all items and parts of the System's equipment, as well as assembly drawings and location diagrams for all electrical, electromechanical and mechanical components. |
| **6.3.8** | | **Equipment Manual** |
| | | The Equipment Manual **shall** give full details of the sub system or unit on the following subjects as a minimum:<br>▪ general description;<br>▪ complete block diagrams;<br>▪ complete logical diagrams; |

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| | | ▪ mechanical and electrical data;<br>▪ interface data;<br>▪ configurations and parameter/switch settings. |
| **6.3.9** | | **Subcontractor's Manuals** |
| | | The documentation for equipment supplied by subcontractors **shall** be delivered in the English language. |
| **6.3.10** | | **Item Manual** |
| | | The Item Manual **shall** list all items and parts of the equipment. |
| | | Complete assembly drawings **shall** be included to enable the identification of all electrical, electromechanical and mechanical components. |
| | | Part lists **shall** contain a cross-reference between the actual part, and Supplier's part number. |
| | | The Item Manual **shall** be written in English language and include the full description of possibilities and consistency. |
| **6.3.11** | | **Safety Assessment Documentation** |
| | | The Safety Assessment Documentation**shall**contain **FHA, PSSA and Safety Case**. |
| | | FHA **shall** identify hazards, assess their effects, the related severity and mitigation means. |
| | | PSSA **shall** include fault tree analysis, event tree analysis, common cause analysis, etc. |
| | | Safety Case**shall** provide safety assurence and evidence. |
| **7** | | **QUALITY ASSURANCE AND CONTROL** |
| **7.1** | | **GENERAL** |
| **7.1.1** | | **Quality System Requirements** |
| | | In order to ensure the System equipment's conformity to the established requirements at all phases of the project implementation, the equipment Supplier **shall** have established a quality system in accordance with the requirements in the document: STANDARD ISO 9000 SERIES. |
| | | All of the offered equipment **shall** be produced in accordance with the European Union Directives to obtain the CEsymbol (including the standards for EMC) as well as the safety regulations, which ensure the protection of personnel and equipment). |

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| **7.1.2** | | **Rights Reserved by the Customer** |
| | | The Customer reserves the following rights as a supplement to the requirements of STANDARD ISO 9000 series: |
| | | The Customer right to verification **shall** be included in the Contract. |
| | | The Customer right to determine the use of nonconformity products **shall** be included in the Contract. |
| **7.1.3** | | **Suppliers Response to Quality Requirements** |
| | | The Supplier **shall** state their conformity with the above quality system requirements. |
| | | To enable the Customer to evaluate the Suppliers quality assurance conformity, the following points **shall** be fully described:<br>a) inspection of Sub-Suppliers (hardware and software);<br>b) quality inspection reports;<br>c) handling of non-conforming equipment;<br>d) the structure and production methods of hardware and software documentation including updating and other relevant rules referred to in this matter. |
| | | The Supplier **shall** describe and document the internal Quality Assurance (QA) organization. Areas of responsibilities **shall** be given and relevant names of QA managers **shall** be mentioned. |
| | | The way of reporting in the QA organization **shall** be detailed and contents of QA reports **shall** be identified. |
| **7.2** | | **Quality Control and Verification** |
| **7.2.1** | | **Introduction** |
| | | The verification activities **shall** be an on-going process that extends from the conception of the system up to and including its acceptance by the Customer. |
| | | The verification process **shall** include design reviews, inspections, and relevant tests. As the realisation of the system progresses, tests **shall** be performed at increasingly higherlevels of items. Test procedures **shall** be worked out for assemblies, units, sub-systems and the complete system under the Contract. |
| **7.2.2** | | **Design Reviews** |

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| | | Design reviews **shall** be held at appropriate points in the design and development phase in order to verify compliance with the requirements in the Product Specification. |
| | | Completion of the design reviews **shall** result in the providing of System Design Document (SDD) to Customer for investigation and confirmation. |
| | | On basic of SDD the Preliminary internal acceptance test procedures **shall** be prepared by Supplier and made be available to the Customer. |
| **7.2.3** | | **Quality Inspection** |
| | | The Supplier **shall** have the full responsibility for a proper and thorough supervision of the manufacturing process. |
| | | The Supplier **shall** have full responsibility for quality of the equipment under the Contract even if the Customer has made use of his right to verify the manufacturing process through inspection activities. |
| | | The Customer's representative **shall** be given complete insight in the Supplier's and any Sub-Supplier's manufacturing and QA activities. |
| | | Should the Customer's representative so wish, he **shall** be entitled to carry out his own verification tests and reviews. In such cases he **shall** be given full assistance from the Supplier's staff. |
| | | All approvals **shall** be in written form and signed by the Customer's Project Manager or his authorised representative. |
| **7.2.4** | | **System Testing** |
| | | A description of the Customer's testing requirements is given here. It contains the Customer's test objectives, describes categories of tests to be conducted and sets out documentation requirements. |
| | | The objective of the Customer's testing requirements is a full verification that the system, when completed and installed on site, meets the contractual specifications, as laid down in the Product Specification. |
| | | Tests are divided into two categories, namely production tests and acceptance tests. Production tests **shall** be performed by the Supplier in order to verify compliance to specifications of items at lower levels. |
| | | Acceptance tests **shall** be performed on items at sub-system level and higher, in order to demonstrate that the item concerned meets the specified functional performance. |
| | | The Customer **shall** be prepared to accept such tests being applied to units if the performance or capabilities of such units cannot be demonstrated properly under higher level tests, or if testing of units will give a better verification of compliance. |
| | | Acceptance tests are of vital significance for the Customer. Every acceptance test **shall** be performed in the presence of the Customer, who will sign the acceptance documentation upon successful completion of the tests. |
| | | Acceptance tests **shall** be further divided into Factory Acceptance Tests (FAT) and Site Acceptance Tests (SAT). |

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| **7.2.5** | | **Procedures and principals of System Acceptance** |
| | | Below the various stages of the requested acceptance testing process are identified and defined. |
| | | Before the actual Factory Acceptance test a full-scale internal preliminary test **shall** be arranged according to the specification. The Customer reserves the right to attend this test as an observer. The Supplier **shall** notice in due time the start of this preliminary test, however not later than one month in advance. |
| | | FAT is a test in the Supplier's facilities, which is conducted in accordance with the agreed FAT specification. The Customer **shall** be entitled to witness the test and **shall** be notified in written form about the FAT in due time. Upon successful completion of the FAT the Customer will sign the test protocol. |
| | | The SAT is f test at the Customer's premises (on site) which is conducted in accordance with the agreed specification. The Customer **shall** witness the test and will sign the test protocol upon successful completion of the test. The Customer **shall** be notified in written form in due time about start date of SAT. |
| **7.2.6** | | **Factory Acceptance Test (FAT)** |
| ***7.2.6.1*** | | ***FAT Documentation*** |
| | | Before the actual FAT, a full-scale internal preliminary test **shall** be arranged. |
| | | A report about preliminary tests, which **shall** include all results of operation and testing of the equipment at the plant as well as details about the Supplier's assessment of the test results, **shall** be submitted by the Supplier to the Customer not later than a week before the beginning of FAT. |
| | | The Supplier **shall** notice in due time the start of FAT, however not later than three weeks in advance. |
| | | Customer representatives **shall** be present at theFAT. |
| | | FAT is a test in the Supplier's facilities, which **shall** be conducted in accordance with the agreed FAT Program. |
| | | The FAT Program **shall** include:<br>a) TEST PLAN, which **shall** contain the general conditions and definitions, a test work flow which defines the test sequence and identifies the related test specifications and test procedures, and a general description of the tests.<br>b) TEST SPECIFICATION, which **shall** include detailed descriptions of the various tests and also include criteria for acceptance/rejection, conditions and interfaces. |

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| | | In addition, requirements for test provisions such as test tools, test equipment and test software **shall** be included.<br><br>c) TEST PROCEDURE, which **shall** describe the tests step by step and include detailed instructions for the test set-up, the use of test tools and test equipment, execution of the tests, and the interpretation and recording of the tests results.<br>The complete test environment **shall** be described, including simulated interfaces, test software and predefined inputs/outputs |
| | | The FAT Program **shall** be worked out by the Supplier and sent, together with its schedule, to the Customer for review latest one month prior to the expected start of the FAT. |
| | | The FAT Program **shall** mutually be agreed at the latest week before the actual start of the FAT. |
| | | The Supplier **shall** draw up a FAT Record, which **shall** contain factory test result records for every item of the FAT Program. The record's form **shall** have been agreed before the beginning of the tests. |
| | | The Supplier **shall** draw up and submit to the Customer the FAT Completion Certificate which **shall** indicate the type of test, the items tested and test result, including possible remarks. |
| | | Remarks may include agreed deviations from the test procedure. The FAT Completion Certificate **shall** be the formal document for recording of approval of the relevant test. Both the Customer and the Supplier **shall** sign the FAT Completion Certificate. |
| | | The FAT Completion Certificate **shall** be supplemented by the List of Delivery containing information about the configuration of the equipment down to sub-assembly level |
| ***7.2.6.2*** | | ***FAT Execution*** |
| | | The Supplier **shall** notify the Customer about the tests' date not later than 21 days before the scheduled date of FAT. |
| | | The FAT **shall** be performed under the environmental conditions that prevail in the Supplier's test department at the time of the test. |
| | | The Supplier **shall** provide conditions for the tests' performance and availability of all the monitoring and measuring devices and instruments, testing equipment, materials, technical facilities and service elements required for an appropriate realisation of the FAT. |
| | | During the FAT the Test Record **shall** be completed. The configuration of the equipment during the FAT **shall** correspond to one requested by the Customer. |
| | | Should problems arise during the FAT or should the FAT test results be deemed unsatisfactory in any major way by the Customer, the problems **shall** be corrected and the status **shall** be mutually verified and agreed. The Supplier **shall** take full economic responsibility for any required re-testing program. |
| ***7.2.6.3*** | | ***FAT Verification*** |

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| | | The following set of documentation **shall** be handed over to the Customer as evidence of a successfully completed FAT:<br>- the Certificate of FAT, signed by the Customer or their representatives upon completion of the test,<br>- the set of completed Test Records,<br>- the List of Delivery |
| | | These Factory Acceptance Test documents, properly signed by the Supplier and the Customer, **shall** imply that the equipment is accepted by the Customer for delivery to the site. |
| **7.2.7** | | **Site Acceptance Test (SAT)** |
| | | On successful installation and setting-up of the System, the Supplier **shall** submit a written Report to the Customer about the System's readiness for the SAT. |
| | | The SAT of the System **shall** include Preliminary Tests, Stability Test, including flight inspection, Final Site Acceptance Testsand 72-hours reliabilitytest. |
| | | The purpose of the Preliminary Tests is to check functionality of the System and its general capability to provide Air Traffic Control in real conditions of the installation area. |
| | | The purpose of the Stability Test is to assess stability of the System's characteristics and verify conformity of the System to requirements for operational reliability, serviceability, and sufficiency of the documentation and spare part types. The flight inspection of the System **shall** be performed during the Stability Test. |
| | | The purpose of the Final Site Acceptance Tests is to perform a detailed analysis of conformity of components and functions of the System to the requirements of this document, and to make the final decision about the possibility to use the System for the Air Traffic Control. |
| | | The second phase of the SAT **shall** include a Stability Test, lasting for minimum 10 days. |
| | | During Stability Test the System **shall** run under continuous relevant operation without any signs of anomalous function. |
| | | The procedures of the stability test and the criteria and conditions to be granted acceptance **shall** be mutually agreed. |
| ***7.2.7.1*** | | ***SAT Documentation*** |
| | | A selection of the required documentation **shall** be approved by the Customer, as indicated below. Upon approval by the Customer these documents **shall** be binding on both parties. The following documentation is relevant for the SAT: |
| **7.2.7.1.1** | | **Preliminary Test Documentation** |

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| | | The PRE-SAT Program **shall** include:<br>a) TEST PLAN-SCHEDULE, which **shall** contain the general conditions and definitions, a test work flow which defines the test sequence and identifies the related test specifications and test procedures, and a general description of the tests.<br>b) TEST SPECIFICATION, which **shall** include detailed descriptions of the various tests and also include criteria for acceptance/rejection, conditions and interfaces.<br>In addition, requirements for test provisions such as test tools, test equipment and test software **shall** be included.<br>c) TEST PROCEDURE, which **shall** describe the tests step by step and include detailed instructions for the test set-up, the use of test tools and test equipment, execution of the tests, and the interpretation and recording of the tests results.<br>The complete test environment **shall** be described, including simulated interfaces, test software and predefined inputs/outputs |
| | | The test results by each paragraph of the PRE-SAT Program **shall** be entered in the Test Records which are signed by the members of testing teams. The test records **shall** be in accordance with the agreed test procedure. |
| | | On completion of the PRE-SAT, the PRE-SAT Completion Certificate **shall** be drawn up providing information about the readiness system for Stability Test**.** |
| | | The PRE-SAT Completion Certificate **shall** be official documents confirming approval of results of the respective tests. Those certificates **shall** be signed by representatives of the Supplier and Customer. |
| **7.2.7.1.2** | | **Stability Test Documentation** |
| | | The Stability TestProgram**shall**be worked out by the Customer that include:<br>a) conditions and order of subsystem/system operation.<br>b) term of Stability Test<br>c) elimination order of drawbacks found out during Stability Test |
| | | The Stability test results **shall** be entered in the Stability Test journal which **shall** contain information about terms of system operation, faults, malfunctions, warnings, changes in system parameters and software. |
| | | On completion of the Stability Test**,** the Stability TestCompletion Certificate **shall** be drawn up providing information about the readiness system for Final Site Acceptance Tests. |
| | | The Stability test Certificate **shall** be official documents confirming approval of results of the respective tests. Those certificates **shall** be signed by representatives of the Supplier and Customer. |

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| **7.2.7.1.3** | | **Final Site Acceptance Tests Documentation** |
| | | The final SAT Program **shall** include:<br>a) TEST PLAN-SCHEDULE, which **shall** contain the general conditions and definitions, a test work flow which defines the test sequence and identifies the related test specifications and test procedures, and a general description of the tests.<br>b) TEST SPECIFICATION, which **shall** include detailed descriptions of the various tests and also include criteria for acceptance/rejection, conditions and interfaces.<br>c) In addition, requirements for test provisions such as test tools, test equipment and test software **shall** be included.<br>d) TEST PROCEDURE, which **shall** describe the tests step by step and include detailed instructions for the test set-up, the use of test tools and test equipment, execution of the tests, and the interpretation and recording of the tests results.<br>The complete test environment **shall** be described, including simulated interfaces, test software and predefined inputs/outputs |
| | | The test results by each paragraph of the final SAT Program **shall** be entered in the Test Record which is signed by the members of a joint testing team. The test record **shall** be in accordance with the agreed test procedure. |
| | | The Test Record forms **shall** be agreed upon before commencing the final SAT. |
| | | On completion of the Final SAT, the final SAT Completion Certificate **shall** be drawn up providing information about the type of test, the item tested and the test result, including possible remarks. |
| | | The final SAT Completion Certificate **shall** be official documents confirming approval of results of the respective tests. Those certificates **shall** be signed by representatives of the Supplier and Customer. |
| | | The final SAT Completion Certificate **shall** be supplemented by the List of Delivery containing information about the configuration of the equipment down to sub-assembly level. |
| ***7.2.7.2*** | | ***Agreement on the SAT Starting Date*** |
| | | The SAT Program **shall** be worked out by the Supplier and sent, together with its schedule, to the Customer for approval not later than 21 days before the expected start of the SAT. |
| | | The Customer **shall** be allowed one week for his evaluation and supplemental proposals for a final version of the SAT Program. |

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| | | The SAT Program **shall** mutually be approved not later than one week before the actual start of the SAT. |
| ***7.2.7.3*** | | ***SAT Execution*** |
| | | SAT Program **shall** comprise the verification and validation of these requirements. |
| | | SAT Program **shall** comprise also the test flights of System. |
| | | Since SAT **shall** be conducted in conditions closest to the real operation conditions of the equipment, the Customer **shall** provide such conditions, for example, arrange test flights and presence of the operation personnel. |
| | | The Site Acceptance Test **shall** be performed on the System complete with all components in accordance with the Contract's provisions. |
| | | The Site Acceptance Tests **shall** be performed under the environmental conditions that will exist under normal operation for the equipment contracted. |
| | | Before the beginning of the SAT, the Supplier **shall** ensure availability of all the necessary documentation, spare parts, software, test equipment, monitoring and measuring instruments and other facilities. |
| | | The SAT **shall** be performed following the Test Plan and the Test Procedure, successively checking the items for compliance with the Test Specification. |
| | | During the SAT, the Test Record **shall** be completed. |
| | | Every recording, listing, print-out etc, created during the SAT **shall** be added to the test report as evidence. The configuration of the equipment, as it is during the SAT **shall** be laid down in the List of Delivery. |
| | | All defects and anomalies detected during acceptance testing **shall** be assignedby Customer one of the following categories:<br>a)Category 1 are those defects and anomalies that affect flight safety<br>b) Category 2 are those defects and anomalies that affect system security<br>c)Category 3 are those defects and anomalies that affect the usefulness of the System<br>d) Category 4 are those defects and anomalies that the Customer deems not be material.<br>In case of appearance of category 1 or 2 defects and anomalies the Buyer is authorized to stop SAT execution procedures and after the fixing detected problems the SAT execution procedures start from the beginning. Any defect or anomaly that is deemed to be Category 1, 2, or 3**shall** provide the Customer the right to reject the test until the defect or anomaly is corrected by the Supplier. The Supplier **shall** immediately after the detection of a Category 1, 2, or 3 problem assign the qualified resources to investigate and correct the problem. |
| | | Should problems arise during the SAT or should the SAT test results be deemed unsatisfactory in any major way by the Customer, the problems **shall** be corrected and the status **shall** be mutually verified and agreed.In case when agreement cannot be reached Category assigned by the |

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| | | Customer shall prevail. |
| | | Upon the resolution of a Category 1, 2, or 2 anomalies, the Supplier **shall** provide the Customer with a recommendation on the portions of the acceptance testing to be repeated. This recommendation **shall**, as a minimum, address all hardware and software elements affected by the correction of the defect or anomaly. |
| ***7.2.7.4*** | | ***SAT Results*** |
| | | The following set of documentation **shall** be handed over to the Customer as evidence of a successfully completed SAT:<br>a) the FAT Completion Certificate signed by both parties' representatives;<br>b) the Preliminary Test Report and Stability Test Report signed by both parties' representatives;<br>c) the set of completed test records;<br>d) all recordings associated with the SAT;<br>e) the List of Delivery. |
| ***7.2.7.5*** | | ***72-hours reliability Test*** |
| | | The 72-hours reliabilitytest shall be provided afterfinal SAT |
| | | The system shall be put into the round- the clock operative working mode |
| | | On completion of the72-hoursreliabilitytest, the SAT Completion Certificate **shall** be drawn up providing information about the type of test and the tests results, including possible remarks and conclusion about the possibility to use the System for permanent operation. |
| **8** | | **TRAINING OF CUSTOMER'S PERSONNEL** |
| **8.1** | | **INTRODUCTION** |
| | | This chapter covers the requirements for operational and technical training to enable correct use, operation and maintenance of the whole Contracted system. |
| **8.2** | | **GENERAL** |
| | | The Supplier **shall** submit detailed training programs to the Customer for each course |

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| | | The training courses **shall**:<br>a) be conducted in the English language;<br>b) involve theoretical and practical training;<br>c) provide simulation of faults and errors;<br>d) use documentation provided for the Contracted system. |
| | | The Supplier **shall**:<br>a) deliver to the Customer detailed course programs not later than one month before the beginning of the course;<br>b) provide each participant with a complete set of course material at the beginning of the course;<br>c) transfer at the end of the course a complete set of used instructor's training material (slides, films, video records and other information materials) to the Customer. |
| | | On completion of whichever course, the Supplier **shall** draw up a Certificate for each student, proving completion of the course and grant the student the right to train other employees of the Customer. |
| | | The Supplier **shall** provide a sufficient quantity of qualified instructors able to carry out a complete course of training. |
| **8.3** | | **TRAINING DOCUMENTATION** |
| | | In order to ensure efficient training, the Supplier **shall** provide the necessary quantity of documentation which conforms to the requirements of modern standards. |
| | | The training documentation **shall** be in the English language and provide all information required, and be presented in a clear, and concise format. |
| | | The Supplier **shall**:<br>a) deliver to the Customer detailed course programs at least 1 month before the beginning of the course;<br>b) provide each participant with a complete set of course material at the beginning of the course;<br>c) transfer at the end of the course a complete set of used instructor's training material (transparencies, films, video, etc.) to the Employer. |
| | | Descriptions and detailed data included in the documentation **shall** fully comply with the characteristics of the delivered equipment. Any advertising or sales promoting material **shall** not be included in the training material. |
| **8.4** | | **TRAINING FACILITIES** |
| | | Supplier **shall** provide the suitable classrooms and laboratory facilities for the theoretical course, which **shall** take place at the Supplier’s |

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| | | plant/training centre. |
| | | Students**shall** have access to rest areas. |
| | | The Customer **shall** provide the needed classrooms and presentation equipment (on Supplier request) for on-site courses. |
| **8.5** | | **EQUIPMENT FOR TRAINING** |
| | | All equipment used for training **shall** not differ from the equipment supplied in accordance with the Contract. Maintenance of training equipment is the Supplier's responsibility. |
| **8.6** | | **TECHNICAL STAFF TRAINING** |
| | | The training course for the personnel responsible for operation and maintenance of the equipment **shall** include theoretical training (at the Supplier's plant/training centre) for at least 10 working days duration and practical training (at the Customer's site) for at least 10 working days duration. |
| | | The Supplier **shall** give a theoretical course for a group of students consisting of 6 persons. |
| | | The theoretical course **shall** be given prior to FAT. The theoretical course course shall be followed by FAT. The students attending the training course will participate to the FAT. |
| | | The program of the theoretical course **shall** include:<br>a) general familiarization of students with the equipment ;<br>b) familiarization with documentation related to the equipment;<br>c) detailed teaching of the equipment's operation and maintenance regulations;<br>d) familiarization with the equipment status monitoring procedures. |
| | | On completion of the theoretical curse, each student **shall**:<br><br>a) have clear understanding of the set of components of the equipment and operation of the whole System;<br>b) have sufficient knowledge about the equipment;<br>c) know the functional design and understand operation of the equipment up to the level of knowing each module;<br>d) have detailed knowledge of all operation functions and parameters of the equipment and adjustment of the equipment to such extent that is necessary for work with the equipment. |
| | | The Supplier **shall** give a practical course at site of the Customer to student group, which **shall** consist of 6 persons. |

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| | | The practical course **shall** be held prior to, but as close as possible to the SAT of System. |
| | | The practical training course **shall** provide the students with the scope of knowledge that would be sufficient for operation, preventive and corrective maintenance, including, but not limited to, knowledge which would allow:<br>a) carry out operation and maintenance, as well as change the equipment's settings envisaged by the specifications;<br>b) control the equipment's operation and adjust the System;<br>c) check working characteristics and parameters of the equipment;<br>d) detect and repair the equipment's faults;<br>e) select and use maintenance facilities such as procedures of fault detection, testing software, monitoring and measuring instruments and test equipment;<br>f) carry out adjustment permitted for the personnel responsible for maintenance;<br>g) perform procedures of the system's operability restoration. |
| | | Every student **shall** also be able to:<br>a) perform all the working operations as per the operation documentation for the equipment;<br>b) select the necessary settings and carry out procedures to change the equipment's settings;<br>c) perform control from a remote control terminal in accordance with the manufacturer's requirements. |
| **8.7** | | **OPERATIONAL STAFF TRAINING** |
| | | The training of ATM operational staff**shall** consist of a theoretical course given at the Supplier's plant/training centre and a practical course given at the installation site. |
| | | The theoretical course for ATM operational staff**shall** be given during at least 10 working days for 12 persons. |
| | | The theoretical course for ATM operational staff **shall** be given prior to the FAT.The theoretical course shall be followed by FAT. The students attending the training course will participate to the FAT. |
| | | The Supplier **shall** provide for ATM operational staff the practical training prior, but as close as possible to the SAT starting date and after the practical training course for technical staff personal. |

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| | | The practical course for all ATM operational staff**shall** be given during at least 10 working days for 12 persons. |
| | | The training course **shall** include:<br>a) general course on system hardware;<br>b) detailed course on rules of the system operating;<br>c) application of system for ATC in real environment;<br>d) supervision system orders;<br>e) documentation on the system operation. |
| | | At the completion of the course each student **shall** have:<br>a) clear overview of the system;<br>b) knowledge of the functional design and operation of the system;<br>c) detailed knowledge of operational functions, input functions and their results, etc. enabling to operate the work station equipment in accordance with the requirements;<br>d) carry out all the functional operations envisaged by the specifications;<br>e) select any configuration of the system and to be able to accomplish reconfiguration of the system;<br>f) knowledge and possibility enough to provide the training for other students;<br>g) ability to apply the existing system functionality for ATS providing. |

## 9 ABBREVIATION

**A-SMGCS** Advanced Surface Movement Guidance & Control System
**ACAS** Airborne Collision Avoidance System (=TCAS in USA)
**ACC** Area control center
**ADEXP** ATS Data Exchange Protocol
**ADS-B** : Automatic dependent surveillance broadcast
**AFTN/AMHS** Aeronautical fixed telecommunications network
**AHMS** Aeronautical Message Handling System
**AIP** Aeronautical Information Publication
**AIS** Aeronautical information system
**AMAN** Arrival Manager
**APW** Area Proximity Warning
**ASM** **A**irspace management
**ATA** Actual time of arrival
**ATC** Air traffic control
**ATCC** Air traffic control centre
**ATD** Actual time of departure
**ATFM** Air traffic flow management
**ATIS** Automatic terminal information station/service
**ATM** Air traffic management
**ATS** Air traffic service

**COTS** **C**ommercial off-the-shelf (equipment)
**CTA** ControlArea
**CTR** (CTZ) controlzone (ATC)
**CTZ** (CTR) controlzone (ATC)
**CTOT** Calculated Take Off Time
**CWP** Controller Working Position

**Dep** Departure
**Dest** Destination

**EOBT** Estimated Off Block Time
**ETD** **E**stimated time of departure
**ETE** Estimated time en route

**ETFMS** Enhanced Tactical Flow Management System
**EUROCONTROL**European Organisation for the Safety of Air Navigation
**EXE** Executive Controller
**EXP** Executive + Planner Controller
**Failure** The unintended termination of the ability of a system, or part of a system, to perform its required function.
**Failure rate** The average number of failures of a system, or part of a system, per unit time.
**FAT** Factory Acceptance Test
**FDPS** Flight Data Processing System
**FL** flight level
**FPL** Filed Flight Plan
**FSA** First System Activation (message)
**FTP** File Transfer Protocol (Internet)
**FUA** Flexible Use of Airspace

**GA** **G**eneralaviation.Executive and company aircraft.Private and flying club aircraft. Gliders, sport aviation and airships/balloons.Aerial work.
**GAT** General air traffic
**GCAA ATD** Georgian Civil Aviation Agency Air Transportation Department
**GMC** Ground movement controller (ATC)
**GPS** Satellite Navigation and Global Positioning System

**HDLC** High-level data link control/communication
**HMI** Human-machine interface

**IFPS** Initial Flight Plan Processing System
**IFR** Instrument Flight Rules
**ILS** Instrument Landing System
**IP** Internet Protocol

**LAP-B** Link Access Procedure (Protocol type B)
**LCIP** Local Convergence and Implementation Plan
**LRU** Lowest Replacable Unit
**LSB** Least Significant Bit

**Mode** SSR mode of operation.Mode A - normal ATC codes, Mode C - encoded flight levels, Mode S -selective interrogation and downlinking of aircraft parameters(DAPs).

**Mode S** SSR using selective addressing.Selection based on ICAO 24-bit unique address for each aircraft.Also allows downlinking of flightplancallsign and altitude in 25 ftincrements.

**MSAW** Minimum Safe Altitude Warning

**MSSR** **M**onopulse secondary surveillance radar

**MTBF** **M**ean time between failures.The average time between 2 successive failures of a system or part ofa system.

**MTCD** Medium-Term Conflict Detection (System) (used in ATC centres)

**MTTR** Mean time to repair/restore

**NM** Nautical mile (not universally used but better than 'nm') (also M)Approx 1,852 m or 6,080 ft.

**NM** Network Management

**Non-precision Approach** A standard instrument approach procedure in which only horizontal guidance is given.

**NOTAM** Notice to Airmen

**OAT** Operational Air Traffic

**OPMET** Operational meteorology (information)

**ORCAM** Originating Region Code Assignment Method

**OSI** Open System Interconnection

**PANS** Procedures for Air Navigation Services

**PENS** Pan-European Fixed Network Service

**PLN** Planner Controller

**POSIX** Portable Operating System Interface for Computer Environments

**P-RNAV** **P**recision area navigation. ICAO definition - having a nav performance equal to or better than a track-keeping accuracy of ±1 NM 95% of time.PSR Primary Surveillance Radar

**QNH** Atmospheric Pressure at Nautical Height ; Q-code designation for atmospheric pressure at mean sea level

**RNAV** Area Navigation

**RPL** Repetitive Flight Plan

**RPS** Recording and Playback System

**RVSM** Reduced Vertical Separation Minimum

**RWY** Runway

**SADIS** Satellite Distribution of World Area Forecast System
**SAR** Search and Rescue
**SAT** Site (System) Acceptance Test
**SDPS** Surveillance Data Processing System
**Slot** An arrival or departure time window reserved for a flight
**SMGC(S)** Surface Movement Guidance and Control System
**SPECI** Aviation Selected Special Weather Report
**SSR** Secondary Surveillance Radar
**SSR Mode S** Selective Address SSR
**SID** Standard Instrument Departure (Route)
**SIGMET** Significant Meteorological Information (broadcast warnings of weather hazards)
**STAR** Standard (Instrument) Arrival Route
**STCA** Short-Term Conflict Alert
**SW** s/w Software
**TAF** Terminal Area (Aerodrome) Forecast
**TAR** Terminal Area Radar (primary, secondary)
**TCP/IP** Transmission Control Protocol/Internetwork Protocol
**TMA** Terminal Control Area
**TRA** Temporary Reserved Airspace/Area
**TSA** Temporary Segregated Area
**UTC** Universal Time Co-ordinates
**VCS** Voice Communication System
**VDF** Very high frequency Direction Finding station
**VDU** Video (Visual) Display (Distribution) Unit
**VFR** Visual Flight Rules
**VSP** Variable System Parameter

**WGS-84** World Geodetic System 84, which is the ICAO recommended parameterisation of an ellipsoid earth model
**WMO** World Meteorological Organisation
**WP** Working Position
**WS** Work Station
**WTC** Wake Turbulence Category
**X.25** PacketSwitchedDataNetwork