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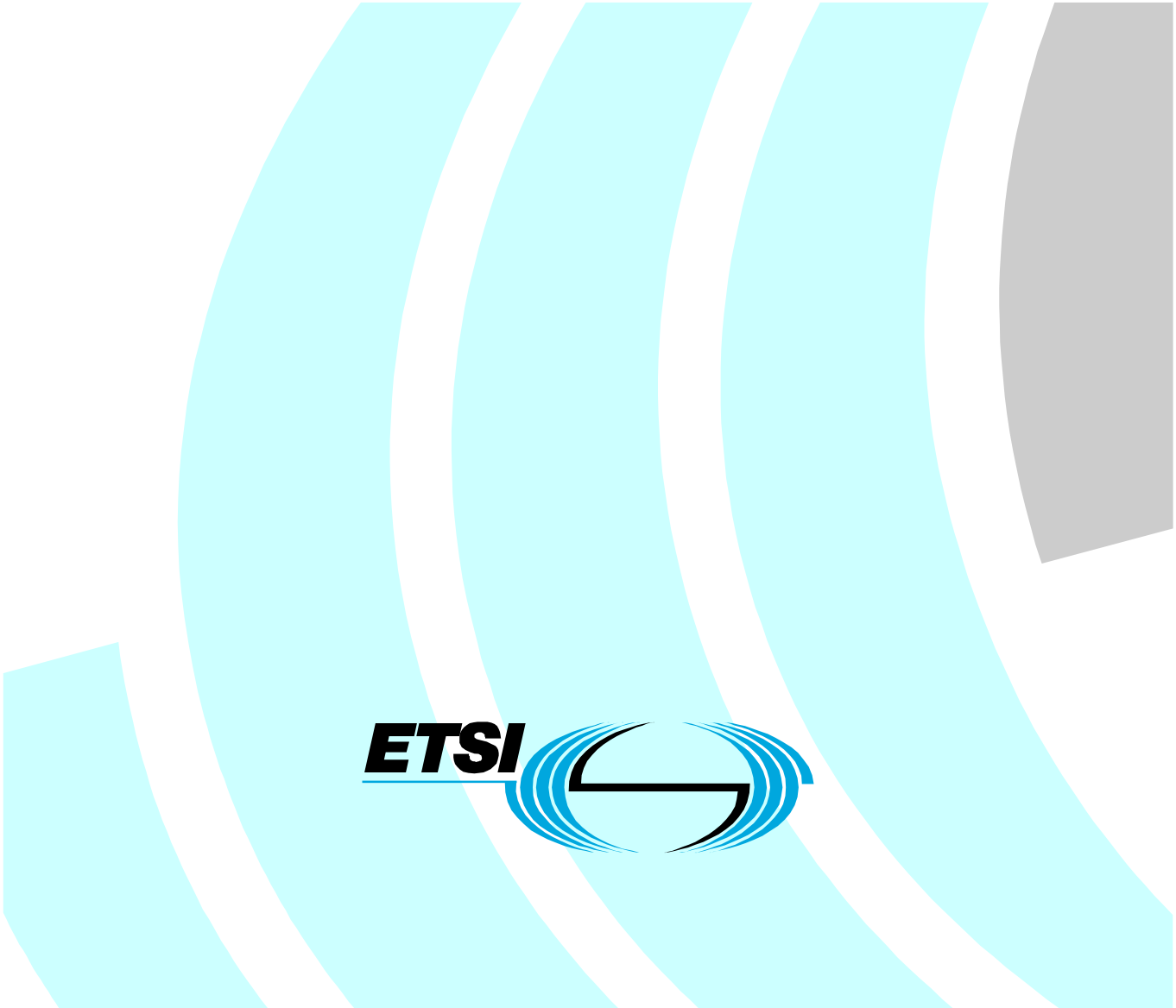
Technical Report

Electromagnetic Compatibility and Radio Spectrum Matters (ERM); European Air Traffic Management Network (EATMN); Part 1: Inventory of existing standards and specifications in progress



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Foreword

This Technical Report (TR) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM).

The present document is part 1 of a multi-part deliverable covering the Electromagnetic Compatibility and Radio Spectrum Matters (ERM); European Air Traffic Management Network (EATMN), as identified below:

Part 1: "Inventory of existing standards and specifications in progress";

Part 2: "Work programme".

STF 293 produced two deliverables: the inventory of the European specification work in progress (the present document) and the Work Plan.

Introduction

Background

At the end of 2003 the European Parliament approved the set of four regulations that comprise the Single European Sky package. In early February 2004 the Council of Ministers endorsed the programme.

The objectives of this regulatory initiative are to improve and reinforce safety, to create additional capacity, to increase the overall efficiency of the air traffic management (ATM) system, and create a European market for ATM systems. This can be achieved e.g. by restructuring the European airspace as a function of traffic flow, rather than according to national borders, by a more effective and integrated air traffic management architecture and by ensuring that this architecture is based on demand driven service provision. The legislation also proposes to significantly enhance international coordination. At the same time it aims to remove many of the administrative and organizational bottlenecks in particular in the area of making regulations and enforcing them.

The Air Traffic Management Package

The European Commission's ATM legislative package, which came into force in April 2004, consists of four regulations covering the essential elements for a seamless European Air Traffic Management System. These four elements are:

Framework for the creation of the Single European Sky

This regulation describes the institutional framework for the creation of the Single European Sky.

The provision of Air Navigation Services

This regulation aims to promote the safe and efficient provision of air navigation services in a seamless and interoperable manner across the European Community. It ensures functional separation between national regulators and air navigation service providers. This separation is compatible with public and private means of ownership and service provision - whichever model is adopted within individual States. It also allows the revision of the current charging system to encourage the efficient use and the efficient provision of ATM infrastructure.

The Organization and Use of Airspace

This regulation will configure a European airspace which will function as a single operating continuum. This will allow common procedures for the planning, structuring, and management of airspace ensuring the safe performance of the entire European Air Traffic Management Network (EATMN). The regulation defines the principles for the organization and use of the airspace, and for the optimization of air traffic flows.

The Interoperability of the European Air Traffic Management Network

A specific regulation defines the conditions to ensure interoperability in the European Union between the different systems of the European Air Traffic Management Network and of their upgrading to new technologies. A fundamental topic of this regulation is the definition and management of the European ATM standardization processes.

Setting the Scene

To achieve the above desirable objectives, the organization, legislation, and the defining principles for the operation of the Single European Sky had to be put in place. To this end, the European Community took specific actions:

The Single European Sky Committee

The above mentioned regulations foresaw the creation of a Single European Sky Committee (SSC) and an Industry Consultation Body (ICB). Member States were encouraged to send a civil and a military representative to the Single European Sky Committee. The European Commission also launched an industrial and a social dialogue with all relevant actors in order to set the roadmap from research to implementation. The Single European Sky Committee itself consists of representatives of the Member States of the European Community. Countries having bilateral agreements with the European Community may be invited as observers or as full member as foreseen in the specific agreements.

Adopting ATM Legislation into European Community Law

The Single European Sky Committee has powers delegated from the European Parliament and the Council to adopt implementing legislation on its behalf. The legislation ensures that all member states' needs will be taken into account.

Converging to a Single European Concept of Operations

While taking into account all the needs of the member states, a single ATM Concept of Operations is being adopted by European ATM stakeholders in close cooperation with the neighbouring regions. This excludes the possibility of non-coordinated development of the future Air Traffic Management in Europe. The single ATM Concept of Operations follows the vision defined by the EUROCONTROL Operational Concept reflected in the ICAO OCD and represents a reference document maintained and further developed by all the European member states through the EUROCONTROL Organization.

For further information consult the website at: http://www.eurocontrol.int/oca/public/standard_page/op_concept.html

An extract is provided in annex C: Concept and Architecture Framework for Community Specifications

Reorganizing the European Airspace

A number of actions are intended to improve the organization and management of European airspace according to the reference Concept of Operations. These include:

European Upper Flight Information Region

Perhaps the most significant action here is the creation of a European Upper Flight Information Region. This will replace the corresponding existing national zones. It will ensure uniform organization of the airspace. Necessarily, this will encourage the reconfiguration of the upper airspace into functional airspace blocks, based on safety and efficiency criteria - regardless of national boundaries. It will also be helpful in harmonizing the use of airspace classifications.

Enhanced co-ordination between civil and military

Military airspace occupies a significant portion of the overall European airspace which could lead to the inefficient use of airspace. Although sharing of airspace does now occur, an action is proposed for the efficient allocation and use of military airspace including the increased use of this airspace to civil flights.

A safeguard clause exists, allowing Member States to apply measures needed to safeguard essential security or defence policy interests.

Air Traffic Flow Management

This action is aimed at the adoption of rules and conditions for the efficient management of air traffic flow in co-operation with service providers, airports and airspace users. Mechanisms will be introduced, allowing for a more comprehensive and disciplined use of the airspace aimed at integrating airports into the Flow Management process.

Harmonizing the European ATM/System Architecture

The lack of an overall, high level ATM/CNS system design has led to the current insufficient levels of integration and interoperability.

The OATA project, co-funded by EUROCONTROL and the European Commission, is developing with the support of ATM Stakeholders the Overall ATM/CNS Target Architecture for 2011 that supports the Reference European Concept of Operations.

This overall architecture will provide the reference for interoperability standards and regulations for the Single European Sky and will be used as a reference for the development of the future European ATM System.

For further information consult the website at: http://www.eurocontrol.int/oca/public/standard_page/overall_arch.html

An extract is provided in annex C: Concept and Architecture Framework for use with Community Specifications.

System Wide ATM Information Management

Key to the evolution of European ATM in the coming decades is the System Wide Management of all ATM related Information (SWIM). This means the consistent application of common principles of information management to the ATM context. The adoption of SWIM principles is already at the basis of the Overall ATM/CNS Target Architecture and the single Concept of Operations and will eventually lead to a Single European ATM Information Environment.

The EUROCONTROL (draft) Information Management strategy defines a common framework for SWIM. Similar to the ISO-OSI 7-layer model for communications, this SWIM framework provides a principle reference structure for embedding standards, community specifications, and regulations.

An extract is provided in Annex D SWIM Framework for Community Specifications.

Specification

A document that defines design or performance requirements and methods of measurements that may be used by a manufacturer(s) or other related industry groups to achieve a measure of performance or commonality. The document may be solely the responsibility of a manufacturer, an agreement with a customer or collaboration between industrial members. The document may also be commercially available.

Standard

A document produced under the remit of a national or international standards institute intended to be adopted nationally as the definitive test, performance and assessment requirement for products in relation to specific applications or environments that have national or international significance. The document must be agreed by relevant industry interested parties and organizations as part of a public consultation exercise and accepted by the National Standards Organization. To attain international standard status the document must be accepted by the government appointed Nation Standards Organizations and be publicly available.

Essential requirements, Implementing Rules and Community Specifications

The interoperability Regulation establishes the essential requirements and foresees Implementing Rules (IR) for Interoperability and (European) Community Specifications (CS) to implement these requirements and secure their compliance, taking account of operational and technical developments. Whereas the adherence to essential requirements and implementing rules is mandatory, the drafting of Community specifications implies the consensual agreement of stakeholders on those standards of voluntary application.

Procedures

It is essential that the development of Implementing Rules and Community Specifications must follow transparent procedures. Community Specifications can be developed either by European Standardization Organizations in co-operation with EUROCAE or by EUROCONTROL. Resulting Community Specifications should be adopted by consensus within a formal public enquiry process. This will enable product manufacturers and service providers to make a declaration of conformity or verification of systems respectively to the essential requirements and the relevant Implementation Rules. This will, in turn, benefit and streamline procurement in ATM and ensure an open market in products and services.

Enhanced industry participation

The aim of inviting industry participation flows from many direct and practical needs. Industry has the knowledge and expertise that can help set the roadmap for the development of ATM toward the future European system. Industry expertise is essential to guide the direction taken and to identify those specific steps required to achieve the future European system. Industry can help to define the investment needs for research and technical development (RTD) and its implementation.

Industry can also be particularly helpful in supporting the standardization process, where much work yet remains to be done. Through the creation of the ICB, industry will be able to advise the European Commission and the Single European Sky Committee. Membership in the ICB will be made up of representatives of the Air Traffic Service Providers, Airspace Users, Manufacturing Industry, Professional Associations, Airports, and RTD Organizations.

EUROCONTROL

The participation and cooperation of EUROCONTROL is an essential element for the successful implementation of the Single European Sky Initiative. EUROCONTROL and the European Commission are working together to ensure an efficient and effective European ATM system. As part of this process, the European Community has become Member of the EUROCONTROL Organization. The main areas where it is anticipated that more formal cooperation with EUROCONTROL will be most beneficial are:

- Co-operation on Research and Development funding;
- Participation in the Single European Sky Committee;
- Implementation planning; and
- Enhanced industry participation process.

It is intended that EUROCONTROL will be in charge of the preparation of proposals for European Community legislation through mandates from the European Commission, e.g.:

- Standardization;
- Airspace redesign; and
- Interoperability requirements.

This is a significant role and includes new and necessary responsibilities for that organization.

EUROCAE

EUROCAE deals with the standardization of ground and airborne systems and equipment for the benefit of the Civil Aviation Community in Europe. EUROCAE acts as a Forum for its 100+ members to collaborate in specific technical tasks (standards, specifications, guidelines, reports, etc.). The EUROCAE membership consists of Manufacturers, Regulators, Services Providers and Users. The membership comprises North American based as well as European based organizations.

EUROCAE works in close cooperation with its US equivalents (RTCA, SAE, ARINC, etc.) and in close relation with the worldwide Aviation authorities (EASA, EUROCONTROL, FAA, ICAO, IATA, etc.).

EUROCAE produces technical standards and other documents in response to operational and functional requirements.

EUROCAE has published over one hundred and thirty documents; several of them developed jointly with US partners. Many are referenced in TSOs and/or referred to in ICAO SARPS and/or EUROCONTROL ESARRs and/or FAA standards.

More recently EUROCAE has established agreements with the European Standardization Organizations (ESOs) to provide technical support where aviation related standards are required to support the SES legislation.

European Aviation Safety Agency

The main functions of the European Aviation Safety agency may be described as follows:

CERTIFICATION: On 28 September 2003, the Agency took over responsibility for the airworthiness and environmental certification of all aeronautical products, parts, and appliances designed, manufactured, maintained or used by persons under the regulatory oversight of EU Member States. This also includes all post-certification activities, such as the approval of changes to, and repairs of, aeronautical products and their components, as well as the issuing of airworthiness directives to correct any potentially unsafe situation. All type-certificates are therefore now issued by the European Aviation Safety Agency, and are valid throughout the European Union.
On the same date the Agency became the competent authority to approve and oversee the organizations involved in the design of aeronautical products, parts and appliances. It also carries out the same role for foreign organizations involved in the manufacture or maintenance of such products.
To execute its tasks within the present period of building up its resources, the Agency relies on national aviation authorities who have historically filled this role and concludes contractual arrangements to this effect.

RULEMAKING: The Agency contributes to the production of all EU legislation related to the regulation of civil aviation safety and environmental compatibility. It submits opinions to the European Commission and must be consulted by the Commission on all legislative proposals in this field. Its experts have direct contact with all relevant actors, and make use of the knowledge available within industry and national administrations across the European Union. The Agency, in consultation with its stakeholders, adopts also so-called "soft rules". These are non-binding standards, specifications and guidance material, to assist in the consistent application of EU legislation across the European Union.

QUALITY AND STANDARDIZATION: Where Community law is implemented at Member State level, the Agency assists the Commission in overseeing its effective application and its uniform understanding.
The necessary standards are therefore being developed and maintained properly, uniformly and consistently across the European Union.
Accordingly, the Agency conducts inspections of undertakings as well as national authorities throughout the EU, both to monitor the application of EU rules on aviation safety, and to assess the effectiveness of these rules. The Agency also provides technical training, which is essential to achieve overall consistency and high level standards.

The Agency's scope should be extended first to Operations, Licensing and third countries aircraft and later on to ATM and Airports safety regulation.

SESAME

SESAME is a common initiative from the European Commission and EUROCONTROL to achieve the Single European Sky (SES) technical/operational implementation, in complement to the SES regulatory framework.

With SESAME, the EU has launched the European air traffic management modernization programme. It combines operational, technological, economic, financial and regulatory aspects and will support the Single Sky legislation. It will synchronize the evolution in all European Union member states ensuring that aircraft equipage is consistent with ground evolutions and will include all the steps from research to operation. Most importantly, it will be based on a co-operation involving airspace users, Air Navigation Service Providers, industry airports, and military, and it will implement a commonly agreed operational concept.

The first phase of SESAME, called the "definition phase" has been launched: it is co-funded by the European Commission under Trans European Networks and EUROCONTROL, and put under EUROCONTROL'S responsibility. This definition phase will end in 2007. It will deliver an ATM Master Plan, which will include a common goal and vision for the development and implementation of the Single European Sky Air Traffic Management environment.

The second phase of SESAME will be a development and implementation phase based upon the results of the definition phase. This phase will build the next generation of Air Traffic Management system, synchronize their deployment and implementation. This phase will span from 2007 to 2020+.

The European Commission and EUROCONTROL participate to strategic orientation of SESAME. The Commission translates into community legislation the required synchronization and harmonization.

As an integral part of the SESAME Definition Phase, specific work packages will address the standardization needs, will consider under which organization these standards will have to be developed, and the timeframe for their delivery. The results will be included in the Master Plan (one of the main deliverable of the Definition Phase) providing to the concerned organizations the necessary information to establish their work programme.

For further information consult the website at: http://europa.eu.int/comm/transport/air/single_sky/sesame/index_en.htm

Summary

Europe has launched an ambitious but essential programme for the achievement of a Single European Sky. This programme involves significant institutional and legislative changes to overcome the barriers that presently stand in the way of a more unified and efficient Air Traffic System. The Single European Sky programme aims to improve the means and the methods of Air Traffic Management in order to achieve this common goal. Many changes are required to avoid a grid lock in Europe as traffic continues to increase. Existing processes and procedures are simply not sufficient to ensure that safety, capacity and efficiency is maintained in the face of this continuing growth.

1 Scope

On 30 June 2004, the European Commission issued mandate M/354 [1] to CEN/CENELEC/ETSI for the development of European Standards for interoperability of the European Air Traffic Management Network (EATMN).

The description of the mandated work is:

- CEN/CENELEC/ETSI are asked to produce standards that satisfy the essential requirements and/or implementing rules of the interoperability Regulation for systems, together with the relevant procedures, or constituents provided for in the annexes (see [1]).
- CEN/CENELEC/ETSI are asked to produce an assessment of the compliance of the standards with the general and specific essential requirements laid down in Annex II, Parts A and B of the interoperability Regulation [2] and with the relevant implementing rules.

The purpose of the present document is to present an inventory of all CNS/ATM system elements and their constituents which may need standardization to enable the development and implementation of the SES programme. Suitable documentation which might facilitate the definition of such standards and related organizations possessing specific know-how and previously involved in such work were identified. The inventory of the standardization candidates was provided with the recommended priorities specified by the SES ICB.

The present document presents Community Specifications proposed as candidates for development either by the European standardization organizations in cooperation with EUROCAE, or by EUROCONTROL, depending on the provisions of Article 4, paragraph 1 of the SES Interoperability Regulation [2].

The European Commission tasked STF 293 to produce a comprehensive inventory of the current status of achieved standardization, on-going work, and open issues thus giving an overview on the rather wide domain of CNS/ATM. Part two of STF 293's task is the creation of a work plan outlining the duration, manpower and estimated efforts to produce the resulting Community Specifications. The final judgement of allocating priorities to the work plan and initiating the required activities rests with the European Commission.

It is proposed that this work plan be categorized dealing with the issues in the following sequence:

- CSs to be developed from March 2006 onwards (clause 5).
- CSs to be developed from 2007 onwards (clause 6).
- CSs whose development should start 2008 and later (especially taking into account the outcome of the SESAME definition phase) (clause 7).

Additionally clause 8 describes a group of systems for which there usually exists a broad current experience to install and operate such systems based on international standards and national regulatory approval AND where are serious doubts that a development of CSs is economically reasonable e.g. seeing the very limited numbers of new installations expected (sometimes even phase out strategies are under consideration).

List of systems for Air Navigation Services

According to REGULATION (EC) No 552/2004; Annex I the EATMN is subdivided into eight systems [2].

1) Systems and procedures for airspace management.
2) Systems and procedures for air traffic flow management.
3) Systems and procedures for air traffic services, in particular flight data processing systems, surveillance data processing systems and human-machine interface systems.
4) Communications systems and procedures for ground-to-ground, air-to-ground and air-to-air communications.
5) Navigation systems and procedures.
6) Surveillance systems and procedures.
7) Systems and procedures for aeronautical information services.

8) Systems and procedures for the use of meteorological information.

2 References

For the purposes of this Technical Report (TR), the following references apply:

[1] European Commission, DG-TREN, Mandate to CEN/CENELEC/ETSI for the development of European standards for interoperability of the European Air Traffic Management Network.

[2] Official Journal of the European Union, Regulation (EC) No 552/2004 of the European Parliament and of the Council of 10 March 2004 on the interoperability of the European Air Traffic Management network (the interoperability Regulation). The SES Interoperability Regulation and can be found at: http://europa.eu.int/eur-lex/en/archive/2004/l-09620040331en.html.

[3] European Council, COUNCIL RESOLUTION of 7 May 1985 on a new approach to technical harmonization and standards (85/C 136/01).

[4] ATM-CNS Interoperability Roadmap Final Report, Sofreavia, EC Contract B2001/B2-704B/S12.322054.

[5] European Air Traffic Management Network (EATMN) Interoperability Implementing Rules (IR) and Community Specifications (CS), European Commission, Working paper ICB/2/3, November 2004.

[6] European Convergence and Implementation Plan (ECIP) for the years 2005-2009, EUROCONTROL.

[7] Price Waterhouse Coopers, multi-modal CBA of Galileo.

[8] EUROCONTROL "Guidelines For An Agreement For The Shared Use Of Radar Sensor Data" (SUR.ET1.ST05.3000-GUI-01-00).

[9] Official Journal of the European Union L 91, 07.04.1999, Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity.

[10] EUROCONTROL Operational Concept Document, Volume 1 (The Vision), Ed 2.1, dated 12 January 2004.

[11] EUROCONTROL Operational Concept Document, Volume 2, Concept of Operations for 2011, Ed 1.0 dated 03 May 2005.

[12] EUROCONTROL OATA Architecture Overview.

3 Explanation of the significant terms, used in the context of the present document and abbreviations

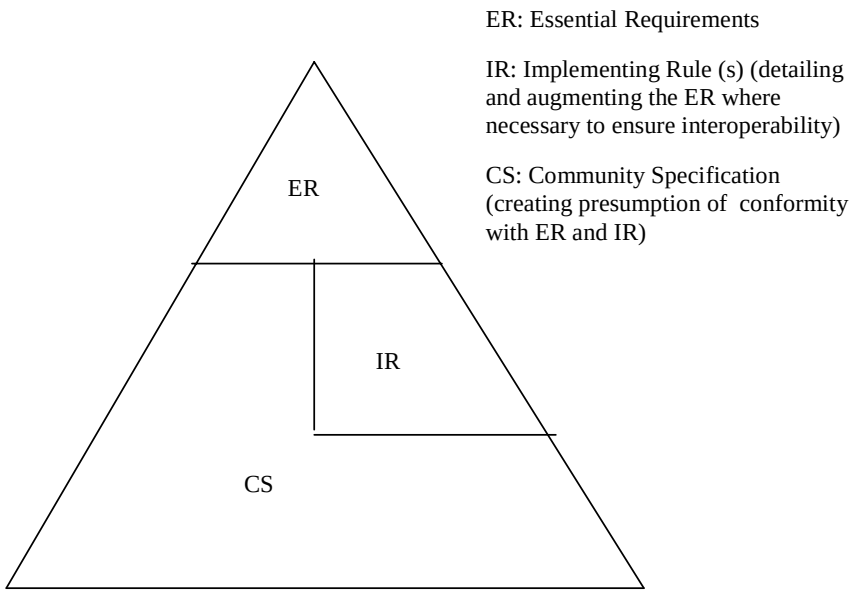
3.1 Explanation of the significant terms, used in the context of the present document

Definition 28 within the SES Framework Regulation defines interoperability as "a set of functional, technical, and operational properties required of the systems and constituents [hardware or software] of the European Air Traffic Management Network and of the procedures for its operation, in order to enable its safe, seamless and efficient operation".

The SES Interoperability Regulation provides the framework for the SES interoperability rules and regulations. The goal is to ensure the coordinated and rapid introduction of agreed validated concepts of operation or any associated technology. The scope of the regulation goes far wider than the traditional technical understanding of interoperability.

Rule setting: The Interoperability Regulation provides the framework for the SES interoperability rules and specifications. Very high level requirements, known as "Essential Requirements", for each of the 8 systems above have been identified in Annex II of the Regulation. These requirements are mandatory and must be taken into account by all ATM stakeholders. The more detailed technical and procedural rules, which build on the essential requirements, basically define WHAT should be done. These are referred to as "Implementing Rules" (IRs). IRs will be developed whenever necessary by EUROCONTROL under mandates from the EC. These rules need to be agreed by the majority of Member States of the EU before becoming mandatory in Community law.

Specification setting: This second level creates the technical specification for the system in question setting out in detail HOW it shall be achieved. These are called "Community Specifications" (CS). According to preamble 11 of the Interoperability Regulation, compliance with published CS, which remains voluntary, creates a presumption of conformity with the Essential Requirements and the relevant IRs for interoperability. This is one of the major features of the "New Approach": CS remain voluntary and provide flexibility for industry as other solutions may be available. CSs are produced by European standardization bodies (CEN, CENELEC, ETSI) in conjunction with EUROCAE and by EUROCONTROL in accordance with Community standardization procedures.



Conformity assessment: The third level relates to the demonstration of compliance to the Essential Requirements and/or Implementing Rules. This is a new mandatory requirement affecting manufacturers of products and air navigation service providers and will result, eventually, in a certification process which declares that the ground ATM system conforms to the interoperability requirements.

Seamless: This term might seem to be self explanatory. But in the context of the SES this attribute is generally used by all stakeholders to characterize the quality of interoperability of the SES ATM system. Therefore, a closer look is deemed justified.
As seen from the airspace users perspective a seamless system plans and conducts flight trajectories from end to end without disruptions due to political boundaries, technical discontinuities or diverging and incompatible operational procedures.

Also from a service provider's point of view the term has several aspects: A seamless ATM system is based on operational principles, regulations and procedures which are in line; system algorithms in direct support of the control processed perform identically, interfacing system elements comprehend and apply a common terminology (e.g. based on a common data dictionary) and are thus able to exchange information and services.

Annex II (Essential Requirements) of the REGULATION (EC) No 552/2004 defines seven generic headings for Essential Requirements, which are given below (extracts):

Seamless operation

Air traffic management systems and their constituents shall be designed, built, maintained and operated using the appropriate and validated procedures, in such a way as to ensure the seamless operation of the EATMN at all times and for all phases of flight. Seamless operation can be expressed, in particular, in terms of information-sharing, including the relevant operational status information, common understanding of information, comparable processing performances and the associated procedures enabling common operational performances agreed for the whole or parts of the EATMN.

Support for new Concepts of Operation

The EATMN, its systems and their constituents shall support, on a coordinated basis, new agreed and validated concepts of operation that improve the quality and effectiveness of air navigation services, in particular in terms of safety and capacity.

The potential of new concepts, such as collaborative decision-making, increasing automation and alternative methods of delegation of separation responsibility, shall be examined taking due account of technological developments and of their safe implementation, following validation.

Safety

In respect of appropriate ground-based systems, or parts thereof, these high levels of safety shall be enhanced by safety nets which shall be subject to agreed common performance characteristics.

A harmonized set of safety requirements for the design, implementation, maintenance and operation of systems and their constituents, both for normal and degraded modes of operation, shall be defined with a view to achieving the agreed safety levels, for all phases of flight and for the entire EATMN.

Systems shall be designed, built, maintained and operated, using the appropriate and validated procedures, in such a way that the tasks assigned to the control staff are compatible with human capabilities, in both the normal and degraded modes of operation, and are consistent with required safety levels.

Systems shall be designed, built, maintained and operated using the appropriate and validated procedures, in such a way as to be free from harmful interference in their normal operational environment.

Civil-Military Co-ordination

The EATMN, its systems and their constituents shall support the progressive implementation of civil/military coordination, to the extent necessary for effective airspace and air traffic flow management, and the safe and efficient use of airspace by all users, through the application of the concept of the flexible use of airspace.

To achieve these objectives, the EATMN, its systems and their constituents shall support the timely sharing of correct and consistent information covering all phases of flight, between civil and military parties.

Environmental Constraints

Systems and operations of the EATMN shall take into account the need to minimize environmental impact in accordance with Community legislation.

Principal governing logical architecture of systems

Systems shall be designed and progressively integrated with the objective of achieving a coherent and increasingly harmonized, evolutionary and validated logical architecture within the EATMN.

Principles governing the construction of systems

Systems shall be designed, built and maintained on the grounds of sound engineering principles, in particular those relating to modularity, enabling the ability to interchange of constituents, high availability, and redundancy and fault tolerance of critical constituents.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ACARS	Aircraft Communications Addressing and Reporting System
ACC	Area Control Centre
ACM	ATC Communication Management
ADEXP	ATS Data Exchange Presentation
AENA	Aeropuertos Españoles y Navegación Aérea
A-ENPRM	Advanced ENPRM
AHLM	ATM/CNS Higher Level Model
AIM	Aeronautical Information Management
AIP	Aeronautical Information Publication
AIS	Aeronautical Information Services
AIXM	Aeronautical Information Exchange Model
AMAN	Arrival Management
AMC	AT Microphone Check
AMHS	ATS Message Handling System
ANSP	Air Navigation Service Provider
ANT	Airspace and Navigation Team
APP	Approach Centre / Control
APV	Approach with Vertical Guidance
ARTAS	ATC Surveillance Tracker and Server
ASA	Aircraft Situation Awareness
ASAS	Airborne Separation Assurance Systems
ASM	Airspace Management
ASMGCS	Advanced Surface Movement Guidance and Control System
ASTERIX	All Purpose Structured Eurocontrol Surveillance Information Exchange
ATC	Air Traffic Control
ATCO	Air Traffic Controller
ATFCM	Air Traffic Flow and Capacity Management
ATFM	Air Traffic Flow Management
ATIS	Automatic Terminal Information Service
ATM	Air Traffic Management
ATMSCG	ATM Standards Co-ordination Group
ATN	Aeronautical Telecommunication Network
ATS	Air Traffic Services
B-RNAV	Basic Area Navigation
CALM	Computer-assisted Approach and Landing Management
CBA	Cost Benefit Analysis
CDM	Collaborate (Cooperative) Decision Making
CEN	Committee for European Normalisation
CENELEC	Committee for European Normalisation in the Electro-technical Field
CFMU	Central Flow Management Unit (EUROCONTROL)
COTR	Co-ordination and Transfer
CPDLC	Controller Pilot Data Link Communications
CS	Community Specification
D-ATIS	Downlink ATIS
DCL	Departure Clearance
DFS	Deutsche Flugsicherung (German Air Traffic Services)
DLIC	Data Link Initial Capability
DMAN	Departure Management
DME	Distance Measuring Equipment
EASA	European Aviation Safety Agency
EATM	European Air Traffic Management (EUROCONTROL)
EATMN	European Air Traffic Management Network
EATMP	Performance Enhancement Programme for European Air Traffic Management (EUROCONTROL)
EBBU	EBBU - Brussels (FIR)
ECAC	European Civil Aviation Conference
ECG	EATMP Communications Gateway
ECIP	European Convergence and Implementation Plan

EDFF	EDFF - Frankfurt (FIR)
EDLL	EDLL - Düsseldorf (FIR)
EDMM	EDMM - Munich (FIR)
EDWW	EDWW - Bremen (FIR)
eFDP	European Flight Data Processing
EFPS	Electronic Flight Progress Strip
EGNOS	European Geostationary Navigation Overlay System
EHAA	EHAA - Amsterdam (FIR)
ENPRM	EUROCONTROL Notice of Proposed Rule Making
ESARR	EUROCONTROL Safety Regulatory Requirement
ESO	European Standardisation Organization
ETFMS	Enhanced Tactical Flow Management System
ETOPS	Extended Twin-engine OPerationS
ETSI	European Telecommunications Standardisation Institute
EU	European Union
EUR - RAN	European Regional Air Navigation Meeting
EUR	European
EUROCAE	EURopean Organization for Civil Aviation Electronics
FAA	Federal Aviation Authority (US)
FDE	OLDI/FDE application.
FDM	Flight Data Management
FDP	Flight Data Processing
FDPS	Flight Data Processing System
FIR	Flight Information Region
FMTP	Flight Message Transfer Protocol
FOM	Flight Object Model
FUA	Flexible Use of Airspace
FUM	Flight Update Message
GBAS	Ground Based Augmentation System
GLONASS	Global Navigation Satellite System (Russian based system)
GNSS	Global Navigation Satellite System
GOBAN	GNSS Roadmap Study
IATA	International Air Transport Association
ICAO	International Civil Aviation Organisation
ICB	Industry Consultation Body (for the Single European Sky)
IDTF	Interoperability Development Task Force
IFPL	Initial Flight Plan
IFPS	Integrated Initial Flight Plan Processing System
IFR	Instrument Flight Rules
II	Interrogator Identifier
ILS	Instrument Landing System
INS/IRS	Inertial Navigation System / Inertial Reference System
IR	Implementing Rule
IR	Integrated Receiver
JAA	Joint Aviation Authorities
LAAS	Local Area Augmentation System
LFEE	LFEE - Reims (FIR)
LFFF	LFFF - Paris (FIR)
MMR	Multi-Mode Receiver
MOPS	Minimum Operational Performance Standards
MSAS	Multi-transport Satellite Augmentation System
NPA	Non Precision Approach
OATA	Overall ATM/CNS Target Architecture
OCD	Operational Concept Document
OLDI	On-Line Data Interchange
OSI	Open Systems Interconnection
P-RNAV	Precision Area Navigation
QA	Quality Assurance
RCP	Required Communications Performance
RF	Radio Frequencies
RNAV	Area Navigation
RNP	Required Navigation Performance

RPL	Repetitive Flight Plan
RVSM	Reduced Vertical Separation Minima
SARPs	Standards and Recommended Practices (ICAO)
SASS-C	SASS-C Development - Maintenance Support and Services
SBAS	Satellite Based Augmentation System
SCRSP	Surveillance and Conflict Resolution Systems Panel
SDPD	Surveillance Data Processing and Distribution
SDPS	Surveillance Data Processing System (ICAO)
SG	Safety Group
SMGCS	Surface Movement Ground Control Systems
SPACE	EUROCONTROL SPACE Programme
SSC	Single Sky Committee
SSR	Secondary Surveillance Radar
SUR	Surveillance (EATMP Domain)
SWAL	SoftWare Assurance Level
SYSCO	System Supported Coordination
TACT	Tactical System
TCP/IP	Transmission Control Protocol / Internet Protocol
TIS-B	Traffic Information Service - Broadcast
TMA	Terminal Manoeuvring Area
TP	Trajectory Prediction
VDL	VHF Digital Link
VFR	Visual Flight Rules
VNAV	Vertical Navigation
VOR	VHF Omni-directional Radio Range (Beacon)
WAAS	Wide Area Augmentation System
WG	Working Group
WV	Wake Vortex

4 Approach and open issues

4.1 Approach

The candidate Community Specifications, as resulting from the assessment of the STF 293 have been organized in 4 groups. The assessment took due account of the maturity of each topic, the existing document on it and its preparatory work, its contribution to the interoperability of the EATMN (in the light of the essential requirements), the timing of relevant implementing rules (existing, under development, proposed) and the necessity of a CS on the topic (e.g. in light of expected phasing out or very limited number of new installations; "what happens, if this CS does not exists?"):

- CSs to be developed from March 2006 onwards (clause 5);

NOTE 1: Advice given in the open meeting on 7/8 September 05 at ETSI HQ has been taken into account.

- CSs to be developed from 2007 onwards (clause 6);
- CSs whose development should start 2008 and later (especially taking into account the outcome of the SESAME definition phase) (clause 7).
- CSs which could be needed from a systematic viewpoint, related to a group of systems for which there usually exists a broad current experience to install and operate such systems based on international standards and national regulatory approval AND where are serious doubts that a development of CSs is economically reasonable e.g. seeing the very limited numbers of new installations expected (sometimes even phase out strategies are under consideration) (clause 8). In terms of ranking and priority group IV technologies are to be seen independent from the other classes and work can be started before, parallel to or after the other groups and is just dependant on agreed demand.

The present document and the proposed grouping of CSs should be reviewed regularly to give consideration to new developments (e.g. availability of implementing Rules for Interoperability, results from R&D and (preparatory) specification activities and from SESAME definition phase).

Furthermore it should be understood that the present document is only concerned with Community Specifications as defined in article 4 of the interoperability Regulation [2]. It does not preclude any organization from developing other specifications or standards.

NOTE 2: The numbering scheme used in clauses 5 to 8 is defined as follows:

- 1st digit: clause number to indicate group/timeframe of Community Specification as given above.
- 2nd digit: indicates type of system (1 General, 2 Airspace Management, 3 Air Traffic Flow management, 4 Air Traffic Services, 5 Communication, 6 Navigation, 7 Surveillance, 8 Aero-nautical Information Services, Use of Meteorological Information).
- 3rd digit: sequence number within each type of system.
- 4th digit: standardized subtitle (1 Description, 2 Status, 3 Timescales, 4 Organizations involved, 5 Existing documentation, 6 Current and future working groups, projects or trials, 7 (used in previous versions of the document; now better information is available in the Work Programme), 8 Additional information); subtitles without content are omitted.

As a consequence the numbers are NOT sequential within each class; proposed CSs with different 1st, but identical 2nd and 3rd digits should be understood as different versions of the same CS.

4.2 Open issues

When proceeding to its work according to its term of reference, the STF 293 identified the following issues for which it did not identified solution and which need to be reported to the Steering Group.

4.2.1 Consistency with other standards

Considering the global operations of aviation, Air Traffic Management calls for global standards. High level standards, describing concepts and functions are developed by ICAO and are translated into regional or national specifications for the design of systems and equipment by organizations such as EUROCAE or RTCA. These organizations co-ordinate their work with the objective to achieve global interoperability.

During its work STF 293 highlighted the want of a process ensuring the consistency between the proposed ESO CSs and the standards as developed by other organizations. The lack of such a process may lead in standards divergence resulting in global non-interoperability which is at the opposite of the principle of the Mandate M/354.

- Therefore the ST 293 stresses the need to identify a mechanism to ensure consistency between future CSs and relevant standards as developed by other aviation organizations.

4.2.2 Time-to deliver

When considering the date (20th October 2005) for declaring conformity of ATM systems, components and procedures with Essential Requirements and Implementing Rules, STF 293 pointed out the unrealism of producing and approving the necessary European Norms in time.

4.3 Recommendation to the Groups tasked to develop Community Specifications

The first task to be undertaken by each standardization group tasked to develop a EATMN CS is the scoping of this CS within the reference model which is applicable to this CS (i.e. Concept of Operation, Open System Architecture Model, or Cross Domain Information Sharing Model - see annexes C and D).

The result of this scoping will be considered by the ATM Standards Co-ordination Group (ATMSCG) to assess consistency and potential overlap with other CS as developed by any ESOs and EUROCONTROL. The ATMSCG will provide back recommendation to the standardization group before starting the development.

5 Group I of candidate Community Specifications (work on Community Specification should start by March 2006)

The following clauses follow the ATM subject headings as listed in Annex I of the Interoperability Regulation [2].

5.1 General

5.1.1 Void

5.1.2 Void

5.1.3 Void

5.1.4 Void

5.1.5 CS on Software Assurance Levels (SWAL)

5.1.5.1 Description

This CS is a transposition of existing EUROCONTROL and EUROCAE documents to recognize these documents under the Interoperability regulation.

Software assurance level is based upon the contribution of software to potential failure conditions as determined by the system safety assessment process. Two EUROCONTROL Safety Regulatory Requirement (ESARR) documents are related to system safety assessment and software assurance level: ESARR 4 [Risk Assessment and Mitigation in ATM] and ESARR 6 [Software in ATM Systems].

ESARR4 specifically focuses on the risk assessment requirements applicable to ATM-related systems, stating that: «an ATM service provider shall ensure that hazard identification as well as risk assessment and mitigation are systematically conducted for any changes to those parts of the ATM system and supporting services within his managerial control».

EUROCONTROL Safety Assessment Methodology) is considered as an acceptable means of compliance and provides guidance on the methodology for the assessment of ATM system safety within EUROCONTROL. This methodology is referenced in ESARR4. The methodology covers the Functional Hazard Assessment (FHA), the Preliminary System Safety Assessment (PSSA) and the System Safety Assessment (SSA). ED87A is another possible candidate as one means of compliance with ESARR4, but should be expanded to address the issues identified in EUROCONTROL-document "Assessment of EUROCAE ED87A as a means of compliance with ESARR4"

ESARR6 requirements apply to Software Safety Assurance System, as part of Safety Management System, and includes requirements for:

- Software Assurance Level (link with ESARR 4);
- Software Verification Assurances;
- Software Configuration Management Assurances.

ESARR6 is a goal-based regulation and states what needs to be done and not how to do it. The "how" is covered by potential means of compliance such as:

- IEC 61508 Functional safety of electrical/electronic/programmable electronic safety-related systems: IEC 61508 addresses the use of these systems in safety functions. To achieve safety certain planning, design, analysis and verification activities must take place. The achievement should be measured throughout the life cycle based on a combination of product, process and competency. IEC 61508 has not bee tailored to CNS/ATM.

- ED 12 B / DO178 B Software considerations in airborne systems and equipment certification: ED 12 B / DO178 B is specific to airborne systems and equipment.

- ED 109 / DO 278 Guidelines for communication, Navigation, Surveillance, and air traffic management (CNS/ATM) systems software integrity assurance: ED 109 / DO 278 provides guidelines for the assurance of software contained in non-airborne CNS/ATM systems. Software assurance levels are defined as a result of the safety assessment process.

ED 109 seems to be the means of compliance which fits better with ESARR6.

5.1.5.2 Status

This CS was neither included in M/354 [1] nor in the document ICB/2/3 [5].

5.1.5.3 Timescales

Delivery of DO-178C/ED-12C [Guidance] is expected at end 2008.

5.1.5.4 Organizations involved

- EUROCONTROL;

- EUROCAE.

5.1.5.5 Existing documentation

ESARR4 - EUROCONTROL Safety Regulatory Requirement (ESARR), ESARR 4, Risk assessment and mitigation in ATM, Edition 1.0, 5 April 2001,

ESARR6 - EUROCONTROL Safety Regulatory Requirement (ESARR), ESARR 6, Software in ATM systems, Edition 1.0, 6 November 2003,

EUROCONTROL Recommendations for ANS Software V1.0 (together with "ANS Software Lifecycle V3.0),

ED78A/DO264 - Guidelines for approval of the provision and use of Air Traffic Services supported by data communications,

SRC Document 20 - Assessment of EUROCAE ED78A as a means of compliance with ESARR4 - Edition 1.0 - 12 December 2002,

ED 109 / DO 278 Guidelines for communication, Navigation, Surveillance, and air traffic management (CNS/ATM) systems software integrity assurance, prepared by EUROCAE and RTCA, accepted March 2002.

5.1.5.6 Current and future working groups, projects or trials

- EUROCAE WG-71 "Software Consideration in Aeronautical Systems".

- EUROCAE WG-64 "ATM Risk Assessment".

5.1.5.7 Void

5.1.5.8 Additional information

WG-71 has to determine, document and report the effects of DO-178C/ED-12C or other modified documents to DO-278/ED-109 and recommend direction to ensure consistency.

The definition of ATM systems in the Interoperability regulation also include on-board systems; if the scope of the proposed CS extends to such systems, such a CS should take into account the paragraphs 1308 of the EASA certification Specifications and the associated Acceptable means of Compliance including ED12B/Do 178B.

5.1.6 Void

5.1.7 CS on Airport Collaborative Decision Making (A-CDM)

5.1.7.1 Description

Airport Collaborative Decision Making (A-CDM) aims to improve airport operations by ensuring that airport partners (e.g. Airports, Airlines, ATC and ATFM) receive relevant and accurate information on time. The common situational awareness allows each partner to harmonize/optimize ground-handling-procedures at airports concerned.

5.1.7.2 Status

EC ICB Recommended Priority: Priority 1; this CS has been included in the Standardization Mandate M/354 [1].

A-CDM is covered by ECIP [6] Objective "AOP05".

The potential benefits of A-CDM are:

- Enhanced decision making capabilities through information sharing.
- Better use of existing resources and increased efficiency in operations.
- Common situational awareness between partners of flight progress in the air and on the ground.
- Predictable air traffic including forthcoming bottlenecks due to timely and accurate shared information.
- Avoidance of disruption or/and recovery there from made easier through timely dissemination of information.

5.1.7.3 Timescales

The following timeline was proposed in the "ATM-CNS Interoperability Roadmap" [4]:

- 2006 to 2008: A CS describing the minimum technical requirements for airport CDM.
- 2008 to 2010: Delivery of the mandatory material for A-CDM implementation and capacity optimization might become realisable, and could specify:
    - The revised structure of ATFM-related information exchanges and their responsibility with regards to airspace users, in terms of support for flight planning mainly.
    - The capacity information exchange structure enabling common air traffic and capacity information management at airports.
    - The adoption of the "flight object" as the standard format for flight information exchange at airports with CDM-applications.

WG69 work on Airport CDM is intended to take place within 24 to 30 months after the acceptance of the source documents (mainly deliverables of the EUROCONTROL Airport CDM Task Force).

5.1.7.4 Organizations involved

- EUROCONTROL Airport CDM Taskforce (EUROCONTROL Airport Throughput Division);
- EUROCAE WG69 "CDM";
- DFS and airport authorities München and Frankfurt.

5.1.7.5 Existing documentation

- EUROCAE:
  - WG-69: Minimum functionalities for A-CDM;
  - WG-69: Specification of Technical Interface.
- EUROCONTROL (APT):
  - 1. Airport CDM Implementation Manual;
  - 2. Airport CDM Application Guide;
  - 3. Airport CDM Functional Requirements Document;
  - 4. Airport CDM Operational Concept Document.
- DFS (GB Tower):
  - Airport CDM Verfahrensbeschreibung München (under development).

5.1.7.6 Current and future working groups, projects or trials

The EUROCAE WG-69 Collaborative Decision Making (CDM) aim is to define "the different sub-systems needing to be interconnected to implement the Airport CDM concept (e.g. Airport Management systems, Airline Operation centre, SMGCS, ATS systems, CFMU)" and their minimum required functionalities.

WG69 is tasked to:

- Define the specific needs as well as the scope and the level of details of an interoperability standard for future Airport Operations information exchange for incorporation into a standard or standards,
- Consider the overall CDM requirements within the context of systems architecture and the architectural implications in formulating the standards;
- Identify potential extension of existing standards;
- Resolve any possible discrepancy between different candidate solution by outlining a convergence plan;
- Make recommendations on the feasibility of developing future interoperability standards;
- Put in place a validation process for the standards.
- Produce guidelines for users, service providers and for suppliers (if appropriate) while standards are being finalized.

Two documents are currently in preparation:

- "Specification of minimum functionalities for the implementation of the Airport CDM concept";
- "Specification of technical interfaces between the interconnected sub-systems".

Further, CDM forms a central part of the ATM 2000+ Strategy. The Strategy foresees:

- CDM for ATFM (network capacity);

NOTE 1: Regional CDM is achieved when a network of CDM airports are linked with the Central Flow Management Unit (CFMU) through the exchange of DPI (Departure Planning Information) and FUM (Flight Update Message) (EUROCONTROL website [12]).

- CDM at airports (airport throughput).

NOTE 2: At a CDM airport all partners share the same information and get the Target Off Block Time (TOBT) of an aircraft provided by the aircraft operator; accurate estimates of arrival times are provided to the CDM airport by the CFMU (EUROCONTROL website [12]).

Within the next five years the Strategy foresees the "first applications of Collaborative Decision Making (CDM), principally for ATFM and at airports".

EUROCONTROL has an ongoing A-CDM project which includes trial/implementation projects at a number of European airports (e.g. Barcelona, Brussels, Heathrow and Stockholm Arlanda). Two new ATFM messages have been developed by EUROCONTROL to facilitate the "Collaborative Management of Flight Updates"; the Flight Update Message (FUM) and the Departure Planning Information (DPI) message.

DFS (German Air Navigation Services) has an ongoing project to implement CDM at Munich airport.

5.1.7.7 Void

5.1.7.8 Additional information

Local development: To date information systems have been or are being developed and built independently at individual airports (for example, ranging from an internet-based system allowing interfaces with legacy systems to considering CDM system adaptations as part of wider airport information system upgrades (e.g. integration with A-SMGCS)).

Data confidentiality and security: Information is to be shared amongst a number of partners (in some cases potentially using web-based systems). Certain partners are reluctant to share information which they consider "commercially sensitive" or as "secure information", therefore restricting information sharing.

NOTE 1: CDM and System Wide Information Management raise a general concern of malicious or accidental compromise to the integrity and availability of ATC data. An IR may be required to cover information security requirements for ATC systems.

As far as EUROCAE WG69 is concerned, as a minimum, WG69 co-operates with existing relevant activities, namely EUROCONTROL Airport CDM Task Force and the Future Systems Architecture (OATA) project, EUROCAE WG59 (Flight Data Processing) and WG61 (ATC Open Architecture).

NOTE 2: There exist quite well developed programmes for Arrival and Departure Planning aids. These are candidates for early community standardization but are largely limited in scope to the ATC domain. There are also differences in view as to what should be the precise scope of AMAN/DMAN.

Collaborative Decision Making addresses the issues of providing information to the various actors at an airport so as to optimize airport operations. There is existing activity to standardize in this area and the topic is expressly mentioned in the mandate.

The Central Flow Management Unit efficiently utilizes the European airspace and its interfaces are identified as candidates for community standardization

All these entities are also integral parts of the concepts of System Wide Information Management which is also identified as a candidate for community standardization. While SWIM is in most respects not mature, it has been identified as a subject to be addressed immediately for two reasons:

- First by providing a common terminology with which to discuss the other areas,

- Secondly because it is likely to be one of the candidates with the longest time to implement.

5.1.7.9 Descriptive text proposed to be included in Commission's mandate for this CS

The work of the European Airport CDM Project, which is part of the European Airport Operation Programme, shall be taken into account. Already developed guideline material, i.e. the "Airport CDM Implementation Manual", "Airport CDM Functional Requirement Document" and the "Airport CDM Operational Concept Document" as well as its further developments shall be the basis for CS/IR on Airport CDM.

5.2 Airspace Management

Airspace Management is generally regulated by the SES Regulation on the Organization and the Use of the European Airspace ("airspace Regulation") and its associated implementing rules. On the other hand systems and procedures for airspace management are systems regulated by the SES interoperability Regulation. Only the latter knows Community Specifications as voluntary means. There is a the need to clarify the relation between CSs on Airspace Management and both regulations (airspace and interoperability) as this link is not totally obvious.

5.2.1 CSs on Flexible use of Airspace

5.2.1.1 Description

Flexible use of airspace is an airspace management concept which determines that airspace should not be designated as either pure civil or military airspace, but rather considered as one continuum in which all user requirements have to be accommodated to the maximum extent possible. The Single European Sky committee is currently discussing the draft regulation for the Flexible use of Airspace. Pending their decision on the subject, the need for development of community specifications will then be identified and adequately scoped.

5.2.1.2 Status

EC ICB Recommended Priority: Priority 1; this CS has been included in M/354 [1] as well as in the document ICB/2/3 [5].

5.2.1.3 Void

5.2.1.4 Organizations involved

EUROCONTROL (ANT; ASM-SG, IAS-TF/B).

5.2.1.5 Existing documentation

- EUROCONTROL Report on Organizational Structures and Procedures Required for the Application of the Concept of the Flexible Use of Airspace *adopted by the ECAC Transport Ministers at their Fourth meeting on the Air Traffic System in Europe (MATSE/4) (*Doc.94.70.08 March 1994).
- EUROCONTROL Functional Specification for System Support to Airspace Data Distribution and Civil/Military Co-ordination [*DPS.ET1.ST10.2000-FS-01-00*] Edition 1.0 15/05/96.
- EUROCONTROL Guidance Document for the Implementation of the Concept of the Flexible Use of Airspace [*ASM.ET1.ST08.5000-GUI-02-00*] Edition 2.0 18/08/03.
- EUROCONTROL Manual for Airspace Planning - Common Guidelines - Vol. 2 [*ASM.ET1.ST03.4000-EAPM-02-02*] Edition 2.0 22/10/03.
- EUROCONTROL Handbook for Airspace Management [*ASM.ET1.ST08.5000-HBK-02-00*] Edition 2.0 22/10/03.
- Draft Concept of Operations for the Enhancement of ASM/ATFM/ATC Processes to ensure seamless FUA Operations from strategic to tactical use - FUA 2008 Scenario Edition 0.A 12/05/04.

- Draft Operational Requirements Document for the Enhancement of ASM/ATFM/ ATC Processes to ensure seamless FUA Operations from strategic to tactical use FUA 2008 Scenario Edition 0.3 March 04.
- Enhanced Flexible Use of Airspace Process Safety Policy - Proposed Issue Edition 1.0 22/03/04.
- Enhanced Flexible Use of Airspace Process Safety Plan - Proposed Issue Edition 1.0 22/03/04.
- Draft Outline Safety Case for the Enhanced Real-time Civil/Military Coordination Edition 0.2 08/06/04.

5.2.1.6 Current and future working groups, projects or trials

EUROCONTROL project DMEAN.

5.2.2 CSs on Airspace Design

5.2.2.1 Description

Draft regulations on Airspace Design have been submitted to the European Union and are pending discussion at the Single European Sky committee. Any considerations on the scope of community specifications on the subject depend on the final decision of the European Union on that regulation.

5.2.2.2 Status

EC ICB Recommended Priority: Priority 1; this CS has been included in M/354 [1] as well as in the document ICB/2/3 [5].

5.2.2.3 Void

5.2.2.4 Organizations involved

- ICAO OCP and OPSP;
- EUROCONTROL (ANT; NASG; RNDSG; IAS-TF/A);
- MCG (5GSO-Subgroup).

5.2.2.5 Existing documentation

- ICAO Annex 11, ICAO Annex 2, ICAO Annex 4;
- ICAO DOC 8168-OPS/611 VOL II;
- ICAO DOC 9368 AN/911;
- ICAO DOC 4444 ATM/501;
- ICAO EUR DOC 001 RNAV/5;
- EUROCONTROL Airspace Planning Manual;
- EUROCONTROL Advanced Airspace Scheme;
- ECAC Airspace Management Handbook;
- IR on Airspace Design.

5.2.2.6 Current and future working groups, projects or trials

EUROCONTROL project DMEAN.

5.3 Air Traffic Flow Management

The aim of the IFPL implementing rule is to give a formal status to a set of key elements of a flight plan, in order to ensure the flight plan consistency between operators, IFPS and ATS units in the pre-flight phase.

The primary objective of the Initial Flight Plan implementing rule is to ensure that the key elements of the flight plan are kept consistent between operators, IFPS and ATS units in the pre-flight phase. This is be achieved by defining the set of key elements and the associated roles and responsibilities of the above mentioned parties with regard the submission, distribution and reception and all subsequent modifications of key flight plan elements.

As the implementing rule addresses only the procedures associated with its target, there is no particular assumption about the logical architecture or about the technical solution used to implement the information exchanges associated to flight plan submission, distribution and reception or modification of key elements of the flight plan processes between the above mentioned ATM actors, in the pre-flight phase.

The scope of the IFPL implementing rule is limited to the pre-flight phase, defined as the period from the first submission of a flight plan until the first delivery of ATC clearance within the airspace covered by the IFPL implementing rule. Once the first delivery of ATC clearance within the airspace covered by the IFPL implementing rule has taken place, responsibility for the contents and update of the flight plan moves from the parties involved in the initial flight planning process to those directly responsible for the safe conduct of the flight, i.e. the pilot and the Air Traffic Controller.

However, a provision addressing the missing flight plans of the flights entering the area of application of the rule has been included. In order to ensure that a minimum set of key elements on all flights is available to all affected parties as early as possible the rule formalizes the process of notification of data on such flights to IFPS. IFPS will in turn distribute resultant flight plans to all affected ATS units.

The proposed vision for the IFPL implementing rule is to accept the existence of differences and the specific needs of individual actors, whilst ensuring that a sufficiently common basis for flight details exists in order to enable each actor to perform their specific duty in an effective and efficient manner.

5.3.1 CS on updated IFPS Users manual

5.3.1.1 Description

The detailed procedures supporting the Regulation will provide all the necessary information to enable the parties within the scope of the rule to submit, modify, accept and distribute the flight plans in the pre-flight phase according with the requirements and provisions of the Regulation. These detailed procedures will be part of an updated IFPS Users Manual developed by EUROCONTROL.

The document will provide all users of the Integrated Initial Flight Plan Processing System with an easy to access reference manual. The manual will be intended to contain all the necessary procedures and information in order for users to be able to construct, transmit or when necessary to correct, flight plan and associated update messages. Procedures for the distribution of such messages after processing by IFPS will be also described.

The document will contain a functional description of the IFPS systems and associated procedures and the following information will be provided:

- General description of functionality (e.g. RVSM flight planning requirements, CHG message rules, RPL submissions, acceptance of flight plans).
- Detailed requirements.
- Formats to be respected.
- Description of system processing.
- Error messages that may be raised during IFPS processing.
- Procedures to be applied y IFPS staff and message originators in correcting erroneous messages and fields.

The document will also describe the procedures to be followed in case of problem and anomaly reporting.

5.3.1.2 Status

This CS was neither included in M/354 [1] nor in the document ICB/2/3 [5].

5.3.1.3 Timescales

Time horizon before SESAME.

5.3.1.4 Organizations involved

EUROCONTROL.

5.3.1.5 Existing documentation

EUROCONTROL IFPS Users Manual.

5.3.1.6 Current and future working groups, projects or trials

EUROCONTROL CFMU.

5.3.2 Void

5.3.3 Void

5.3.4 Void

5.3.5 CS on Data Exchange Formats

5.3.5.1 Description

The purpose is to develop a CS of the technical details of the ATS Data Exchange Presentation (ADEXP), i.e. the transposition of EUROCONTROL documents to recognize these documents under the Interoperability regulation. The issue concerning the use (mandatory or not) of ADEXP will be addressed during or after the development of the CS.

The EUROCONTROL Convergence and Implementation Plan (ECIP) [6] contains an agreed objective for the 2006 - 2010 cycle, to implement collaborative flight planning.

The aims are to improve the collaboration between the CFMU, ANS providers, airports and airspace users in flight plan filing, in particular to assist airspace users in filing their flight plans and in re-routings according to the airspace availability and AFTM situation. Also to improve flight plan distribution to increase consistency of flight plan data amongst all parties involved (CFMU IFPS/ETFMS, ANSPs, etc.).

In due course this becomes a key enabler to the broader objectives of Flexible Use of Airspace.

The objective of this CS is to adopt ADEXP as a formal European Standard.

5.3.5.2 Status

EC ICB Recommended Priority: Priority 1.

This topic was included in the Standardization Mandate M/354 [1] and ICB/2/3. The CS was initially proposed in the ATM-CNS Interoperability Roadmap Study [4].

The ATS Data Exchange Presentation (ADEXP) is a format for message exchange in the following areas:

- Flight Planning;
- Air Traffic Flow Management (ATFM);
- Air Traffic Control Co-ordination;
- Airspace Management;
- Civil / Military Co-ordination.

ADEXP is a format, not a protocol. No restrictions are imposed on the transmission media or protocols to be used, other than that of the character set.

ADEXP exists as a EUROCONTROL Standard and was adopted by COMMISSION REGULATION (EC) No 2082/2000 which will be withdrawn by 20th October 2005.

The ADEXP standard is based on ideas from French CAUTRA system which were used to support CFMU development. It goes significantly beyond the ICAO 4444 standard for flight data interchange. ADEXP has a high level of support.

It seems straightforward that support could continue to be given to the collaborative flight planning action and that appropriate support could also be provided by means of a CS for ADEXP.

The expected benefits listed in the ECIP [6] are as follows:

- Safety: Prevention of overloads;
- Capacity: Better use of the available network capacity;
- Cost-effectiveness: Reduction of costs induced by delays.

These benefits are not quantified. Nor are the costs, but we do not believe that the costs of aligning with an existing well-defined standard will be large.

5.3.5.3 Timescales

The main timescale involved in the collaborative flight planning action should be complete in 2006.

5.3.5.4 Void

5.3.5.5 Existing documentation

EUROCONTROL Standard ADEXP, Vsn 2.1, December 2001 (update activities ongoing).

5.3.5.6 Void

5.3.5.7 Void

5.3.5.8 Additional information

Technical Issues

The Action Plan for Collaborative Flight Planning using ADEXP involves a number of actions by ANSPs to use IFPS (and hence the ADEXP format) to provide more data to the CFMU.

Descriptive text proposed to be included in Commission's mandate for this CS

Exchange of Flight and Airspace Data between the main actors in the EATMN (ANS Providers, CFMU, Airports and Airspace Users) is one key enabler for efficient and timely execution of air traffic. A widely and flexibly usable and commonly accepted format for this kind of data is necessary in order to ensure automated data distribution and exchange.

The purpose is to develop a CS on an ATS message exchange format adopting the existing ATS Data Exchange Presentation (ADEXP). ADEXP is a mature EUROCONTROL Standard which has been implemented by various stakeholders.

5.4 Air Traffic Services (ATS)

IR on Co-ordination and Transfer (COTR)

The purpose of the IR aims at addressing the interoperability for the exchange of system information between Air Traffic Services Units in the process of coordination and transfer of flights.

A draft Implementing Rule for Co-ordination and Transfer has been provided by EUROCONTROL.

To support this IR, means of compliance in the form of technical standards (CS) are needed. In this sense, it is proposed to define a CS on On-Line Data Interchange (OLDI) based on the existing OLDI standard.

5.4.1 Void

5.4.2 CS on On-Line Data Interchange (OLDI)

5.4.2.1 Description

This item concerns the development of a CS based on OLDI standard (draft version 3.0) to ensure that Air Traffic Control Units will be interoperable for Co-ordination and Transfer purposes. This CS is primarily a transposition of existing EUROCONTROL documents to recognize these documents under the Interoperability regulation.

A mandate has been given to EUROCONTROL by the European Commission for the development of a draft Implementing Rule for Coordination and Transfer (COTR) under the Single European Sky (SES) Regulations. This mandate is one of several issued under the Interoperability Regulations, related mandates being for the Initial Flight Plan (IFPL) and Flight Message Transport Protocol (FMTP). The draft IR for Coordination and Transfer has been published by EUROCONTROL and has been subject to a review and workshop process. A draft summary of responses was published by EUROCONTROL on 20 January 2005.

OLDI is currently a EUROCONTROL standard which has been widely adopted by ECAC states already. In many cases, OLDI has been operational in various versions for more than 10 years.

OLDI is a means of compliance to the Implementing Rule for Coordination and Transfer and the existing standard needs to be defined as a Community Specification.

5.4.2.2 Status

EC ICB Recommended Priority: Priority 1.

This CS is not included in the Mandate M/354 [1]. The need for this CS has been identified during the development of the Implementing Rules for COTR and FMTP.

OLDI is currently implemented widely in the ECAC region. It facilitates automatic communication between FDP systems in adjacent Area Control Centres, in particular when flights are being handed over between controllers in the relevant Flight Information Regions. The use of OLDI therefore provides an existing capacity benefit. The specification of a standard data interface between separate ATC systems also enables system providers to develop once-only solutions to operational requirements. There is also therefore a cost-effectiveness benefit arising from the use of the OLDI standard.

In addition to the use of the OLDI standard for data communication between Member States in the ECAC area, it is known that OLDI is also used by choice by service providers to manage the communication between units which are internal to their own systems, thus extending the capacity and cost effectiveness benefits. OLDI is also known to be widely used elsewhere in the world.

There is no particular mention of the OLDI standard in the current version of the European Convergence and Implementation Plan (2005 - 2009), except for a technical communications issue of the need for a phased transition of the data communications protocol from X25 to an internet based TCP/IP protocol.

Under the guidance of an Interoperability Development Task Force (IDTF) organized by EUROCONTROL, the OLDI standard has recently been up-issued to version 3 (not yet formally issued); this new version offers improved capabilities for Civil to Military coordination and is also now able to support the SYSCO Level 1 Concept, thus introducing new capacity benefits.

5.4.2.3 Timescales

The current version of the European Convergence and Implementation Plan 2005-2009 aims at implementing ground-ground data exchange and automated co-ordination procedures in the ECAC States. It addresses the further implementation of several OLDI messages.

Implementation of the new standard at individual centres and hook-up with adjacent centres by means eventually of a series of bilateral actions will involve both systems upgrade and operational readiness actions (e.g. procedures and raining as required). It is likely that centre systems would be upgraded on a controlled basis (annual upgrades are normal). In general the facility can be tested, verified and deployed, with activation under operational control at some later date.

The OLDI Standard in its version 3 should be converted into a CS with high priority, since it will be needed as an officially approved Means of compliance for the IR on Co-ordination and Transfer.

NOTE: In a medium, long-term perspective, it is envisaged that the OLDI CS will be replaced by a new CS for Flight Data Interoperability. This CS will not be limited to the coordination and transfer process and will address more global interoperability for future operational improvements.

The CS for Flight Data Interoperability will address timely sharing of up to date, correct and consistent information between Flight Data Processing Systems and provision of flight data to all ATM actors concerned.

5.4.2.4 Organizations involved

EUROCONTROL.

5.4.2.5 Existing documentation

- EUROCONTROL Standard OLDI, VSn. 2.3, December 2001 (update to Vsn 3.0 completed on working level);
- EUROCONTROL: Co-ordination and Transfer ICD.

5.4.2.6 Current and future working groups, projects or trials

EUROCONTROL Operational Requirements for ATS Systems Task Force (ORAS-TF).

5.4.2.7 Void

5.4.2.8 Additional information

Technical Issues

To date, the implementation of individual instances of OLDI data communication has been arranged bilaterally between adjacent service providers and Area Control Centres. There is nothing to require or guarantee a consistent level of application of the standard from a top-down operational viewpoint. Thus, for example, service providers may choose bilaterally to implement a sub-set only of the OLDI messaging capability.

The OLDI standard is a peer-to-peer data communications mechanism. Without very substantial change or replacement, it does not fit with the System Wide Information Management concepts envisaged by the European Commissions Interoperability Regulations and currently envisaged in forward plans for the ATM Roadmap in Europe and related plans for systems architecture. In due course, therefore, the OLDI standard and the various implementations of it in Europe will become part of the legacy system.

Descriptive text proposed to be included in Commission's mandate for this CS

The processes of Co-ordination and Transfer of flights between ATS Units have been described and will be regulated by an Implementing Rule within the SES framework. Currently most ANS providers in Europe use the OLDI (Online-Data Interchange) mechanism to provide for an automated exchange of information supporting these processes of co-ordination and transfer. OLDI is a EUROCONTROL Standard, which defines message exchanges between ATS units. The purpose is to produce a CS on Online Data Interchange adopting this already widely used standard and to identify this CS as means of compliance for the IR on co-ordination and transfer.

5.4.3 to 5.4.15 Void

5.4.16 CS on Interoperability of Flight Data Processing (ATC - ATC)

5.4.16.1 Description

This item concerns the development of a Flight Object Model (FOM) and its application to ATC-to-ATC interoperability for Flight Data Processing. This includes the definition of a standard flight data model and the specification of a Flight Data Interface based thereon to be implemented between ATC units, which encompass application as well as middleware layer.

This CS will be developed from EUROCONTROL and EUROCAE documents and from results obtained by the ICOG group representing current FDP implementation projects.

As noted in the ATM-CNS Interoperability Roadmap Study [4] Flight Data Processing remains a core interoperability issue, the regulation of which needs to be rapidly addressed. Given the complexity of the task and the difficulty of defining the "target" European FDPS network architecture, in particular regarding the level of commonality and centralization, the ATM-CNS Interoperability Roadmap Study [4] proposes that IR/CS development might:

- be focused on flight data needs between FD consumers at short, long and medium term;
- define their nature and associated performance depending on their use and achievability for the SES;
- define the necessary consistency assurance processes to be developed either centrally or locally.

This CS focuses specifically on the needs of ATC-to-ATC interoperability of Flight Data Processing and the definition of the corresponding interface.

In a next step this should be extended to general Flight Data Interoperability for all Flight Data consumers.

5.4.16.2 Status

EC ICB Recommended Priority: Priority 1.

This CS has been included in the Standardization Mandate M/354 [1]. It has also been identified in point 7 of the "Draft Justification Material - Draft Implementing Rule for Co-ordination and Transfer".

This CS has been subject of substantial work by the EUROCONTROL FDM SG and is being addressed by EUROCAE WG 59 and the FOIPS study and by the ICOG interoperability study. Detailed results are expected in 2006.

5.4.16.3 Timescales

The timescale expected for the development of a standard Flight Object Model through the mechanism EUROCAE WG 59 is expected to be 2006. Results from the ICOG FDP Interoperability Study are expected in 2006. Based on the availability of preparatory material it may be necessary that this CS is progressed in two steps:

- Flight Data Object Model;
- Flight Data Processing and Interoperability.

5.4.16.4 Organizations involved

- EUROCONTROL;
- EUROCAE;
- COFLIGHT and iTEC-eFDP projects.

5.4.16.5 Existing documentation

Interoperability Requirements Documents for Flight Data Processing.

FOIPS Study (Draft).

ICOG FDP Interoperability Study (Draft).

5.4.16.6 Current and future working groups, projects or trials

- EUROCAE WG59;
- EUROCONTROL (FOIPS) mid 2006;
- ICOG (COFLIGHT and iTEC-eFDP projects).

5.4.16.7 Void

5.4.16.8 Additional information

It is assumed that the development of the Flight Object Model (FOM) will be an initial deliverable from the EUROCAE WG 59, and that traceability needs to be clearly established and maintained between:

- User requirements, as represented by interoperability requirements documents.
- The technical definition of a standard interface for implementation.

It is assumed that the interface specification would be defined and agreed between the Industry suppliers to the iTEC-eFDP and COFLIGHT projects. Also the need for a standardized middleware layer will be addressed.

The CS will therefore serve as a means to achieve the objectives of data interchange and advanced interoperability between ATC systems.

Conclusion

Work has already been initiated in this area by EUROCONTROL, EUROCAE WG 59 and the FDP implementation projects COFLIGHT and iTEC-eFDP. This particular CS on a proposal for a Flight Object model and an interoperability interface represents only a part of the overall standardization work required for Flight Data Processing.

Descriptive text proposed to be included in Commission's mandate for this CS

Flight Data Processing and the sharing of Flight Data are of key importance for ATM. In order to provide a comprehensive and consistent view of relevant flight data to all involved stakeholders a Flight Object Model should be developed and implemented. The purpose of this CS is to define a data model for flight data and to specify a corresponding interface between ATC units (including middleware layer) in order to share consistent and up-to-date flight data as derived from advanced interoperability requirements.

Work done in the framework of EUROCAE WG 59 and the FOIPS study, as well as results obtained by ICOG (iTEC and Coflight FDPS implementation projects) should form the basis for this CS.

5.4.17 CS on Advanced Surface Movement Guidance and Control Systems (A-SMGCS; Level 1 and 2)

5.4.17.1 Description

The purpose of this item is to develop a community specification covering Advanced Surface Movement Guidance and Control Systems (A-SMGCS). This CS is primarily a transposition of EUROCONTROL and EUROCAE documents to recognize these documents under the Interoperability regulation.

CSs for AMAN and DMAN and multilateration are described in other clauses of the present document.

Advanced Surface Movement Guidance and Control System, A-SMGCS, will in its initial stages, i.e. the so-called Level 1 and Level 2 implementations with enhanced surveillance and control functionalities, provide a display to controllers with accurate position information of all targets and positive identification of all suitably equipped aircraft and vehicles on the entire manoeuvring area. The introduction of a secure and high integrity labelling system will greatly increase the situational awareness of controllers, which will not only increase safety but also improve efficiency and airport throughput.

In conditions of restricted or reduced visibility the benefits of the system will become more apparent, allowing the controller to be completely sure of the position of identified aircraft and vehicles.

In addition the system will enhance safety, alerting the controller by detecting potential conflicts between arriving and departing aircraft and other targets on the runways.

Harmonized procedures are being developed to ensure that as A-SMGCS becomes widespread, pilots, vehicle drivers and controllers will be working to the same rules and standards throughout the European region.

5.4.17.2 Status

EC ICB Recommended Priority: Priority 2.

In the ICB/2/3, this CS was combined with the definition of a standard for arrival management (AMAN) and departure management (DMAN).

This CS is part of Mandate M/354 [1].

Currently basic SMGCS are already in place in most significant airports across Europe. The need for further improvements has led to the development and initial implementation of A-SMGCS.

The components needed to implement an A-SMGCS Level 1 or Level 2 are already commercially available based on SMR and multilateration technique and are becoming operational at different levels of maturity on larger airports across Europe.

5.4.17.3 Timescales

In general, the implementation of A-SMGCS is usually divided into incremental levels. EUROCONTROL foresees implementation of the first level, related to improved surveillance capabilities, on individual aerodromes form the year 2000 onwards. For the next level, covering runway incursion alerting, is foreseen for implementation from 2006 onwards. Further levels covering guidance and route planning are expected from 2006 and 2009 onwards respectively. Therefore the development of a CS should take into account the maturity of the different A-SMGCS- Levels:

- CS on A-SMGCS Level 1 and Level 2: before SESAME;
- CS on A-SMGCS Level 3 and higher: parallel to SESAME, or following SESAME.

5.4.17.4 Organizations involved

- EUROCONTROL A-SMGCS project as part of the Airport Operations Programme;
- EUROCAE WG 41 "SMCGS";
- EUROCAE WG 51 "ADS Broadcast".

5.4.17.5 Existing documentation

Existing standards:

- ICAO (recommendation, not a Standard in the sense of ICAO)
  - ICAO Doc 9830: Manual of Advanced Surface movements and Guidance Control Systems (A-SMGCS); published as global manual in 2003.
- EUROCAE
  - ED-116 Electronic Copy - MOPS for Surface Movement Radar Sensor Systems for Use in A-SMGCS. Issued in January 2004.
  - ED-117 Electronic Copy - MOPS for Mode S Multilateration systems for use in A-SMGCS. Issued in November 2003.
  - ED-87A MASPS for A-SMGCS, issued January 2001.

Documents Already Produced:

- ICAO Annex 14;;
- ICAO Annex 10;
- ICAO Doc 9476: Manual of Surface Movements and Guidance Control Systems (SMGCS);
- ICAO Doc 9830: Manual of Advanced Surface movements and Guidance Control Systems (A-SMGCS);
- ICAO EUR Manual on A-SMGCS;
- EUROCAE ED-87A: MASPS for A-SMGCS 12/2001;
- EUROCAE ED-117 MOPS for Mode S Multilateration Systems for Use in A-SMGCS 11/2003;
- EUROCAE ED-116 MOPS for Surface Movement RADAR Sensor Systems for Use in A-SMGCS, 01/2004;
- EUROCONTROL: European Action Plan for the Prevention of Runway Incursions;
- EUROCONTROL: A-SMGCS Concept Justification and User Requirements;
- WG51: ADS-B MASPS for ground surveillance applications.

5.4.17.6 Current and future working groups, projects or trials

- EU-funded programme EMMA (operational validation);
- EUROCAE WG 41 "SMCGS";
- EUROCAE WG 51 "ADS Broadcast";
- EUROCONTROL APR A-SMGCS Project (Concept and requirements development. Operational validation).

5.4.17.7 Void

5.4.17.8 Additional information

Technical Issues

A-SMGCS is a key enabler both for the improvement of manoeuvring area safety (in particular runways) and increased airport capacity, including the maintainability of high capacity in periods of reduced visibility. Significant research has been undertaken by the EC, EUROCONTROL and Industry, leading to a number of ICAO and EUROCAE specifications (listed above).

A-SMGCS systems requirements are specific to a particular airport configuration and traffic level and composition. Standards must remain flexible enough to accommodate all types of aerodromes; however, they should also be common enough for aircraft operators to be able to adhere to the local situation at different aerodromes without additional frustration or confusion.

Different technologies are available to achieve the objective of uninterrupted identification of aircraft and vehicles on the manoeuvring area. This may put different requirements on the local procedures and on avionics. The identification of aircraft should be based on the mandatory aircraft equipment; the identification of vehicles can be based on individual local solutions.

Systems aimed at alerting air traffic controllers about potential conflicts on runways and/or taxiways have been the subject of discussion and development for a long time, with satisfactory results still being unclear.

Conclusion

A-SMGCS is generally agreed as the key enabler for maintainable high airport capacity with no infringement of the target level of safety, and implementation is already ongoing at several of the largest airports in Europe.

A-SMGCS development and implementation is very much dependent on local issues. The effect this might have on aircraft operators operating at different airports requires attention.

The prime users of A-SMGCS are both the ANSP providing the local aerodrome control services and the local aerodrome operator generally providing not only apron control but also being responsible for e. g. the runway and taxiway lighting systems (which also form part of an A-SMGCS). Therefore A-SMGCS are usually commonly used by both parties, leading also to a sharing of benefits and costs. It is therefore recommended that close liaison with airport operators is being established and maintained throughout the development of this CS.

Basic material for at least Level 1 and Level 2 A-SMGCS are already available through ICAO, EUROCAE, EUROCONTROL and EC RTD Framework Programmes, which should be sufficiently mature for the development of a CS.

5.5 Communication

No proposed CS for this time frame.

5.6 Navigation

No proposed CS for this time frame.

5.7 Surveillance

Currently in this area, there is one proposed IR on surveillance, the purpose of which would be to define a single European process for allocating Mode S Interrogator Codes. This will address the need for the co-ordination of Mode S Interrogator Codes on a European basis in support of the deployment of Mode S radars.

The IR will address:

- Compliance with the ICAO EUR Air Navigation Plan as amended to reflect the EUROCONTROL framework proposal for Mode S Interrogator Code Allocation in the ICAO EUR Region.
- Conformity assessment requirements for the allocation process.
- Provisions specifying implementation conditions.

Once the regulatory approach for developing the IR has been defined and agreed, it may be possible to determine the relationship between mandatory provisions and any supporting CS and other material that is felt necessary.

Furthermore the drafting of an IR on surveillance performance is expected to be mandated to EUROCONTROL in the second half 2005. In order to avoid duplication of work, the drafting of CSs in the field of surveillance should only start, when the regulatory approach of this IR is sufficiently stable.

No proposed CS for this time frame.

5.8 Aeronautical Information Services (AIS)

No proposed CS for this time frame.

5.9 Use of Meteorological Information

No proposed CS for this time frame.

6 Group II of candidate Community Specifications (work on Community Specification to be started in 2007)

The following clauses follow the ATM subject headings as listed in Annex I of the Interoperability Regulation [2].

6.1 General

6.1.1 to 6.1.5 Void

6.1.6 CS on Cross Domain Information Sharing

6.1.6.1 Description

Information sharing is based on the paradigm that applications do not need to care for the required data on which to perform calculations, because it is there in sufficient quality when needed. Information sharing, as opposed to data exchange, where a system has to have peer-to-peer communications paths with all systems it needs to exchange the data with, requires having only one (redundant) access to the infrastructure hosting the information.

All applications use standardized methods to subscribe to, create, store, update, retrieve, forward, delete, and archive the data fields in the information model regardless of the domain or technology. The method cares for availability, security, consistency, credibility, synchronism, accessibility, notification about and recovery of the information entered to those who have subscribed.

Interoperability is a native result of information sharing. If all domains use standard methods to access and provide information to be shared between stakeholder systems, interoperability does not need extra effort providing that the operational concepts and procedures leading to the definition of the information model are harmonized.

Such mechanism, which is widely known as System Wide Information Management, can be standardized at the engineering level with little impact on the operational use. However the operational concepts and requirements will put demands on the method in terms of performance and non-functional requirements.

First priority for seamlessness is sharing of information. Secondly it is harmonization of procedures and commonality of definitions between stakeholders providing information for sharing. The information sharing concept is not limited to Gate-to-Gate, it may be applied for airside as well as landside operation providing the missing link between the two worlds.

Information sharing across domains and at global level is essential to Aircraft operators, who are operating globally. All other stakeholders are only working at regional, national or even local level. It is the global operation of aircraft which demands standards most in order to share information about a flight with all stakeholders involved across the globe eventually.

Standardization in this context, therefore, must be based on the concept to think global and act local.

Sharing of information enables and requires checking for consistency and resolution for inconsistencies. Consistent, current information at the right time makes operation safe, seamless and efficient. However, it only works if the sharing of information is accepted by the stakeholders in the aviation chain either by voluntary recognition of the benefit it provides to all, or by enforcement through law.

6.1.6.2 Status

This CS was neither included in M/354 [1] nor in the document ICB/2/3 [5].

6.1.6.3 Void

6.1.6.4 Organizations involved

- EUROCONTROL;
- EUROCAE;
- ICAO;
- FAA;
- ACI;
- IATA.

6.1.6.5 Existing documentation

- Cross Domain Synchronization Study contracted by OATA;
- IDTF Data Dictionary (UML);
- IDTF IRDs from the IDTF/ORAS-TF;
- FDM-SG Flight Data Server Concept;
- ICAO Operational Concept;
- EATM Strategy;
- Operational ATM concept (CONOPS) for 2011 and 2020.

6.1.6.6 Current and future working groups, projects or trials

- FOIPS project on FO standardization;
- EUROCAE WG59 - FDP-FDP Interoperability;
- EUROCAE WG69 - CDM;
- ICOG - common initiative on interoperability between Coflight and iTEC FDP interoperability;
- FAA SWIM initiative and FO specification;
- Nordic SWIM;
- EUROCONTROL SWIM initiative.

6.1.6.7 Void

6.1.6.8 Additional information

Stakeholders/Domains concerned

- Air Navigation Service Providers;
- Airport Operators;
- Aircraft Operators;
- Air Traffic Flow and Capacity Management Providers;
- Aviation Industry (Avionics, Air Traffic Management, Air Information Management, IT Service Providers, etc.);
- MET Service Providers;
- Air Information Service Providers.

Benefits (in terms of safety, efficiency, capacity and others)

- Less effort for the implementation and validation of interfaces (one interface instead of many).
- Improved safety, capacity and efficiency by consistency of information between all participating stakeholders.
- Optimization of resource utilization (airspace, concrete, HR, aircraft, passengers, luggage, gates/stands, catering, cleaning, transport, etc.).
- Increased situational awareness for all stakeholders and their processes.
- Support for new operational concepts in optimization of traffic flow and sequence.
- Single mechanism for all applications across all domains in ground-ground as well as air-ground communications.
- Provision of a globally standardized mechanism for sharing information between systems across and within domains.
- Common data model for information items to be shared.
- Implicit interoperability between all participating domains.
- Performance scalable with demand.
- Alternative technologies for implementation applicable transparently to applications.

- Seamless, safe and efficient operation by timely availability of consistent and current information to all stakeholders involved.

Impact on existing systems and procedures

The method shall be transparent to existing legacy implementations. It shall not require changes to continue to interoperate between stakeholder systems already using the methods for information sharing and those still using traditional interoperability based on data exchange. To achieve this proxy services shall be provided by the information sharing environment to interface legacy systems with the new method.

NOTE: There exist quite well developed programmes for Arrival and Departure Planning aids. These are candidates for early community standardization but are largely limited in scope to the ATC domain. There are also differences in view as to what should be the precise scope of AMAN/DMAN.

Collaborative Decision Making addresses the issues of providing information to the various actors at an airport so as to optimize airport operations. There is existing activity to standardize in this area and the topic is expressly mentioned in the mandate.

The Central Flow Management Unit efficiently utilizes the European airspace and its interfaces are identified as candidates for community standardization.

All these entities are also integral parts of the concepts of System Wide Information Management which is also identified as a candidate for community standardization. While SWIM is in most respects not mature, it has been identified as a subject to be addressed urgently for two reasons:

- First by providing a common terminology with which to discuss the other areas.
- Secondly because it is likely to be one of the candidates with the longest time to implement.

6.2 Airspace Management

No proposed CS in this time frame.

6.3 Air Traffic Flow Management

No proposed CS in this time frame.

6.4 Air Traffic Services (ATS)

IR on Data Link Services

The purpose of the IR on Data Link Services is to specify the regulatory provisions for Air Traffic Services supported by air/ground data link communications in order to harmonize the provision and use of data link services in continental airspace.

The IR will address:

- the list of data link services initially supported (e.g. DLIC, ACM, ACL, ACM, etc.);
- the supporting communication infrastructure(s);
- the ATC procedures and CPDLC messages for the provision and use of data link services;
- certification requirements;
- conformity assessment requirements;
- applicability scope and exemption policy.

To support this IR, both operational and technical standards (CSs) are needed. In absence of a clear view on the functional and technical scope of this IR, it is proposed to consider the 3 candidates for CSs that meet at best the activities that are currently undertaken in Europe in the domain of the data link. A first CS could be defined to specify the requirements for data link service in the European continental airspace using the ATN over VDLM2 technology. A second CS could specify the interoperability requirements for the same services but using the FANS1/A over VDLM2. Finally, a CS might be required on the legacy data link services already operational in some airports in Europe.

NOTE 1: Depending on the contents of the final IR on DL it may be necessary to re-scope the following three CSs on DL.

NOTE 2: EASA will send out very soon an NPA relative to the on-board equipments for data-link.

6.4.1 Void

6.4.2 Void

6.4.3 CS on Link Baseline 1 DL Services over ATN/VDLM2 in Continental Airspace

6.4.3.1 Description

The CS on DL Services over ATN/VDLM2 in continental airspace defines the technical and operational conditions necessary to provide data link services over an ATN communication infrastructure in compliance with the DL Services Implementing Rule (under development).

6.4.3.2 Status

This CS was neither included in M/354 [1] nor in the document ICB/2/3 [5]. No CS has been formally identified with the European Commission's mandate to EUROCONTROL to draft an IR on DL Services. This CS is proposed as a potential means of compliance pertaining to the Link Baseline 1 DL services over ATN/VDLM2, **in case the final IR on DL services encompasses such services**.

6.4.3.3 Timescales

2003-2007 Introduction phase. Mandate above FL285 planned starting 1.1.2009 for new aircraft and 2012 for all aircraft.

6.4.3.4 Organizations involved

- Operational standards:
  - EUROCAE WG-53 has produced an operational standard for data link in continental airspace [**EUROCAE_ED120**]. EUROCAE_ED120 contains the functional, interoperability, performance and safety requirements for the Baseline-1 DL services in continental airspace. It includes the Operational Services and Environment Definition (OSED), the Operational Hazards Assessment (OHA), the allocation of Safety Objectives and Requirements (ASOR) and the Operational Performance Assessment (OPA).
  - EUROCONTROL has defined the ATC procedures [ECTL_B1_ATCManual] to be followed and CPDLC messages [**ECTL_LINK_B1**] to be used by ATS users when using the Baseline-1 DL services.
- Technical standards:
  - ATN:
    - EUROCAE WG-53 has refined the functional requirements into interoperability technical requirements specifically for the ATN environment in [**EUROCAE_ED110A**]. These requirements explain how to provide the Baseline-1 DL service using ATN applications. They remove all the open options left to the implementers in the ICAO ATN specifications.

        - ICAO is developing technical provisions for an enhanced CPDLC application (the so-called "Protected Mode CPDLC") which meets most critical safety requirements for message integrity and mis-direction. The draft specification is under validation and it is expected that once the specification is included in Doc 9705 EUROCAE will produce [EUROCAE_110B] including support of PM-CPDLC.

    - VDLM2:

        - EUROCAE WG-47 has produced in a MOPS document the minimum list of requirements to be supported on the airborne side and a testing methodology for VDLM2 [EUROCAE_ED92A].

        - RTCA has published MOPS and MASPs for VDLM2.

        - ETSI has drafted specification for VDLM2 ground equipment [ETSI_EN_VDLM2].

        - AEEC is refining the [**ARINC_758-1**], [**ARINC_750-4**], [**ARINC_631-3**] and [ARINC_618] standards.

    - Data Recording:

        - EUROCAE WG-xx has produced functional and performance requirements in [**EUROCAE-ED111**] and [**EUROCAE-ED112**].

- Guidance:

    - EUROCAE WG-53 has produced in [EUROCAE_ED78A] guidelines for the approval and use of ATS supported by data link communications. It also provides guidance's on test.

    - JAA has developed guidance for the use of air/ground DL in continental airspace in [**JAA_NPA_20-11**].

6.4.3.5 Existing documentation

These documents are de facto standards for which compliance will be required. They do not require additional standardization work.

- [ICAO_Annex6_AirRecording][ICAOAnnex11_Gnd_Recording] - Recording of data link messages.

- [ICAO_Annex10_DigitalComms] - SARPs for ATN protocol (clause 3) and VDLM2 physical means and the access protocols (clause 6).

- [ICAO_Doc4444] - Rules of the Air and Air Traffic Services.

- [ICAO_Doc9694] - Manual of Air Traffic Services (ATS) Data Link Applications. This manual provides operational guidelines for the DL applications and communication services, together with some data link service definitions.

- [ICAO_Doc9705] - Manual of Technical Provisions for the Aeronautical Telecommunication Network (ATN) - contains the technical provisions for ATN protocols. These technical provisions ensure technical interoperability between air and ground based ATN systems for the air-ground data transfer, routing and application functions. Interoperability is only guaranteed at the technical level, i.e. meaningless operational behaviours are still possible.

- [ICAO_Doc9776] - contains the technical provisions for VDLM2 mobile sub-network.

6.4.3.6 Current and future working groups, projects or trials

- EUROCONTROL Link 2000+: co-ordinating the implementation of en-route CPDLC over ATN/VDLM2 by 2007 and provide a migration path from legacy data link services from ACARS to ATN/VDLM2.

- CASCADE: Implementation of Cooperative ATS for Step 3 of 2000+ based on CPDLC, ADS-B and DFIS applications (date 2010 beyond the scope of the STF).

6.4.4 CS on DL Services over FANS-1/A in Continental Airspace

6.4.4.1 Description

The CS on DL Services over FANS-1/A in continental airspace defines the technical and operational conditions necessary to provide data link services over a FANS-1/A communication infrastructure in compliance with the DL Services Implementing Rule (under development).

Only if required by the DL Service IR this CS might also address the way the DL services are expected to be used and when both FANS-1/A equipped aircraft and ATN equipped aircraft are to be accommodated in the continental airspace.

6.4.4.2 Status

This CS was neither included in M/354 [1] nor in the document ICB/2/3 [5]; no CS has been formally identified with the European Commission's mandate to EUROCONTROL to draft an IR on DL Services. This CS is proposed as a potential means of compliance pertaining to the Baseline-1 DL services over FANS1-A/ACARS, **in case the final IR on DL services encompasses such services**.

6.4.4.3 Timescales

FANS-1/A accommodation will be performed in Link 2000+ on a voluntary basis.

6.4.4.4 Organizations involved

Organizations working on this topic

- Operational standards:
  - EUROCAE WG-53 has produced an operational standard for data link in continental airspace [**EUROCAE_ED120**]. EUROCAE_ED120 contains the functional, interoperability, performance and safety requirements for the Baseline-1 DL services in continental airspace. It includes the Operational Services and Environment Definition (OSED), the Operational Hazards Assessment (OHA), the allocation of Safety Objectives and Requirements (ASOR) and the Operational Performance Assessment (OPA).
- Technical standards:
  - FANS-1/A:
    - EUROCAE WG-53 has refined the functional requirements into interoperability technical requirements specifically for the FANS-1/A environment in [**EUROCAE_ED100A**]. These requirements explain how to provide the Baseline-1 DL service using FANS-1/A applications.
    - ARINC 618 to 623.
  - VDLM2:
    - EUROCAE WG-47 has produced in a MOPS document the minimum list of requirements to be supported on the airborne side and a testing methodology for VDLM2 [EUROCAE_ED92A].
    - RTCA has published MOPS and MASPs for VDLM2.
    - ETSI has drafted specification for VDLM2 ground equipment [ETSI_EN_VDLM2].
    - AEEC is refining the [**ARINC_758-1**], [**ARINC_750-4**], [**ARINC_631-3**] and [ARINC_618] standards.
  - Accommodation FANS-1/A:
    - EUROCAE WG-53 is currently developing a standard [**EUROCAE_PU40**] for ground systems to enable ANSPs to interoperate with data link equipped aircraft regardless of which technology is installed on the aircraft.

6.4.4.5 Existing documentation

Reference Material

- [ICAO_Doc4444] - Rules of the Air and Air Traffic Services.
- [ICAO_Doc9694] - Manual of Air Traffic Services (ATS) Data Link Applications. This manual provides operational guidelines for the DL applications and communication services, together with some data link service definitions.
- No ICAO document on technical issues (FANS1/A is not recognized by ICAO).

6.4.5 CS on DL Services over ACARS in Continental Airspace

6.4.5.1 Description

The CS on DL Services over ACARS in continental airspace defines the technical and operational conditions necessary to provide data link services over an ACARS network in compliance with the DL Services Implementing Rule (under development).

6.4.5.2 Status

This CS was neither included in M/354 [1] nor in the document ICB/2/3 [5]; no CS has been formally identified with the European Commission's mandate to EUROCONTROL to draft an IR on DL Services. This CS is proposed as a potential means of compliance pertaining to the DL services over ACARS/VDLM2, **in case the final IR on DL services encompasses such applications**.

6.4.5.3 Timescales

DCL and DATIS are available today over ACARS.

6.4.5.4 Organizations involved

Organizations working on these topics

- Operational and Technical standards:
  - EUROCAE WG-45 has produced an operational and technical standard for the DCL service over the ACARS network [EUROCAE_ED85A]. EUROCAE_ED85A contains the functional, interoperability, performance and safety requirements for the Baseline-1 DL services in continental airspace. It includes the Operational Services and Environment Definition (OSED), the Operational Hazards Assessment (OHA), the allocation of Safety Objectives and Requirements (ASOR) and the Operational Performance Assessment (OPA). EUROCAE WG-45 also contains the interoperability requirements (INTEROP).
  - EUROCAE WG-45 has produced an operational and technical standard for the ATIS service over the ACARS network [EUROCAE_ED89A].
  - Technical provisions are provided in [ARINC_618] to [ARINC_622] documents.
- Guidance's:
  - JAA has produced guidance material for the approval of airborne equipment compliant with [EUROCAE_ED85] and [EUROCAE_ED89]: [JAA_TGL_DCL]: Departure Clearance over ACARS and [JAA_TGL_ATIS]: ATIS over ACARS, [JAA_NPA-20-13]

6.4.5.5 Existing documentation

Reference Material

- [ICAO_Doc9694] - Manual of Air Traffic Services (ATS) Data Link Applications. This manual provides operational guidelines for CPDLC, ATIS applications and communication services, together with some data link service definitions.

6.4.5.6 Current and future working groups, projects or trials

Covered by the Link 2000+ Programme.

6.4.6 Void

6.4.7 Void

6.4.8 CSs on Open ATC system architecture model

6.4.8.1 Description

The purpose is to define a reference architecture defining the components, the services and the associated interfaces required to support future ATC operations.

This item calls for: "Definition of an open ATC system architecture including its standard interfaces towards the other entities of the ATM/CNS (Air Traffic Management/Communication, Navigation and Surveillance) network". This CS is a transposition of EUROCONTROL and EUROCAE documents (currently under development) to recognize these documents under the Interoperability regulation.

Development of a system architecture which is reviewed and agreed by industry enables the identification of services and interfaces required by future operational concepts.

A key benefit of this reference architecture will be to support the identification of further Community Specifications (and possibly Implementing Rules) required for open System platforms and future interoperability. The ultimate goal is to move ATM systems from the current bespoke developments to Open System Platforms. This goal is also supported by the CS on the adoption of Middleware.

The creation of a systems architecture model for Europe will also facilitate the alignment of systems and interfaces with those of the USA and other ICAO member states outside ECAC, in particular with respect to common interfaces to stakeholders (including airports and aircraft).

6.4.8.2 Status

EC ICB Recommended Priority: Priority 1; the item has been included in the Standardization Mandate M/354 [1].

The EUROCONTROL OATA project is developing a Logical Architecture of ATM/CNS services in the 2011 timeframe based on the operational concept defined in the EUROCONTROL OCD and CONOPS documents. The OATA Phase 2 programme is due to be completed in summer 2006.

EUROCAE WG 61 is preparing a document entitled "Standards of an Open Architecture for Future European interoperable ATC Systems". The work is supported by the AHLM project which is developing implementation models based on the following OATA clusters:

- En Route and Approach ATC;
- Flight Management;
- Air Surveillance.

The AHLM Project is funded by EUROCONTROL and administered by the OATA Project Office. It is also due to complete during 2005.

6.4.8.3 Timescales

AHLM project will be completed end 2005.

NOTE: The AHLM model, in the current contract, does not cover the complete scope of the ATC (e.g. Arrival Manager, Departure Manager, Operational Supervision, and Traffic Load Manager) as defined in the ATC System Logical Decomposition document. It is envisaged to cover the complete scope by an extension of the contract and to complete the work for end 2006-mid 2007.

OATA phase 2 projects to be completed for summer 2006.

The architecture work within SESAME will start in 2006. The CS should take care of the SESAME definition phase results

Therefore the CS should be resolved in parallel to the progress and in liaison with the SESAME project.

6.4.8.4 Organizations involved

- EUROCONTROL;
- EUROCAE WG 61.

6.4.8.5 Existing documentation

OATA Documentation, specific document for AHLM by end 2005.

6.4.8.6 Current and future working groups, projects or trials

- EUROCONTROL:
  - OATA project;
  - ATC system architecture High Level Model (AHLM) project.
- EUROCAE WG 61;
- COFLIGHT;
- iTEC-eFDP.

6.4.8.7 Void

6.4.8.8 Additional information

Technical Issues

The OATA Project, supported by the AHLM project, is the only significant current high level architecture for ATM for Europe.

The OATA product is a target logical structure for ATM systems. Substantial work is required to define:

- The process for moving forward from a target logical approach to the standardized definition of system functions and interfaces. (This is the role of the EUROCAE WG61 project for the ATC part).
- The outputs (e.g. standards for interfaces) of the work which need to be produced and maintained.

The development of a high level architecture of ATM is a significant undertaking requiring a full QA, Review and Consultative processes.

If successful, the high level architecture would enable the identification of:

- The Services required/provided by interoperating entities support ATM functions.
- The interfaces between such entities.
- Requirements supporting interoperability.

The development of the required architecture is likely to form part of the SESAME work program.

Conclusion

The existence of an agreed high level architecture is an essential enabler for the systematic identification of CSs and possibly IRs.

Significant work is underway such that EUROCAE Working Group 61 should be in a position to provide the necessary specification during 2005 based on the EUROCONTROL OATA project. Close collaboration between the EUROCONTROL OATA project and EUROCAE WG-61/AHLM needs to be maintained. However, further work is required to define the use and applicability of the specification.

Future work on the definition of the CS should take account of the results of the OATA and AHLM projects and should be focussed on enabling the progressive adoption of Open Standards within ATM.

6.4.9 to 6.4.16 Void

6.4.17 CS on Advanced Surface Movement Guidance and Control Systems (A-SMGCS) (Levels 3 and higher)

6.4.17.1 Description

The purpose of this item is to develop a community specification covering Advanced Surface Movement Guidance and Control Systems (A-SMGCS).

In the ICB/2/3, this CS was combined with the definition of a standard for arrival management (AMAN) and departure management (DMAN). CSs for AMAN and DMAN are described below.

Advanced Surface Movement Guidance and Control System, A-SMGCS, will in its initial stages, i.e. the so-called Level 1 and Level 2 implementations with enhanced surveillance and control functionalities, provide a display to controllers with accurate position information of all targets and positive identification of all suitably equipped aircraft and vehicles on the entire manoeuvring area. The introduction of a secure and high integrity labelling system will greatly increase the situational awareness of controllers, which will not only increase safety but also improve efficiency and airport throughput.

In conditions of restricted or reduced visibility the benefits of the system will become more apparent, allowing the controller to be completely sure of the position of identified aircraft and vehicles.

In addition the system will enhance safety, alerting the controller by detecting potential conflicts between arriving and departing aircraft and other targets on the runways.

Harmonized procedures are being developed to ensure that as A-SMGCS becomes widespread, pilots, vehicle drivers and controllers will be working to the same rules and standards throughout the European region.

6.4.17.2 Status

EC ICB Recommended Priority: Priority 2.

This CS is part of Mandate M/354 [1].

Currently basic SMGCS are already in place in most significant airports across Europe. The need for further improvements has led to the development and initial implementation of A-SMGCS.

The components needed to implement an A-SMGCS Level 1 or Level 2 are already commercially available based on SMR and multilateration technique (and/or ADS-B) and are becoming operational at different levels of maturity on larger airports across Europe.

6.4.17.3 Timescales

In general, the implementation of A-SMGCS is usually divided into incremental levels. EUROCONTROL foresees implementation of the first level, related to improved surveillance capabilities, on individual aerodromes form the year 2000 onwards. For the next level, covering runway incursion alerting, is foreseen for implementation from 2006 onwards. Further levels covering guidance and route planning are expected from 2006 and 2009 onwards respectively. Therefore the development of a CS should take into account the maturity of the different A-SMGCS- Levels:

- CS on A-SMGCS Level 1 and Level 2: before SESAME;
- CS on A-SMGCS Level 3 and higher: parallel to SESAME, or following SESAME.

6.4.17.4 Organizations involved

- EUROCONTROL A-SMGCS project;
- EUROCAE.

6.4.17.5 Existing documentation

Existing standards:

- ICAO (recommendation, not a Standard in the sense of ICAO):
  - ICAO Doc 9830: Manual of Advanced Surface movements and Guidance Control Systems (A-SMGCS); published as global manual in 2003.
- EUROCAE/RTCA:
  - ED-116 Electronic Copy - MOPS for Surface Movement Radar Sensor Systems for Use in A-SMGCS. Issued in January 2004.
  - ED-117 Electronic Copy - MOPS for Mode S Multilateration systems for use in A-SMGCS.
  - ED-87A Electronic Copy - MASPS for A-SMGCS, issued January 2001.

Documents Already Produced

- ICAO Annex 14;
- ICAO Annex 10;
- ICAO Doc 9476: Manual of Surface Movements and Guidance Control Systems (SMGCS);
- ICAO Doc 9830: Manual of Advanced Surface movements and Guidance Control Systems (A-SMGCS);
- ICAO EUR Manual on A-SMGCSEUROCAE ED-87A: MASPS for A-SMGCS 12/2000;
- EUROCAE ED-117 MOPS for Mode S Multilateration Systems for Use in A-SMGCS 11/2003;
- EUROCAE ED-116 MOPS for Surface Movement RADAR Sensor Systems for Use in A-SMGCS, 01/2004;
- EUROCONTROL: European Action Plan for the Prevention of Runway Incursions;
- EUROCONTROL: A-SMGCS Concept Justification and User Requirements;
- WG51: ADS-B MASPS for ground surveillance applications.

6.4.17.6 Current and future working groups, projects or trials

- EU-funded programme EMMA (operational validation);
- EUROCONTROL A-SMGCS project as part of the Airport Operations Programme;
- EUROCAE WG 41;
- EUROCAE WG 51.

6.4.17.7 Void

6.4.17.8 Additional information

Technical Issues

A-SMGCS is a key enabler both for the prevention of runway incursions and increased airport capacity, including the maintainability of high capacity in periods of reduced visibility. Significant research has been undertaken by the EC, EUROCONTROL and Industry, leading to a number of ICAO and EUROCAE specifications (listed above).

A-SMGCS systems requirements are specific to a particular airport configuration and traffic level and composition. Standards must remain flexible enough to accommodate all types of aerodromes, however, they should also be common enough for aircraft operators to be able to adhere to the local situation at different aerodromes.

Different technologies are available to achieve the objective of uninterrupted identification of aircraft and vehicles on the manoeuvring area. This may put different requirements on the local procedures and on avionics. The identification of aircraft should be based on the mandatory aircraft equipment; the identification of vehicles can be based on individual local solutions.

Systems aimed at alerting air traffic controllers about potential conflicts on runways and/or taxiways have been the subject of discussion and development for a long time, with satisfactory results still being unclear.

Conclusion

A-SMGCS is generally agreed as the key enabler for maintainable high airport capacity with no infringement of the target level of safety, and implementation is already ongoing at several of the largest airports in Europe.

A-SMGCS development and implementation is very much dependent on local issues. The effect this might have on aircraft operators operating at different airports requires attention.

The prime users of A-SMGCS are both the ANSP providing the local aerodrome control services and the local aerodrome operator generally providing not only apron control but also being responsible for e. g. the runway and taxiway lighting systems (which also form part of an A-SMGCS). Therefore A-SMGCS are usually commonly used by both parties, leading also to a sharing of benefits and costs. It is therefore recommended that close liaison with airport operators is being established and maintained throughout the development of this CS.

Basic material for at least Level 1 and Level 2 A-SMGCS are already available through ICAO, EUROCAE, EUROCONTROL and EC RTD Framework Programmes, which should be sufficiently mature for the development of a CS.

6.4.18 Void

6.4.19 CS on arrival management

6.4.19.1 Description

The objective of implementing both the Arrival and Departure Management systems is to create a more orderly and expeditious flow of traffic for both departing and arriving aircraft.

This will allow the more efficient use of departure and arrival runaways without increasing the current strain on holding stacks.

An Arrival Manager is an automated assistance tool that performs runway sequencing functions for arrival traffic. It optimizes the arrival order and assigns runway time slots to arrivals.

6.4.19.2 Status

EC ICB Recommended Priority: Priority 2.

This item is covered by the Standardization Mandate M/354 [1]. It was initially proposed in the ATM-CNS Interoperability Roadmap Study [4] and included DMAN as well as A-SMGCS which are covered in separate CSs.

This CS and the CS on Airport CDM are closely related.

Development of the CS needs to draw on work already done by EUROCONTROL, its member states and ICAO, and take account of the EUROCONTROL ASA programme results and other industrial developments

6.4.19.3 Timescales

AMAN is a mature application and the procedures for its use are due for implementation in 2005 along with adaptation of the TMA organization to accommodate the use of AMAN and the validation, safety assessment and CBA.

In 2006 the guidelines for the adaptation of ATCO working methods are due for production with AMAN functions being implemented in 2007. This will run in parallel with the publishing of the regulations on arrival management tool operation.

6.4.19.4 Organizations involved

- EUROCONTROL;
- ANSPs.

Several Air Navigation Service Providers (see below).

6.4.19.5 Existing documentation

- EUROCONTROL ORD (1999);
- AMAN ORD;
- AMAN Functional Specification.

6.4.19.6 Current and future working groups, projects or trials

- EUROCONTROL TMA2000+;
- EUROCONTROL ASA Programme/FASTI Programme (AMAN is a significantly more mature concept than DMAN).

Basic Arrival Management systems are already in use in several European airports. For example the 4D Planner is currently being used by DFS at Frankfurt airport and CALM (Computer-assisted Approach and Landing Management) is in use by Skyguide at Zürich airport.

Several validations and trials have been carried out on the AMAN tool. This included trials at Stockholm Arlanda in autumn 2003 and Rome in autumn 2004, with a joint AMAN and DMAN trial planned for Stockholm Arlanda in autumn 2005.

6.4.19.7 Void

6.4.19.8 Additional information

Technical Issues

AMAN considers arriving aircraft at a radius of up to 200NM from the destination airport. It calculates an unconstrained arrival time over the runway threshold using the expected flight profile and aircraft performance parameters. This calculation is done using a Trajectory Prediction tool or TP. Therefore, functionality of AMAN is reliant upon the accuracy of the TP.

If the unconstrained arrival times conflict with each other by the overlap of expected runway occupancy time and/or required wake-vortex (WV) separation, AMAN considers all possible sequences of arrivals and computes a cost-value for each, respecting the required separation.

AMAN also has to be able to adapt its plan to new situations. Technically, a complete refresh of the AMAN sequence should be possible with each turn of the radar. However, the solution presented to the respective operator must be more stable.

NOTE: There exist quite well developed programmes for Arrival and Departure Planning aids. These are candidates for early community standardization but are largely limited in scope to the ATC domain. There are also differences in view as to what should be the precise scope of AMAN/DMAN.

Collaborative Decision Making addresses the issues of providing information to the various actors at an airport so as to optimize airport operations. There is existing activity to standardize in this area and the topic is expressly mentioned in the mandate.

The Central Flow Management Unit efficiently utilizes the European airspace and its interfaces are identified as candidates for community standardization.

All these entities are also integral parts of the concepts of System Wide Information Management which is also identified as a candidate for community standardization. While SWIM is in most respects not mature, it has been identified as a subject to be addressed immediately for two reasons:

- First by providing a common terminology with which to discuss the other areas.
- Secondly because it is likely to be one of the candidates with the longest time to implement.

6.4.20 CS on departure management

6.4.20.1 Description

The objective of implementing both the Arrival and Departure Management systems is to create a more orderly and expeditious flow of traffic for both departing and arriving aircraft.

This will allow the more efficient use of departure and arrival runaways without increasing the current strain on holding stacks.

A Departure Manager is a computer-based tool for assisting air traffic controllers at airports with the management of departing flights. The function of DMAN is to plan take-off times and consequent start up times and to make these available to ATC, airport authorities and aircraft operators.

The primary objective of DMAN is to maximize runway throughput for departing flights. The minimum separation between two successive departing flights depends on the specific details of the flights, including their wake turbulence categories and their proposed route through the TMA (Terminal Manoeuvring Area). Using these details for a sequence of departures it is possible to minimize the average time between them. DMAN uses an algorithm to shuffle the planned departure times from the natural order.

6.4.20.2 Status

EC ICB Recommended Priority: Priority 2.

This item is covered by the Standardization Mandate M/354 [1]. It was initially proposed in the ATM-CNS Interoperability Roadmap Study [4] and included AMAN and A-SMGCS which are covered in separate CSs.

This CS and the CS on Airport CDM are closely related and it should be considered to combine both into one CS.

Development of the CS needs to draw on work already done by EUROCONTROL, its member states and ICAO, and take account of the EUROCONTROL ASA programme results and other industrial developments.

The advantages of DMAN are:

- Enables optimal use of runway capacity;
- Reduced controller workload.

NOTE: In order to fully optimize the traffic sequence the First Come - First Served principle could not strictly be applied, this may require an IR as legal basis.

6.4.20.3 Timescales

DMAN implementation timescale starts 2005.

6.4.20.4 Organizations involved

- EUROCONTROL TMA2000+;
- EUROCONTROL ASA Programme/FASTI Programme;
- Several Air Navigation Service Provider (see below).

6.4.20.5 Existing documentation

- EUROCONTROL ORD (1999);
- ORD for basic DMAN;
- ORD for advanced DMAN.

6.4.20.6 Current and future working groups, projects or trials

- EUROCONTROL TMA2000+;
- EUROCONTROL ASA Programme/FASTI Programme.

DMAN is less mature than AMAN. Skyguide has implemented a Basic Departure Management tool, DARTS at Zürich. Further, EUROCONTROL is developing DMAN, and have produced a "DMAN Demonstrator", which is adaptable to any airport and can be used for simulation and live trials. This demonstrator allows technical and operational staff to become familiar with the DMAN concept. A joint AMAN and DMAN trial is planned for Stockholm Arlanda in autumn 2005.

6.4.20.7 Void

6.4.20.8 Additional information

DMAN uses the expected ready-time for pushback as the main input. This data can be further improved by the co-operative effort of all airport actors. The EUROCONTROL CDM (Collaborative Decision Making) project aims to make this possible.

Considering that airport traffic is highly dynamic, DMAN will have to react and adapt flexibly to changes in traffic. DMAN will use the standard inputs from the EFPS (Electronic Flight Progress Strip) Systems to detect these changes without increasing controller workload.

ASMGCS (Advanced Surface Movement Guidance and Control System) will enable accurate and reliable surveillance and provide a close link between reality and the plan. This will also enable the display of the DMAN information in the traffic label.

NOTE: There exist quite well developed programmes for Arrival and Departure Planning aids. These are candidates for early community standardization but are largely limited in scope to the ATC domain. There are also differences in view as to what should be the precise scope of AMAN/DMAN.

Collaborative Decision Making addresses the issues of providing information to the various actors at an airport so as to optimize airport operations. There is existing activity to standardize in this area and the topic is expressly mentioned in the mandate.

The Central Flow Management Unit efficiently utilizes the European airspace and its interfaces are identified as candidates for community standardization.

All these entities are also integral parts of the concepts of System Wide Information Management which is also identified as a candidate for community standardization. While SWIM is in most respects not mature, it has been identified as a subject to be addressed immediately for two reasons:

- First by providing a common terminology with which to discuss the other areas.
- Secondly because it is likely to be one of the candidates with the longest time to implement.

6.4.21 Void

6.4.22 Void

6.4.23 CS on Surveillance Performance

6.4.23.1 Description

This CS is foreseen as a means of compliance to the IR on Surveillance performance for which a mandate to EUROCONTROL is announced by the EUROPEAN COMMISSION to be issued second half 2005 **if there is a need for such a means which should be determined when the work on the IR permits.**

6.4.23.2 Status

This CS was neither included in M/354 [1] nor in the document ICB/2/3 [5].

6.4.23.3 Void

6.4.23.4 Organizations involved

- ICAO;
- EUROCONTROL.

6.5 Communication

6.5.1 Void

6.5.2 CS on ATS Message Handling System (AMHS)

6.5.2.1 Description

The specification, procurement and deployment processes of AMHS Systems in Europe are made difficult by the profusion of reference documents (Base Standards - X400 -, ISPs, RFCs, ICAO Doc 9705, SPACE Project Requirements, PDRs, etc.). The complete AMHS solution involves the specification of three different system component types (Message Transfer Agent - MTA, Message Stores - MS and User Agent -UA), each of which has a number of implementation options.

The EUR-AMHS profile is intended to provide a single document that contains a specification of the European AMHS with cross references to all the supporting Base Standards, ISP, ICAO Doc. 9705 and RFCs. It also contains the Protocol Implementation Conformance Statement Proforma for each type of AMHS system.

The EUR-AMHS profile supports the approach of European ATSPs to implement AMHS in gradual stages. The Basic AMHS specified in ICAO SARPs is not sufficient for their requirements, but the Extended service was too much. The EUR-AMHS Profile is between the two.

The minimum AMHS functionality specified in the EUR-AMHS Profile is as follows:

- Functional scope limited to international COM Centres of member states using AMHS and TCP/IP (local ATSP internal messaging is considered of a local nature, AFTN and CIDIN Gateways are out of scope);
- Basic AMHS functions with distribution list expansion capability are mandatory;
- Use of the File Transfer Body Part;
- Use of TCP/IP (instead of the OSI communication stack);
- Use of Directory is not mandated;
- Further options are allowed on a local basis.

This CS is primarily a transposition of the EUR-AMHS Profile document to recognize the profile under the Interoperability regulation.

6.5.2.2 Status

This CS was neither included in M/354 [1] nor in the document ICB/2/3 [5].

6.5.2.3 Void

6.5.2.4 Organizations involved

EUROCONTROL prepared an initial draft of the EUR-AMHS profile. It has been circulated to the EUROCONTROL Communications Team and the ICAO European AFSG-PG.

6.5.2.5 Existing documentation

- ICAO Annex 10;
- ICAO Doc 9705, ISO standards and ISPs, RFCs;
- EUR ICAO: ATS Messaging Management Manual, CIDIN Manual;
- EUROCONTROL AMHS Profile - Version 2.0: Profile for ATS Messaging using AMHS and TCP/IP;
- NATO STANAG 4406.

6.5.2.6 Void

6.5.2.7 Void

6.5.2.8 Additional information

Previous projects included EUROCONTROL projects SPACE and ECG. SPACE (Study and Planning of AMHS in Europe) is a CEC funded project.

6.5.3 Void

6.5.4 Void

6.5.5 CS on VoIP (ground-ground) for use in EATMN

6.5.5.1 Description

The current Air Traffic Services voice switches provide air traffic controllers with the capability to establish air-ground and ground-ground voice communications. The current G-G telephone infrastructure makes extensive use of dedicated circuits to communicate between air traffic services units.

The modern practice of converging voice and data onto a common networking infrastructure is now recognized as the next step forward. Internet Protocol (IP) is the preferred technology thus opening up the possibility of conveying voice using Voice over IP (VoIP) techniques.

6.5.5.2 Status

This CS was neither included in M/354 [1] nor in the document ICB/2/3 [5].

6.5.5.3 Timescales

The EUROCONTROL EATMP G-G Communications Strategy foresees the deployment of an IP-based Pan-European Network (PEN) and a PEN Development Focus Group has very recently been formed to initiate its implementation. It is already understood that the PEN will be deployed for data in the first instance but with the possibility of enhancement to include voice. The roll-out of voice (possibly as VoIP) may begin around 2010 but this will be depending on the actual progress of the PEN and (more significantly for voice services) the work currently in progress within EUROCAE WG-67.

6.5.5.4 Organizations involved

- EUROCAE WG-67:
  - has been created to analyze the situation regarding operational and technical A/G and G/G ATM Voice System requirements in the context of IP Voice Protocols and IP networks' capability for Voice Services. The scope includes ground-ground ATM communications and the ground component of A/G communications. The main delivery will be a Technical Specification covering these former items and this is scheduled for delivery in September 2006.
- European Air traffic management Voice over IP Project (EAVoIP): see below.

6.5.5.5 Existing documentation

- ICAO Annex 10, volume III;
- ICAO Doc 9804, AN/762, first Edition 2002 - Manual on ATS Ground-Ground Voice Switching and signalling.

6.5.5.6 Current and future working groups, projects or trials

EUROCAE WG-67:

- (SG-1) VoIP ATM System Operational and Technical Requirements specifications (mid 2006);
- (SG-2) Interoperability Standards for VoIP ATM components;
- (SG-3) Network Requirements and Performances for VoIP ATM System (2006/2007);
- (SG-4) Qualification tests for VoIP ATM Components and System.

EAVoIP-project (proposed):

- A proposal (known as European Air traffic Management Voice over IP Project "EAVoIP") has been submitted to the European Commission for consideration under its Strategic Research Agenda. In summary EAVoIP is to validate if VoIP can fulfill the requirements of ATM as specified by EUROCAE WG-67. Assuming EUROCAE WG-67 completes its work on time the earliest outcome for EAVoIP would be early 2009. This last date sets the earliest date from which VoIP may (or may not) be considered suitable for ATM purposes.

6.5.6 CS on telephone used for ATC purposes in the EATMN

6.5.6.1 Description

This CS is primarily a transposition of existing ETSI and EUROCONTROL documents to recognize these documents under the interoperability Regulation.

6.5.6.2 Status

This CS was neither included in M/354 [1] nor in the document ICB/2/3 [5].

6.5.6.3 Timescales

The Official Journal of the European Union, Regulation (EC) No 552/2004 [2] requires conformity declarations from the 20th October 2005 onward which - in principle - gives a need for harmonized EN covering all relevant essential requirements.

6.5.6.4 Organizations involved

EUROCONTROL

6.5.6.5 Existing documentation

- EUROCONTROL: ATS R2 and ATS No5 signalling protocol specifications - Edition 1.0 February 2005 (EATM Infocentre Ref 05/01/12-04).
- ETSI ATS QSIG (ECMA-312/ETSI EN 301 846).
- EUROCONTROL: Inter-working between ATS-QSIG and ATS R2 signalling system - Edition 1.0 February 2005 (EATM Infocentre Ref 05/01/12-05).
- EUROCONTROL: Inter-working between ATS-QSIG and ATS Number 5 signalling systems - Edition February 2005 (EATM Infocentre Ref 05/01/12-06).
- EUROCONTROL ATS-QSIG Field Engineers Test Instrument (available by end of 2005).

6.5.6.6 Void

6.5.6.7 Void

6.5.6.8 Additional information

EUROCONTROL has developed a digital signalling protocol, known as "ATS-QSIG", to meet the ground telephone requirements of air traffic controllers in carrying out their duties of air traffic management. EUROCONTROL has sponsored this protocol through the European Standardization procedures and it has been published by ECMA as their Standard ECMA 312 ed 3 also published by ETSI as EN 301-846: Private Integrated Services (PISN) - Profile Standard for use of PSS1 (QSIG) in Air Traffic Services Networks.

ATS-QSIG was developed from an existing telecom industry standard known simply as QSIG/PSS1. ICAO recommends PSS1 for use as a digital signalling protocol and quotes ATS-QSIG as a variant that may be used in the European Region and elsewhere (Ref ICAO Doc 9804 AN/762 Manual on Air Traffic Services (ATS) Ground-Ground Voice Switching and Signalling.)

6.6 Navigation

IR on the Required Navigation Performance

This IR concerns the definition of the horizontal and vertical separation/performance in different airspaces, particularly for Precision RNAV (P-RNAV). It is assumed that the purpose of the proposed IR will be to mandate an RNP capability for application in the European airspace. Whilst P-RNAV is being implemented within the RNAV Integrated Initiative, this is expected to be only an interim step towards meeting the Navigation Strategy whereby RNAV becomes the only means of navigation in ECAC using DME and GNSS as the positioning sources.

There is an ECAC wide mandate for Basic-RNAV (B-RNAV) in European Upper Airspace. B-RNAV requires an adherence to RNP-5 supported by limited additional navigation functionality. B-RNAV is not suited to use in terminal airspace.

P-RNAV is an enhancement to B-RNAV which requires adherence to RNP-1 supported by additional navigation functions, not least the availability of a navigation database. P-RNAV is currently used in a number of TMAs in Europe.

RNP-RNAV is a further level of area navigation. The required accuracy is set dependant on the current airspace or procedure. Typically RNP-0.1 is required for approach procedures. RNP-RNAV includes significant additional navigation functions including containment accuracy and fixed radius turns. Some new aircraft are already equipped to RNP RNAV standards, but no operational procedures exist in Europe. RNP-RNAV provides for integrity of operation sufficient for it to become the sole means of navigation on the flight deck enabling ground based VOR and NDB to be decommissioned. The need for Dual RNAV on Air Transport aircraft to provide sufficient continuity of service will determine the effective implementation date since many aircraft are today only equipped with single systems

Required Navigation Performance is only one parameter in the determination of separation standards. RNP levels should not be set in isolation but take into account other requirements including relevant communication and surveillance requirements.

B-RNAV (RNAV equipment meeting the RNP5 accuracy requirement) became mandatory for en-route in 1998.

P-RNAV (RNAV equipment meeting the RNP1 accuracy requirement) is progressively introduced in selected TMAs. PRNAV exists in Norway and Finland and there are plans for introduction in 2005 in Sweden, Italy, Austria, Switzerland, Belgium, the Netherlands, Greece, France and Spain.

A key issue is to see to it that aircraft capabilities, conventional ground navigation infrastructure and GNSS infrastructure plus airspace planning are analysed and improved in parallel so that the expected benefits accrue in a timely manner. A typical example is the statement that most of aircraft are already capable of P-RNAV but cannot use it.

In addition to the work on the IR, action could be undertaken to:

- Support EUROCONTROL's programme for the progressive introduction of P-RNAV (including development of best practise for the cost effective certification of P-RNAV).

Review the current cost benefit analysis of the various RNP-RNAV levels in order to determine which have the potential to produce the largest benefits (to be always linked to a defined concept of operations).

NOTE: EASA is developing two means of compliance as follows: This output from the task should be two acceptable means of compliance to be introduced in AMC-20:

- one relative to "airworthiness and operational approval for RNP approach operations";
- one relative to "approval of GNSS systems for RNAV/GNSS approach operations".

6.6.1 to 6.6.8 Void

6.6.9 CS on Space Based Augmentation Systems

6.6.9.1 Description

This item calls for the development of a CS defining the technical requirements for APV I/II (Approach procedure with vertical guidance) relying on EGNOS and to enable the timely implementation of APV procedures.

NOTE: The scope of this CS is not precisely defined yet, a distinction should be made between SBAS system issues and Application issues. SBAS system issues refer to the Signal-In-Space specifications. Applications concern the way the signal in Space is used, including the way it is processed (receiver + other avionics systems) and the way the aircraft used the processed information.

Approach and landing operations with vertical guidance are defined as follows: An instrument approach and landing which utilizes lateral and vertical guidance but does not meet the requirements established for precision approach and landing operations.

Approach and landing operations with vertical guidance (APV) have then been introduced in Annex 6 in between Non-Precision Approach (without vertical guidance) and Precision Approach: more precisely, they are defined as instrument approaches which utilize lateral and vertical guidance but do not meet the requirements established for precision approach and landing operations.

APV-I and APV-II are initially performance-based approaches, rather than system based. That means that approach procedures developed based on the performance of APV-I or II could theoretically be used by any aircraft navigation system that complies with the associated performance requirements. However, the operational situation is more complex, in particular, practically, obstacle assessment surfaces and procedures have to be designed based on an operational concept for the elaboration and provision to the pilot of the navigation information during the approach and landing phase of flight (including missed approach). Currently, only the SBAS MOPS [X] provides such a description and this why in the current ICAO OCP work programme, procedure design activities are limited to APV I and II for a particular system, the SBAS.

APV II has lower minima than APV I, and a slightly higher minima (approximately 50 feet) than Cat I. Currently, CAT I is not possible using SBAS only.

Space-based Augmentation Systems have similar needs in the standardization environment as Ground-Based Augmentation Systems: In both cases, international standards exist from ICAO for the Signal-in-Space from the (ground- or ground-controlled) infrastructure, and from RTCA for the associated avionics.
In the case of SBAS, a European standard should define which exact configuration is required for the implementation in ECAC. This detail shall cover the properties of the technical system (e.g. use of message types to cover adjacent areas, future use of augmentations on L5 frequency) and the identification of roles, responsibilities and processes for the certification of such a pan-European system.

If it should transpire that this rulemaking does NOT fall into the responsibility of EASA, a CS should be put in place.

6.6.9.2 Status

This item was included in the Standardization Mandate M/354 [1].

This subject is completed in ICAO Annex 10. Current work in EUROCONTROL is aimed at meeting the EGNOS operational date in 2 years time. ICAO ANC/11 recommended that air navigation service providers move rapidly, in coordination with airspace users, with a view to achieving, as soon as possible, worldwide navigation capability to at least APV I performance. States and airspace users shall take note of the available and upcoming SBAS navigation services providing for APV operations and take necessary steps towards installation and certification of SBAS capable avionics.

EUROCONTROL are currently conducting a business case comparing the need, costs and benefits of APVs and Baro-aided VNAV approaches. Both are considered technically feasible and have been demonstrated as such. Criteria exist for both, although regulatory material is still under development. It should be applicable by November 2006.

APV tends to be supported by ANSPs. Baro-aided VNAV procedures are proposed by Airbus, Boeing and Airlines as an alternative. The alternative is supported because it is a self contained system with no necessity to rely on a non aviation third party service provider.

The work on APV (Approach with vertical guidance) requirements is ongoing within EUROCONTROL, in line with ANC/11 conclusions. It is expected to be available after necessary validation by 2007. A CS could therefore be completed by that time. It is currently not evident whether European standards should exist for APV which is not based on SBAS/EGNOS. If such standards should be regarded necessary, they could be developed under the direction of EASA.

Introduction of APV I/II relying on EGNOS would be a first application of EGNOS for aviation. As such it would be a first contribution of Europe for the implementation of the ICAO concept of GNSS.

- Introducing APV I/II based on EGNOS is a pragmatic approach towards the implementation of the GNSS concept, making use of what is currently available to augment the GPS system.
- Provided that interoperability with WAAS and other systems such as GLONASS and MSAS comes at no cost for the airspace users, APV I/II would be available where suitable Ranging and Integrity Monitoring Stations (RIMS) are available. This would significantly enhance safety, mainly for operations in parts of the world where the navigation infrastructure is insufficient.
- Increased runway accessibility, through lower minima.
- Increased Safety compared to NPA.
- Increased Safety through the reduction of Descent Glide Slope.
- Increased Safety and improved routings for ETOPS.
- Improved airport accessibility when ILS is not available.
- Improved airport accessibility through the provision of guided missed approach.
- Savings through non-renewal of conventional navaids.
- Increased availability of SBAS-based APV compared to APV Baro/VNAV.
- Improved accuracy and integrity of GNSS-based APV compared to APV Baro/VNAV.
- Use of SBAS increases the capabilities of the airspace users for possibly more demanding future navigation and ATM requirements (e.g. ADS).

6.6.9.3 Timescales

EGNOS signal in space would be available by 2006. Certified WAAS, SBAS non-integrated, stand-alone SO-C145 compliant receivers for General Aviation are available since 2004 in the US and their increase equipage in EU can be expected. However neither BOEING nor AIRBUS seem to have any activity ongoing or plans to support EGNOS certification. They rather promote solutions based on Baro-aided VNAV.

The work on APV (Approach with vertical guidance) requirements is ongoing within EUROCONTROL, in line with ANC/11 conclusions. It is expected to be available after necessary validation by 2007. A CS could therefore be completed by that time. It is currently not evident whether European standards should exist for APV which is not based on SBAS/EGNOS. If such standards should be regarded necessary, they could be developed under the direction of EASA.

6.6.9.4 Organizations involved

- EUROCAE;
- RTCA;
- EUROCONTROL;
- FAA;
- ICAO.

6.6.9.5 Existing documentation

Reference Material

- [**ICAO_Annex10_RadioNavAids**] - SARPs concerning the requirements (clause 3), the specifications (appendix B) for the GNSS, and the information and material for guidance in the application of the GNSS SARPS (attachment D).

Related Material

- EUROCAE_ED72A] (EUROCAE WG-28): contains a minimum operational performance specification for airborne GPS receiving equipment intended to be used as a supplemental navigation system.
- [RTCA_DO229C] (RTCA SC-159): defines minimum performance, functions and features for WAAS based sensors that provide position information to a multi-sensor system or separate system (the term WAAS is used as one specific implementation of SBAS).
- [RTCA/EUROCAE_SBASL1L5] first draft (EUROCAE WG-62): has been presented for review to the meeting in December 2004. RTCA/EUROCAE_SBASL1L5 presents the Signal Specification for SBAS L1 and L5 signals, and can be considered as a first step for the development of the material to be proposed to ICAO for the writing of SBAS L5 SARPS. It has been produced as part of the activities of GEM WP 2111 (SBAS L5 SARPS drafting). The objectives pursued are basically the consolidation of the table of contents for the document in a SARPS-like structure and the insertion within this table of some of the material already available from previous works (for instance, RF characteristics for frequency L5). Further versions of this material filling up the clauses that are empty in this draft and accounting for the feedback from RTCA SC-159 and EUROCAE WG-62 members will be developed. A consolidated version is expected for EUROCAE WG-62 in June 2005.
- Technical Standard Order [FAA_TSOC145A] (FAA): prescribes to manufacturers seeking a TSO authorization or letter of design approval what minimum performance standards (MPS) their airborne navigation sensors, using the Global Positioning System (GPS) augmented by the Wide Area Augmentation System (WAAS), must first meet in order to obtain approval and be identified with the applicable TSO marking.
- Technical Standard Order [FAA_TSOC146A] (FAA): prescribes to manufacturers seeking a TSO authorization or letter of design approval what minimum performance standards (MPS) their stand-alone airborne navigation equipment, using the Global Positioning System (GPS) augmented by the Wide Area Augmentation System (WAAS), must meet to obtain approval and be identified with the applicable TSO marking.
- [ICAO_doc8071] (ICAO): aims to provide general guidance on the extent of testing and inspection normally carried out to ensure that GNSS procedures, using the SARPs specified in Annex 10, are appropriate for aviation use and that describes the ground and flight testing to be accomplished for a specific radio navigation aid. Clause 3 provides guidance for the ground and flight test procedures and tolerances to be applied to Satellite-based augmentation systems (SBAS) instrument approach procedures, including approach with vertical guidance (APV).
- [EUROCAE_ED88A] (EUROCAE WG-28/Subgroup 3): specifies the particular operational performance requirements applicable to airborne receiving systems with ILS and/or MLS and/or GLS and GNSS subsystems incorporated within a single equipment. The requirements of EUROCAE_ED88A are met by a MMR (Multi-Mode Receiver) which operates in one of up to four mutually exclusive Precision Approach modes addressed in EUROCAE_ED88A: ILS (Cat I-III), MLS (Cat I-III), GLS SBAS (Cat I), GLS GBAS (Cat I).

6.6.9.6 Current and future working groups, projects or trials

- EUROCAE WG-28 (Global Navigation Satellite System (GNSS): mission: Update of ED-88 (rev A) and analyse of GBAS for CAT II/III.
- RTCA SC 159 (GPS): this group develops minimum standards that form the basis for FAA approval of equipment using GPS as a primary means of civil aircraft navigation.
- EUROCONTROL APV WG.
- ICAO NSP GSSG: GNSS SARPS Sub-Group concerning SBAS L1/L5.
- ESA ORR (Operational Readiness Review) from the 10th of May 2005 to the 27th of May 2005.
- ICAO PANS-OPS: definition of the criteria for APV.

6.6.9.7 Void

6.6.9.8 Additional information

Conclusion

In addition to the work on the CS, action could be undertaken to:

- Require the early production of detailed commercial and legal arrangements concerning the level of service to be supplied and the agreed amount of core costs that would be charged to the aviation community in Europe for the use of EGNOS.
- Review the need for an IR based on the latest business case being conducted by EUROCONTROL. It is noted that an IR could cover both APV and Baro-aided VNAV if the intent was to ensure the availability of vertical guidance during the approach phase.

Descriptive text proposed to be included in Commission's mandate for this CS

Technical requirements for Approach with Vertical Guidance I/II exist as Standards and Recommended Practices from ICAO in the form of Signal-in-Space performance requirements and the SBAS signal specification. Corresponding Minimum Operational Performance Requirements for on-board equipment exist from RTCA (DO-229C). It has to be secured that Community Specifications will exist to

- transform the relevant standards into instruments foreseen in [2],
- define the processes and responsibilities for the certification of the SBAS service,
- define the detailed commercial and legal arrangements concerning the level of service and agreed amount of cost to aviation.

6.6.10 CS on Galileo, GNSS

6.6.10.1 Description

This item calls for a CS defining standards for aviation use of the Galileo navigation system, but the exact nature of this CS/these CSs should be reviewed.

Galileo, along with EGNOS, is Europe's contribution to GNSS. By providing a constellation in addition to GPS, Galileo will enhance the availability and continuity of service of GNSS. Integrity will also be enhanced by specific mechanisms being designed into Galileo which were not included in GPS.

While the benefit of increased availability and integrity through Galileo is acknowledged, it is currently impossible to identify a financial value for it. Therefore, no Cost Benefit Analysis demonstrating a high level of benefits has been accepted by the community. Additionally, GPS or GPS plus EGNOS are seen by some as sufficient for existing aviation applications. Further work is therefore required to establish and prove a role for Galileo in aviation.

Whatever the result of benefits calculations, aviation should be ready to be able to use Galileo signals as a world-wide source of navigation signals independent from, but interoperable with, GPS. This requires the production of avionics standards. The objective of this item is to ensure the timely production of such standards.

NOTE: As only one implementation of Galileo exists there is no risk of diversification which would lead to any lack of interoperability. Based on this fact it should not be deduced that standardization is not necessary. Galileo (in contrast to the GPS constellation operated under US jurisdiction) is to be certificated by European authorities. A standardization is therefore required to define the roles, responsibilities and processes for the certification of this system and to define the certification requirements and measures.

6.6.10.2 Status

The item was included in the Standardization mandate M/354 [1].

Current plans envisage Galileo to be operational by 2008. Allowing for delays, the operational use of Galileo for civil aviation could take place around 2010.

In support of this:

- Standards (SARPS) are currently being produced within the ICAO process.
- EUROCAE WG-62 is working on the production of initial MOPS for the first generation of GALILEO airborne receivers.

Potential benefits for EU:

- Galileo would be a major European contribution to the ICAO GNSS strategy.
- The institutional concerns within Europe regarding dependency on GPS would disappear.

Full confidence would be placed on the use of the GNSS system due to the combined use of GPS plus Galileo.

The GOBAN (GNSS Roadmap Study) of 2003 has compared a GNSS scenario with Galileo and a GNSS scenario without Galileo in order to determine what the contributions of Galileo could be.

It concluded that (subject to confirmation of some technical hypothesis) a combination of GPS II/F, plus SBAS plus GBAS for Cat II/III plus INS/IRS integrating a GPS-derived position update capability would allow for world-wide operations for all phases of flight.

According to the GOBAN study Galileo potential contribution might then be:

- Avoid the deployment of a SBAS infrastructure **world-wide**, which could prove to be an expensive solution unless SBAS is marketed as a multi-modal product, with aviation paying only a small share of the total cost.
- Reduce the number of places where GBAS Cat I would be required in spite of availability of SBAS, due to geometry (mountains).
- Offer "better than SBAS" landing capability, providing that the potential benefits exceed the cost of the lighting systems.
- Offer aircraft, other than first level aircraft, an alternative to INS/IRS or to SBAS for NPA if SBAS avionics do not come out cheap.

Yet according to the GOBAN study the most beneficial contribution from Galileo is to avoid a political debate centred on sovereignty (USA versus rest of the world) and on civil versus military GNSS ownership. Even where regions would have developed their own SBAS and GBAS systems, such as EGNOS for Europe, GPS dominance could still be seen as excessive and a number of states or groups of states would impose to keep at least one conventional infrastructure (DME or VOR) as back-up. This would seriously impact on the total cost of the navigation infrastructure, both on the ground and in the cockpit.

6.6.10.3 Timescales

Based on the above, decisions and implementation are highly dependant on:

- timely availability of SARPS covering Galileo signals specification (expected 2007/2008);
- plans for the upgrade of GPS (timing of the deployment of the constellation, pricing);
- plans for the deployment of a world-wide (or only regional) overlay for GPS offering APV I/II (or possibly Cat I landing capability when GPS II/F is available);
- the feasibility of achieving GBAS Cat II/III;
- the availability of a Galileo service for aviation.

A Community Specification for Galileo should be pursued in the mid-term, in order to permit that the system can be certificated to a European Standard immediately following its initial operational capability. In case that this could not be secured, the future commercial operator runs a risk of not being able to serve the safety critical markets without delay which may jeopardize the industrial success of the system. Relevant standards should therefore be in place by 2008 to support the system entry into service by 2009.

6.6.10.4 Organizations involved

- EUROCAE;
- RTCA;
- ESA;
- European Commission;
- Galileo Joint Undertaking.

6.6.10.5 Existing documentation

- [**ICAO_Annex10_RadioNavAids**] - SARPs concerning the requirements (clause 3), the specifications (appendix B) for the GNSS, and the information and material for guidance in the application of the GNSS SARPS (attachment D; Generic Requirements for GNSS signal-in-space).

Related Material

- [EUROCAE_Galileo].(EUROCAE WG-62) produces MOPS (clause 3) for Galileo civil aviation receiver This clause of the MOPS contains the minimum performance requirements and defines the common requirements applicable to the GALILEO class beta 1 equipment for all phases up to APV2.
- [RTCA/EUROCAE_SBASL1L5] first draft (EUROCAE WG-62): presents the Signal Specification for SBAS L1 and L5 signals, and can be considered as a first step for the development of the material to be proposed to ICAO for the writing of SBAS L5 SARPS. It has been produced as part of the activities of GEM WP 2111 (SBAS L5 SARPS drafting). The objectives pursued are basically the consolidation of the table of contents for the document in a SARPS-like structure and the insertion within this table of some of the material already available from previous works (for instance, RF characteristics for frequency L5). Further versions of this material filling up the clauses that are empty in this draft and accounting for the feedback from RTCA SC-159 and EUROCAE WG-62 members will be developed. A consolidated version is expected for EUROCAE WG-62 in June 2005.
- [ESA_GalileoICD] (ESA): was endorsed by the Galileo Signal Task Force of the European Commission (15/01/05). The Galileo Signal-In-Space Interface Control Document comprises extracts from the Galileo System Requirements document which is the top level document for Galileo development and validation phase.

- [EC_SAGA] Standardization Activities to Galileo (EUROPEAN COMMISSION): is the contribution of the air receiver work package (WP 2200) to the SAGA final draft of GALILEO standards for aviation (Final WP 2000 deliverable D20). It is the synthesis of four-years activities within SAGA as support to the development of future standards for GALILEO receiver.

- [EC_HLD] (EUROPEAN COMMISSION): the Galileo High Level Definition (HLD) presents a picture of the main characteristics of the Galileo programme and describes the services and performances offered in this way. It is used as the framework for the Galileo programme and is applicable to the Mission Requirement Document.

- [EC_MRD] (EUROPEAN COMMISSION): the Galileo Mission Requirements Document (MRD) defines the detailed mission requirements applicable to the Galileo Satellite Navigation System. EC_MRD provides details on the choice and on the definition of the various requirements of the MRD. A new update of the JMRD, which reflects the requirements of this new MRD Issue, will be produced right after completion of the MRD Issue 5 requirements review.

- [EC_SRD] (EUROPEAN COMMISSION): the Galileo System Requirements Document (SRD) specifies the final "Full Operational Configuration" of Galileo.

- [ICAO_doc8071] (ICAO): aims to provide general guidance on the extent of testing and inspection normally carried out to ensure that GNSS procedures, using the SARPs specified in annex 10, are appropriate for aviation use and that describes the ground and flight testing to be accomplished for a specific radio navigation aid.

6.6.10.6 Current and future working groups, projects or trials

- ICAO NSP (Galileo signal specification);

- EUROCAE WG62.

EUROCAE WG 28 Global Navigation Satellite System (GNSS)

Background:

The group is responsible for standards in the area of the Global Navigation Satellite System and MLS.

WG-28 co-ordinates its activity with RTCA SC 159 and the ICAO GNSS Panel.

Objectives:

WG-28 is has recently been tasked with:

- The Development of MOPS for the GBAS ground subsystem to support Cat I precision approach operations, and optionally the GBAS Positioning Service. The MOPS shall be compatible with the ICAO Annex 10 GBAS SARPs.

- An update the MOPS (Document ED-88) for airborne Multi Mode Receiver for ILS, MLS or GNSS to consider GBAS and SBAS in order to support Cat I precision approach and improved positioning function.

- The development of signal in space performance requirements for GBAS to support Cat II, Cat Ixia and Cat IIIb operations including directional take-off in low visibility.

- An update of the MOPS for MLS equipment.

Deliverables:

Recently completed documents:

- ED-95 "MASPS for a GNSS/GBAS System to support Cat I Operations".

- ED-114 "MOPS for GNSS/GBAS Ground System to support Cat I Operations".

- ED-88A "MOPS for a Multimode Receiver including ILS, MLS and GNSS".

Continuing work:

- Development of High Level Signal-in-Space Performance Requirements for GBAS Cat II/III operations. (Co-ordinated with RTCA SC-159).
- Update of MOPS for MLS equipment ED-53 (ground) and ED-36 (airborne).

EUROCAE WG62 GALILEO

Background:

GALILEO is the future European navigation satellite system including ground, space and airborne elements. Operations should start from 2008. In the same timeframe, GPS will be modernized, SBAS is expected to evolve to incorporate the GPS modernizations, and airborne receivers will need to evolve in order to incorporate the additional frequency (L5). The airborne GNSS function will be significantly impacted by multiple constellations and the new signals context.

As a consequence there is a need for a representative group of airborne and ground stakeholders able to interact during this process and specifically during the GALILEO definition phase. WG 62 is created to fill this need.

Objectives:

WG62 is a forum to discuss and make recommendations to the Galileo project on issues of concern to civil aviation airborne and ground equipment. To achieve efficiently this task, close relationship with Galileo project management has been established.

Deliverables:

- An operational concept document to be submitted to the relevant body.
- A MOPS for airborne GPS/Galileo/SBAS receiver equipment in a two-step approach as follows:
  - Interim MOPS to allow development of receiver;
  - Final MOPS to allow certification.
- A MOPS for both ground and airborne equipment for precision approach to Cat I, II, IIIB for a combined Galileo/GPS system.
- The need for standardization associated with the introduction of dual frequency SBAS services. In particular WG62 will contribute to the elaboration of the signal in space interface control document (ICD) for the SBAS L5 signal. This ICD will be used for harmonization with RTCA SC159 and ICAO GNSSP/NSP (Navigation System Panel).

GALILEO JOINT UNDERTAKING

Has put in place a committee of experts on the certification of Galileo.

6.6.10.7 Void

6.6.10.8 Additional information

Technical Issues

Galileo would be either an alternative to GPS or would be operated in combination with GPS.

As an alternative, Galileo would not offer to the aviation community major advantages above GPS IIF (or improved versions thereof) in particular if GPS is augmented by EGNOS, WAAS, MSAS and other regional overlay systems. Moreover GPS is offered free of charge (at least for the time being).

Combining GPS and Galileo is promising. This scenario raises a number of technical issues in particular concerning the interoperability of the signals, but is probably key for the implementation of a sole service GNSS across the world.

Conclusion

Development of this CS should enable commercial air transport, general aviation users and manufacturers to profit by a window of opportunity for a cost effective migration towards the use of robust GNSS services. These services are based on GPS (partially with SBAS) and Galileo around 2010 when a single receiver for both Galileo and GPSII/F should be available.

In addition to the work on the CS, action could be undertaken to:

- Monitor activities on SBAS and GBAS Cat II/III in conjunction with GPS because the analysis of Galileo / GNSS cannot be done in isolation.
- Monitor and influence the commercial and legal arrangements surrounding the concession of Galileo to a third party service provider so that the interests of airspace users and air traffic service providers are taken into account. At the same time give the manufacturing industry sufficient comfort as to potential revenue streams.

Descriptive text proposed to be included in Commission's mandate for this CS

Technical requirements for Galileo exist as generic GNSS Standards and Recommended Practices from ICAO in the form of Signal-in-Space performance requirements. The corresponding signal specification will be developed until 2007. Corresponding Minimum Operational Performance Requirements for on-board equipment are currently being developed by EUROCAE (WG62). It has to be secured that Community Specifications will exist to

- transform the relevant standards into instruments foreseen in [2];
- define the processes and responsibilities for the certification of the Galileo based services;
- define the detailed commercial and legal arrangements concerning the level of service and agreed amount of cost to aviation.

6.7 Surveillance

The drafting of an IR on surveillance performance is expected to be mandated to EUROCONTROL in the second half 2005. In order to avoid duplication of work, the drafting of CSs in the field of surveillance should only start, when the regulatory approach of this IR is sufficiently stable.

6.7.1 CS on ground-based primary radar equipment for use in the EATMN

6.7.1.1 Description

This CS derives appropriate technical requirements from the essential requirements contained in the Interoperability Regulation [2] and the RTTE Directive [9] including appropriate procedures for testing of ground-based primary radar equipment to replace existing national practices (which may have been notified to the European Commission) by a harmonized one.

6.7.1.2 Status

This CS was neither included in M/354 [1] nor in the document ICB/2/3 [5].

6.7.1.3 Timescales

Official Journal of the European Union, Regulation (EC) No 552/2004 [2] requires conformity declarations from the 20th October 2005 onward which - in principle - gives a need for harmonized EN covering all relevant essential requirements. On the other hand primary radar could be considered as legacy systems (lower priority), but there are interoperability issue with military surveillance systems.

6.7.1.4 Void

6.7.1.5 Existing documentation

- ICAO Annex 10;
- ICAO Doc 8071, Manual on testing of Radio Navigation Aids, Volume III, Testing of Surveillance Radar Systems;
- EUROCONTROL Standard Document for Radar Surveillance in En-route and Major Terminal Areas SUR.ET.1.1000-STD-01-01.

National practices, e.g. DEU: Reg TP SSB FL 001 (notified to the European Commission); see as well: http://europa.eu.int/comm/enterprise/tris/pisa/app/search/index.cfm?fuseaction=pisa_search_results&iStart=1&iYear=2004&sCountry=D&sProdType=V00T&LANG=EN&STYPE=STRUCTURED&iBack=2&iBack=3

6.7.2 Void

6.7.3 CS on Multilateration Equipment for use in the EATMN

6.7.3.1 Description

This CS derives appropriate technical requirements from the essential requirements contained in the Interoperability Regulation [2] and the RTTE Directive [9] including appropriate procedures for testing of multilateration equipment.

6.7.3.2 Status

This CS was neither included in M/354 [1] nor in the document ICB/2/3 [5].

6.7.3.3 Timescales

The work on this CS should start as soon as possible, since [2] requires conformity declarations from the 20th October 2005 onward which gives a need for harmonized EN covering all relevant essential requirements.

6.7.3.4 Organizations involved

EUROCAE WG-70

EUROCONTROL (sub-group of the surveillance team)

6.7.3.5 Existing documentation

- ICAO Annex 10;
- ICAO DOC 4444 chap. 8;
- EUROCONTROL Standard Document for Radar Surveillance in En-route and Major Terminal Areas SUR.ET.1.1000-STD-01-01;
- EUROCAE ED-116;
- National practices, e.g. DEU: Reg TP SSB FL 003 (notified to the European Commission); see as well: http://europa.eu.int/comm/enterprise/tris/pisa/app/search/index.cfm?fuseaction=pisa_search_results&iStart=1&iYear=2004&sCountry=D&sProdType=V00T&LANG=EN&STYPE=STRUCTURED&iBack=2&iBack=3

6.7.3.6 Void

6.7.3.7 Void

6.7.3.8 Additional information

At TCAM#19 it was confirmed that European Commission expects ATM equipment to be compliant with RTTE Directive [9] from 20 October 2005 onwards.

6.7.4 Void

6.7.5 CS on Surveillance Data Exchange

6.7.5.1 Description

This CS calls for the definition of a common format for the transfer of surveillance information. The intent is that the present document is basically a transposition of the existing ASTERIX standard.

The objective of this CS is to develop a standardized data format for the exchange of surveillance information:

- between components of the surveillance system (e.g. radars, multi-lateration systems, ADS-B receivers and SDPD); and
- between the surveillance function and other ATM functions.

The ASTERIX standard is considered the most appropriate to achieve this CS. It is generic (e.g. not relying on any underlying communication protocol) and is constantly updated to accommodate new surveillance systems and stakeholder needs. The objective of the All purpose STructured Eurocontrol suRveillance Information eXchange (ASTERIX) is to develop standards, specifications and guidelines related to the formatting of the surveillance-related data, exchanged between surveillance sensors and surveillance data processing systems.

The EUROCONTROL Agency has established a number of groups to aid the definition of ASTERIX and related standards. These are:

- The Surveillance Data Distribution Requirements Forum (SDDR-F), established by the Surveillance Team, has the following objectives:
  - to co-ordinate and develop common requirements, rules, procedures and guidelines, as well as to address and solve interoperability issues for the exchange and distribution of surveillance data in network environments (including interconnected networks);
  - to co-ordinate and develop common rules and procedures for the exchange and distribution of surveillance data between ANS Providers (civil/military).
- Surveillance Data Exchange - Focus Group (SDE-FG) for the detailed definition and maintenance of the ASTERIX standard.

The EUROCONTROL "Guidelines For An Agreement For The Shared Use Of Radar Sensor Data" [8] sets out a number of principals for the sharing of radar data. It makes reference to the ASTERIX standard and sets out guidelines for setting up an agreement between the supplier and user of radar data.

6.7.5.2 Status

EC ICB Recommended Priority: Priority 2.

The CS was included in the Standardization Mandate M/354 [1].

6.7.5.3 Timescales

ASTERIX is a mature standard, it is anticipated that a CS could be developed within one calendar year, but the content of the proposed IR on surveillance performance should be taken into account.

6.7.5.4 Organizations involved

- EUROCONTROL;
- ANSPs.

6.7.5.5 Existing documentation

EUROCONTROL Standard Asterix Vsn 1.29 and related documents for ASTERIX categories.

6.7.5.6 Void

6.7.5.7 Void

6.7.5.8 Additional information

Descriptive text proposed to be included in Commission's mandate for this CS.

ASTERIX is a mature EUROCONTROL standard for Surveillance data formats which is being widely used within Europe and other parts of the world.

The purpose of this CS is to define common sets of surveillance data and their formats to be used between surveillance data sources and user/ATM systems and between ATM systems to support seamless surveillance. The CS should adopt the formats already defined in the ASTERIX Standard.

6.7.6 Void

6.7.7 CS on surveillance services using ADS-B

6.7.7.1 Description

In order to cater for the increased capacity demands, the ATM systems must undergo significant changes over the next few years. Key to the development will be the introduction of new data link applications to support communications, navigation and surveillance. The planned introduction of new data link technologies and services will provide safety, capacity and efficiency benefits. Most significantly, the introduction of an ADS-B system capable of providing aircraft derived Trajectory or Intent information will provide substantial benefits both to the ground and airborne segments of ATM. Through periodic broadcast of aircraft identification, position and trajectory (intent) data both to the ground systems and to other aircraft, ADS-B will provide new means for ATC surveillance supplementing current radars and offer surveillance capabilities in regions with no radar infrastructure. It is also a key element for the introduction of "Time Navigation" into European airspace and airports. ADS-B will also provide a new level of pilot situational awareness, and support the detection of conflicts, not only for airborne traffic, but also on the airport surface.

Availability of surveillance data in the cockpit will allow the aircrew to take a more active role in the ATM process and allow pilots and controllers to share separation tasks. Data links will provide new opportunities for downlink of additional aircraft derived data to support enhanced ATC surveillance and uplink of information for use on aircraft.

This CS will describe requirements and will be independent of any technology.

6.7.7.2 Status

This CS was neither included in M/354 [1] nor in the document ICB/2/3 [5].

6.7.7.3 Timescales

There exist quite a number of results from former programmes and trials; outside the European Union plans exists at least for one large scale implementation programme (RUS).

After lengthy discussions TG25 proposed to put this CS in group I of the candidate CSs. ICB is invited to decide finally about the recommendation whether this CS will be located in group I or II.

The essential arguments to allocate it to group I are that:

- there is a lot of preparatory R&D-work (nationally funded and funded by European Commission);
- there are plans for a large scale implementation in Russia; and
- there are ENs (developed by ETSI) for ground-based and airborne equipment (using VDLM4 technology) to the support the application of ADS-B.

This altogether is considered to be sufficient to start reasonable work on a Community Specification.

Essential arguments for allocation to group II are:

- that the implementing rule on surveillance performance should be sufficiently stable before the work on a means of compliance to it (i.e. this CS) will be started to avoid additional rework to fix incoherencies;
- that there are interdependences with the activities on ConOps and architecture (in group II and in SESAME definition phase);
- that relevant parts of the SESAME definition phase should have conclusive results before starting activities on Community Specifications which will materialize during SESAME implementation phase (otherwise resource consuming coordination activities will be necessary and/or duplication of work could be expected distracting scarce resource from SESAME definition phase activities).

If it would be decided to mandate work on this CS in group I, it should seriously be considered to install appropriate precautionary measures to avoid the side effects described above.

6.7.7.4 Organizations involved

- ICAO;
- EUROCONTROL;
- EASA;
- ETSI;
- EUROCAE WG51.

6.7.7.5 Existing documentation

- ICAO Annex 10.
- ICAO SARPs, published November 2001 and ICAO Doc. 9816, AN/448, published June 2004.
- ETSI ENs for VDL Mode 4 Airborne Equipment (EN 302 842, parts 1-4) and Ground systems (EN 301 842, parts 1-4).

NOTE: ICAO and ETSI documents are covering ADS-B, TIS-B, FIS-B, GNSS Augmentation and Point-to-Point communications (e.g. CPDLC and AOC).

- The ATM Concept, Generic Aircraft Systems, December 2004.
- RTCA ADS-B MASPS, DO-242A.
- Roadmap for the implementation of data link services in European Air Traffic Management (ATM), European Commission, February 2003.
- EUROCAE WG51: MASPS for Airborne Surveillance Applications and for Ground Surveillance Applications, jointly with RTCA SC-186.
- Evaluation of STDMA for Use on the Airport Surface, Phase II Test Report, FAA, October 6, 19.
- ICAO SCRSP ASAS Circular.

- ICAO OPLINK Panel Concept of Operations for ADS-B.
- ICAO ANC 11 Conclusions and recommendations, especially concerning the interoperable datalink of 1090 Extended squitter.
- Surveillance Development Road map (ADS/RMAP/SUR/D1-04).
- DO-260/ED-102 ADS-B 1090 MOPS.
- DO-260A-V1 1090 MOPS.
- DO-260A-V2 1090 MOPS.
- DO-286 TIS-B MASPS.
- DO-286A TIS-B MASPS.
- DO-289-Vol1 ASA MASPS.
- DO-289-Vol2 ASA MASPS.
- UAT MOPS.
- ED-108A Interim VDL4 MOPS.
- ADS-B NRA OSED, SPR and INTEROP (publication expected early 2006; under development by RFG).
- ASPA S&M OSED and SPR (publication early 2006; under development by RFG).

6.7.7.6 Current and future working groups, projects or trials

EUROCONTROL programmes CASCADE and CRISTAL.

6.8 Aeronautical Information Services (AIS)

The purpose of the IR on Aeronautical Information Services will be to ensure aeronautical information of sufficient quality, accuracy, timeliness and granularity as a key enabler of the present and future Air Traffic Management (ATM) systems. This implementing rule will bring forward provisions which ensure compliance to existing ICAO Annex 15 data integrity requirements and complement them by describing performance requirements for data origination, transfer and processing. Close cooperation will be achieved with the JAA/EASA and take account of the provisions of EUROCAE Document ED76 (Industry Standards for the Processing of Aeronautical Data) to ensure that the part of the process from publication to end-use is addressed in parallel.

The IR will address:

- The objective and scope of the Rule (noting that for the purposes of the mandate, EUROCONTROL's scope of responsibility within the aeronautical data process extends from data origination through to publication in the AIP and/or EAD).
- Technical provisions to ensure the compliance to existing provisions of Annex 15 for ensuring aeronautical information data quality (accuracy, resolution and integrity).
- Technical provisions describing the performance requirements for how data shall be originated transferred electronically from one party to another and how data shall be automatically handled and processed. Specifically, provisions shall ensure achievement of the necessary levels of integrity, security and validation.
- Conformity assessment requirements.
- Provisions specifying implementations conditions.

Community Specifications and guidance material required for ensuring compliance with regulatory provisions will also be identified, taking into account current activities to develop appropriate Means of Compliance, software tools and other guidance/procedural material as appropriate and plans to provide support to training and implementation. It may not be possible to define the exact specification and content of the related mandatory, CS and guidance materials until the regulatory approach has been defined and agreed.

6.8.1 CS on AIS - Generic data process and Principles (including Data and Quality Management)

6.8.1.1 Description

This proposed CS should be a means of compliance to the a.m. IR and should be described after the regulatory approach has been defined.

6.8.1.2 Status

This CS was included in M/354 [1] in general terms, but not in the document ICB/2/3 [5].

6.8.1.3 Void

6.8.1.4 Void

6.8.1.5 Existing documentation

- ICAO Annex 15 (4, 11, 14);
- EUROCAE ED 76 - Industry Standards for the processing of Aeronautical Data..

6.8.2 Void

6.8.3 CS on Integrity of Aeronautical Information - Data Origination

6.8.3.1 Description

This proposed CS should be a means of compliance to the a.m. IR and should be described after the regulatory approach has been defined.

6.8.3.2 Status

This CS was included in M/354 [1] in general terms, but not in the document ICB/2/3 [5].

6.8.3.3 Void

6.8.3.4 Organizations involved

- ICAO;
- EUROCONTROL.

6.8.3.5 Void

6.8.3.6 Current and future working groups, projects or trials

EUROCONTROL Guidance Material under development.

6.8.4 Void

6.8.5 CS on Integrity of Aeronautical Information - Data Publication

6.8.5.1 Description

This proposed CS should be a means of compliance to the a.m. IR and should be described after the regulatory approach has been defined.

6.8.5.2 Status

This CS was included in M/354 [1] in general terms, but not in the document ICB/2/3 [5].

6.8.5.3 Void

6.8.5.4 Organizations involved

- ICAO;
- EUROCONTROL.

6.8.5.5 Existing documentation

EUROCONTROL Guidance Material under development.

6.9 Use of Meteorological Information

6.9.1 CS on Systems and Procedures for the Use of Meteorological Information

6.9.1.1 Description

Meteorological information is already well defined within ICAO and World Meteorological Organisation (WMO) framework (both for the products itself as for the distribution and use of the information). However, the distribution of information between MET and ATM domain systems could benefit from a community specification, especially in a CDM environment.

These domain systems are:

- Airport systems making use of meteorological information.
- Distribution Systems of MET information for ATM.

6.9.1.2 Status

This CS was neither included in M/354 [1] nor in the document ICB/2/3 [5]; it has been proposed by an MET expert group.

6.9.1.3 Timescales

Period of time required: 2007-2009.

Expertise required: MET and ATM systems experts and technical experts.

6.9.1.4 Organizations involved

- MET providers;
- ANSPs;
- MUAC EUROCONTROL.

6.9.1.5 Existing documentation

- ICAO Annex 3, Annex 5, Annex 10, Annex 14, Annex 15;
- ICAO Doc. 4444 (PANS ATM);
- ICAO Doc. 8896;
- ICAO Doc. 9750 (Clause 8);
- WMO Doc. 306;
- WMO Doc. 731;
- WMO Doc. 732;
- ICAO EUR Doc. 010.

6.9.1.6 Current and future working groups, projects or trials

In many European states non-standard solution are implemented for the interface between ATM and MET systems; currently projects under development within the MUAC and the CEATS in co-operation with MET service providers.

7 Group III of candidate Community Specifications (work on Community Specification to be started by 2008 or later)

The following clauses follow the ATM subject headings as listed in Annex I of the Interoperability Regulation [2].

7.1 General

7.1.1 CS on Reference Concept of Operation (including long term)

7.1.1.1 Description

This entry is the extension of the medium term Reference Concept of Operation (see above) to include the long term perspective based both on the EUROCONTROL Concept of Operations for 2020 (ConOps 2020) Volume III which represents the 2nd step in the evolution of the European ATM system towards the vision expressed in the OCD as well as on the findings of the SESAME definition phase. It is the objective of this CS to determine an agreed overall Concept of Operations to be implemented in the long term (2011-2020) having a formal status under the SES interoperability Regulation.

7.1.1.2 Status

This CS was neither included in M/354 [1] nor in the document ICB/2/3 [5].

This work is of primary importance for any ATM system definition following a Model Driven Approach (MDA) as defined by Industry standards. It provides the methodology which frameworks ATM operational concepts activities providing a vision to achieve, complemented with a detailed coherent and consistent overview of how the European ATM system works. In addition it provides the traceability context to identify and analyse the impact of any changes within the system.

Ignoring the primary importance of this issue will contribute to maintain a fragmented view of the ATM system trough the proliferation of contradicting concepts and creating the opportunities to fail on implementing interoperable ATM systems.

7.1.1.3 Timescales

The OCD Volume I and ConOps Volume II are already completed. ConOps Volume III is under development. All this set of documents will be updated within the framework of the SESAME Definition Phase under Work Package 2.2.

7.1.1.4 Organizations involved

EUROCONTROL has an Operational Concept Document Drafting Group (OCD DG), consisting of internal and external stakeholders, as part of the Operational Concept and Architecture (OCA) activity carried out in the EUROCONTROL ATM Strategy and Concepts Business Division.

The Operational Concept documentation described above will support the Single European Sky ATM Modernisation programme (SESAME), the Definition Phase of which has just been launched by the Commission and EUROCONTROL, The SESAME consortium will provide the necessary working structure to support this development. EUROCONTROL will ensure the means to maintain these reference documentation and corresponding approval process under configuration management.

7.1.1.5 Existing documentation

The operational concept is defined in the EUROCONTROL OCD (a high-level vision for the year 2020) and the ConOps (detailed concepts of operations for the years 2011 and 2020) documents. Both the OCD and the ConOps for the target year 2011 are available on the EUROCONTROL website:
http://www.eurocontrol.int/oca/public/standard_page/op_concept.html.

C-ATM project documentation.

Proposal of the SESAME consortium for the definition phase of SESAME.

7.1.1.6 Current and future working groups, projects or trials

SESAME WP 2.2

7.1.1.7 Void

7.1.1.8 Additional information

EUROCONTROL CONOPS 2011 contains an ATM Process Model that shows, inter alia, the interfaces between the ATM components throughout all the ATM planning phases. A full traceability is being established from the ATM Process Model to a set of Requirements (Operational, Functional, Performance and Safety) leading to the development of Use Cases (description of responsibilities and interactions between ATM personnel and systems). These Use Cases are the basis for the development of the OATA Logical Architecture, which provides back a traceability to the Concept of Operations by mapping Operational Improvements and Enablers, as defined in the framework Strategic Network Performance activity of EUROCONTROL.

7.1.2 to 7.1.7 Void

7.1.8 CS on UAV Systems Operation

7.1.8.1 Description

At present UAV Systems are used extensively for military and state applications in more than 50 countries around the world. However, it is foreseen that in the near future UAV Systems will be used globally in civil and commercial applications as well. Initial civil users may include customs, police, environmental and metrological institutions, research organizations etc. Initial commercial applications may include e.g. freight and parcel delivery, structural and environmental inspection, aerial photography and mapping, agricultural applications, pipeline and power line inspection.

The Euro UAV ICB has the objective to provide its views and recommendations towards the routine, safe and reliable operation of UAV Systems in European Airspace. It is widely recognized that the key for successful introduction of UAV Systems in the European Airspace lies with obtaining an "Equivalent Level of Safety" for UAV System operations compared to the present (manned) Airspace use.

The Euro UAV ICB, together with a number of important Airspace Management stakeholders, such as EUROCONTROL, EASA, EUROCAE and ETSI, have identified priorities in (technological and operational) objectives with respect to, amongst others airworthiness, system-worthiness, safety and security allowing flexible UAV System operations and interoperability in European Airspace and its ATM Network.

7.1.8.2 Status

This CS has not specifically been included in the Standardization Mandate M/354.

7.1.8.3 Timescales

The below timeline is foreseen for the definition of

- 2006 - 2008: preliminary specifications and draft standard;
- 2008 - 2010: completion of community specifications and issue of final standard (to be verified and acknowledged by stakeholders).

7.1.8.4 Organizations involved

- JAA / EASA;
- ETSI;
- EUROCONTROL;
- EUROCAE;
- Euro UAV ICB;
- Members: ADSE, The Netherlands, Boeing R&T, Spain, Dassault Aviation, France, Diehl BGT Defence, Germany, EADS DCS, France, EADS GmbH, Germany, Galileo Avionica, Italy, QinetiQ, United Kingdom, S2-ATM Ltd, United Kingdom, Saab, Sweden, Sagem Defence and Security, France, Sinovia, France, Stork Fokker, The Netherlands, Thales Airborne Systems, France, Thales Avionics, France, Thales Aerospace, United Kingdom, Ultra Electronics SCS, United Kingdom.
- Observers: IAI-Malat Division, Israel, Elbil Systems, Israel, UAV DACH, UVS International.

7.1.8.5 Existing documentation

Below a list of some existing documentation (not exhaustive):

- JAA/EUROCONTROL UAV Task-Force report;
- UK CAA CAP722 document;
- EUROCONTROL UAV OAT report;
- ASTRAEA TOR definition;
- UNITE / ACCESS5 and RTCA SC-205 TOR definitions;
- UAV Systems Airworthiness Requirements (USAR);
- Applicable ICAO documents, e.g. Doc 4444;
- Applicable EN 301 842 and EN 302 842.

7.1.8.6 Current and future working groups, projects or trials

See above.

7.1.8.7 Void

7.1.8.8 Additional information

This mandate addresses the development of Community Specifications for efficient operation of UAV Systems in European Airspace and its ATM environment, and involves specifications required to ensure safe, secure, interoperable and efficient use of UAV Systems.

The work is divided into two phases: the first phase concentrates on the development of draft CS, while the second involves modifications and completion of the CS following broad stakeholder consultation and validation.

In addition to the work on this CS the availability of frequencies for the remote piloting of UAVs has to be ensured. If not included in this CS, a CS on the remote control system and the information downlink system may be necessary.

There is an EASA advance-NPA that is undergoing EASA internal consultation. This A-NPA will propose a policy for UAV Type certification basis. The next steps of EASA activity will depend of the result of the consultation on this A-NPA. The development of a comprehensive UAV regulation necessitates the cooperation of several bodies in Europe and also the cooperation with other Authorities outside Europe is necessary. The comprehensive regulation should be supported by an adequate safety justification.

7.1.9 CS on En-route and Airspace CDM

7.1.9.1 Description

This CS should be a transposition of the relevant documents developed on this topic within DMEAN and SESAME definition phase.

7.1.9.2 Status

This CS was neither included in M/354 [1] nor in the document ICB/2/3 [5].

7.1.9.3 Timescales

Important field, but not yet mature for standardization; standardization should be assessed after DMEAN implementation.

7.1.9.4 Organizations involved

- EUROCONTROL;
- ANSPs.

7.1.9.5 Existing documentation

- DMEAN Concept of Operations, edition 1.0;
- DMEAN Master plan, final draft (16.09.04);
- DMEAN Operational Requirement Documents (ORD) (2005/2006).

7.1.9.6 Current and future working groups, projects or trials

EUROCONTROL DMEAN framework programme and DMEAN Steering Committee.

7.1.9.7 Void

7.1.9.8 Additional information

An integrated ASM/ATFCM planning process based on an airspace structure design ready for dynamic modifications and data reflecting the airspace utilization anticipated, might be called the core-function of DMEAN. This consistent management of air-traffic, ATS routes and associated airspace has to be seen as a rolling process starting in the strategic phase (up to 5 years ahead) and lasting until the OPS day aiming to ensure an optimum use of European airspace for all users. As such the enhanced ATM processes and procedures for the dynamic management of airspace allocation and traffic flows will result in an increased efficiency in airspace-utilization for all airspace users in respect of their operational and economic requirements.

A successful operation of the Dynamic Management of European Airspace Network requires the harmonious participation of planners, designers and service providers on local, regional and network levels, working together with airports and airspace users. The functional integration of the collaborative processes:

- at airports; and
- during the airborne-phase of flights,

will ensure common situational awareness based on shared data, agreed coordination rules, procedures, protocols as well as clear responsibilities and transparent decisions for all actors involved.

Although the on-going CDM activities at airport level are outside of the scope of DMEAN (DMEAN is not involved in improving airside operations per se but rather enhancing the interface between airside operations and the en route phase of flight) the functional integration envisaged needs an extension of the airport CDM activities to the associated airspace (network CDM) in order to allow airspace-users a unique and synchronized gate-to-gate operation throughout Europe.

Therefore the definition and agreement of collaborative processes for integrated collaborative airspace design, airspace-planning, demand and capacity balancing including appropriate management processes before departure and post departure will form an essential part of DMEAN.

Relevant processes to be considered may be:

- advanced route-network and airspace design;
- ATFCM/ASM-processes before departure;
- airspace allocation;
- demand / capacity - balancing;
- post departure ATFCM/ASM-processes.

7.2 Airspace Management

There is no proposed CS in this timeframe.

7.3 Air Traffic Flow Management

7.3.1 to 7.3.5 Void

7.3.6 CS on Advanced Data Exchange Formats

7.3.6.1 Description

Should be developed during SESAME definition phase if needed.

7.3.6.2 Status

This CS was neither included in M/354 [1] nor in the document ICB/2/3 [5].

7.3.6.3 Timescales

Standardization should be assessed within SESAME, when needs on advanced Data Exchange Formats are more mature.

7.3.7 CS on European Air Traffic Flow Management (CFMU/IFPS (TACT and CADF, ETFMS))

7.3.7.1 Description

This CS is primarily a transposition of existing EUROCONTROL documents to recognize these documents under the Interoperability regulation.

7.3.7.2 Status

This CS was neither included in M/354 [1] nor in the document ICB/2/3 [5].

7.3.7.3 Timescales

CS may be necessary depending on the outcome of EUROCONTROL's Conformity Assessment Task Force to provide for a basic document on which ANSPs could draw the verification of systems for use of CFMU and IFPS.

7.4 Air Traffic Services (ATS)

7.4.1 to 7.4.8 Void

7.4.9 CSs on Interfaces between Controller Working Positions and Data Processing (flight and Surveillance Data)

7.4.9.1 Description

Should be defined during SESAME definition phase if needed.

7.4.9.2 Status

This CS was neither included in M/354 [1] nor in the document ICB/2/3 [5].

7.4.10 CSs on Interface with Flight Data Operator Positions

7.4.10.1 Description

Should be defined during SESAME definition phase if needed.

7.4.10.2 Status

This CS was neither included in M/354 [1] nor in the document ICB/2/3 [5].

7.4.11 Void

7.4.12 CSs on Interfaces with Local Centre sub-systems (Surveillance Systems, Supervision System, Recording System, Data Analysis System, Adaptation Database)

7.4.12.1 Description

Should be defined during SESAME definition phase if needed.

7.4.12.2 Status

This CS was neither included in M/354 [1] nor in the document ICB/2/3 [5].

7.4.13 CSs on Flight Plan Information Subscriber systems (for e.g. Airline Operators and Airports)

7.4.13.1 Description

Should be defined during SESAME definition phase if needed.

7.4.13.2 Status

This CS was neither included in M/354 [1] nor in the document ICB/2/3 [5].

7.4.14 Void

7.4.15 CS on Interoperability of Flight Data Processing (Middleware ATM-ATM)

7.4.15.1 Description

This item concerns the development of unified and standardized interfaces between FDP systems.

This CS is the second step of a CS development programme providing global interoperability for FDP Systems defining ATC-non ATC and non ATC -non ATC interfaces for FDP systems.

The development of the CSs will be based on the Flight Object Model specification. Work ongoing for the iTEC and COFLIGHT projects should be considered as basis for the CSs.

In addition, and for both work packages, middleware interoperability will be addressed in order to achieve the necessary services interoperability between different middleware products.

7.4.15.2 Status

This CS has been included in the Standardization Mandate M/354 [1]. It has also been identified in point 7 of the "Draft Justification Material - Draft Implementing Rule for Co-ordination and Transfer".

7.4.15.3 Timescales

The timescale expected for the development of the package one through ICOG (COFLIGHT and iTEC-eFDP) and EUROCAE WG59 is expected to be end 2007.

The timescale expected for the development of the package two through EUROCONTROL FDM SG and EUROCAE WG59 is expected to be mid 2008.

7.4.15.4 Organizations involved

- ICOG (COFLIGHT and iTEC-Projects);
- EUROCAE;
- EUROCONTROL.

7.4.15.5 Existing documentation

- FOIPS study results (mid 2006);
- ATC-ATC architecture for FDP Interoperability (ICOG study)(mid 2006).

7.4.15.6 Current and future working groups, projects or trials

- ICOG (COFLIGHT and iTEC-projects);
- EUROCAE WG59;
- EUROCONTROL (FOIPS) mid 2006;
- EUROCONTROL FDM SG.

7.4.15.7 Void

7.4.15.8 Additional information

Technical Issues

- In practice, it is likely that the CS for ATC-ATC FDP Interoperability would be to be defined and agreed between the Industry suppliers of the iTEC-eFDP and COFLIGHT projects. It needs to be regarded therefore as a means to achieve the objectives of data sharing and interoperability between ATC systems.
- The validation of the CS for ATC-ATC FDP Interoperability would be done through the COFLIGHT and iTEC-eFDP developments.

Conclusion

Work has already been initiated in this area by ICOG, EUROCAE WG59 and Eurocontrol. The development of a CS for ATC-ATC FDP Interoperability is largely dependent on the ICOG co-operation (including the Industry suppliers) and on the development of the COFLIGHT and iTEC-eFDP projects. Such a CS should be extended to a global Interoperability for FDP systems.

Descriptive text proposed to be included in Commission's mandate for this CS

Flight Data Processing and the sharing of Flight Data are of key importance for ATM. In order to provide a comprehensive and consistent view of relevant flight data to all involved stakeholders a CS on Interoperability for Flight Data Processing should be developed. The purpose of these CSs is to define interfaces (including the middleware aspects) between the Flight Data Processing Systems for flight data update and distribution in order to share consistent and up-to-date flight data between all ATM systems.

7.5 Communication

7.5.1 Void

7.5.2 Void

7.5.3 CS on Directory Service in support of AMHS

7.5.3.1 Description

Should be defined during SESAME definition phase if needed.

7.5.3.2 Status

This CS was neither included in M/354 [1] nor in the document ICB/2/3 [5].

7.5.4 Void

7.5.5 CS on VoIP (including air-ground VoIP/Ethernet) for use in EATMN

7.5.5.1 Description

This entry is a further update of the CS for the voice telephony CS (ground-ground) to include air-ground voice over IP/Ethernet.

7.5.5.2 Status

This CS was neither included in M/354 [1] nor in the document ICB/2/3 [5]; An inventory of Ground/Ground applications and a proposed list of derived CSs should be discussed and agreed by a stakeholder expert group.

7.5.5.3 Void

7.5.5.4 Organizations involved

- EUROCAE WG-67.
- Action Plan 17 (EUROCONTROL/FAA for air/ground com).

7.5.5.5 Void

7.5.5.6 Current and future working groups, projects or trials

EUROCAE WG-67:

- Technical specifications (mid 2006);
- Operational specifications;
- Manual on RCP (2006/2007);
- Guidelines on validation.

7.6 Navigation

7.6.1 Void

7.6.2 Void

7.6.3 CS on distance measuring ground equipment (DME)

7.6.3.1 Description

This CS derives appropriate technical requirements from the essential requirements contained in the Interoperability Regulation [2] and the RTTE Ddirective [9] including appropriate procedures for testing of distance measuring equipment (DME) to replace existing national practices (which may have been notified to the European Commission) by a harmonized one.

7.6.3.2 Status

This CS was neither included in M/354 [1] nor in the document ICB/2/3 [5].

7.6.3.3 Timescales

The Official Journal of the European Union, Regulation (EC) No 552/2004 [2] requires conformity declarations from the 20th October 2005 onward which - in principle - gives a need for harmonized EN covering all relevant essential requirements. On the other hand DME could be considered as legacy systems (lower priority).

7.6.3.4 Organizations involved

ICAO Navigation Systems Panel (NSP) working on ensuring DMEs compatible with E5/L5 GNSS and upgrading specification for DME(P) for MLS. The specification already exists but the DME(P) equipment is not expected to be in existence until 2008, at the earliest.

7.6.3.5 Existing documentation

- ICAO Annex 10;
- ICAO DOC 8071.

National practices, e.g. DEU: Reg TP SSB FL 006 (notified to the European Commission); see as well: http://europa.eu.int/comm/enterprise/tris/pisa/app/search/index.cfm?fuseaction=pisa_search_results&iStart=1&iYear=2004&sCountry=D&sProdType=V00T&LANG=EN&STYPE=STRUCTURED&iBack=2&iBack=3.

- EUROCAE ED 27 "MOPR for airborne area navigation systems based on VOR and DME as sensors".
- EUROCAE ED 28 "MPS for airborne area navigation computing equipment based on VOR and DME as sensors".
- EUROCAE ED 39 "MOPR for airborne area navigation systems based on two DME as sensors".
- EUROCAE ED 40 "MOPR for airborne computing equipment for area navigation system using two DME as sensors".
- EUROCAE ED 54 "MOPR for DME interrogators (DME/N and DME/P) operating within the radio frequency range 960-1215 MHz (airborne equipment).
- EUROCAE ED 57 "MOPR for DME/N and DME/P (ground equipment).

7.6.3.6 Void

7.6.3.7 Void

7.6.3.8 Additional information

An additional CS on corresponding airborne equipment may be necessary if legal investigation shows applicability of interoperability regulation to airborne constituents of the EATMN.

7.6.4 CS on ILS ground equipment

7.6.4.1 Description

This CS derives appropriate technical requirements from the essential requirements contained in the Interoperability Regulation [2] and the RTTE Directive [9] including appropriate procedures for testing of localizer radio equipment to replace existing national practices (which may have been notified to the European Commission) by a harmonized one.

7.6.4.2 Status

This CS was neither included in M/354 [1] nor in the document ICB/2/3 [5].

7.6.4.3 Timescales

Official Journal of the European Union, Regulation (EC) No 552/2004 [2] requires conformity declarations from the 20th October 2005 onward which - in principle - gives a need for harmonized EN covering all relevant essential requirements. On the other hand ILS could be considered as legacy systems (lower priority).

7.6.4.4 Organizations involved

ICAO Navigation Systems Panel (NSP) working on potential for life extension by reducing the interference by reducing the radiated area. This is expected to be completed in 3-4 years, but any new equipment so specified will not be available for 10-15 years.

7.6.4.5 Existing documentation

- ICAO Annex 10;
- ICAO DOC 8071;
- National practices, e.g. DEU: Reg TP SSB FL 012 and TP SSB FL 005 (notified to the European Commission); see as well: http://europa.eu.int/comm/enterprise/tris/pisa/app/search/index.cfm?fuseaction=pisa_search_results&iStart=1&iYear=2004&sCountry=D&sProdType=V00T&LANG=EN&STYPE=STRUCTURED&iBack=2&iBack=3

- EUROCAE ED 46 "MOPS for airborne ILS localizer receiving equipment";
- EUROCAE ED 46 "MOPS for airborne ILS glide path receiving equipment";
- EUROCAE ED 88 "MOPS for Multi-Mode Airborne Receiver (MMR) including ILS, MLS and GPS used for Supplemental Means of Navigation".

7.6.4.6 Current and future working groups, projects or trials

ICAO Systems Navigation Panel.

7.6.4.7 Void

7.6.4.8 Additional information

An additional CS on corresponding airborne equipment may be necessary if legal investigation shows applicability of interoperability regulation to airborne constituents of the EATMN.

7.6.5 Void

7.6.6 Void

7.6.7 CS on MLS

7.6.7.1 Description

This CS derives appropriate technical requirements from the essential requirements contained in the Interoperability Regulation [2] and the RTTE Directive [9] including appropriate procedures for testing of localizer radio equipment to replace existing national practices (which may have been notified to the European Commission) by a harmonized one.

7.6.7.2 Status

This CS was neither included in M/354 [1] nor in the document ICB/2/3 [5].

7.6.7.3 Timescales

Official Journal of the European Union, Regulation (EC) No 552/2004 [2] requires conformity declarations from the 20th October 2005 onward which - in principle- gives a need for harmonized EN covering all relevant essential requirements. On the other hand it should be considered that there are currently only very few installations planned.

7.6.7.4 Organizations involved

None - but ICAO NSP is expected to address MLS problems (see below) with a target date for solution of 2009.

7.6.7.5 Existing documentation

- ICAO Annex 10;
- ICAO DOC 8071;
- National practices, e.g. DEU: Reg TP SSB FL 0xx (Draft; not yet notified to the European Commission);
- EUROCAE ED 36 "MOPS for MLS airborne receiving equipment";
- EUROCAE ED-53 "MOPS for MLS (ground equipment)";
- EUROCAE ED 74 MOPS for combine ILS and MLS airborne receiving equipment";

- EASA ETSO.2C104 (a).

7.6.7.6 Current and future working groups, projects or trials

See above.

7.6.7.7 Void

7.6.7.8 Additional information

First operational example has revealed an inadequacy of the existing standards. Problems of radiated reflections are currently investigated. An EU policy is needed (ETSI?) but the outcome has to be global.

An additional CS on corresponding airborne equipment may be necessary if legal investigation shows applicability of interoperability regulation to airborne constituents of the EATMN.

7.6.8 CS on Ground Based Augmentation Systems (CAT II/III)

7.6.8.1 Description

This item calls for the development of a CS to define the technical requirements for Category II / III precision approaches relying on GBAS.

Ground Based Augmentation System (GBAS) is a candidate for a replacement for the current Instrument Landing System (ILS). GBAS employs a local monitoring network and VHF data link to uplink differential corrections to GNSS (currently using GPS) signals along with the required final approach segment. GBAS requires the correct operation of the GNSS constellation.

The objective of this item is to ensure that the necessary standards exist for the timely deployment of GBAS systems supporting Cat II/III operations.

7.6.8.2 Status

EC ICB Recommended Priority: Priority 3 (no differentiation for CAT I - III).

It was included in the Standardization Mandate M/354 [1].

ICAO standards for GBAS Cat I were produced in 2002 and by the end of 2003 EUROCAE had produced MOPS for the MMR (ED-88A) together with MOPS for the ground GBAS component (ED-114). ICAO PANS OPS Doc 8168 Vol. II is in place since 25 November 2004.

However, GBAS Cat II/III is still being worked on by the Navigation System Panel of ICAO who are working on the production of high level standards and EUROCAE WG 62 who are working on the production of relevant MOPS for the multi-mode receiver.

It is understood that significant technical obstacles are still to be overcome before standardization of GBAS Cat II/III can be finalized.

7.6.8.3 Timescales

The initial assumption was that ICAO standards for CAT II/III would be available by 2005/2006 and 3 years would be needed for validation. This would result in GBAS Cat II/III being available at least three years following the successful implementation of CAT I.

It is noted however, that technical difficulties in the definition of GBAS Cat II/II may lengthen this timeframe. The earliest that (restricted) Cat I operations would be possible is 2008. Indeed, if it is confirmed that 2 frequencies are required, it will take until a sufficient number of GPS IIF (or of an improved standard) and/or Galileo satellites are in place and operational before GBAS Cat II/III could enter into operation. This is unlikely to take place before 2011/2012 as a minimum.

7.6.8.4 Organizations involved

- EUROCAE;
- RTCA;
- EUROCONTROL;
- FAA;
- ICAO;
- EASA.

7.6.8.5 Existing documentation

Reference Material

- [**ICAO_Annex10_RadioNavAids**] - SARPs concerning the requirements (clause 3), the specifications (appendix B) for the GNSS, and the information and material for guidance in the application of the GNSS SARPS (attachment D).

Related Material

- [EUROCAE_ED72A] (EUROCAE WG-28): contains a minimum operational performance specification for airborne GPS receiving equipment intending to be used as a supplemental navigation system.
- [EUROCAE_ED114] (EUROCAE WG-28): contains MOPS for a GBAS ground facility, as part of the GNSS to support Cat I precision approach and landing.
- [EUROCAE_ED88A] (EUROCAE WG-28/Subgroup 3): specifies the particular operational performance requirements applicable to airborne receiving systems with ILS and/or MLS and/or GLS and GNSS subsystems incorporated within a single equipment. The requirements of EUROCAE_ED88A are met by a MMR (Multi-Mode Receiver) which operates in one of up to four mutually exclusive Precision Approach modes addressed in EUROCAE_ED88A: ILS (Cat I-III), MLS (Cat I-III), GLS SBAS (Cat I), GLS GBAS (Cat I).
- [RTCA_DO253A] (RTCA SC-159): defines minimum performance requirements, functions and features for LAAS airborne equipment to support Cat I precision approach operations.
- [RTCA_DO246B] (RTCA SC-159): is an Interface Control Document (ICD) defining the Signal-in-Space for the GNSS-based Local Area Augmentation System (LAAS) that supports Cat I precision approach and the differential positioning service.
- [ECTL_CONOPS]. (EUROCONTROL): deals with the concept of operations for GBAS Cat I. ECTL_CONOPS aims at applying context to the GBAS CAT-I Safety Assessment process.
- [FAA_E2937A] (FAA): establishes the performance requirements for the FAA Cat I LAAS Ground facility. Requirements contained within this specification are the basis to augment the GPS to provide precision approach capability down to Cat I minimums and area navigation (RNAV).
- [EUROCAE_ED95] (EUROCAE WG-28/Subgroup 2): contains Minimum Aviation System Performance Specification (MASPS) for the airborne element of GBAS, as part of the GNSS, to support Cat I precision approaches and landing.
- [RTCA_DO245A] (RTCA SC-159): document equivalent to the ED95.
- [EUROCAE_HLR] (EUROCAE WG-28/Subgroup 4): contains high level performance requirements for a Ground Based Augmentation System (GBAS), as part of the Global Navigation Satellite System (GNSS), to support Cat I, II and III precision approaches and landing.

- Technical Standard Order [FAA_TSOC161] (FAA): prescribes to manufacturers seeking a TSO authorization or letter of design approval what minimum performance standards (MPS) their airborne navigation equipment using the Global Positioning System (GPS) augmented by the Ground Based Augmentation System (GBAS), for example the U.S. Local Area Augmentation System (LAAS), must first meet for approval and identification with the applicable TSO marking.

- Technical Standard Order [FAA_TSOC162] (FAA): prescribes to manufacturers seeking a TSO authorization or letter of design approval what minimum performance standards (MPS) their Very High Frequency (VHF) data broadcast (VDB) equipment using the Global Positioning System (GPS) augmented by the Ground Based Augmentation System (GBAS), for example the U.S. Local Area Augmentation System (LAAS) must first meet for approval and identification with the applicable TSO marking.

- [ICAO_Doc 8071] (ICAO): intends to provide general guidance on the extent of testing and inspection normally carried out to ensure that GNSS procedures, using the SARPs specified in Annex 10, are appropriate for aviation use and that describes the ground and flight testing to be accomplished for a specific radio navigation aid. Clause 4 provides guidance for the test procedures and tolerances to be applied to ground-based augmentation system (GBAS) instrument approach procedures, including Category I precision approaches and Positioning Service applications.

- EASA ETSO C145a and C146a (expected by end of 2006).

- National practices, e.g. DEU: Reg TP SSB FL 011 (notified to the European Commission); see as well: http://europa.eu.int/comm/enterprise/tris/pisa/app/search/index.cfm?fuseaction=pisa_search_results&iStart=1&iYear=2004&sCountry=D&sProdType=V00T&LANG=EN&STYPE=STRUCTURED&iBack=2&iBack=3

7.6.8.6 Current and future working groups, projects or trials

- EUROCAE WG-28 (Global Navigation Satellite System (GNSS): mission: Update of ED-88 (rev A) and analyse of GBAS for CAT II/III.

- RTCA SC 159 (GPS): this group develops minimum standards that form the basis for FAA approval of equipment using GPS as a primary means of civil aircraft navigation; sub-group 4 is dedicated to GBAS.

- EUROCONTROL LATO (Landing And Take-Off) mainly oriented for Cat II/III.

- ICAO NSP (Navigation System Panel) Sub-Group Cat II/III.

- RTCA SC 159 SG4: GBAS.

7.6.8.7 Void

7.6.8.8 Additional information

Technical Issues

GBAS developments in Europe have followed those in the US (the FAA LAAS programme).

It is considered beneficial for EU that European industry retains an independent proficiency in the domain of GBAS. This is especially desirable as it is not clear at the present time whether the US industry will in the future develop GBAS systems which offer any Galileo capability.

No comprehensive plan seems to be in place in Europe for the deployment of GBAS Cat I ground stations. Three reasons for that: the lack of market (the cost of a station would be similar to the cost of an ILS); the lack of a clear transition to GBAS Cat II/III; and the fragmentation of user requirements (in the case of GBAS, airports and operators tend to make local decisions for or against the use of this technology which cannot be combined into a single decision). The only fully funded European programme in place is the DFS GBAS project in Bremen, Germany. This project was funded on 14 March 2005, and is supported by EUROCONTROL. Additionally in Malaga, Spain a SCAT-I ground station is being upgraded to the Safe prototype standard by AENA.

Performing GBAS Cat II/III landings may require the use of two frequencies in order to perform the ionospheric correction in the receiver itself. As a consequence performing GBAS Cat II/III landings may underlie certain restrictions before such date when a sufficient number of GPS Block IIF and/or Galileo satellites are operational.

In order to make use of one single frequency the US industry would recommend downgrading the Cat II/III requirements so as to launch GBAS Cat I on the assumption that a transition would then exist from Cat I to Cat II/III. The FAA seems to line-up with the European approach for un-compromised Cat II/III capabilities. Regarding Cat I operations, the FAA is promoting WAAS with further enhancements to support such capability.

Conclusion

In addition to the work on the CS, action could be undertaken to:

- Support the concept of GBAS CAT I in order to determine if two frequencies are indeed required for the performance of GBAS Cat II/III landings. Update the Navigation Strategy and transition plan accordingly.
- Support the concept of GBAS II/III and continued R&D in order to determine if two frequencies are indeed required for the performance of GBAS Cat II/III landings. Update the Navigation Strategy and transition plan accordingly.

Descriptive text proposed to be included in Commission's mandate for this CS

It is of predominant importance that for the successful implementation of GBAS CAT II/III, an implementation of GBAS CAT I is required. Experience gained from this first step will lead to a faster transition. Airlines and industry are strongly supporting this stepwise approach.

Technical requirements for GBAS CAT I exist as Standards and Recommended Practices from ICAO in the form of Signal-in-Space performance requirements and the GBAS signal specification. Corresponding Minimum Operational Performance Requirements for on-board equipment exist from RTCA. It has to be secured that Community Specifications will exist which transform the existing GBAS standards into European regulations. It has to be secured as well that European standards will be developed for GBAS CAT II / III.

7.7 Surveillance

No CS proposed in this timeframe.

7.8 Aeronautical Information Services (AIS)

7.8.1 to 7.8.5 Void

7.8.6 CS on Aeronautical Information Exchange (AIXM)

7.8.6.1 Description

No details provided.

7.9 Use of Meteorological information

No CS proposed in this timeframe.

8 Group IV of candidate Community Specifications for which work is to be started when demanded only

In most cases this group of candidate Community Specifications describe aspects of aviation where there are standards already in existence. There is often an economic argument for improving the standards in some way but not necessarily in the form of a European Norm. These aspects have been included in the inventory for completeness as candidate CSs. It is arguable whether further work should in fact take place on these aspects and if so in what timescale.

In terms of ranking and priority group IV CSs are to be seen independent from the other groups and work can be started before, parallel to or after the other groups and is just dependant on agreed demand.

8.1 to 8.3 Void

8.4 Air Traffic Services (ATS)

8.4.1 to 8.4.21 Void

8.4.22 CS on Surveillance Data Processing

8.4.22.1 Description

This CS is aimed at the introduction of common surveillance data processing functionality (e.g. ARTAS or equivalent) as a common means for the exchange of surveillance data.

8.4.22.2 Status

EC ICB Recommended Priority: Priority 2.

The EUROCONTROL "Guidelines For An Agreement For The Shared Use Of Radar Sensor Data" sets out a number of principals for the sharing of radar data. It makes reference to the ASTERIX standard and sets out guidelines for setting up an agreement between the supplier and user of radar data.

Whilst the deployment of ARTAS is encouraged by EUROCONTROL there are no mandates or ECIPs for ANSPs to abide by.

ECIP SUR03 [6] (which has been formally achieved) requires the Implementation of radar data processing and distribution systems based on radar server technology. Specifically it requires provision of multi-radar surveillance data processing and distribution (SDPD) at ACC level.

One existing SDPD product is ARTAS. However, a Surveillance Data Processing System monopoly should be avoided, since it hinders further development and may raise associated costs. Therefore, a more general CS on SDPS seems more appropriate than a special CS on ARTAS.

8.4.22.3 Timescales

Said SDPD units (e.g. ARTAS and others) are already in operation.

8.4.22.4 Void

8.4.22.5 Existing documentation

- ARTAS Foreground Documentation (Baseline Version SSS and SSDD);
- PHOENIX (SRD, Req. Synopses FBS, SDDs);
- ICAO: Annex 10, Volume IV (SSR and Mode S Surveillance);
- ICAO Doc 4444, Chap. 8 (Surveillance Systems available 2006/2007);
- ICAO DOC 8071, Vol. III, Manual on Testing Surveillance Systems;
- ICAO Manual on Airspace Planning Methodology for the Determination of Separation Minima (Doc 9689);
- ICAO: Framework on Required Surveillance Performance;
- EUROCAE ED-101;
- EUROONTROL: Standard Document for Radar Surveillance in Enroute Airspace and major TMAs (Mono-Radar);

- EUROCONTROL Guidelines for the application of ECAC 5/10 NM RADAR separation minima.

8.4.22.6 Current and future working groups, projects or trials

- EUROCONTROL;
- DFS;
- ICAO SCRSP (Surveillance and Conflict Resolution Systems Panel);
- ICAO SASP (Separation and Airspace Safety Panel);
- EUROCAE WG 70 (Wide Area Multilateration);
- EUROCONTROL: Mode S Wide Area Multilateration, Civ.-Mil. Coordination.

8.4.22.7 Void

8.4.22.8 Additional information

Technical Issues

A concept of a Europe-wide distributed Surveillance Data Processing and Distribution (SDPD) system which has been developed by EUROCONTROL for implementation in the ECAC area. The system concept relies on the implementation of interoperable SDP Units which all act as one region-wide integrated Surveillance system. The elements to build such an SDPD network are the ARTAS Units, or any other SDPD system fulfilling well defined interoperability requirements.

The interface between the SDPD units, the data sources (e.g. radar) and its ATM User systems (e.g. a sensor or other SDPD units) are based on ASTERIX. There are three standards relating to inter SDPD data exchange, namely:

- System track data (ASTERIX Cat 062);
- Sensor Status messages (ASTERIX Cat 063);
- SDPS Service status messages (ASTERIX Cat 065).

Conclusion

The wide deployment of ARTAS and the ASTERIX categories, which define its interface, reflect that ARTAS is a well-defined EUROCONTROL product. However, ARTAS is seen as one particular technical solution among many others.

A CS on data exchange, associated protocols and interfaces is much more important to ensure interoperability than a CS on one particular technical solution.

Descriptive text proposed to be included in Commission's mandate for this CS

A Europe-wide distributed Surveillance Data Processing and Distribution (SDPD) system concept for implementation in the ECAC area should be supported. The system concept relies on the implementation of interoperable SDP Units which all together act as one region-wide integrated Surveillance system.

The purpose of this CS is to define the elements to build such an SDPD network. It should be specified based on well defined interoperability requirements, which include quality of information and performance requirements as well as specification of interfaces and protocols between the data sources (e.g. radar) and ATM User systems (e.g. SDPS) and/or for inter SDPD data exchange.

8.5 Communication

8.5.1 to 8.5.6 Void

8.5.7 CSs on ground and mobile stations in the aeronautical mobile service (AM radio telephone installations) operating in the frequency range 117,975 MHz to 137 MHz

8.5.7.1 Description

This work comprises two parts:

(a) A new EN to cover airborne equipment. (Pending further investigation of legal issues.)

(b) ETSI needs to check that the essential requirements contained in the Interoperability Regulation [2] are fully taken into account in the existing standard for ground equipment EN 300 676.

8.5.7.2 Status

This CS was neither included in M/354 [1] nor in the document ICB/2/3 [5].

8.5.7.3 Timescales

The work on this CS should start as soon as possible, since [2] requires conformity declarations from the 20th October 2005 onward which gives a need for harmonized EN covering all relevant essential requirements.

8.5.7.4 Organizations involved

ETSI ERM TG25.

8.5.7.5 Existing documentation

- ICAO Annex 10.
- EN 300 676 (Electromagnetic compatibility and Radio spectrum Matters (ERM);Ground-based VHF hand-held, mobile and fixed radio transmitters, receivers and transceivers for the VHF aeronautical mobile service using amplitude modulation; Technical characteristics and methods of measurement).
- EN 301 489-22 (Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 22: Specific conditions for ground based VHF aeronautical mobile and fixed radio equipment).
- AEEC 716.
- AEEC 750.
- EUROCAE ED-23B.
- EASA ETSO 2C37e and ETSO 2C38e.

8.5.7.6 Current and future working groups, projects or trials

None, as the system is mature.

8.5.8 CS on HF radio equipment

8.5.8.1 Description

This CS will contain information beyond that given in Annex 10 concerning HF radio equipment and give it recognition under the interoperability Regulation.

8.5.8.2 Status

This CS was neither included in M/354 [1] nor in the document ICB/2/3 [5].

8.5.8.3 Timescales

Official Journal of the European Union, Regulation (EC) No 552/2004 [2] requires conformity declarations from the 20th October 2005 onward which - in principle - gives a need for harmonized EN covering all relevant essential requirements. On the other hand there is only a limited number of new installations to be expected.

8.5.8.4 Organizations involved

None, as the system is mature.

8.5.8.5 Existing documentation

ICAO Annex 10.

8.5.8.6 Void

8.5.8.7 Void

8.5.8.8 Additional information

This CS may have lower priority compared to other CSs.

8.5.9 CS on UHF for use by civil ATC

8.5.9.1 Description

This CS complements the CS on aeronautical mobile service. The technical framework to promote a better synergy between civil and military CNS resources would be created.

8.5.9.2 Status

This CS was neither included in M/354 [1] nor in the document ICB/2/3 [5].

8.5.9.3 Timescales

Official Journal of the European Union, Regulation (EC) No 552/2004 [2] requires conformity declarations from the 20th October 2005 onward which - in principle - gives a need for harmonized EN covering all relevant essential requirements.

8.5.9.4 Void

8.5.9.5 Existing documentation

- Civil-Military CNS/ATM interoperability roadmap.
- 8,33 kHz User Guide.
- NATO STANAG 4205.

8.5.9.6 Void

8.5.9.7 Void

8.5.9.8 Additional information

UHF transceivers are widely used by European ANSPs as an alternative means for handling non-8.33 State aircraft.

8.6 Navigation

8.6.1 CS on non-directional beacon (NDB) ground equipment

8.6.1.1 Description

This CS derives appropriate technical requirements from the essential requirements contained in the Interoperability Regulation [2] and the RTTE Directive [9] including appropriate procedures for testing of non-directional beacons (NDB) to replace existing national practices (which may have been notified to the European Commission) by a harmonized one.

8.6.1.2 Status

This CS was neither included in M/354 [1] nor in the document ICB/2/3 [5].

8.6.1.3 Timescales

Official Journal of the European Union, Regulation (EC) No 552/2004 [2] requires conformity declarations from the 20th October 2005 onward which - in principle - gives a need for harmonized EN covering all relevant essential requirements. On the other hand NDB is considered as legacy system (lower priority).

8.6.1.4 Organizations involved

None, system is mature.

8.6.1.5 Existing documentation

- ICAO Annex 10;
- ICAO DOC 8071;
- National practices, e.g. DEU: Reg TP SSB FL 009 (notified to the European Commission); see as well: http://europa.eu.int/comm/enterprise/tris/pisa/app/search/index.cfm?fuseaction=pisa_search_results&iStart=1&iYear=2004&sCountry=D&sProdType=V00T&LANG=EN&STYPE=STRUCTURED&iBack=2&iBack=3,

8.6.1.6 Void

8.6.1.7 Void

8.6.1.8 Additional information

An additional CS on Automatic Direction Finder may be necessary if legal investigation shows applicability of interoperability regulation to airborne constituents of the EATMN.

8.6.2 CS on omni-directional radio range ground equipment (VOR, D-VOR)

8.6.2.1 Description

This CS derives appropriate technical requirements from the essential requirements contained in the Interoperability Regulation [2] and the RTTE Directive [9] including appropriate procedures for testing of omni-directional radio range equipment (VOR, D-VOR) to replace existing national practices (which may have been notified to the European Commission) by a harmonized one.

8.6.2.2 Status

This CS was neither included in M/354 [1] nor in the document ICB/2/3 [5].

8.6.2.3 Timescales

Official Journal of the European Union, Regulation (EC) No 552/2004 [2] requires conformity declarations from the 20th October 2005 onward which - in principle - gives a need for harmonized EN covering all relevant essential requirements. On the other hand VOR/D-VOR could be considered as legacy systems (lower priority).

8.6.2.4 Organizations involved

None, system is mature

8.6.2.5 Existing documentation

- ICAO Annex 10;
- ICAO DOC 8071;
- National practices, e.g. DEU: Reg TP SSB FL 008 (notified to the European Commission); see as well: http://europa.eu.int/comm/enterprise/tris/pisa/app/search/index.cfm?fuseaction=pisa_search_results&iStart=1&iYear=2004&sCountry=D&sProdType=V00T&LANG=EN&STYPE=STRUCTURED&iBack=2&iBack=3.
- EUROCAE ED 27 "MOPR for airborne area navigation systems based on VOR and DME as sensors";
- EUROCAE ED 28 "MPS for airborne area navigation computing equipment based on VOR and DME as sensors";
- EUROCAE ED 52 "MPS for conventional and DopplerVHF Omnirange (C-VOR and D-VOR) (ground equipment).

8.6.2.6 Void

8.6.2.7 Void

8.6.2.8 Additional information

An additional CS on corresponding airborne equipment may be necessary if legal investigation shows applicability of interoperability regulation to airborne constituents of the EATMN.

8.6.3 to 8.6.5 Void

8.6.6 CS on VHF Marker Beacon ground equipment

8.6.6.1 Description

This CS derives appropriate technical requirements from the essential requirements contained in the Interoperability Regulation [2] and the RTTE Directive [9] including appropriate procedures for testing of glide path transmitter systems to replace existing national practices (which may have been notified to the European Commission) by a harmonized one.

8.6.6.2 Status

This CS was neither included in M/354 [1] nor in the document ICB/2/3 [5].

8.6.6.3 Timescales

Official Journal of the European Union, Regulation (EC) No 552/2004 [2] requires conformity declarations from the 20th October 2005 onward which - in principle - gives a need for harmonized EN covering all relevant essential requirements. On the other hand VHF Marker Beacon could be considered as legacy systems (lower priority).

8.6.6.4 Organizations involved

None, system is mature.

8.6.6.5 Existing documentation

- ICAO Annex 10;
- ICAO DOC 8071;
- National practices, e.g. DEU: Reg TP SSB FL 010 (notified to the European Commission); see as well: http://europa.eu.int/comm/enterprise/tris/pisa/app/search/index.cfm?fuseaction=pisa_search_results&iStart=1&iYear=2004&sCountry=D&sProdType=V00T&LANG=EN&STYPE=STRUCTURED&iBack=2&iBack=3

8.6.6.6 Void

8.6.6.7 Void

8.6.6.8 Additional information

An additional CS on corresponding airborne equipment may be necessary if legal investigation shows applicability of interoperability regulation to airborne constituents of the EATMN.

8.6.7 Void

8.6.8 CS on Ground-Based Augmentation Systems (CAT I only)

8.6.8.1 Description

This item calls for the development of a CS to define the technical requirements for Category I precision approaches relying on GBAS.

Ground Based Augmentation System (GBAS) is a candidate for replacement for the current Instrument Landing System (ILS) where ILS limitations exist. GBAS employs a local monitoring network and VHF data link to uplink differential corrections to GNSS (currently using GPS) signals along with the required final approach segment. GBAS requires the correct operation of the GNSS constellation.

The objective of this item is to ensure that the necessary standards exist for the timely deployment of GBAS systems supporting Cat I operations.

8.6.8.2 Status

EC ICB Recommended Priority: Priority 3 (no differentiation for CAT I - III).

It was included in the Standardization Mandate M/354 [1].

8.6.8.3 Timescales

ICAO standards for GBAS Cat I were produced in 2002 and by the end of 2003 EUROCAE had produced MOPS for the MMR (ED-88A) together with MOPS for the ground GBAS component (ED-114). ICAO PANS OPS Doc 8168 Vol. II is in place since 25 November 2004.

8.6.8.4 Organizations involved

- EUROCAE;
- RTCA;
- EUROCONTROL;
- FAA;
- ICAO;
- EASA.

8.6.8.5 Existing documentation

Reference Material

- [**ICAO_Annex10_RadioNavAids**] - SARPs concerning the requirements (clause 3), the specifications (appendix B) for the GNSS, and the information and material for guidance in the application of the GNSS SARPS (attachment D).

Related Material

- [EUROCAE_ED72A] (EUROCAE WG-28): contains a minimum operational performance specification for airborne GPS receiving equipment intending to be used as a supplemental navigation system.
- [EUROCAE_ED114] (EUROCAE WG-28): contains MOPS for a GBAS ground facility, as part of the GNSS to support Cat I precision approach and landing.

- [EUROCAE_ED88A] (EUROCAE WG-28/Subgroup 3): specifies the particular operational performance requirements applicable to airborne receiving systems with ILS and/or MLS and/or GLS and GNSS subsystems incorporated within a single equipment. The requirements of EUROCAE_ED88A are met by a MMR (Multi-Mode Receiver) which operates in one of up to four mutually exclusive Precision Approach modes addressed in EUROCAE_ED88A: ILS (Cat I-III), MLS (Cat I-III), GLS SBAS (Cat I), GLS GBAS (Cat I).
- [RTCA_DO253A] (RTCA SC-159): defines minimum performance requirements, functions and features for LAAS airborne equipment to support Cat I precision approach operations.
- [RTCA_DO246B] (RTCA SC-159): is an Interface Control Document (ICD) defining the Signal-in-Space for the GNSS-based Local Area Augmentation System (LAAS) that supports Cat I precision approach and the differential positioning service.
- [ECTL_CONOPS]. (EUROCONTROL): deals with the concept of operations for GBAS Cat I. ECTL_CONOPS aims at applying context to the GBAS CAT-I Safety Assessment process.
- [FAA_E2937A] (FAA): establishes the performance requirements for the FAA Cat I LAAS Ground facility. Requirements contained within this specification are the basis to augment the GPS to provide precision approach capability down to Cat I minimums and area navigation (RNAV).
- [EUROCAE_ED95] (EUROCAE WG-28/Subgroup 2): contains Minimum Aviation System Performance Specification (MASPS) for the airborne element of GBAS, as part of the GNSS, to support Cat I precision approaches and landing.
- [RTCA_DO245A] (RTCA SC-159): document equivalent to the ED95.
- [EUROCAE_HLR] (EUROCAE WG-28/Subgroup 4): contains high level performance requirements for a Ground Based Augmentation System (GBAS), as part of the Global Navigation Satellite System (GNSS), to support Cat I, II and III precision approaches and landing.
- Technical Standard Order [FAA_TSOC161] (FAA): prescribes to manufacturers seeking a TSO authorization or letter of design approval what minimum performance standards (MPS) their airborne navigation equipment using the Global Positioning System (GPS) augmented by the Ground Based Augmentation System (GBAS), for example the U.S. Local Area Augmentation System (LAAS), must first meet for approval and identification with the applicable TSO marking.
- Technical Standard Order [FAA_TSOC162] (FAA): prescribes to manufacturers seeking a TSO authorization or letter of design approval what minimum performance standards (MPS) their Very High Frequency (VHF) data broadcast (VDB) equipment using the Global Positioning System (GPS) augmented by the Ground Based Augmentation System (GBAS), for example the U.S. Local Area Augmentation System (LAAS) must first meet for approval and identification with the applicable TSO marking.
- [ICAO_Doc 8071] (ICAO): intends to provide general guidance on the extent of testing and inspection normally carried out to ensure that GNSS procedures, using the SARPs specified in Annex 10, are appropriate for aviation use and that describes the ground and flight testing to be accomplished for a specific radio navigation aid. Clause 4 provides guidance for the test procedures and tolerances to be applied to ground-based augmentation system (GBAS) instrument approach procedures, including Category I precision approaches and Positioning Service applications.
- EASA ETSO C145a and C146a (expected by end of 2006).
- National practices, e.g. DEU: Reg TP SSB FL 011 (notified to the European Commission); see as well: http://europa.eu.int/comm/enterprise/tris/pisa/app/search/index.cfm?fuseaction=pisa_search_results&iStart=1&iYear=2004&sCountry=D&sProdType=V00T&LANG=EN&STYPE=STRUCTURED&iBack=2&iBack=3

8.6.8.6 Current and future working groups, projects or trials

- EUROCONTROL LATO (Landing And Take-Off) mainly oriented for Cat II/III;
- EUROCAE WG-28 "Global Navigation Satellite System";
- ICAO NSP (Navigation System Panel) Sub-Group Cat II/III;

- DFS GBAS project Bremen/Germany.

8.6.8.7 Void

8.6.8.8 Additional information

Technical Issues

GBAS developments in Europe have followed those in the US (the FAA LAAS programme).

It is considered beneficial for EU that European industry retains an independent proficiency in the domain of GBAS. This is especially desirable as it is not clear at the present time whether the US industry will in the future develop GBAS systems which offer any Galileo capability.

No comprehensive plan seems to be in place in Europe for the deployment of GBAS Cat I ground stations. Three reasons for that: the lack of market (the cost of a station would be similar to the cost of an ILS); the lack of a clear transition to GBAS Cat II/III; and the fragmentation of user requirements (in the case of GBAS, airports and operators tend to make local decisions for or against the use of this technology which cannot be combined into a single decision). The only fully funded European programme in place is the DFS GBAS project in Bremen, Germany. This project was funded on 14 March 2005, and is supported by EUROCONTROL. Additionally in Malaga, Spain a SCAT-I ground station is being upgraded to the Safe prototype standard by AENA.

In order to make use of one single frequency the US industry would recommend downgrading the Cat II/III requirements so as to launch GBAS Cat I on the assumption that a transition would then exist from Cat I to Cat II/III. The FAA seems to line-up with the European approach for un-compromised Cat II/III capabilities. Regarding Cat I operations, the FAA is promoting WAAS with further enhancements to support such capability.

Conclusion

In addition to the work on the CS, action could be undertaken to:

- Support the concept of GBAS CAT I in order to determine if two frequencies are indeed required for the performance of GBAS Cat II/III landings. Update the Navigation Strategy and transition plan accordingly.
- Support the concept of GBAS II/III and continued R&D in order to determine if two frequencies are indeed required for the performance of GBAS Cat II/III landings. Update the Navigation Strategy and transition plan accordingly.

Descriptive text proposed to be included in Commission's mandate for this CS

It is of predominant importance that for the successful implementation of GBAS CAT II/III, an implementation of GBAS CAT I is required. Experience gained from this first step will lead to a faster transition. Airlines and industry are strongly supporting this stepwise approach.

Technical requirements for GBAS CAT I exist as Standards and Recommended Practices from ICAO in the form of Signal-in-Space performance requirements and the GBAS signal specification. Corresponding Minimum Operational Performance Requirements for on-board equipment exist from RTCA. It has to be secured that Community Specifications will exist to transform the existing GBAS standards into instruments foreseen in [2].

8.7 Surveillance

8.7.1 Void

8.7.2 CS on ground-based secondary surveillance radar systems for use in the EATMN

8.7.2.1 Description

This CS derives appropriate technical requirements from the essential requirements contained in the Interoperability Regulation [2] and the RTTE Directive [9] including appropriate procedures for testing of ground-based secondary surveillance radar systems to replace existing national practices (which may have been notified to the European Commission) by a harmonized one.

8.7.2.2 Status

This CS was neither included in M/354 [1] nor in the document ICB/2/3 [5].

8.7.2.3 Timescales

Official Journal of the European Union, Regulation (EC) No 552/2004 [2] requires conformity declarations from the 20th October 2005 onward which - in principle - gives a need for harmonized EN covering all relevant essential requirements. On the other hand secondary radar could be considered as legacy systems (lower priority).

8.7.2.4 Organizations involved

- ICAO;
- EUROCONTROL;
- EUROCAE.

8.7.2.5 Existing documentation

- ICAO Annex 10;
- ICAO DOC 9684, Manual of the Secondary Surveillance Radar (SSR) Systems;
- ICAO DOC 9688, Manual on Mode S Specific Services;
- ICAO DOC 8071, Vol.3 Testing of Surveillance Radar Systems;
- ICAO DOC 4444, PANS ATM Clause 8 Surveillance;
- ICAO DOC 9689, Manual on Airspace Planning Methodology for the Determination of Separation Minima;
- EUROCONTROL Standard Document for Radar Surveillance in En-route and Major Terminal Areas SUR.ET.1.1000-STD-01-01;
- EUROCAE ED 73 B, MOPS for Secondary Surveillance Radar Mode S Transponder;
- EUROCAE ED 101, MOPS for Mode S Specific Service Applications;
- EUROCAE ED 115, MOPS for Light Aviation Secondary Surveillance Radar Transponder;
- National practices, e.g. DEU: Reg TP SSB FL 003 (notified to the European Commission); see as well: http://europa.eu.int/comm/enterprise/tris/pisa/app/search/index.cfm?fuseaction=pisa_search_results&iStart=1&iYear=2004&sCountry=D&sProdType=V00T&LANG=EN&STYPE=STRUCTURED&iBack=2&iBack=3.

8.7.2.6 Current and future working groups, projects or trials

- ICAO SCRSP;
- EUROCONTROL Working Group (Appraisal Programme);
- EUROCONTROL Committee on Interrogator Code Allocation;
- EUROCAE WG-49.

8.7.2.7 Void

8.7.2.8 Additional information

An additional CS on corresponding airborne equipment may be necessary if legal investigation shows applicability of interoperability regulation to airborne constituents of the EATMN.

Annex A:
Existing ICAO and ETSI standards, other relevant specifications and related documents

- [ICAO CNS/MET SG/8-IP/31 Implementation of ICAO standardized data-links 12-16 July 2004.
- [ICAO_Annex6_Air_Recording] ICAO Annex 6 to the Convention on International Civil Aviation, Operation of Aircraft, Part I - International Commercial Air Transport - Aeroplanes, clause 6.3; Part II - International General Aviation - Aeroplanes, clause 6.10; Part III - International Operations - Helicopters, clause 4.3.
- [ICAO_Annex10_DigitalComms] ICAO Annex 10 to the Convention on International Civil Aviation, Aeronautical Telecommunications Volume III (Part I - Digital Data Communications Systems) Clause 3 (ATN), clause 5 (Mode S), clause 6 (VDL)) - First Edition - July 1995 Amended by Amendment 76 (01/11/2001).
- [ICAO_Annex10_Surveillance] ICAO Annex 10 to the Convention on International Civil Aviation, Aeronautical Telecommunications Volume IV - Third Edition - July 2001.
- [ICAO_Annex10_RadioNavAids] ICAO Annex 10 to the Convention on International Civil Aviation, Aeronautical Telecommunications Volume I (Radio Navigation Aids) Clause 3 (Specifications for radio navigation aids), Appendix B (Detailed technical specifications for the global navigation satellite system (GNSS)), Attachment D (information and material for guidance in the application of the GNSS Standards and Recommended Practices) - Fifth Edition - July 1996 Amended by Amendment 79 (25/11/2004).
- [ICAO_Annex11_ATS] ICAO Annex 11 to the Convention on International Civil Aviation, Air Traffic Services, Air Traffic Control Service.
- [ICAO_Annex11_Gnd_Recording] ICAO Annex 11 to the Convention on International Civil Aviation, Air Traffic Services, Air Traffic Control Service, Flight Information Service, Alerting Service, clause 6.2 - Thirteenth Edition - July 2001.
- [ICAO_Doc4444] - Procedures for Air Navigation Services - Air Traffic Management (PANS-ATM).
- [ICAO_Doc8071] -Manual on testing on Radio-Navigation Aids.
- [ICAO_Doc8071_VolIII] -Manual on testing on Radio-Navigation Aids Vol. III Testing Surveillance Systems.
- [ICAO_Doc9684] - ICAO Doc 9684/AN951 - Manual on Secondary Surveillance Radar (SSR) Systems.
- [ICAO_Doc9688] - ICAO Doc 9688/AN952 - Manual on Mode S Specific Services.
- [ICAO_Doc9689] - ICAO Doc 9689 - Manual on Airspace Planning Methodology for the Determination of Separation Minima.
- [ICAO_Doc9694] - ICAO Doc 9694/AN955 - Manual of Air Traffic Services (ATS) Data Link Applications.
- [ICAO_Doc9705] - ICAO Doc 9705/AN956 - Manual of Technical Provisions for the Aeronautical Telecommunication Network (ATN) - Second Edition - 1999.
- [ICAO_Doc9776] - ICAO Doc 9776/AN970 - Manual on VHF Digital Link (VDL) Mode 2 - First Edition 2001.
- [ICAO_Doc9816] - ICAO Doc 9816/AN448 - Manual on VHF Digital Link (VDL) Mode 4 - June 2004.
- [ICAO_AN-Conf/11-WP/190] - Report of Committee A to the Conference "The Global ATM Operational Concept" 29/9/03.
- [ETSI_EN_VHF] EN 300 676 - Electromagnetic compatibility and Radio spectrum Matters (ERM); Ground-based VHF hand-held, mobile and fixed radio transmitters, receivers and transceivers for the VHF aeronautical mobile service using amplitude modulation; Technical characteristics and methods of measurement.

- [ETSI_EN_VDLM2] EN 301 841 - Electromagnetic compatibility and Radio spectrum Matters (ERM);VHF air-ground Digital Link (VDL) Mode 2;Technical characteristics and methods of measurement for ground-based equipment.
- [ETSI_EN_VDLM4_G] EN 301 842 - Electromagnetic compatibility and Radio spectrum Matters (ERM);VHF air-ground Digital Link (VDL) Mode 4 radio equipment; Technical characteristics and methods of measurement for ground-based equipment.
- [ETSI_EN_VDLM4_A] EN 302 842 - Electromagnetic compatibility and Radio spectrum Matters (ERM);VHF air-ground and air-air Digital Link (VDL) Mode 4 radio equipment; Technical characteristics and methods of measurement for aeronautical mobile (airborne) equipment.
- [ESA_GalileoICD] - Galileo Signal-In-Space Interface Control Document (SIS-ICD), Draft 04 - June 2002.
- [JAA_NPA_20-11] Notice of Proposed Amendment - Advisory Material for the approval for use of Initial Services for Air-Ground Data Link Continental Airspace - June 2003.
- [JAA_NPA_20-13] Notice of Proposed Amendment - Digital ATIS via Data Link over ACARS.
- [JAA_TGL_DCL] - JAA GAI-20 ACJ 20X8 (TGL n°15 (DCL)).
- [JAA_TGL_ATIS] - JAA NPA 20-13 (TGL n°16 (D-ATIS)).
- [JAA_TGL2R1] - JAA guidance material on airworthiness approval and operational criteria for the use of navigation systems in European airspace designated for basic RNAV operations - July 1996.
- [JAA_TGL3R1] - JAA interim guidance material on airworthiness approval and operational criteria for the use of the NAVSTAR global positioning system (GPS) - June 1996.
- [JAA_TGL10] - Airworthiness and operational approval for precision RNAV operations in designated European airspace.
- [JAA_TGLXX] - Draft, Guidance material for approval of GNSS systems for RNAV (GNSS) approach operation - August 2004.
- [JAA_TGLXZ] - Draft, Airworthiness and operational approval for RNP-RNAV approach operations - January 2004.
- [EC_HLD] - Galileo High Level Definition, Issue 3 - September 2002.
- [EC_MRD] - Galileo Mission Requirements Document, Issue 5 Rev.1.1 - March 2003.
- [EC_SRD] - Galileo System Requirements Document, Issue 2 -March 2002.
- [ARINC_428] - Considerations for Avionics Network, 1995.
- [ARINC_750-4] - Airborne VHF Communications Transceiver - VHF Data Radio - Grey cover - August 2004.
- [ARINC_618] - ARINC specification 618-2 - Air ground character-oriented air protocol- December 20, 1996.
- [ARINC_620] - ARINC specification 620-3 - Data-Link ground system standard and interfaces specification (DGSS/IS), December 19, 1997.
- [ARINC_622] - ARINC specification 622-2 - ATS Data-Link applications over ACARS air-ground network, December 20, 1994.
- [ARINC_631-3] - VHF Data Link Implementation Considerations + Supplements - Grey cover - October 2000.
- [ARINC_718A] - Mark 4 Air Traffic Control Transponder (ATCRBS/MODE S), 2002.
- [ARINC_750-4] VHF Data Radio, 2004.
- [ARINC-758-1] Communications Management Unit (CMU) Mark 2 - Grey cover - August 2004.

- [EUROCAE_ED72A] [RTCA_DO208] - MOPS for airborne GPS receiving equipment used for supplemental means of navigation - April 1997.
- [EUROCAE_ED73B] [RTCA_DO181C] - MOPS for Mode S Specific Service Applications.
- [EUROCAE_ED78A][RTCA_DO264] - Guidelines for Approval of the Provision and Use of Air Traffic Services supported by Data communications.
- [EUROCAE_ED85A] ED-85A - DLASD for the "Departure Clearance" Data Link Service.
- [EUROCAE_ED88A] - Minimum operational performance specification for Multi-mode airborne receiver (MMR) including ILS, MLS and GNSS - December 2004.
- [EUROCAE_ED89A] ED-89A - DLASD for the "ATIS" Data Link Service.
- [EUROCAE_ED92A] ED-92A - Minimum Operational Performance Specification for an Airborne VDL Mode-2 Transceiver.
- [EUROCAE_ED95] - MASPS for a Global Navigation Satellite System Ground Based Augmentation System to support CAT1 Operations - October 1999.
- [EUROCAE_ED100A][RTCA_DO258] ED-100A - Interoperability Requirements Standard for ATS Application using ARINC-622 data communications.
- [EUROCAE_ED101] MOPS for Mode S Specific Service Applications.
- [EUROCAE_ED102] [RTCA_DO260] - MOPS for 1090 MHz Automatic Dependent Surveillance Broadcast (ADS-B).
- [EUROCAE_ED109] [RTCA_DO278] Guidelines for communication, navigation, surveillance, and air traffic management (CNS/ATM) systems software integrity assurance, prepared by EUROCAE and RTCA, accepted March 2002.
- [EUROCAE_ED110A][RTCA_DO280] ED-110A - Interoperability Requirements Standard for ATN Baseline-1 - August 2004.
- [EUROCAE_ED111] ED-111 - Functional Specification for ground recording.
- [EUROCAE_ED112] ED-112 - Operation Performance Specification for airborne recording.
- [EUROCAE_ED114] - "Minimum Operational Performance Specification for Global Navigation Satellite Ground Based Augmentation System Ground Equipment to support Category I Operations" - final Draft - April 2003 (GBAS MOPS).
- [EUROCAE_ED115] - MOPS for Light Aviation Secondary Surveillance Transponders.
- [EUROCAE_ED116] - MOPS for Surface Movement Radar Systems for Use in A-SMGCS.
- [EUROCAE_ED117] - MOPS for Mode S Multilateration Systems for Use in A-SMGCS.
- [EUROCAE_ED120][RTCA_DO290] ED-120 - Safety and Performance Requirements for ATS DL Services in continental airspace - May 2004.
- [EUROCAE_Galileo] - Interim MOPS For GALILEO Civil Aviation Receiver clause 3 - Minimum Performances requirements, Draft 2 - November 2005.
- [EUROCAE_HLR] - High level performance requirements for a global navigation satellite system/ground based augmentation system to support precision approach operations, draft v0.3 - 2005.
- [EUROCAE_PU40] PU-40 - Accommodation of FANS-1/A aircraft in continental ATN airspace.
- [ECTL_B1_ATCManual] - ATC Data Link Manual for Link 2000+ - 28/07/2004.
- [ECTL_LINK_B1] - LINK Baseline 1.

- [ECTL_GBAS_CONOPS] GBAS Cat I Safety Assessment, Concept of Operations, issue 1.1 - December 2003.
- [ECTL_OCD] EUROCONTROL Operational Concept Document, Volume 1 (The Vision), Ed 2.1, dated 12 January 2004.
- [ECTL_ConOps_II_2011] EUROCONTROL Operational Concept Document, Volume 2, Concept of Operations for 2011, Ed 1.0 dated 03 May 2005.
- [ECTL_OATA] OATA Architecture Overview.
- [ECTL_ESARR4] EUROCONTROL Safety Regulatory Requirement (ESARR), ESARR 4, Risk assessment and mitigation in ATM, Edition 1.0, dated 05 April 2001.
- [ECTL_ESARR6] EUROCONTROL Safety Regulatory Requirement (ESARR), ESARR 6, Software in ATM systems, Edition 1.0, dated 6 November 2003.
- [FAA_AC20-130A] - Airworthiness approval of navigation or flight management systems integrating multiple navigation sensors - June 1995.
- [FAA_AC20-138] - Airworthiness approval of global positioning system (GPS) navigation equipment for use as a VFR and IFR supplemental navigation system - May 1994.
- [FAA_E2937A] - Category I Local Area Augmentation System Ground Facility - April 2002.
- [FAA_TSOC129a] or [JAA_JTSO/ETSOC129a] - Airborne supplemental navigation equipment using global positioning system (GPS) - February 1996.
- [FAA_TSOC145A] - Airborne navigation sensors using the global positioning system (GPS) augmented by the wide area augmentation system (WAAS).
- [FAA_TSOC146A] - Stand-alone airborne navigation equipment using the global positioning system (GPS) augmented by the wide area augmentation system (WAAS).
- [FAA_TSOC161] - Ground Based Augmentation System Positioning and Navigation Equipment - May 2003.
- [FAA_TSOC162] - Ground Based Augmentation System Very High Frequency Data Broadcast Equipment - May 2003.
- [RTCA_DO208] "Minimum Operational Performance Standards for Airborne Supplemental Navigation Equipment Using Global Positioning System (GPS)," - July 1991.
- [RTCA_DO229C] - MOPS for Global Positioning System/WAAS Airborne Equipment - November 2001.
- [RTCA_DO245A] - Minimum Aviation System Performance Standards for the Local Area Augmentation System (LAAS) - August 2004.
- [RTCA_DO246B] - GNSS-based precision approach local area augmentation system (LAAS) Signal-in-Space interface control document (ICD) - January 2003.
- [RTCA_DO253A] - MOPS for GPS Local Area Augmentation System Airborne Equipment - November 2001.
- [RTCA DO260A] - Minimum Operational Performance Standards for 1090 MHz Extended Squitter Automatic Dependent Surveillance - Broadcast (ADS-B) and Traffic Information Services - Broadcast (TIS-B), 2003.
- [RTCA/EUROCAE_SBASL1L5] - SBAS L1/L5 Signal Specification (Draft) - November 2004.

Annex B1:
Advice from the open meeting to group proposed Community Specifications

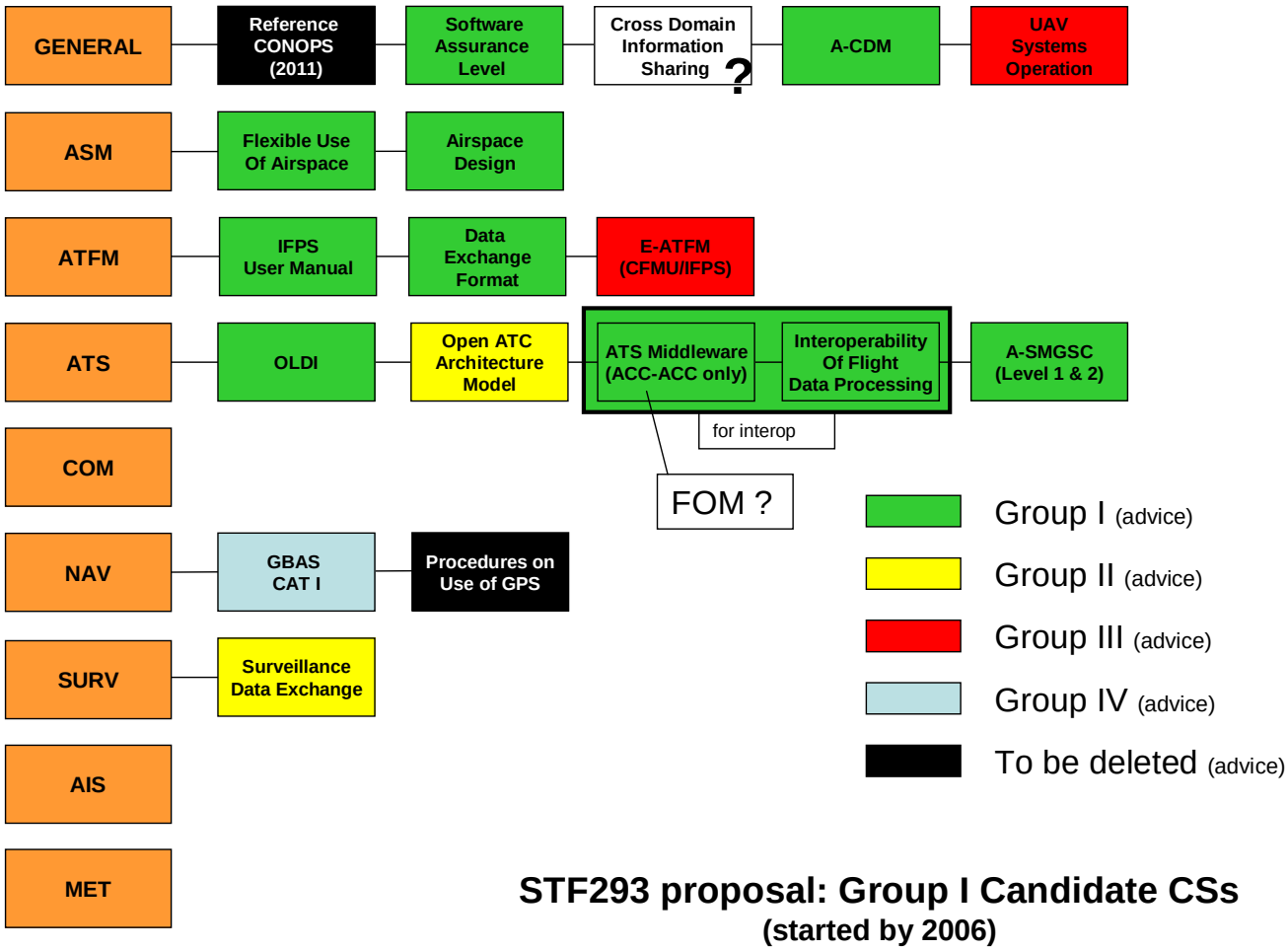


Figure B.1.1

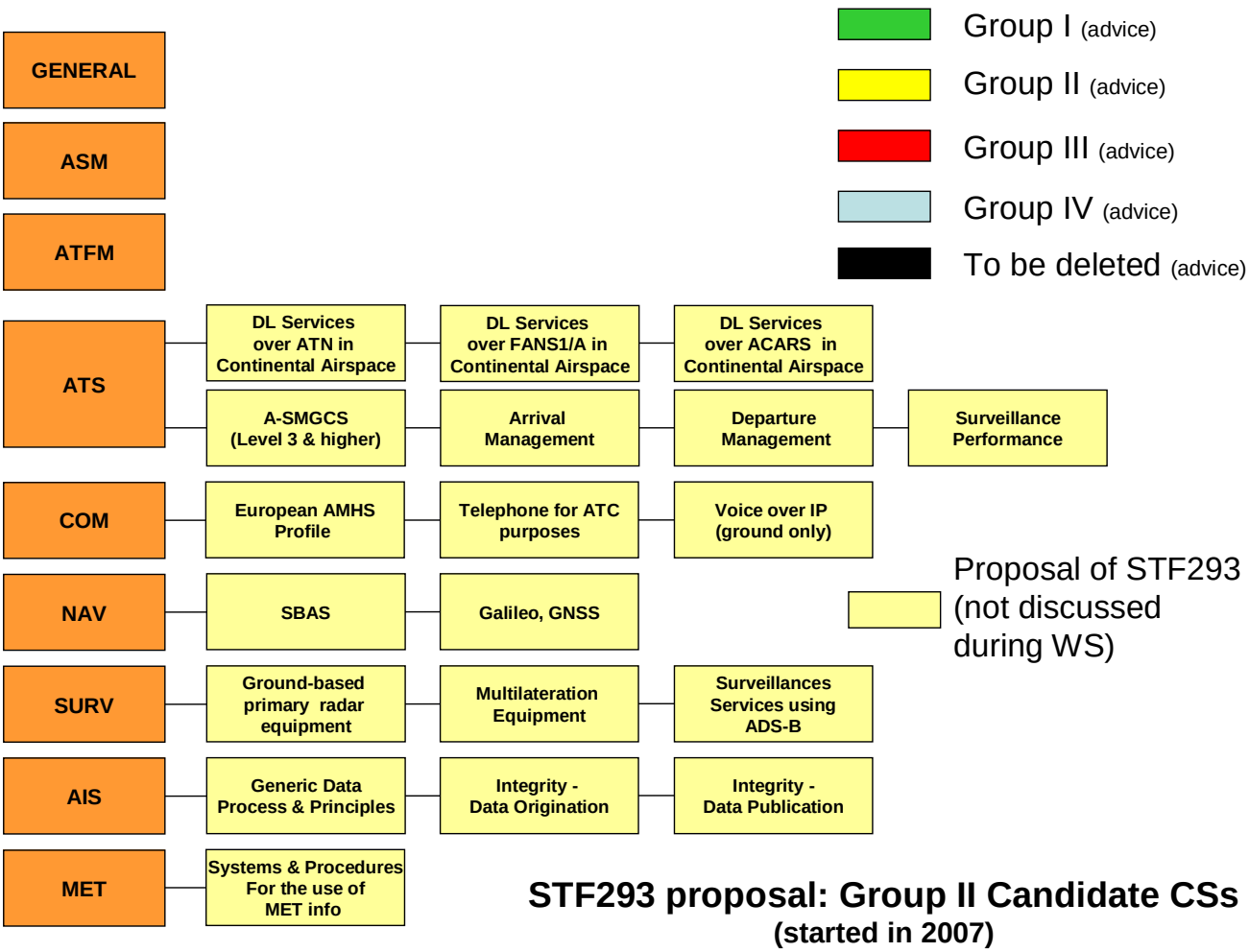

Group I (advice)
Group II (advice)
Group III (advice)
Group IV (advice)
To be deleted (advice)
GENERAL
ASM
ATFM
ATS
DL Services over ATN in Continental Airspace
DL Services over FANS1/A in Continental Airspace
DL Services over ACARS in Continental Airspace
A-SMGCS (Level 3 & higher)
Arrival Management
Departure Management
Surveillance Performance
COM
European AMHS Profile
Telephone for ATC purposes
Voice over IP (ground only)
NAV
SBAS
Galileo, GNSS
Proposal of STF293 (not discussed during WS)
SURV
Ground-based primary radar equipment
Multilateration Equipment
Surveillances Services using ADS-B
AIS
Generic Data Process & Principles
Integrity - Data Origination
Integrity - Data Publication
MET
Systems & Procedures For the use of MET info
STF293 proposal: Group II Candidate CSs
(started in 2007)

Figure B.1.2

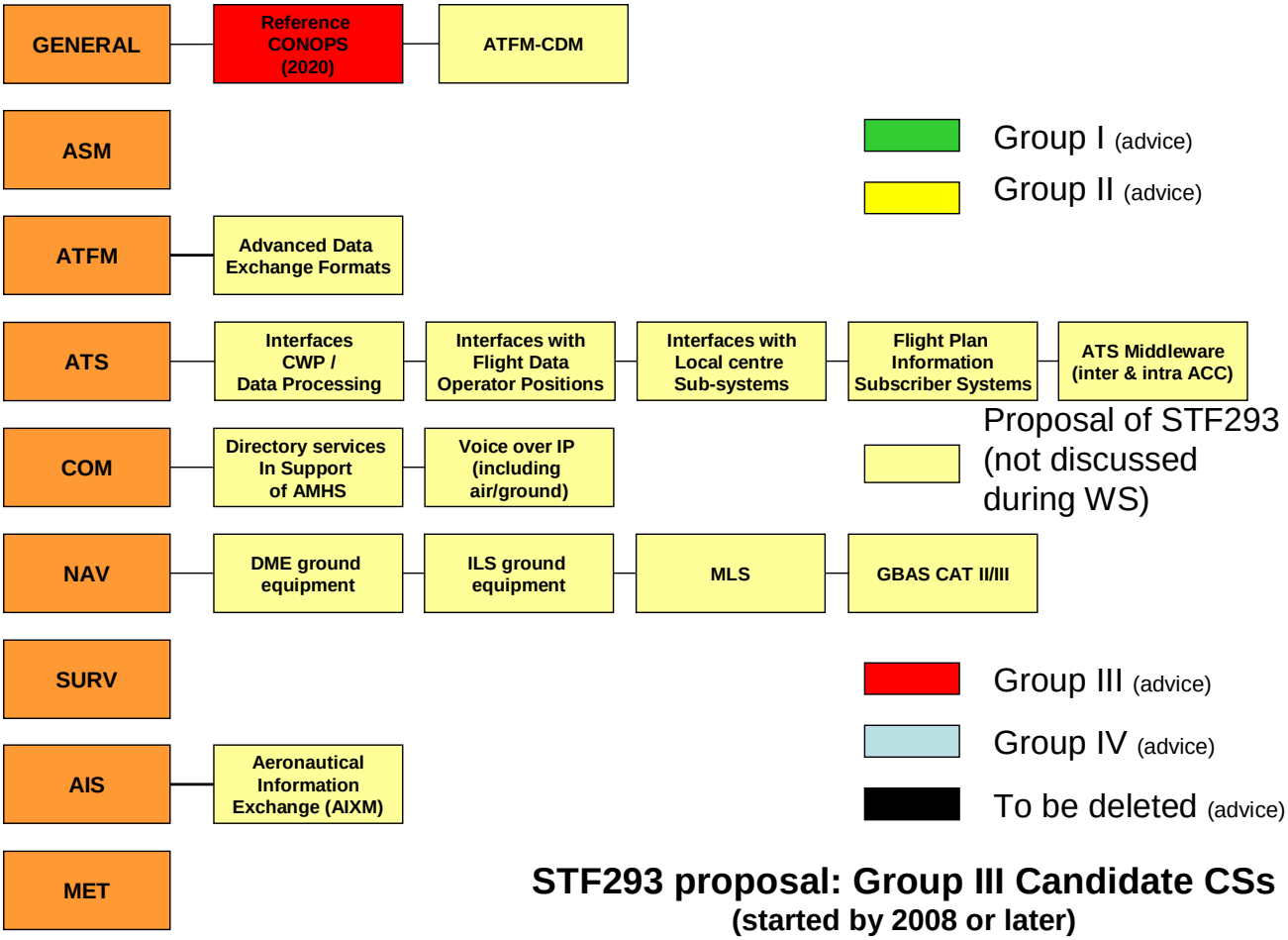

GENERAL
Reference CONOPS (2020)
ATFM-CDM
ASM
ATFM
Advanced Data Exchange Formats
ATS
Interfaces CWP / Data Processing
Interfaces with Flight Data Operator Positions
Interfaces with Local centre Sub-systems
Flight Plan Information Subscriber Systems
ATS Middleware (inter & intra ACC)
COM
Directory services In Support of AMHS
Voice over IP (including air/ground)
NAV
DME ground equipment
ILS ground equipment
MLS
GBAS CAT II/III
SURV
AIS
Aeronautical Information Exchange (AIXM)
MET
Group I (advice)
Group II (advice)
Proposal of STF293 (not discussed during WS)
Group III (advice)
Group IV (advice)
To be deleted (advice)
STF293 proposal: Group III Candidate CSs
(started by 2008 or later)

Figure B.1.3

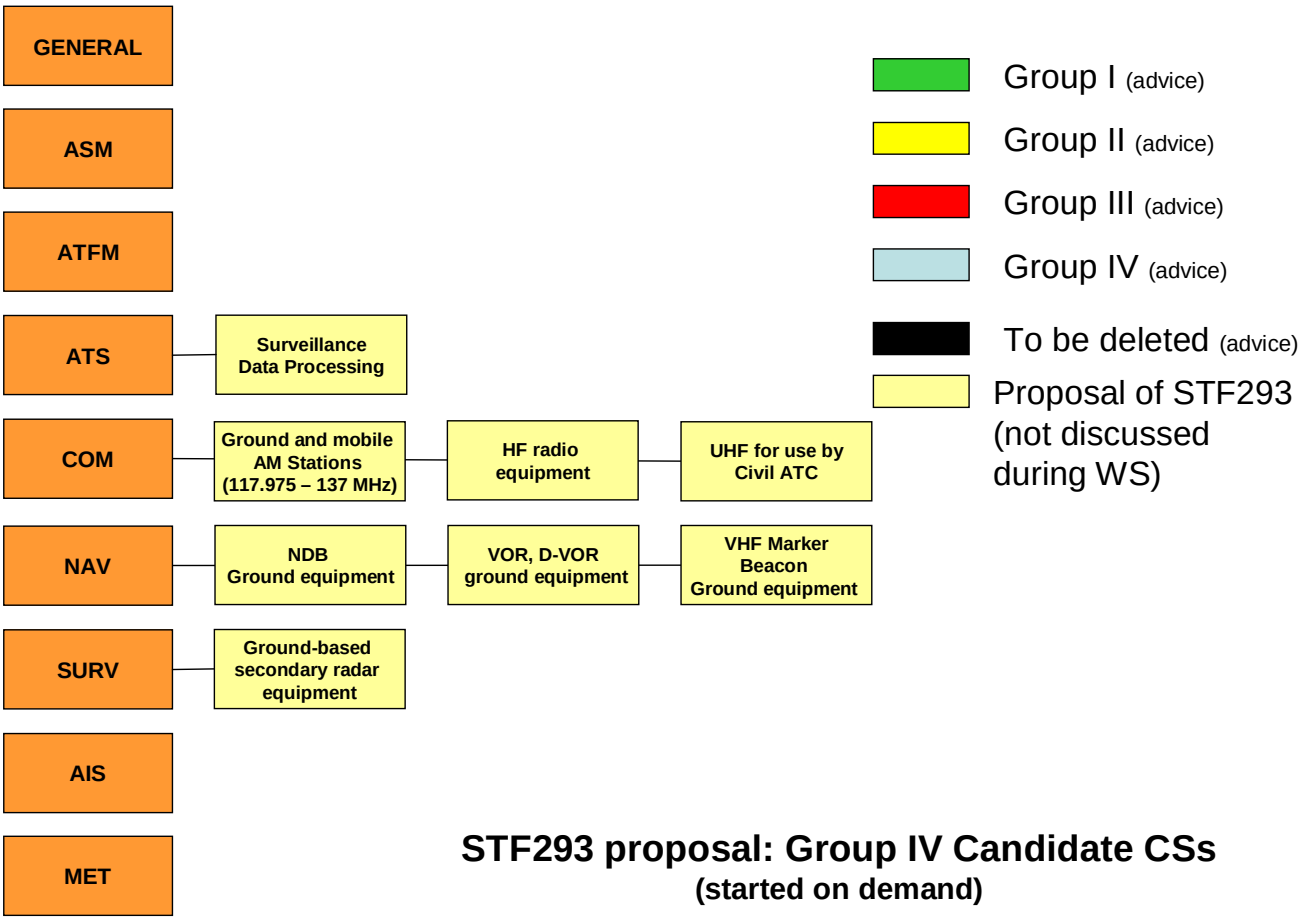

GENERAL
ASM
ATFM
ATS
Surveillance Data Processing
COM
Ground and mobile AM Stations (117.975 – 137 MHz)
HF radio equipment
UHF for use by Civil ATC
NAV
NDB Ground equipment
VOR, D-VOR ground equipment
VHF Marker Beacon Ground equipment
SURV
Ground-based secondary radar equipment
AIS
MET
Group I (advice)
Group II (advice)
Group III (advice)
Group IV (advice)
To be deleted (advice)
Proposal of STF293 (not discussed during WS)
STF293 proposal: Group IV Candidate CSs
(started on demand)

Figure B.1.4

Annex B2:
Final recommendation on grouping of proposed Community Specifications

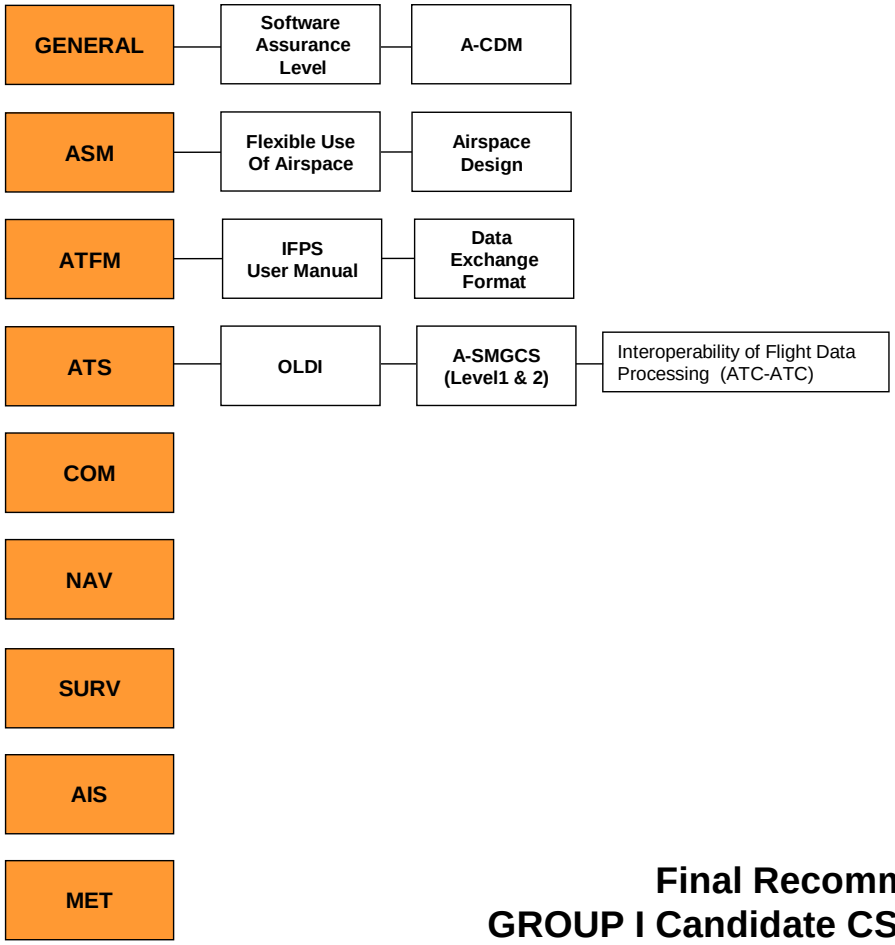


Figure B.2.1

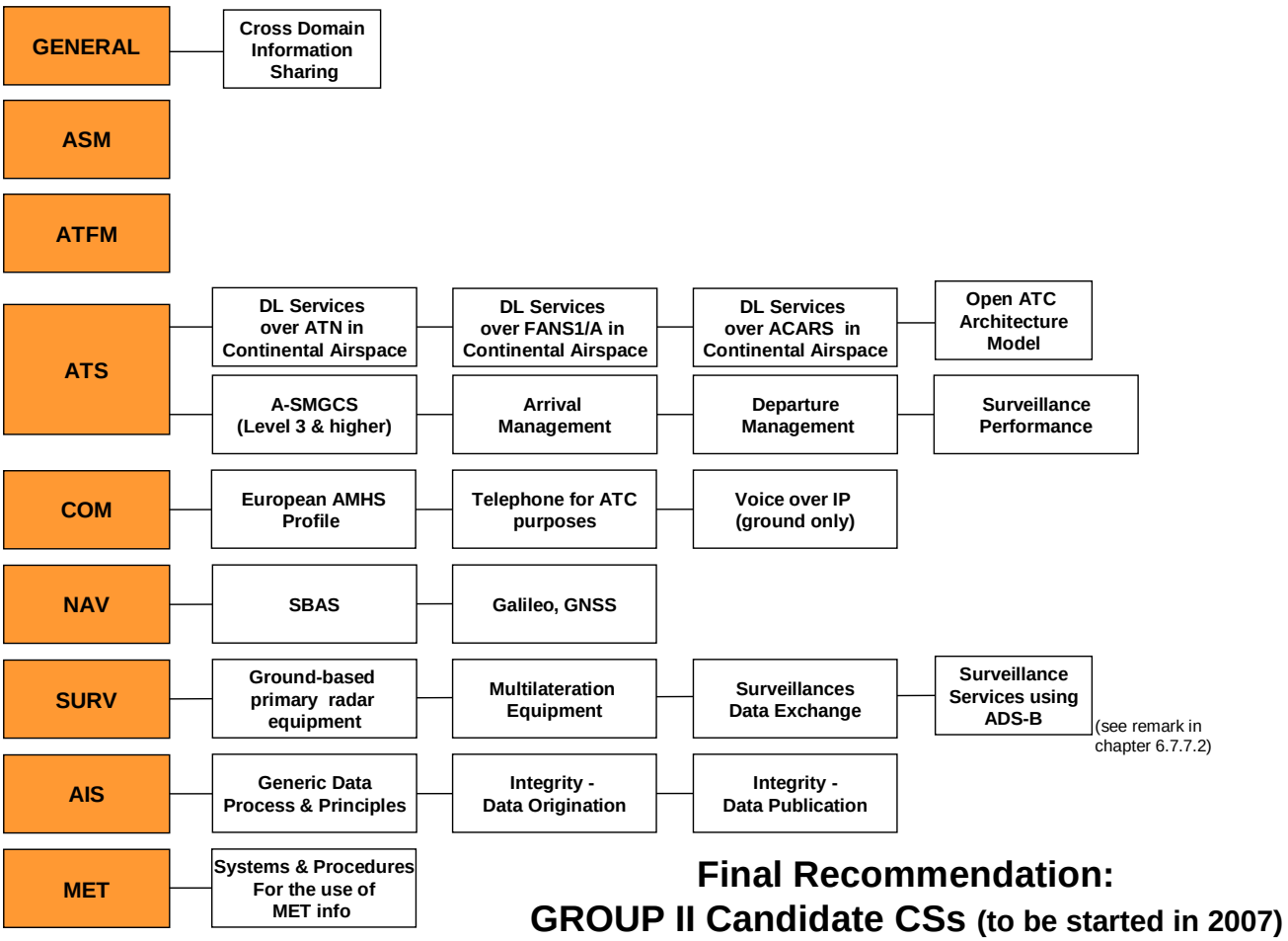

GENERAL
Cross Domain Information Sharing
ASM
ATFM
ATS
DL Services over ATN in Continental Airspace
DL Services over FANS1/A in Continental Airspace
DL Services over ACARS in Continental Airspace
Open ATC Architecture Model
A-SMGCS (Level 3 & higher)
Arrival Management
Departure Management
Surveillance Performance
COM
European AMHS Profile
Telephone for ATC purposes
Voice over IP (ground only)
NAV
SBAS
Galileo, GNSS
SURV
Ground-based primary radar equipment
Multilateration Equipment
Surveillances Data Exchange
Surveillance Services using ADS-B
(see remark in chapter 6.7.7.2)
AIS
Generic Data Process & Principles
Integrity - Data Origination
Integrity - Data Publication
MET
Systems & Procedures For the use of MET info
Final Recommendation:
GROUP II Candidate CSs (to be started in 2007)

Figure B.2.2

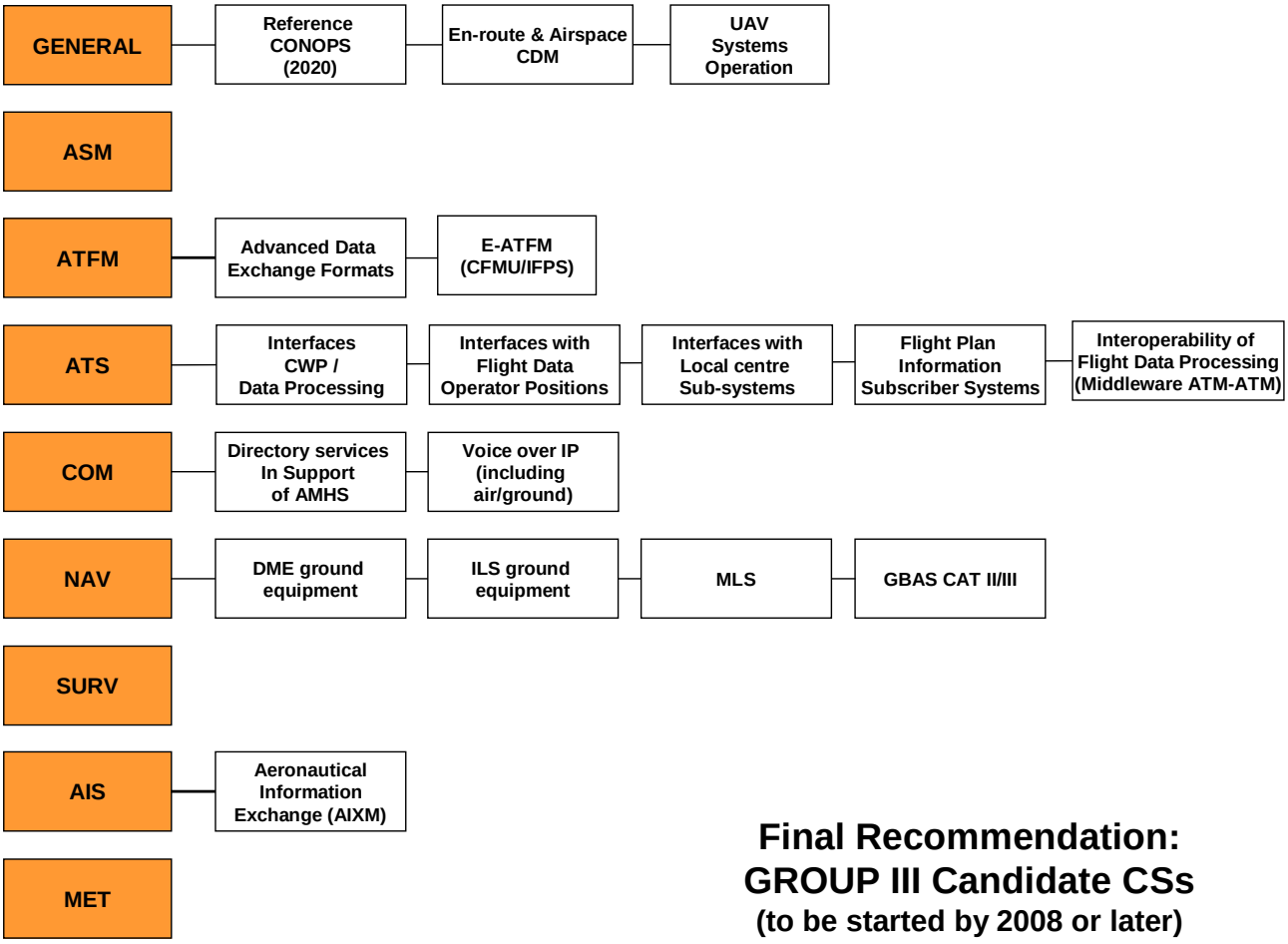

GENERAL
Reference CONOPS (2020)
En-route & Airspace CDM
UAV Systems Operation
ASM
ATFM
Advanced Data Exchange Formats
E-ATFM (CFMU/IFPS)
ATS
Interfaces CWP / Data Processing
Interfaces with Flight Data Operator Positions
Interfaces with Local centre Sub-systems
Flight Plan Information Subscriber Systems
Interoperability of Flight Data Processing (Middleware ATM-ATM)
COM
Directory services In Support of AMHS
Voice over IP (including air/ground)
NAV
DME ground equipment
ILS ground equipment
MLS
GBAS CAT II/III
SURV
AIS
Aeronautical Information Exchange (AIXM)
MET
Final Recommendation:
GROUP III Candidate CSs
(to be started by 2008 or later)

Figure B.2.3

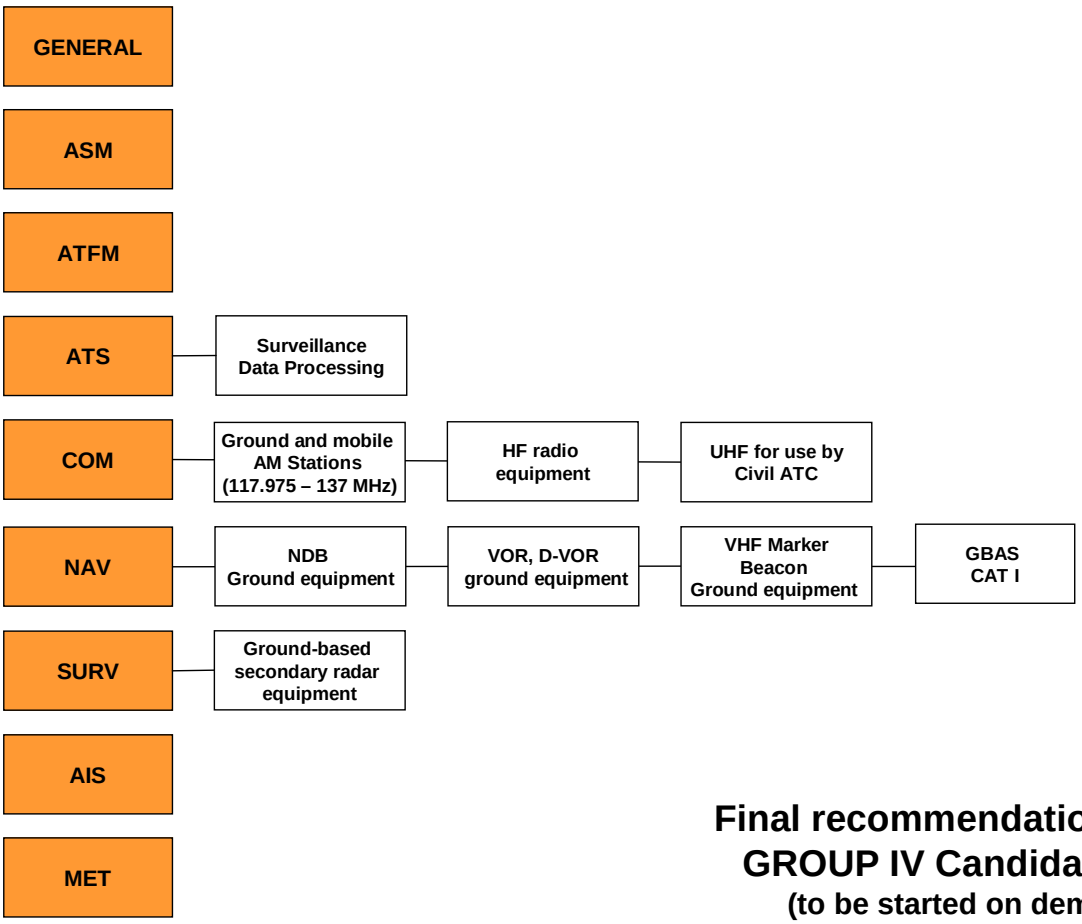

GENERAL
ASM
ATFM
ATS
Surveillance Data Processing
COM
Ground and mobile AM Stations (117.975 – 137 MHz)
HF radio equipment
UHF for use by Civil ATC
NAV
NDB Ground equipment
VOR, D-VOR ground equipment
VHF Marker Beacon Ground equipment
GBAS CAT I
SURV
Ground-based secondary radar equipment
AIS
MET
Final recommendation TG25:
GROUP IV Candidate CSs
(to be started on demand)

Figure B.2.4

Annex C:
The Concept and Architecture Framework for use with Community Specifications

Concept of Operation Framework

The modernization of the European ATM System requires a clear vision of the future operational concept required to absorb the forecast growth in demand, to meet the user's expectations in terms of improved flexibility, punctuality and reduced costs, and to fully exploit current and emerging technologies, while improving safety.

The Operational Concept Document (OCD, The Vision) Volume I was approved by the Permanent Commission of EUROCONTROL and it served as input to generate global reference through the ICAO ATMCP Concept approved by the 11th Air Navigation Council. The Concept of Operations for 2011 (ConOps 2011) Volume II represents the 1st step in the evolution of the European ATM system towards the vision set out in the OCD building upon those components and processes of the ATM system that are expected to evolve up to 2011.

The OCD Volume I and ConOps Volume II are already completed. ConOps Volume III (ConOps 2020) is under development. All this set of documents will be updated within the framework of the SESAME Definition Phase under Work Package 2.2. Both the OCD and the ConOps for the target year 2011 are available on the EUROCONTROL website: http://www.eurocontrol.int/oca/public/standard_page/op_concept.html.

This work is of primary importance for any ATM system definition following a Model Driven Approach (MDA) as defined by Industry standards. It provides the methodology which frameworks ATM operational concepts activities providing a vision to achieve, complemented with a detailed coherent and consistent overview of how the European ATM system works. In addition it provides the traceability context to identify and analyse the impact of any changes within the system.

Ignoring the primary importance of this issue will contribute to maintain a fragmented view of the ATM system through the proliferation of contradicting concepts and creating the opportunities to fail on implementing interoperable ATM systems.

Overall Architecture Framework

The Overall ATM/CNS Target Architecture (OATA) is based on the Requirements as defined by the EUROCONTROL OCD and the EUROCONTROL CONOPS for 2011. The logical architecture has been driven by the Use Cases as defined in the CONOPS for 2011 and full traceability is provided from the CONOPS and Use Cases to the Modules (Constituents) in the system and the detailed services they provide. Descriptions of the architecture are currently available on two levels of detail, which are both generated from the Model of the Logical Architecture in order to assure consistency and to conform to the principles of a Model Driven Architecture (MDA). A Management Overview will be added in 2005.

Essential Requirements and OATA

The Overall ATM/CNS Target Architecture is the answer to the following Essential Requirements or parts thereof of the REGULATION (EC) No 552/2004.

1) Seamless operation, OATA and its constituents has been designed from the beginning to support seamless operation of the EATMN at all times and for all phases of flight. Interoperability has been built-in by defining which information and services shall be shared by ATFCM, ATC, Aerodromes, Aircraft Operators, Aircraft and their military complements. Those services are identified by the Shared Elements (Cross Domain Modules).

2) Support for new concepts, OATA has been based on the OCD/CONOPS for 2011 which incorporates new concepts like CDM and ASAS. On top of that one Work Package of OATA investigates how future concepts like the one defined in OCD/CONOPS for 2020 or others would be supported by the Architecture. A modern layered architecture is able to deal with future changes and for OATA that will be validated by checking how the most essential Use Cases for the 2020 concepts would be implemented.

3) Safety, the safety methodologies for the development phase delivering the Logical Architecture have been defined and will be executed on the most safety critical parts of the architecture. The methodologies have been developed by ERC with the help of the SRU and the OATA Project.

4) Environmental constraints have been taken into account in the OCD/CONOPS for 2011 and consequently the systems services needed to support those environmental constraints have been incorporated in OATA.

5) Principles governing the logical architecture of systems. The TA in OATA stands for Target Architecture, that name has been chosen to highlight that the aim is to progressively integrate the systems with the objective of achieving a coherent and increasingly harmonized, evolutionary and validated logical architecture for Europe. As stated in the first paragraph OATA is the result of an integrated team of operational experts and architects and it is based on the operational concept as approved by the Provisional Council and its derived, more detailed documents (CONOPS).

6) Principles governing the construction of systems. OATA has been based on the Model Driven Architecture Approach and as such it is fully in-line with the same approach used by industry in the new development projects (eFDP) and the parts of OATA developed by the AHLM consortium have already been used in a new development project.

The objective of this framework is to create an agreed overall Logical Architecture verified and validated by the EUROCONTROL Stakeholders and by the SESAME project for the medium term (2011). It will be used to create the 2012 SESAME Baseline Architecture and it will be used to develop the 2020 SESAME Target Architecture.

Strength: "Time to Market and Inclusiveness"

Time to Market

This work is of primary importance for any ATM system definition; it follows a Model Driven Approach (MDA) as defined by industry standards (OMG) and as used for the new eFDP developments. It provides the framework and the Logical Architecture part for almost all ATM/CNS Interoperability Community Specifications. In addition it provides the traceability to identify and analyse the impact of any changes within the operational concept on the architecture and systems based on it.

The integrated approach of developing operational concept and architecture based on MDA is needed to reduce the "Time to Market" considerably. MDA, the industry standard for developing "software based" systems provides a high degree of automation for the whole development life-cycle and assures re-usability of deliverables on all levels of development, which is essential to ensure that the systems implemented are operational before the standards and the technologies used are out-of-date.

Inclusive Architecture

The OATA Logical Architecture Process major advantage is that various organizations do contribute to an integrated architecture. Currently based on the IBM Rational Rose tool set (see note 1), parts of the Overall Model are exchanged with industry partners like the AHLM Consortium (see note 2) for En-Route/APP ATC and the AAM (see note 3) Consortium for Aerodrome ATC and Aerodrome Operations. After delivery by industry those parts are re-integrated in the overall model ensuring seamless interoperability.

NOTE 1: The MDA process, the ATM specialisation as defined in the OATA Modelling Guide, the IBM toolset and the agreement with the industry partners on this process allows achieving the same type of improvements in development process and times as achieved through AUTOCAD in the field of mechanical engineering.

NOTE 2: The AHLM Consortium consists of SELEX-SI, Thales-ATM, INDRA and Lockheed Martin.

NOTE 3: The AAM Consortium consists of SELEX-SI, Thales-ATM, INDRA, SOFREAVIA, Aeroports de Paris, Air France, NLR, DLR, NeoMetSys and CS.

OATA and the SES Systems and Procedures

The matrix shows horizontally the SES Systems and vertically the OATA Clusters as defined in Iteration 7. The matrix provides a mapping of the Logical Architecture to the sets of systems as defined in the Interoperability Regulation (EC) No 552/2004.

OATA Cluster / SES System	Airspace Man.	ATFM	ATC	Communication	Navigation	Surveillance	AIS	Meteorological
Air Surveillance			See note 1			See note 2		
Ground Surveillance			See note 4			See note 5		
En-route/APP ATC			+					
Aerodrome ATC			+					
Airport (Airside) Operations								
Airspace User Operations							See note 3	
AFTCM		+						
Airspace Organization and Management	+							
Aircraft Navigation					±			
Aircraft Surveillance								
Flight managementManagement		+	+					
Aerodrome Shared Elements (AIM)		+	+				+	
Airspace Shared Elements (AIM)	+	+	+		±		+	
Aircraft CharacteristicsShared Elements		+	+					
Meteo Shared Elements		+	+					+
Communication/Distributed System Services	+	+	+	±		+	+	+
+ means: the cluster is an integral part of the SES System. N means: that a subset of modules/constituents forming the cluster is part of that SES System.								
NOTE 1: Sensor (Radar) Data Processing. NOTE 2: Sensors (Radars, etc). NOTE 3: Flight Briefing. NOTE 4: Air Multi Sensor Tracking and Air Track Distribution. NOTE 5: Ground Multi Sensor Tracking and Ground Track Distribution.								

As can been seen from the table for example the ATC System consists of:

- some constituents of the Air Surveillance Cluster: Air Multi Sensor Tracking and Air Track Distribution;
- some constituents of the Ground Surveillance Cluster: Ground Multi Sensor Tracking and Ground Track Distribution;
- En-Route/APP ATC Cluster;
- Aerodrome ATC Cluster;
- Flight Manager;
- Airspace Shared Elements;
- Aerodrome Shared Elements;
- Aircraft Shared Elements;
- Meteo Shared Elements;
- Communications and Distributed Systems Services.

The matrix shows a number of (almost) empty rows where the scope of OATA seemingly exceeds that of the SES Systems.

1) Airspace User Operations, OATA has or will include the part of the aircraft operator (airline) systems dealing with CDM and consequently SWIM and the role of the aircraft operator ensuring that before departure all AIM and Flight information in the Aircraft is consistent with the latest information on the ground.

2) Airport (Airside) Operations, OATA has or will include that part dealing with CDM and consequently SWIM and the role of the airport operator in Gate/Stand Allocation and Aircraft Turn Around.

3) Aircraft Navigation and Aircraft Surveillance, to ensure that on the ground and in the air the same concept (class structure) is used for e.g. a Flight in order to ensure seamless interoperability between air and ground.

Two columns are marked with "$\pm$" only:

1) Communication

   Data communication is part of the Communication and Distributed System Services, basically representing the middleware platform supporting the distribution of the modules/constituents.

   Voice communication is considered out-of-scope for OATA, because on a logical level two actors are talking to each other and from a pure logical point of view we do not care whether they use radio (UHF, VHF, 8.33 kHz), telephone, VOIPS or megaphones, that is part of the physical design of the voice communication system.

2) Navigation is performed by the Navigation Cluster in the Aircraft, the ground and space based support to the Aircraft Navigation consist of a set of "equipment" providing a radio signal to the aircraft. In OATA that equipment part is represented as the Navigation Aid Module inside the Airspace Shared Elements (AIM). That part of the model is based on the current representation of the Navigation Aids as found in the AIP and EAD.

Annex D:
SWIM Framework for Community Specifications

Introduction

The EUROCONTROL SWIM strategy identifies the following framework:

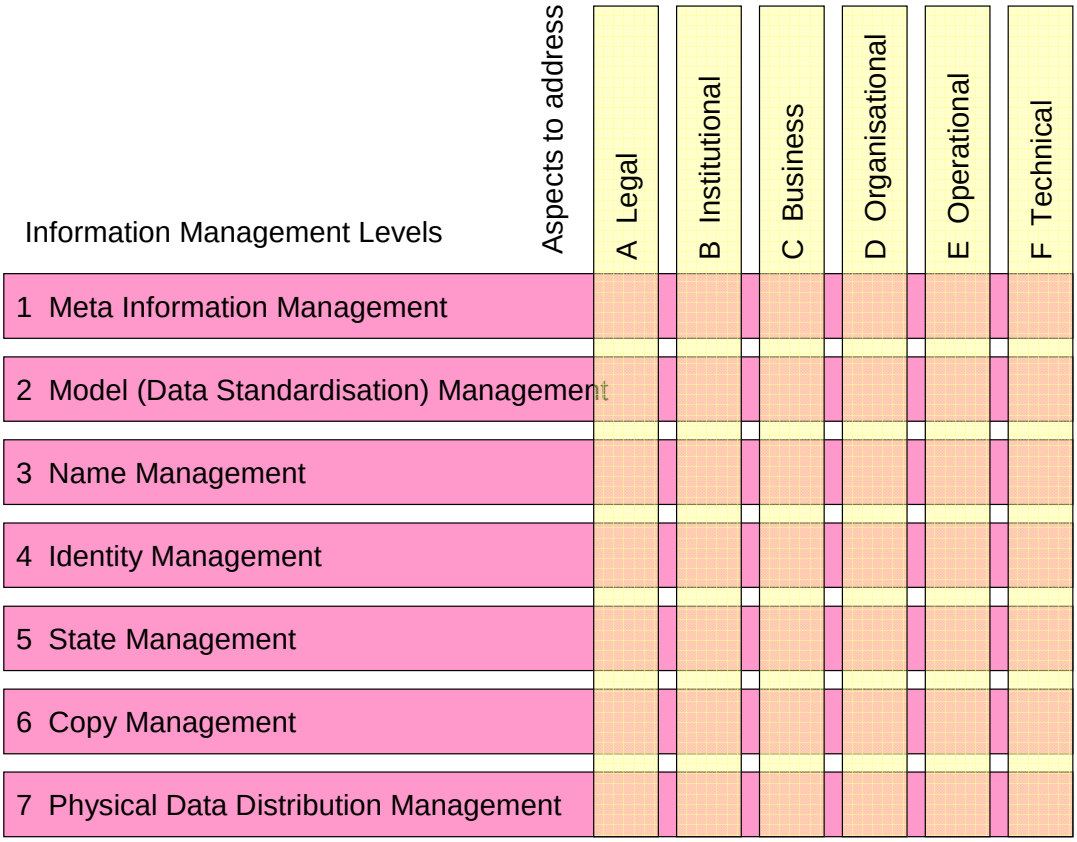


Figure D.1: SWIM Framework

The SWIM framework provides a matrix - processes are needed for managing the information on all 7 abstraction levels and at each abstraction level, choices are to be made regarding the different aspects.

SWIM Abstraction Levels

Meta-Information management

Meta-information is *information about information*. Without it, information management is not possible. It is needed to ensure proper management of information on all abstraction levels and so includes information about:

- Temporality;
- Quality;
- Version control;
- Security;
- Ownership;
- Pricing;

- Licensing;
- Distribution;
- Prediction of needs;
- Policies.

Model (data standardization) management

A *common* "*view of the world*" and "*level of understanding*" is the basic prerequisite for successful communication between two or more parties. It is provided in terms of *terminology* used, *definitions* and *conceptual information models* that are standardized or at least compatible in an environment with disparate and evolving information needs.

Name management

To enable humans and automated systems to efficiently refer to information in other information, to maintain the dynamic web of relationships and to reliably find information.

Names, identifiers, co-ordinate systems and other *labelling conventions* comprise a finite resource that needs to be properly managed and to be coherent at system-wide level.

Identity management

To provide the ability to know the *true identity* behind each and every piece of information. To ensure that among the multiple information copies and multiple naming conventions, users can positively identify physical entities and corresponding information entities and their relationships.

State management

This addresses the *values* of attributes (variables) and *quality*. It ensures that different users, interested in the same object can have different needs met in terms of object state parameters, detail, accuracy, timeliness, etc.

Copy management

For operational reasons, information often needs to be *replicated* between stakeholders. Each piece of information will exist in many physical (e.g. electronic / paper) and mental copies. Copy management deals with *event propagation*, search and retrieval (*directory services*), *security*, *licensing*, *pricing* etc.

Physical data distribution management

To manage the operation of physical *information architecture*, *system architecture*, communication *protocols* and *networks*, presentation *formats*, storage and retrieval *infrastructure* etc. This level will also address centralization/communication trade-offs, selection of appropriate technologies and all other implementation issues.

SWIM Aspects

a) Legal

Information *ownership* and *liability* aspects in an information sharing environment.

b) Institutional

Regulatory aspects of information sharing (*who* can act as the regulator for *what*).

c) Business

Aspects of information sharing related to *cost efficiency*, *licensing*, *cost recovery* etc.

d) Organizational

Mechanisms for managing the *rules*, *roles* and *responsibilities* of the stakeholders participating in information sharing.

e) Operational

Mechanisms for ensuring *timely information availability*, *anticipating* upcoming information needs, and managing information *acquisition*, *storage*, *dissemination*, *security* and *quality* in line with rules, roles and responsibilities of stakeholders.

f) Technical

Automation and *technology selection*:

- for ensuring *information integration* in an environment of distributed co-operating stakeholders working with distributed fast-changing shared information; and

- for *implementing* the operational, organizational, business, institutional and legal sub-strategies.

History

Document history		
V1.1.1	December 2005	Publication