

TITLE

Network Manager Operational Best Practices and System co-ordination and evolutions

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NM system upgrades for FRA

- Several major and minor NM system upgrades, adaptation and fine tuning have been carried out in the last 8-9 years.
- The NM system upgrades have been reviewed and agreed within the EUROCONTROL/NM working arrangements and there is no need further elaborate all of them.
- Only the major and most recent NM system upgrades are listed here.
- The NM system upgrades can be divided in three category as:
 - Flight Planning (IFPS) system upgrades
 - Airspace data system upgrades
 - ASM integration (ASM/ATFCM) upgrades

IFPS within FRA environment

- “IFPS check” for flights operating in FRA is dependent on the data in CACD.
- There are two FRA models (full FRA and FRA with intermediate points) in NM systems but many variables introduced by the states:
 - H24, night only, night and WE, seasonal
 - Keeping the ATS Route Network parallel or not
 - DCT limit value in the airspace below FRA (impacting FRA vertical connectivity)
 - FRA level band (impacting FRA vertical connectivity)
 - Extra layers of RAD restrictions to control the “FRA”
- All these may make the flight planning in FRA a challenge for AO, CFSPs;
- Vertical connectivity is the “difficulty” when flight planning in FRA;
- NM system evolution to one FRA model/points role will have little impact on flight planning;

Future improvements related to FRA DCT - IFPS

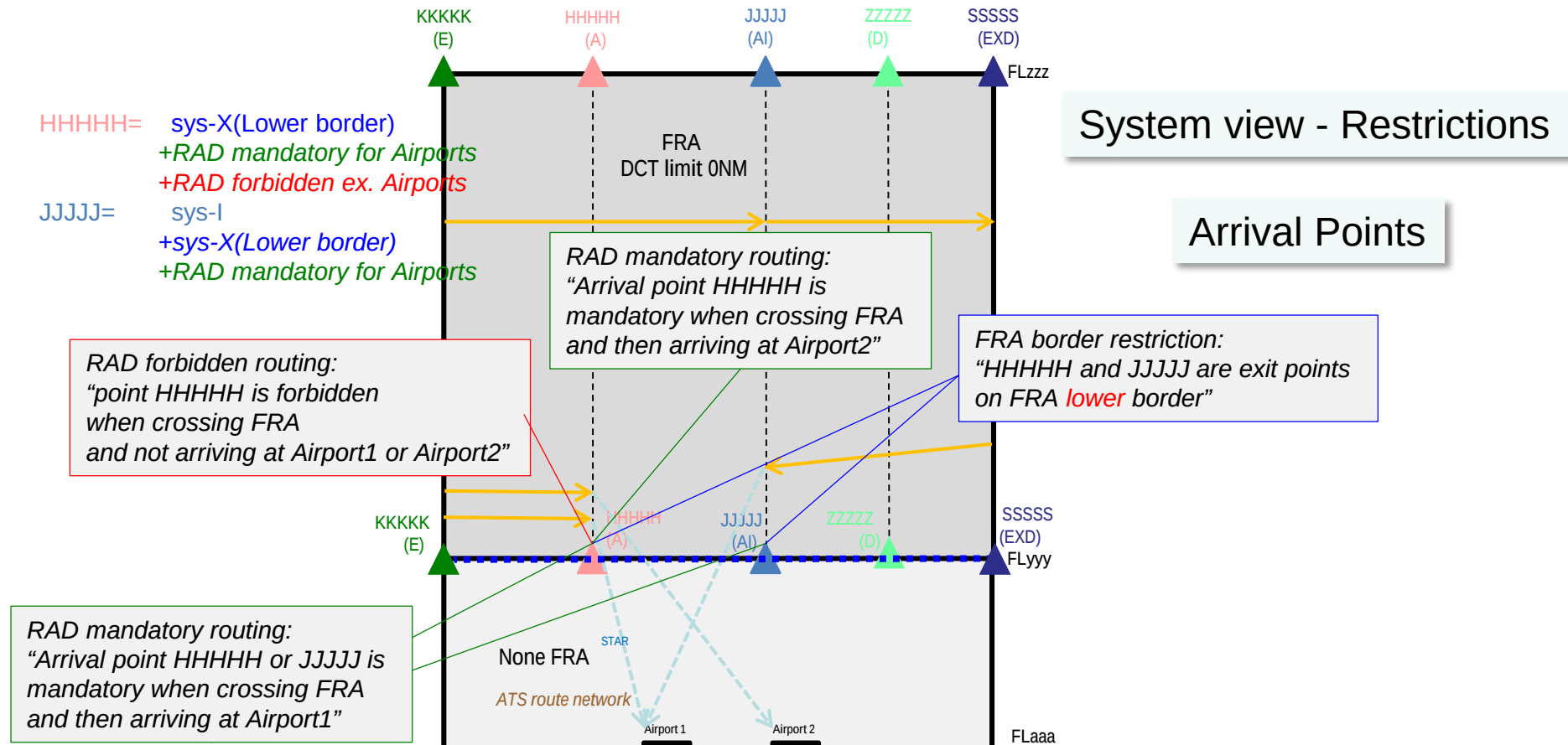
“border” checking

- It is planned to change the current function to enable checking along the boundary of the new FRA airspace. Where an FRA airspace comprises two or more ANSPs AoR the border check shall be disabled along the common AoR boundaries. (short term improvements)
- Further enhancements could be envisaged to satisfy the ANSPs needs. ANSPs request aimed at improving the current function will be evaluated in terms benefit of the new requirements compared with the existing function.

Airspace data system upgrades

- The FRA implementation by NM is based on two models as:
 - Full FRA
 - FRA with intermediate points;
- Some improvements have been done in the last years (prototype on NM test system) as:
 - Changes to significant point model;
 - Support to allow/forbid GEO coordinates in FRA operations;
 - FRA Point Usage data with vertical range (lower and upper limits), time validity and reference location.
- Additional Airspace Data enhancements are planned for NM 23.0 and NM 23.5 mainly related to automated FRA Restrictions generation for FRA entry, exit and intermediate points.

Future airspace data system upgrades



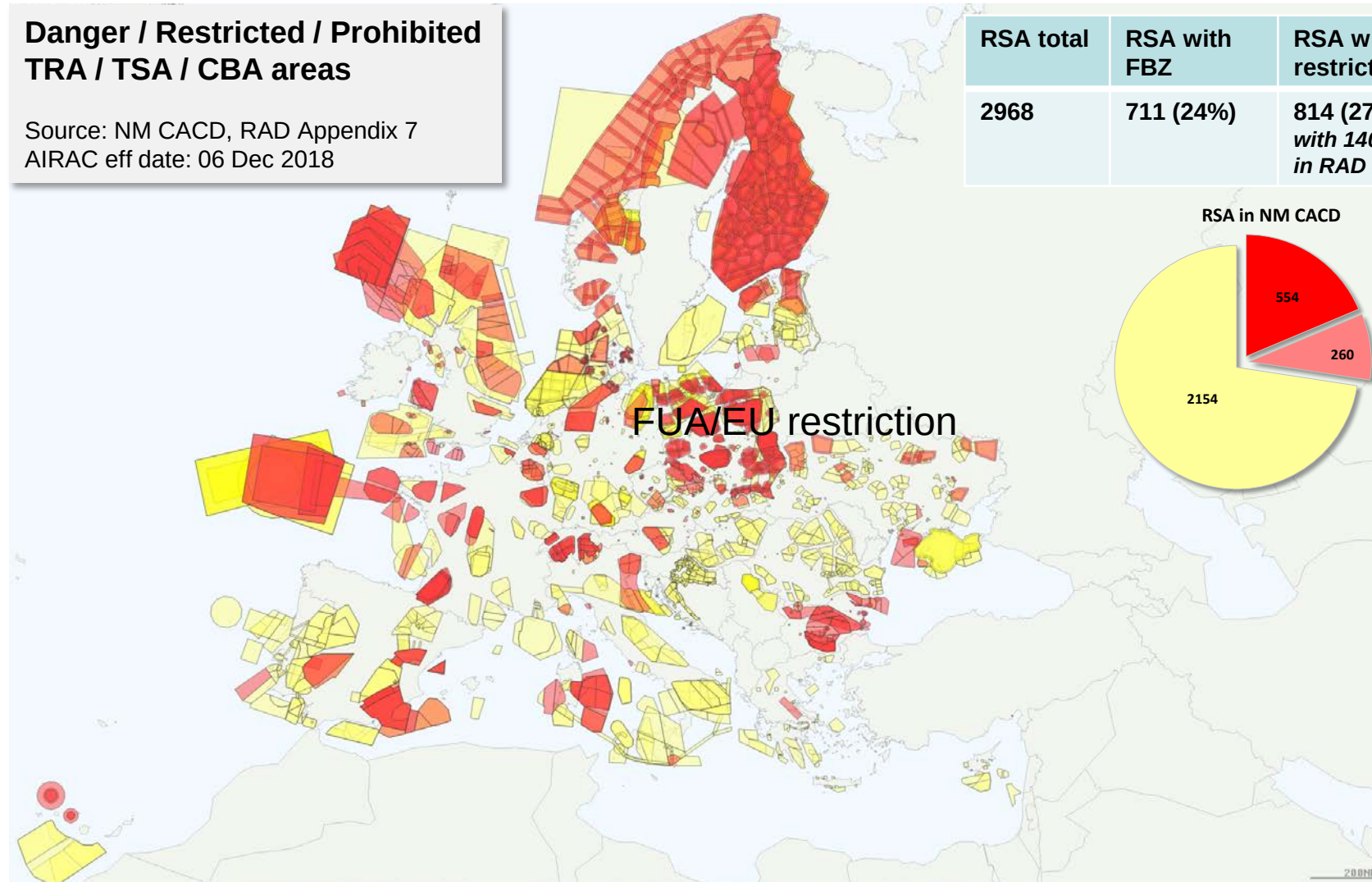
ASM system improvements directly related to FRA

- Management of Area, FBZ (FPL buffer zone) and FUA/EU restriction are considered as specific ASM/ATFCM improvements related to FRA.
- The additional elements (FBZ and FUA/EU restriction) were included in AUP template to facilitate the integration of ASM/ATFCM process as well as to improve the notification process with AUs

Danger / Restricted / Prohibited TRA / TSA / CBA areas

Source: NM CACD, RAD Appendix 7
AIRAC eff date: 06 Dec 2018

RSA total	RSA with FBZ	RSA with FUA restrictions
2968	711 (24%)	814 (27%) <i>with 1409 FUA restrictions in RAD Appendix 7</i>



ASM system improvements not strictly linked with FRA

- Rolling AUP/UUP
- Rolling EAUP/EUUP
- B2B services:
 - For the exchange of AUP/UUP with local ASM tools
 - For the EAUP/EUUP notification to AUs (eAMI message)

EUROCONTROL best practices for ANSPs system improvements for FRA

- The best practices are contained the several EUROCONTROL specifications, guidance materials and generic specifications as:
 - EUROCONTROL specification for MTCD (<https://www.eurocontrol.int/sites/default/files/content/documents/single-sky/specifications/EUROCONTROL-SPEC-0143%20TrajPred%20Ed%202.0.pdf>)
 - EUROCONTROL specification for MONA (<https://www.eurocontrol.int/sites/default/files/publication/files/EUROCONTROL-SPEC-0142%20MONA%20Ed%202.0.pdf>)
 - EUROCONTROL specification for TP (<https://www.eurocontrol.int/sites/default/files/content/documents/single-sky/specifications/EUROCONTROL-SPEC-0143%20TrajPred%20Ed%202.0.pdf>)
 - OLDI specification 4.3 (<https://eurocontrol.int/sites/default/files/publication/files/EUROCONTROL%20Specification%20OLDI%204.3.pdf>)
 - MSAW guidance (https://www.eurocontrol.int/sites/default/files/content/documents/single-sky/guidelines/ECTL-GUID-160-MSAW-Part-I_1.0.pdf)
 - Draft OLDI guidance material
 - Generic ATM system technical specification (<https://ost.eurocontrol.int/sites/AEGIS/AEGIS/AEGIS/SitePages/Home.aspx>)

MTCD specification

- Develop in 2010;
- Mainly oriented towards the planned encounters;
- Cover also the context traffic requirements;
- Airspace encounters;
- Conflict grouping and posting;
- Sector team coordination (conflict transfer and interaction);
- MTCD HMI
- MTCD warnings

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EUROCONTROL Specification for
Medium-Term Conflict Detection

DOCUMENT IDENTIFIER: EUROCONTROL-SPEC-0139

Edition Number	:	2.0
Edition Date	:	03/03/2017
Status	:	Released Issue
Intended for	:	General Public
Category	:	EUROCONTROL Specification

MTCD specification in the context of PCP

- Updated in 2016/2017 and aligned with PCP requirements as:
 - It does include the requirements for Planned based and Tactical based encounters.
 - Encounters outside AoR (AoI Problems);
 - Conflict Probe;
 - Warnings for conflicts against the reserved airspace;

MONA specification

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**EUROCONTROL Specification for
Monitoring Aids**

DOCUMENT IDENTIFIER: EUROCONTROL-SPEC-0142

Edition Number	:	2.0
Edition Date	:	03/03/2017
Status	:	Released Issue
Intended for	:	General Public
Category	:	EUROCONTROL Specification

- Develop in 2010;
- Provides the requirements related to :
 - Progress monitoring
 - Lateral deviation
 - Longitudinal deviation
 - Vertical deviation
 - Automatic reminders
- Updated in 2016/2017
- The main functional updates were related to the Downlinked Aircraft Parameters (DAP) Monitoring and warnings

TP specification

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**EUROCONTROL Specification for
Trajectory Prediction**

DOCUMENT IDENTIFIER: EUROCONTROL-SPEC-0143

Edition Number	:	2.0
Edition Date	:	03/03/2017
Status	:	Released Issue
Intended for	:	General Public
Category	:	EUROCONTROL Specification

- Develop in 2010;
- Elaborate the Trajectory building principles :
 - Flight intent;
 - Application of Strategic Constraint and ATC procedures
 - Application of Tactical Constraints
 - Climb/descent rules
 - Trajectory updates

TP specification in the context of PCP

- Updated in 2016/2017 and aligned with PCP requirements as:
 - Handling of LAT/LONG points
 - DCT routings;
 - TP editing function including graphical editor;
 - Multi sector planner coordination;

**EUROCONTROL Guidelines
for Area Proximity Warning
Part I - Concept and
Requirements**

DOCUMENT IDENTIFIER : EUROCONTROL-GUID-161

Edition Number :	1.0
Edition Date :	18/01/2017
Status :	Released Issue
Intended for :	General Public
Category :	EUROCONTROL Guidelines

- Developed as draft specification in 2009.
- Published as EUROCONTROL guidance in 2017
- Contains the PCP requirements for APW for dynamic airspace volumes by the real-time updates of airspace booking data (airspace volumes and booking times).

OLDI specification

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**EUROCONTROL
Specification for On-Line
Data Interchange (OLDI)**

DOCUMENT IDENTIFIER : EUROCONTROL-SPEC-0106

Edition Number:	4.3
Edition Date:	18/12/2017
Status:	Released Issue
Intended for:	General Public
Category:	EUROCONTROL Specification

- First EUROCONTROL specification developed in 1994.
- Covers the requirements for the automation of notifications, co-ordinations and transfer of the flight between ATSUs through data message exchanges.
- Recognised as a SES Community specification; a recognised means of compliance for COTR implementing rule.
- Abandoned for several years and not reviewed since 2010, mostly due to the expectations that the Flight Object (FO) would rapidly emerge.

OLDI specification 4.3

- Updates requested by the Operational Stakeholder that identified that OLDI is still required in the context of FRA and extended AMAN deployments and some adaptations/clarification of existing specification are required as these operational changes need to come before the FO deployment;
- The OLDI specification review process covered:
 - The outdated requirements and wordings have been removed New Annex related to the OLDI in FRA environment has been developed;
 - The preliminary system requirements for route info processing have been developed
 - All examples of OLDI messages have been revisited and updated;
 - The requirements wording and terminology have been reviewed and unified;

OLDI specification in support of FRA

- The OLDI specification provides several features to support the FRA operational needs, some of them important for cross border FRA deployments as:
 - Handling of reference points with range and bearing from the published COP;
 - Handling of coordination point expressed by reference to latitude/longitude.
 - Exchange of sufficient details for the flight intent using the OLDI route information.
 - The REV/RRV/SDM message allows transmitting the route information. SDM permits the route info exchanges until the transfer of the aircraft.
 - In case of tactical rerouting initiated by upstream unit, the MAC message might be beneficial for the improved ATCO situation al awareness of the change flight intent in the downstream unit.
 - In case a tactical DCT is requested by the downstream unit (e.g. in case of activation of a military area or in case of adverse weather), the CDN allows that unit to offer that the aircraft be sent on that DCT.
 - The use of SDM from the Accepting to the Transferring Unit will help in bringing situational awareness about the sector and frequency to which the flight has to be transferred.
 - At interfaces requiring a lot of tactical “short notice” coordination, the use of TIP and RTI may help alleviating the need for a large amount of verbal coordination.

OLDI Guidance Material (GM)

OLDI Guidance Material edition 0.2.2

OLDI Guidance Material



Edition	:	0.2.2
Date	:	24 November 2018
Status	:	Draft
Class	:	General Public

- During the OLDI specification update cycle, the operational Stakeholders identified a need for the additional OLDI implementation material that is intended to clarify the provisions contained in the OLDI specification Edition 4.3;
- Still in drafting process;
- Agreed by the OLDI group on 12/02/2019, to be followed by NETOPS's consultation mechanism.
- It is expected to be published in May/June 2019;

OLDI GM content

- Further detailed elaboration and examples of system requirement for the OLDI messages route info handling;
- Substantial changes of MAC message;
- SDM and CDN message intent;
- PNT message clarifications;
- Handling of re-entrant flights;
- AMA message clarifications
- OLDI versus NM related exchanges;

EUROCONTROL generic ATM system specification (AEGIS)

ATM Systems - Home



ATM Systems

It is a common practise that the upgrade/deployment of new ATM system should be elaborated and documented. This process usually starts with:

- Development of Concept of Operations (CONOPS);
- Streamlining CONOPS provisions into the Operational Requirements Document (ORD);
- Supplementing ORD by Technical Requirements Documents (TRD);
- Developing the Technical Specification for the upgrade or new ATM system based on the documents listed above.

Depending on the magnitude of change and available resources, this process of preparation of documentation of upgrade/new ATM system might be followed as defined here or some steps might be skipped (for instance going directly from CONOPS to Technical specification).

The generic CONOPS skeleton and generic ATM system technical specifications (17 chapters addressing different components and services) are contained in this repository. Operational stakeholders/ANSPs should be advised that these specifications need some adaptations, alignments and enhancements to produce the procurement specification for upgrade/new ATM system. These adaptations might be done by EUROCONTROL/Network Manager on ANSP's request in the context of EUROCONTROL/NM implementation support task and relevant policies, if so requested by the specific operational stakeholder.

These Generic Technical specifications have been reviewed and adapted in 2016 with the inclusion of mature PCP IR /DP 2016 and NOP requirements like MSP, TCT, XMAN, Dynamic sectorisation, Traffic Complexity tools. The process of alignment with PCP/DP 2016 will continue in 2017 by an inclusion of mature components that are already industrialised or about to be industrialised as SWIM interfaces, target time management and EPPL.

The alignment with the most demanding SESAR requirements for flight objects, EPP management and target times /AMAN reconciliation could be done in the coming year when these requirements will reach the required maturity level and the their industrialisation is about to finished.

Shared Documents

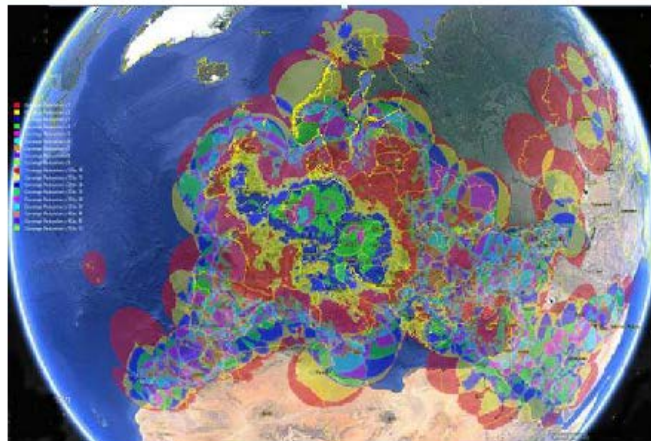
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	CH 02_Flight data processing system	07/02/2017 10:21	GIORDANO Greste
	CH 03_Misc Operational Display System	07/02/2017 10:21	GIORDANO Greste
	CH 04_Support Operational Display	07/02/2017 10:21	GIORDANO Greste
	CH 05_Safety Nets	07/02/2017 10:21	GIORDANO Greste
	CH 06_ATC Tools	07/02/2017 10:21	GIORDANO Greste
	CH 07_Technical Monitoring and Control System	07/02/2017 10:21	GIORDANO Greste
	CH 08_Recording and Replay	07/02/2017 10:21	GIORDANO Greste
	CH 09_DataLink System	07/02/2017 10:21	GIORDANO Greste
	CH 10_Off-line System	07/02/2017 10:21	GIORDANO Greste
	CH 11_ATC Simulator	07/02/2017 10:21	GIORDANO Greste
	CH 12_System Requirements	07/02/2017 10:21	GIORDANO Greste
	CH 13_Technical Requirements	07/02/2017 10:21	GIORDANO Greste
	CH 14_Project Management	07/02/2017 10:21	GIORDANO Greste

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[Add document](#)

- Based on the experience and knowhow gathered in the last 27 years developing the ATM system technical and operational requirements by different ANSPs.
- Access via OneSkyTeam credentials;
- Generic part available for everybody, tuning of generic requirements to specific needs and environment can be done in the context of cooperation agreement with EUROCONTROL
- It includes 19 different chapter covering all ATM system components, starting from CONOPS

AEGIS link with PCP

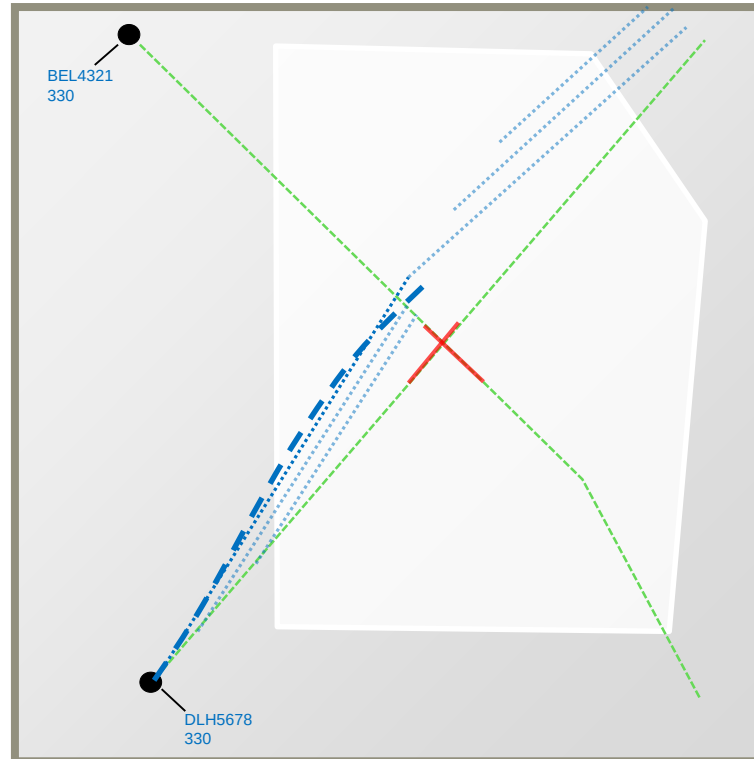


- Include the requirements for the variety of PCP AFs and SAFs as:
 - ATC tools (MTCD, TCT, MONA, AMAN, extended AMAN)
 - Core FDP requirements including dynamic sectorisation and multisector planner
 - Traffic complexity tool
 - Advanced HMI requirements
 -(many more)

Trial and Validation of Future System enhancements for FRA

- The big majority of FRA system enablers are already fully validated and implemented.
- Some minor system improvement concerning the handling of long DCT segment via data link is part of SESAR activities. Within FRA, the controllers might more often resort to vectoring for conflict resolution, which is likely to increase workload and be detrimental to predictability.
- To address this, within SESAR PJ10 (EUROCONTROL together with ANS Czech Republic) in April 2019 is planned to test a working method where the planner resolves conflicts if possible using a route clearance “Cleared to XYZ via ABC”, which is uplinked using CPDLC.
- Critically, the intermediate points are random (GEO) points, which are likely to be uplinked as a bearing and distance from a published point (though this still has to be discussed with airspace users).

Concept – 1. Typical scenario



Situation

Conflict detected in sector between two inbounds.

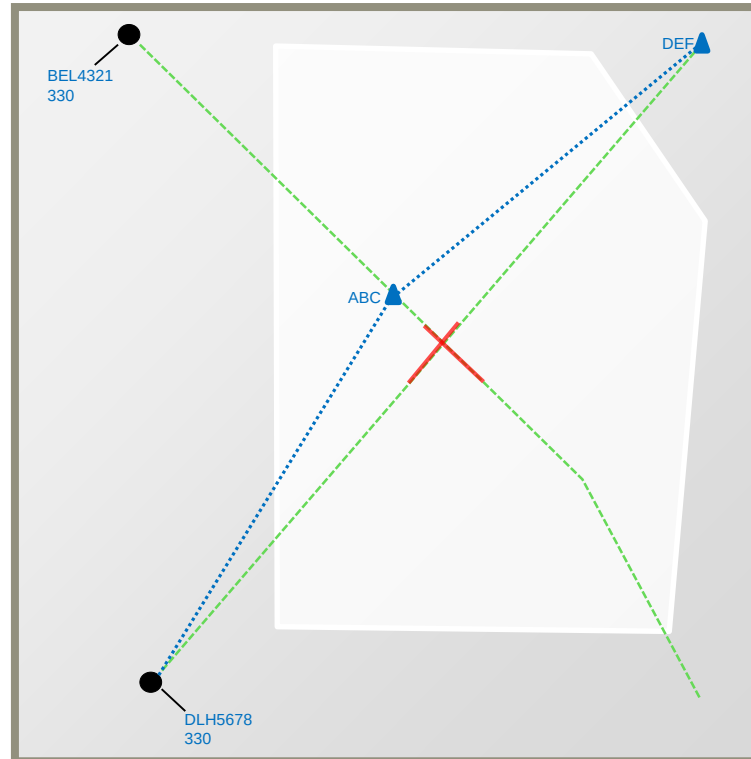
Action

Planner asks previous sector to put one of the aircraft on a heading to solve conflict.

Issues

1. The actual separation achieved is dependent on when the manoeuvre is effected;
2. When the flight is on an assigned heading, if the aircraft encounters different wind, the path will change. Over a long segment, this is more likely.
3. A further instruction is needed for the aircraft to resume its planned route;
4. Until this second instruction is given, the further route is unknown to the aircrew and the downstream controllers.

Concept – 2. Future scenario



Situation

Conflict detected in sector between two inbounds.

Action

Planner asks previous sector to clear the aircraft to point “DEF” via point “ABC”. The clearance is sent to the aircraft by CPDLC (UM79 Cleared to DEF Via ABC).

To facilitate manual entry in the FMS, point “ABC” would probably be specified as bearing and offset from point “DEF” – e.g. “DEF/242/63”.

Benefits

1. The separation achieved is much less dependent on when the manoeuvre is effected;
2. The path of the aircraft is known;
3. As the clearance constitutes a “closed loop”, no further clearance is required;
4. Both the aircrew and downstream sectors are aware of the complete route.