



Agenda Item 3: Activities for the development of the air navigation systems/services
3.3 Communications, Navigation and Surveillance (CNS)

RADAR DATA SHARING

(Presented by Raporteur of the Radar Data Sharing Task Force)

SUMMARY

This Working concentrates on the need identified by the Task Force for the establishment of an institutional framework coordinated by ICAO NACC with the assistance of a Task Force, selected from technical and operational members appointed by states/territories having shown interest for radar data sharing within the C-CAR, for the design of a coordinated and harmonized implementation programme of radar data sharing within the C/CAR.

1. Introduction

1.1 The Radar data task force stresses that the roadmap for the coordinated and harmonized networked implementation of (radar) data sharing within the C-CAR should be part of a (radar) data implementation project of which the first phase is limited to the organization of high technical and operational level seminars and or meetings with air traffic service providers, air traffic controllers, telecommunication suppliers, technical personnel, airports and manufacturers.

1.2 These seminars or meetings dedicated solely to the (radar) data exchange within the C-CAR should respectively be conducted or convened under the auspices of the ICAO NACC office.

2. *Radar sharing project.*

2.1 The radar data sharing task force is convinced that to reach the objective of the C-CAR Working Group to achieve effective and efficient radar data sharing within the C-CAR the above mentioned framework should include a (radar) data implementation project, in which the ICAO NACC office has a facilitating and coordinating role.

2.2 The project must clearly indicate the typical costs for the implementation, maintenance and upgrading of the system. It shall also quantify the operational benefits.

2.3 This project should also encompass aspects of ADS-B and the sharing of ADS-B data. This in view of the fact that the expectations that automated surveillance and detection using ADS-B will add greatly to enroute safety and efficiency in areas where no radar services are available.

2.4 Discussions should also be initiated in respect of separation reduction based on ADS-B surveillance data within the region and the required safety nets to increase safety during ATC operations. It is therefore important to receive from airlines or IATA information concerning aircraft operating in the C-CAR carrying ADS-B avionics.

2.5 All the above clearly indicates that a harmonized implementation of radar sharing within the C-Car can be best achieved through the design of a radar data sharing project for the C-CAR focused on the provision of guidance, planning and coordination of a harmonized implementation of radar data sharing within the C-CAR.

2.6 Timely, reliable and accurate radar data shared on a networked basis will provide ATC units in the C-CAR an improved situational awareness of air traffic and the ability to manage the flow of air traffic within the C-CAR seamlessly. Since it provides a regional common picture of air traffic, facilitating traffic assessment and related coordination procedures.

2.7 Seminars, workshops and meetings provide excellent means to build confidence of states/territories on the functionality and the benefits of the system, and also trigger the necessary impetus by states/territories to foster the required level of coordination for an efficient and harmonized radar data exchange in the region.

2.8 The participation of a large number of C-CAR states/territories; the volunteering of sufficient number of suppliers and manufactures to participate with presentations and their products and the means to acquire well balanced in-depth presentations on the subject by highly skilled and experienced lecturers can only be guaranteed, if the seminars/workshops or meetings are conducted or convened under auspices of an international aviation organisation.

2.8 The radar data sharing task force therefore propose the meeting to adopt the following recommendations:

2.9 That ICAO NACC office with the assistance of a task force composed as envisaged by conclusionof C/CAR /WG 5, acts as facilitator for a project intended for the design of an institutional framework that will guarantee or support strongly the successful implementation of (radar) data sharing within the C-CAR. This including the organizing of seminars or meeting focussed on providing states/territories the technical and operational knowledge level for an efficient and cost-effective implementation and safe operation of the system.

2.10 The radar data task force is of the opinion that this strategy is of great importance for the desirable networked distribution of radar data within the C-CAR to gain momentum and be accomplished within a reasonable time frame.

2.11 A different roadmap will result in a fragmentary implementation of radar data sharing within the region.

3. *Requirements for seminars or meetings.*

3.1 The success of these seminars or meetings is dependent on the following key factors:

- a) The level of technical and operational details imparted or dealt with during seminars or meetings focused on radar data sharing
- b) The knowledge level and experience in respect of radar data sharing of persons assigned to provide presentations during these seminars or meetings.
- c) The academic level and pro-activity of participants appointed for the seminar or meetings.
- d) The participation of system suppliers and system manufacturers during seminars or meetings.
- e) The willingness of states/territories to share radar data indiscriminately.
- f) The disposition of participants to coordinate efforts to achieve cooperative agreements and raise the necessary finance for the networked implementation of radar data sharing.

3.2 The coordinator of the seminars or meetings must ensure that only the highly qualified and experienced experts in the field of radar data sharing are invited to give presentations. He must also ensure that their presentation will focus predominantly on the technical concepts as the operational concepts of radar data sharing. Eventual bottlenecks in the implementation of the system, including the practical solutions applied to overcome the identified difficulties in other regions where they have been involved in the implementation process of radar data sharing.

3.3 Their presentations must furthermore dedicate attention to the topics identified by the radar data sharing task force as important to be discussed during the seminars or meetings and their intervention must be addressed to support states in their decision making process in the different areas of discussions.

3.4 Presentations of system suppliers are also essential during this seminar during which suppliers and technical experts should discuss the accommodation of eventual different radar systems within the networked system and the commercial availability of solutions for eventual incompatibilities within the system.

3.5 Discussions concerning system architecture and communication protocols within the C-CAR operational environment may provide cost-effective solutions for radar data distribution within the C-CAR system as well as economic long-term support for the system maintenance and up-grades.

3.6 A programme dedicated (during its initial phase) to the imparting of in-depth knowledge of the system and information sharing will surely lead to a cost effective system for distribution of radar data within the C-CAR.

3.7 The radar sharing task force considers the organisation of seminars/workshops or meetings referred to above an excellent opportunity for ICAO NACC to request the United States and Mexico to provide in-depth details of their experience in the operational, technical, administrative and legal fields in respect of radar data sharing.

3.8 The European experience in this field will also be greatly appreciated.

3.9 The results of operational and technical analysis and studies made during the seminar/workshops or meetings will contribute to the work given to GREPECAS by CAR/SAM/3 RAN Meeting.

3.10 The seminars or meetings provide excellent means for the establishment of a common approach to the exchange of radar data within the region and facilitates the harmonisation and integration between ATC units of the C-CAR.

3.11 These seminars and meetings may also foster the development of Cooperative Agreement Programs engaging states/territories to seriously head towards a safe and cost effective implementation of radar data exchange within the C-Car by developing and implementing effective standards and achieve the level of integration that will lead to full development of the system within the C-Car.

4. ***High level objective of the seminars or meetings.***

4.1 The high level objective of the seminars/workshops or meetings is aimed towards the achievement of a cost-effective, reliable, accurate and safe networked radar data sharing system within the C-CAR, which will enhance seamless air traffic management within the region.

4.2 These seminars will trigger a collaborative support for the implementation of the system, since states/territories obtain the necessary knowledge and ability to evaluate the benefits of a networked system.

4.3 The seminars/workshops and meetings output will encourage them to procure cost-savings by the use of radar data processing and distribution components or systems satisfying an interoperability standard which is globally accepted to enhance cost savings.

4.4 In a networked system ATC providers within the region will have access to a regional air traffic picture, enabling to improve awareness of the traffics situation based on aircraft positions and trajectory data.

4.5 Participating ATC units in the system will have real time access to the traffic picture enabling them to offer valid flight profile to aircraft operating within the region .and re-evaluate cleared flight profile to aircraft whenever er regional operational environment changes, especially considering the possibility for the inclusion of weather data in the system.

5. **Recommended seminars content:**

5.1 General considerations to be covered:

- a) make an inventory of radar installed in C-Car including their specifications.
- b) identify training needs for their radar technicians and air traffic controllers.
- c) Identify technical requirements for the implementation of radar data sharing within the C-CAR environment
- d) The sharing of radar data sharing technical and operational experience from other regions, particularly useful information in respect to errors and or omissions and discuss measures to be taken to avoid or mitigate such occurrences.
- e) Address means to achieve cost-effectiveness, reliability and integrity of data products offered by the system.
- f) Discuss methods to ensure that timely, accurate and quality assured radar data information is exchanged.
- g) To get a high level view of system components, common systems and common user interfaces
- h) Assure the system interconnectivity with E CAR Dakota system and system used for data sharing in the SAM region

- i) Discuss the characteristics, ADS –C and ADS-B as they relate to the transmission of surveillance data to ATS units and is said to provide a cost effective solution for surveillance in non-radar airspace.
- j) Ensure that the networked system is also able to support the distribution of AFTN/CIDIN messages regionally.
- k) Discuss the type of data to be exchanged and the established of priorities for their implementation taking due consideration of ATC operational requirements.
- l) Discuss the configuration of messages so as to ensure that the displays presented to the controller for selection compliments his controlling tasks.
- m) Discuss methods to ensure that the system integrates the functionality of all current regional radar automation systems.
- n) Discuss resource and priority issues for system implementation
- o) Provide the air navigation service providers with special reports on developments in the area of radar data and ADS-B data sharing.
- p) The protection of information obtained from shared radar data (see Assembly resolution A 35-17.
- q) System familiarization for staff of air navigation service providers
- r) Discuss training needs; training development and delivery schedule.
- s) Discuss and plan of system policies.
- t) To achieve agreement on a common specification for radar sensor hardware and software.
- u) To establish common standards for data acquisition methods
- v) Discuss the distribution and filtering of messages.
- w) Discuss methods for the operational readiness demonstration of the system and the target date for system commissioning.
- x) Define, test and implement adequate communication methods and protocols as well as dissemination procedures
- y) Discuss the testing of data communication and protocol telecommunication of the network, as well as monitoring and management of the system

5.2 Technical considerations to be covered

- a) Discuss message transmission formats, in particular the All Purpose Structured European Surveillance Information Exchange and its benefits.(Asterix).
- b) Present the reasons for the choice of Asterix
- c) To define the data formats and interfaces to realise an optimal data exchange.
- d) To evaluate and recommend suitable data communication links.
- e) Discuss the availability and performance of equipment for radar message conversion and message distribution system, taking into consideration the system to support different existing formats in particular those in the C-CAR, like asterix and CD2, and that it is upgradeable for other types of formats.
- f) Present technical studies of radar data sharing to participants.
- g) Discuss specifications for the network node, its location and legal implications
- h) Discuss specification design, acceptance testing and evaluation of the system.
- i) Discuss the likely regional problems for implementing radar data sharing, if any, and methods of resolution.
- j) Discuss the implementation of (radar) data against constraints experienced and issues which rose during implementation projects in other areas.
- k) Consider the evaluation of component the performance the European RADNET
- l) Provide expert advice to telecommunication engineering; identifying the cost/benefit advantages for implementing radar data sharing specifically to facilitate the flow of traffic within the C-CAR.
- m) Discuss methods and procedures for maintenance as well as possibilities for system enhancements and upgrades

- n) Develop interface requirement document and interface control document.
- o) Develop and standardize appropriate quality procedures.
- p) Discuss methods to ensure infrastructure compatibility across the region
- q) Make states/territories better acquainted with new communication tools such as ADS-B, which may support radar surveillance.
- r) Make states/territories acquainted with the multi-lateration technique employing ground-based monitors to triangulate aircraft transponders, TCAS, ADS-B and military IFF signals.
- s) Discuss adaptability of infrastructure design to meet the purpose of advanced technology in aircraft avionics e.g. sharing of ADS-B.
- t) The provision of assistance to states/territories in their decision making process for the selection of the necessary equipment, software development or installation, system support or installation, and the further enhancement of the system with mode S.
- u) To develop and standardize appropriate quality procedures.
- v) Discuss the availability of compatible replacement to avoid system failures and outages.
- w) Discuss the development describing the risk analysis and the mitigation actions by the system supplier, maintenance service suppliers and air navigation service suppliers.
- x) Discuss possibility of technical assistance by ICAO Technical Bureau.
- y) Discuss radar data sharing agreement with the assistance of persons in the legal field and ICAO legal Bureau.

5.3 Operational considerations to be covered.

- a) Discuss procedures to make the system user friendly in order to facilitate the controller to access easily only relevant data, so as to prevent the system to overflow the controller with information, which might adversely affect the controller's decision-making process.
- b) Trigger discussions on operational requirements within the region in order to increase safety.
- c) Discuss the perceived deficiencies within the system in other regions and identify the most appropriate action that should be taken in order to avoid or minimise the same deficiencies within the C-CAR.
- d) Discuss operational evaluations in areas making use of radar data sharing such as its influence on the capabilities of ATC units and the target level of safety, including the response of controllers with regard to the system.
- e) Discuss operating problems, which may have been experienced by ATS of other regions participating in radar data sharing exchange so that these can be taken into account when developing plans for its implementation
- f) Discuss contemporary functional requirements and solutions for congestion on the network

4. Meeting the goal.

4.1 The seminars or meeting have only met their goal if important elements for radar data sharing such as methods for the building-up of multi-national radar communication network for C-Car, investment security, distribution specifications and performance, specifications for conversion units, time synchronization, filtering, system and network management, flexibility, support for software upgrade, access control, technical data like interfaces, formats, protocols, backup services, availability, maintainability, availability of open architecture and modular design system costs, safety and reliability have been duly discussed.

4.2 The radar data task force cannot overemphasize that radar sharing within the C-CAR can only be successfully implemented in the region through the collaborative effort of all states/territories and with the support of experienced human resources in the subject. Misinformation and inadequate planning of the system will adversely affect the economics and effectiveness of ATC units. ATC units of the C-CAR may lease or acquire inadequate equipment for the system and may not have sufficient well trained personnel to operate and maintain the system.

4.3 The radar data task force therefore requests the ICAO NACC office to assume a role as coordinator and facilitator for the drafting of a well coordinated plan for the implementation of radar sharing within C-CAR so as to avoid costly delays or system limitations.

Taking all above into consideration the radar data task force request the meeting to adopt the following draft conclusion:

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CONCLUSION 6/X

That ICAO NACC acting as coordinator for the radar sharing project designs a framework with regard to planning, cost benefit studies, organising of seminars dedicated in particular to the areas stated above, and the establishment and implementation of cooperation agreements necessitated for the trials of cross-border radar data sharing and the networked operation of the system.

4.4 That ICAO NACC office requests the feedback from states/territories in the C-CAR on the desirability of ADS-B data sharing with adjacent FIRs.

4.5 The radar data task force is aware that the sharing of radar data may also include the sharing of targets of military air defence units of states. This sharing of radar data information may be very sensitive when military aircraft are operating on special missions.

4.6 ADS-B is transmitted by aircraft wishing to be monitored by both air and ground surveillance system.

4.7 The task force suggests states/territories to take into the experience, comments and eventual suggestions and proposals from air navigation services providers where radar data systems are in place, e.g. Euro control radar data sharing system, for the execution of the required functionality (quality) and safety assessment of the system in an operational environment

4.8 The encouragement of potential providers of the system to have an operational demonstration during the seminars or meetings cycle will beyond doubt enhance the appraisal by states/territories in the region of the benefits of the use of a networked radar (data) sharing technology. For its provision of a networked visualisation of air traffic within the region enabling as such air traffic services to obtain enhanced monitoring capabilities of airplane traffic which consequently contribute to:

- a) The safe and expeditious flow of traffic as a result of the capacity the system to broadcast information carrying visual data and or audio data from every surveillance sensor connected to the system to all ATC units forming part of the system, creating as such a multi-surveillance sensor system which provides air traffic controllers with a common picture of the traffic flow in the region leading to a better management of the traffic flow in the region.
- b) More efficient coordination between adjacent ATC units and as such facilitating ATC operations. This will have a positive effect on airspace capacity.
- c) A better protection against illicit civil or military aircraft, enhancing security of air operations.

4.9 Airline operators may benefit from the system in respect of improved operational control since ATC units are in a better position to provide airline operators more exact information with regard to the progress of their flights.

- a) To the safe flow of traffic in both the airspace of jurisdiction of the air navigation service provider and also in adjacent Fir's based on information broadcast carrying visual data and or audio data of air traffic within these Fir's. Forming part of the networked radar data sharing system.
- b) Simplify coordination with adjacent Fir's and as such facilitating ATC operations.

4.10 The radar data task force identified the following states/territories requirements for a successful implementation of radar sharing in the C-Car.

- a) The awareness of states /territories that ATS airspaces must be able to provide increased flexibility to users, with increased level of capacity and safety to meet the growing demand for air transportation.
- b) Maintain a collaborative decision making attitude during seminars or meetings related to radar data sharing so as to pro-actively resolve potential problems
- c) The interest of states for sharing both military aircraft surveillance and civil aircraft surveillance with each other
- d) The availability of adequate training for technicians and air traffic controllers.
- e) The implementation of the necessary changes in structure and systems which are required.
- f) The cooperation and collaboration in the drafting of radar data sharing agreements.
- g) Cooperation with respect to the testing of the system so as to obtain a high degree of assurance that the system is working satisfactorily.
- h) Adaptation of Letter of Agreements to simplify coordination of air traffic.

5. Recommended Roadmap towards implementation of radar data sharing

- a) Organize seminars/workshops and meetings to make C-Car states/territories better acquainted with the technical and operational requirements of radar data sharing.
- b) Establish a multi-national task force to assist the ICAO NACC office in its role as coordinator and facilitator for the system implementation.
- c) Evaluate the current capabilities of radar systems within the region based on the collaborative exchange of data from states/territories.
- d) Determine the requirements for data sharing within the C-Car (regional requirements for data sharing)
- e) Identify a common communication media for data sharing within the C-CAR.
- f) Identify funding resources of states to start the process for starting to acquire hardware and software for the system
- g) Develop a detailed system architecture for C-CAR
- h) Develop a system and component acquisition roadmap
- i) Acquire hardware and software for the system
- j) Install and test the system.
- k) Develop radar data sharing agreements

6. Time table.

6.1 The determination of a realistic time table for the implementation of radar data sharing within the C-CAR depends on the following parameters to be discussed or created during these seminars/workshops or meetings:

- a) the commitment of states/territories to head seriously towards its implementation
- b) the financial capabilities of states/territories
- c) the preparation of human resources in the technical field
- d) the development of legal agreements
- e) the conclusion of contracts between air navigation service providers.
- f) the possibility of technical assistance from ICAO

7. Conclusion

7.1 The meeting is invited to take note of the information contained in this working paper and consider aspects in this working paper to prepare a formal application of technical assistance to be presented to ICAO for the organization of seminars/workshops or meetings in order to pave the road towards the implementation of radar data sharing in a time effective and structured way.