



**WORKING PAPER**

**FIFTH MEETING OF THE ALLPIRG/ADVISORY GROUP**

(Montreal, 23 – 24 March 2006)

**Agenda Item 2.8: On-line searchable air navigation plan (ANP) database to support planning activities, including ICAO 5-letter name code**

**ICAO GLOBAL AIR NAVIGATION PLAN (GANP) DATABASE  
AVAILABLE THROUGH AN ICAO GIS PORTAL**

(Presented by the Secretariat)

**SUMMARY**

The Eleventh Air Navigation Conference (AN-Conf/11) recommended that ICAO develop database containing all tabular material from all the regional air navigation plans together with the major traffic flows and other regional data and make this database and associated charts available through the Web. In follow up to the recommendation, the Secretariat continued working towards the final goal of providing all the global air navigation planning data and associated planning services through an ICAO GIS portal. This paper elaborates on this subject and reports to ALLPIRG/5 on the progress made.

Action by ALLPIRG/5 is in paragraph 6.

**1. INTRODUCTION**

1.1 The Eleventh Air Navigation Conference (AN-Conf/11, Montreal, 22 September to 3 October 2003) discussed the need for the development of one ICAO Air Navigation Plan (ANP) Database containing up-to-date air navigation planning information that would be made available and functional for all those involved in the planning process. The meeting noted that ICAO had already developed an air navigation planning database and related publication and GIS<sup>1</sup>-based charting system that supported preparation of specialized CD-ROM and hard copy ANP publication formats, and that the

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1 Geographic Information System (GIS), a computer-based system for capturing, storing, updating, analyzing, manipulating and displaying geographically referenced information

database was possible to convert to take advantage of Internet-based database and mapping technologies. Therefore, the meeting agreed that steps should be taken so that web-based interfaces to the existing electronic tabular material from all the ANPs were developed and made accessible to States/PIRGs in order to allow for viewing, analysis and updates of the air navigation planning to be made in real time.

1.2 It was recognized that an air navigation plan database and associated web-based information and charting service would provide invaluable efficiencies and benefits including Internet-based access by States, PIRGs, participating CNS/ATM partners, regional offices and Headquarters to ANPs and the data upon which they are based. The development of the Global Plan and ATM system planning through enhanced information availability and charting, with particular regard to interregional homogeneous ATM areas, major traffic flows and forecasts, and usage of all available additional information on costs, aircraft performances, etc. would also be facilitated.

1.3 Consequently, the meeting developed following recommendation:

**Recommendation 1/14 – Development of an ICAO air navigation plan  
database and associated Web-based information and  
charting service**

That ICAO develop and maintain a database containing all tabular material from all the regional air navigation plans, both Basic Operational Requirements and Planning Criteria (BORPC) and the Facilities and Services Implementation Document (FASID), together with the major traffic flows and other regional data from Part II of the *Global Air Navigation Plan for CNS/ATM Systems* (Doc 9750), and make this database and associated charts available through the Web.

1.4 The Air Navigation Commission (165-1/2) agreed that electronic access to air navigation plan material would constitute an invaluable analytical planning tool and that a web-based information and charting service would directly support the regional, interregional and global planning elements in support of the ATM operational concept. It approved the recommendation and requested Secretary General to take appropriate action with the understanding that work on the subject was already in progress by the Secretariat.

## 2. DISCUSSION

2.1 The Secretariat further progressed the work in accordance with the recommendation and all the ANP tables were converted for direct usage in GIS while the web GIS-user interface was customized to be able to link it with the ANP data. To make available an ANP database information and charting service on Internet (through one ICAO GIS portal), one web mapping server was purchased and installed under ICAO Headquarters auspices thus, having proximity to the current ANP database, production resources, and information technology support. Further, suitable and cost-effective software tools that would support not only ANP tabular material but also all aeronautical numerical planning data and associated charting services, were acquired. From April 2005, the System Analyst position in AIS/MAP Section was filled and together with the work on the development of air navigation planning tools, the Secretariat started developing the web-based user interfaces to the tabular and cartographic ANP geodatabase.

2.2 To establish the global aspect of the air navigation planning and facilitate the interregional integration of the planning material, work is underway by the Secretariat to harmonize the tables contained in different ANPs. In addition, and following introduction of Global Plan Initiatives

(GPI) in the Global Plan, the formats of planning tables are under the review and updating to ascertain that it would be possible to plan and include GPIs in the tables, as appropriate. As the air navigation planning will be performance based and to be able to monitor and analyze status of implementation of the planned material, all ANP tables will be amended to include an indication regarding the status of the implementation (p-planned or i-implemented) and for the planned data, an indication of the planned implementation date. This additional temporal information should be used by the PIRGs to analyze implementation progress and if a delay is envisaged, to recommend appropriate action to be taken to expedite the implementation in accordance with established priority.

2.3 For the ANP material, the currency of the database will be maintained by authorized staff in States, ICAO regional offices and Headquarters who would input amendments through standardized and harmonized ANP tables and text formats which would include data filters and data look-up (selector) to limit erroneous entries. A detailed technical review and verification of submitted ANP amendments would take place at ICAO Headquarters and pending their formal approval, the material will be stored in the database before being posted as an approved ANP amendment. The amendment process would essentially follow the same paper-based process that occurs today when amendments were submitted for inclusion in the hard copy ANP publications, except that the whole amendment process will be performed in an electronic, web-based environment through one ICAO GIS portal.

### **3. ICAO GIS PORTAL**

3.1 The ICAO GIS Portal is intended to organize Global ANP content and associated services such as aeronautical geo-data directories, planning and search tools, flow and traffic forecast information, planning support resources and associated applications. The portal will provide the capability to query metadata records for relevant planning and other data and services and to link users directly to the ICAO online site that hosts the air navigation planning services. At the portal, the Global ANP content could be visualized as selectable information layers, overlaid by information from other sources (air navigation geobased data) and used in user-defined geographic query and analysis.

3.2 The Secretariat started its work on the ICAO GIS Portal in 2005 by developing the Global ANP GIS services and the planning tools. The portal will contain information on flight information regions (FIR), aerodromes (AD), routes (ARN), communications, navigation and surveillance (CNS), meteorology (MET), search and rescue (SAR), aeronautical information (AIS), air traffic flow, etc. The portal will allow viewing, editing, reporting, developing amendment proposals, selecting and allocating codes, linking to other ICAO and outside ICAO information resources and many other services associated with the air navigation planning (GEO Network).

### **4. AIR NAVIGATION PLANNING GIS SERVICES**

4.1 The ICAO implemented GIS software with all the available drafting tools allowed us to create applications that would permit authorized users to develop and propose changes directly through the ICAO GIS Portal. Besides the planning data, the Secretariat was able to obtain global operational air navigation data that allows us to analyse, compare and present through the GIS, the implementation status of the plans. The Internet functionality of the GIS was ensured by placing the system on the server which would allow the remote user to access and use the system without the need for the GIS software to be installed locally. The functionality to use the system remotely is envisaged to become a very useful tool for all the Planning and Implementation Regional Groups (PIRGs) and Regional Offices as ANP information could be viewed and edited and regional coordination would be facilitated in the future through web-based conferencing (net meeting) from different places.

4.2 GIS has the capability to provide for an interactive dynamic chart where the user is able to select what should be displayed. Among the many other functions included in GIS are identification of information, extraction of data, geographic queries and analysis, just to mention the few. The output of the system could be plot of selected size, GIS-specialized CD-ROM, electronic files with various data formats. Integration of ANP data with a GIS and the consequential graphical presentation of the geospatial data facilitates validation of the planning data as data discrepancies are easily visually detected and corrected.

4.3 One of the GIS services developed by the Secretariat is the ICAO five-letter name code (5LNC) system and associated global database. The system is intended for authorised air navigation planners in States to access the 5LNC system, reserve a new code and once approved by the responsible Regional Office, use the code. The system is conceptually designed according to the first-come-first-served method and has the possibility of generating new pronounceable or non-pronounceable codes. As designed, the system would not require any coordination among the Regional Offices prior to approving the use of reserved code. This tool will improve the efficiency and reduce significantly a workload in ICAO Regional Offices, thus improving the planning. In addition to the assignments of new codes and since the system is fully integrated with the GIS, it will also be used as a tool in resolving the existing duplicates, triplicates of five-letter codes that exist today.

4.4 Another ANP GIS service developed by the Secretariat is the tool to search, view and update the Aerodrome Operations (AOP) data for all the ICAO regions. The tool allows searching the existing information and the results will be shown in the form of a table. Some table columns give links to the GIS system and that allow user to view aerodrome location on the map and interact with the system. Once in the GIS, the user could get all the detailed information related to the aerodrome in query and additional link to the outside source of information (Google Earth Service) is also available. Another important function for air navigation planning is the possibility for authorized users to edit/update the information and produce report in the form of a publishing table.

4.5 The Secretariat is progressing the development of similar other planning tools and applications that will be used for other ANP GIS services (ARN, FIR, CNS, MET, SAR and AIS) and those new tools will be introduced in the GIS portal as their development is completed. Most of the above services have already been through the initial development stage and reached the level of demonstration. As the ANP GIS services are evolving, the portal will in future also include all aircraft types and their registration and collect evolutionary aircraft type performances and avionics data. To accomplish this demanding but important task of data collection, cooperation and collaboration with authorized data sources must be established.

## 5. CONCLUSION

5.1 Recent technology and properly selected software tools allow for the further development of the ICAO Global Air Navigation Plan database and for the availability of that database and all associated planning GIS services through an ICAO GIS portal. The database and services will improve the efficiency and provide conditions for electronic updates and timely provision of an up-to-date Global ANP information to all users. The portal will ensure the currency, coordination and implementation of regional air navigation and contribute to the further development of air navigation plans by providing the framework for the efficient implementation of new air navigation systems and services at the national, regional, inter-regional and global levels. It is also fully in line with the ICAO Strategic Objective D, which is to develop, coordinate and implement air navigation plans that reduce operational unit costs, facilitate increased traffic and optimize the use of existing and emerging technologies.

5.2 Finally, the availability of the ICAO GIS Portal and the underlining quality databases and services to all ANP users will improve the image, credibility and visibility of ICAO, create possibility for additional revenue generation for ICAO and augment coordination and cooperation of ICAO with States, other international organizations and air navigation stakeholders.

5.3 In light of the above, ALLPIRG is invited to consider adopting the following conclusion:

**Draft Conclusion 5/x – ICAO global air navigation plan (GANP) database and geographic information system (GIS) portal**

Recognizing that access to an ICAO global air navigation plan (GANP) database and associated planning services through an web-based ICAO GIS portal would constitute an invaluable tool to support, integrate and monitor the planning and implementation of harmonised regional, interregional and global air navigation infrastructures, the regional planning groups:

- a) note the progress made by the Secretariat in accordance with Recommendation 1/14 of the Eleventh Air Navigation Conference and the ICAO GANP database;
- b) note the ongoing efforts by the Secretariat in harmonizing formats of all the ANP tables together with the inclusion of temporal information in the tables that would assist the regional planning groups in monitoring and analyzing implementation progress;
- c) note the intent to expand the ANP tables to include Global Plan Initiatives (GPI's), as appropriate; and
- d) utilize through the ICAO GIS portal the ICAO GANP database and associated planning services so to ensure the currency, coordination and implementation of regional air navigation planning and contribute to the further development of air navigation plans as the framework for the efficient implementation of new air navigation systems and services at the national, regional, inter-regional and global levels.

**6. ACTION BY ALLPIRG**

6.1 The ALLPIRG/5 Meeting is invited to:

- a) note the progress achieved in developing one ICAO Global Air Navigation Plan (GANP) database and associated services; and
- b) adopt Conclusion 5/x as presented in paragraph 5.3 above.

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