PERSPECTIVES OF THE TRANSPORT AND THE COMMUNICATION IN THE LIGHT OF THE EUROPEAN EUPOS PROGRAM

Józef Zając
Andrzej Fellner
Paweł Trómiński

Chelm State School of Higher Education
Pocztowa Street 54, 22-100 Chelm, Poland
tel.:+48 82 562112, fax: +48 825640080
e-mail: afellner@o2.pl

Abstract

Development scientifically – technical he is causing that satellite technologies are becoming inVolved in every sphere of activity of the man. In individual states diverse satellite systems are coming into existence e.g. SAPOS, SWEPOS, SWIPOS, BaltPOS, WAAS, MSAS, SNAS, the EGNOS. EUPOS is one of these programs (European Position Determination System) - European network of multifunctional reference stations. In this project they established, that the EUPOS stations will be permanently operating, multifunctional DGNSS reference stations, The average distance between the stations will be about 70 km. Higher density may be required in conurbation. Existing reference station systems (e.g. EUREF, IGS) should be connected or incorporated. The coordinates of the stations will be determined with high precision, both in ETRS 89 and in conventional geodetic reference systems by connecting to EUREF points as well as to the other control networks of the countries. EUPOS will use the signals of Galileo as basis standard as soon as it is available and GPS as basis standard up to the complete availability of Galileo and as optional additional standard after complete availability of Galileo; also System GLONASS will be used as optional additional standard. All participating countries will observe the unified standards or/and will build up their multi-functional systems fully compatible with future European system GALILEO. Permanent DGNSS service EUPOS will maintain the following sub-services: EUPOS DGNSS for real time or post processing DGNSS applications by code and code-phase measurements with metre up to sub-metre accuracy, EUPOS RTK for real time DGNSS applications by carrier phase measurements with centimetre accuracy, EUPOS Geodetic for DGNSS applications by phase measurements in static or kinematic mode with centimetre up to sub-centimetre accuracy. Galileo gains a huge number of new users, more than 400 reference stations in 14 countries will work permanently using the Galileo system, by EUPOS Galileo will transfer the reference system to all users in Central and Eastern Europe; EUPOS will offer and guarantee the services of proper accuracy as recommended by the Galileo programme; EUPOS stations could be integrated into Galileo programme. Some selected EUPOS stations could be incorporated to the Galileo ground control segment. We would like to introduce "Perspectives of the Transport and the Communication in the light of the European EUPOS Program". We are going to prepare an experiment on the base of permanent The State School of Higher Education station.

Keywords: *transport, transport systems, satellite systems, navigation, communication*

The dynamic development of aviation caused huge development of present techniques and technologies in navigation. Already since 1995, aircraft navigation GPS system has introduced receivers to be used as boosters, which added up to the supplement of classical navigation aids. However, NATO headquarters (STANAG 4550) have already exploited the majority of satellite radio navigation equipment between 2005 and 2007 (Fig. 1 and Fig. 2).

The present air navigation system equipment has to be replaced as it will form essential aid for air - navigation, enabling RNAV exercise flights (Fig. 3).

Along with world trends as well as recommendations of international aviation organizations, every aircraft should be equipped with a satellite receiver set. Also the dependent supervision equipment - ADS (Automatic the Dependent Surveillance) depends on satellite technology (Fig. 4).

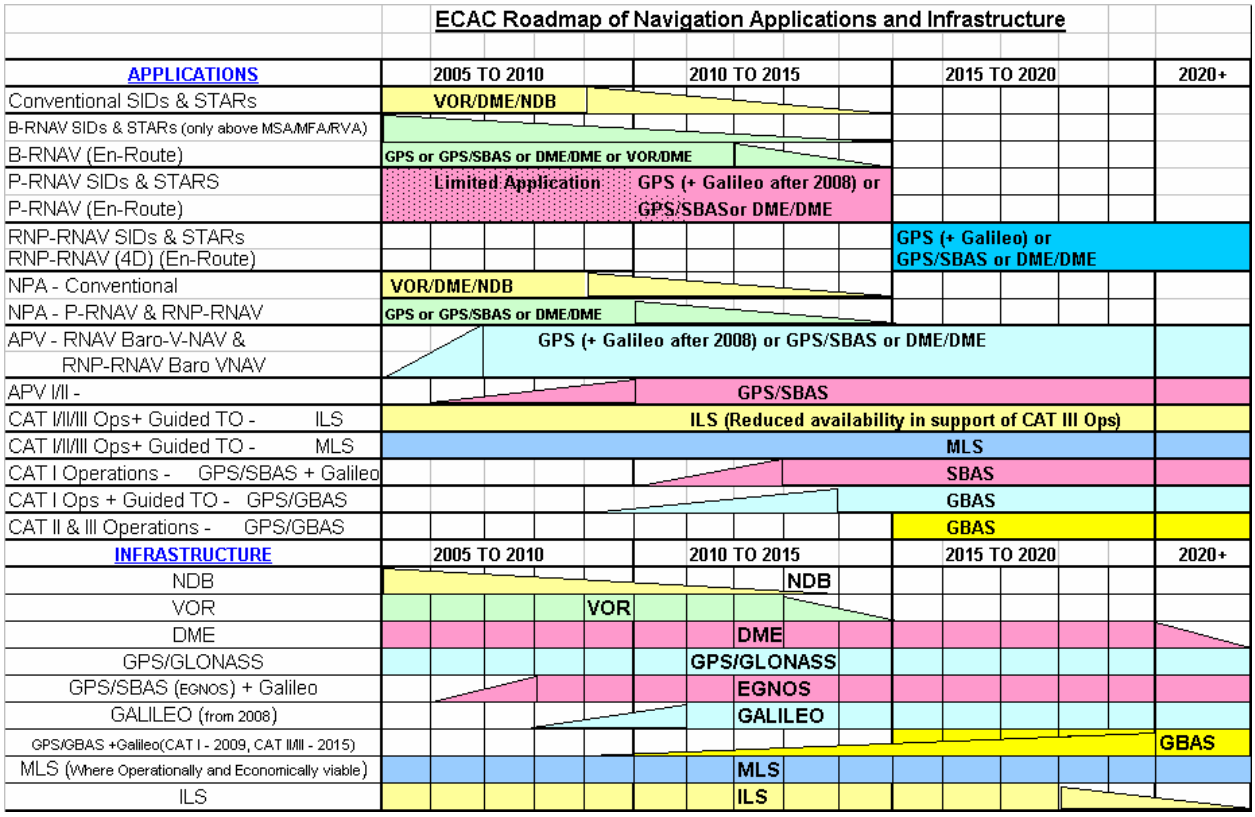

Fig. 1. Review of the ECAC Roadmap navigation strategy and implementation plan

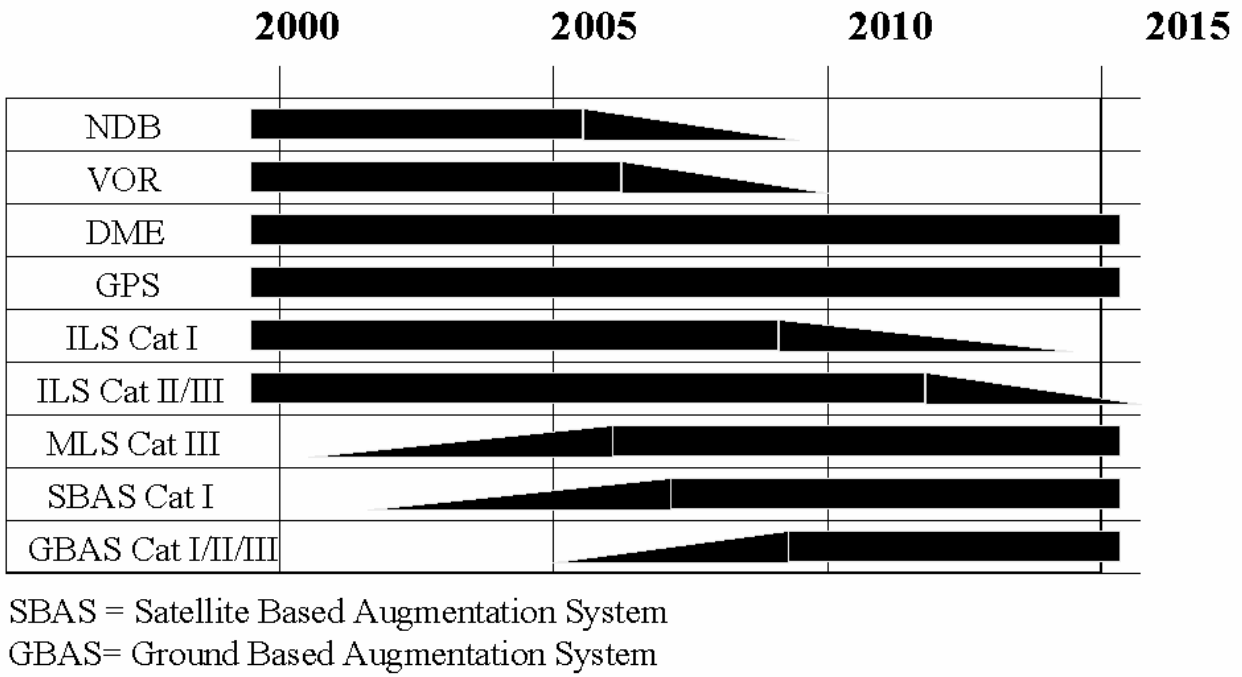

Fig. 2. Navigation strategy for ECAC

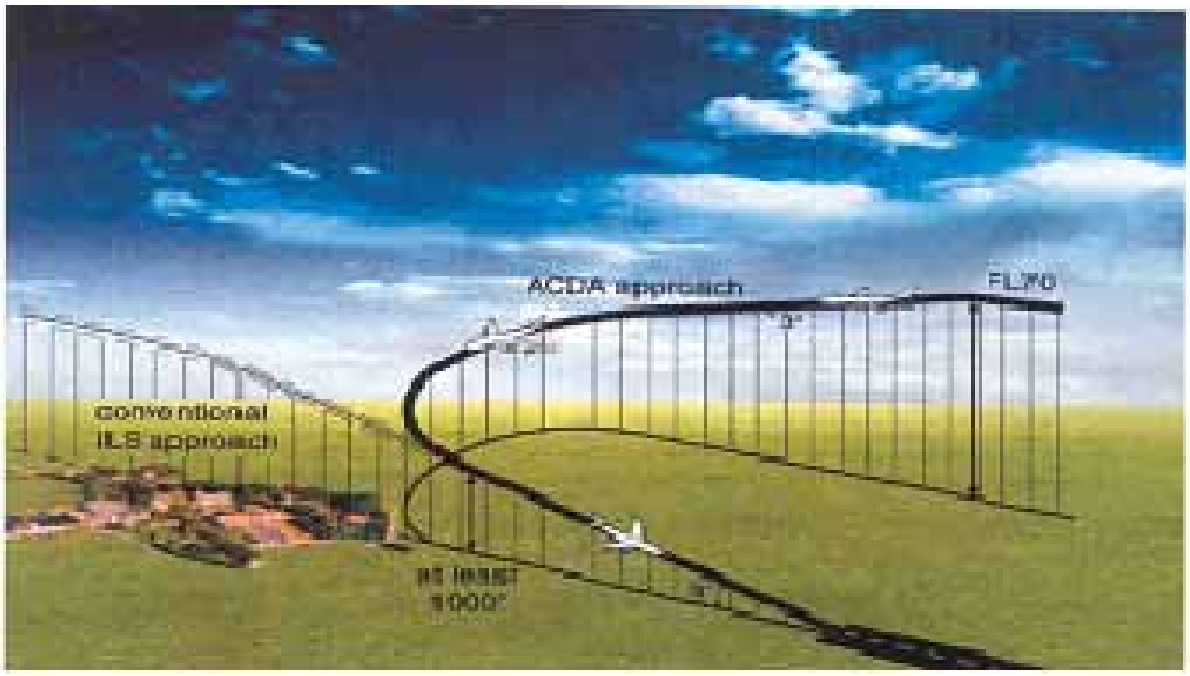

Fig. 3. Segment of approach procedure

Fig. 4. On - board approach equipment

This kind of information is received through COMSAT and sent to the operator's suitable air traffic centre. In turn, mainly in Sweden and in Germany airborne tests are made on the use of DGPS technique, on one of modules of automatic unit of ADS - B supervision (Automatic the Dependent Surveillance - Broadcast), which is the derivative of ADS. The deck receiver set GPS is to be used as basic source of information about time in this unit. ADS - B net was created and tested in Northern Europe in NEAN frame project (Northern European ADS -B Network). The countries received the ADS - B net enthusiastically, so in near future this navigation radars will replaced by the ones traditionally used in air traffic control. Essential unit in created it becomes formations satellite technology and introduced to Global use particularly Navigation Satellite System defined as GNSS (Global Navigation Satellite System). The demand appeared on entirely new approach in connection with management the air traffic questions, in the aim of solution of problems connected with enlargement the capacity and transfer function and the skyway as well as existing the far-reaching European formations the ATM (Fig. 5).

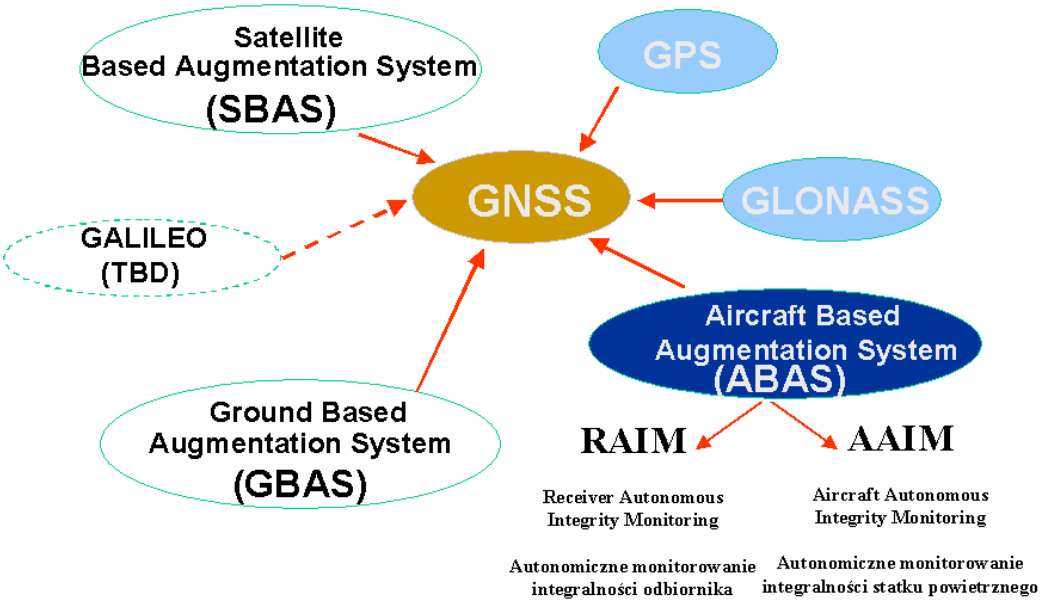

Fig. 5. ICAO GNSS

Therefore document was worked out "THE AIR TRAFFIC MANAGEMENT STRATEGY FOR THE YEARS 2000 +", which is the aim the creation of uniform aerospace for Europe. Presented strategy delivers also precise hands and presents effective centers, thanks which is possible to deal all problems and effectively cope with challenges by European ATM in XXI century. Then on the base of THE AIR TRAFFIC MANAGEMENT STRATEGY FOR THE YEARS 2000 +" realize regional undertakings. For European countries the programme of standardization CNS /ATM and harmonization of workings carries the name "European Convergence and Implementation Plan 2004 - 2008". In support about this document every country was obliged to study and to realize the state programme of standardization CNS /ATM and harmonization of workings named "Local Convergence and Implementation Plan". Poland also participates in this programme and meets or corrects received requirements. Problems connected with GNSS have been treated recently as a priority Global Navigation Satellite System, contained in "ANNEX 10 THIS THE CONVENTIONON INTERNATIONAL CIVIL AVIATION". In received international solutions mention, that initiation global formation ATM / CNS should take into account present techniques and technologies in wide range and simultaneously build it will make possible the modernization of formations in the future. This formation was foreseen in CNS according to the aim ATM in support about component units: GNSS, ASDLS, GEO, VDL, FMS, SSR, PSR, MCC, METEO, Mod S, GES, MLS, LAAS, WAAS, EGNOS, GALILEO, ATN, RMS, SMGCS, ACC. Changes in our country began also, to creating bases under Polish formation ATM / CNS (Fig. 6) the net of permanent the air - stations RTK DGPS.

The conception of formation DGPS was worked out for needs of aviation in support about normative documents. The coordinate also uniform, global system, world formation of time UTC is the additional advantage, which makes possible between the armed services in different states, services exercise on terrain in all over the world the peaceful missions, the assurance of safety in the communication routes and lots of others. Proposed air - formation RTK DGPS realizes arrangement C3I (Command, Control, Communications, Intelligence - control, argumentation, transport, and interview - recognition). We would like to emphasize that arrangement C3I in Polish formation treats to gathering of function relating accumulations, working out and spread of

information, indispensable to correct of aviation. It be required the Polish formation RTK DGPS from this time also to consist of different types of joint with mobile operating centers. Future Polish air - net of permanent reference stations present the general structural pattern of Polish air - formation RTK DGPS – POLPOS (Fig. 7).

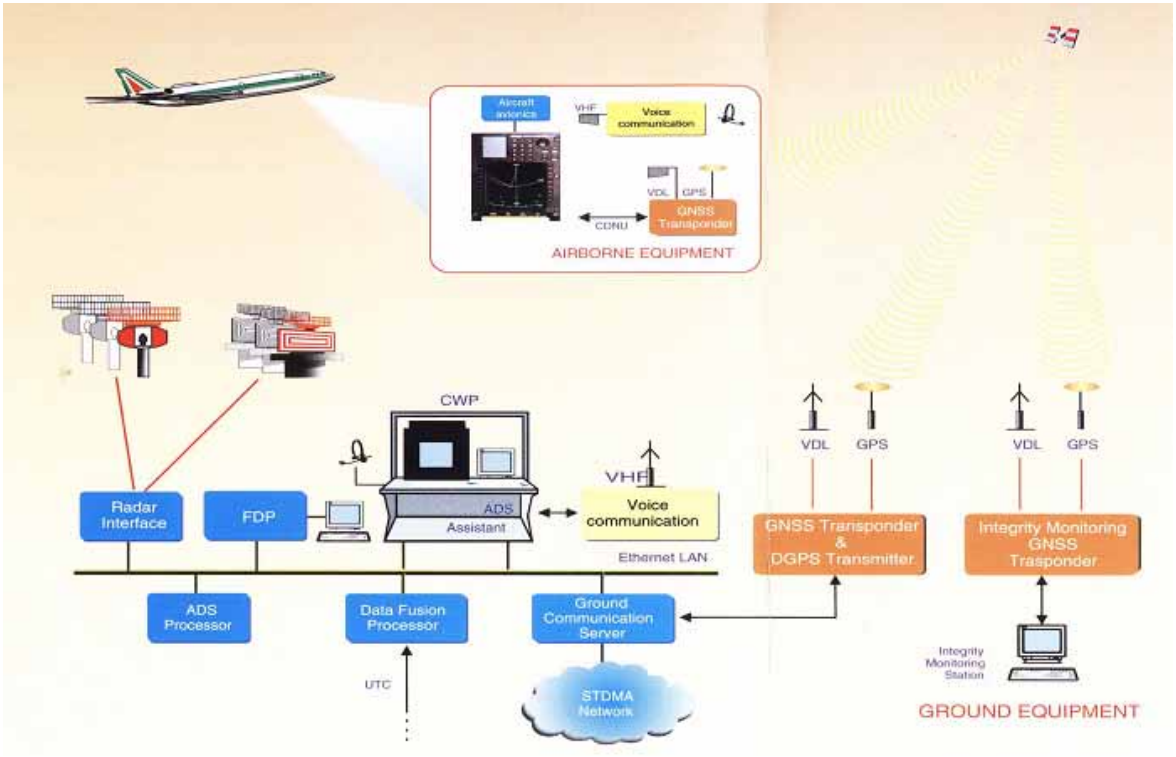

Fig. 6. European CNS/ATM system

Fig. 7. Polish air - net of permanent reference stations

We are going to prepare an experiment connected with exercise on new airport landing approach Chełm - Deputycze Królewskie on the base of permanent The State School of Higher Education station (Fig. 8 and Fig. 9).

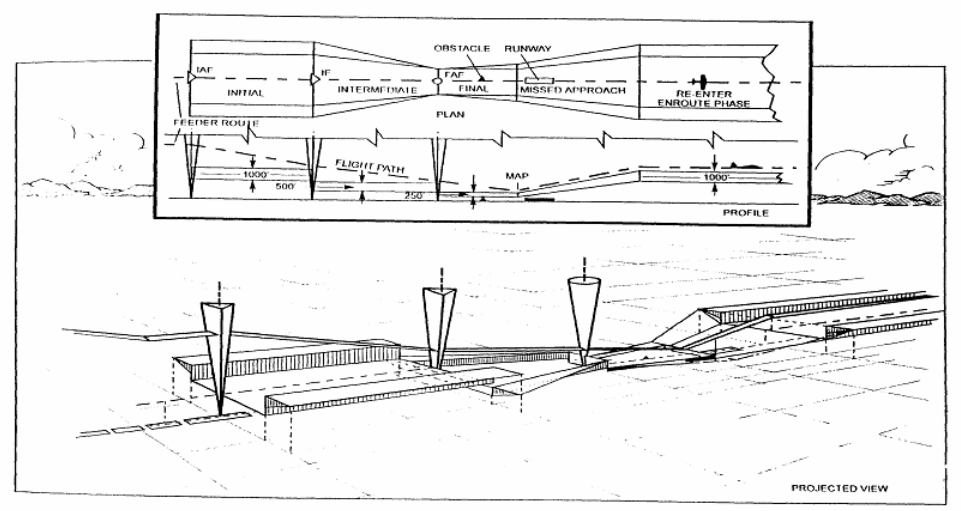

Fig. 8. Segment of approach procedure

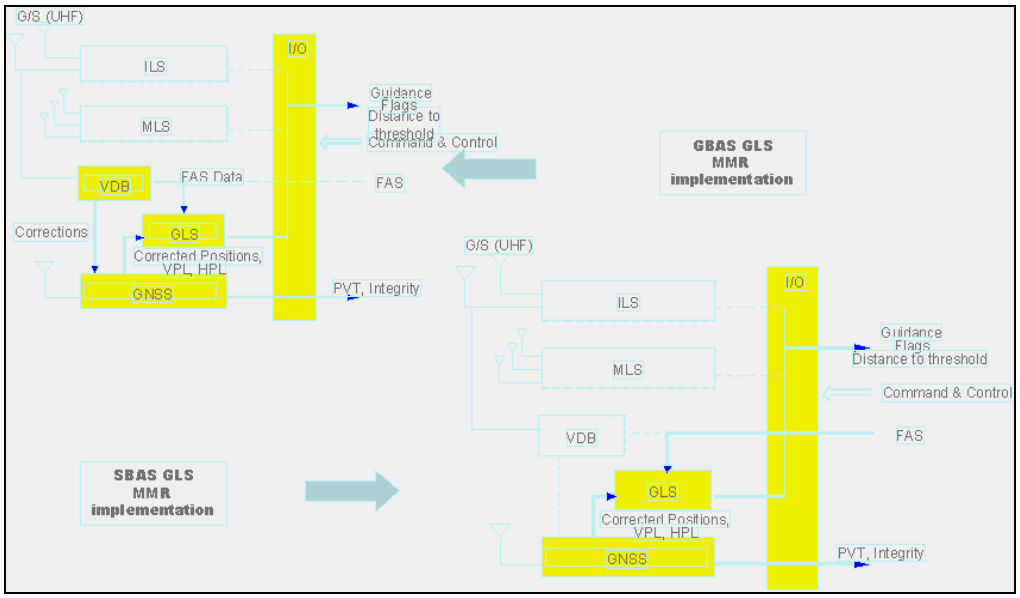

Fig. 9. On – board infrastructure

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