SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
Space-Based Navigation Systems and Services (1)

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SPACE BASED NAVIGATION AUGMENTATION SYSTEMS WORLDWIDE - CURRENT STATUS AND FUTURE OUTLOOK

Abstract

2012 saw the worldwide Global Navigation Satellite Systems (GNSS) market surpassing the 50 bn threshold, achieving a Compound Annual Growth Rate (CAGR) of 13%. According to a market report by the GSA, today's GNSS market is mostly fuelled by road (54%) and LBS (43.7%) applications. Although aviation ranks only as number 5 of the global core GNSS market segments, contributing 0.5% to the cumulated revenues for the 2010-2020 timeframe, it is nonetheless of top importance especially because of its expected growth rates. Today there are about 15,000 commercial aircrafts in operation and about 31,000 are envisaged for the year 2030. In addition the general aviation sector provides for another substantial number of movements in the air; movements that need to be controlled and coordinated to ensure safety and to avoid congestions.

Guiding an airplane from A to B under all weather conditions requires Air Navigation Systems (ANS), enabling a safe landing in hail, snow, fog, etc. even more so. ILS, NDBs, VORs are proven system, however they are also expensive infrastructures and smaller airports cannot readily afford such systems, since they have difficulties offsetting the CAPEX and OPEX with their low passenger numbers. GPS, GLONASS and Galileo provide a way out of that cost issue – provided that they can ensure a Safety-of-Life (SoL) service. Such a service provides a constant feedback loop to the GNSS user telling him whether the satellite navigation signal is reliable to enable safe flight navigation and landings. EGNOS, WAAS, GAGAN, MSAS and CDM are all representatives of such Space Based Augmentation Systems (SBAS), providing an SoL-service to the various GNSS services. Developed in the last two decades, these systems are gaining more and more traction in aviation, as well as in other applications where their increased accuracy provides for significant benefits (such as in precision farming for example).

This paper examines the current status of the different SBAS solutions and their currently envisaged roadmaps. An analysis of the driving user requirements, the associated design considerations and trade-offs will be undertaken to compare the different systems with each other. Finally this paper will envisage alternative utilisation patterns (new/other applications and their associated requirements/constraints) to provide an outlook on the future developments of WAAS, EGNOS, GAGAN, MSAS and CDM.