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COMPATIBILITY AND INTEROPERABILITY AMONG MULTI- GNSS

Abstract

We are transiting from a GPS to GNSS era. Now, there are 120 satellites in constellation as on 25th December, 2019 dedicated for Navigation launched by 6 countries (GPS by US, GLONASS by Russia, Galileo by European Union, BeiDou by China, NavIC by India and QZSS by Japan). Satellite Based Augmentation System (SBAS) is also developed by the aforesaid countries to complement GPS. Now, there is a possibility arises of using more than one system together and this situation is termed as 'Multi-GNSS'. Multiple systems are required for seamless, uninterrupted and system- independent solutions. These systems which are declared as fully operational as of now had their own limitations and drawbacks. Furthermore, one system failed to provide position solution under constraint conditions like: deep foliage, open cut mines, urban canyons etc. Availability of minimum 4 satellites for position solution is hardly possible in such situations and we cannot confine ourselves to one system only. Thus multi constellation is always better than a stand- alone system for system independence, redundancy and choice. But more system does not always assure better system integration. Effective use of Multi- GNSS systems is a challenge for user community nowadays. But compatibility, interoperability and transparency among the systems are the key issues to be taken into consideration for having the full benefit of this new situation of Multi- GNSS. Interoperability is defined as best possible way of using multiple systems together to help user community than relying on a single system only. Compatibility is the process of using multiple systems together without adversely affecting each other and mitigating the interference between them. Compatibility is mainly followed by the regulations governed by International Telecommunication Union (ITU) regarding frequency band allocations. Interoperability is rather a tricky way can be addressed by system level and receiver level. System level interoperability is rather complex process than receiver level. Receiver uses all the available systems together interchangeably considering all the systems as unique system for system level. This process requires a virtual sensitive link between the systems which is difficult to establish. Receiver level interoperability is rather simple to address and followed by most of the receivers. In that case, the receiver takes the signal from the best possible system offsetting the others. This paper will address this issue of interoperability and compatibility between different GNSS systems for having the full benefits of using all the systems together.