

## Radio Regulation Development and Radio Spectrum Analysis of Earth Station in Motion Service

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**Abstract :** Although Earth Station in Motion (ESIM) services are widely used and there is a huge market demand around the world, International Telecommunication Union (ITU) does not have unified conclusion for the use of ESIM yet. ESIM are Mobile Satellite Services (MSS) due to its mobile-based attributes, while multiple administrations want to use ESIM in Fixed Satellite Service (FSS). However, Radio Regulations (RR) have strict distinction between MSS and FSS. In this case, ITU has been very controversial because this kind of application will violate the RR Article and the conflict will bring risks to the global deployment. Thus, this paper illustrates the development of rules, regulations, standards concerning ESIM and the radio spectrum usage of ESIM in different regions around the world. Firstly, the basic rules, standard and definition of ITU's Radiocommunication Sector (ITU-R) is introduced. Secondly, the World Radiocommunication Conference (WRC) agenda item on radio spectrum allocation for ESIM, e.g. in C/Ku/Ka band, is introduced and multi-view on the radio spectrum allocation is elaborated, especially on 19.7-20.2 GHz & 29.5-30.0 GHz. Then, some ITU-R Recommendations and Reports are analyzed on the specific technique to enable these ESIM to communicate with Geostationary Earth Orbit Satellite (GSO) space stations in the FSS without causing interference at levels in excess of that caused by conventional FSS earth stations. Meanwhile, the opposite opinion on not allocating EISM service in FSS frequency band is also elaborated. Finally, based on the ESIM's future application, the ITU-R standards development trend is forecasted. In conclusion, using radio spectrum resource in an equitable, rational and efficient manner is the basic guideline of ITU. Although it is not a good approach to obstruct the revise of RR when there is a large demand for radio spectrum resource in satellite industry, still the propulsion and global demand of the whole industry may face difficulties on the unclear application in modify rules of RR.

**Keywords :** earth station in motion, ITU standards, radio regulations, radio spectrum, satellite communication

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