Interference Tolerant Sub-GHz Band Wireless Sensor Networks

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This paper discusses the research and development for wireless sensor networks with interference tolerant in the Sub-GHz (920 MHz) band where a several wireless standards are intermingled. In recent years, wireless communication networks based on a concept called low power wide area networks (LPWANs), which is constructed with many end devices and gateways and has features of low power consumption and wide range communication area, have been attracting attention as infrastructure to support the Internet of Things (IoT) in the real world. On the other hand, as LPWANs become more widespread, it can expect to see the emergence of LPWANs with a large number of end devices and several types of networks with diverse purposes utilize various wireless communication standards, e.g., long range (LoRa), Sigfox, wireless smart utility network (Wi-SUN), and so on. This causes that wireless networks in the same frequency band will become sources of interference that degrade their own network characteristics, and as a result, the Sub-GHz band will be strained. The depletion of the frequency band is likely to become a bottleneck in the realization of IoT in the real world, and it is an issue that should be solved/prepared for as soon as possible. The aim of the research and development is to develop a wireless sensor network that can provide good information transmission even in environments where many wireless sensor networks are clustered together. Especially, it is important the advancement of techniques for avoidance at the end device of interference from other networks, that is, carrier sense. In order to achieve this, I am currently progressing on R&D project for competitive funding of the Ministry of Internal Affairs and Communications (MIC) as representative researcher (F.Y. 2021-2023), and this paper presents the status of one of these R&D on energy detection based carrier sense.