T18-096

Tohoku University's Invention

Frequency spectrum regeneration method, receiver and reception method

Real-time monitoring of several different frequency bands

Summary

In recent years, with the diffusion of the wireless Internet of Things (IoT), interference between different IoT systems are reported. In order to avoid those interferences, real-time frequency detection techniques are used to monitor signals and noise in the IoT frequency band in milliseconds level. However, monitoring these bands in real time all at once using Nyquist sampling is not easy because the high-speed analog-to-digital converter (ADC) that exceeds 12 Ghz is necessary.
This invention made possible to monitor in real-time several different frequency bands with a real-time frequency monitor using an undersampling reception method by following steps: the step of obtaining a frequency spectrum from 0 to the Nyquist frequency, the step of generating a frequency spectrum by reversing the data at each Nyquist frequency, and the step of performing a minimum value calculation on each of the obtained above data to generate a single frequency spectrum which reproduces the received frequency spectrum.

Application

Spectrum analyser, etc.

Patent Data Sheet
Related patent (Serial number):
2020-106478 (T18-096)
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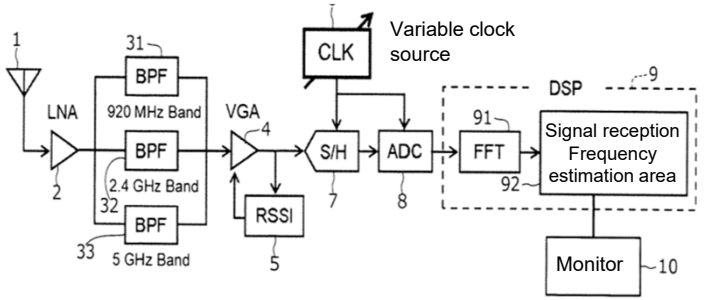
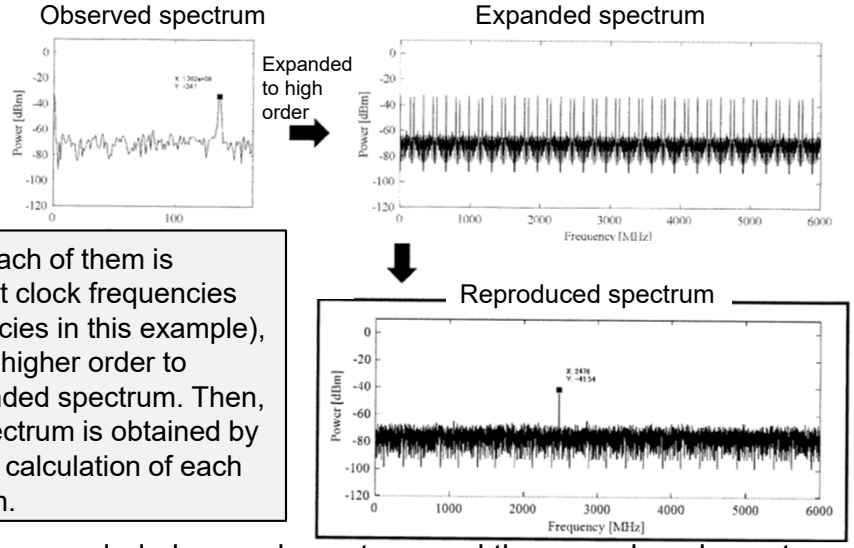
Example



Block diagram showing an example of the receiver's configuration



During sampling, each of them is sampled at different clock frequencies (3 different frequencies in this example), and expanded to a higher order to generate the expanded spectrum. Then, the reproduced spectrum is obtained by the minimum value calculation of each expanded spectrum.

Example of the expanded observed spectrum and the reproduced spectrum

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