

Efficient Storage Algorithm for Time-Domain Spectrum Measurements

Technology Summary

Wireless communication is everywhere and there is a great need to understand the patterns and properties of radio frequency spectrum use on medical devices. This is especially true in of high traffic areas where an abundance of wireless signals and medical devices intersect, such as in hospitals and other healthcare facilities. Spectrum utilization measurements can determine a medical device's susceptibility to wireless interference (a requirement under ANSI C63.27), but current solutions are limited due to the large storage volume needed for spectrum surveys. Consequently, long-term surveys, which can capture traffic variability and peaks and lows is not possible.

This technology provides a method for efficiently storing and reproducing time-domain spectrum measurements. The algorithm divides the dynamic range from the monitoring equipment into bins or windows—each represented by a Gaussian mixture model (GMM) (e.g. statistical distribution). Windows of activity and inactivity in the measurements are established, the GMM parameters (e.g. mean, variance, length) for each window are stored, and then the signal is reproduced. The raw data is not stored reducing the storage volume significantly making high sample rates and long-term surveys possible.

Potential Commercial Applications

- High capacity storage of spectrum survey in a hospitals and healthcare systems

Competitive Advantages

- 99% Reduction in storage volume
- Highly accurate channel utilization during active/inactive periods
- High quality, long-term spectrum measurement capability
- Fast sample rate
- Easily adaptable to multiple devices and platforms

Development Stage:

- Validated on National Instruments (NI) vector signal transceiver platform in a healthcare environment.

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Publications:

- M.O. Al Kalaa et al, "PESA: Probabilistic Efficient Storage Algorithm for Time-Domain Spectrum Measurements", IEEE Trans Ins and Meas 68 (2), 325-333. **INSPEC Accession Number:** [18364851](#)

Intellectual Property: US Patent Application No. 16/391,135 filed 4/23/2019

Product Area: Bluetooth, frequency, wireless, signal, storage, hospital, medical, device, spectrum, time-domain, platform, method, interference, data compression

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