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学位（博士）論文要旨

(Doctoral thesis abstract)

論文提出者 (Ph.D. candidate)	工学府博士後期課程 電子情報工学 専攻 (major) 平成 28 年度入学(Admission year) 学籍番号 16834201 氏名 岩田 大輝 (student ID No.) (Name) (Seal)
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論文題目 (Title)	High-Efficient Wideband Spectrum Measurement based on FFT for Dynamic Spectrum Access
論文要旨 (2000 字程度) (Abstract(400 words)) <p>In this dissertation, we investigate a high-efficient spectrum measurement based on fast Fourier transform (FFT) for an advanced dynamic spectrum access (DSA). In DSA, secondary users (SUs), which have lower priority to use the spectrum, can opportunistically use the vacant spectrum owned by primary users (PUs) without causing any harmful interference to PUs. For enhancing DSA, smart spectrum access (SSA), which exploits useful <i>priori</i> information regarding spectrum usage over multiple wireless systems via spectrum measurements is a promising approach. One important aspect in SSA is spectrum measurement part since the results of spectrum measurements may affect the performance and operation of SUs based on SSA. Previous spectrum measurements have utilized energy detection (ED) based on the FFT to detect the spectrum usage over a time-frequency plane. Then, information regarding spectrum usage are estimated based on the results of FFT-based ED. For an accurate awareness of spectrum usage over a time-frequency plane, the FFT size should be set properly in FFT-based ED. Now, the performance of spectrum usage awareness depends on the resolutions of time and frequency, and detection performance and the FFT size gives a trade-off relationship among these three parameters. However, previous works have not deeply considered the FFT size setting problem and this dissertation tackles the FFT size setting problem.</p> <p>In Chapter 1, the background, the purpose of this study and our contributions are shown. In Chapter 2, we summarize the related work in terms of several spectrum measurement campaign. In Chapter 3, we describe the assumed spectrum measurement system and spectrum signal processing. Next two chapters correspond to our main contributions. Specifically, in Chapter 4, we formulate</p>	

the optimum FFT size that allows the accurate awareness of spectrum usage over a time-frequency plane, i.e., it can achieve the reasonable detection performance and the proper resolutions in time and frequency domains. In addition, we also define a sub-optimum FFT size which can be obtained analytically. The analysis reveals that the optimum FFT size depends on SNR and true occupancy rate, making FFT size setting a challenging problem. In Chapter 5, we propose a practical and efficient FFT size setting method which utilizes noise floor (NF) estimation. This method achieves a reasonable spectrum usage awareness performance and low computational complexity since it limits the search space. The proposed method allows adaptive and efficient FFT size setting in real time. Therefore, we expect the contributions in this dissertation are helpful for developing the real-time and automatic spectrum measurement systems. In Chapter 6, we conclude the dissertation and point to the future directions.