

## Flexible Rake Receiver for User-Defined QoS Based on Software Defined Radio<sup>1</sup>

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### Abstract

Future wireless communication systems development is mainly targeting towards the feature of flexibility, as rapid evolution of the generations of such systems is strongly driven by increasing demands on more wireless services, with variable quality defined by user; together with the need to adapt to variable wireless channels conditions. The most powerful environment to realize such systems is the Software Defined Radio. By which, reconfigurable wireless communication systems by software could be built. A major key principle in designing such systems is the trade-off between performance, power consumption, and effective utilization of digital signal processing resources in the device.

Based on CDMA techniques, the Interim Standard 95 (IS-95) is one of the major mobile communication systems around the world, it has been considered as the basis of future third generation of mobile communications (3G). This system uses a Rake receiver to effectively utilize an important feature of wireless wideband communications, which is path diversity.

In this paper, we base on the methodology of SDR to design a flexible Rake receiver with variable number of fingers upon both channel condition and level of QoS defined by user.

<sup>1</sup> For the paper Arabic see pages( 123 -156).

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In the introduction of this paper, we present a background on SDR, in section 2, we give a quick demonstration of main IS-95 features and ways to improve QoS in it. After a short recognition of key fading effects in section 3, we analyze in section 4 the principle of Rake reception. In section 5, we use simulation results to effectively categorize variable number of fingers of the flexible Rake receiver upon user defined level of QoS, and we show the importance of such approach in effectively utilizing hardware resources dedicated for performing digital signal processing tasks, and in reducing power consumption required for these tasks.

**KEYWORDS:** Software Defined Radio (SDR), user defined QoS, Interim Standard (IS-95), Flexible Rake receiver.