Rapid interferer detector for next-generation wireless networks

Future 5G and next-generation wireless networks will require a significant increase in data traffic capacity. Thus, in addition to the designated licensed spectrum, emerging technologies such as cognitive radio and LTE-License Assisted Access/LTE-Unlicensed will utilize the unlicensed spectrum. These technologies will require the ability to rapidly detect interferences in the unlicensed bands and make appropriate adjustments to wireless connections to effectively receive and transmit data. This technology implements a time-segmented quadrature analog-to-information converter (TS-QAIC) for nearly instantaneous interferer detection. The TS-QAIC chip architecture provides a power-efficient and cost-effective approach for rapidly sensing interferer conditions and possesses flexible scalability for implementation in next-generation wireless technologies.

Time segmentation with adaptive thresholding increases interferer detection capabilities and decreases costs

TS-QAIC technology uses compressive sampling (CS) for rapid interferer sensing. Time segmentation is used in this technology to break the trade-off of existing CS systems between the number of physical branches versus the number of interferers that can be detected with a CS spectrum sensor. This approach enables an extension of the interferer detection capabilities by using time segmentation and adaptive thresholding. Through this flexible time-segmented CS system with adaptive thresholding, silicon cost and design complexity can be reduced. Another key advantage of this extended, rapid-sensing architecture is that it can detect up to six interferers, about double the number of detectable interferers in low-pass CS architectures with the same number of physical branches on silicon. Moreover, six interferers can be detected in less than 11 microseconds within a 1 GHz instantaneous bandwidth while also yielding improved energy efficiency and sensitivity.

A demonstration of the TS-QAIC architecture has verified the enhanced capabilities of this technology.
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Applications:

• 5G and next-generation wireless communication networks
• Cognitive radio shared-spectrum access systems
• Internet-of-Things applications
• Wireless sensor networks

Advantages:

• Facilitates extended interferer detection capabilities of the physical hardware via time segmentation and adaptive thresholding
• Offers highly flexible system scalability
• Detects up to six interferers in less than 11 microseconds
• Enables rapid-sensing utilizable for shared-spectrum access systems
• Delivers a 1 GHz instantaneous bandwidth
• Increases energy efficiency and sensitivity while detecting twice as many interferers as comparable architectures that employ the same number of physical hardware branches on silicon
• Enables reductions in silicon cost and design complexity

Patent Information:

Patent Pending

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Related Publications:


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