Local Oscillator Modulation for Non-Contiguous Carrier Aggregation

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BACKGROUND

Carrier aggregation (CA) is a foundation of 5G sub-6GHz wireless networks allowing the user equipment and base station to communicate simultaneously over a number of available radio frequency (RF) channels. This foundational principle results in the increased speed, reduced latency, and spectrum sharing that characterizes 5G performance. However, using multiple channels in arbitrary bands complicates the radio design. Typically, several separate receivers will independently interact with RF channels at the expense of the device's power consumption and silicon footprint.

DESCRIPTION

Researchers at the University of California, Santa Barbara have developed a receiver architecture that is capable of non-contiguous carrier aggregation using a single local oscillator (LO), reaching farther across the range of separated channels without the need for separate receivers. By matching channels across a large RF range to adjacent intermediate frequency (IF) channels, the processing bandwidth of the analog-to-digital converter (ADC) is reduced. This technology circumvents wideband phase-locked loop (PLL) tuning and allows for faster channel switching times, which is critical for spectrum sensing and low-latency. Eliminating the need for multiple receivers also eliminates linear scaling in power consumption.

ADVANTAGES

- Contiguous and non-contiguous carrier aggregation
- Industry-leading receiver sensitivity
- Reduced power consumption
- Smaller form factor

APPLICATIONS

- 5G mobile devices
- Wireless networks

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	12,267,094	04/01/2025	2019-428

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OTHER INFORMATION

KEYWORDS

5G, Mobile device, Wireless network, Network, Carrier aggregation, Radio, RF, New radio, 5G sub-6GHz

CATEGORIZED AS

- **Communications**
  - Internet
  - Networking
  - Optical
  - Other
  - Wireless
- **Computer**
  - Hardware
  - Other
- **Semiconductors**
  - Design and Fabrication

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