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## Compact Integrated Three-Broadside-Mode Patch Antenna

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### Background

A promising 5th generation (5G) technology for base stations is to use massive multiple-input multiple-output (MIMO) to increase data throughput and serve more devices simultaneously. Massive MIMO uses a large number of small antennas to create more possible signal paths to improve data rate, link reliability and serve multiple users. Usually, the number of antenna ports in massive MIMO corresponds to hundreds or more. In order to make massive MIMO antennas more compact, or to build more radiating elements in a specific area, multi-mode antennas may be considered.

### Technology Overview

This invention provides a triple port MIMO antenna element that can be concatenated together to form a massive MIMO antenna. The MIMO antenna includes: a plurality of three-broadside-mode patch antenna cells. Each of the plurality of three-broadside-mode patch antenna cells includes: a rotationally symmetric radiator; a patch, wherein the patch is separated from the rotationally symmetric radiator by a dielectric and configured to capacitively feed the rotationally symmetric radiator; and three antenna probes, connected to the patch, configured to provide three antenna ports corresponding to three respective broadside radiation polarizations.

### Market Analysis

The global antenna market was valued at USD 17.54 billion in 2017, and is expected to reach a value of USD 25.46 billion by 2023, recording a CAGR of 6.61% over the forecast period (2018-2023). The need for an alternate technology is of utmost importance, due to the limitations of existing technologies, such as 2G, 3G, and 4G, which have limited bandwidth, high latency, lack of real-time applications, and poor mobility handling. The 5G technology has the potential to deliver a unified communication platform capable of dealing with an increase in several orders of magnitude, of the number of assets, volume, variety of information, and reaction times for a wide range of industrial, healthcare, and ICT sectors.<sup>1</sup>

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<sup>1</sup> 'Global Antenna Market – Analysis of Growth, Trends and Forecasts (2018-2023)' (Mordor Intelligence, 2018) Report Description

## Benefits

- Provides three antenna ports per element instead of two in conventional designs.
- Scalable to massive MIMO antenna.
- Achieves 50% more antennas in a given area compared to a conventional massive MIMO antenna.
- Achieves low mutual coupling between antenna ports.
- Provides compatible beam patterns from all antenna ports

## Applications

- Antenna for 5G base station

## Patents

- US Patent no.: 16/220916
- China Patent no.: 201811524041.5

## Figures

