

Experimental Description

By this application, Samsung respectfully requests an experimental radio license to evaluate new technologies that are needed to further boost the spectral efficiency of cellular wireless communications networks. One such promising technology is known as massive multiple-input-and-multiple-output (MIMO). Massive MIMO uses a large number of antennas to support high throughput and reception reliability. One of the main challenges in building massive MIMO systems in practice is that the number of antennas that can be installed at a base-station (BS) is often limited due to BS form factors, especially at typical cellular carrier frequencies. This practical limitation has motivated the development of full-dimension MIMO cellular communication systems, or FD-MIMO, which deploys a large number of active antenna elements in a two-dimensional grid at each base station and can support much more users on the same bandwidth simultaneously than currently deployed systems. Testing will be carried on a single site consisting of a base station emulator, a planar two dimensional antenna array with integrated (distributed) transceivers / power amplifiers, and a small number of test mobiles.

This experimental license will enable a comprehensive and realistic understanding of FD-MIMO technology via proof-of-concept system design and implementation. Both hardware aspects including planar antenna array, transceiver, and baseband design will be evaluated as well as advanced algorithms for precoding, channel estimation, and interference management.

Samsung does not seek authority to conduct market studies or provide communications services under the requested experimental authority. It also does not propose to market, sell, or lease prototype equipment in conjunction with this test. Furthermore, Samsung will coordinate the operation of the test system with current licensees that may be impacted by such operations in areas and bands listed below.

Proposed Operations / Locations and Frequencies

Test system will be a single sector only and testing will be intermittent over the period of requested spectrum access, for a distance of up to 1000 meters radius around the Samsung Telecommunications America in Richardson, TX USA (32°59'13.09"N, 96°42'4.09"W). The test system will utilize frequencies in 2602-2624 MHz.

Technical Specifications

Frequencies:	2602-2624 MHz
Base Station Power:	16 W / 1200 W ERP
Mobile Power:	100 mW / 100 mW ERP
Bandwidth:	20 MHz
Modulation:	LTE
Emission Designators:	20M0F9W
Base Station Antenna:	Single sector with 20°-70° beam width, Gain of 20.9 dBi
Mobile Antenna:	Omnidirectional up to 0 dBi Gain

Directional Antenna Information

The antennas used for these tests will be installed and operated in accordance with all FAA and FCC rules and regulations. Location and height details are in the attached Antenna Drawing Exhibit. The base station antenna will be a single sector with a beam width in the range of 20 to 70 degrees, the maximum gain will be 20.9 dBi.

Restrictions on Operation / Interference Protection

Samsung recognizes that experimental operations must not cause harmful interference to authorized facilities. Samsung will coordinate with existing licensees. Should interference occur, however, Samsung will take immediate steps to resolve the interference, including if necessary arranging for the discontinuance of operation.

Antenna Drawing Exhibit

In this experiment, the base-station (transmitter) consists of a planar two dimensional antenna array and transceivers, which are both internally designed by Samsung. The base-station will be placed in the rooftop of Samsung's 3-floor office building, where is located at $32^{\circ}59'13.09''\text{N}$, $96^{\circ}42'4.09''\text{W}$, as shown in Figure 2. Experimental system will be a single sector only and testing will be intermittent over the period of requested spectrum access, for a distance of up to 1000 meters radius around the Samsung Telecommunications America in Richardson, TX USA.

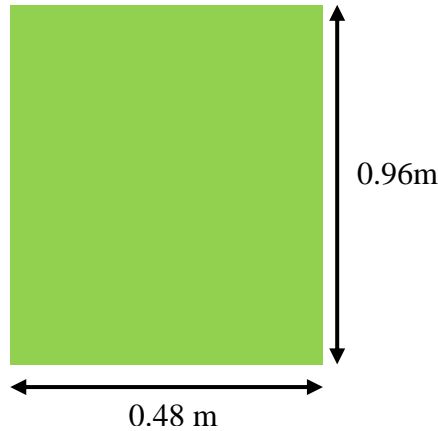


Figure 1. Dimension of the antenna array

Figure 2 illustrates the vertical profiles of the experiment planned, including antenna placement, building surroundings. The top of the antenna will be 1.5 - 2 m above the Samsung office 1 building.

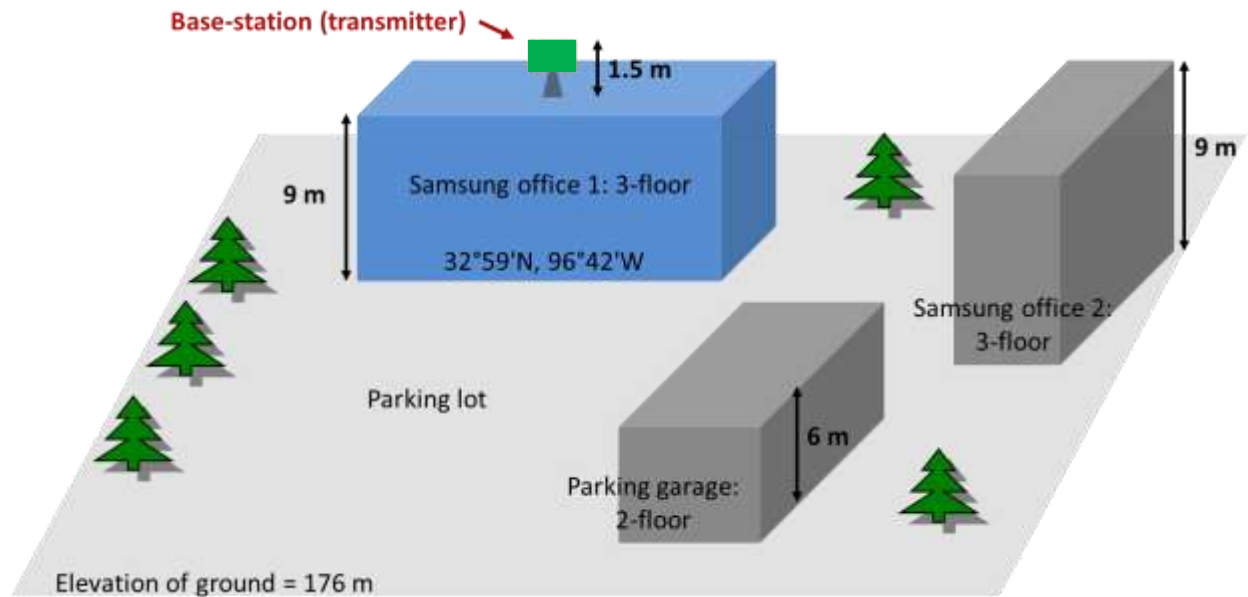


Figure 2. Transmitter placement and surroundings of planned experiment.