

# How Massive MIMO can deliver the promise of new 5G Radio Networks

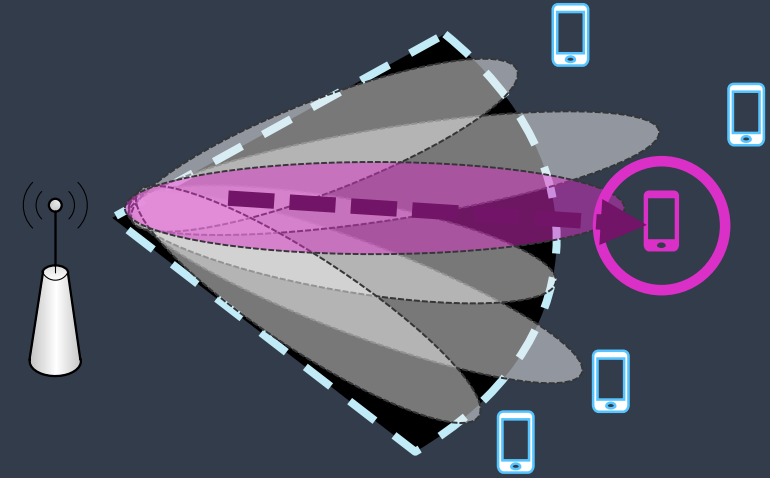
- What is Massive MIMO ?
- Some examples of Massive MIMO products
- Results of Massive MIMO in 4G TDD
- Some of the site challenges
- Massive MIMO in 5G networks

# What is Massive MIMO ?

Definition:

MIMO stands for Multiple-input multiple-output. While it involves multiple technologies, MIMO can essentially be boiled down to this single principle: a wireless network that allows the transmitting and receiving of more than one data signal simultaneously over the same radio channel.

Standard MIMO networks tend to use two or four antennas. Massive MIMO, is a MIMO system with an especially high number of antennas. Generally  $>8$ .



# Massive MIMO products?

Vary by:

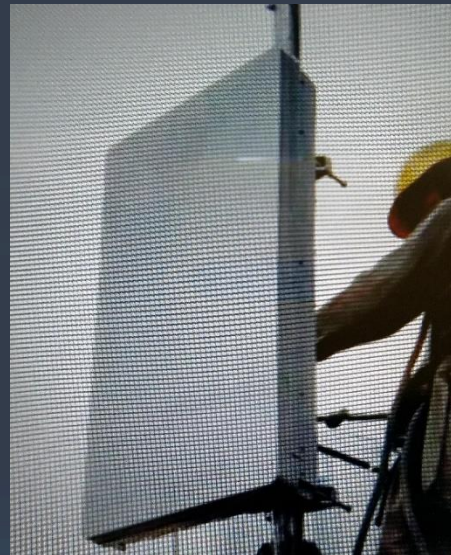
No of antenna elements

No of Transmitters/Receivers

16/32/64 ?

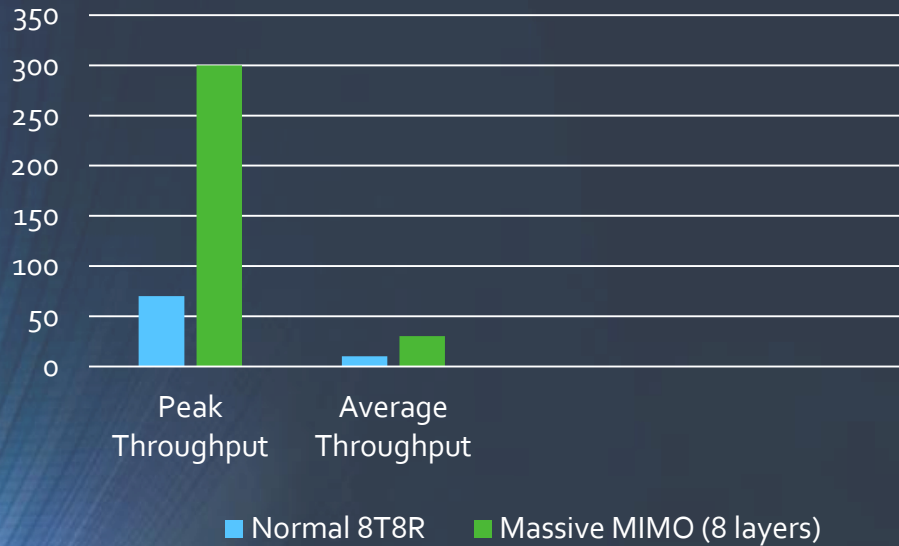
Power outputs

Spectrum/Bandwidths



# Massive MIMO results (in 20MHz BW 4G TDD systems)

## Massive MIMO v 8T8R (China)



Other results (US):

3.5x DL Sector Throughput (Ideal conditions)

8x UL Sector Throughput (Ideal conditions)

Adding in normal users - DL maybe drops to 1.5-2x Sector Throughputs

Peak Throughput with 60MHz BW (3 CA) > 1Gbit/s

# Massive MIMO results – coverage gains



Standard 8T8R Base Station



Massive MIMO Base Station

# Deployment challenges with Massive MIMO

Obvious ones:

Cost, size and weight (size 450mm x 800mm x ?), typically 50-90Kg.

Not so obvious:

Wind loading

Fronthaul requirements (fibres, etc)

Downtilts

Safe distances

# UK Massive MIMO in 5G (below 6GHz)

Trials in 2018 on the way to first launches in 2019

Some Massive MIMO sites but mostly (?) based on 5G using 8T8R solutions with passive antennas

Due to lack of device availability it is difficult to get a view of actual performance in real world 5G scenarios

Massive MIMO capacity benefits, combined with much wider 5G bandwidths at 3.4-3.8GHz, offer longer term solutions for growing network demand.



BT/EE 5G Trial with massive MIMO



Thank you

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