

# Challenger mobile network operators should consider deploying 4×4 MIMO in emerging Asia–Pacific

April 2017

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Emerging Asia–Pacific mobile network operators (MNOs) are looking for ways to upgrade their LTE networks to deal with growing traffic levels and deliver improved mobile data access. One option that some MNOs (including True in Thailand and XL Axiata in Indonesia) are pursuing is more-advanced antenna configurations at cell sites. Analysys Mason has produced a model to assess the viability of antenna upgrades in emerging Asia–Pacific,<sup>1</sup> and this comment analyses whether operators could receive a significant return on these investments.

Operators can upgrade to 4T4R cell sites, which involves increasing both the number of transmitting and the number of receiving antennas to four. This increases cell average spectral efficiency by around 10%, with more significant increases of up to 40% at the cell edge. MNOs could also upgrade their cell sites to 4×4 MIMO, which would only require a software upgrade to sites that already have four transmitting antennas. However, 4×4 MIMO will only deliver greater performance benefits than 4T4R if end-user devices also have four receiving antennas. Such devices could potentially benefit from a doubling of throughput on the downlink and operators would be able to market the benefits of higher maximum theoretical download speeds.

## 4T4R deployments could help MNOs deliver capacity benefits despite spectrum constraints

4T4R investments could also provide emerging Asia–Pacific MNOs with increased capacity to deal with growing traffic levels. 4T4R deployments are not yet mainstream and some operators that have invested in the technology globally (such as T-Mobile in the USA) have done so due to a relative shortage of spectrum. Some operators in emerging Asia–Pacific may find themselves in a similar position, because regulators in the region have often been slower to release spectrum in new bands than their counterparts in developed countries. The need to dedicate significant amounts of spectrum to 2G and 3G in emerging Asia–Pacific also means that less spectrum has been refarmed for 4G use compared to other regions. Furthermore, MNOs have sometimes paid high prices to acquire spectrum, as at the Thai spectrum auction of November 2015. These high prices then act as an additional incentive for operators to maximise the spectral efficiency of their acquired spectrum by upgrading to 4T4R antenna configurations.

We also assessed the value of 4T4R investments under the assumption that these will reduce churn rates. 4T4R roll-outs will deliver the greatest benefits at the cell edge, where performance is likely to be a cause for dissatisfaction (and potentially churn) among consumers. However, our analysis shows that it would be very difficult for an operator to justify 4T4R investments solely on the basis of reduced churn.

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<sup>1</sup> For further details, see Analysys Mason's Report [The business case for 4×4 MIMO in emerging Asia–Pacific](#).

## Limited device support reduces the attractiveness of 4×4 MIMO upgrades

We also assessed the return on investment (ROI) for 4×4 MIMO upgrades. The business case for these network investments is complicated by the need for available 4×4 MIMO-capable devices if the technology is to deliver its full benefits. However, only a limited number of high-end devices currently support 4×4 MIMO: the Samsung Galaxy Note 7 (now withdrawn from sale) was the first smartphone to support the technology, but a few other device vendors have since followed suit.

Incorporating 4×4 MIMO capability in devices introduces some challenges, because the technology needs to be supported on a chipset level. Qualcomm does support the technology, but only in its higher tier products at present and there is therefore a cost premium associated with such devices. The company has developed new 4×4 MIMO chipsets that support deploying the technology on more than one band at the same time, which is an enabler of Gigabit LTE speeds. Supporting 4×4 MIMO in smartphones also introduces design challenges that will increase costs and complexity, as the additional receiving antennas present space-related challenges in smartphones.

Smartphone vendors may also prefer to reserve 4×4 MIMO support for their higher-end devices. The technology is being promoted as part of LTE Advanced Pro or 4.5G, and vendors may wish to use these more-advanced connectivity options as differentiators for high-end devices compared to cheaper, lower tier models. We thus do not anticipate 4×4 MIMO support becoming available in the lowest smartphone tiers over the next 2–3 years, but the functionality will become more commonplace in higher-end devices.

## Any business case for 4×4 MIMO upgrades will rely on improved subscriber acquisition

We have analysed the potential ROI for 4×4 MIMO upgrades and have found that the resulting increase in ARPU (driven by increased data consumption from those with 4×4 MIMO-capable devices) and reduction in churn do not have a significant impact. These factors alone will not justify network-wide 4×4 MIMO upgrades – an increase in subscriber acquisition will be necessary to generate a positive business case for these deployments. Such increases in subscriber acquisition may be feasible, as Analysys Mason's *Connected Consumer Survey*<sup>2</sup> (conducted across several emerging Asia-Pacific markets in 2016) showed that there is still some dissatisfaction with data speeds, even among consumers using LTE. However, the level of customer acquisition required to generate a positive business case would be greater than that provided by users with 4×4 MIMO-capable devices. MNOs would also need to acquire consumers who were attracted solely by their marketing of higher maximum speeds and improved network quality.

The value of investing in 4×4 MIMO upgrades in emerging Asia-Pacific is likely to be greatest for challenger MNOs that are already using network quality as a differentiator and are attempting to increase their market share and attract new customers. This strategy has been successful for players such as True in Thailand, which has benefitted from its early investments in LTE and grown its share of mobile service revenue from 15.2% in 2Q 2013 (when it launched LTE in the 2100MHz band) to 24.2% in 3Q 2016. Such operators must continue to invest in incremental LTE upgrades, including 4×4 MIMO, as they will otherwise place their wider strategy of differentiation through network quality at risk.

<sup>2</sup> For further details, see Analysys Mason's Report [Connected Consumer Survey 2016: mobile churn and customer satisfaction in emerging Asia-Pacific](#).