



Evolving Trends in 5G

Manoj Misra
Sr. Public Policy Director, India
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The mobile industry is
the first to formally
commit to the UN
Sustainable Development
Goals



8.7 bn+

MOBILE
CONNECTIONS
WORLDWIDE



The GSMA
represents the
interests of
mobile
operators
worldwide



UNITING
NEARLY
750
MOBILE
OPERATORS



MORE THAN
350
COMPANIES
in the broader mobile
ecosystem



Driving industry
programmes that
add value to the
digital economy

The GSMA works to deliver a regulatory environment that
creates value for consumers by engaging regularly with:



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TELECOMS
REGULATORY
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ORGANISATIONS

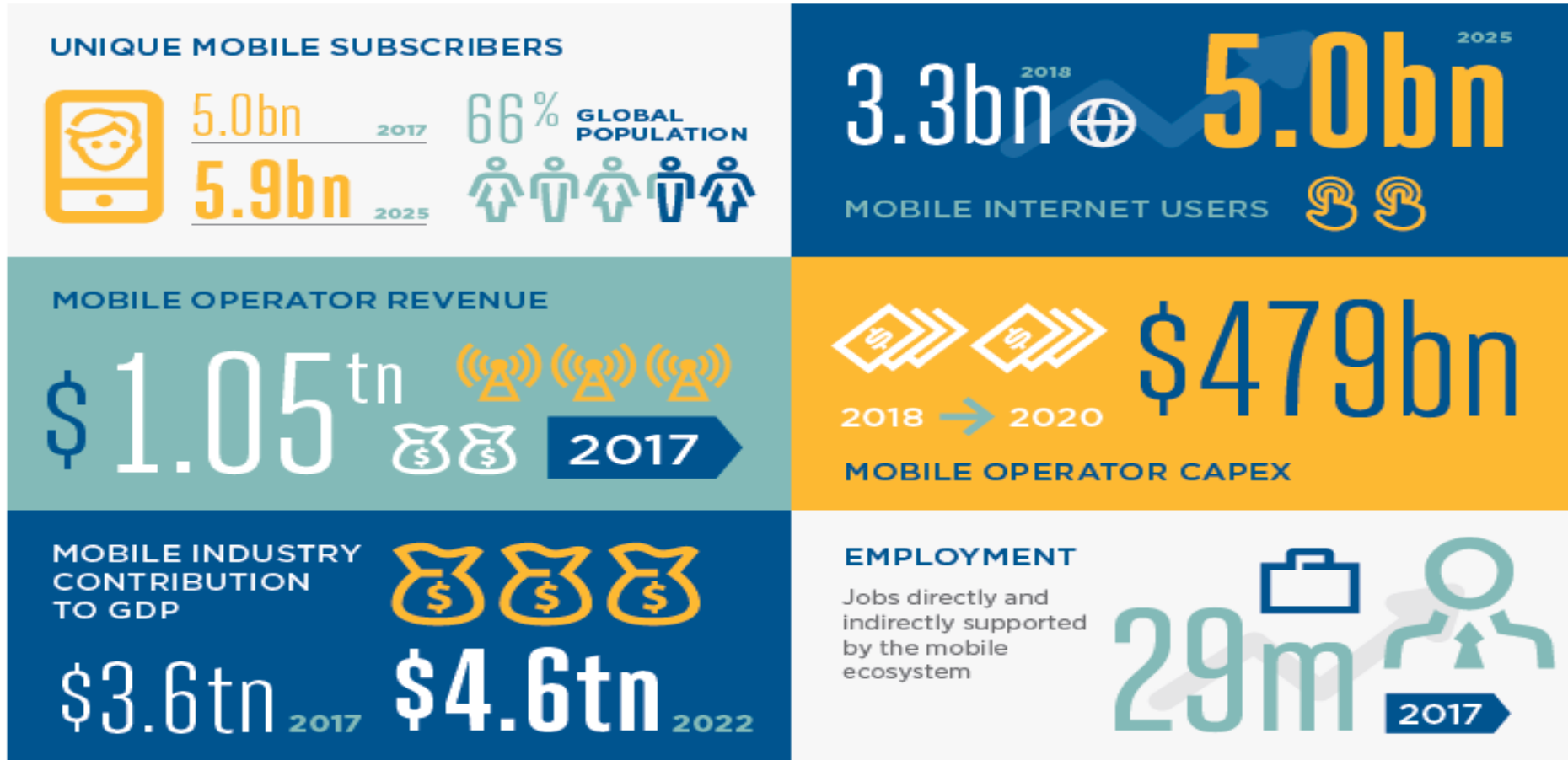


The world's leading mobile industry
events: Mobile World Congress,
Mobile World Congress Shanghai and
Mobile World Congress Americas,
together attract nearly

200,000
people from across the globe each year



The Global Mobile Market

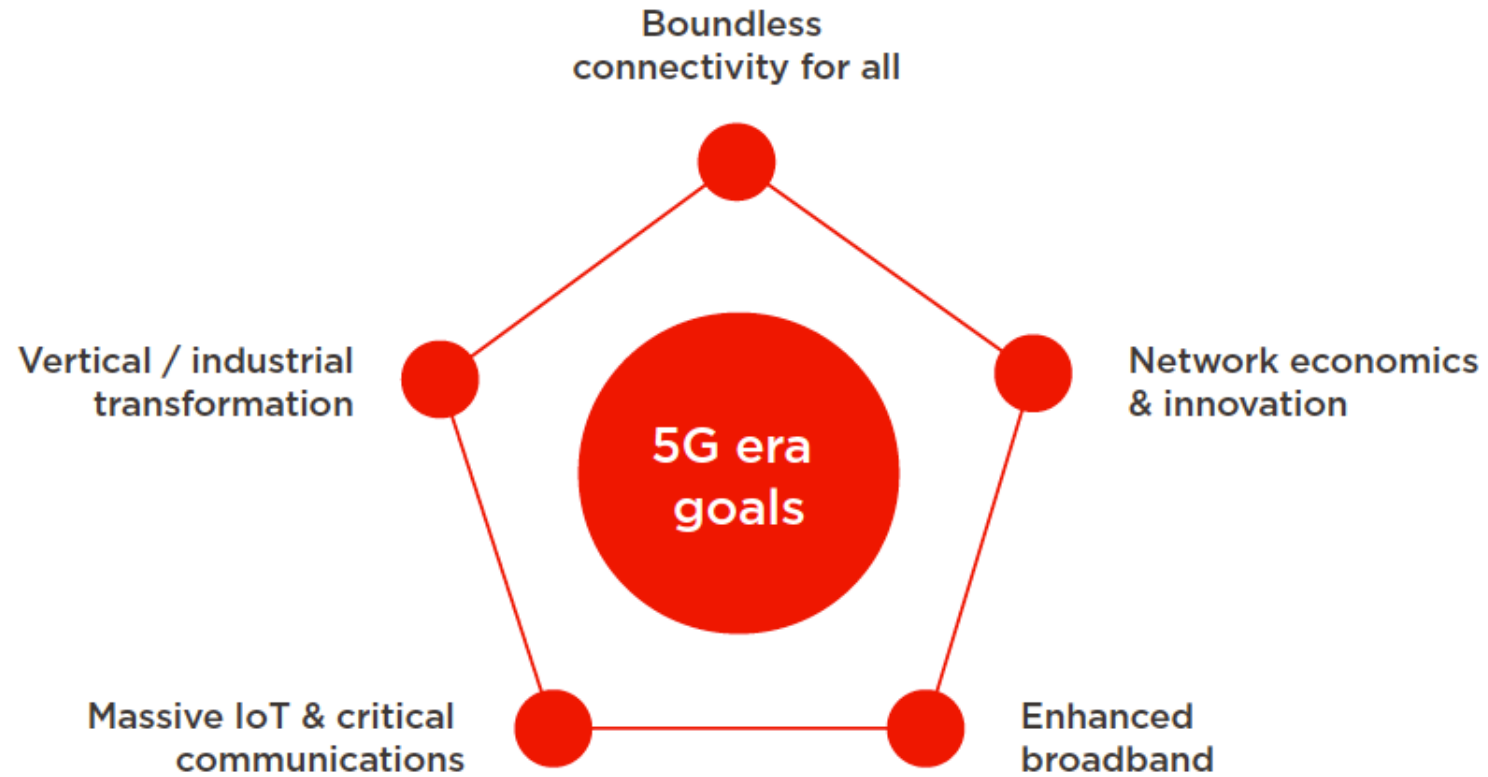


For more information on the mobile industry, please see the Mobile Economy Report 2018:
www.gsma.com/mobileeconomy

Source: GSMA Intelligence

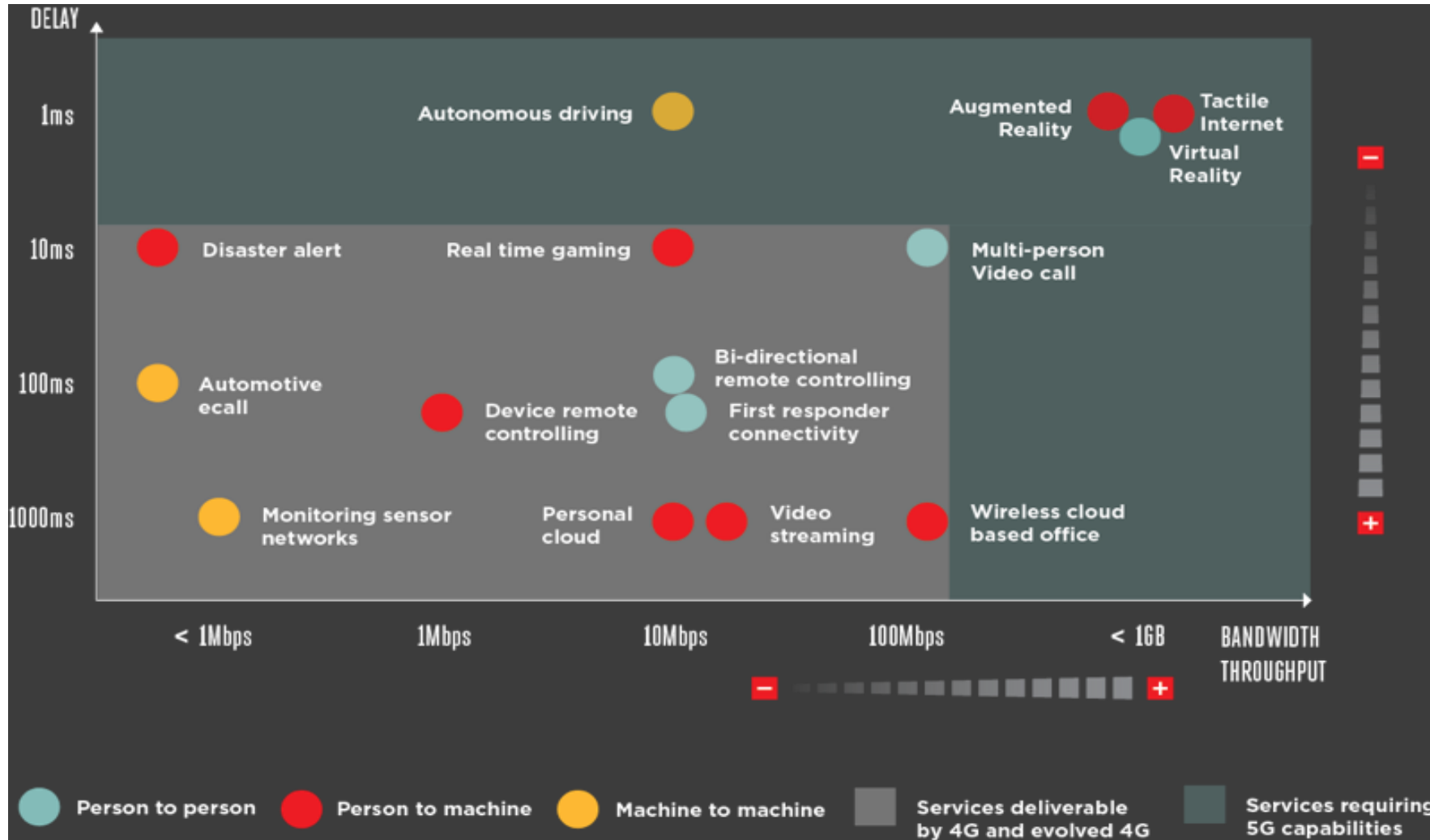


5G: a massive transformation


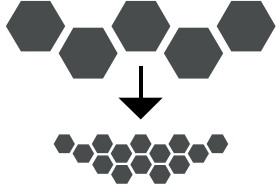







The path to 5G: what matters for what service?

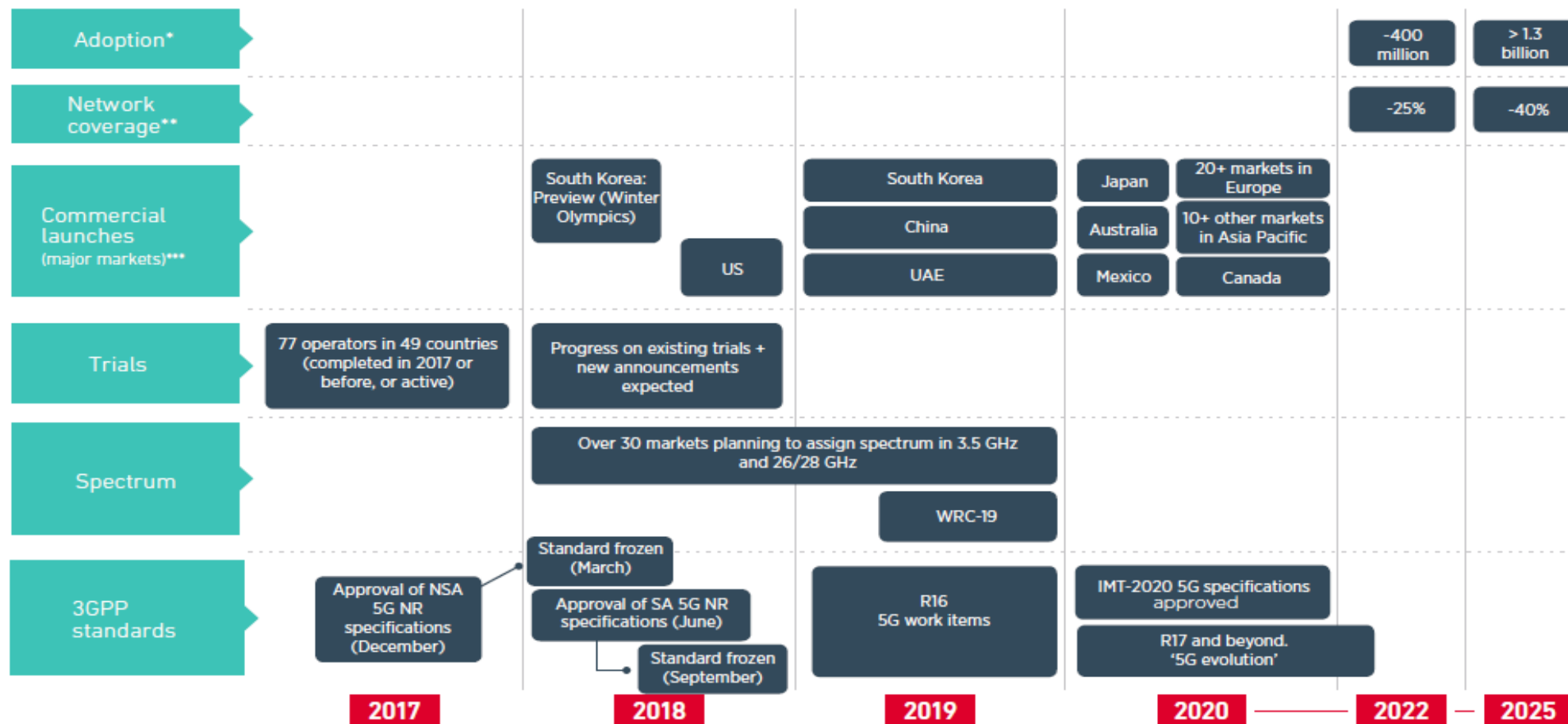


The path to 5G: Mobile technologies will have impact

Antenna	Densification	New radio	Virtualisation	Massive Connectivity
		 <p>Frequency Band</p>	 <p>NFV & SDN</p>	
<ul style="list-style-type: none"> → Massive MIMO → Active Antenna → Multiple antenna models → Long range deep coverage 	<ul style="list-style-type: none"> → Self backhauling → Energy Efficiency → Adapts to transport requirements 	<ul style="list-style-type: none"> → Below 1 GHz: for IoT and mobile broadband → 1 GHz to 6 GHz: for mobile broadband → Above 6 GHz: extreme mobile broadband 	<ul style="list-style-type: none"> → Virtualisation → NFV and SDN to adapt the network → service enabler for network slicing 	<ul style="list-style-type: none"> → Optimisation for millions of connected devices → Multi-year battery life → Massive connectivity



5G – the evolving trends



* Number of mobile connections excluding cellular IoT, worldwide.
 ** Percentage of global population.
 *** Not exhaustive.

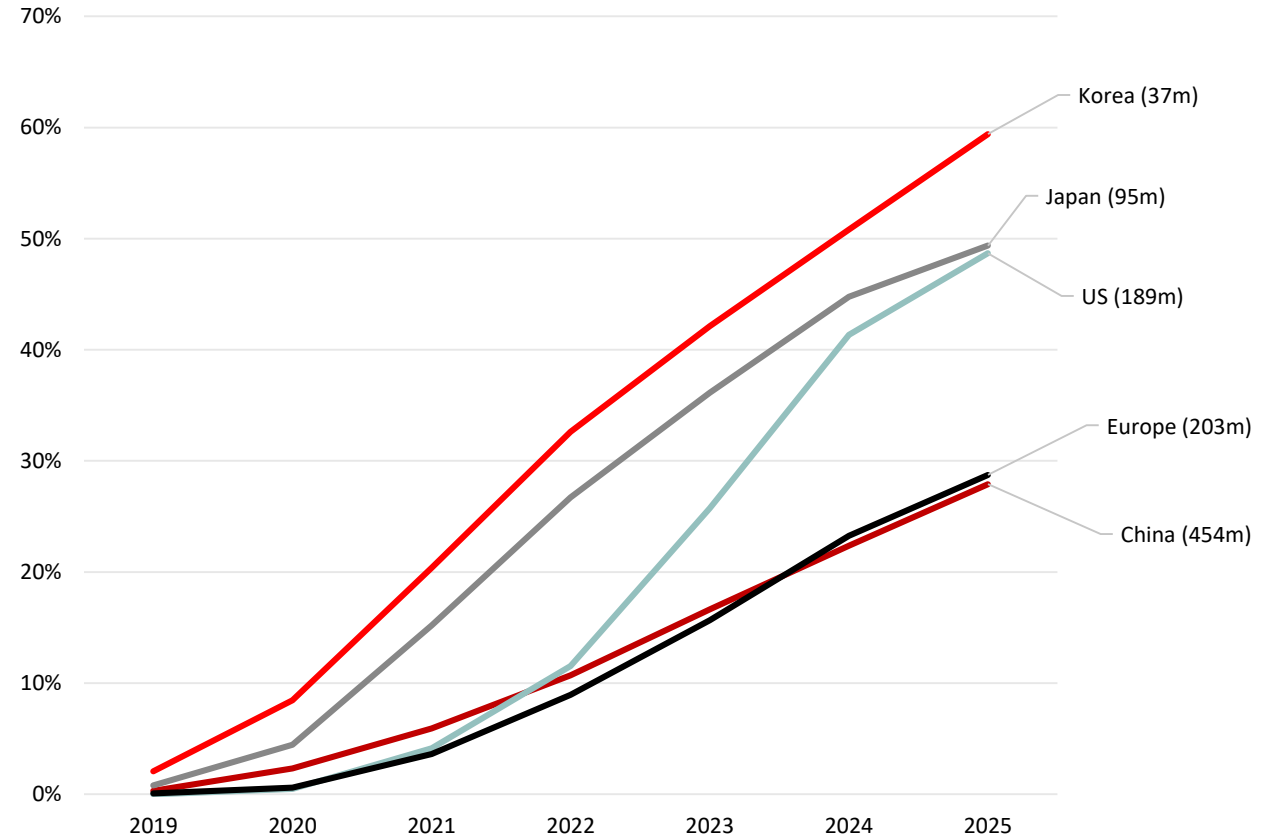
Source: GSMA Intelligence



China, Japan, Korea, US and Europe are the early 5G adopters

- GSMA intelligence forecast 1.36 billion 5G consumer mobile connections by 2025.
- While this equates to a global average penetration of 15%, in reality 5G will be driven by a small number of countries.
- In each case, the 5G take-up path will be longer than for 4G. LTE speeds are improving, which makes 5G less compelling without new services.
- On the supply side, operator capex will be managed in a flexible way, according to market and regulatory uncertainties, so to monitor return on investment before commitment to national rollouts.

Projected 5G share of the mobile subscriber base



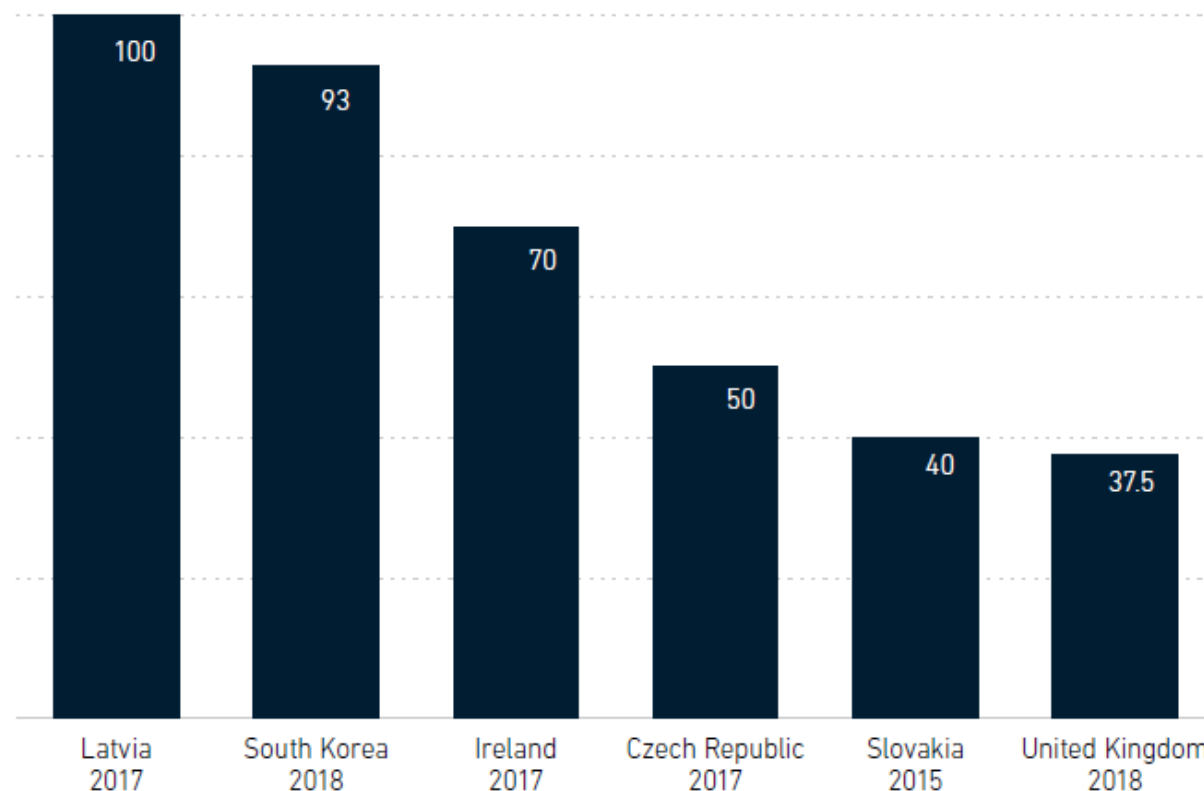
Source: GSMA Intelligence



5G spectrum – risk of fragmentation exists

- 5G should ideally be deployed in 80–100 MHz contiguous spectrum per operator.
- The situation in the 3.5 GHz band following recent auctions shows this fragmentation already exists.
- Fragmentation can increase the time to roll out networks, reduce speeds and increase handset costs (diseconomies of scale).

Assigned 3.5 GHz spectrum per operator
MHz



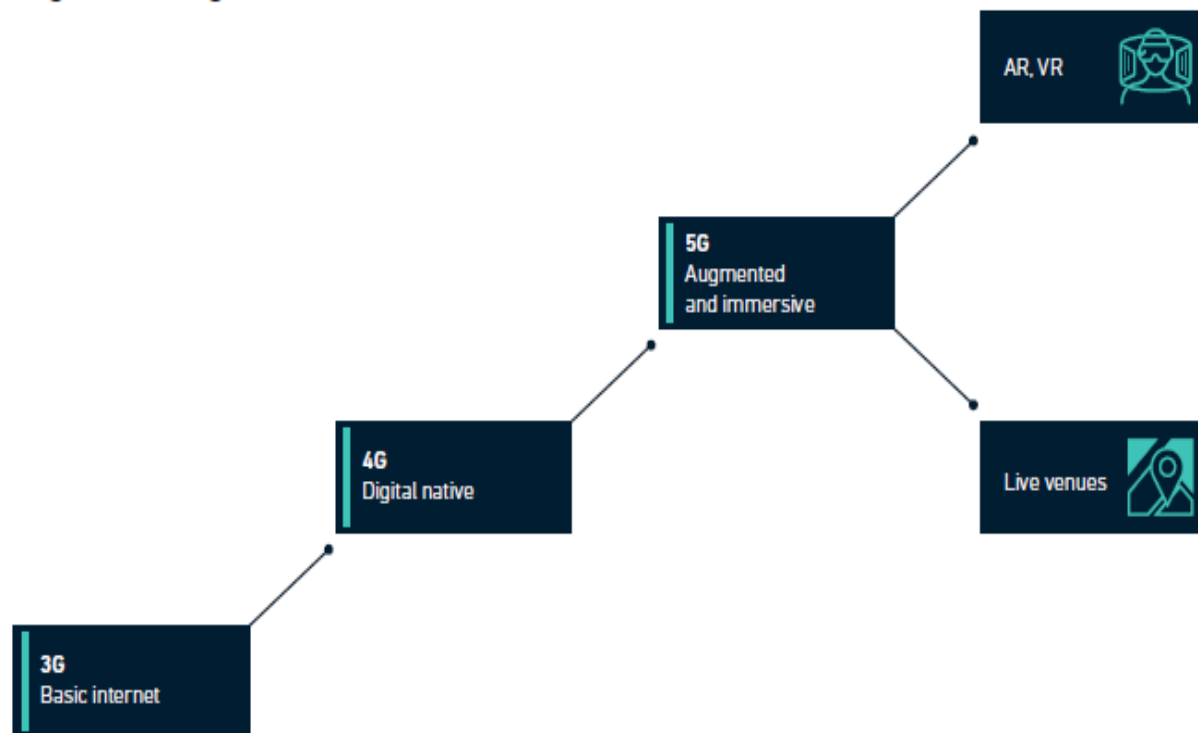
Source: GSMA Intelligence



5G business case (Consumer) could be a hard sell – at least initially

- 5G services on smartphones have two broad use cases: faster speed (enhanced mobile broadband) and immersive entertainment.
- Faster speeds (above 1 Gbps) will be pushed but likely carry minimal pricing uplift on 4G. The incremental opportunity is in immersion (AR/VR/live). Unfortunately the tech is not there yet, with monetisation also a question.
- Absorbing excess LTE traffic is a more near-term benefit of 5G, thanks to new spectrum and air interface.

Digital to augmented consumer?



Source: GSMA Intelligence



5G business case (Enterprise) – vertical market opportunities



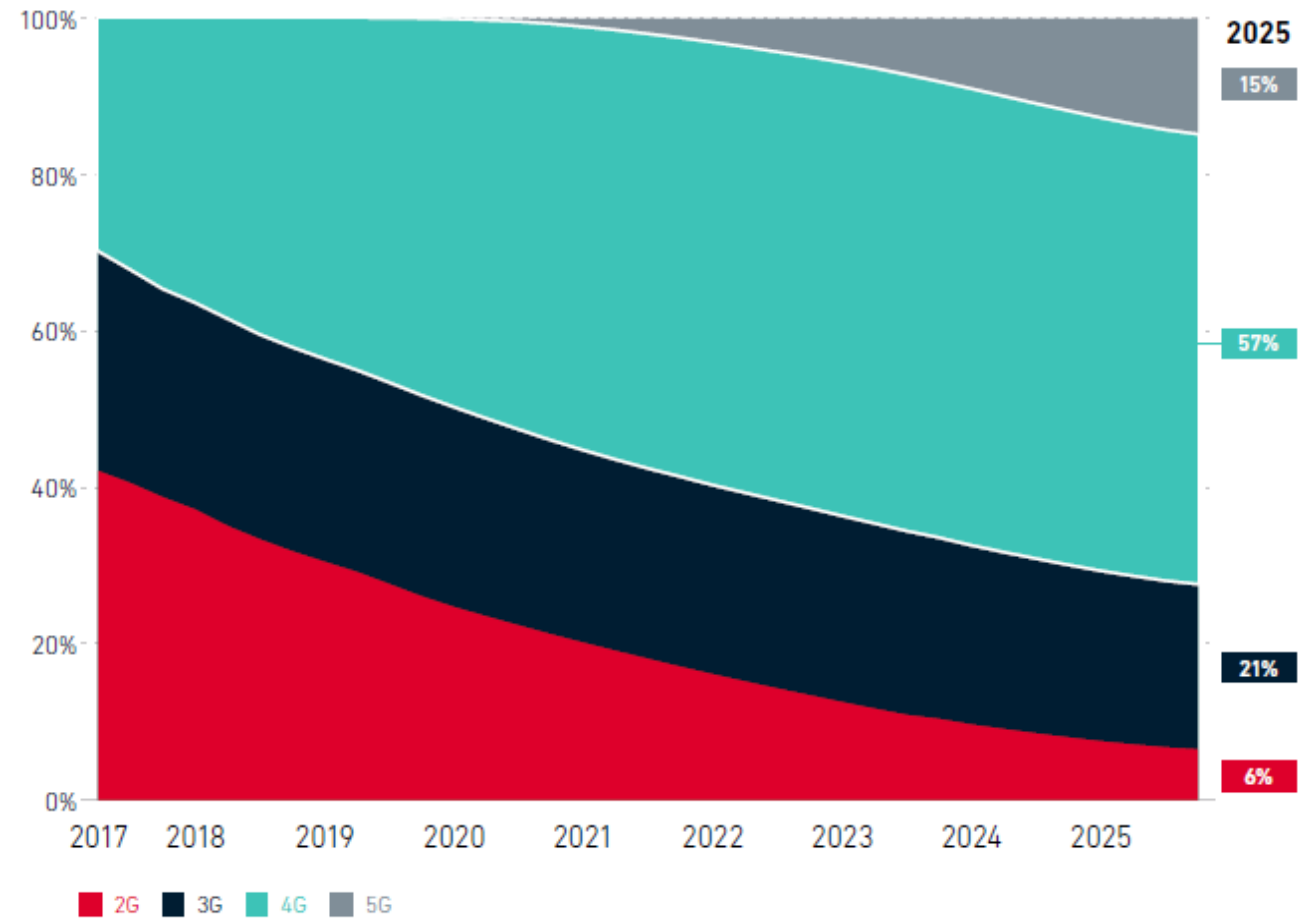
- Mobility use cases will require significant network investment to support
 - Must take account of investment cycles for specific verticals
 - Demand is fragmented



Regardless of 5G, 4G/LTE will pay the bills for the next 10 years

- For operators in many parts of the world, 4G / LTE is and will be the foundation for the next 10 years at least.
- Globally 4G / LTE is projected to increase to 57% of total connections in 2025.
- 5G will reach 15%, but even if it goes higher, it will complement rather than replace 4G / LTE.

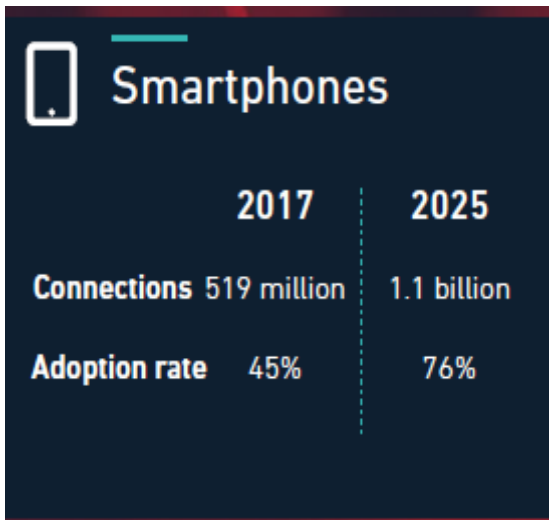
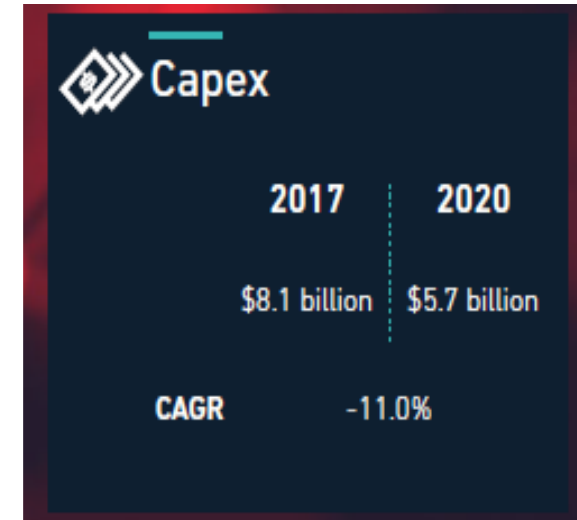
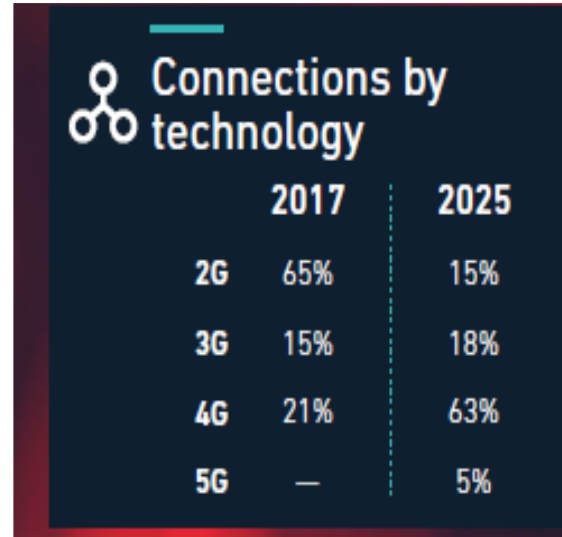
Share of total mobile connections



Source: GSMA Intelligence



India Outlook



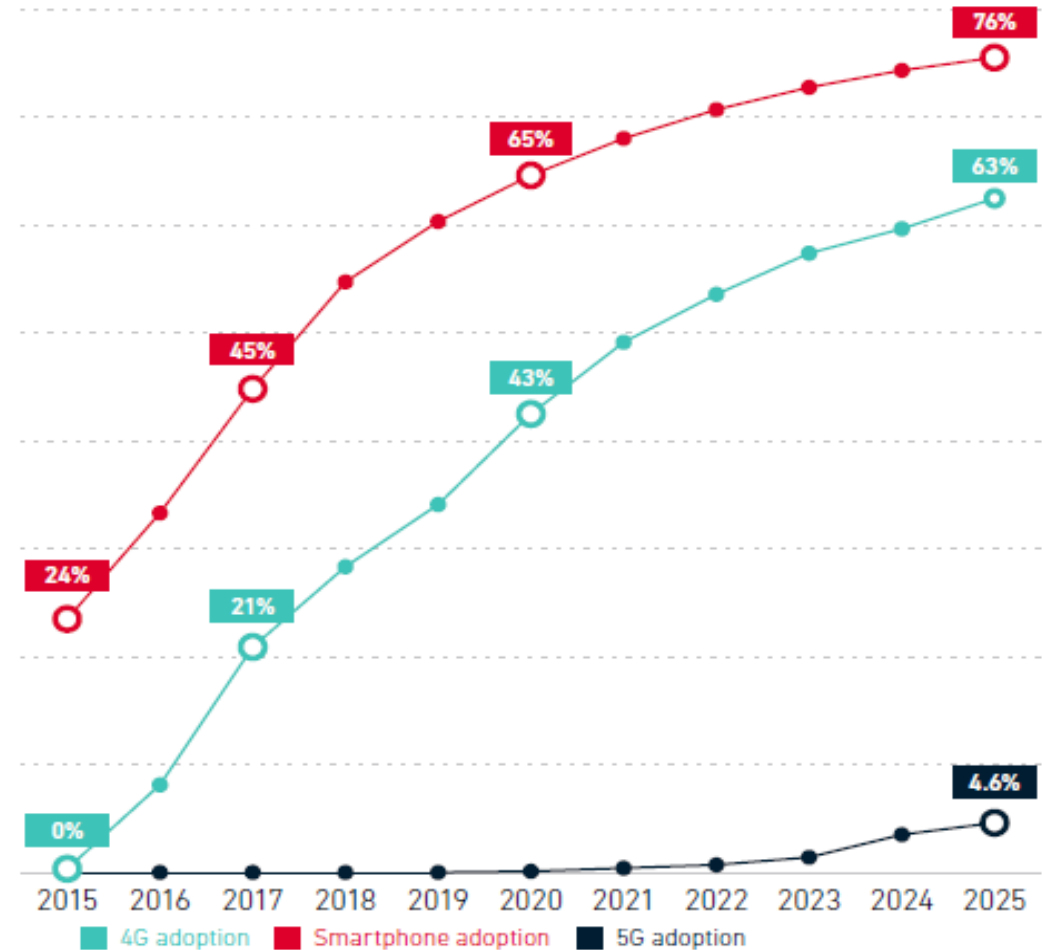
Capex excludes spectrum
Source: GSMA Intelligence



India: 4G takes off; smartphone connections to reach 1.1 billion by 2025

- While India remains a predominantly 2G market - this is changing rapidly: the 4G connection base is forecast to grow three-fold to 890 million by 2025 (4G will account for 6 in 10 connections)
- This growth is being fuelled by a combination of falling data prices, better network coverage, improved smartphone affordability and development of locally relevant content.
- Despite the 4G era only just beginning in India, initial deployments of 5G are expected in 2020, and the government has targeted 2022 for the completion of the 5G rollout. However, 5G consumer adoption will not significantly impact 4G to begin with, reaching 5% of total connections by 2025.

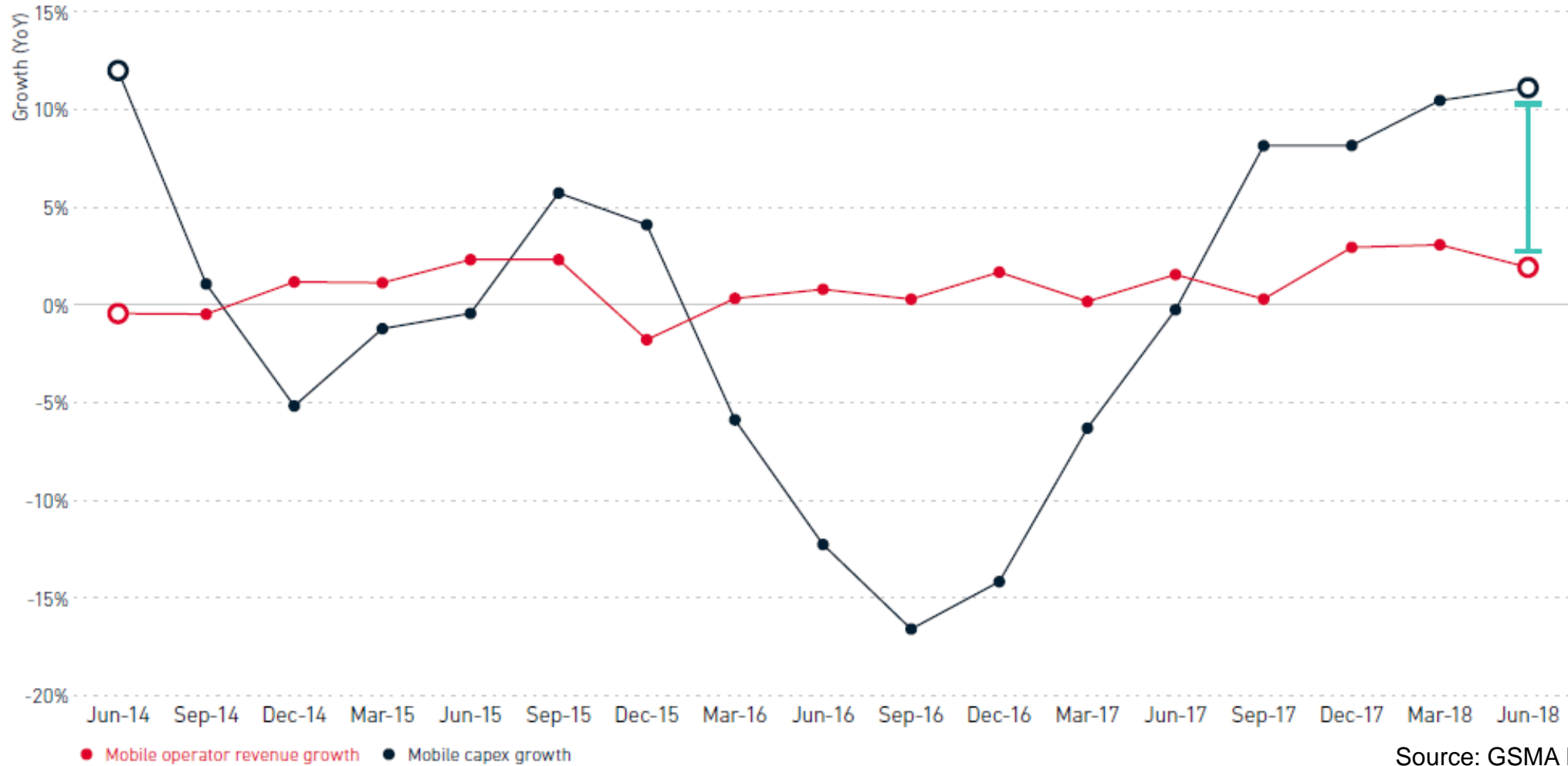
4G, 5G and smartphone adoption in India



Source: GSMA Intelligence



Globally Investment is needed for the sector's future, but so is growth



Source: GSMA Intelligence



Thank You

mmisra@gsma.com

