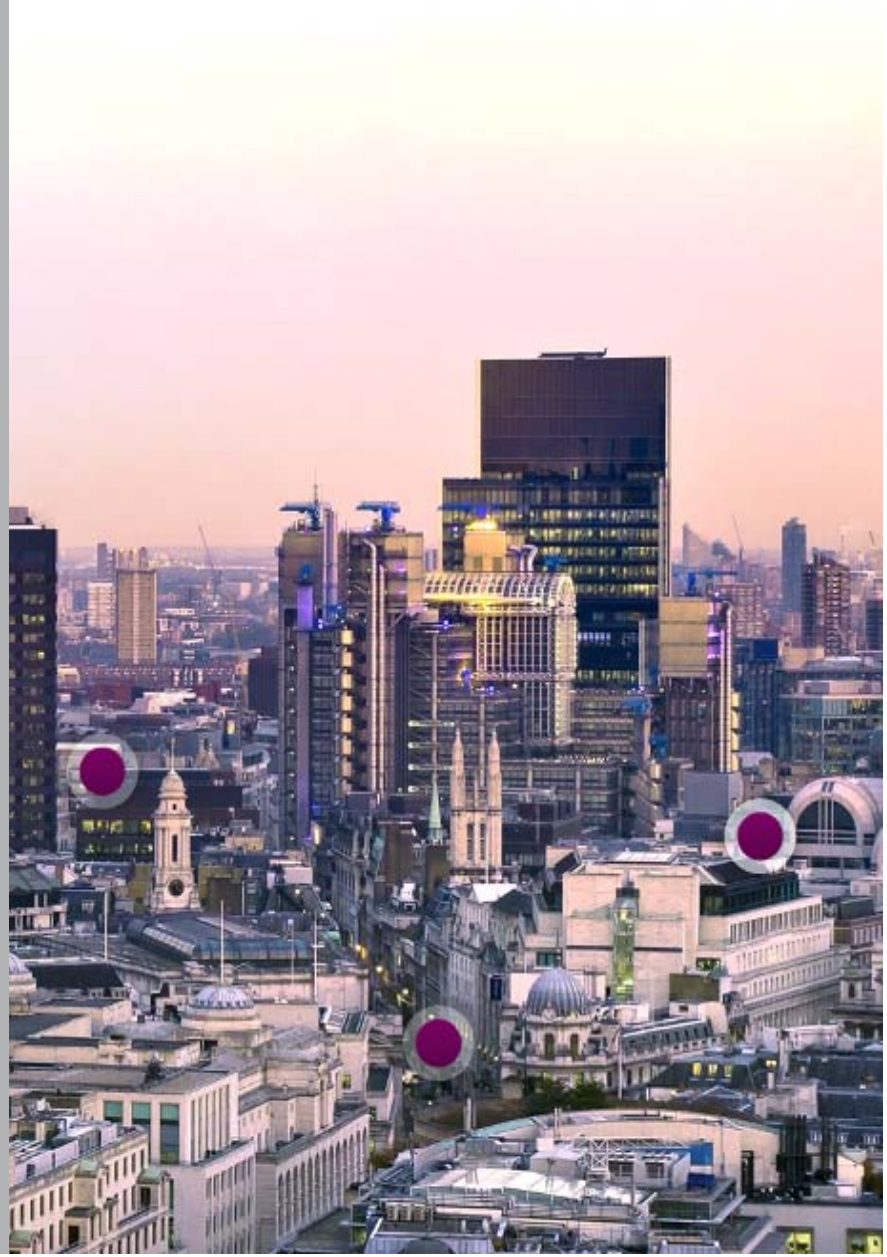
RADIO TECHNOLOGIES AND SPECTRUM PERSPECTIVES



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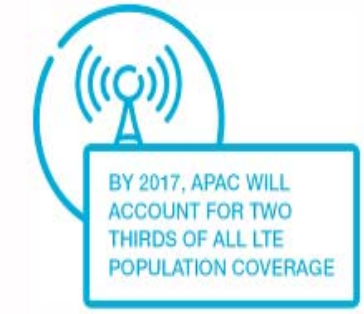
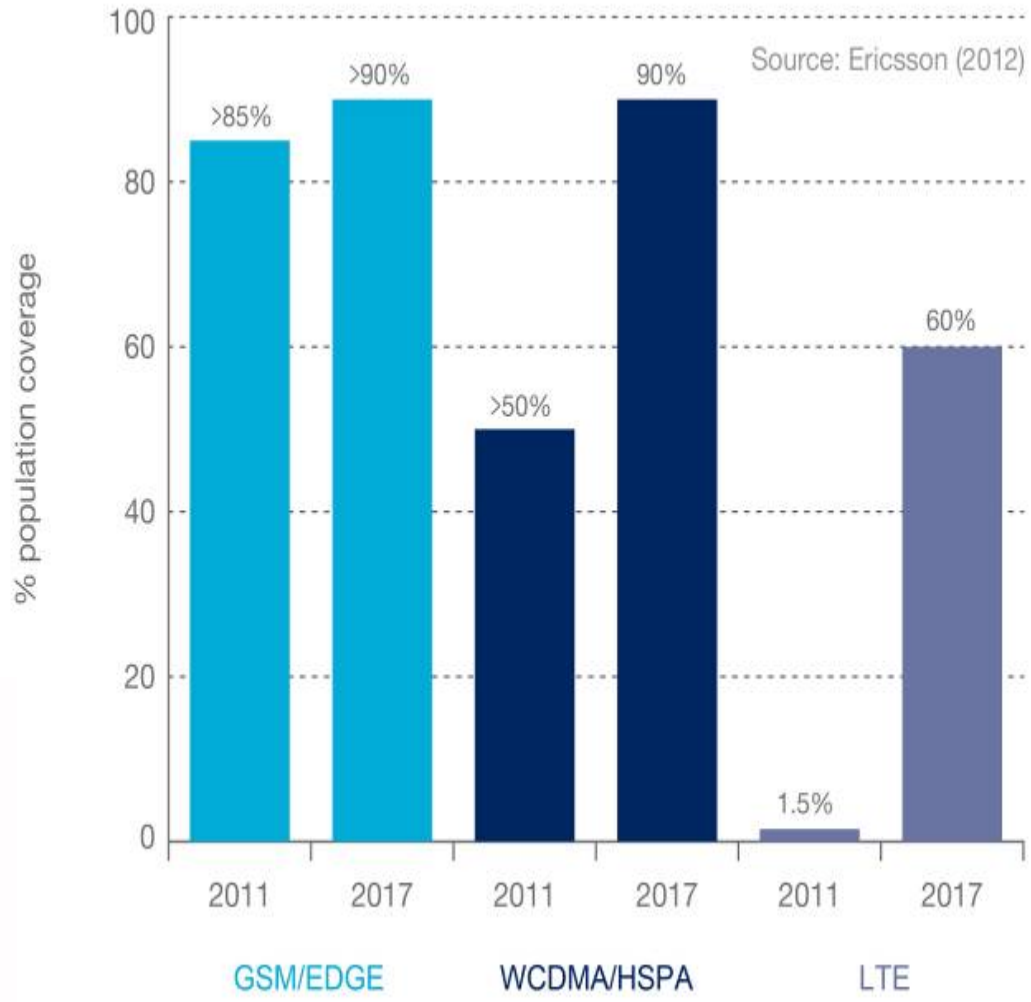
MOBILE COVERAGE IN APAC

By 2017

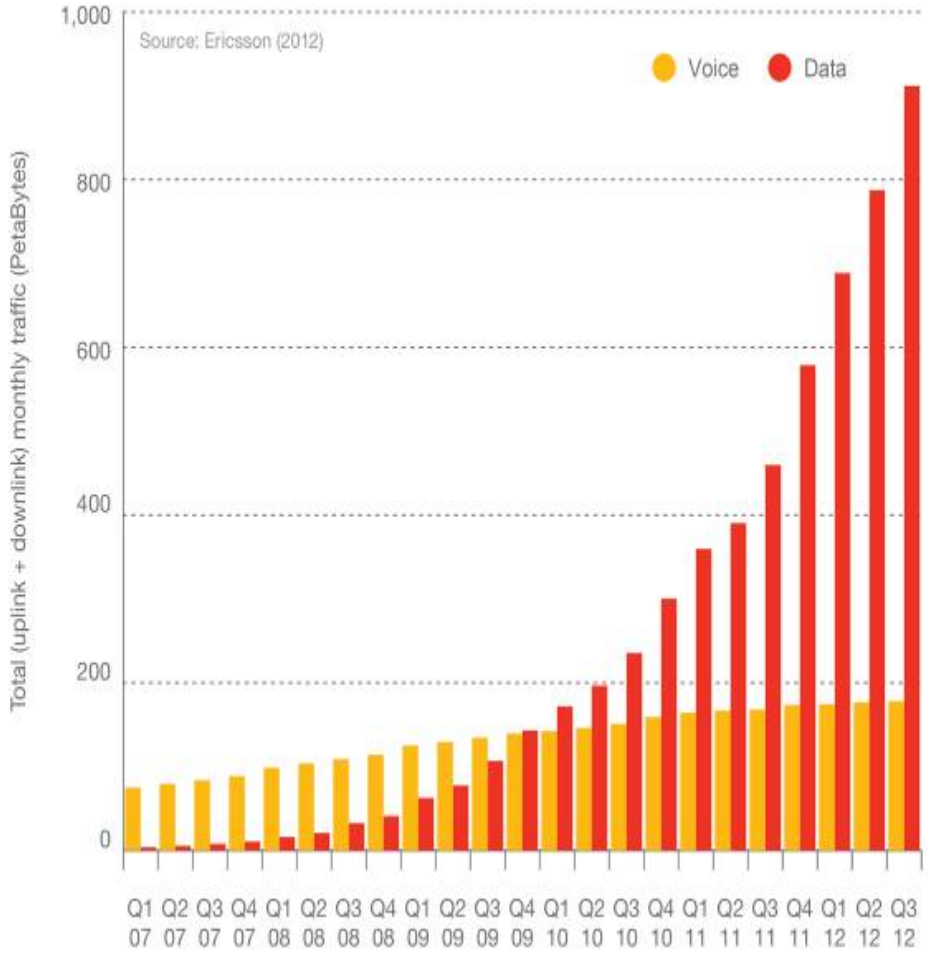
- 90 percent of the population in APAC will be covered by 3G
- 60 percent of the APAC population will be covered by LTE





MOBILE DATA TRAFFIC DOUBLED AGAIN

- Mobile data traffic doubled between Q3 2011 and Q3 2012
- Voice increase due to new subscriptions



ECONOMIES OF SCALE

- LOWER SMARTPHONE PRICES DRIVING ADOPTION

Moto XT300 $66
7.2Mbps,
2100Mhz

Moto XT316 $60
7.2Mbps,
2100Mhz

Samsung I5508 $78
7.2Mbps,
2100Mhz

Small Pepper $110
Dual Core
14.4Mbps, 900/2100Mhz

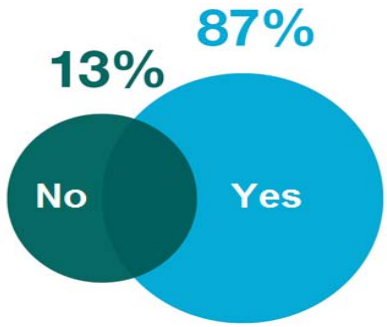
ZTE V889D $110
CPU 1Ghz, dual SIM
14.4Mbps, 900/2100Mhz

Moto XT390 $105
Dual SIM
14.4Mbps, 900/2100Mhz

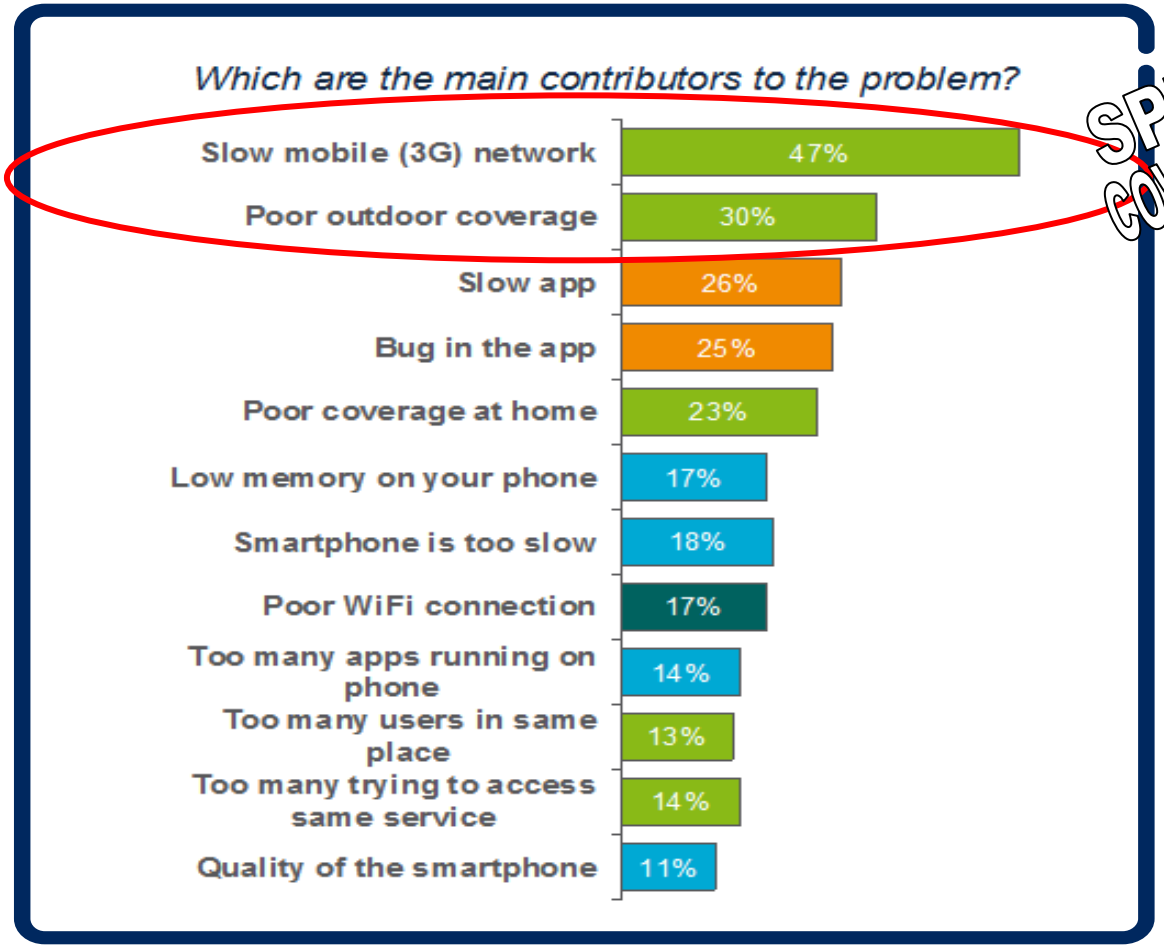
Source: zol.com.cn; 360buy.com

NETWORK PERFORMANCE IS KEY TO SMARTPHONE EXPERIENCE

Do you experience issues with your smartphone?



Which are the main contributors to the problem?

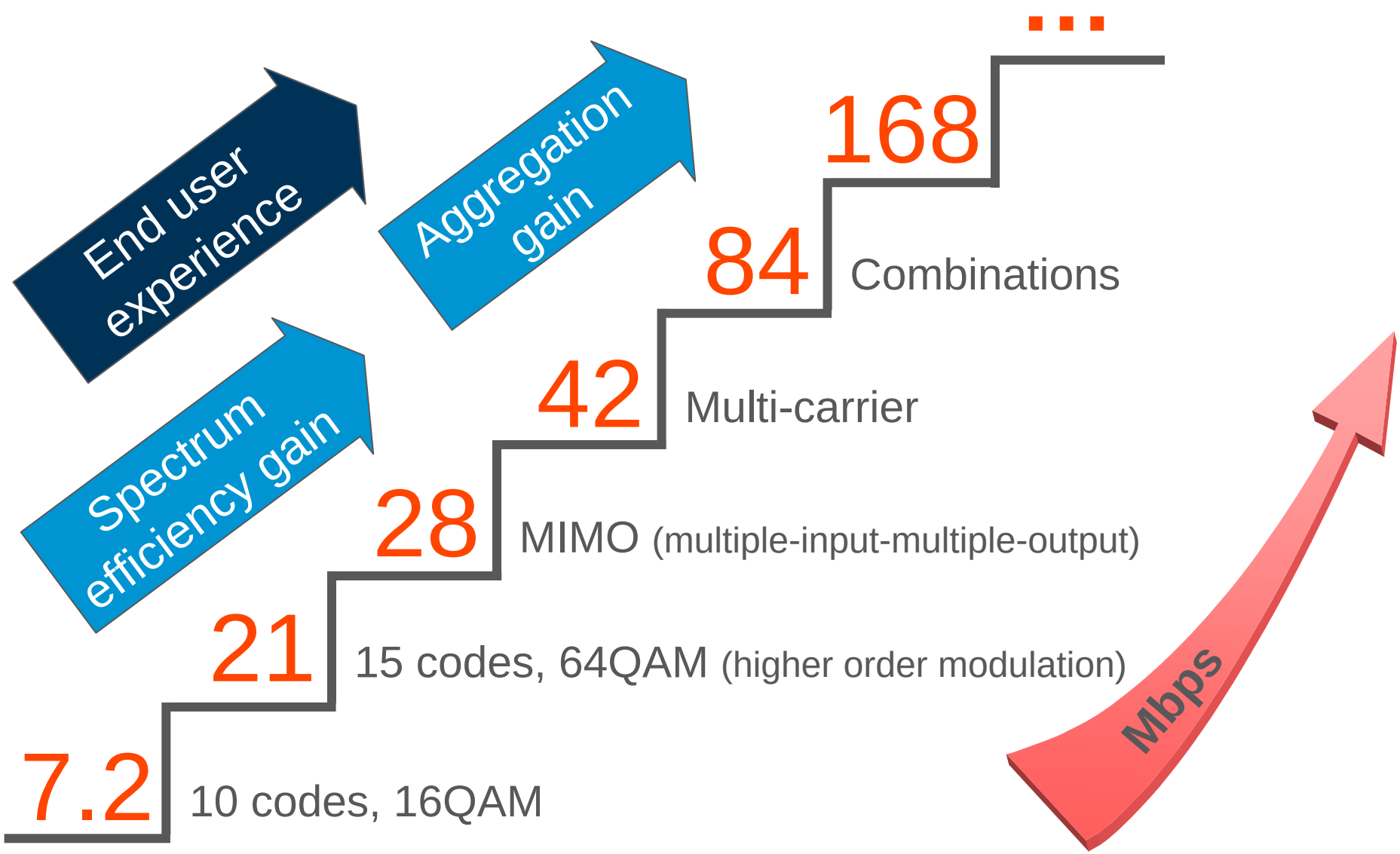


SPEED COVERAGE

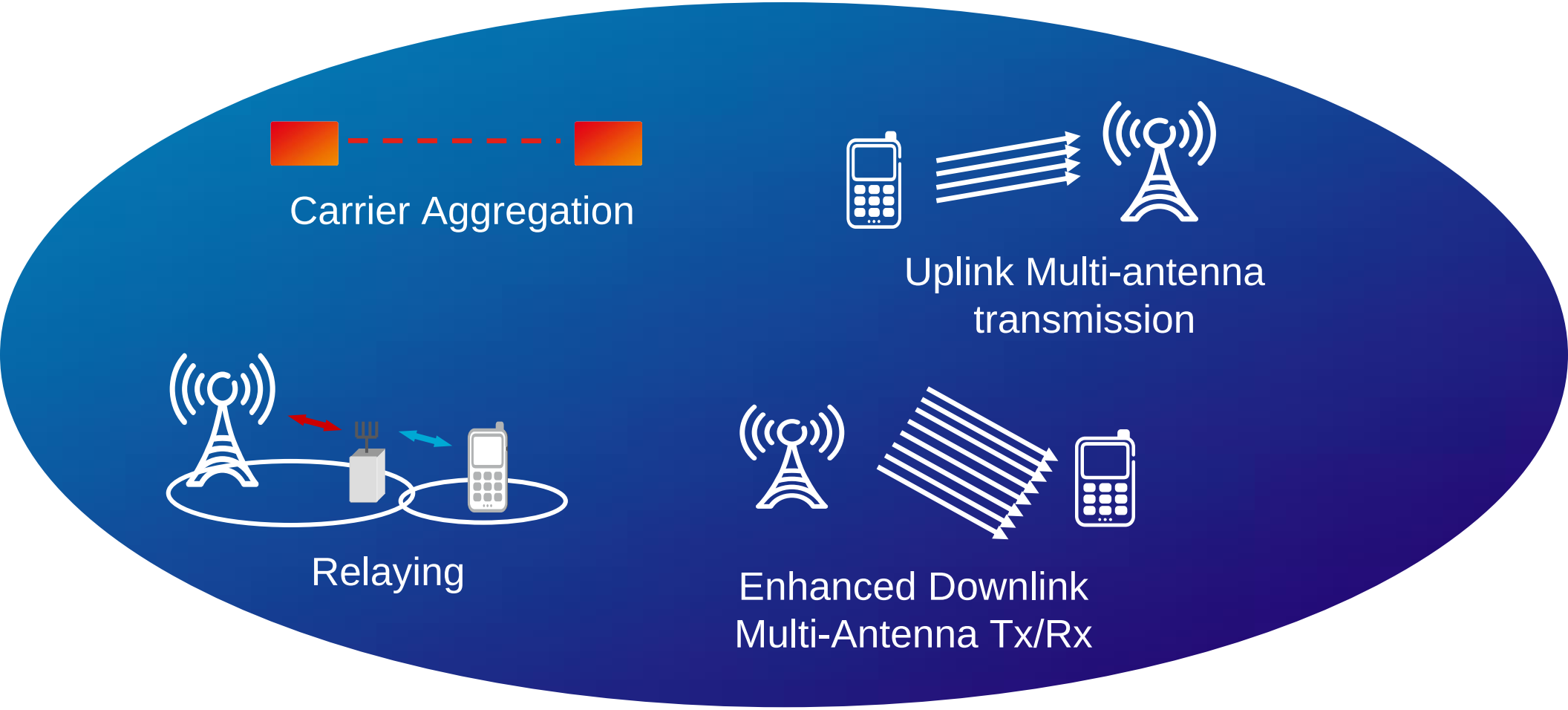
Source: Ericsson ConsumerLab 2012

Great potential for operators to generate competitive advantage through network performance improvement

TECHNOLOGY TO SUPPORT FUTURE MBB GROWTH - HSPA EVOLUTION



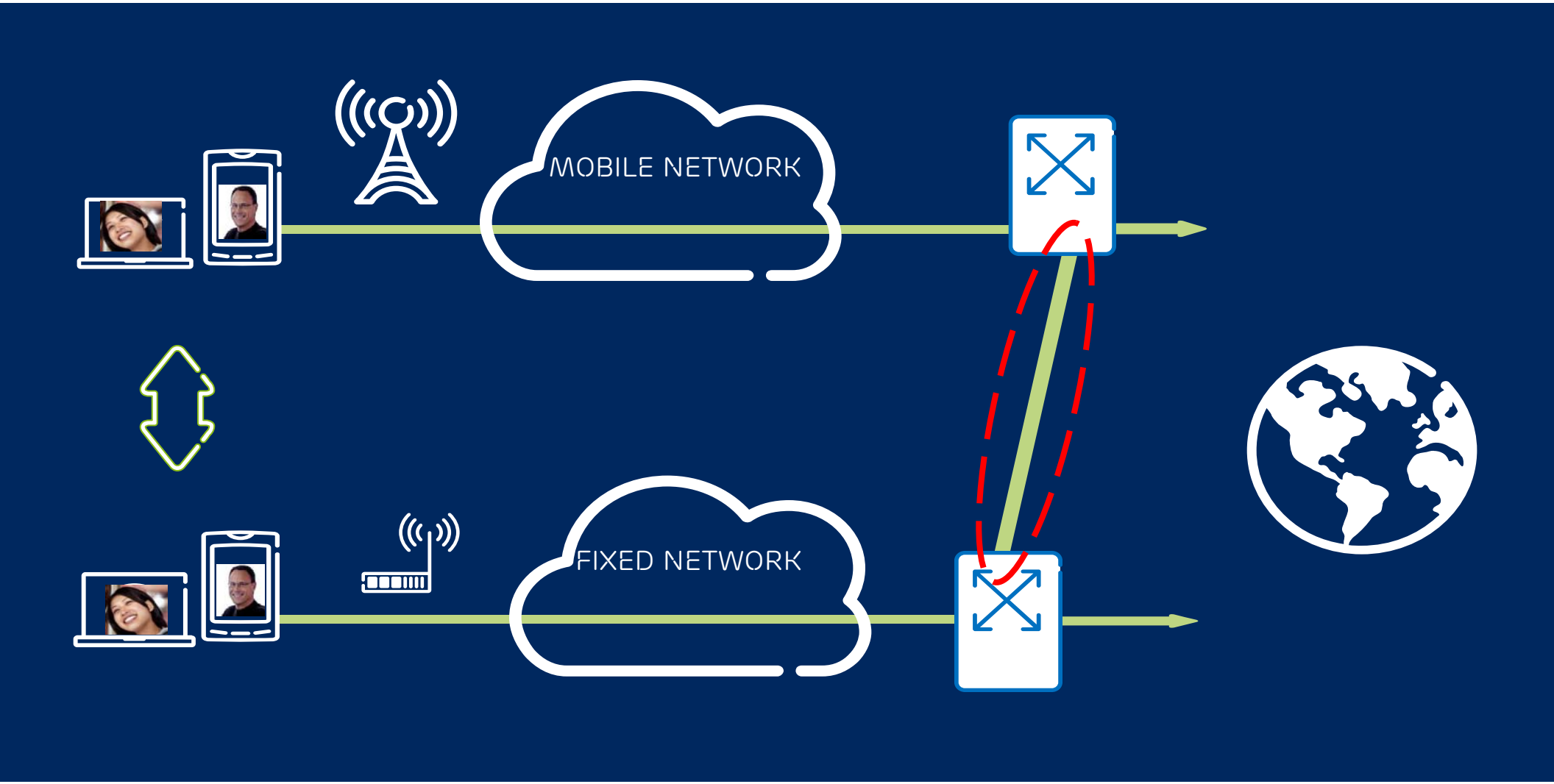
TECHNOLOGY TO SUPPORT FUTURE MBB GROWTH
- LTE ADVANCED 3GPP REL 10 & BEYOND



[100 MHz bandwidth: Up to 3.0 Gbps DL / 1.5 Gbps UL]

HETEROGENEOUS NETWORK TO MEET CAPACITY DEMAND

NETWORK INTEGRATED WIFI SOLUTION



SPECTRUM AND TECHNOLOGY

› Select the right spectrum bouquet for future business offerings

› Typical considerations:

1. **Coverage bands** – is fundamental (low frequency)
2. **Capacity bands** – to satisfy the large majority of consumers (medium frequency)
3. **Peak performance bands** – for the demanding peak data rate traffic requirements (high frequency)
4. **Dynamic traffic bands** – to provide for different and changing traffic patterns in hot-spots (unpaired)

Example 1
900 MHz or 850 MHz FDD
1800 MHz FDD
2100 MHz FDD
2500 MHz LTE FDD

Example 2
700 MHz or 800 MHz FDD
850 MHz or 900 MHz FDD
2100 MHz FDD
2300 MHz LTE TDD

Good combination of both frequency bands and access schemes is important

RISKS OF UNLICENSED SHARED BANDS

Quote

- *"Chinese Railway Uses Wi-Fi Spectrum for Signalling - with Predictable Results "*
- *"The band is used by Wi-Fi hotspots, which are now interfering with its signalling network and shutting down the railways."*

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Chinese Railway Uses Wi-Fi Spectrum for Signalling - with Predictable Results

Published on: 21st Nov 2012

The decision by a Chinese railway to rely on the unlicensed 2.4Ghz radio spectrum band for its signalling systems has caused an entirely predictable effect.

The band is used by Wi-Fi hotspots, which are now interfering with its signalling network and shutting down the railways.

The problem has been exasperated by the use of portable Mi-Fi devices that allow a 3G signal to be shared by a portable Wi-Fi device. Experiments by the railway found that their signalling systems are affected when seven or eight wireless routers are carried into each carriage.

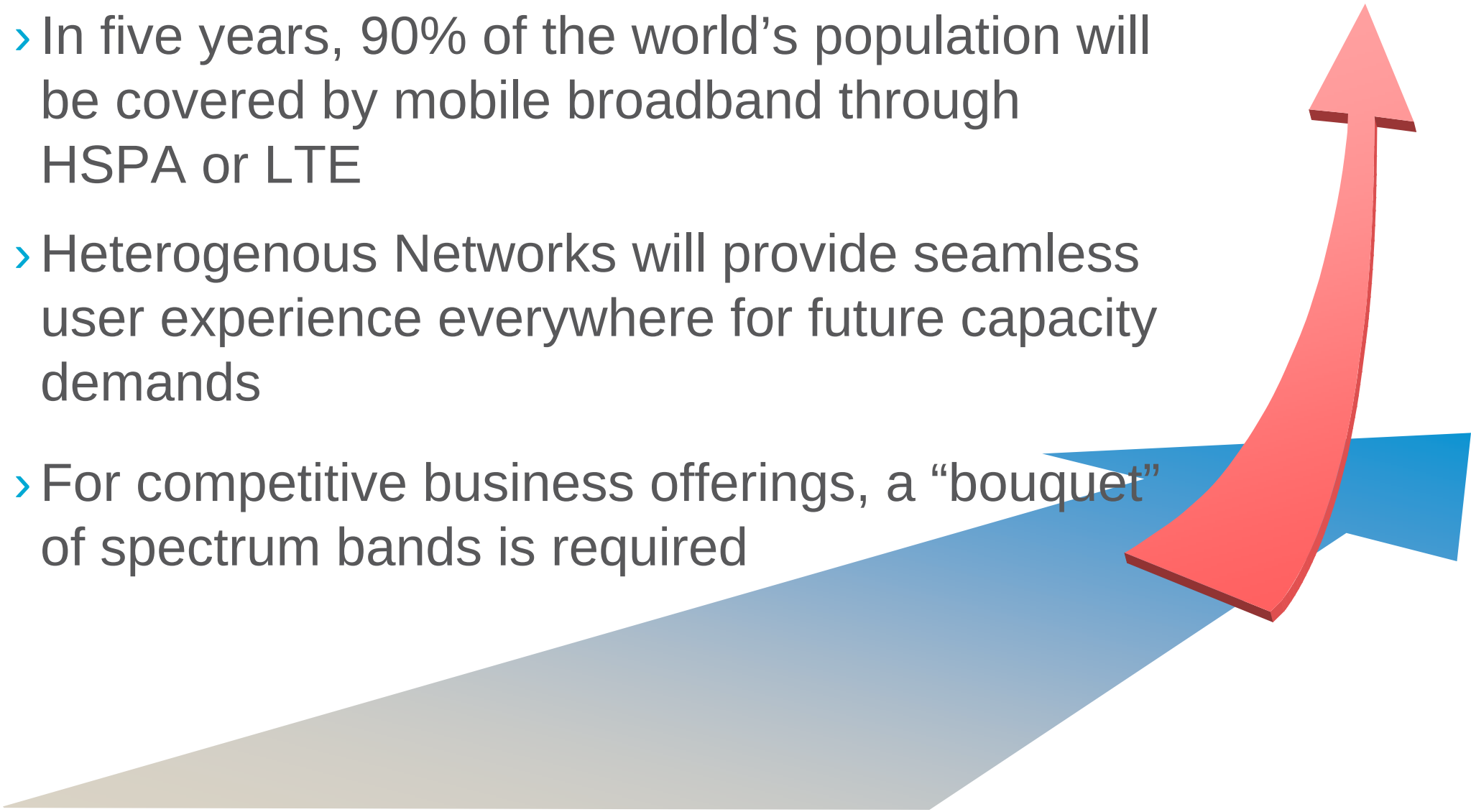
Shenzhen Metro has applied to the regulator to allow it to block the Wi-Fi hotspots, but that was refused.

Although the railways have been criticized for relying on the public Wi-Fi spectrum for their critical infrastructure, the difficulty in securing licensed radio spectrum from the regulator, that would be free of interference has also been blamed.

On the web: Caijing

SUMMARY

- In five years, 90% of the world's population will be covered by mobile broadband through HSPA or LTE
- Heterogenous Networks will provide seamless user experience everywhere for future capacity demands
- For competitive business offerings, a "bouquet" of spectrum bands is required



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