IMPORTANCE OF 800MHZ FOR INDOOR COVERAGE

Presentation at IET Event –

Mobility and Access: Femtocells, LTE and the new Radio Revolution

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18 May 2011

Wireless has a key role to play in the realisation of universal broadband access

- EU Digital Agenda (2010) requires that by 2020:
  - 100% of population to have access to at least 30Mbps
  - 50% of households to subscribe to 100Mbps+ service
- Wireless is likely to be the most cost-effective means of providing high-speed broadband access to homes and small businesses which:
  - are far from the local telephone exchange/ cabinet
  - do not have a cable TV connection
- This applies in both:
  - rural parts of the country
  - sub-urban regions

Low-frequency spectrum is critical to the economics of covering rural areas ….

Table 3: Central estimate of site and cost advantages for different frequencies

	Advantage of 900 MHz over 2100 MHz	Advantage of 900 MHz over 1800 MHz	Advantage of 1800 MHz over 2100 MHz
Site advantage	10,300	6,000	4,400
Cost advantage (£bn)	1.7	1.3	0.4

All costs are 20 year NPVs using a social discount rate of 3.5%

Source: 'Application of spectrum trading and liberalisation to the mobile sector', Ofcom, 20 September 2007

… and for providing good indoor voice and data coverage in urban and rural areas

- Studies have shown that indoor coverage falls-off rapidly with increasing data rate

Probability of Coverage by bearer channel

	Dense Urban	Urban	Suburban	Rural
Outdoor PoC	98%	98%	98%	98%
Indoor PoCs				
12.2kbps (inbuilding PoC)	67%	70%	72%	68%
64kbps (inbuilding PoC)	50%	50%	46%	38%
144kbps (inbuilding PoC)	41%	39%	34%	26%
384kbps (inbuilding PoC)	31%	28%	22%	16%

Source: Signals Research Group, LLC

Source: 'Mobile Broadband Wireless', Signals Research Group LLC, August 2007

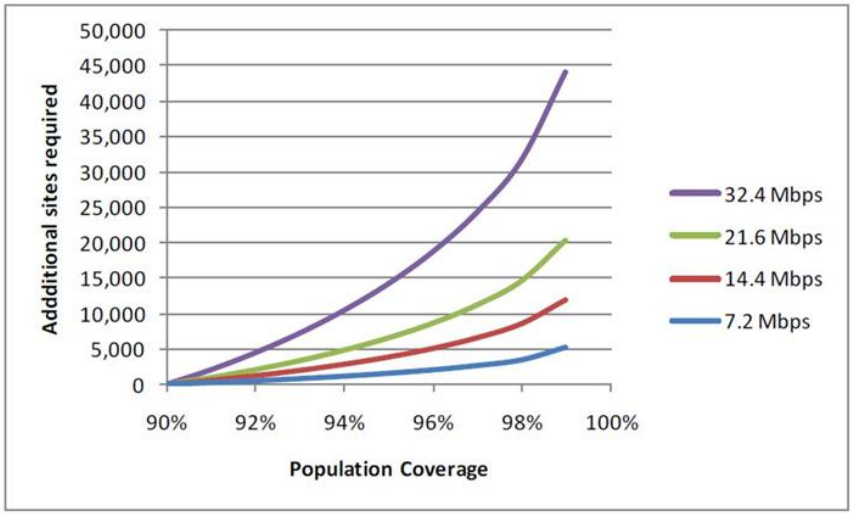
- 3 UK has estimated that the benefits of using 900MHz over 2.1GHz are considerable
  - 2.1GHz spectrum: 79% indoor coverage
  - 900MHz spectrum: 96% indoor coverage

Source: 'Radio spectrum auctions', speech by Kevin Russell (CEO of 3 UK) to Westminster eForum, London, 15 March 2011

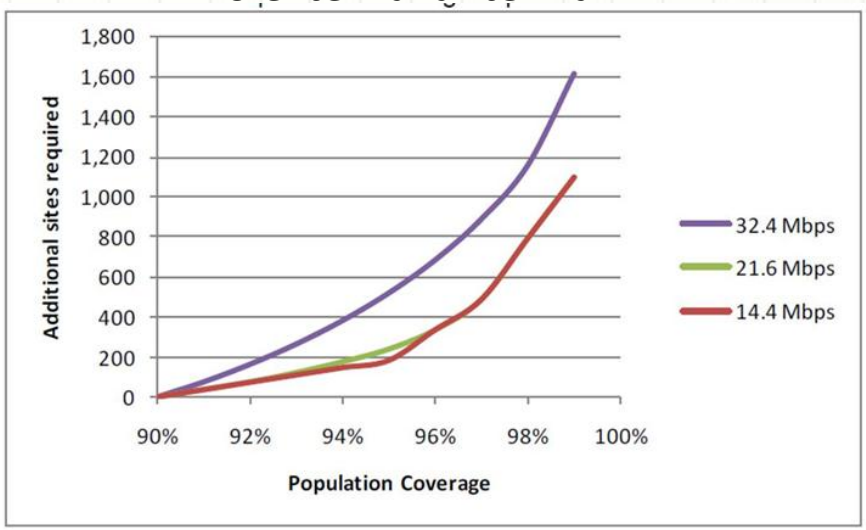
Even with low frequency spectrum, the economics of indoor coverage are tough

Number of additional base stations required to provide indoor coverage using 800MHz spectrum

To “typical” USB dongle/mobile handset

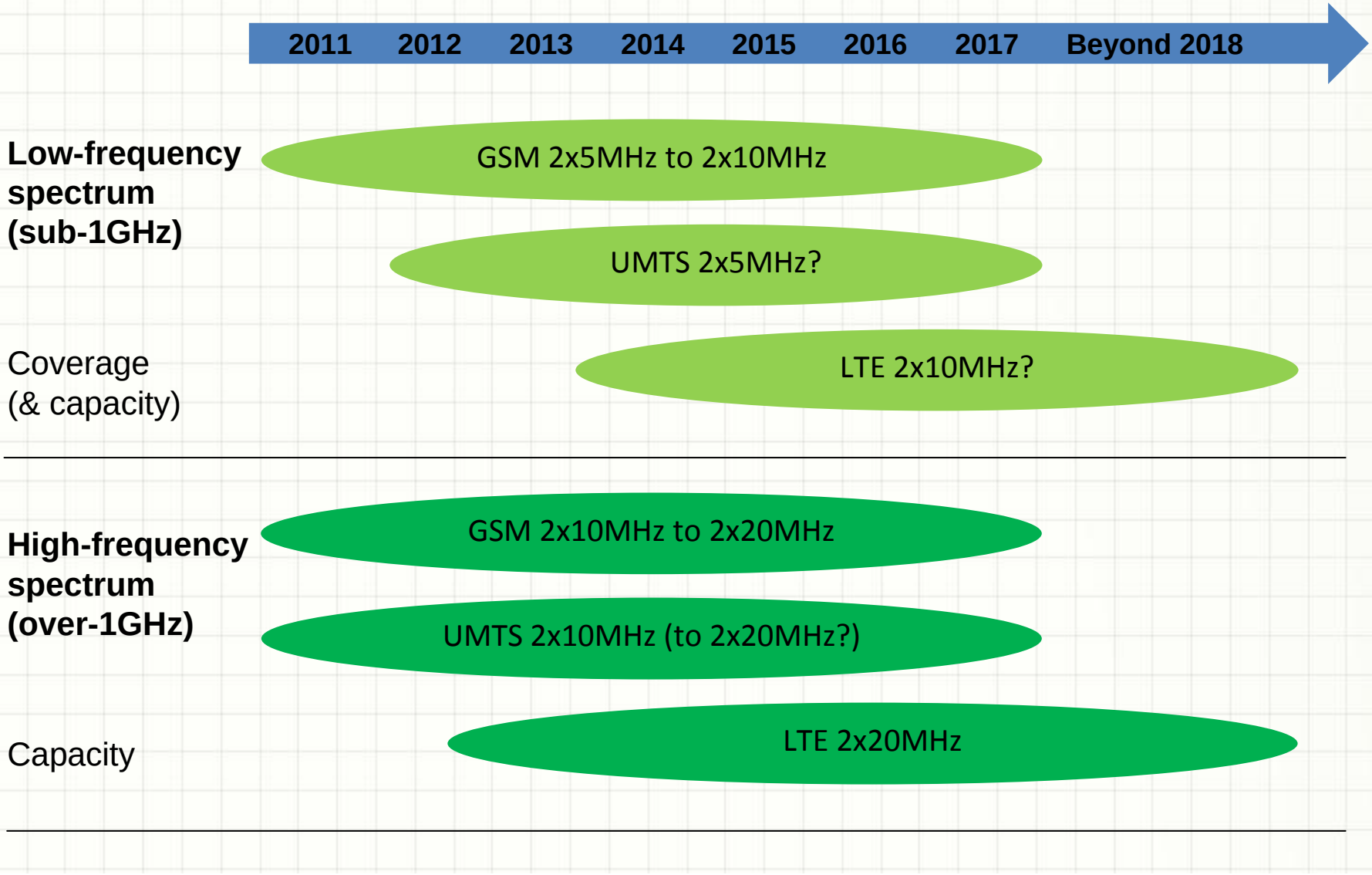


To external antenna

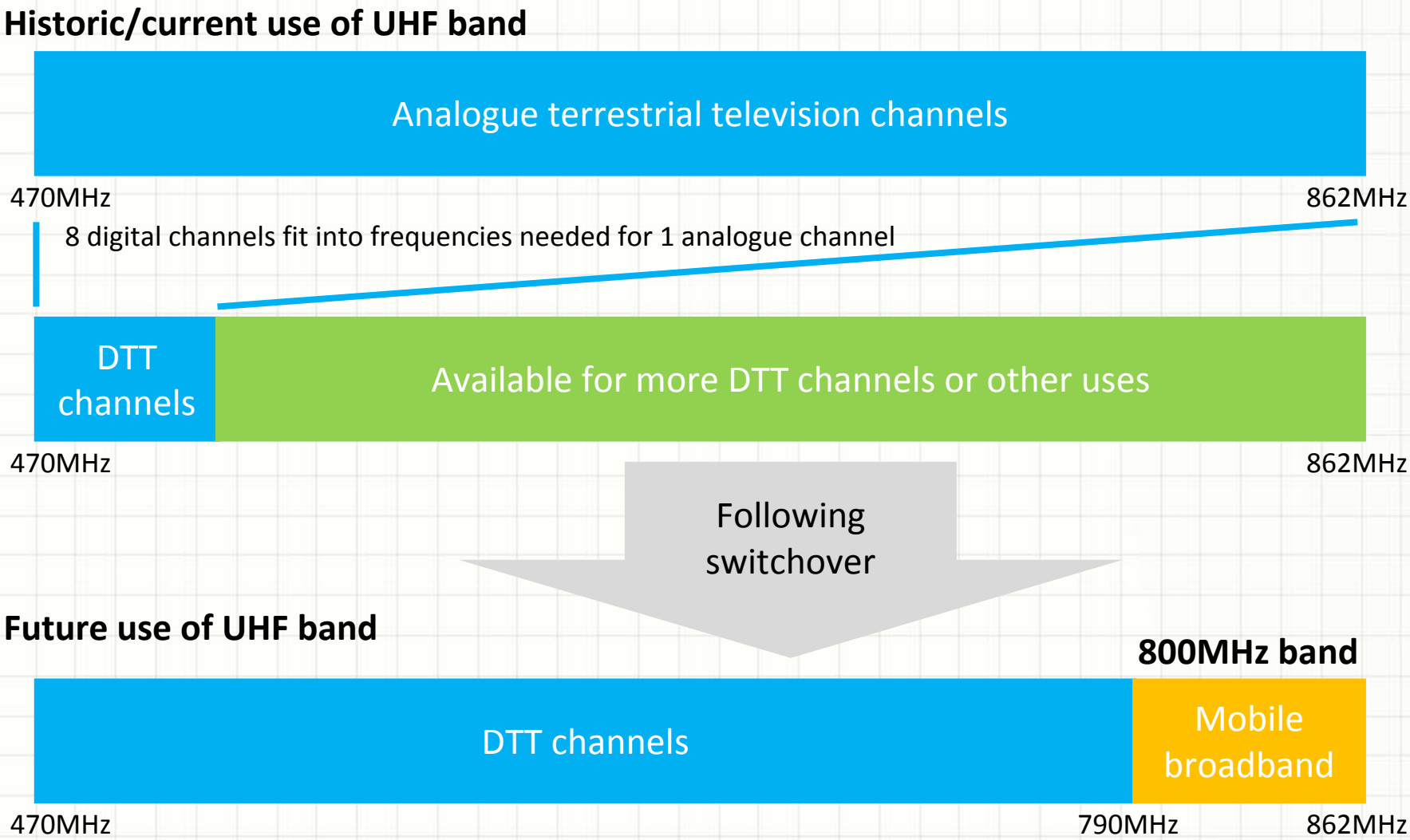


Source: ‘Infrastructure analysis and solutions for 800MHz deployment’, ICT Knowledge Transfer Network, May 2011

In summary, operators need a portfolio of high and low-frequency spectrum



The ‘digital dividend’ is the best new source of low-frequency spectrum



Femtocells do not remove the need for 800MHz spectrum

1. Femtocells require a broadband connection to operate:
   - therefore they do not resolve the digital divide issue
2. The consumer case for buying and installing a femtocell is not clear:
   - so far, only attractive to consumers with poor GSM voice coverage
3. It may not be commercially/technically possible to implement femtocells in all areas
   - e.g. where landlord seeks to extract unreasonable fees from operators for femtocell deployment
4. The technology has yet to be fully proven
   - not clear whether widespread femtocell deployment will cause interference problems
5. Is Wi-Fi off-load a better solution than femtocells?
   - will cellular voice (following migration to LTE) be carried over WiFi/a fixed broadband connection in a seamless manner?

A "joined up" approach by Govt is needed to meet all the needs for connectivity

- Several Government initiatives could potentially lead to significant investment in national wireless communications networks

Rural broadband

Emergency services broadband

Smart meters for utilities

Transportation/ congestion mgmt

- A “joined up” approach is needed to serve all these needs in view of:
  - shortage of (low frequency) spectrum
  - economic environment – the country cannot afford to build separate networks for each individual use

Spectrum management experience

Digital dividend	• Assessment of the optimal European approach to the use of the digital dividend for the European Commission • Study for Ofcom (UK) on the optimal use of the 470-862MHz band • Study for GSM Association on alternative uses of the digital dividend in Russia
GSM re-farming	• Support to O_2 Ireland re liberalisation and re-farming of 900MHz and 1800MHz spectrum • Study for Ofcom (UK) on the liberalisation of mobile spectrum • Study for West European government on 900MHz licence expiry
2.6GHz auctions	• Valuation and auction strategy advice to KPN in Netherlands • Support to NITA (Denmark) with award of 2.5GHz spectrum • Study for Ofcom (UK) on award of 2.6GHz spectrum
Other auctions	• Support to Etisalat with successful acquisition of Egyptian 3rd mobile licence (2G and 3G) • Advisor to Orascom re successful acquisition of AWS spectrum in Canada • Support to Far EasTone (Taiwan) and SmarTone (Hong Kong) with 3G (2.1GHz) licence acquisition • Studies for Ofcom (UK) regarding 410-430MHz and L-Band spectrum awards
Spectrum trading	• Study for European Commission on harmonisation of spectrum trading frameworks • Support to NITA (Denmark) on introduction of trading and liberalisation • Valuation of 3.5GHz spectrum for European fixed network operator
Demand for spectrum	• 20 year forecast of future commercial spectrum demand for UK Government

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