

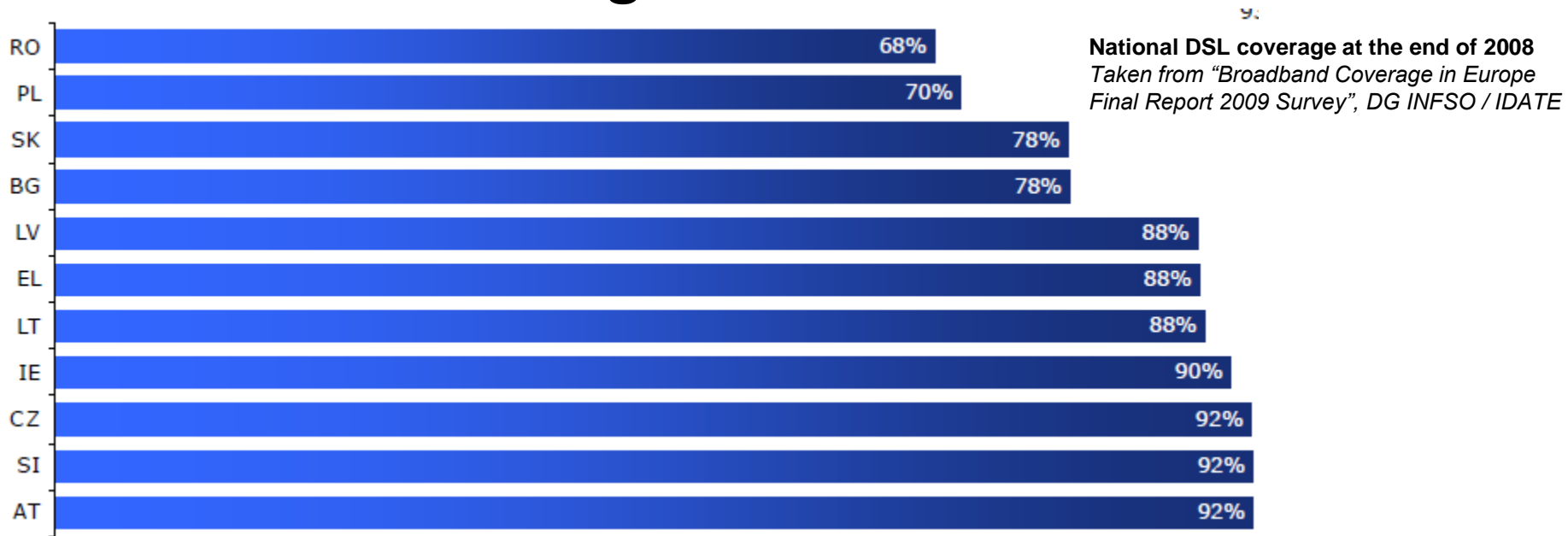
# Making the Most of Available Spectrum

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*Presentation to European Internet Foundation Dinner Debate  
Brussels  
15<sup>th</sup> March 2011*

# Digital Agenda 2020: The Challenge

- Broadband for All by 2013
- 30 Mbps everywhere by 2020
- But big gaps currently exist even in basic broadband coverage...

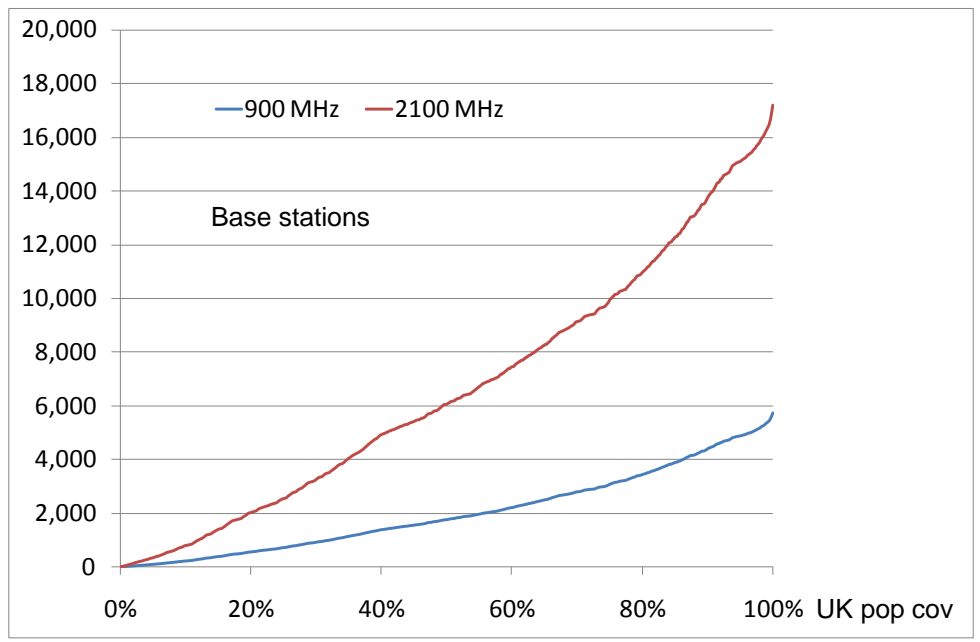
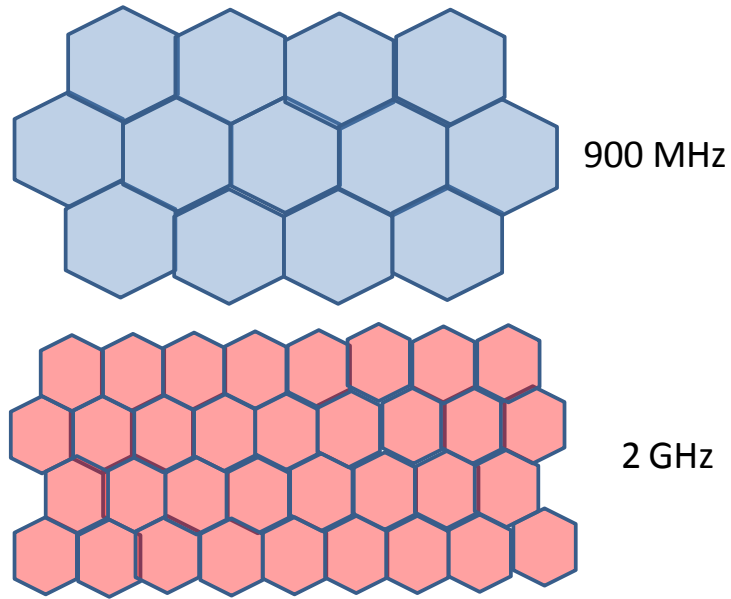


# How can Spectrum help?

- Wireless can provide a fast and cost-effective way to expand rural broadband coverage
- **But...**
  - Requires sufficient spectrum in the right frequency range
  - Efficient use of available spectrum
  - Appropriate technology and network configuration to optimise coverage, speed and throughput

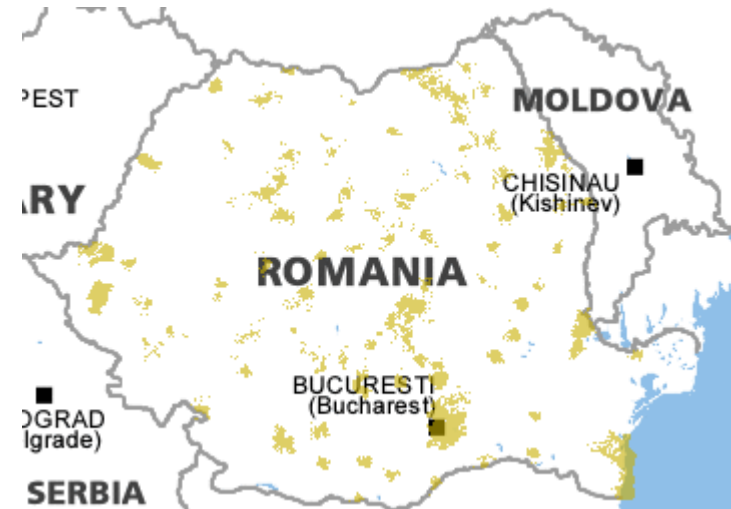
# Not all spectrum is equal...especially when it comes to Coverage

*Higher frequencies = more base stations = more cost*



# Hence 3G coverage has tended to lag behind established 2G voice networks

e.g. Romania 2G voice (900 MHz) and 3G data coverage (2 GHz)



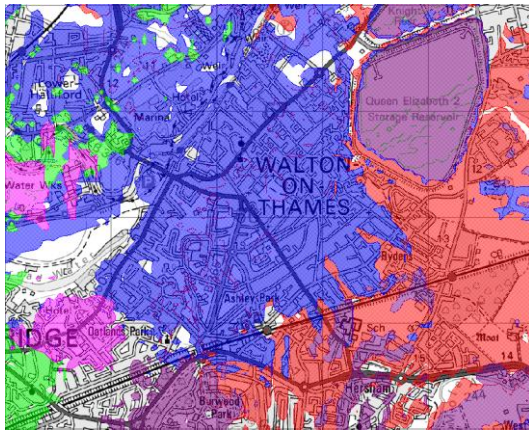
Source: GSM Association. Maps relate to Cosmote 2G network and Orange 3G network (March 2011)

Romanian networks are currently expanding coverage with re-farmed 900 MHz spectrum – Vodafone already at 90% after one year

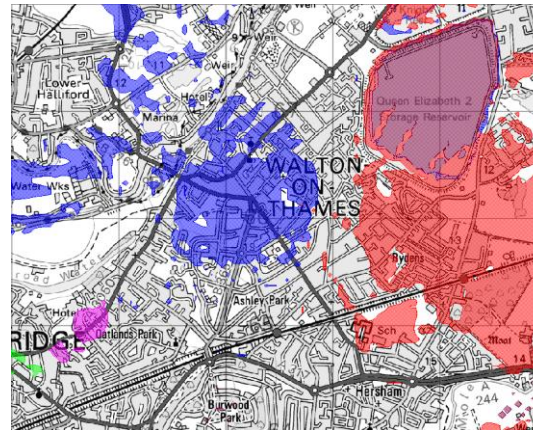
# Coverage Quality is also affected by frequency

Predicted coverage from 3G network base stations in Walton-on-Thames, UK

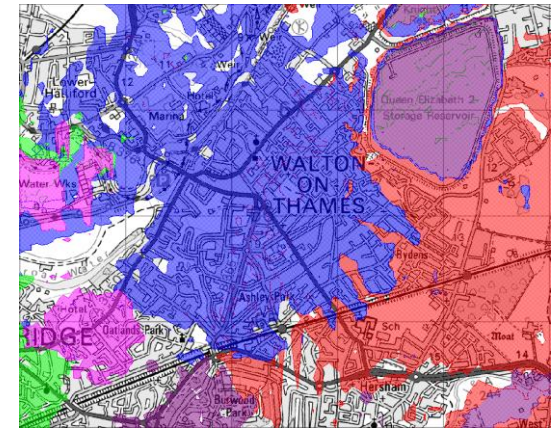
2 GHz OUTDOOR



2 GHz INDOOR

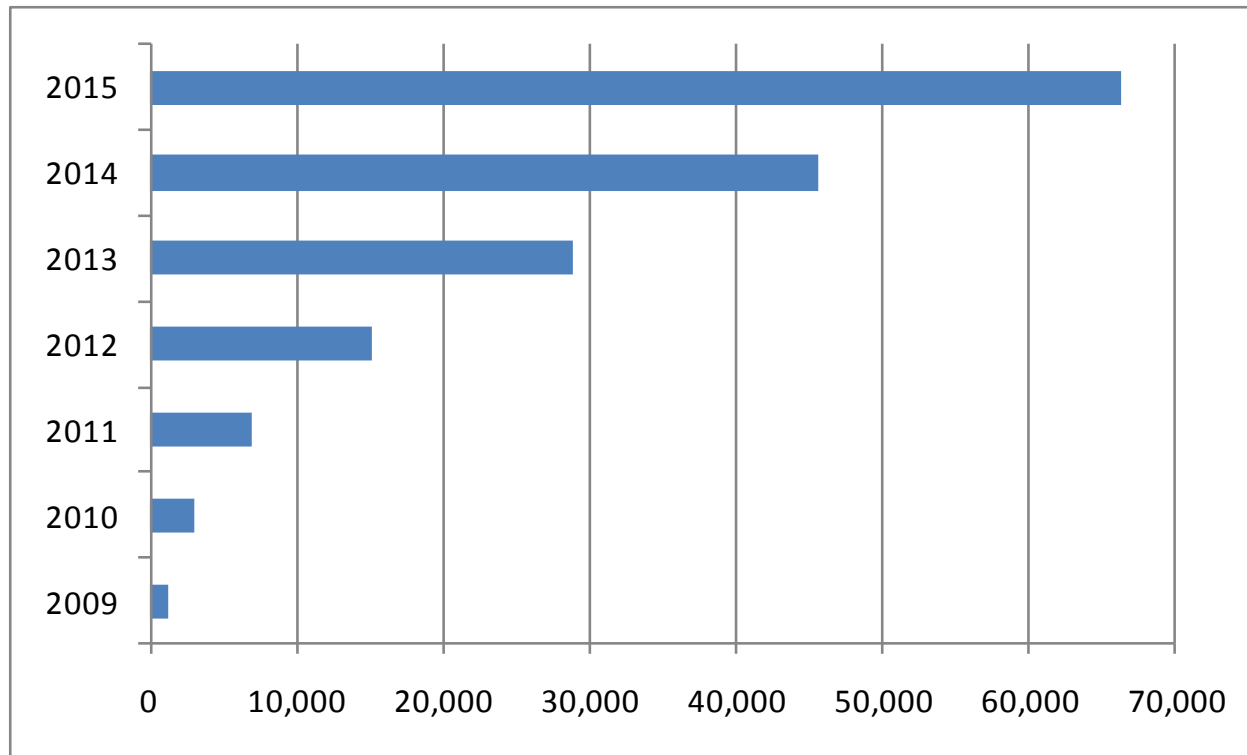


900 MHz INDOOR



Access to lower frequencies provides significantly better indoor coverage without need for more base stations

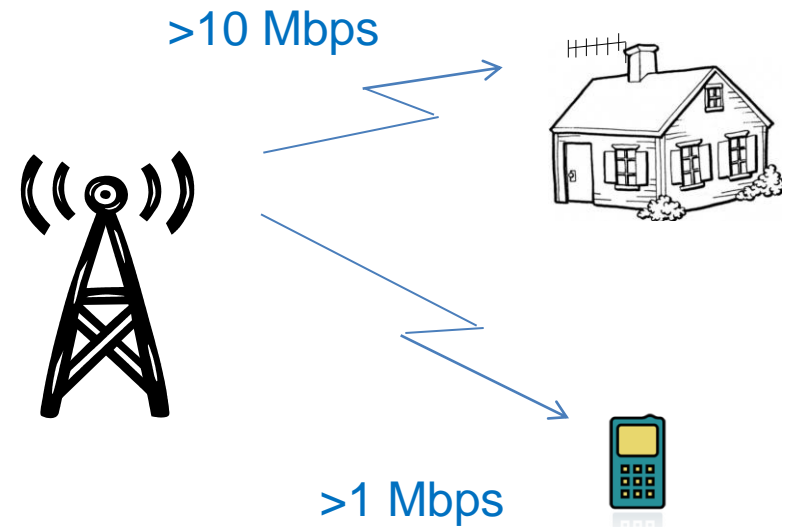
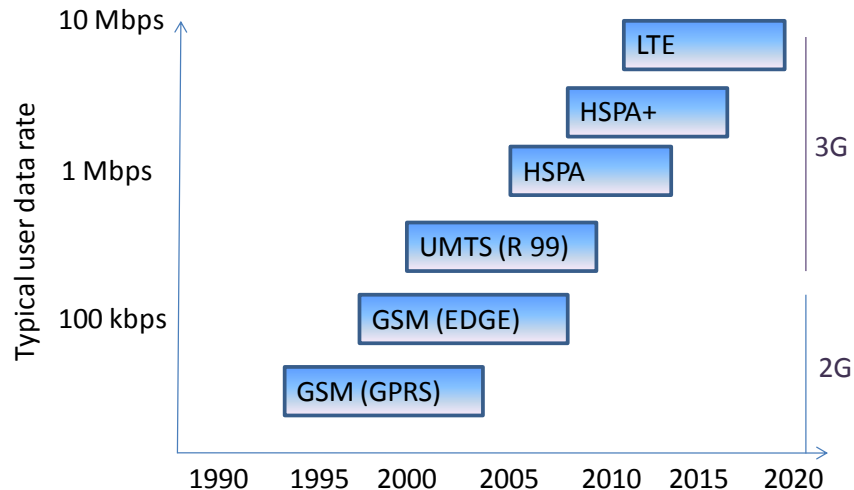
# Also need enough network capacity to meet future traffic demand...



Projected monthly mobile data traffic in Western Europe (Terabytes per Month)  
*Source: Cisco*

# Optimising Network Capacity

- Technology and network configuration can greatly influence network performance



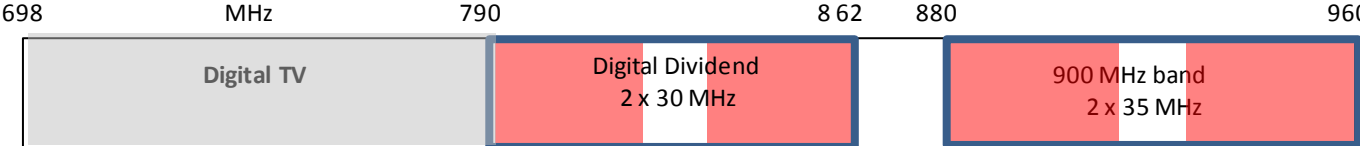


# New technology delivers more efficiency - but requires more bandwidth

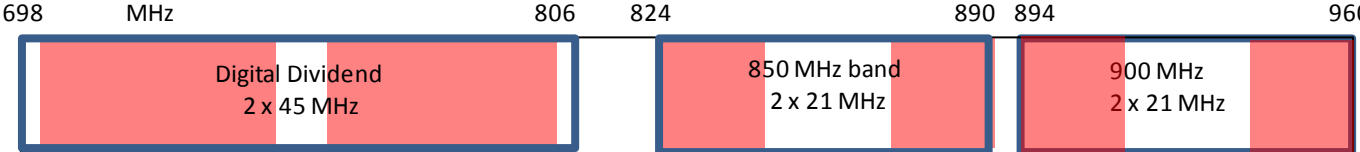
- 2 x 20 MHz per operator required to realise full potential of 4G “LTE” technology
- Implies at least **2 x 80 MHz** to support four operators – ideally below 1 GHz for rural coverage
- Also need to support legacy 2G / 3G devices at least in short to medium term
- Spectrum also sought for public safety and smart grids
- Currently only **2 x 35 MHz** available!

# Lack of spectrum may put Europe at a disadvantage

Mobile spectrum in Europe : **2 x 65 MHz** total, including digital dividend



Mobile spectrum in Asia Pacific : **2 x 87 MHz** total

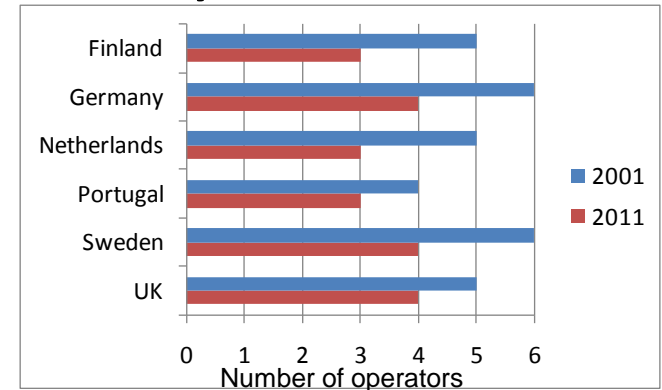


# Coping with the spectrum squeeze

- Make optimum use of existing and new technologies
- Identify new opportunities for spectrum release
  - e.g. Extension of digital dividend to 698 MHz
- Avoid excessive fragmentation of existing spectrum
  - Implies greater co-operation between competing networks
  - Promote initiatives like MVNOs to facilitate market entry as alternative to new spectrum licences

# Balancing competition and costs

- Too few networks may limit competition
- Too many networks may be economically inefficient
- Market consolidation in Europe and elsewhere suggests optimum number of networks with national coverage is 3 – 4
- Competition can be promoted and network costs reduced through initiatives such as:
  - MVNOs
  - National Roaming
  - Infrastructure sharing
  - Spectrum sharing



# Conclusions

- Good rural coverage & capacity depends on access to spectrum below 1 GHz
- Current spectrum is unlikely to be sufficient to meet long term needs (even with the digital dividend)
- Less competition and excessive network costs will lead to higher prices and poorer service
- Initiatives are required from both regulators and operators

# Actions Required

- Expedite 900 MHz refarming from 2G to 3G/4G (whilst reappportioning spectrum to address any imbalanced holdings)
- License existing digital dividend and identify further additional spectrum (e.g. 698-790 MHz)
- Adoption of more efficient technologies (HSPA+, LTE)
- Avoid excessive spectrum fragmentation (leading to higher network costs) when awarding network licences
- Encourage greater co-operation between network operators (e.g. infrastructure and spectrum sharing)
- Promote competition through MVNOs and national roaming

# Thank You!

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