

# Digital Communications KTN - Stuart Revell



## Networks and the new economy 9/11/10

Joint DCKTN & Cambridge Wireless Event

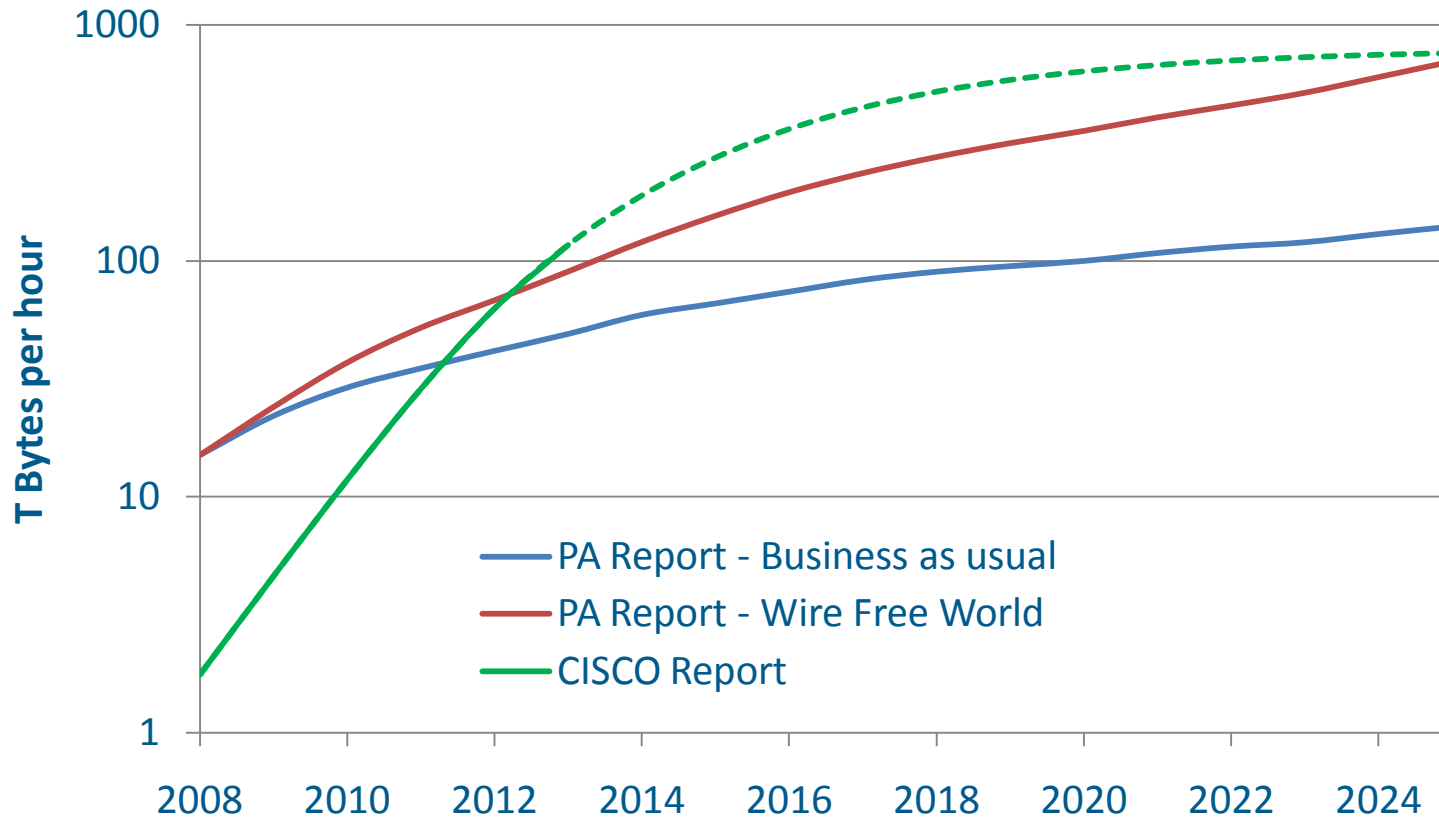
Knowledge  
Transfer  
Network

Digital  
Communications

# Agenda

- The third in a series of events on the ‘new economy’
  - Spectrum 24/9/09
  - Standards 25/3/10
  - Networks 9/11/10
- Mobile evolution and landscape
- Where are we today
- What can mobile broadband enable for the future
- Q&A
- Join the DCKTN [www.dcktn.org.uk](http://www.dcktn.org.uk)
- Join the Wireless technology & spectrum working group  
[stuart.revell@dcktn.org.uk](mailto:stuart.revell@dcktn.org.uk)

# UK exponential traffic growth



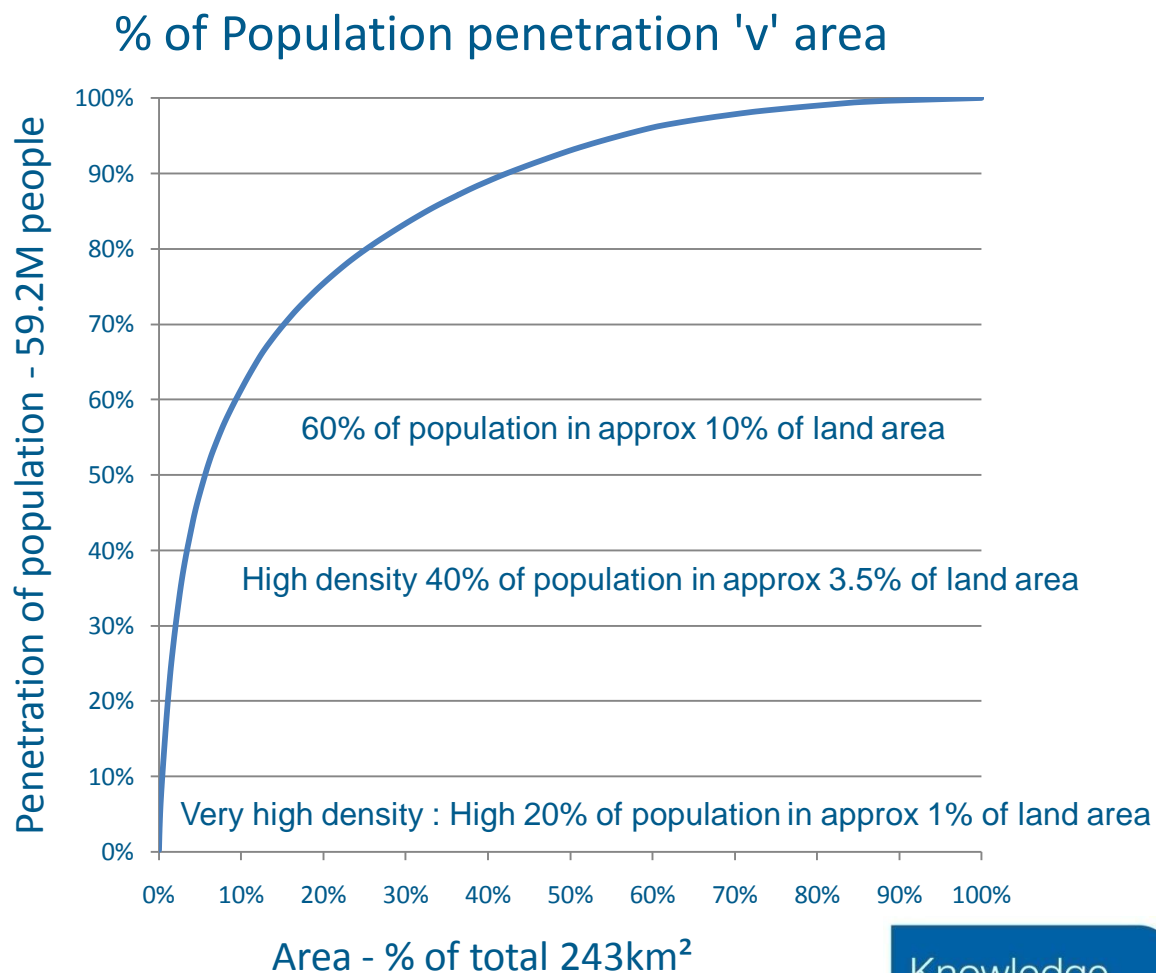
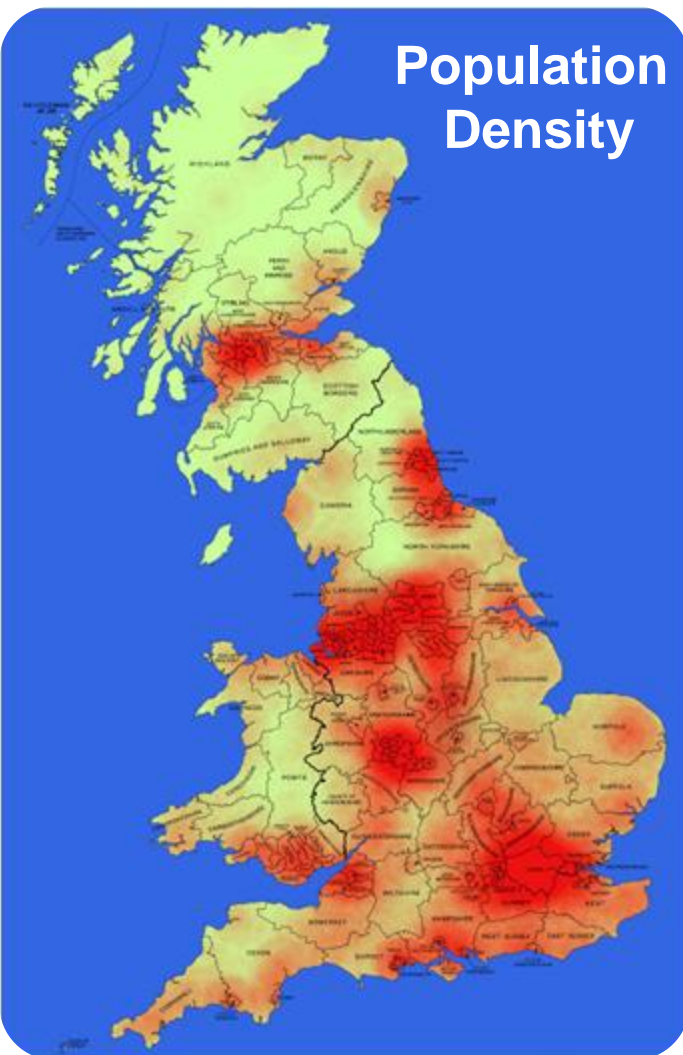
Source: DCKTN  
Paper Optimising  
Mobile Spectrum

Bandwidth/traffic growth and revenue gap increasing !

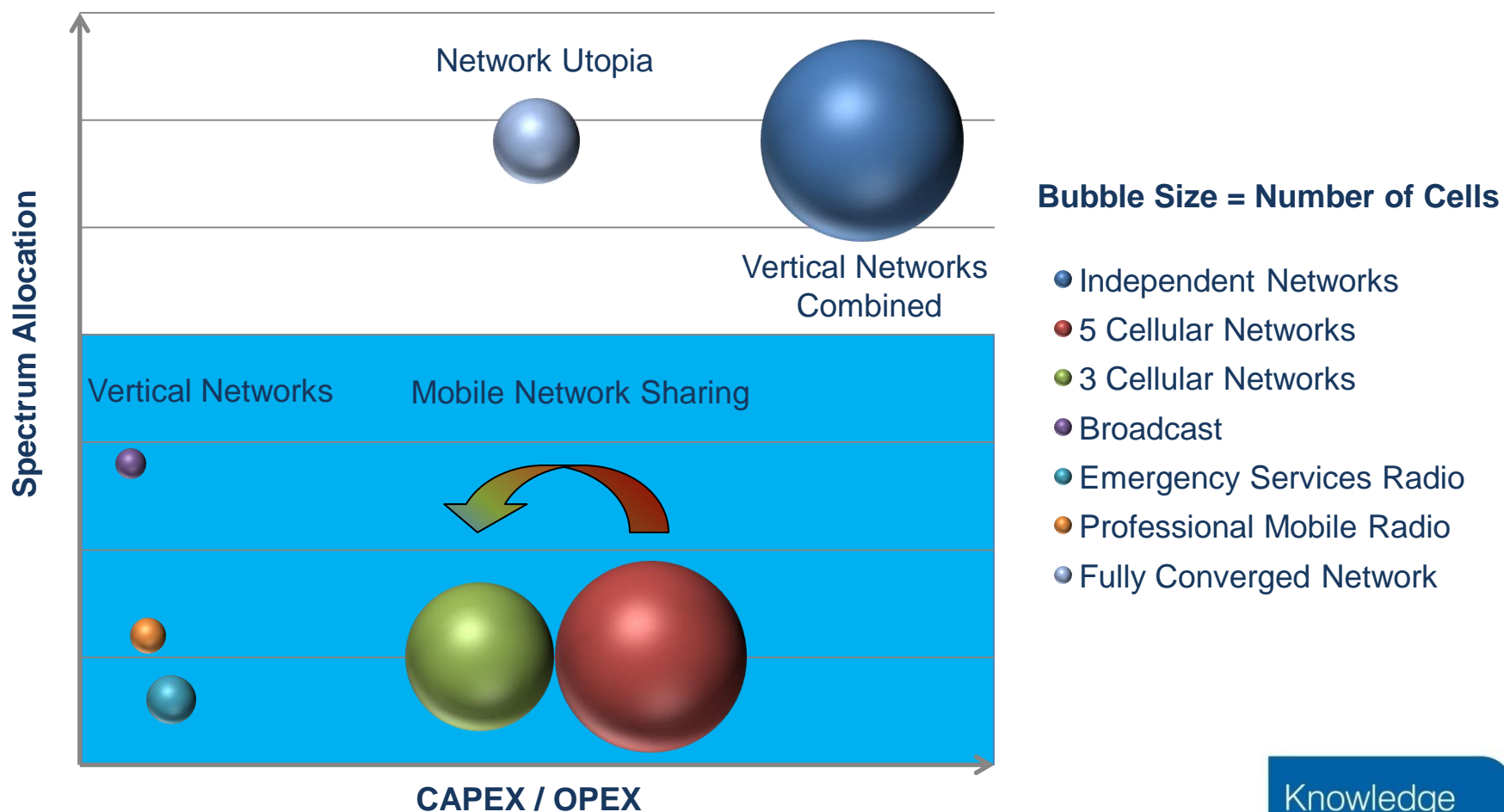
Knowledge  
Transfer  
Network

Digital  
Communications

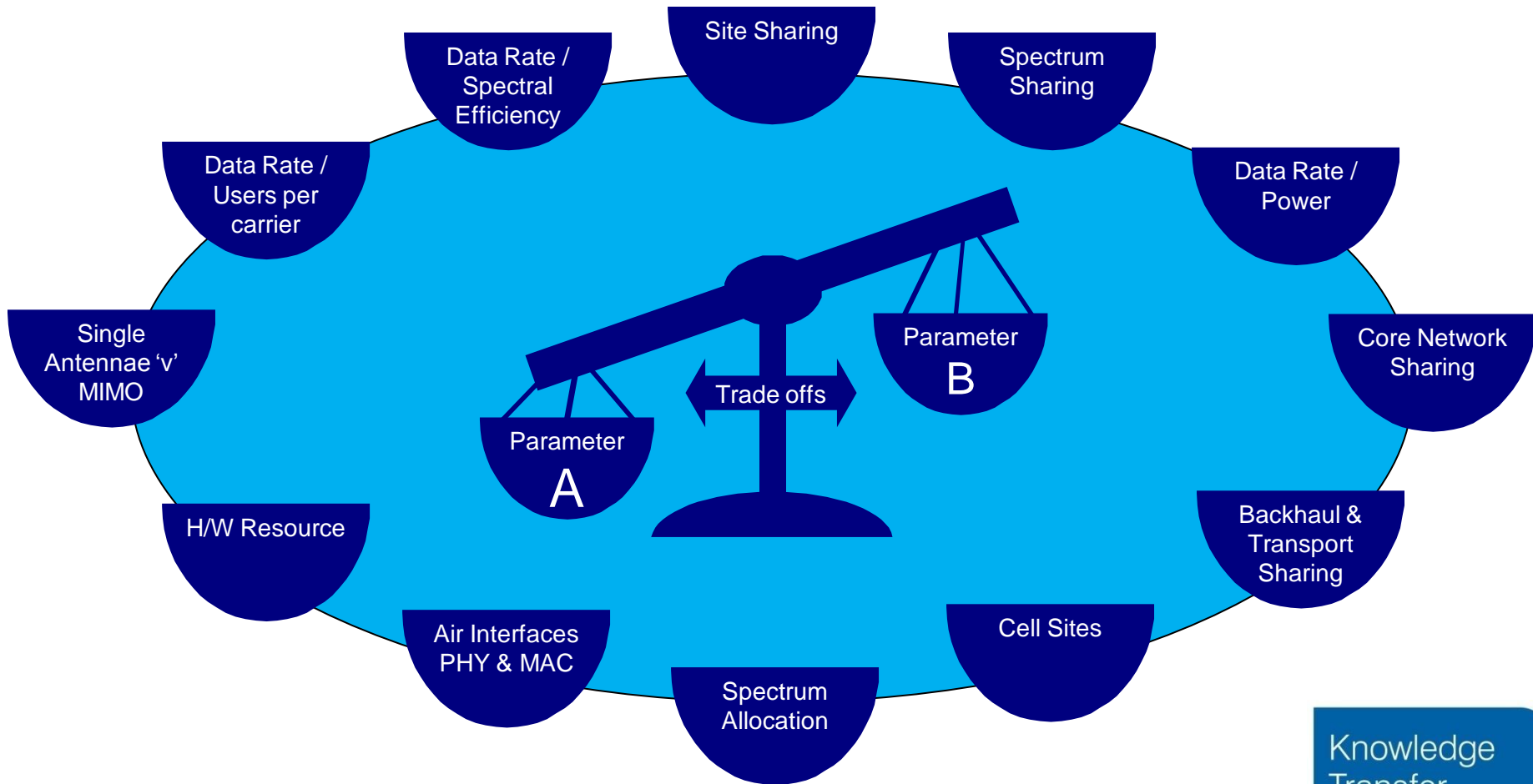
# Infrastructure challenges



# Sharing and convergence



# Exponential traffic growth / complexity challenges - How can we do more for less?






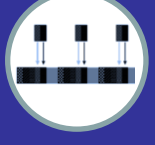


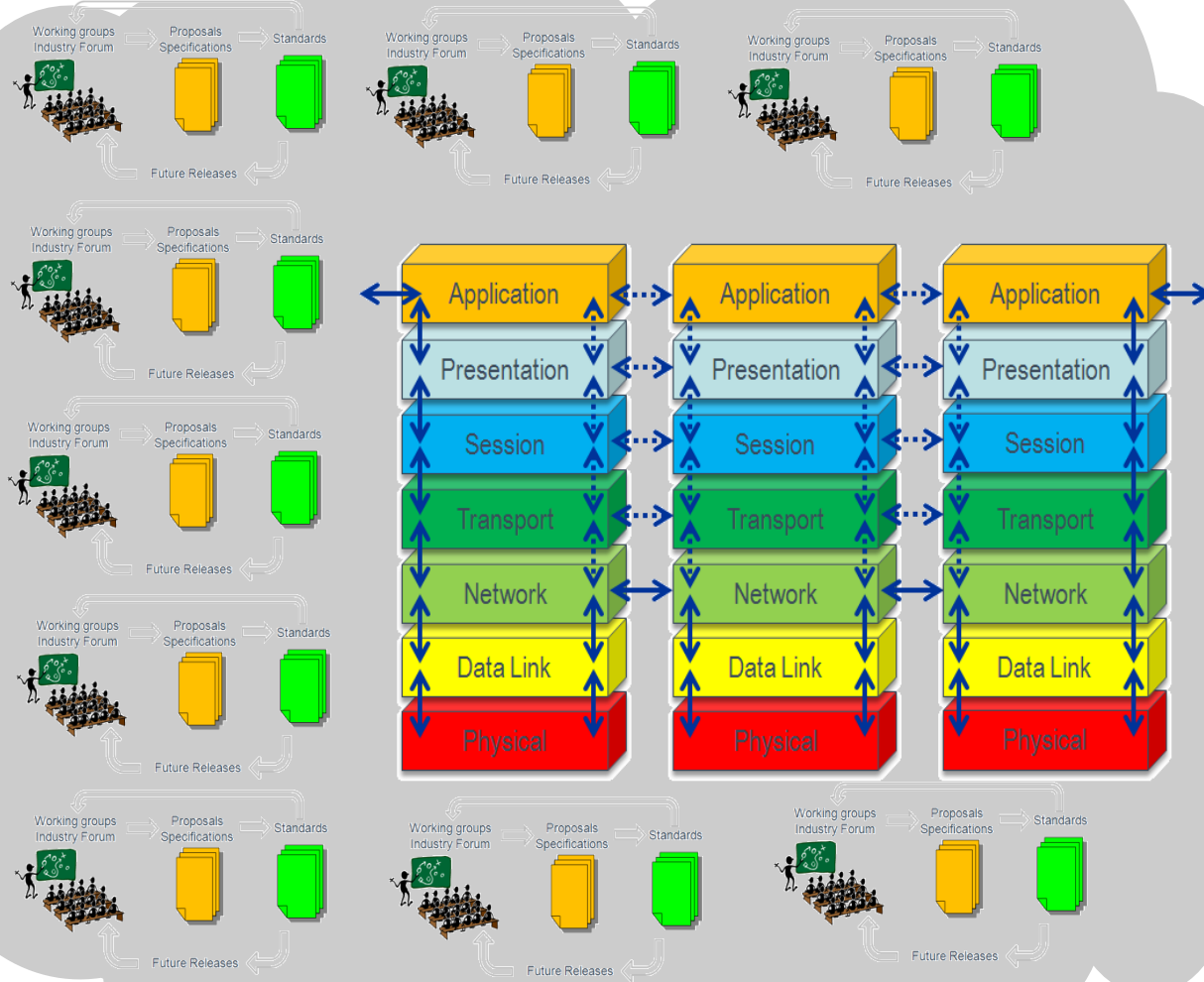
## What can we trade and/or share ?

Knowledge  
Transfer  
Network

Digital  
Communications

# The standards process – fragmented / vertical industry driven

-  **DTV**
-  **Wireless**
-  **Satellite**
-  **xDSL**
-  **PON  
Access  
Node**
-  **HFC  
Cable**

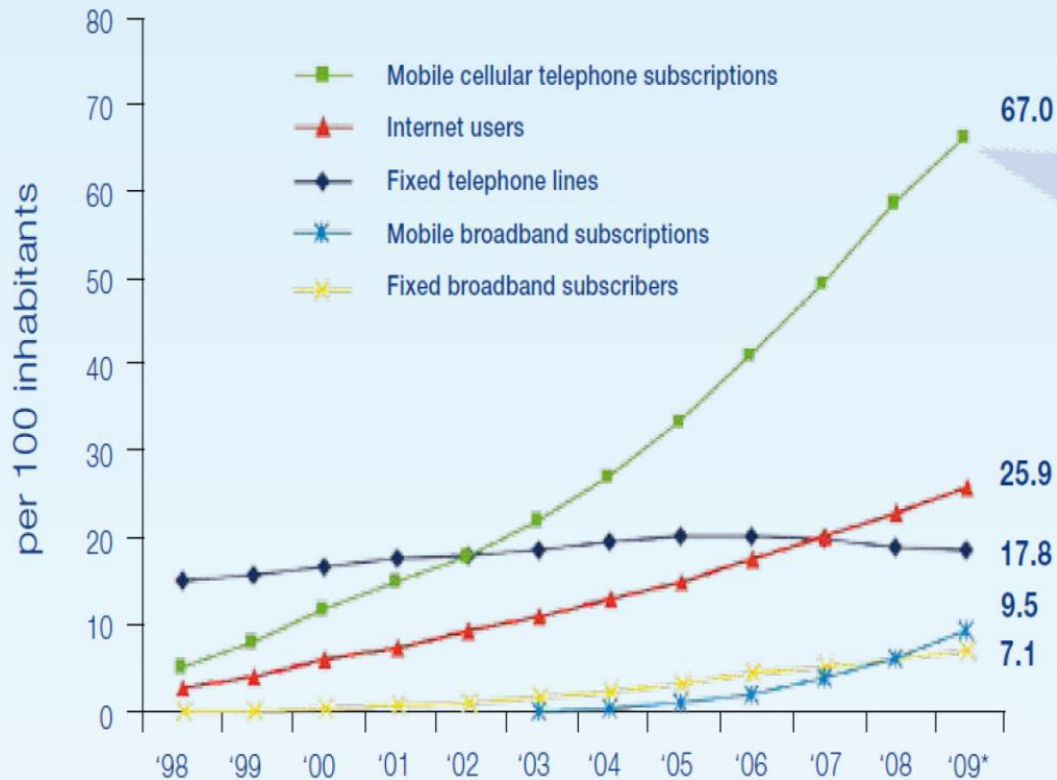


Knowledge  
Transfer  
Network

Digital  
Communications

# Mobile penetration today

## A decade of ICT growth driven by mobile technologies



An estimated 4.6 bn subscriptions globally by the end of 2009

Europe  
approx  
120%  
penetration

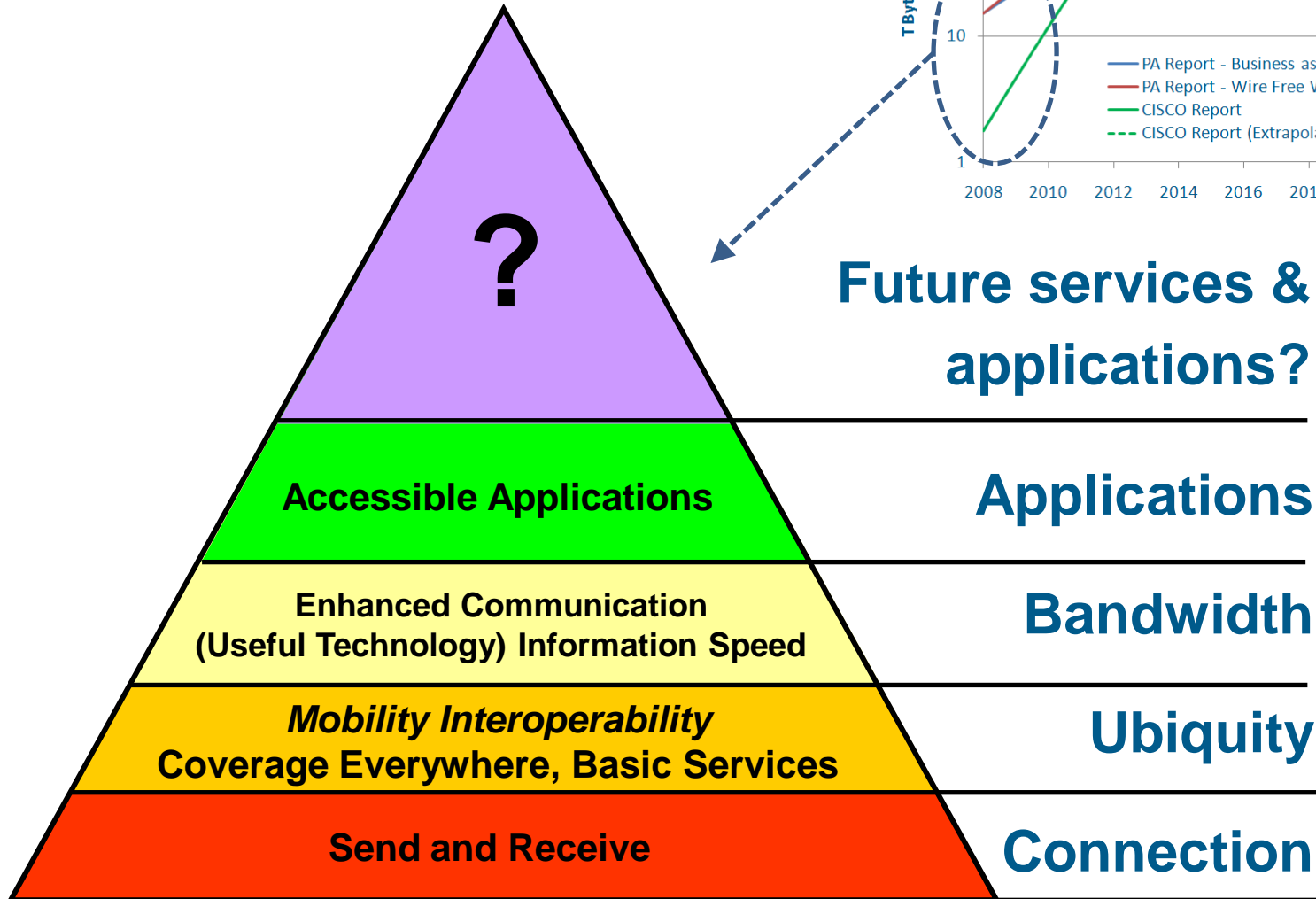
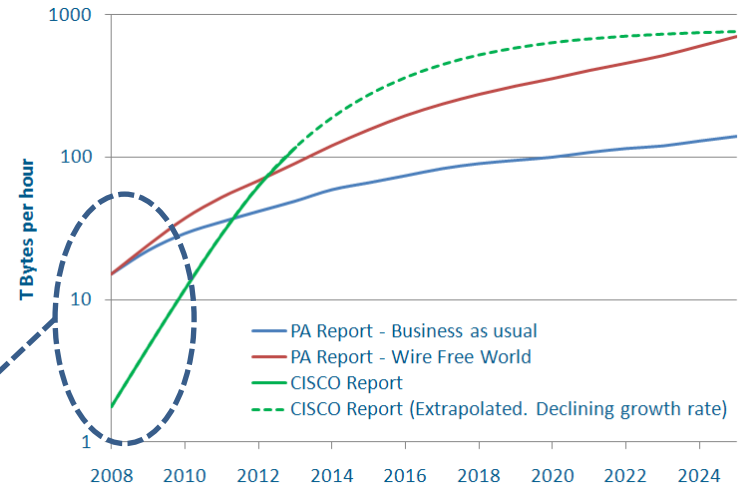
Source: ITU World Telecommunication/ICT Indicators Database.

\* Estimates.

Knowledge  
Transfer  
Network

Digital  
Communications

# How did we get here? *Maslow 2.0 (for comms)*



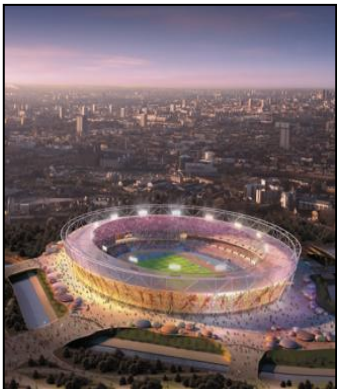
# Wireless enabling the connected consumer



Tasks  
Gaming  
Financial  
Entertainment  
Calendar  
Security  
Social  
Media  
Music



News  
Video  
Location  
Information  
Messaging  
Networking  
Contacts  
Safety  
Photo



6.5B Apple downloads to date, 1.4B Android  
....and you can even make a telephone call

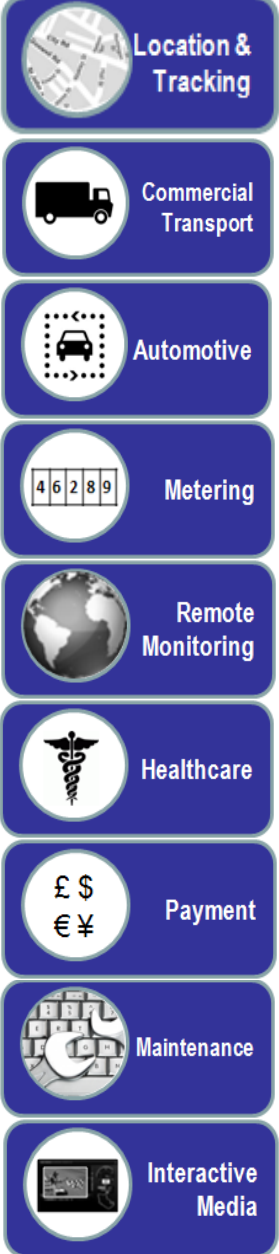
Photo source:  
CSR plc and UKTI

Knowledge  
Transfer  
Network

Digital  
Communications

# Wireless M2M and 'Internet of things' eco-system

## Enabling verticals / technologies



## Enabling horizontals Mobile / WAN / LAN / PAN

Platforms  
E2E services & cross  
'Verticals' operation

Virtual overlay systems  
- MVNO

Mobile & fixed  
networks  
Private & Public

Knowledge  
Transfer  
Network

Digital  
Communications

# Wireless enabling the future



- Transport will account for 15% of greenhouse gas by 2010
- 2% of cars shipped in 2010 will have embedded mobile
- Estimated to grow to 1B by 2020
- Mobile could reduce green house emissions by 3.5% by 2020



- Smart meters/ grids
- Utilities investing 200B\$ by 2015
- Smart grids can save 60B\$ annually
- UK 26 Million homes connected
- Self managed systems predicting 10% energy savings



- Ageing population
- Living with long term conditions
- Global spend 7T\$
- Developed countries 15% GDP
- Predicted to double over the next 30 years

Source: GSMA Association: <http://www.youtube.com/user/MobileWorldLive#p/u/2/8EtjAFVPAu8>

Knowledge  
Transfer  
Network

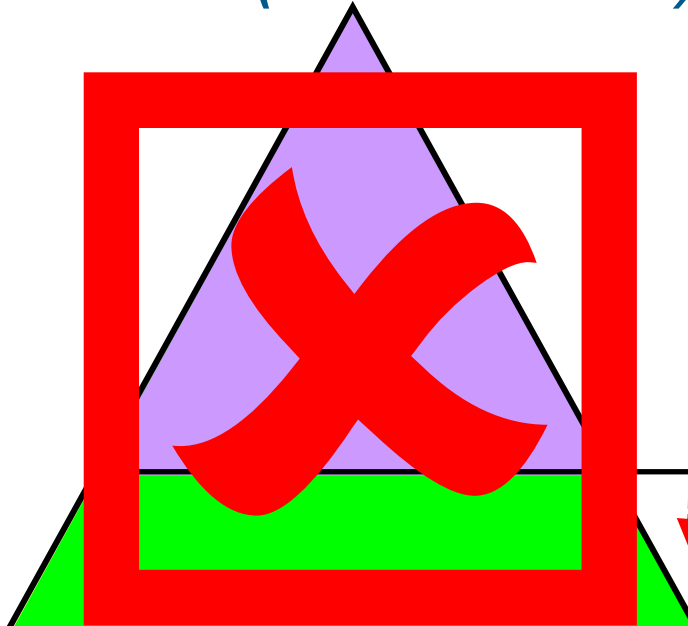
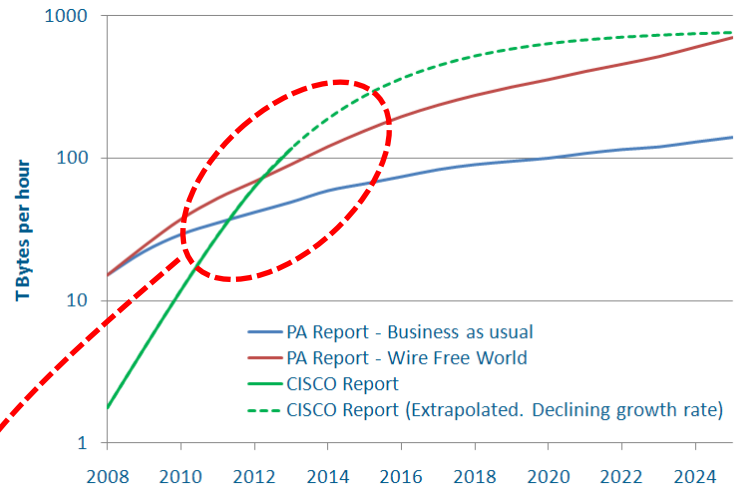
Digital  
Communications

# Wireless evolution – the future

- 1995 – 5 Million mobile connections
- 2010 – 5 Billion mobile connections
- 2020 – 50 Billion mobile connections (GSMA)
- 2020 – 7 Trillion wireless connected ‘things’ (WWRF)
- 2010 – Industry turning point....**Something’s got to give !**
  - Consumer awareness
  - Realisation of network dimensioning



# Next generation: Applications and needs *Maslow 2.0 (for comms)*



**Future services & applications?**

**Applications**

**Bandwidth**

**Ubiquity**

**Connection**

**Major problem**

Knowledge  
Transfer  
Network

Digital  
Communications

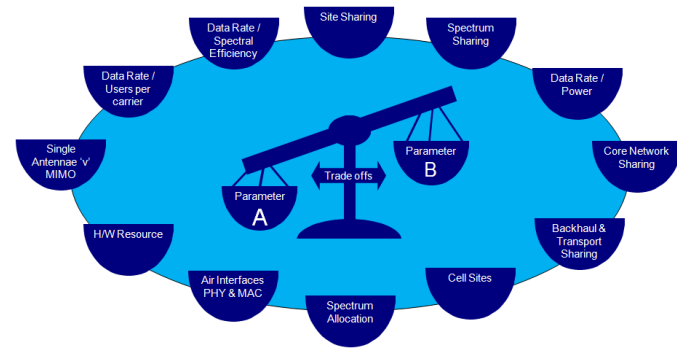
# Options

- More Spectrum, slow process to release and expensive, lack of good spectrum !
- Restrict market / tiered pricing
- Increase network and spectrum efficiency
- Improve user equipment / application performance
- Significant innovation steps required, address TCO

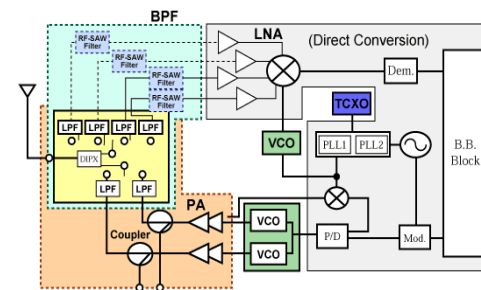
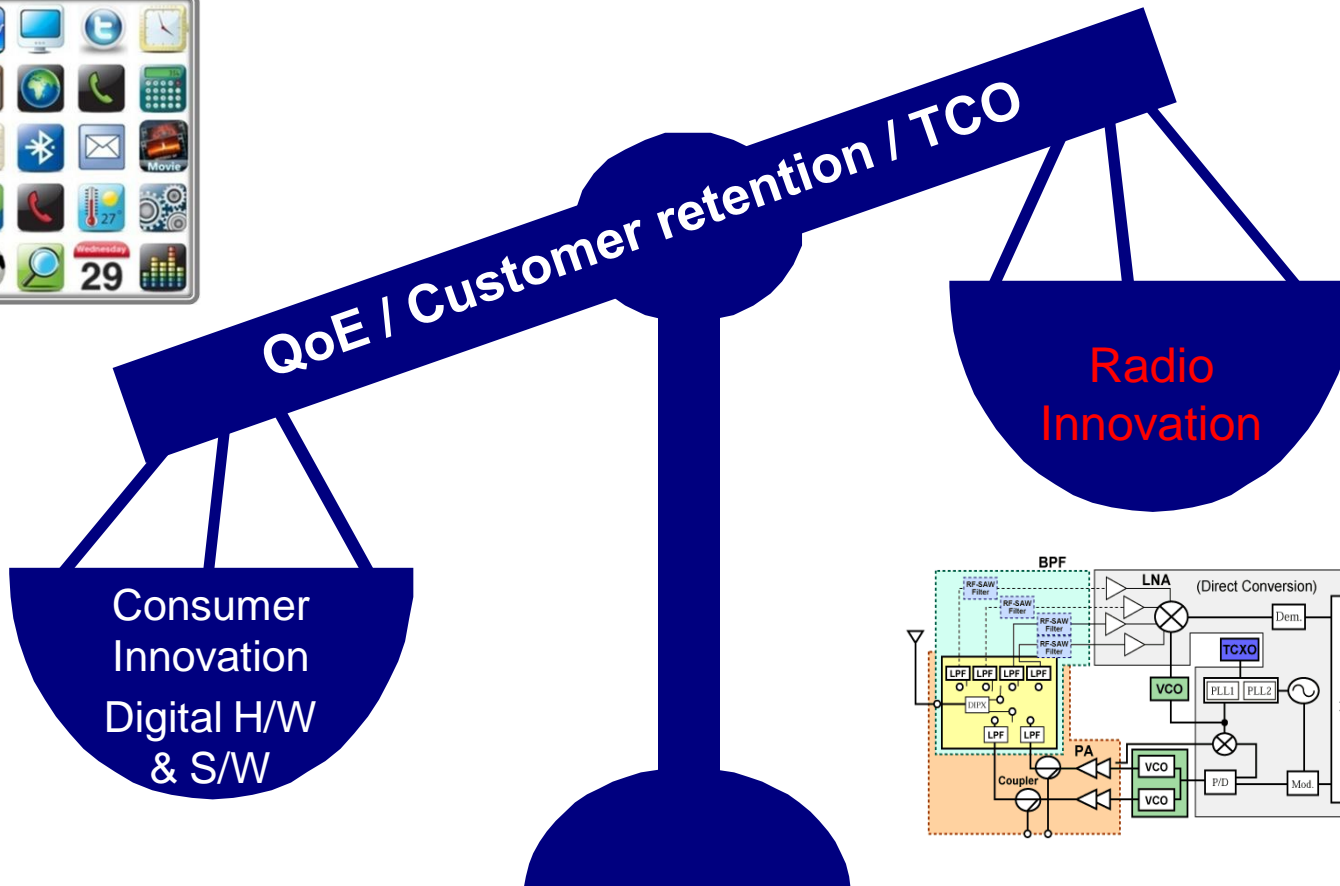


Drive efficiency  
improvements

# Lack of radio innovation will limit the opportunities



Spectrum and the new economy 24/9/10



Knowledge Transfer Network

Digital Communications

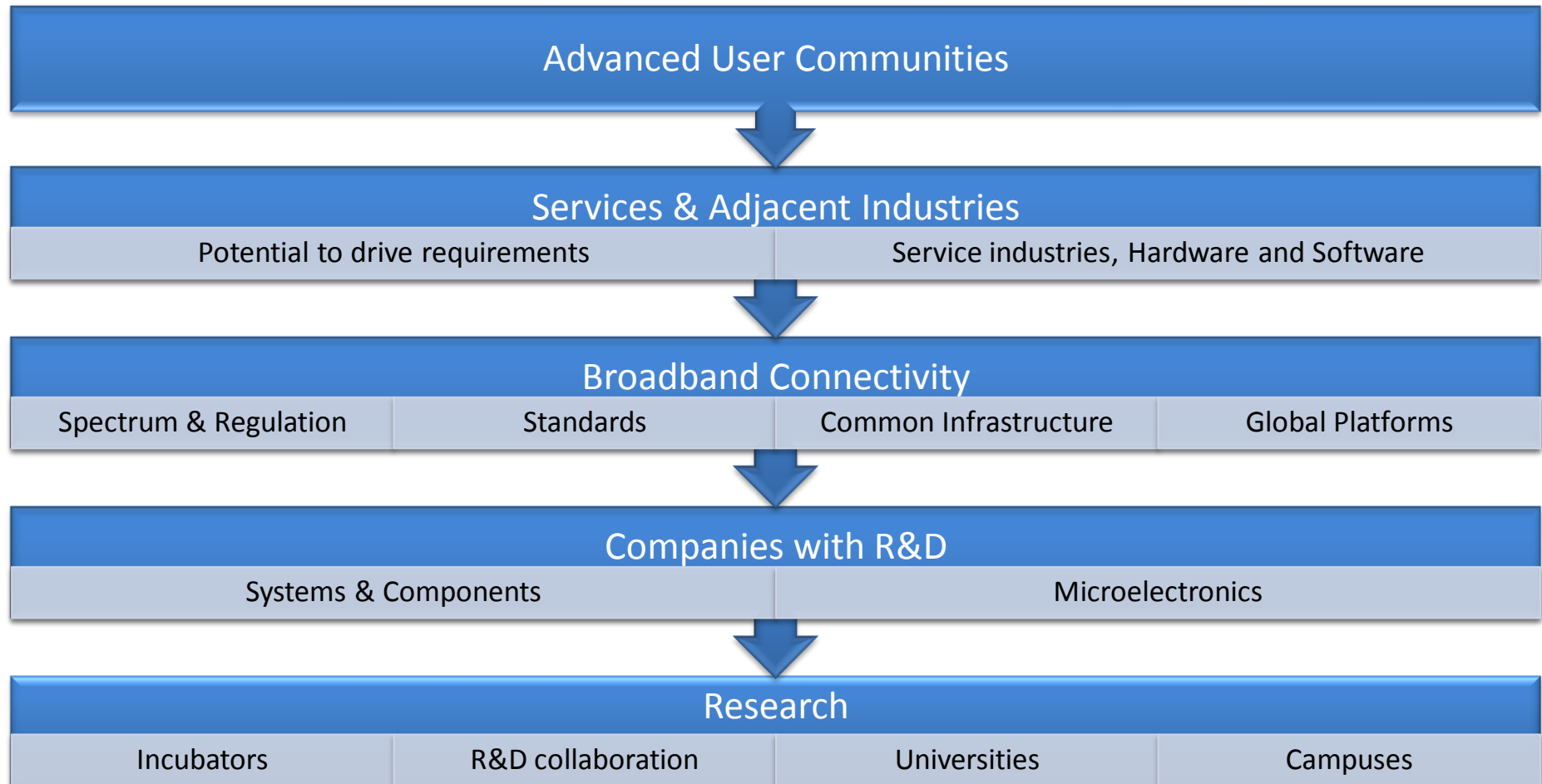
# Radio efficiency improvements

- ✓ Radio efficiency improvements are critical
- ✓ RF front end technologies need step improvement to realise benefits of future air interface evolution and higher bandwidth spectrum allocation
  - ✓ Transceiver TX EVM and RX sensitivity
  - ✓ Cognitive radio technologies – maximising use of spectrum
  - ✓ Antennae efficiency
  - ✓ Switch losses
  - ✓ Smart multiple radio technologies
- ✓ Radio design needs to be considered at the same level as form factor, aesthetics and display

# ICT / network efficiency improvements

- ✓ Small gains in E2E network efficiency and optimisation of applications have a huge impact on total costs / performance:
  - ✓ Spectrum efficiency, dynamic radio planning & management
  - ✓ Number of nodes, cell size optimisation and disruptive topologies
  - ✓ Bandwidth optimisation and efficiency
  - ✓ Hybrid broadband – true convergence
  - ✓ Application efficiency
  - ✓ Energy
- ✓ DCKTN is facilitating collaboration within the UK eco-system to address the end to end system and user platform challenges.

# UK eco-system Opportunity -> Global exploitation



## DCKTN : Leveraging the value chain

Knowledge  
Transfer  
Network

Digital  
Communications

# Agenda

- The third in a series of events on the ‘new economy’
  - Spectrum 24/9/09
  - Standards 25/3/10
  - Networks 9/11/10
- Mobile evolution and landscape
- Where are we today
- What can mobile broadband enable for the future
- Q&A
- Join the DCKTN [www.dcktn.org.uk](http://www.dcktn.org.uk)
- Join the Wireless technology & spectrum working group  
[stuart.revell@dcktn.org.uk](mailto:stuart.revell@dcktn.org.uk)