



IMPACT OF GROWING DEMAND AND INCREASED TRAFFIC ON NETWORKS

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BEYOND VOICE – THE TELECOM MARKET IS REDEFINING ITSELF

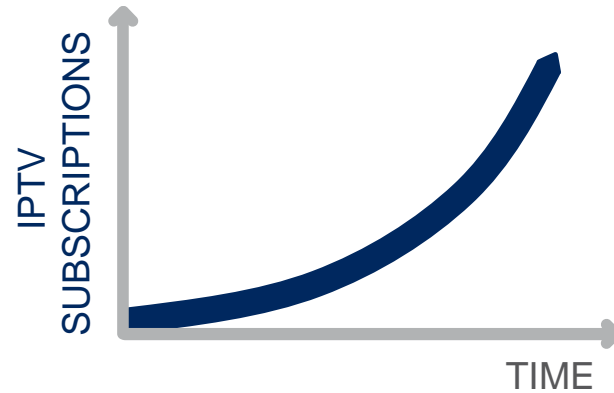
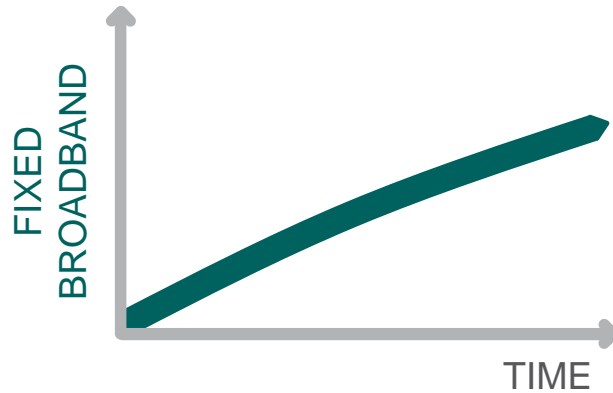
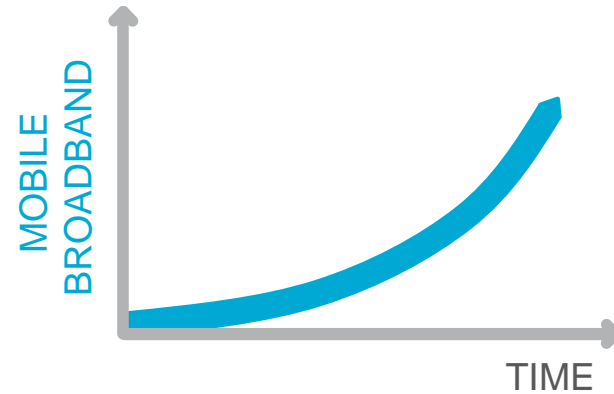
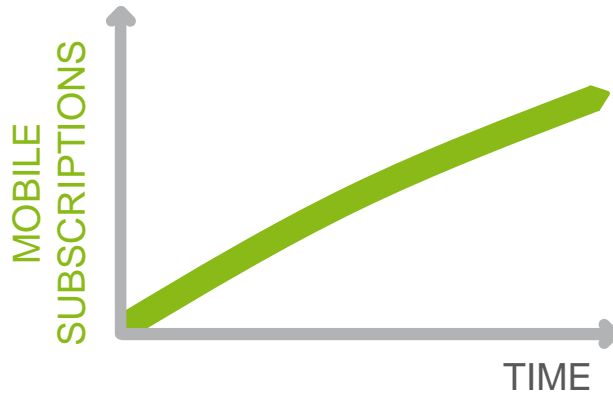


BROADBAND BENEFITS SOCIETY

INDIVIDUALS, BUSINESSES, & GOVERNMENTS



TELECOM IS A GLOBAL GROWTH INDUSTRY



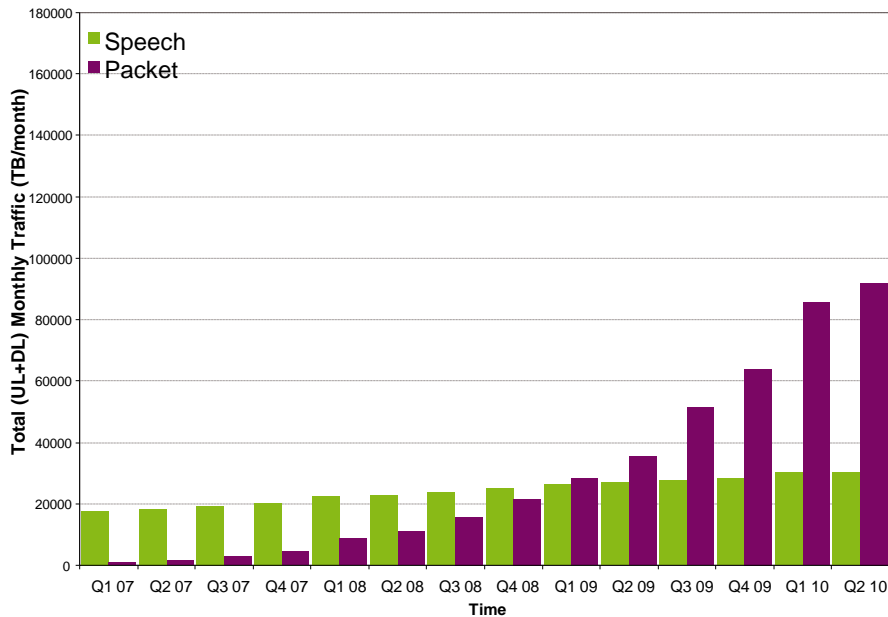
[AND A GROWTH ENGINE FOR PEOPLE, ENTERPRISES AND SOCIETY]

MOBILE VOICE AND DATA TRAFFIC

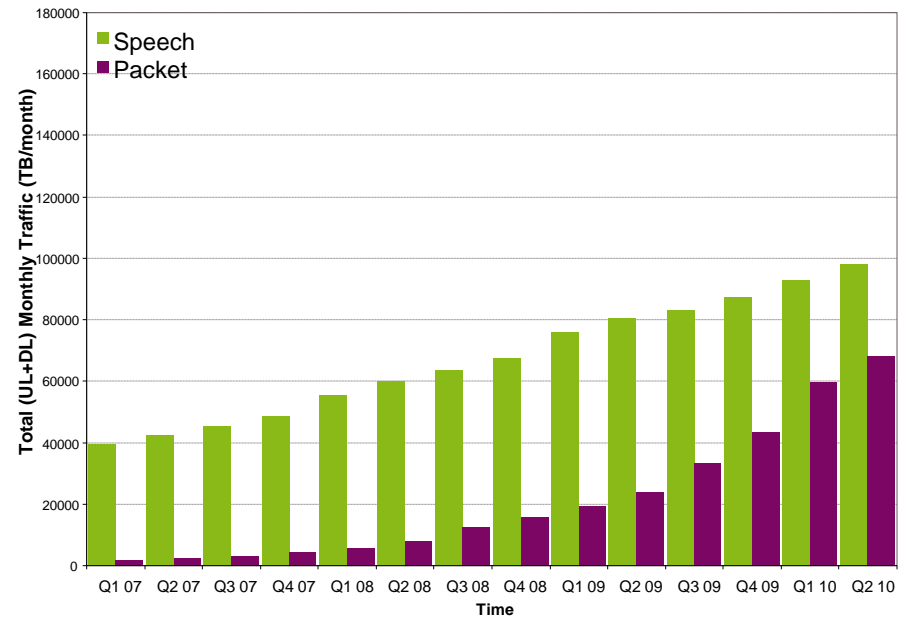
EMEA

APAC

Total UL+DL Monthly Traffic (GSM, WCDMA & CDMA)



Total UL+DL Monthly Traffic (GSM, WCDMA & CDMA)



↑
Q1 2009

↑
Q2 2010

Source: NetQB (measurements in real NW) and internal estimates

DATA HAS VALUE

- › Smartphone sales accounted for 19% of volumes and ~50% of value in Q2
- › Mobile data now totals 32% of ARPU in developed markets and 22% in emerging
- › Overall, data is 27% of ARPU compared to 24% last year.

NEW DATA FOR 2009 FROM OFCOM:

- › UK mobile call volumes increased by 7% in 2009
- › Text messages increased by 25%
- › Data volumes increased by 68% during 2009
- › Data volumes over mobile networks increased by 240%

BOTTLENECKS

› Access

› Backhaul

› Core

FIXED ACCESS

- › Copper delivery (twisted pair)
 - Good for up to 50Mbps over short distances
 - Potential for bonding where spare pairs available

- › Fibre to the premise
 - Effectively *infinite* capacity in the fibre itself
 - › Then choose from GPON, WDM PON, Point to point for 100Mbps+
 - › Low opex
 - › No street electronics
 - › Investment in a long term legacy for the nation
 - › Good for business and residential

- › Hybrid fibre coax
 - Underlying physical media good for 3-4Gbps
 - › Electronics currently at 200Mbps

Technology not a constraint

MOBILE ACCESS

> 3G/HSPA

- UK networks currently deliver up to 7.2Mbps using
- Most new networks being rolled out at 21Mbps
- Contracting to deliver over 80Mbps

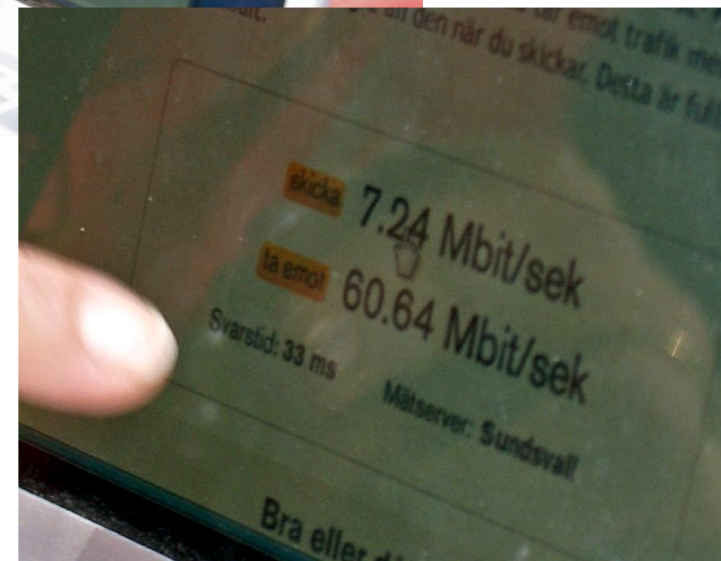
> LTE

- Shipping 150Mbps
- 150Mbps in service
- 1.2Gbps prototype demonstrated

Technology not a constraint

MOBILE BROADBAND - LTE

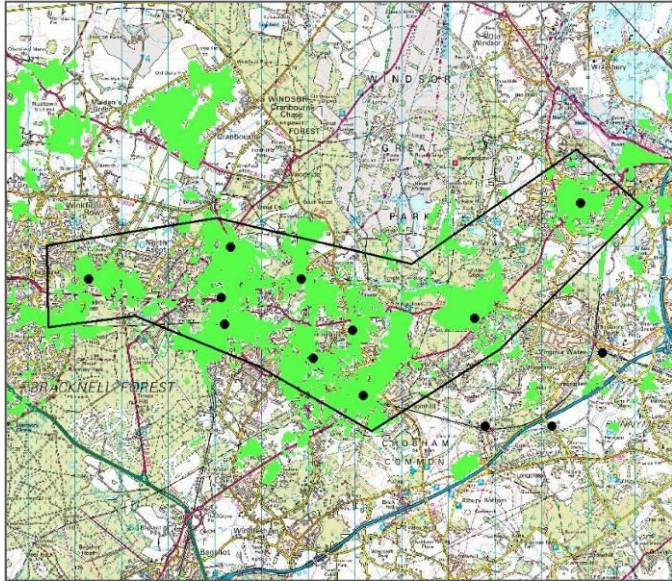
› up to 150Mbps in service now



FIXED WIRELESS TERMINAL

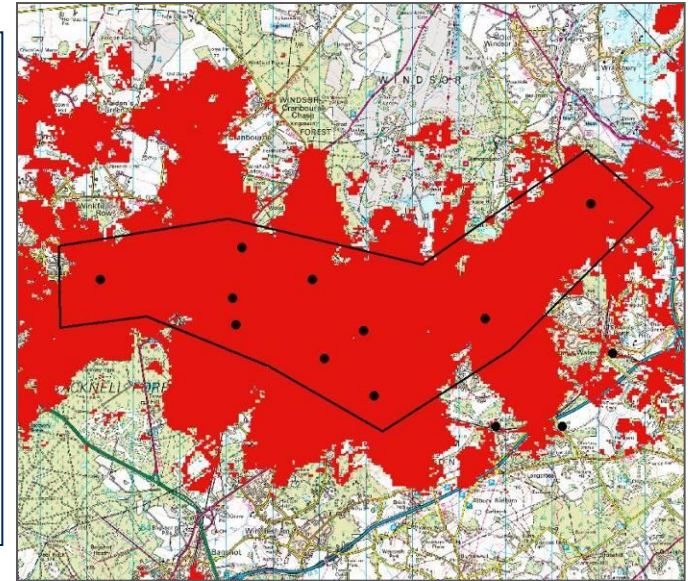
CHANGES HOW WE THINK ABOUT MOBILE BROADBAND

“Mobile Broadband”



- Study for UK MNO
- Existing 3G coverage area to west of M25
- Analysis of probability for a minimum 2Mbps DL service using today's technologies

“Fixed Wireless Broadband”



Potential to deliver Wireless Broadband from existing MNOs by simply changing the terminal types – *using external antennas changes the game again*

NETWORK QUALITY MATTERS



iPhone 3G S

The fastest, most powerful iPhone yet.

Outstanding phone. Outstanding network.

Get the full iPhone experience from a network you can rely on

Visit vodafone.co.uk/iphone or go to your local Vodafone store

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Operators are responding

BACKHAUL

› Fibre

- Effectively infinite capacity
- Limited number of suppliers

› Microwave

- Currently delivering at almost 1Gbps
- Quick to deploy
- Also offered as a managed service

CORE

› Transmission

- SDH/Packet in combination with WDM delivers managed, protected data
 - › Currently delivering systems carrying 960Gbps per fibre

› Routers

- Very high capacity devices available
- Care needs to be taken to avoid using routers unnecessarily where routes are largely static and are managed manually
 - › Transmission equipment is cheaper

› Session management

- Challenges being overcome
 - › Total number of concurrent sessions
 - › Signalling capacity around session joins and leaves
 - › DPI capacity

SUMMARY

- › There is an insatiable consumer desire for bandwidth
- › Broadband delivers wide economic and social benefit
- › The technology can easily deliver
- › The technology hasn't increased in price with performance
- › Operators are responding to consumer demand by improving capacity and coverage
- › Operators should be able to charge more to those consumers with very high capacity needs
- › Meanwhile, ...I predict that the capacity of networks will continue to grow significantly



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