



# Stagnation of deployment of 4G and beyond?

## An Internet Perspective

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# What is 4G?

Quote from Wikipedia (24 August 2007):

4G will be a **fully IP-based** integrated *system of systems* and *network of networks* achieved after the **convergence of wired and wireless networks** as well as **computer, consumer electronics, communication technology**, and several other convergences that will be capable of providing **100 Mbit/s and 1 Gbit/s**, respectively, in outdoor and indoor environments with **end-to-end quality of service** and high **security**, offering **any kind of services anytime, anywhere**, at **affordable cost and one billing**.

Young Kyun, Kim; Prasad, Ramjee. *4G Roadmap and Emerging Communication Technologies*. [Artech House](#), pp 12-13. [ISBN 1-58053-931-9](#).



# What is 4G? — Some More Focus

Application

- ▶ IP-based (new) Services and Applications
  - Voice, video, data, multimedia streaming

Transport

- ▶ All-IP (IPv6)
  - Mobility, handoff, roaming
  - QoS end-to-end (like always)

Network

Link

- ▶ Support for heterogeneous link layers

Physical

- ▶ New radio technologies; higher data rates
- ▶ Yet another marketing term?



# Where are we with 3G?

## ▶ 3GPP Timeline (Specs)

- Release 99 (Q1/2000): New radios, circuit-switched voice + video, data
- Release 4 (Q2/2001): All-IP core
- Release 5 (Q1/2002): HSDPA, IMS using SIP-based multimedia
- Release 6 (Q4/2004): HSUPA, WLAN, MBMS, more SIP services
- Release 7 (mid 2007): fixed networks, QoS, more services
  
- Release 8 (expected 2009): All-IP 4G network



# Where are we with 3G?

## ▶ 3GPP Timeline (Specs)

- Release 99 (Q1/2000): This is what most of us use and enjoy today:
- Release 4 (Q2/2001):
  - Circuit-switched voice and video
- Release 5 (Q1/2002):
  - Text and multimedia messaging
- Release 6 (Q4/2004):
  - Various 'value-added' services
- Release 7 (mid 2007):
  - Fast IP access (well, often high RTT)
  - + whatever you can run on top of IP
- Release 8 (expected 2009): All-IP 4G network

## ▶ Deployments

- Today: 3.5G: 3G + fast IP access
- Beyond 3.5G yet to come
- Large areas still see only GSM (i

### Some 3G roadblocks:

- Complexity
- Coverage
- Cost (providers and users)
- Capability (users and devices)



# People and Demands: Two Examples

- ▶ Customers in industrialized countries
  - Convenience: can make phone calls and maybe send text messages
  - Aware/advanced: roughly know their phones, configure and use services
  - Tech-savvy: create their own service portfolio (choose, install, build)
  - Most are cost-conscious: **do not want to pay a premium for the sake of 4G**
  - Recent history: VoIP hard to sell on the basis of technology only
  
- ▶ Third world countries
  - Need cheap devices and coverage for basic services first
  - Large parts of the population thus **do not have an immediate 4G demand**



# Some Hypotheses

**There is no deployment stagnation for 4G technologies...**

Application

- ▶ New applications and services appear all the time
  - Media streaming, IP telephony, data, ...
  - Peer-to-peer and provider-based

**...it is called *Internet* and innovation continues as we speak...**

Network

- ▶ We have IP everywhere (even though mostly IPv4)
  - Overprovisioning + local prioritization support QoS
  - Various approaches to mobility

**...this deployment just does not happen in the controlled way  
the established operators would like to see (“one=my bill”)**

Physical

- Data rates are getting higher
- Wired and wireless technologies are part of the same network



# MobiArch Perspectives

- ▶ Mobility management is one big issue
  - High bar: seamlessness
  - Solved usually within a provider and/or within a link layer technology
  - But operator-based mobility management may be seen too limiting
  - And cross-link-layer mobility is considered important
  
- ▶ Lower the bar: seamlessness only where really needed
  - Stop trying to mimic fixed network reliability in the mobile domain
  - Needs to go all the way up to the applications and user interfaces
  
- ▶ Reasonable roles for the operators
  - Supportive functions instead of full control for mobility and applications
  
- ▶ End user and device empowerment in the mobile domain