# Why 4G Deployment Stagnates

**Lars Eggert**
Nokia Research Center

## Panel on Stagnation of Deployment of 4G and Beyond

ACM Workshop on Mobility in the Evolving Internet Architecture (MobiArch)
Kyoto, Japan, August 27, 2007

NOKIA

# Disclaimer

- these may or may not be my personal opinions (hey, it's a panel)
- these are definitely <u>not</u> Nokia positions

# What is 4G? (to me)

- **services framework (layer 7)**
  - sort-of an extended IMS, e.g., a hacked-up SIP API
- **IP-based network layer (layer 3)**
  - IPv6 + mobility/multihoming + QoS + AAA + charging + ?
- **access-link radio technologies (layer 1/2)**
  - 100Mb/s to multiple Gb/s
- tongue-in-cheek summary: mobile Internet with pay-per-view extensions and non-IEEE access links

NOKIA

# So why is 4G deployment slow?

- **well, first off, we already <u>have</u> an Internet**

- it has "manual mobility"
  - not so cool, but OK for the really important stuff
  - and some apps are really good in managing that

- it has AAA and charging
  - log-ins & credit card forms
  - cumbersome and per-site, but usable
  - (unfortunately, the operator doesn't get a cut...)

- it has QoS by overprovisioning & prioritization at ends

NOKIA

# Not many drivers for deployment

- **service framework (layer 7) is incremental**
  - the "Internet API" is HTTP, SOAP, XML, SIP, etc.
  - 3G IMS is similar in scope but different in details – not smart
  - with 3G IMS not looking so hot, where does that leave 4G IMS?
- **4G network-layer extensions aren't much deployed anywhere else in the Internet;** even less so in an integrated fashion
  - IPv6 with mobility, multihoming, fast handovers
  - QoS
  - pervasive AAA
- there isn't much leverage here

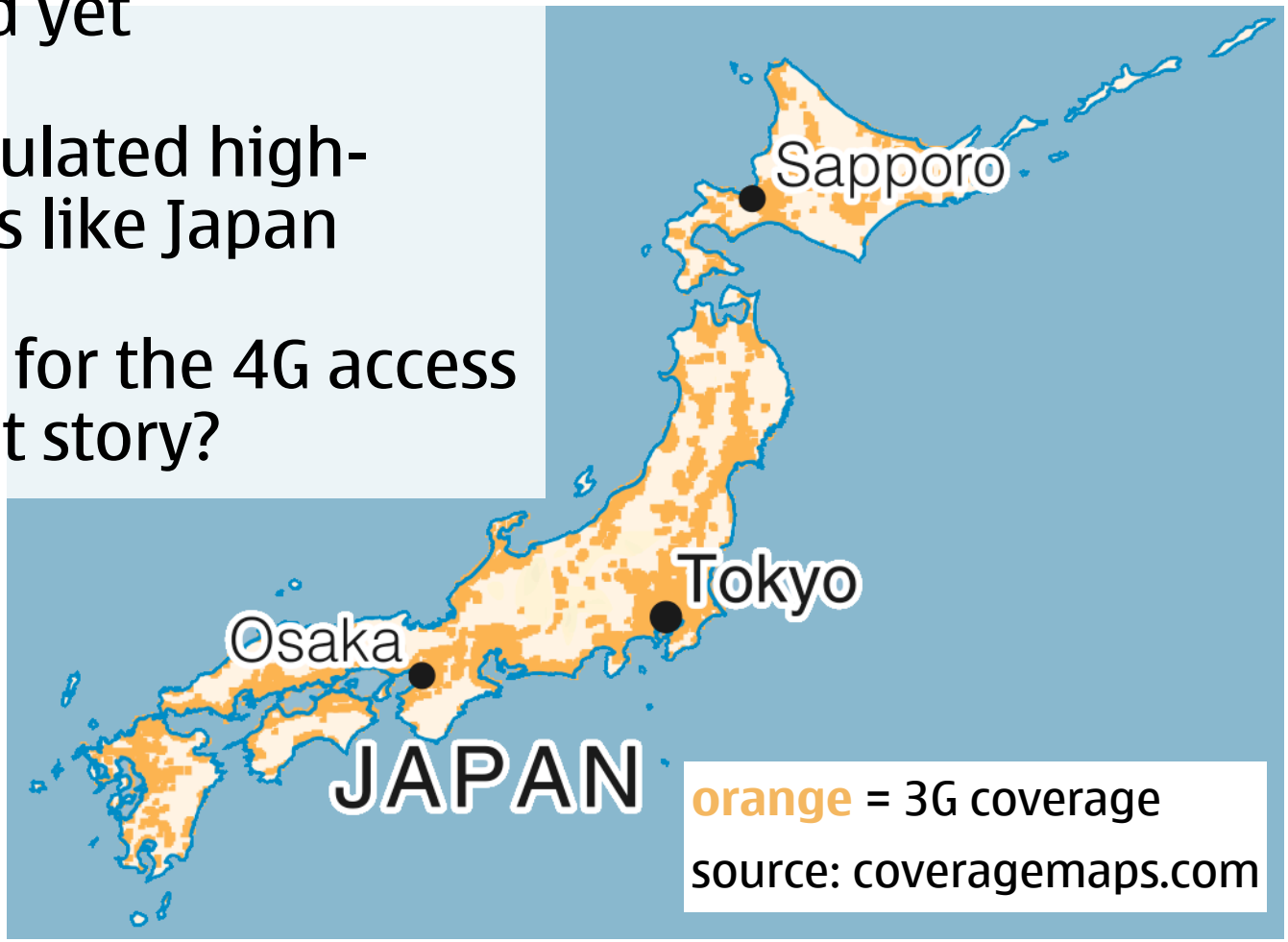
# But what about fast access links?

- >> 100Mb/s to a mobile terminal would be cool, but...
- **how many bps can a human source/sink through a mobile UI?**
  - 7.1, 96 KHz, 24-bit audio = ~9 Mb/s raw, ~0.9 Mb/s comp.
  - 720p raw HDTV = ~210Mb/s raw, ~25-50Mb/s comp.
- **what about the rest of the mobile hardware?**
  - need to transmit & process all these bits – battery?
- **other mitigating factors**
  - storage is free, small & low-power
  - disruption/delay-tolerant apps
  - may not need mega-bps instantaneous bandwidth in many cases
- still, the 4G access technology shows promise

NOKIA

# What about 3G deployment?

- mature 3G access technology isn't completely deployed yet
- even in densely-populated high-technology countries like Japan
- what will that mean for the 4G access network deployment story?




NOKIA

# To end on a provocative note

- **4G is a telco dream**

- 4G uses Internet technology, but doesn't embrace the spirit behind these protocols
  - the 4G access link technology is the innovative part, but it's useful independently from the rest of 4G

- the spirit of 4G is old-style telecom thinking
  - **"only an integrated system provided by us – from radios to services – could ever really work"**

- no lessons learnt since 1993

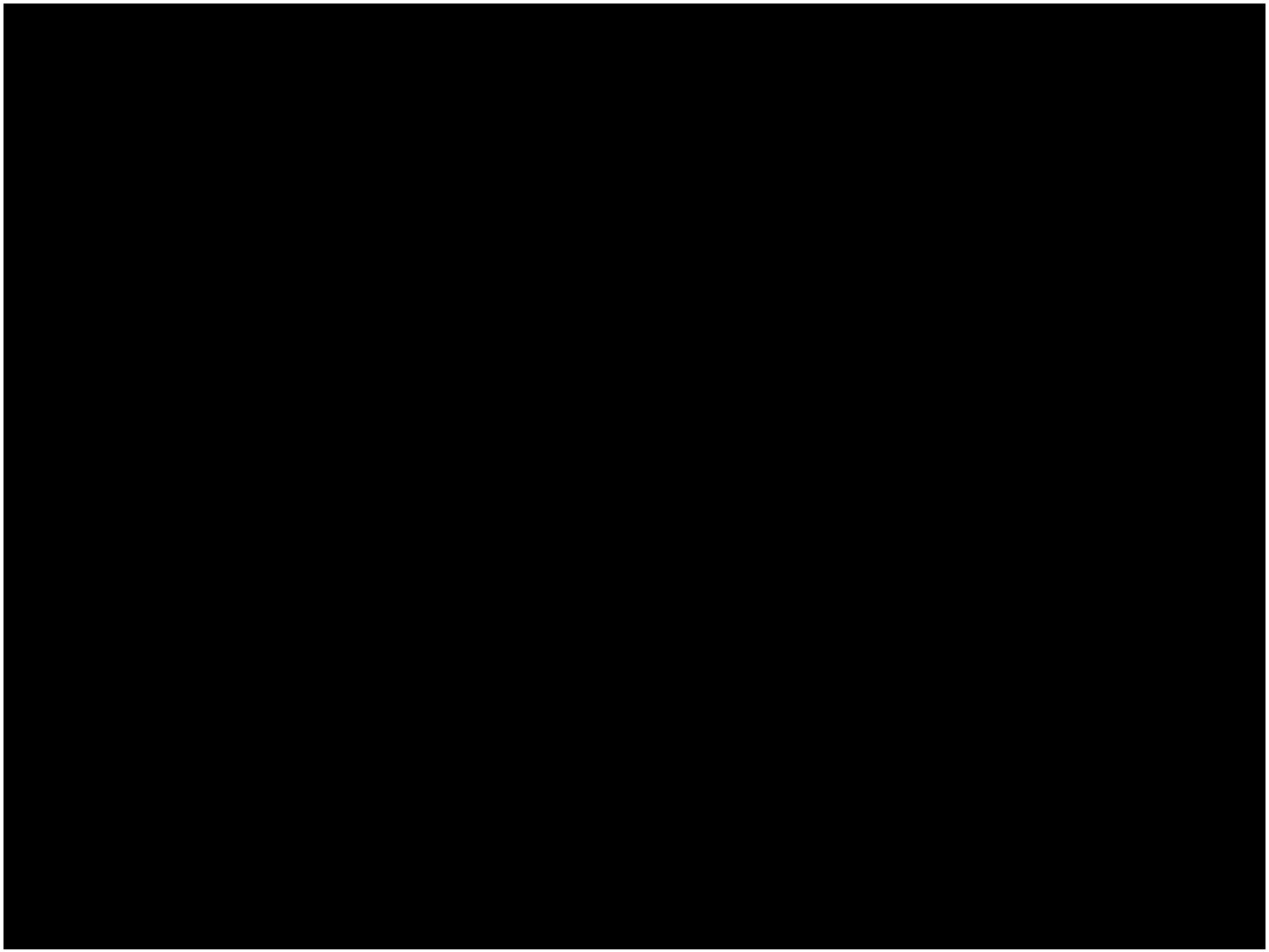
# Ask yourself: how instrumental were operators in enabling these services?

Source: AT&T, 1993

Note: Use of this video intents to illustrate operator mindsets in general and isn't meant to single out AT&T in particular.

http://www.youtube.com/watch?v=sYNUcFMCIzw

# Ask yourself: how instrumental were operators in enabling these services?



Source: AT&T, 1993

Note: Use of this video intents to illustrate operator mindsets in general and isn't meant to single out AT&T in particular.

http://www.youtube.com/watch?v=1cOvXn40EZw