

*The Internet of ~~Things~~ Everything:
The terascale is historically inevitable*

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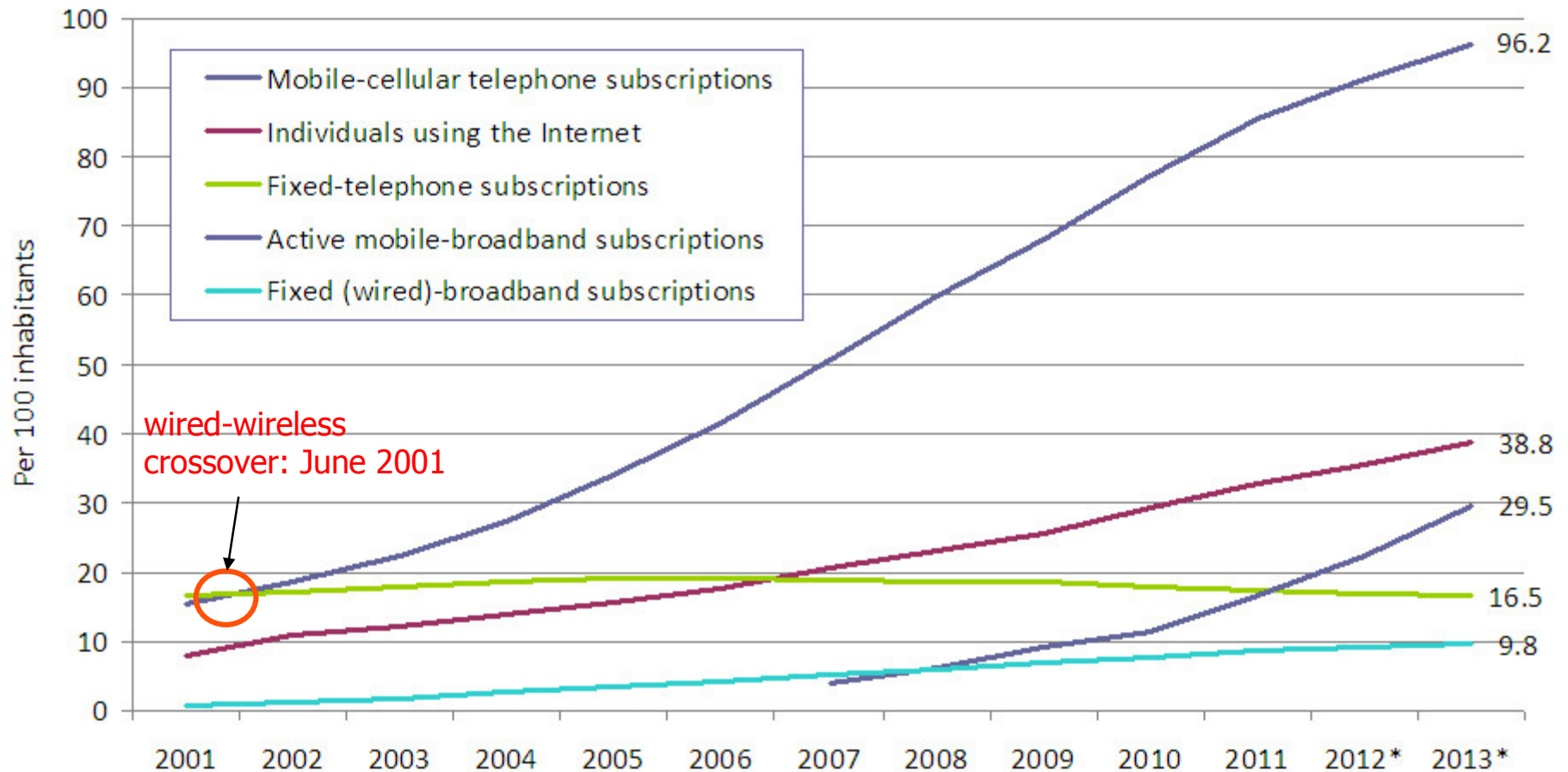
SystemX Kickoff

11 November 2014



From wired to wireless

Global ICT developments, 2001-2013



- 4 million cellphones are sold each day.
- 250,000 text messages are sent each second.

Mobile miracles

- There are now >6 billion mobile subscriptions.
 - There were ~0 in 1981; 20 years later we became a mobile species.
- 2014: Wireless subscriptions will *exceed* the earth's population of 7 billion.

1st Age of wireless: *Station-to-station*

Guglielmo Marconi, c. 1902



(GBC Marconi)

- Killer app: Maritime comms.
 - Famously enabled rescue of *Titanic* survivors in 1912.
- Station-to-station mode limited to kiloscale.

2nd Age of wireless: *Station-to-people*



E. Howard Armstrong and Marion on honeymoon, Dec. 1923

- Expensive transmitters, but cheap receivers. Enables megascale reach and beyond.
- Advertising makes startups like NBC/CBS *much* more valuable than wireless telegraph companies.

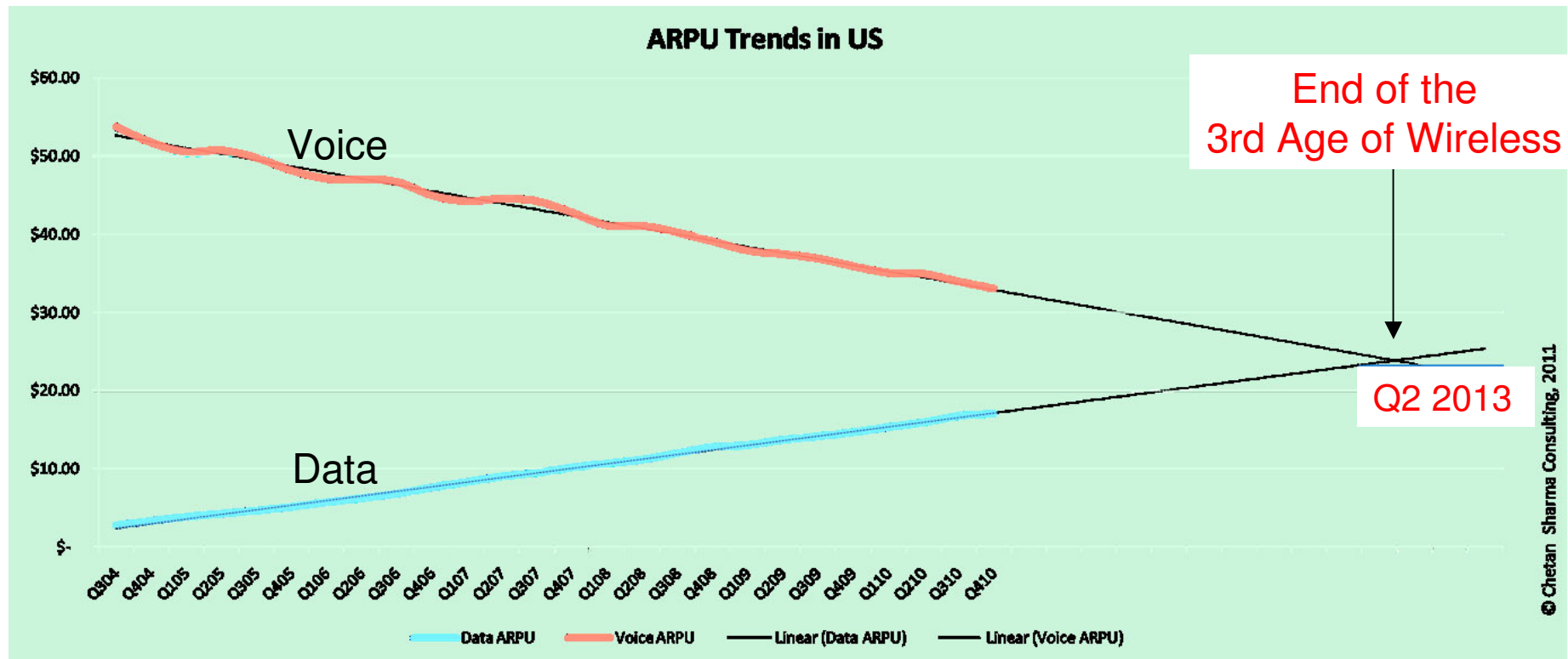
3rd Age of wireless: *People-to-people*



(Associated Press)

- Rapidly achieved gigascale connectivity.
- There are clouds on the horizon, however...

Tea leaves tell a tale



© Chetan Sharma Consulting, 2011

- Voice-data crossover occurred last year; we are now a mobile *digital* species.

The 3rd age is long in the tooth

Revenue from New Subscriptions



- New-subscription revenues have plummeted, marking the end of a phase of wireless history.

The IoE is the 4th age

- Adding *things* to the conversation will take us to the terascale.
- It's not just an Internet of Things, it's the *Internet of Everything* (IoE).
 - People-to-people, people-to-things and things-to-things.
 - Wireless and wired.
 - Nets of nets/webs of webs.

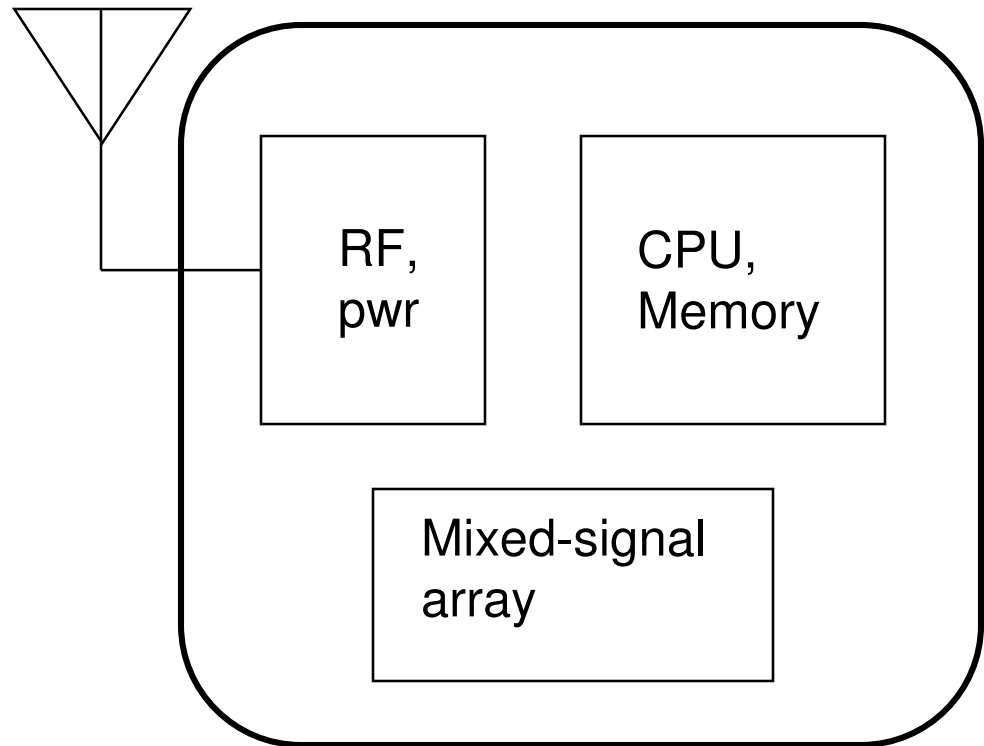
Many challenges

- To connect a trillion devices, we first need to design and fab them.
- A trillion devices can't all be battery-powered.
- A trillion devices constitute a large “attack surface”.

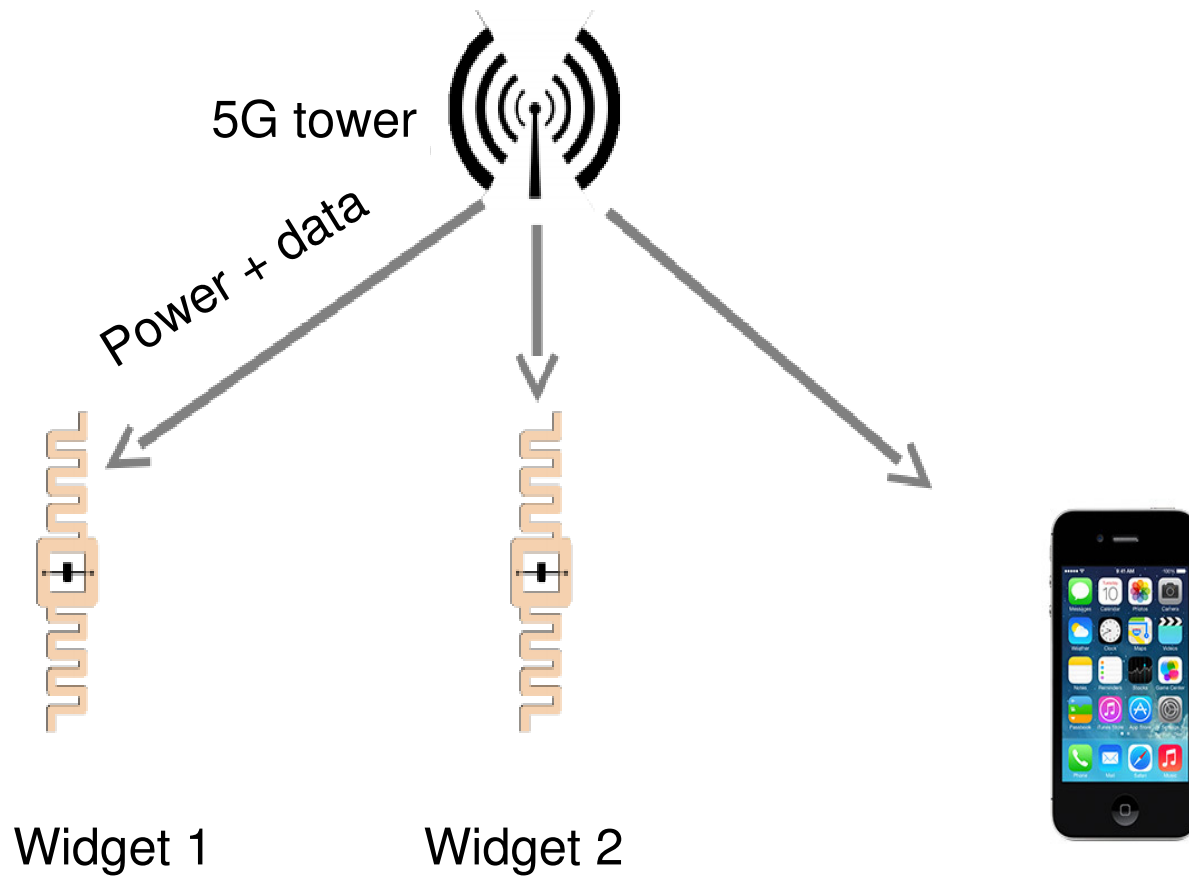
Possible solutions

- Automated design tools as a “workforce multiplier.”
- Field-programmable things arrays (FPTAs) to reduce the number of different mask sets.
- RF-powered modules to supplement energy harvesting.
- Low-power configurable security engines.

FPTAs



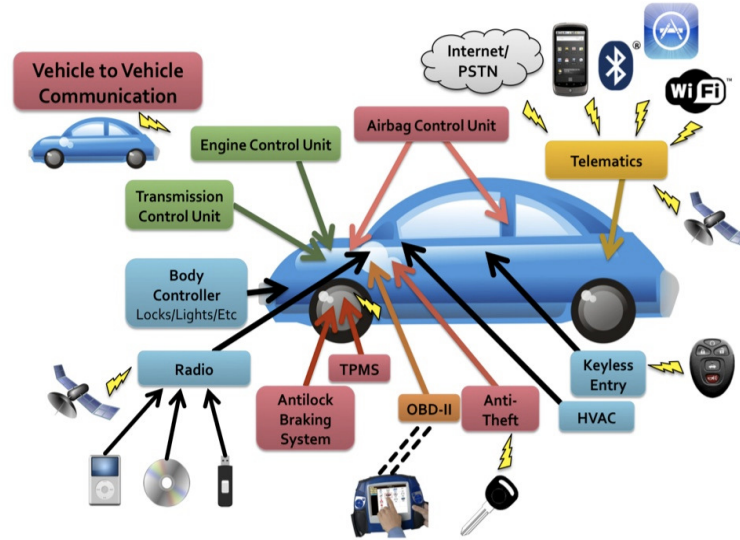
No batteries



IoE: Plenty of visions and work to do



Extremetech



thetruthaboutcars.com



Qualcomm

SLASH GEAR

