



# DISRUPTIVE MODEM INNOVATION FOR LTE

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# THE WORLD GOES MOBILE

Phone sales  
outnumber births

**9 to 1**

Mobile  
subscriptions  
outnumber  
bank accounts

**4 to 1**



**35 hours**  
of video is uploaded  
to YouTube  
every minute<sup>D</sup>

**Mobile** will  
overtake PCs for  
internet browsing  
in 2013<sup>C</sup>

**7 times** increase  
in USB modem  
sales since 2007<sup>D</sup>

A: Ericsson  
B: Morgan Stanley  
C: Gartner  
D: ABI

# MOBILE DATA: FROM NICHE TO EVERYWHERE



## 1990's – Mobile data

- CDPD, Mobitex, GPRS, EDGE
- Custom made devices, PCMCIA modems



## 2000's – Mobile broadband

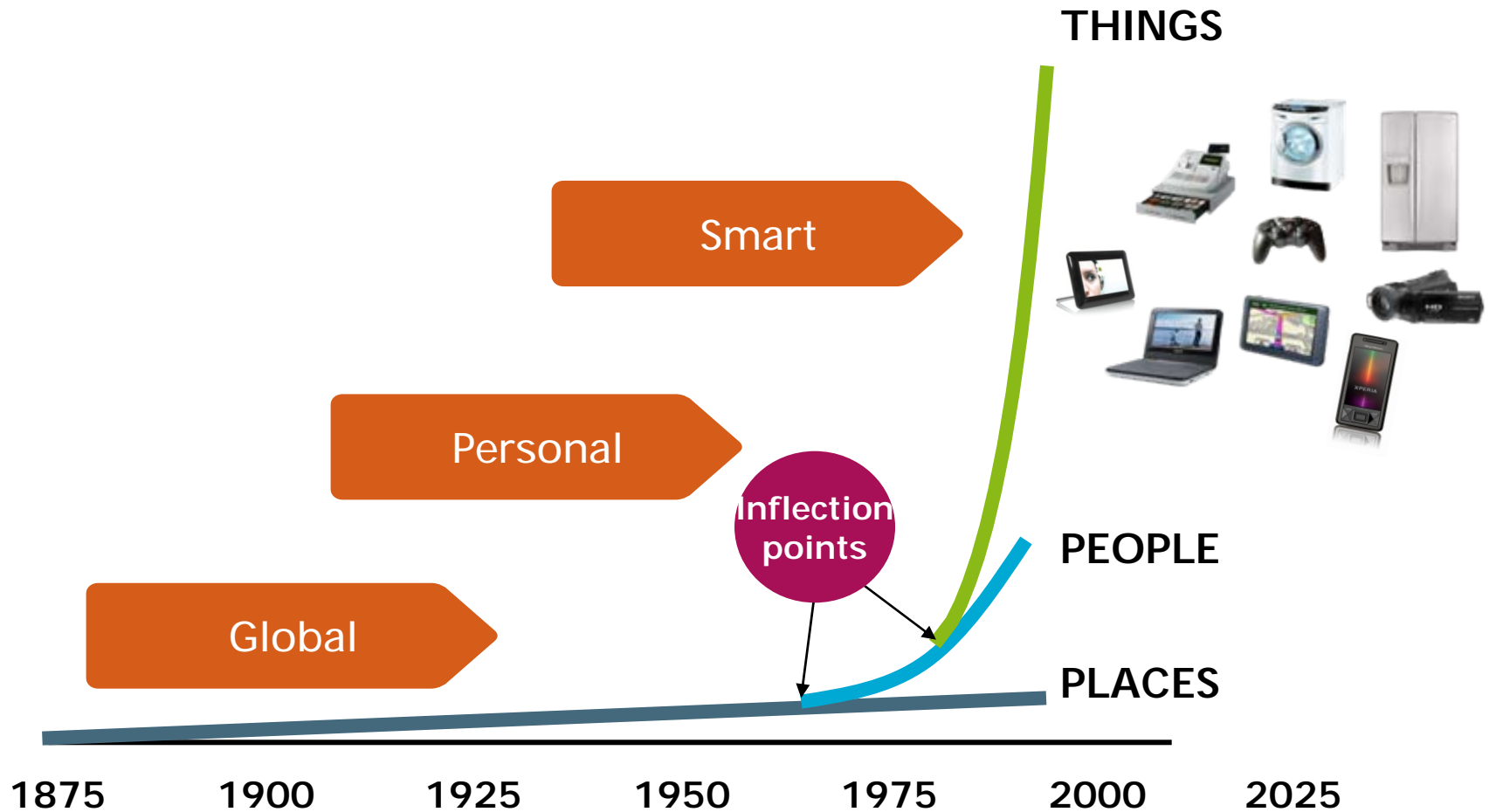
- HSPA, EvDO
- USB modems and some embedded solutions



## 2010's – Real broadband

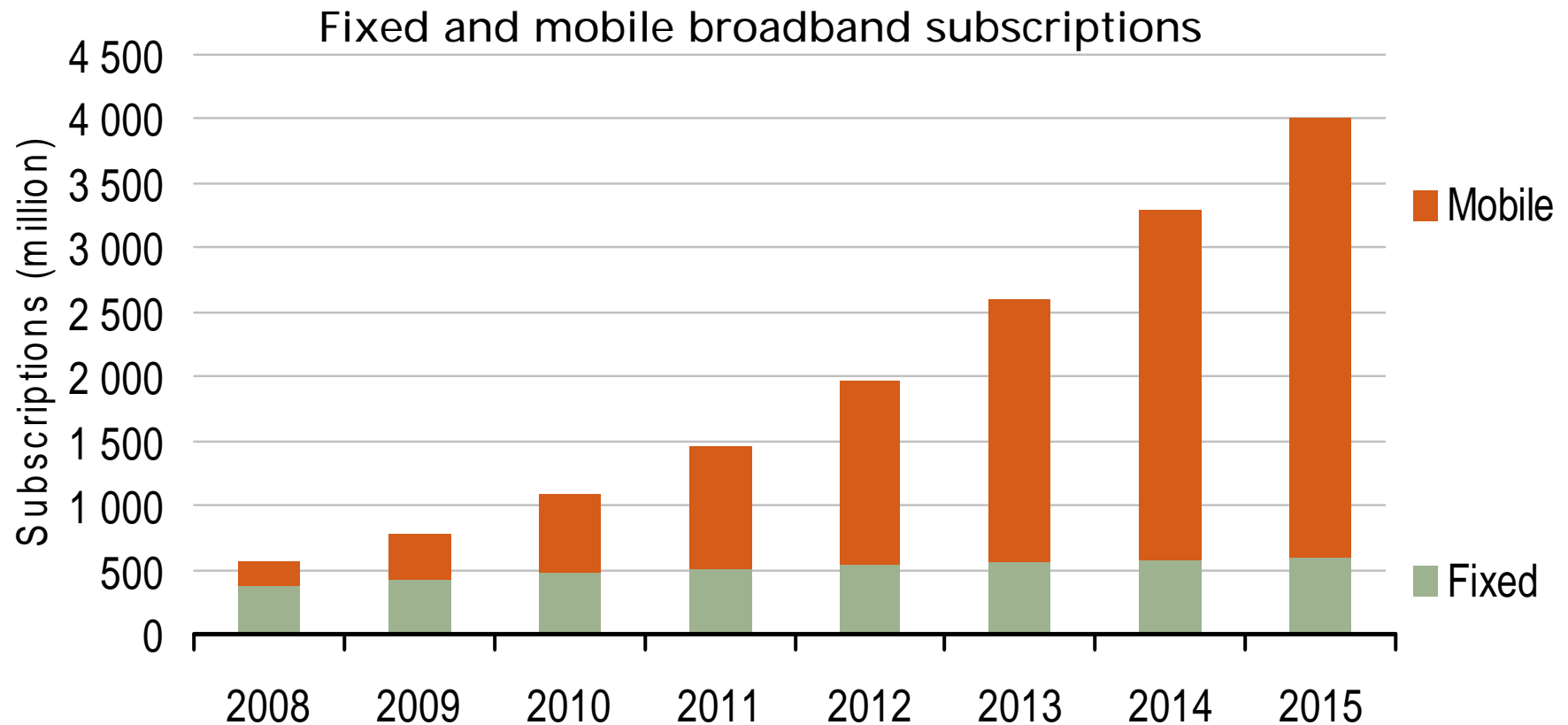
- LTE FDD & TDD
- Embedded in all types of devices

# THE COMMUNICATING WORLD



Places – People – Things

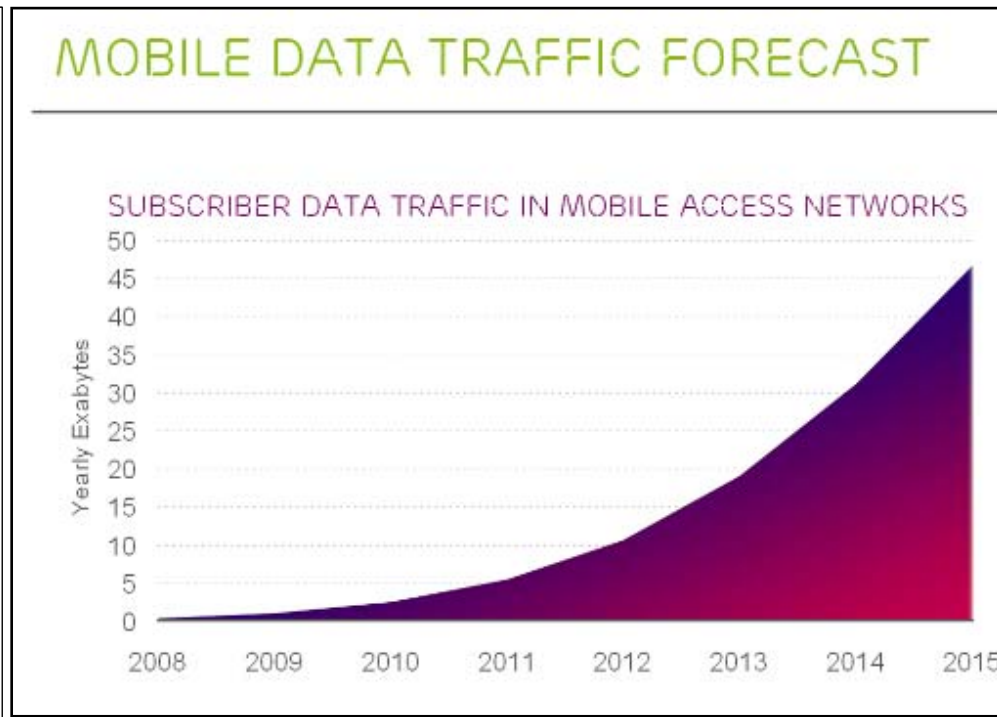
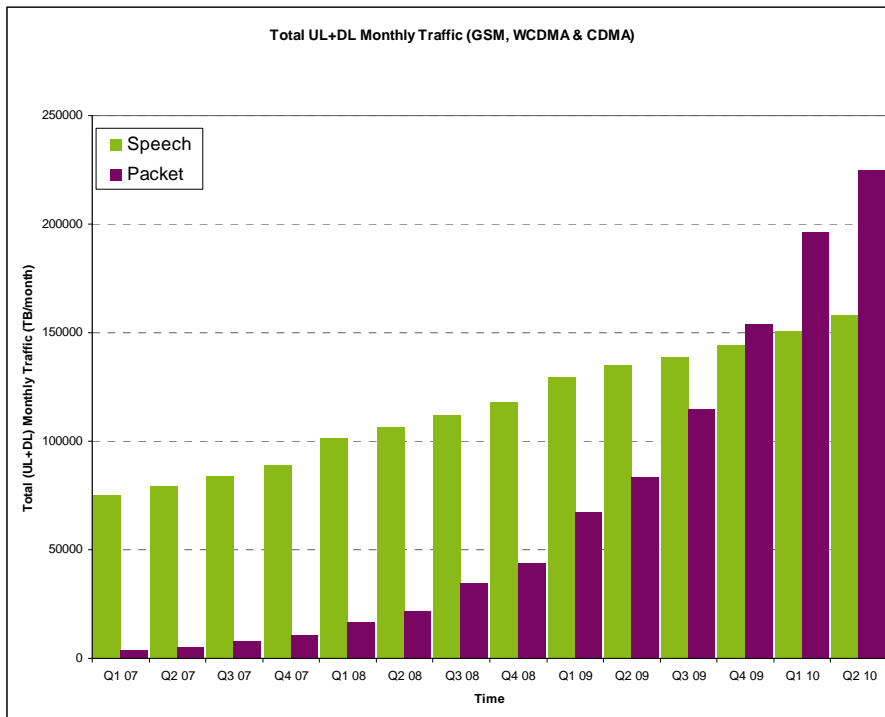
# BROADBAND SUBSCRIPTIONS



Source: Ericsson

**Mobile Broadband – the Dominating Broadband**

# THE REALITY – MEASURED TRAFFIC

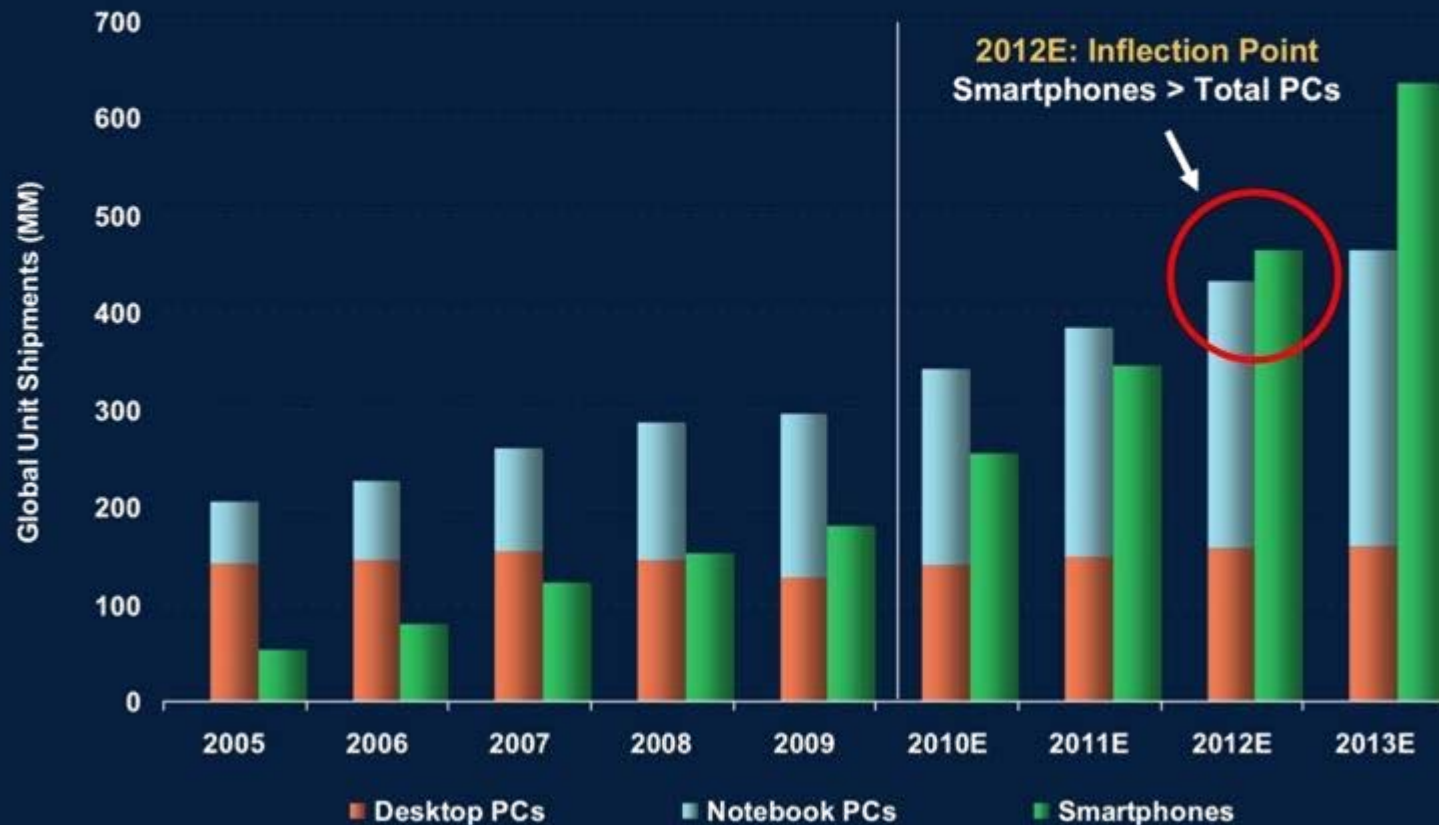


- Q209 to Q210 – Mobile Data Traffic nearly triples
- Mobile Data traffic grew 10 times faster than voice

Source: Ericsson Measurements in Global Networks (DVB-H, Mobile WiMax, M2M and WiFi traffic not included)

# Smartphone > PC Shipments Within 2 Years – Implies Very Rapid / Land Grab Evolution of Internet Access

Global Unit Shipments of Desktop PCs + Notebook PCs vs. Smartphones, 2005 – 2013E



Morgan Stanley

Note: Notebook PCs include Netbooks. Source: Katy Huberty, Ehud Gelblum, Morgan Stanley Research. Data and Estimates as of 11/10

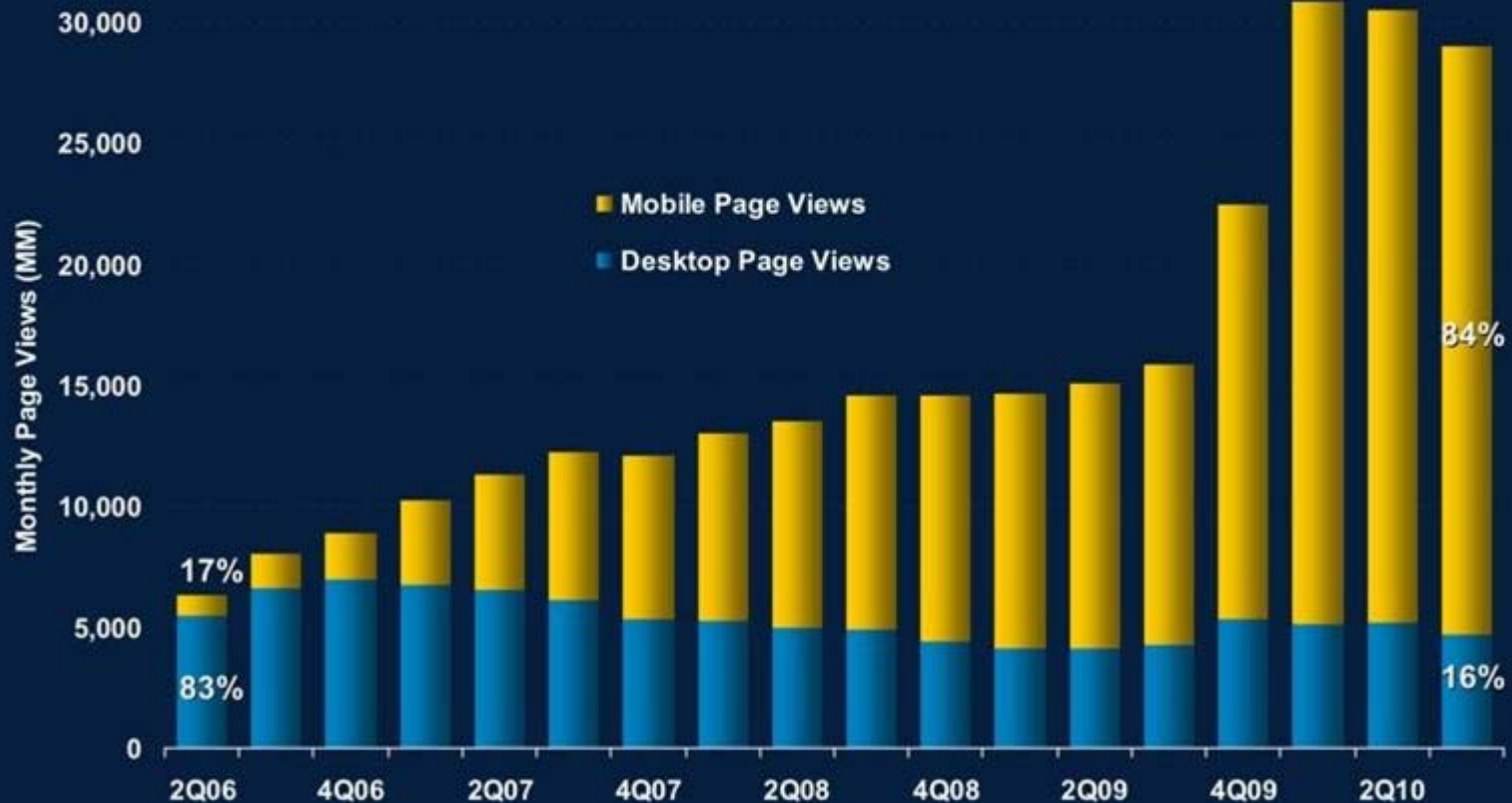
10

Source: Mary Meeker, Morgan Stanley, November 2010



# Japan Social Networking Trends Show How Quickly Mobile Can Overtake Desktop Internet Access – Mixi Mobile Page Views = 84% vs. 17% Four Years Ago

Mixi's (Japan's Leading Social Network) Monthly Page Views, Mobile vs. PC, CQ2:06 – CQ3:10



Morgan Stanley

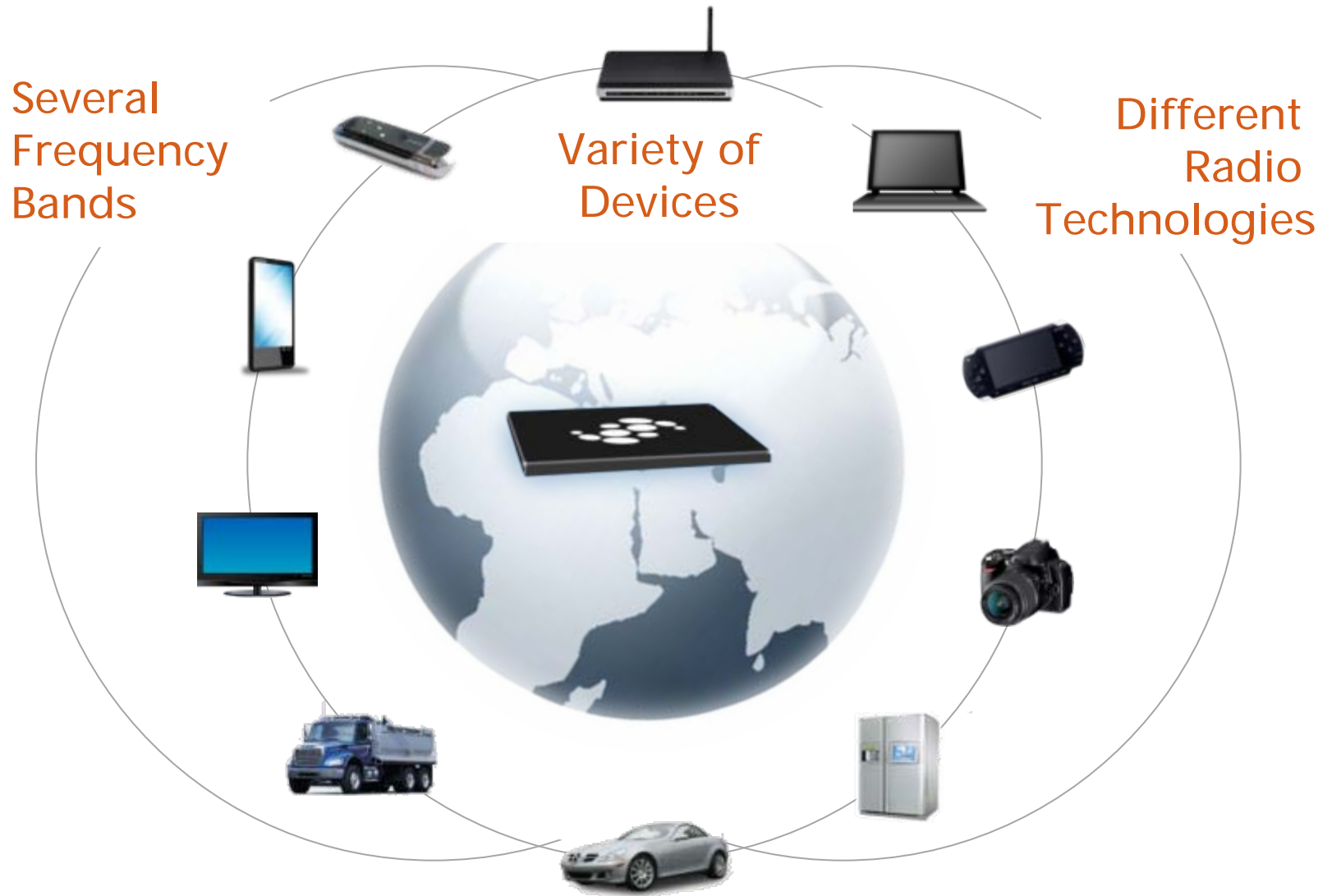
Note: Mixi is one of Japan's leading social networking sites on PC and mobile with 22MM registered users as of 10/31/10. It monetizes mobile usage via sales of avatars, customized homepages and other premium services.  
Source: Company reports, Morgan Stanley Research

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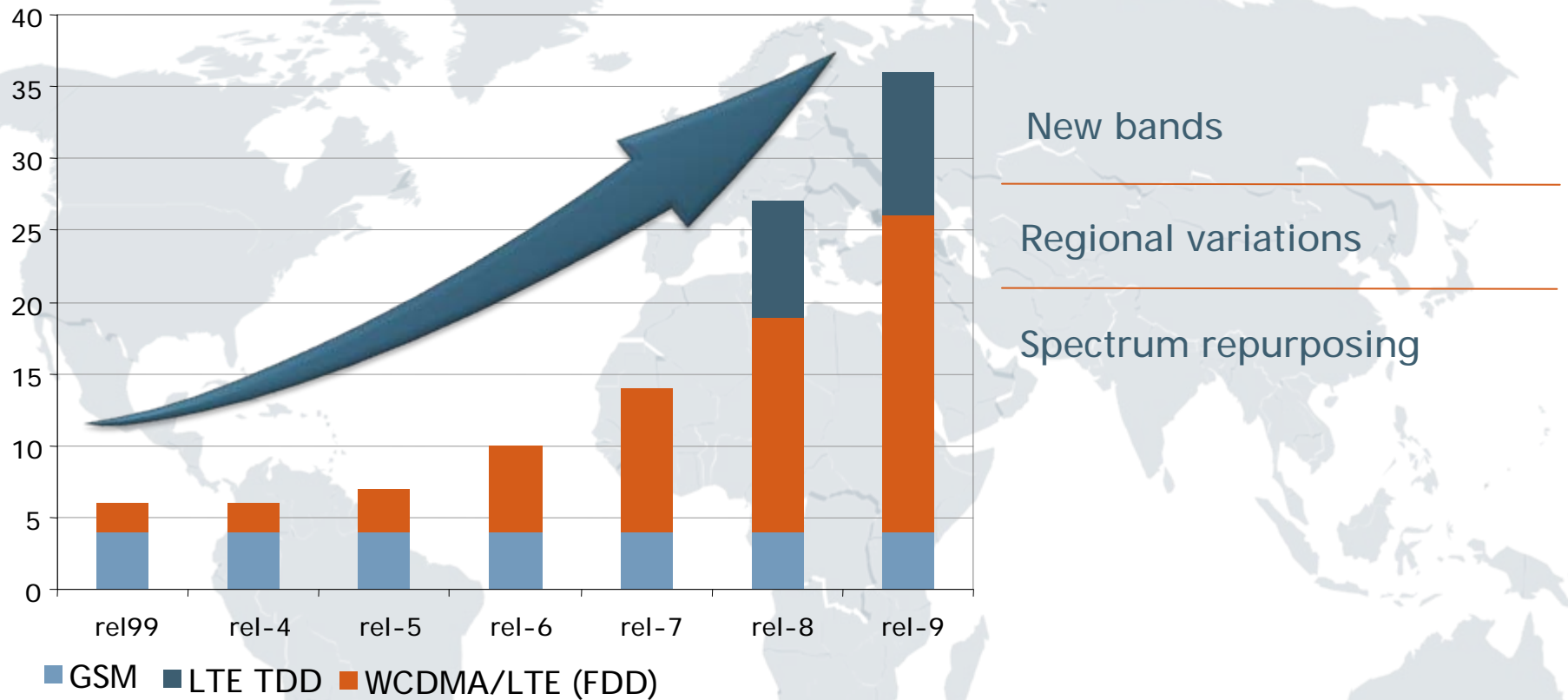
Source: Mary Meeker, Morgan Stanley, November 2010



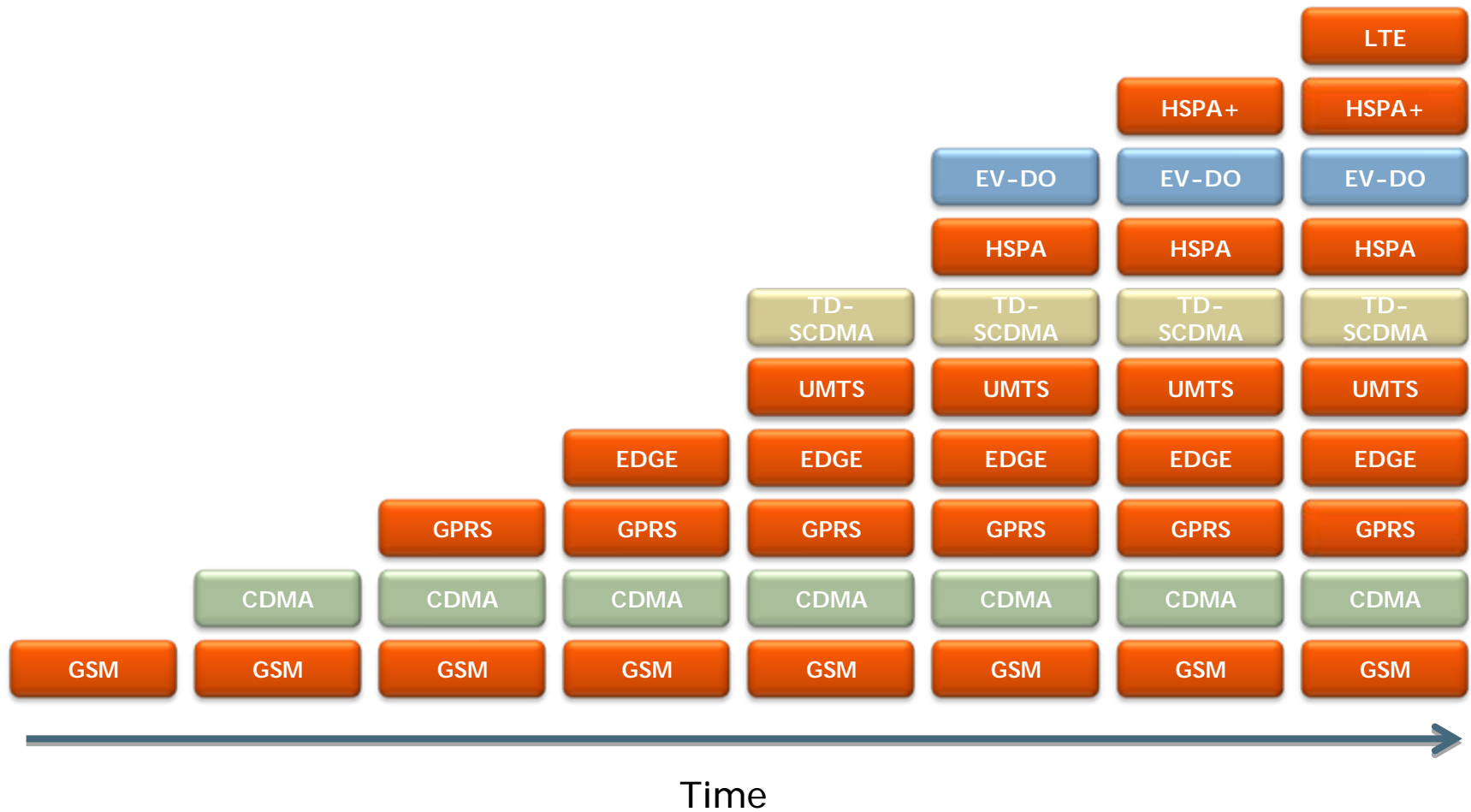
# THE FRAGMENTATION CHALLENGE



# 3GPP FREQUENCY BANDS



# DEALING WITH LEGACY



# ...BUT END PRODUCT CHALLENGES REMAIN



Power



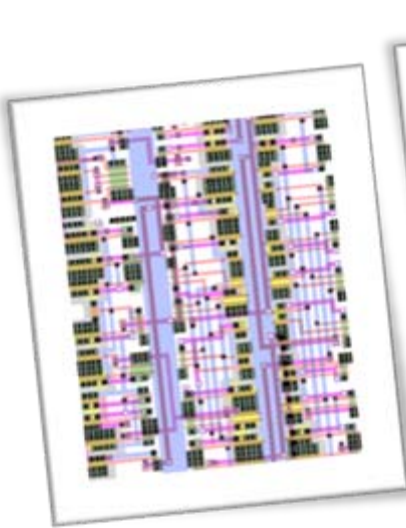
Size



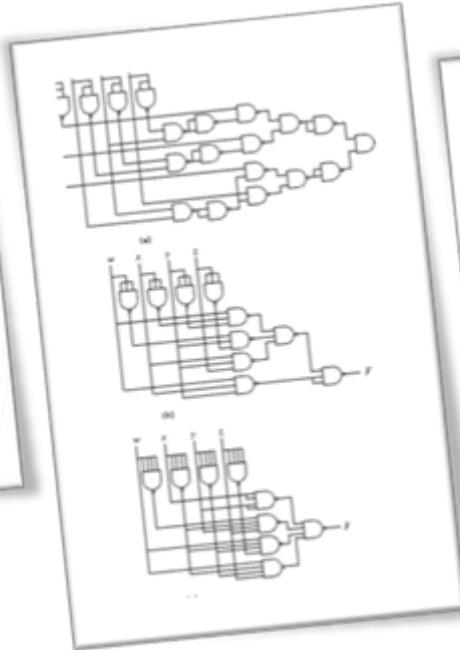
Cost



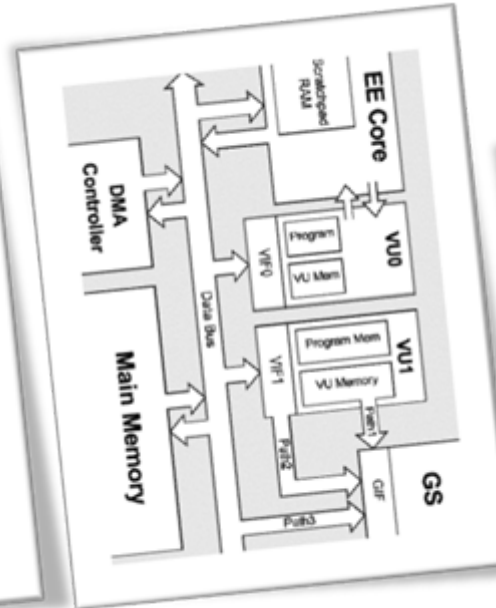
# CHIP DESIGN AND ARCHITECTURE EVOLUTION



1980's



1990's



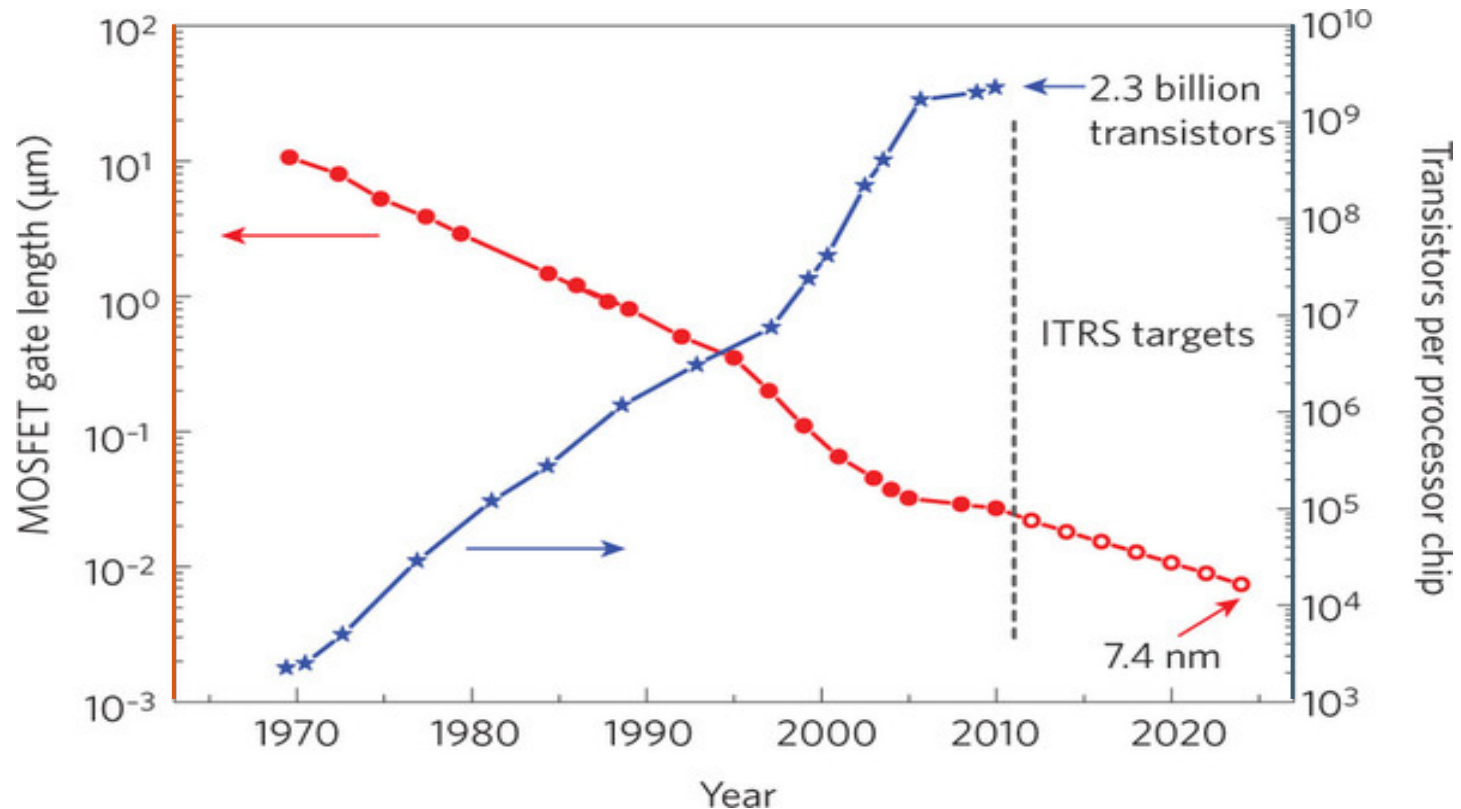
2000's



Now

From stick diagrams to software

# SILICON TECHNOLOGY DEVELOPMENT



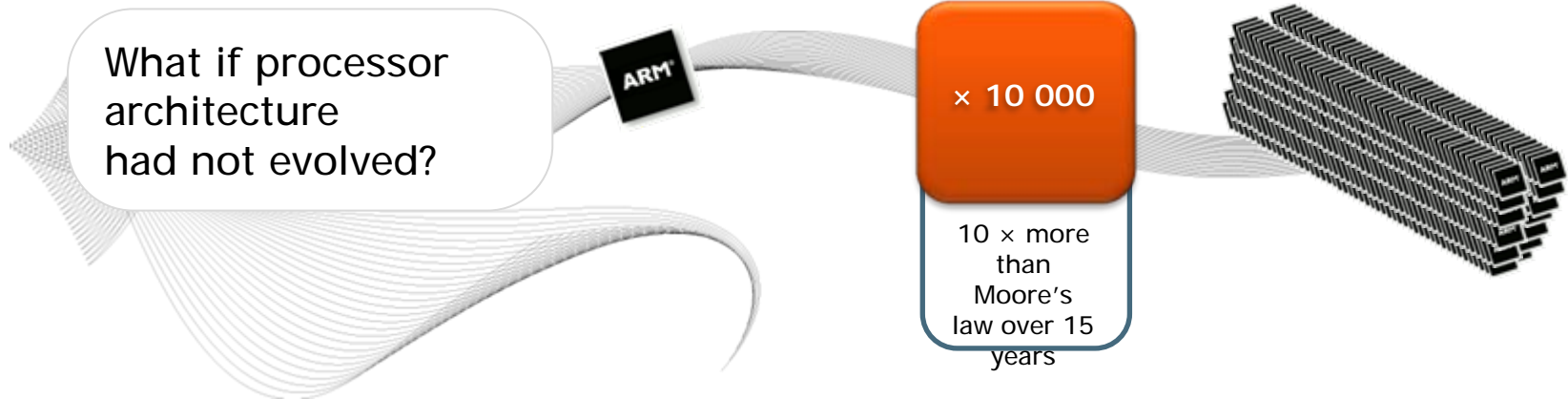
Source: Nature Nanotechnology 2010

Performance, size and power consumption gains



# 15 YEARS OF MOBILE INNOVATION

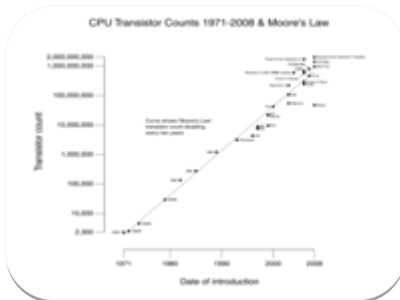
Air Interface	GSM	Evolution	LTE
Standby current	5mA		0.5mA
Processor speed	13MHz	× 80	1GHz
Payload data rate	9.2kbps	× 10 000	100Mbps



**Explosive growth in air interface complexity**

# INNOVATION REQUIRED

## Moore's law



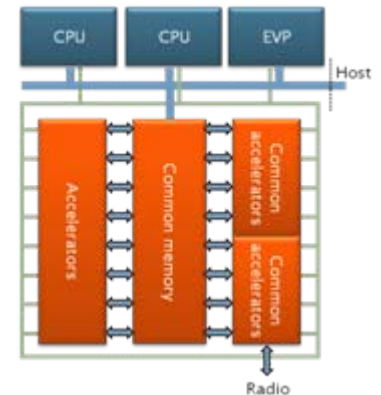
Moore's law is making software radio increasingly easy and cost-efficient

## The needs



However: Modem processing needs has grown 10× faster than Moore's law the last 15 years

## New solutions



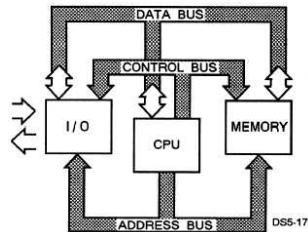
Architectural innovation is essential

# ST-ERICSSON INNOVATION – HARDWARE/SOFTWARE PARTITIONING

Data transport  
cost energy

Centralized vs.  
distributed storage

Processor cores vs.  
accelerators



Sustained Lead



Moving standards

Soft processing vs.  
accelerators

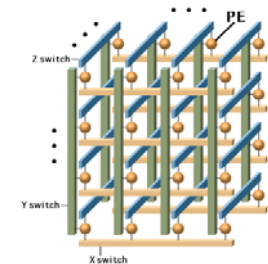
Vector processing

Generic processing  
elements

Cross-protocol  
interaction

Multi-threaded  
processing

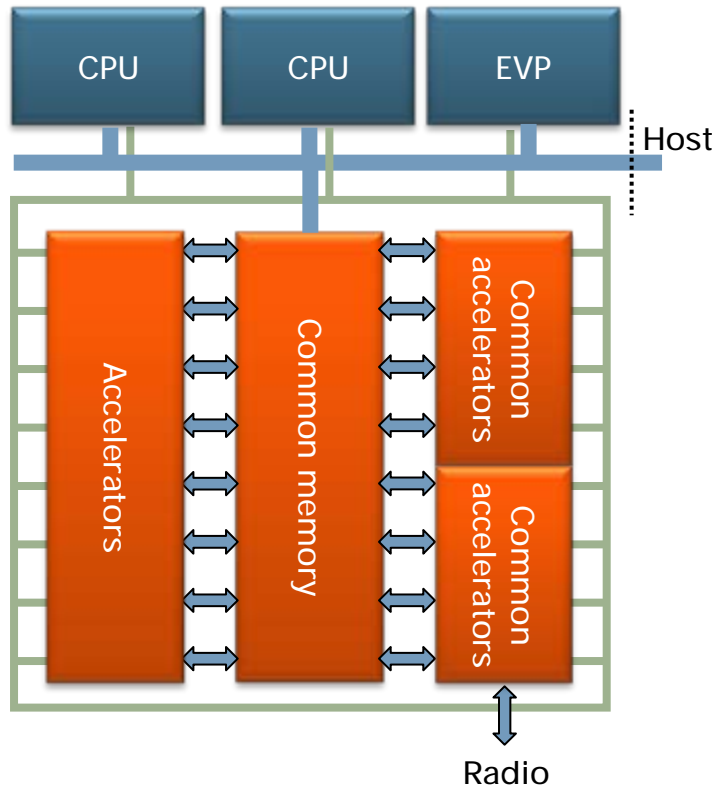
Time sharing of  
key resources



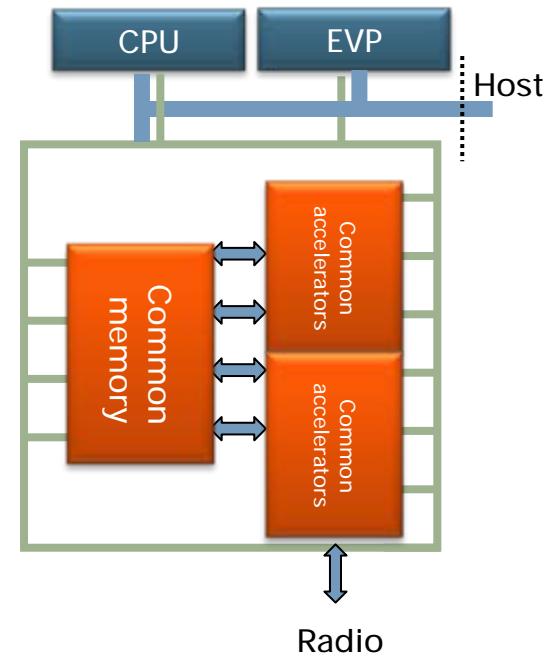
Flexibility vs. Cost vs. Power consumption

# ST-ERICSSON INNOVATION – SCALABILITY

Full performance, global solution  
LTE/HSPA+/EDGE/GSM/TD-SCDMA

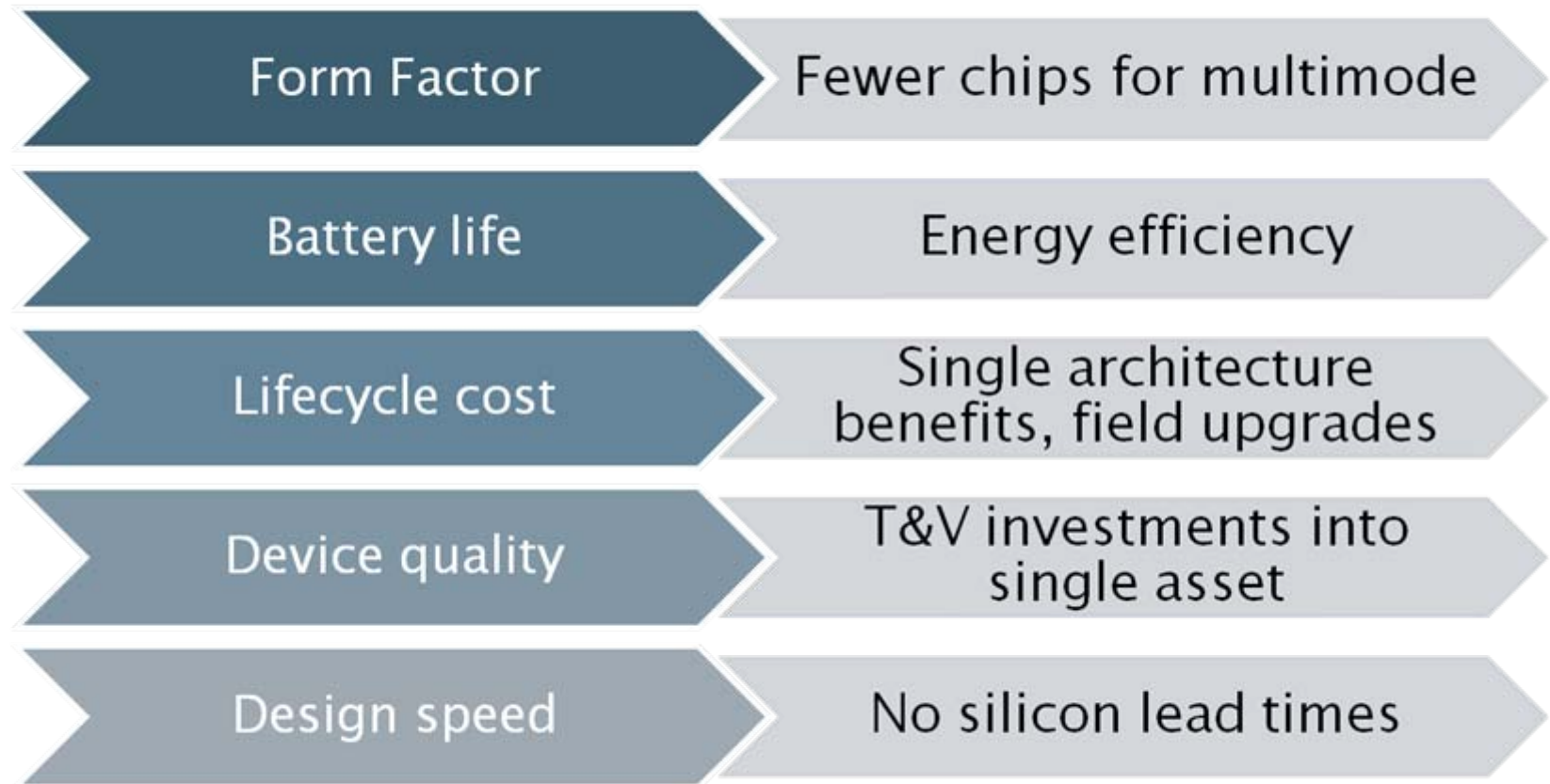


Low cost solution  
HSPA/EDGE/GSM/TD-SCDMA



Software and verification dominates modem R&D investments

# SOFT RADIO – BENEFITS TO THE WHOLE VALUE CHAIN



# SUMMARY

Software radio is here, but with a twist

Silicon evolution does not enable truly soft approaches

Major benefits for whole value chain

Technology vector continues



THANK YOU

