

# LTE / EPC

addressing the  
broadening of the  
mobile data market

Vivek Badrinath

executive vice president  
networks, carriers, platforms and  
infrastructure

France Telecom

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# agenda

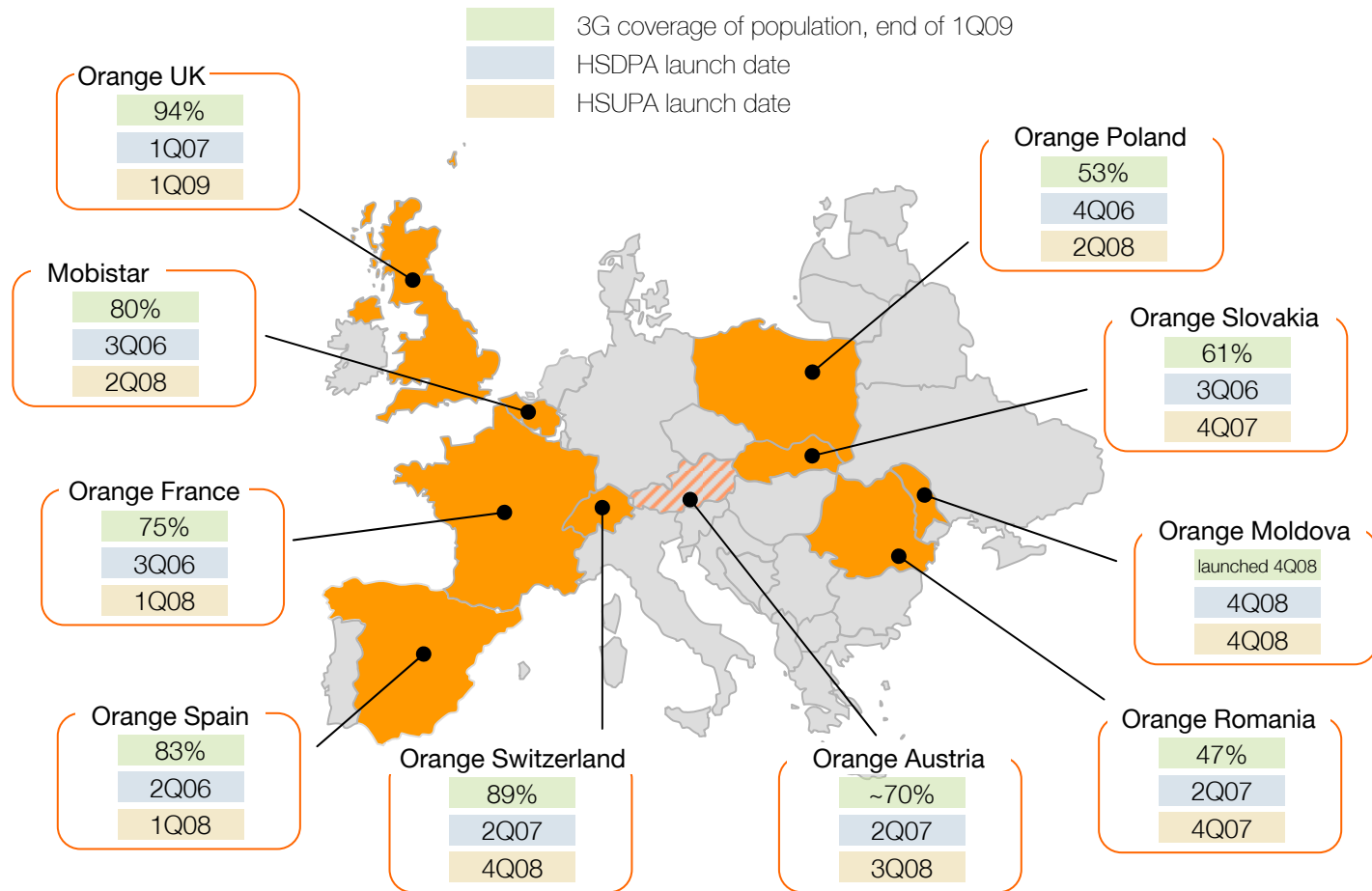
1 LTE is part of our mobile broadband strategy

2 LTE main characteristics

3 France Telecom timeline for LTE

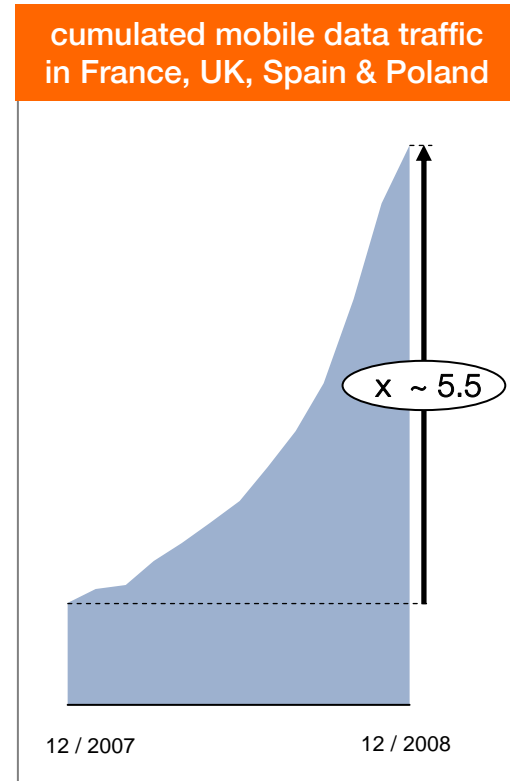
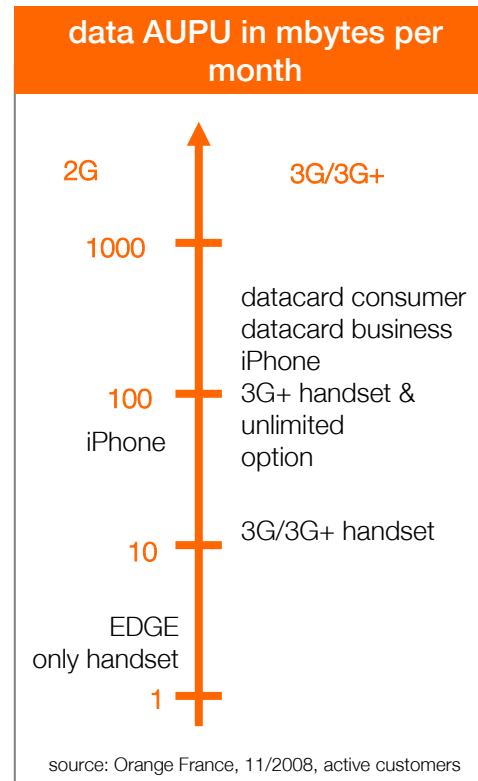
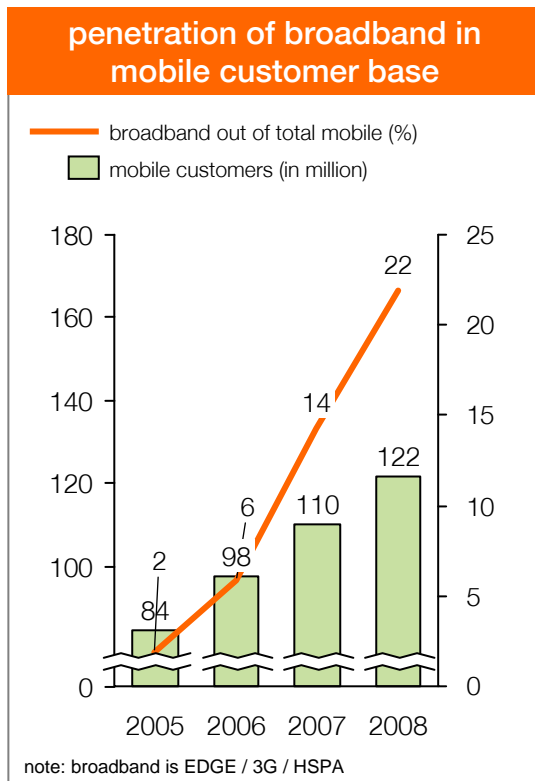
4 conclusion

# 1 France Telecom Orange has successfully delivered mobile broadband in Europe



→ services delivered through a consistent utilization of single technology family: GSM, EDGE, 3G (UMTS phase 1), HSDPA and HSUPA

# 1 coverage and technology rollout for mobile broadband resulted on a rapid rise of multimedia usage

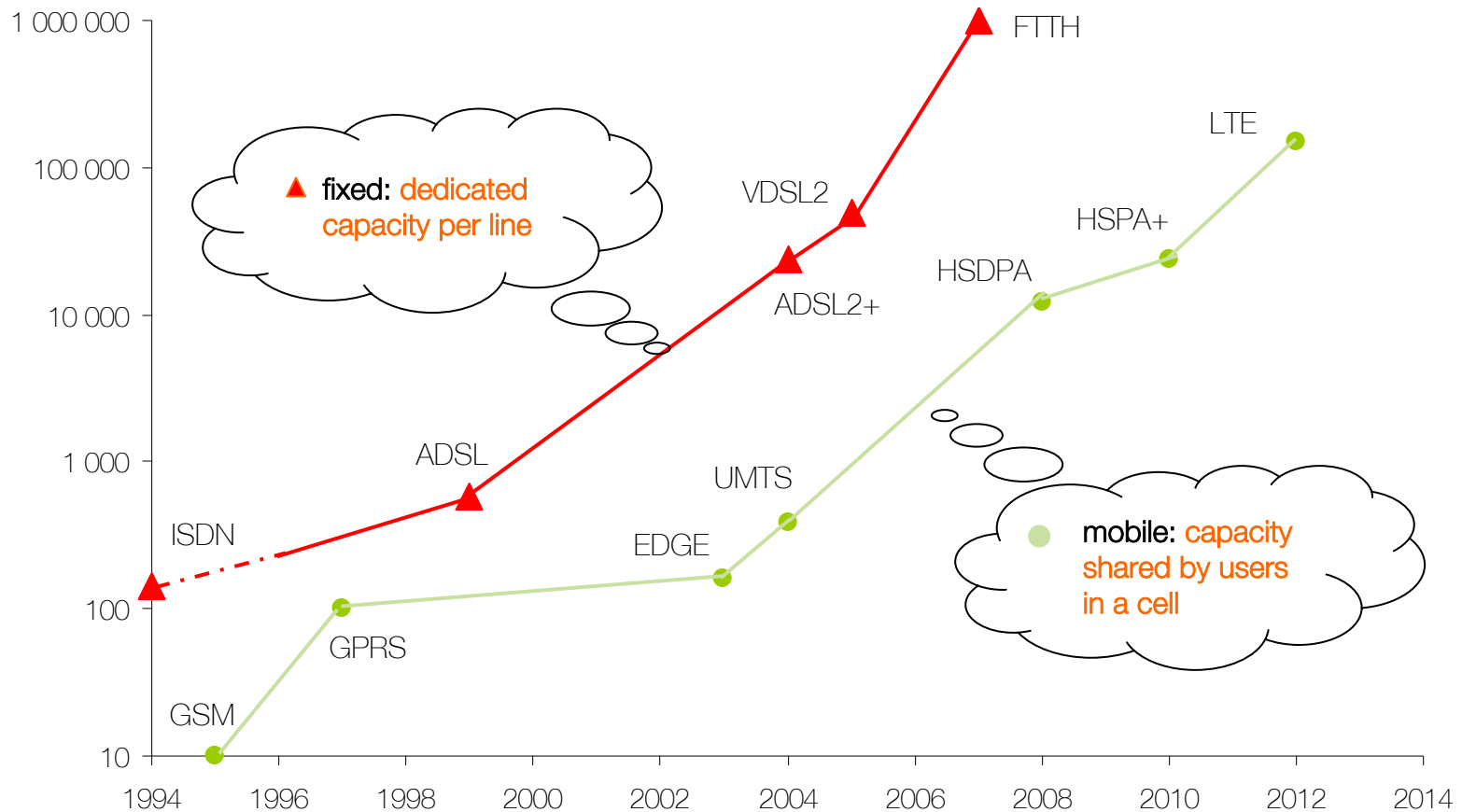


- mobile data traffic was multiplied by more than 5 over 2008 in the four major Orange countries
- traffic growth driven by new HSPA capable devices and video / Internet based services

## 1

# mobile broadband is continuously advancing to cope with new usages, however always trailing behind fixed broadband

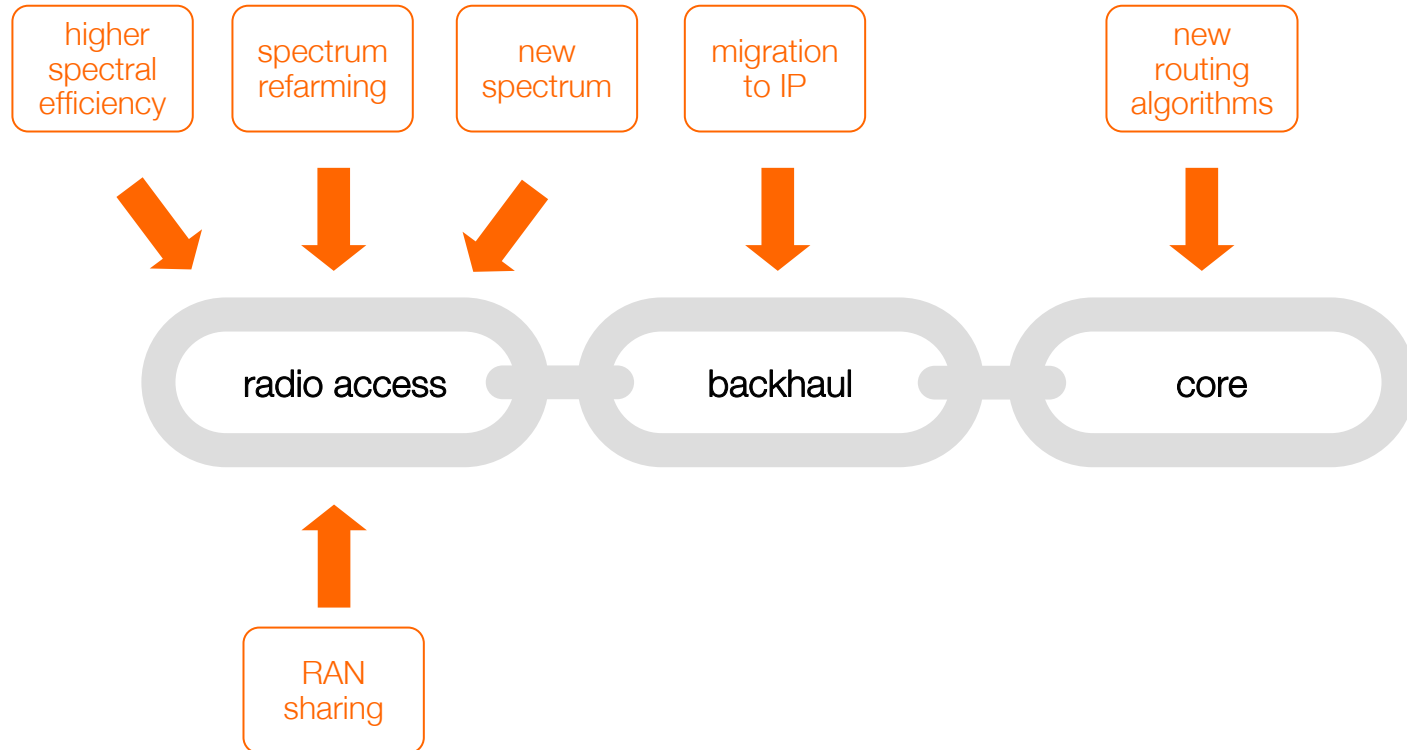
max. theoretical  
throughput (in kbps)



- moreover, fixed broadband capacity is dedicated to each line, whereas mobile broadband capacity is shared by all customers located in same cell

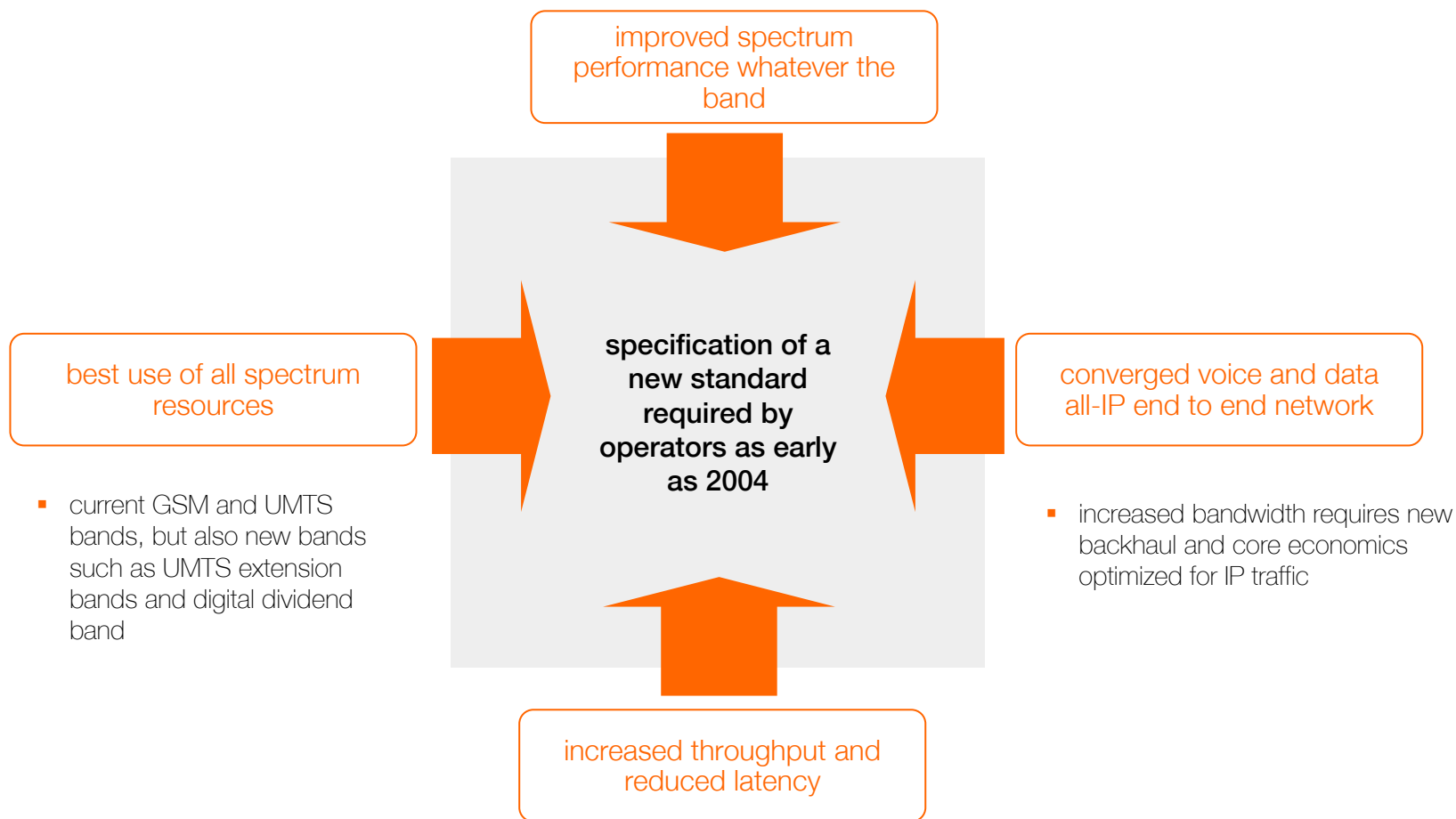
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within next 3 years, a combination of levers will help absorb mobile data traffic growth



→ beyond 2012, LTE offers an opportunity to benefit from higher spectrum efficiency, leveraging refarming and new allocation

# 1 | technology requirements for mobile broadband beyond 2012



→ LTE / EPC is the answer to the new requirements

# agenda

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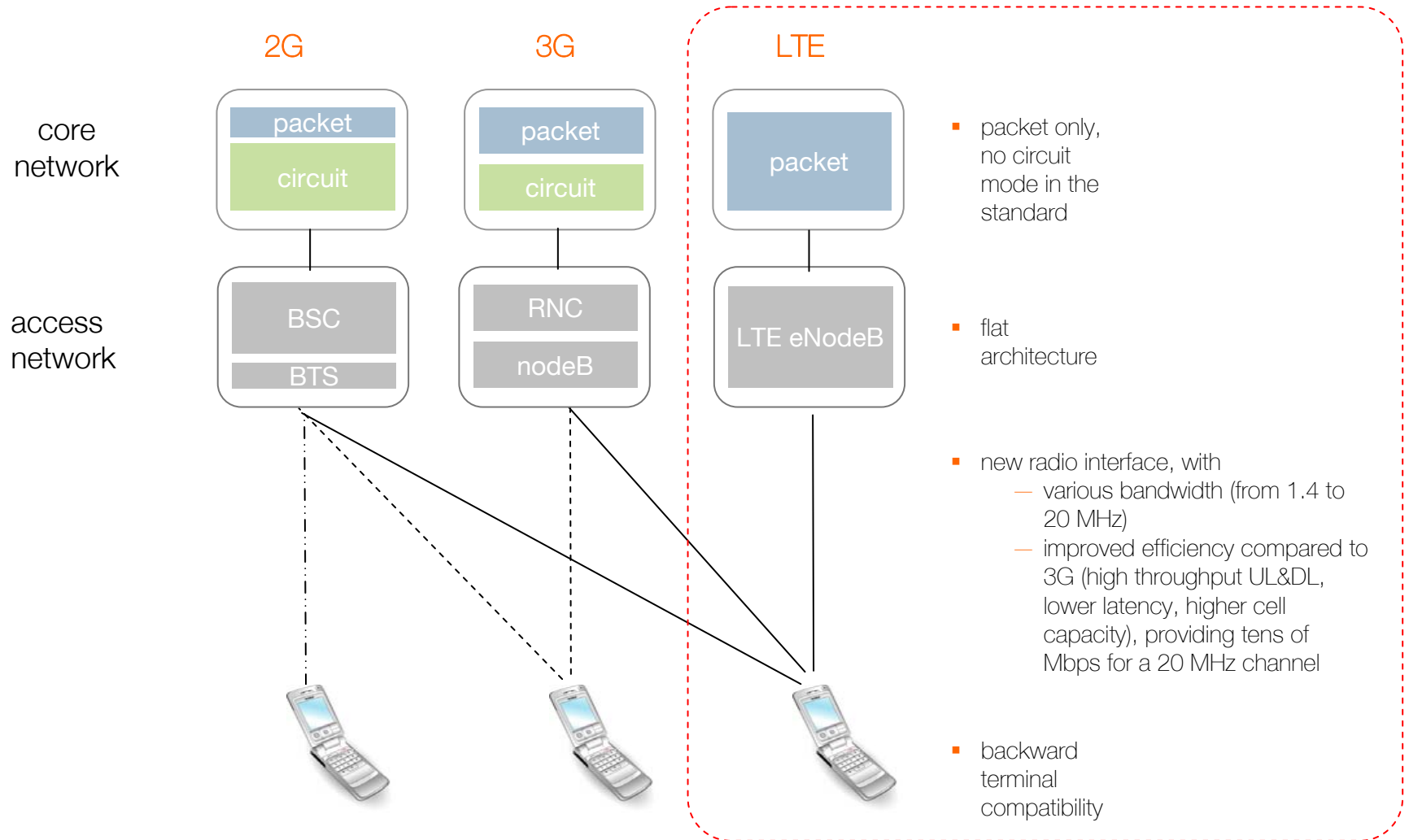
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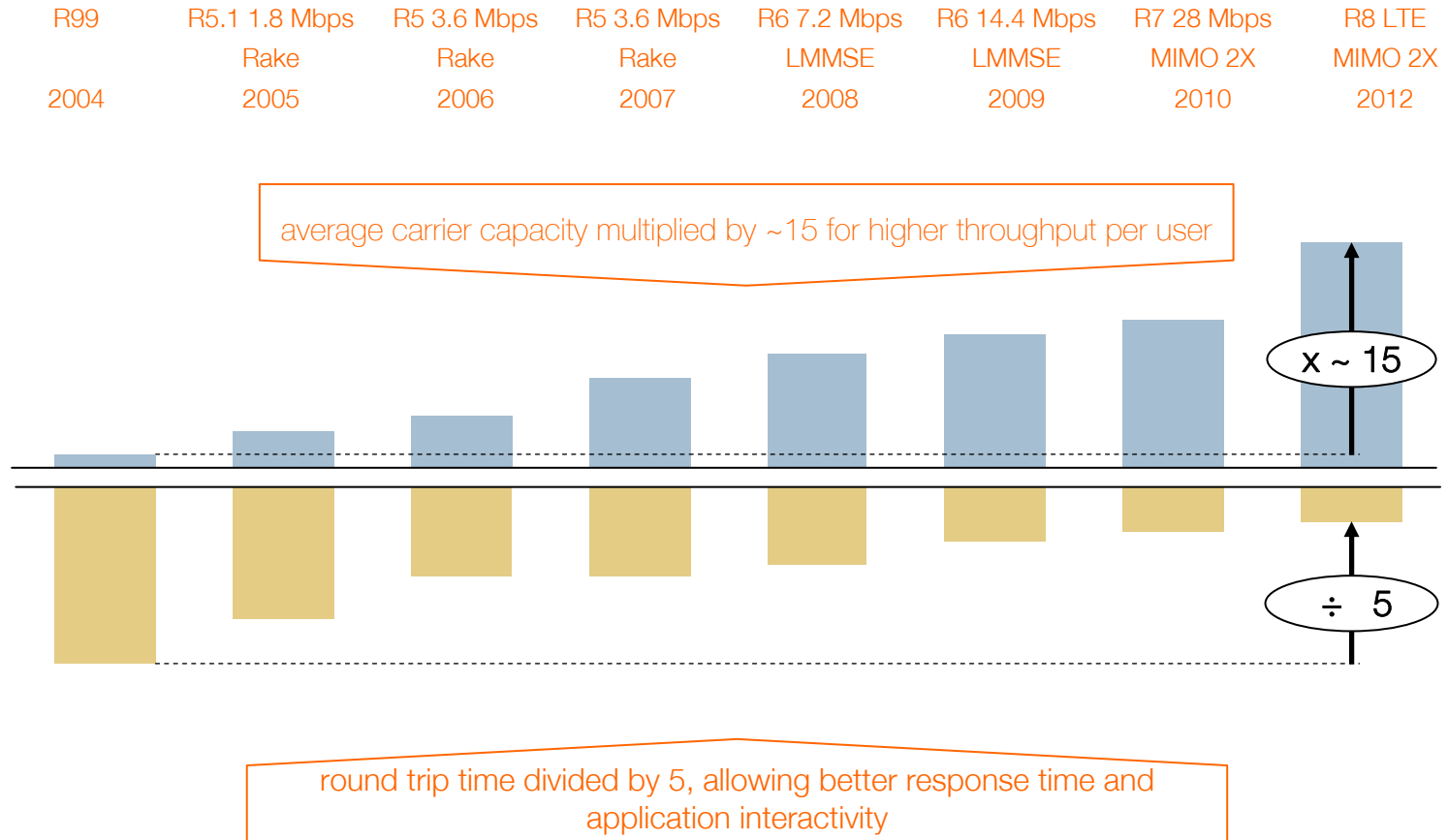
## 2 | LTE will bring significant improvements



circuit : dedicated path between two terminals over which a communication session is established

packet : shared network which routes each packet independently from all others and re-assembles them at both terminals

## 2 | radio efficiency is one key landmark of LTE



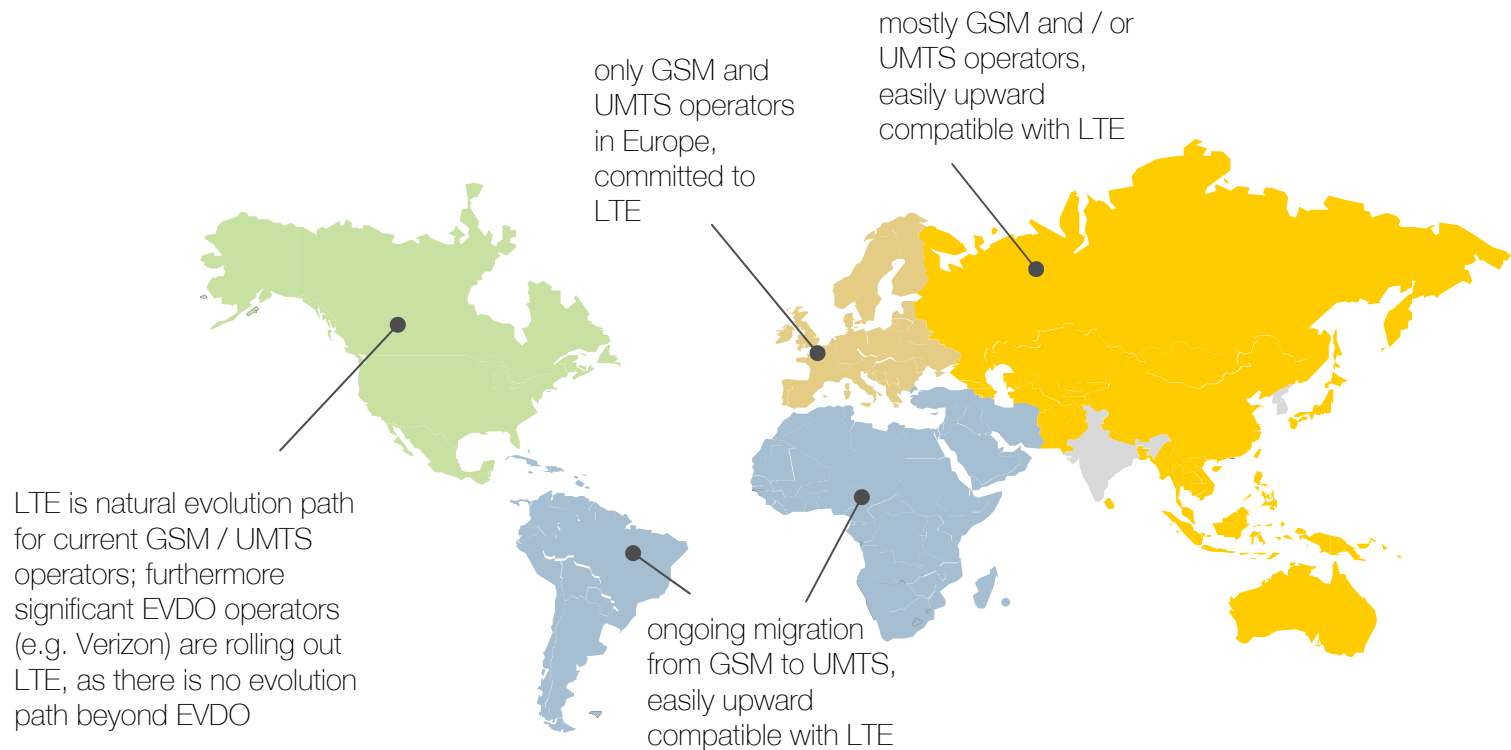
# 2

## yet, peak theoretical radio throughput does not directly translate into end user bandwidth experience




\* higher data rates can be achieved if user is closer to the transmitter

## 2 | LTE is widely adopted by operators



- supported by **GSMA** as the natural evolution for GSM/UMTS operators
- declared by **NGMN** as the technology closest to objectives
- chosen by many **EVDO operators**, such as Verizon and KDDI

- 
- LTE will extend the GSM / UMTS world footprint, with **greater economy of scale and wider roaming**

# 2

## delivering voice to LTE customers

### target architecture

- VoIP is to be steered by IMS, with efficient use of radio resources and IMS-enabled support of advanced services
- rich communication suite (RCS) trial in France

### handover

- at the border of LTE coverage, SRVCC will provide hand-over with 2G and 3G coverage by same operator

### roaming

- international roaming with 2G-3G networks is warranted
- all LTE terminals will be multimode terminals, therefore at least benefit from voice service on legacy networks

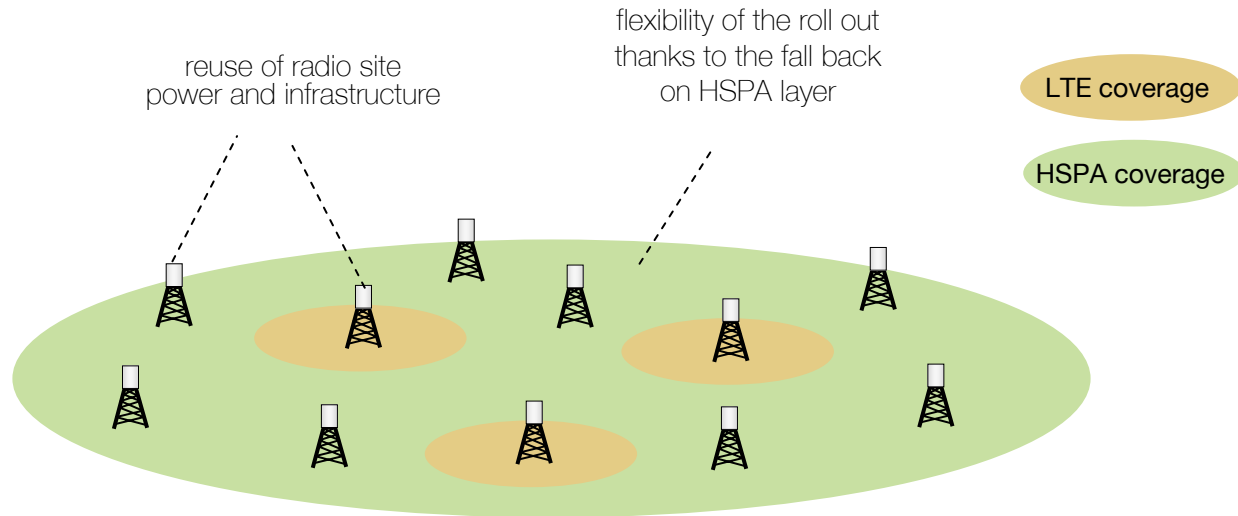
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### interim solution

- if LTE handsets were available before IMS deployment, interim solution would be to fall back on 3G network for voice, as standardized by 3GPP (use of CSFB)

# 2

## impact on CAPEX and OPEX



flexibility on  
CAPEX for  
rollout

- initial LTE rollout can focus on dense areas, on existing sites (co-sited with 3G), with an order of magnitude of €50-100 m CAPEX (excluding licence) for inner districts of two major French cities
- further rollout will be driven by market demand

reduced  
OPEX

- self-optimized network (SON)
- improved spectral efficiency
- IP induced lower cost of transport per bit

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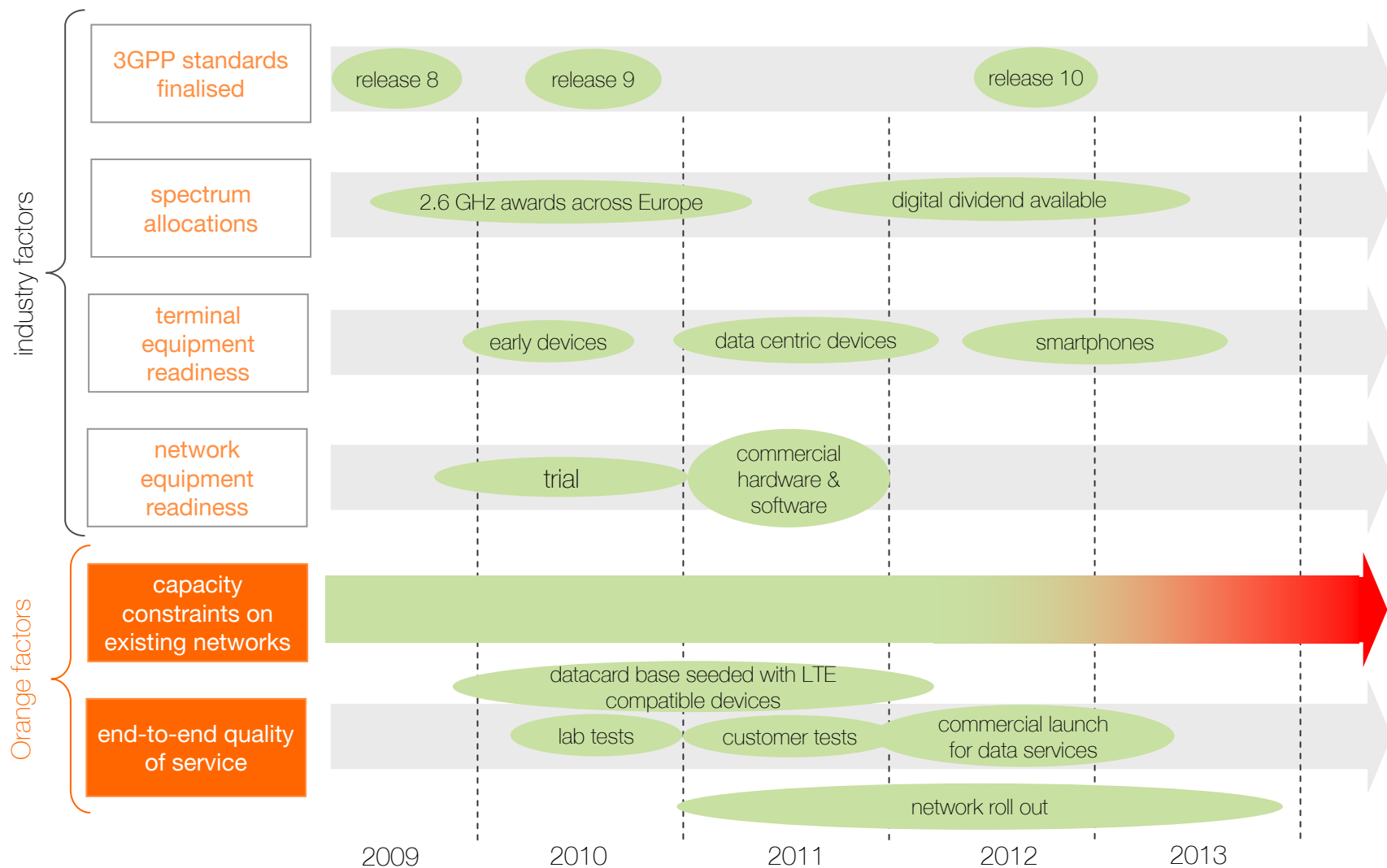
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## 3

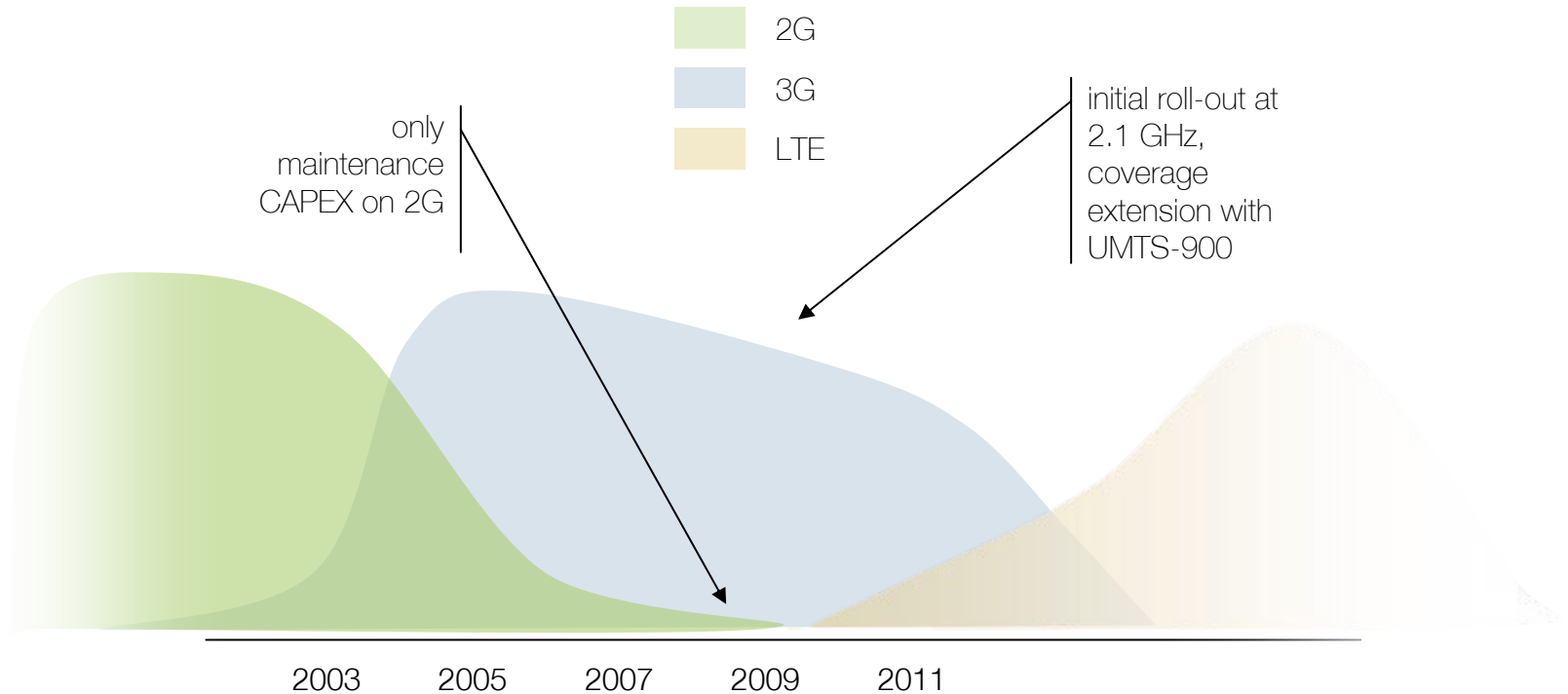
# timeline for LTE deployment: current view for commercial launch around 2012



→ marketing and economic requirements will drive commercial launch



### 3 | impact on CAPEX: typical phasing in European countries



→ CAPEX to sales ratio for mobile to remain approx. constant

# 4

## conclusion



- higher spectrum efficiency
- reduced latency
- reduced costs thanks to flat architecture
- compatibility with the GSM/UMTS family
- modular roll out on the back of HSPA+
- technology adopted by both GSM/UMTS and EVDO worlds

- multimode device availability
- open interfaces
- SON features availability
- easy roll-out of network equipment



# glossary

# glossary (1)

<b>3G</b>	UMTS Rel. 99
<b>3G+</b>	HSDPA, HSUPA, HSPA+
<b>AUPU</b>	Average Usage Per User
<b>BSC</b>	Base Station Controller
<b>BSS</b>	Base Station Sub-system
<b>CAPEX</b>	Capital Expenditure
<b>CSFB</b>	Circuit Switched Fall-Back
<b>EDGE</b>	Enhanced Data GSM Environment
<b>EVDO</b>	Evolution Data Optimized (same family as IS95 and cdma2000)
<b>GSM</b>	Global System for Mobile communication
<b>HSDPA</b>	High Speed Downlink Packet Access
<b>HSPA</b>	High Speed Packet Access
<b>HSUPA</b>	High Speed Uplink Packet Access
<b>IMS</b>	Internet Protocol Multimedia Subsystem
<b>IP</b>	Internet Protocol
<b>LTE / EPC</b>	Long Term Evolution / Evolved Packet Core
<b>LMMSE</b>	Linear Minimum Mean Square Error
<b>HoM/MIMO</b>	High-order modulations /Multiple-Input Multiple-Output
<b>NGMN</b>	Next generation mobile Networks
<b>OPEX</b>	Operational Expenditure
<b>RAN</b>	Radio Access Network

## glossary (2)

<b>RNC</b>	Radio Network Controller
<b>SON</b>	Self Optimized Network
<b>SRVCC</b>	Single Radio Voice Call Continuity
<b>UMTS</b>	Universal Mobile Telecommunications System
<b>UTRAN</b>	UMTS Terrestrial Radio Access Network
<b>VoIP</b>	Voice over Internet Protocole
<b>WiMAX</b>	Worldwide Interoperability for Microwave Access