

# Deployments and evolutions of Mobile Broadband networks and services

## LTE EPC in the France Telecom Orange Strategy

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## agenda

1 LTE is part of our mobile broadband strategy

2 LTE main characteristics and challenges

3 France Telecom timeline for LTE

4 conclusion

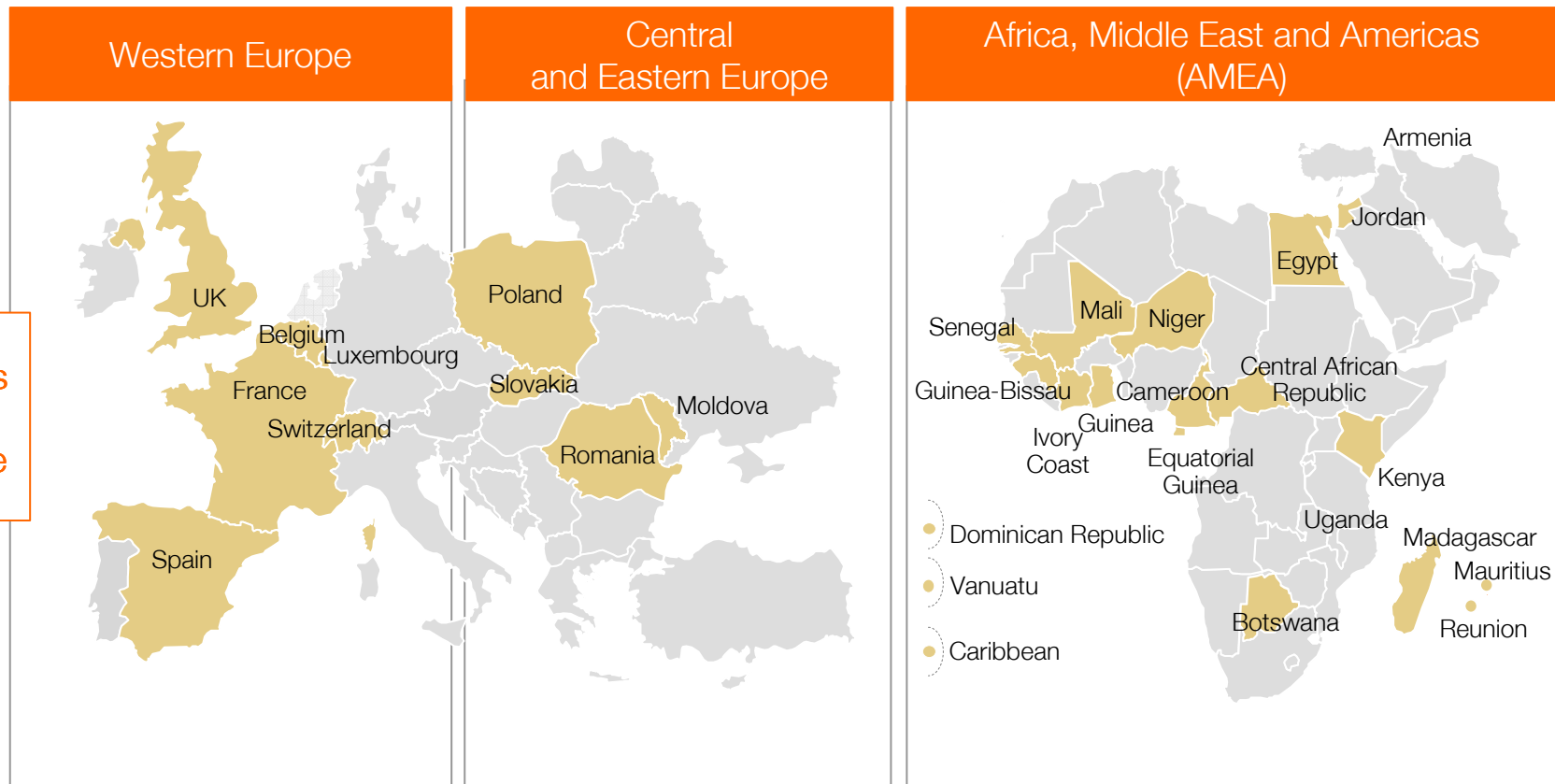
# Mobile presence in 30 countries

1

End of 2008 : 121.8 millions mobile customers (+11% y.o.y.)

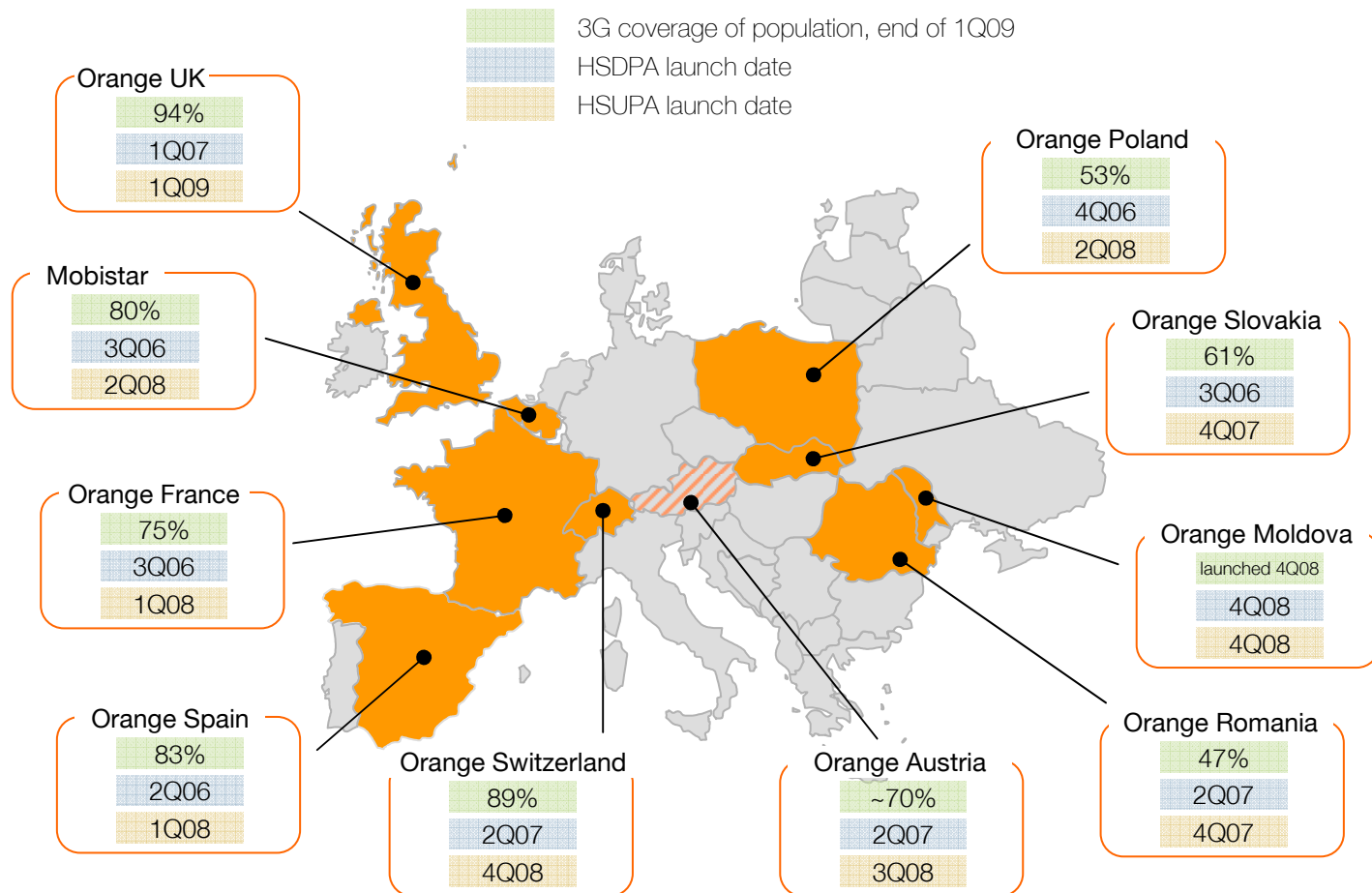
26.7 millions mobile broadband customers (+70% y.o.y.)

Orange is solid #2 in Europe



# 1

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

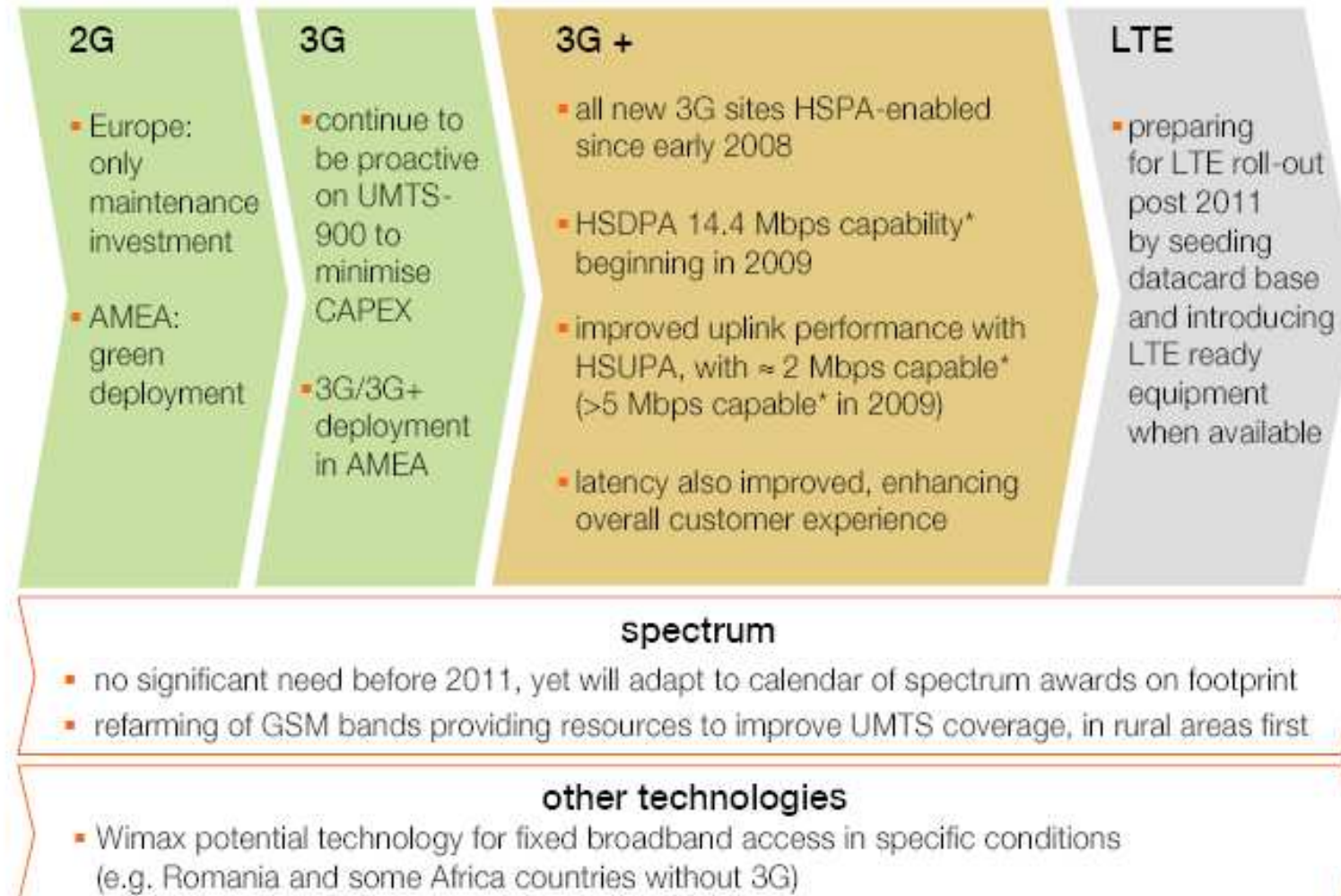


→ services delivered through a consistent utilization of single technology family: GSM, EDGE, 3G (UMTS phase 1), HSDPA and HSUPA

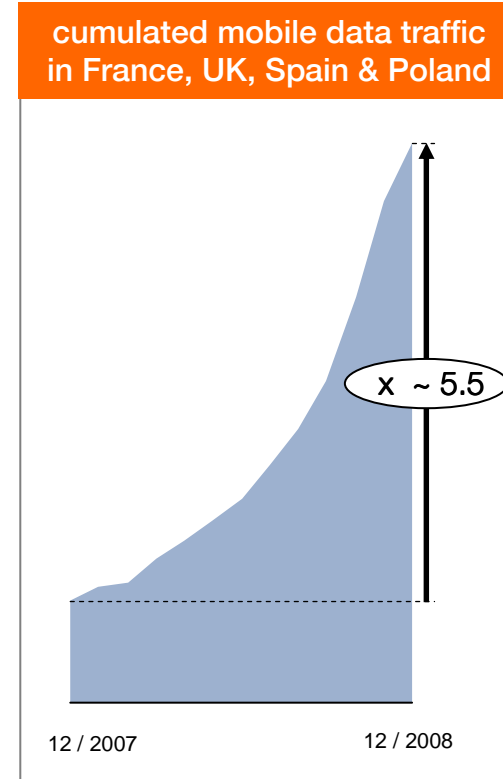
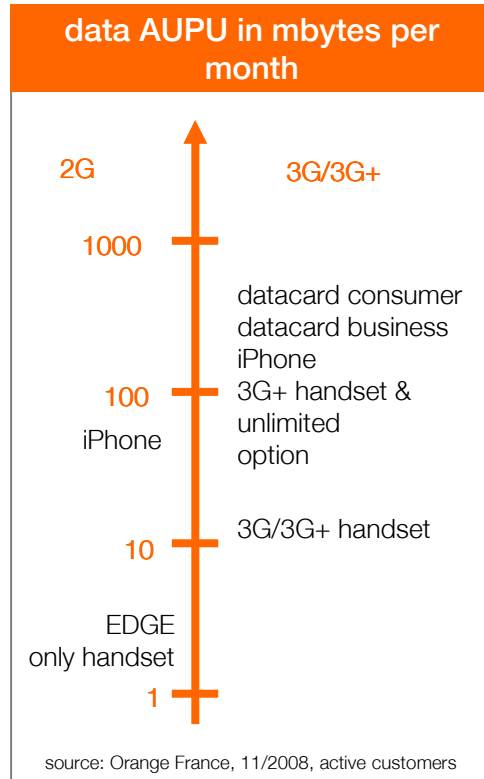
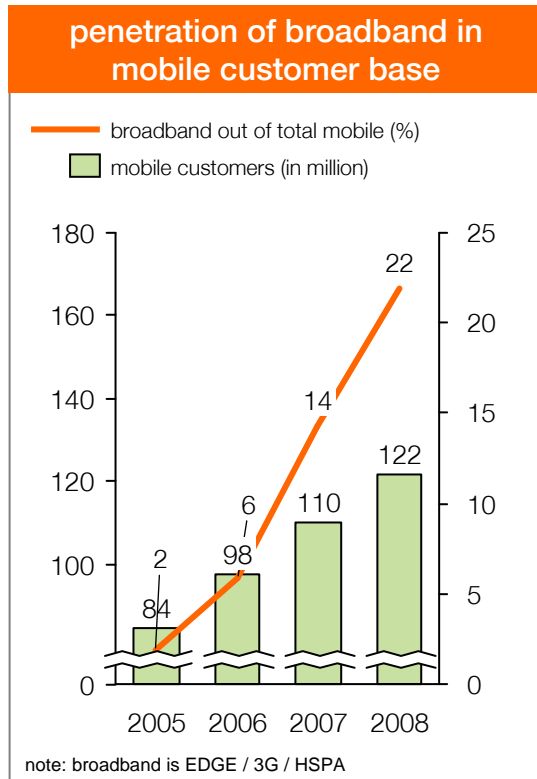
# 1

## Wireless access :

### Rolling out new technologies at the right pace

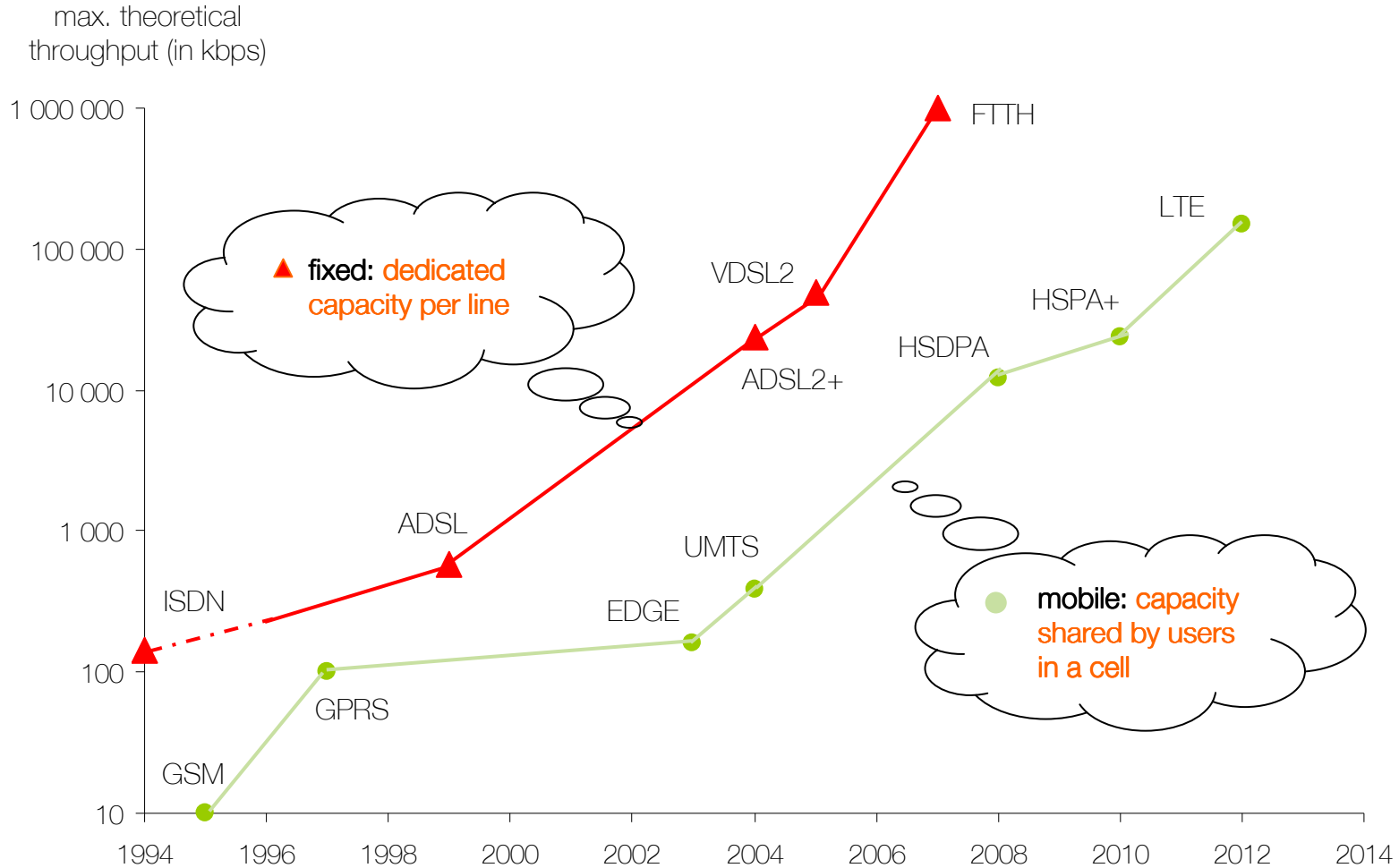


# 1 coverage and technology rollout for mobile broadband resulted on a rapid rise of multimedia usage



- 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



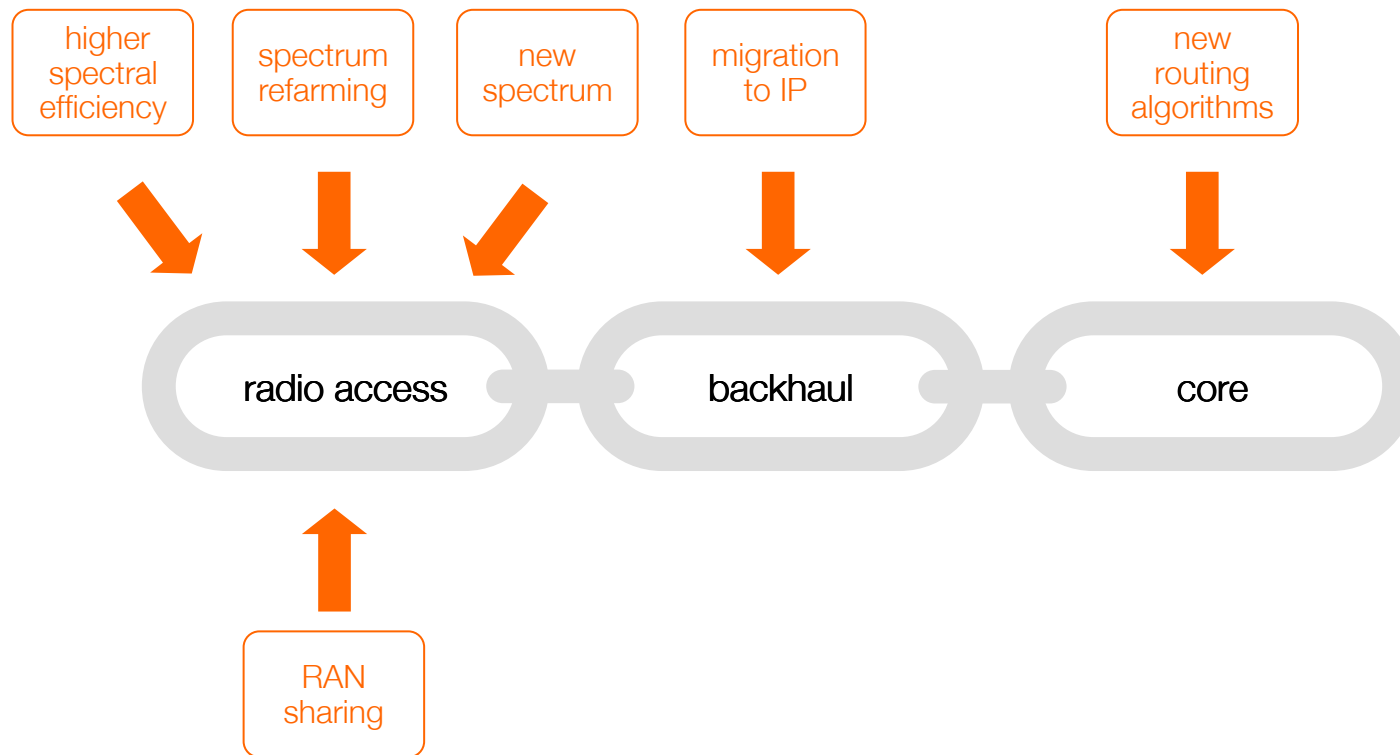
- moreover, fixed broadband capacity is dedicated to each line, whereas mobile broadband capacity is shared by all customers located in same cell

## Stakes and challenges for mobile broadband

- Mobile Broadband is currently driving a huge increase in data traffic
  - increasing data-centric applications, requiring 10's or 100's of Mbit/s
  - increasing adoption of mobile devices such as smart phones, video-enabled handsets, mobile broadband access and other media enriched services
  
- Voice minutes per subscriber are also still increasing
  
- This may create congestion in existing spectrum in certain locations as early as 2011- 2012 in some countries → New spectrum will be needed, and will support new technologies such as LTE
  
- Mobile broadband revenues will not grow at the same rate as traffic → cost effective solutions are absolutely necessary
  
- Broadcast TV on mobile is consuming a lot of capacity → this application should be offloaded to multicast technologies using dedicated spectrum (TDD), but with continuity with unicast services

1

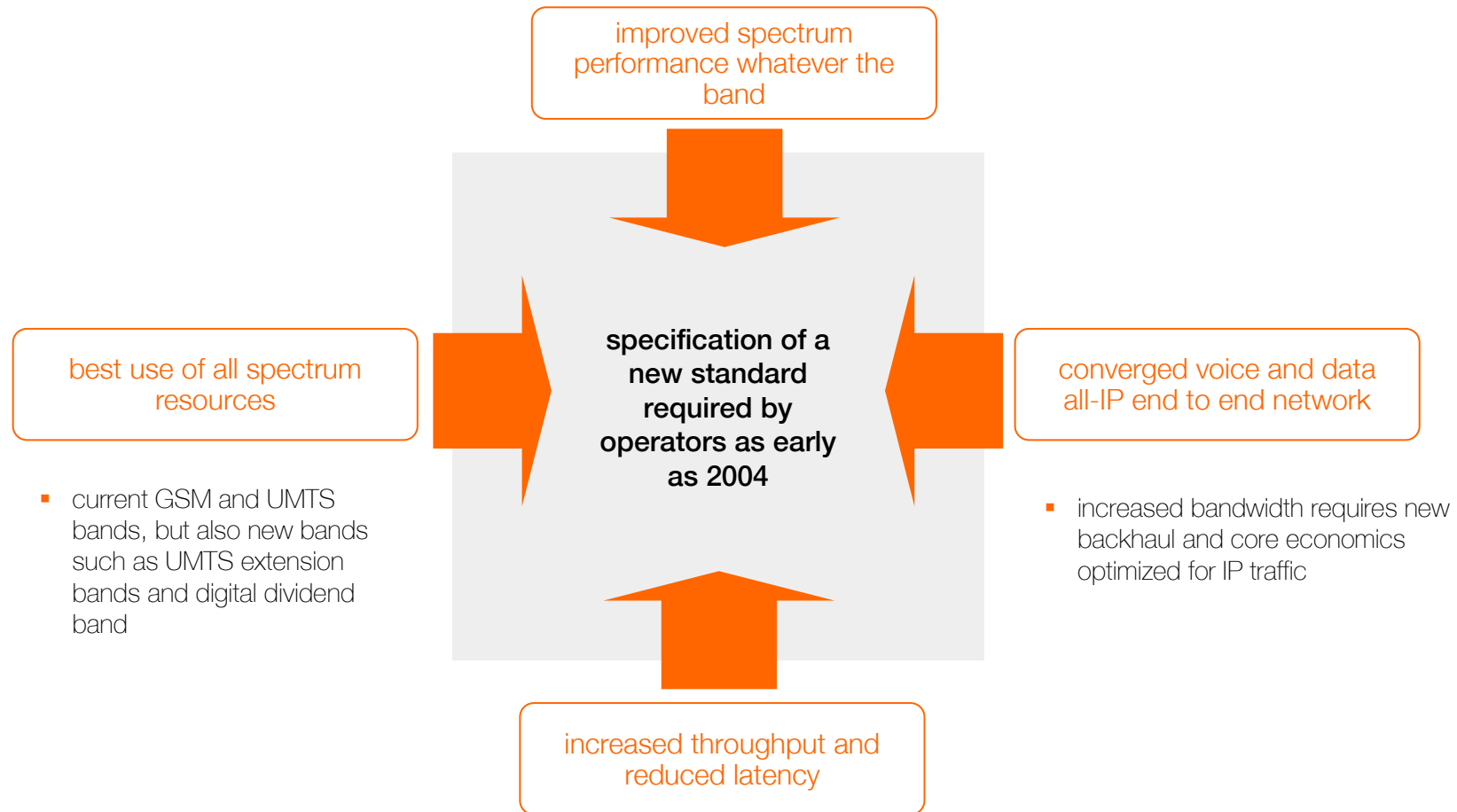
within next 3 years, a combination of levers will help absorb mobile data traffic growth



→ 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

1 LTE is part of our mobile broadband strategy

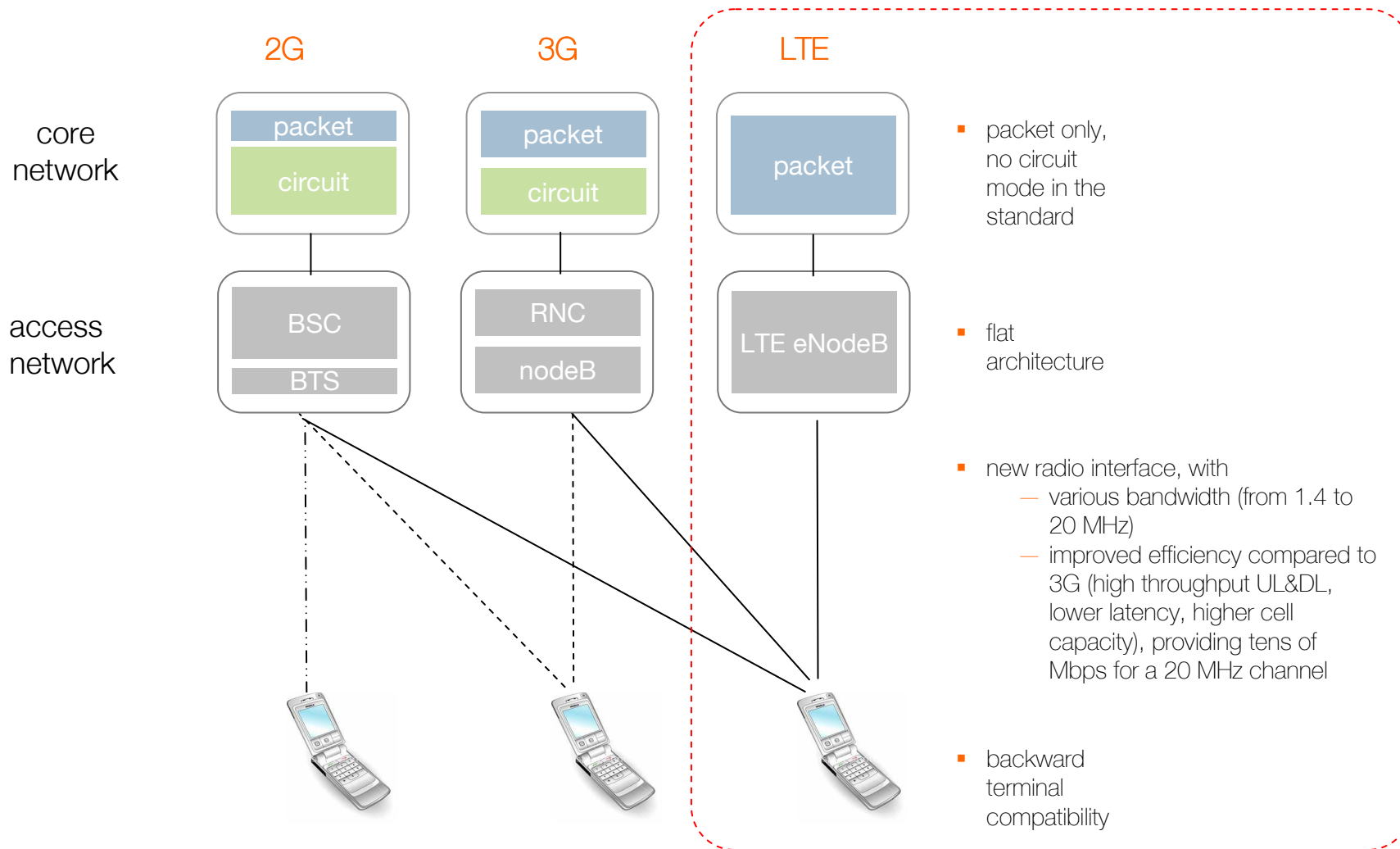
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# 2

## LTE will bring significant improvements



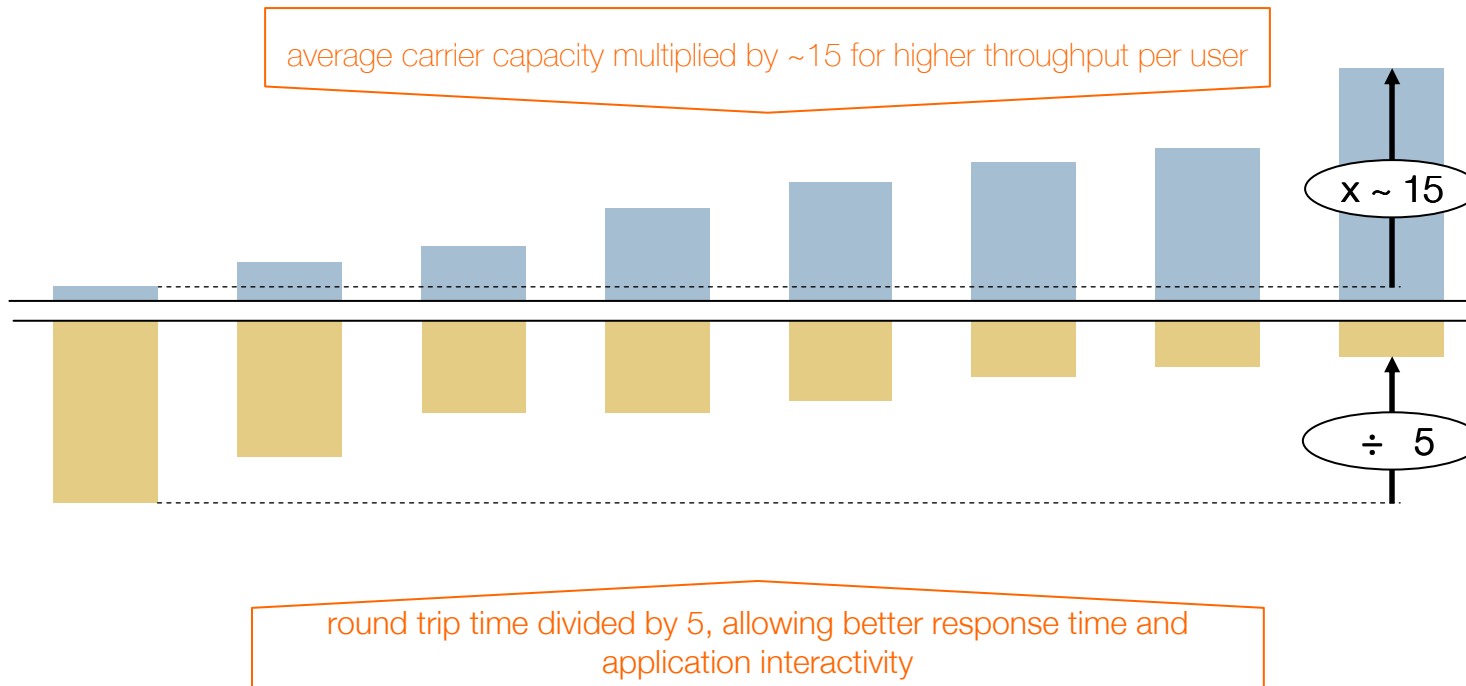
circuit : dedicated path between two terminals over which a communication session is established

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

R99	R5.1 1.8 Mbps	R5 3.6 Mbps	R5 3.6 Mbps	R6 7.2 Mbps	R6 14.4 Mbps	R7 28 Mbps	R8 LTE
	Rake	Rake	Rake	LMMSE	LMMSE	MIMO 2X	MIMO 2X
2004	2005	2006	2007	2008	2009	2010	2012



# 2

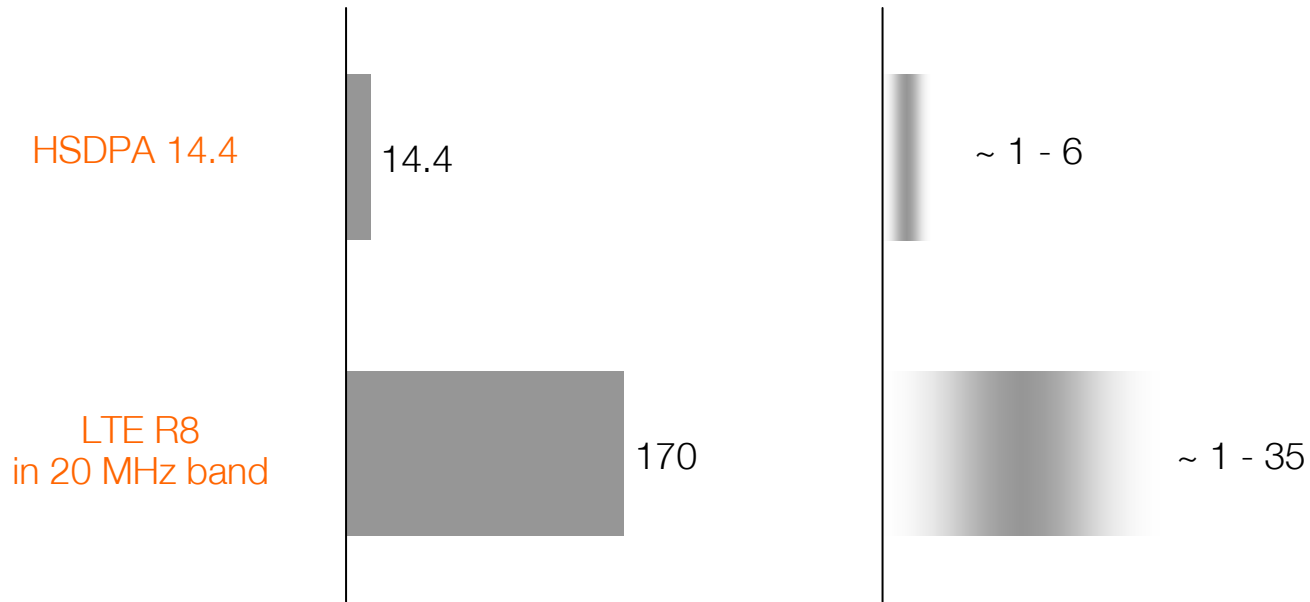
## yet, peak theoretical radio throughput does not directly translate into end user bandwidth experience

in Mbps

peak theoretical radio throughput – headline advertised rate

practical data rate for a user, depending on:

- distance from transmitter\*
- number of active users in the cell
- profile of services used



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

## 2

### Orange has supported NGMN to select LTE as the best technology to answer operators' needs

#### Lower cost operations

LTE should help operators moving towards a lower cost operating regime through lower Intellectual Property Rights (IPR), Self-Optimising networks (SON), flat RAN/CN & transport architectures, and economies of scale.

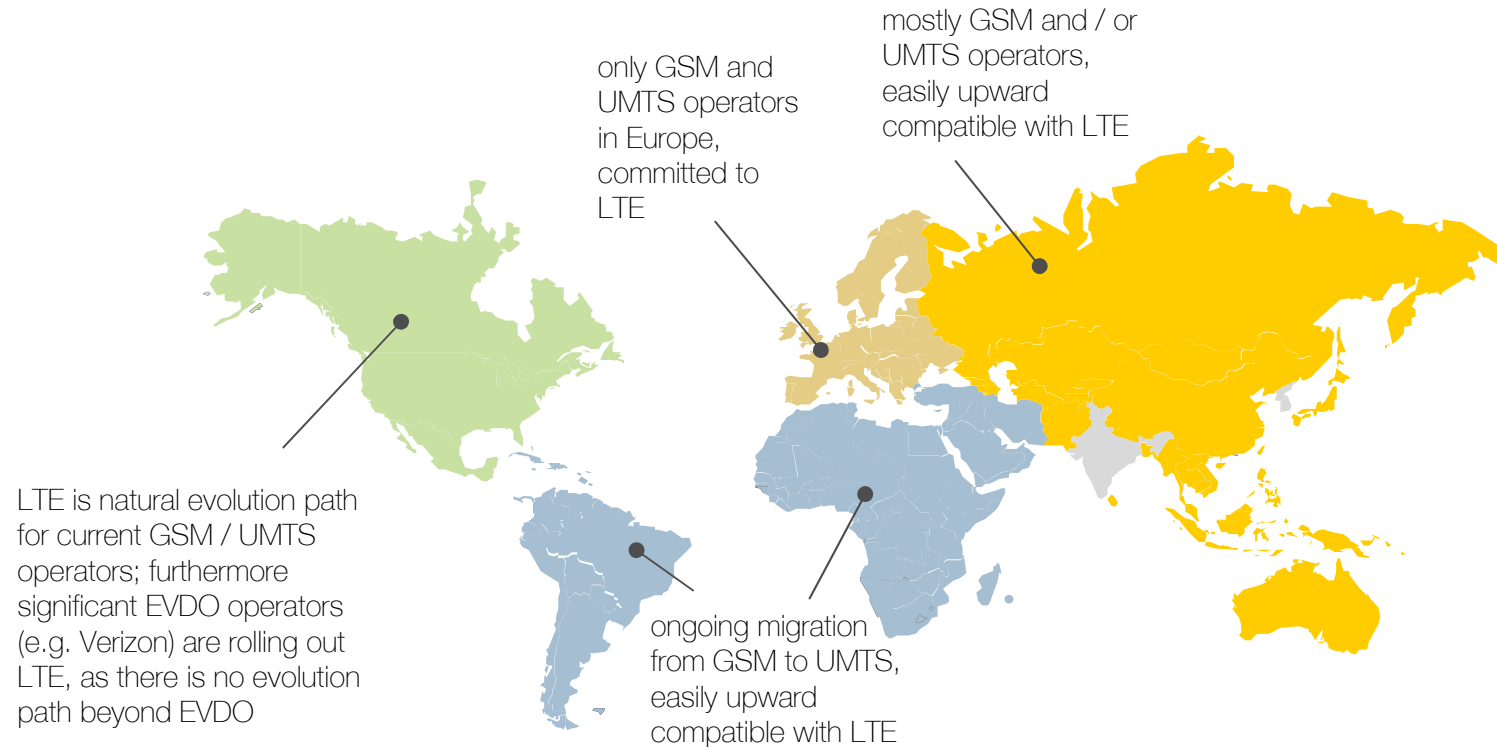
#### More flexible deployment

The flexible channel bandwidth, harmonised FDD/TDD modes, and LTE-advanced evolutions will enable much more flexible deployment options in increasingly diverse spectrum opportunities.

#### Evolutionary transition

LTE is compatible with GSM/EDGE and UMTS/HSPA as well as CDMA 2000 ; this will allow performing progressive deployments because the 2G/3G layer can be used as a fallback by the multimode devices - allowing for an evolutionary path in many cases, which is appropriate considering the nature of the demand.

## 2 | LTE is widely adopted by operators



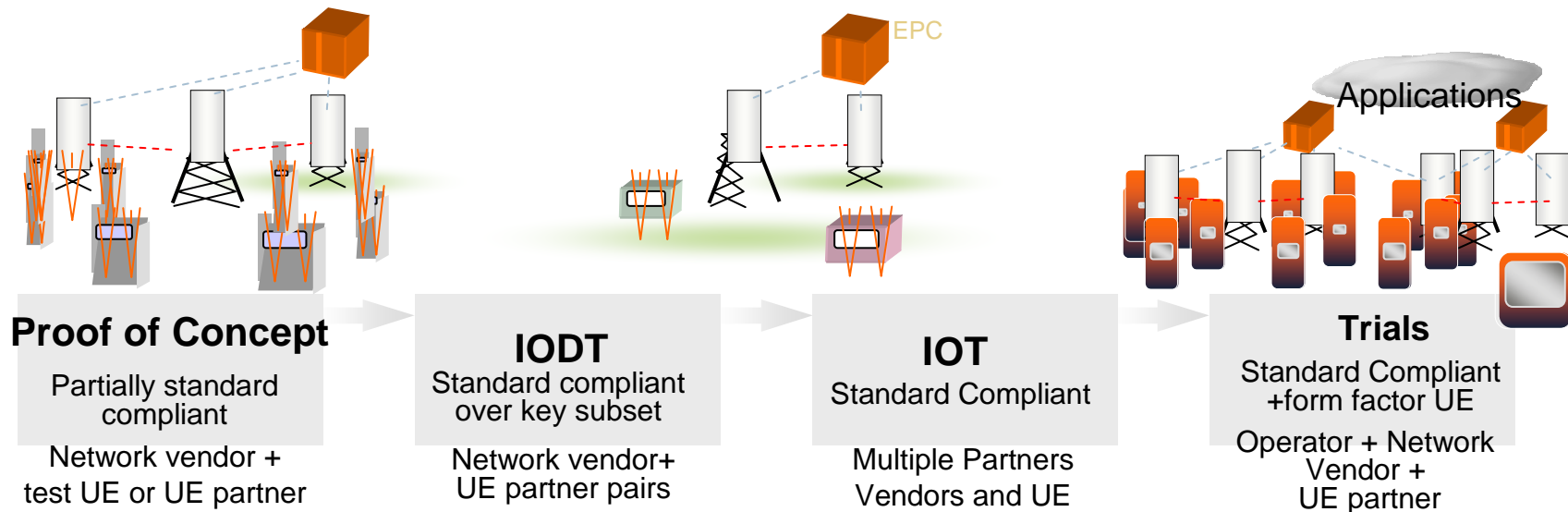
- supported by **GSMA** as the natural evolution for GSM/UMTS operators
- declared by **NGMN** as the technology closest to objectives
- chosen by many **EVDO operators**, such as Verizon and KDDI



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

# 2

But trials are critical in 2009 to evaluate performance et consolidate LTE ecosystem...



- LTE/SAE Trial initiative (LSTI) uses the NGMN requirements and guidelines as an input to their testing work
- The LSTI operators are active in:
  - Pushing the introduction of advanced radio features testing in LSTI Proof of Concept phases: MIMO schemes, RRM, interference coordination etc...
  - Visiting and observing the test session
  - Preparing the interoperability test plans, trial test plans and results sharing
  - Hosting the LSTI trials and Deployment strategy will make use of both theoretical analysis and results of field trials
- ➔ LSTI is an efficient way to share experiences between the LTE players
- ➔ LSTI widens the LTE/EPC ecosystem

## 2 | ...as LTE still faces some important challenges

- LTE is expected to reduce the cost per bit regime:
  - Self Organizing Network could save OPEX, but to do so, more standardization is needed:
    - Low level of SON features support in release 8
    - Many proprietary implementations in vendors products
    - Release 9 shall include a lot more SON features
  - IPR are expected to be lower in LTE, but they will be added on top of 2G/3G IPR in multi-mode terminals
  - Operators require multi-vendors capabilities
- The support of voice in LTE is being clarified, some optimisations effort are still necessary
- The infrastructure manufacturers shall provide operators with easy means to migrate their 3G radio networks towards LTE (in particular no crane operations should be necessary)
- The backhaul is expected to be the great challenge in LTE deployments

# 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

### 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

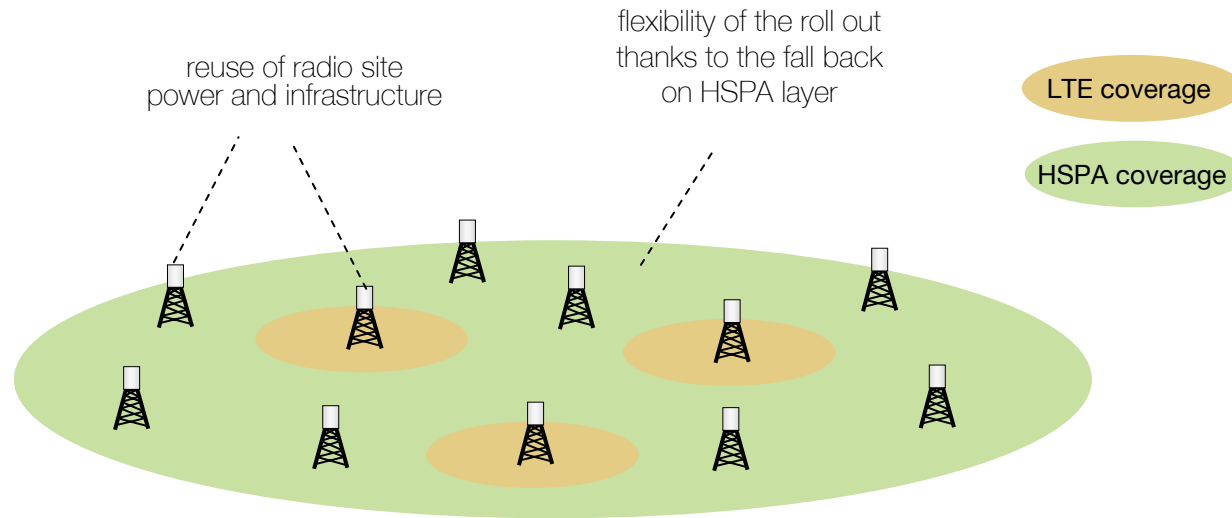
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### interim solution

- 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)
- 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

# 2

Availability of LTE capacity on any device needing broadband will be key



## 2

### Multi-band & multi-technology devices will be the key of success for LTE deployment

- In a first step LTE devices will be data only devices (Laptop, dongles ...) to help the success of mobile broadband.
- In a second step LTE data devices enabling the speech service are needed
  - The voice quality in a LTE device shall be at least as good as in a UMTS or GSM device.
- The power consumption of a LTE handset shall meet the same standard as current UMTS multimedia handsets.
- Implementing LTE in a device should not have any impact on its form factor.
- All LTE devices shall comprise:
  - GSM on 4 bands
  - UMTS on 3 or 4 bands
  - Some other technologies like CDMA 2000 might be required
  - And LTE on some bands:  
The target implementation will include **at least 4 bands for LTE**  
High frequency bands will provide the capacity in the urban areas  
Low frequency bands will enable to get larger coverage in the rural areas

## agenda

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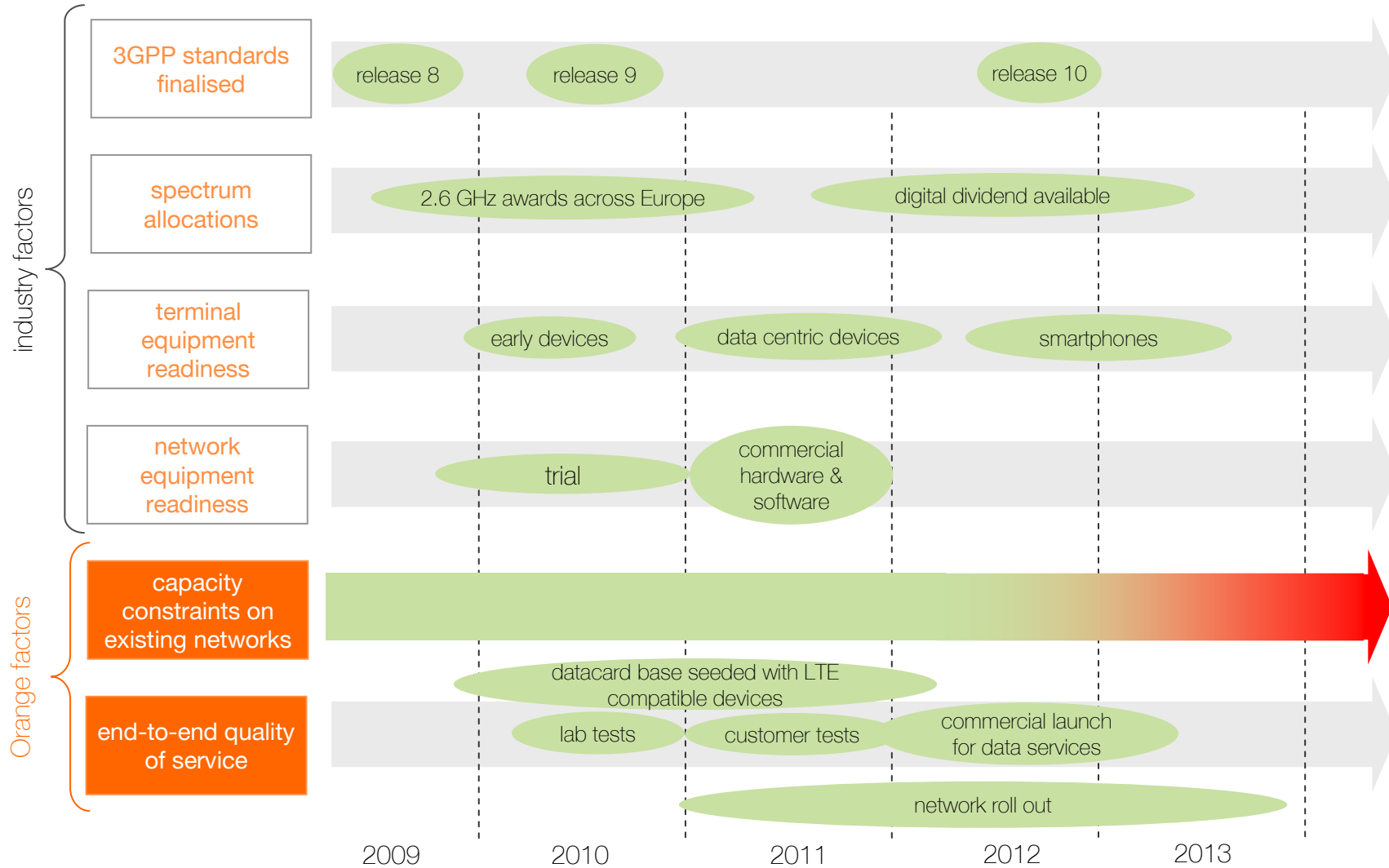
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# 3

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



→ marketing and economic requirements will drive commercial launch


# 4

## conclusion



LTE / EPC is the  
new horizon for  
mobile technology

commercial launch only  
when LTE **end to end**  
**customer experience**  
superior to the one with  
HSPA+



on going efforts to  
resolve **outstanding**  
**issues**

- 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