



IMT-Advanced process:

current status, new services and applications
for the users

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agenda



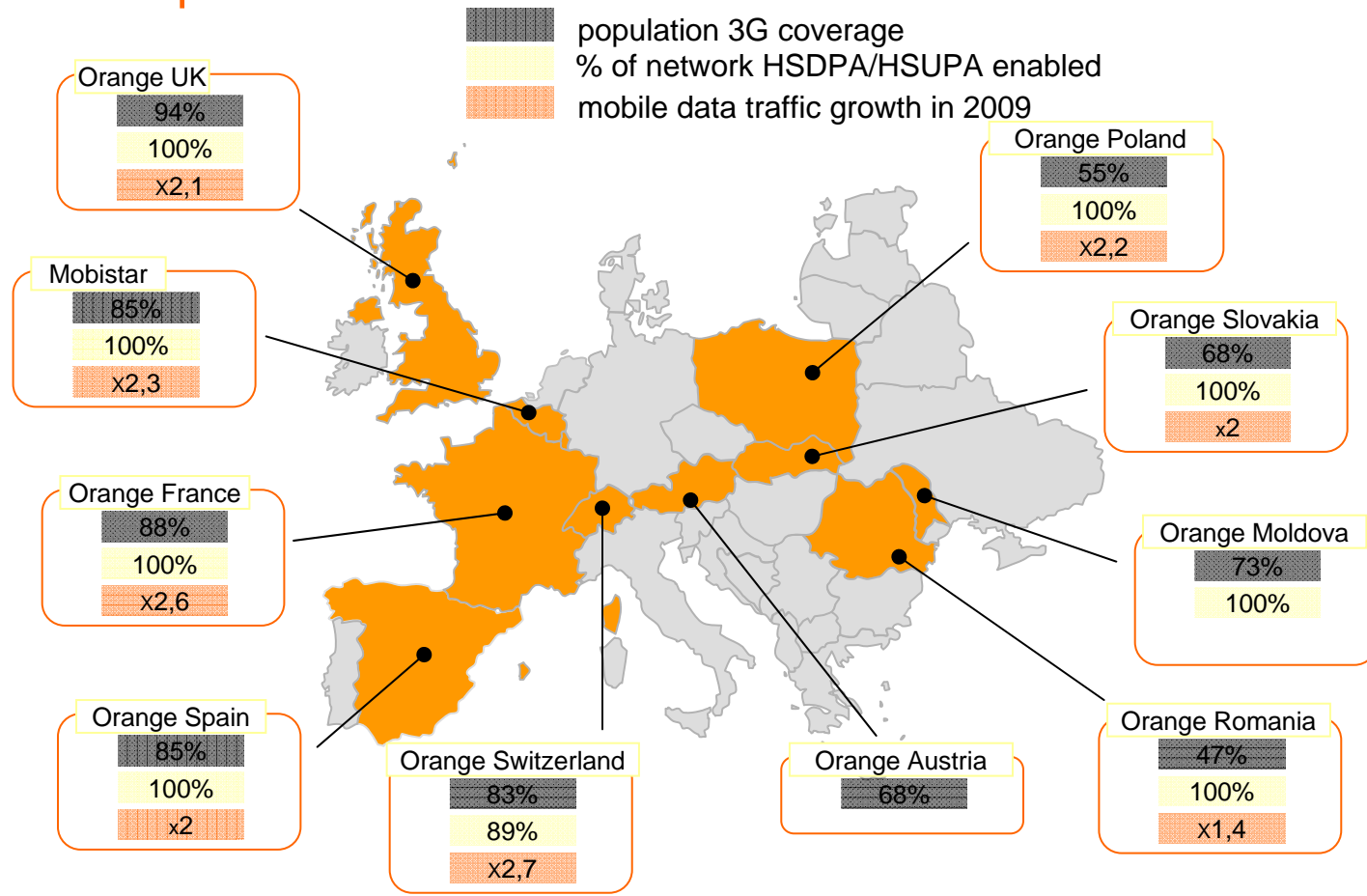
1 mobile broadband engine of traffic growth

2 IMT-Advanced: technical framework

3 IMT-Advanced: new services for users

4 conclusions

France Telecom Orange is delivering successfully mobile broadband in Europe



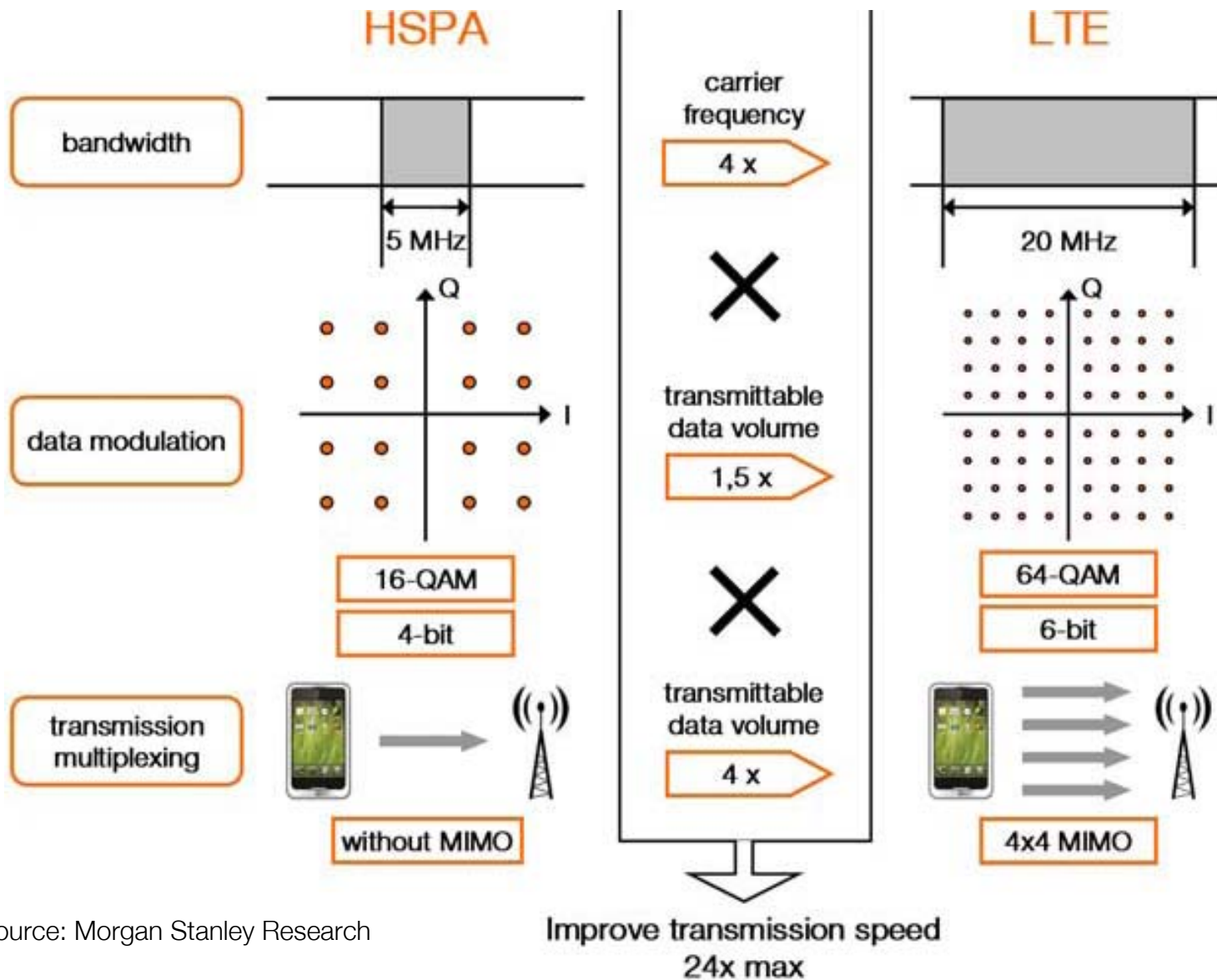
consistent utilisation of a single technology family:
GSM, EDGE, W-CDMA, HSDPA/HSUPA
to be followed by LTE and **LTE-Advanced**

super-fast mobile broadband with LTE and LTE-Advanced



- there are now **over a billion broadband customers across the world**, for all technologies combined (mobile, fixed and cable)
- with HSPA and LTE, usage that was previously the sole preserve of fixed connections reaches the mobile world
- LTE creates a very **large eco-system**, offering an evolution path not only for GSM/UMTS operators but also for CDMA operators
- LTE opens the way for a pure-IP network architecture, spectral efficiency 3 to 5 times greater than the most sophisticated 3G networks, and theoretical speeds reaching between 173 Mbps and 326 Mbps, with a **20 MHz bandwidth**, depending on the number of MIMO antennas used
- content, services and terminals (netbooks, tablets, smartphones) are genuinely building the appetite for the digital world

market moves on to LTE



Source: Morgan Stanley Research

market moves on to LTE

Commitments and launches on LTE deployments in Europe

country	operator	trials	deployment / launch
Austria	T-Mobile		2011-2012
Austria	Mobilkom Austria		2011-2012
Austria	Hutchison 3		2011-2012
Austria	Orange		2011-2012
Finland	Elisa		to be confirmed
Finland	TeliaSonera		2010
Finland	DNA		to be confirmed
France	Orange		2011-2012
Germany	T-Mobile		2011
Germany	Vodafone	2009	2010-2011
Germany	O2 (Telefonica)	2010	to be confirmed
Ireland	Hutchison 3		2011
Italy	Telecom Italia	2009	to be confirmed
Norway	TeliaSonera	2009	déc-09
Norway	Telenor Norway	2009	to be confirmed
Portugal	TMN		to be confirmed
Spain	Telefonica		to be confirmed
Sweden	TeliaSonera	2009	déc-09
Sweden	Telenor /Tele2 (Net4 Mobility)	2009	2010
UK	O2 (Telefonica)	2009	To be confirmed

Source: GSA, Safrecom (December 10, 2009)

- both FDD and TDD mode exist
- bandwidths: 1.4/3/5/10/15/20 MHz
- more deployment flexibilities for operators

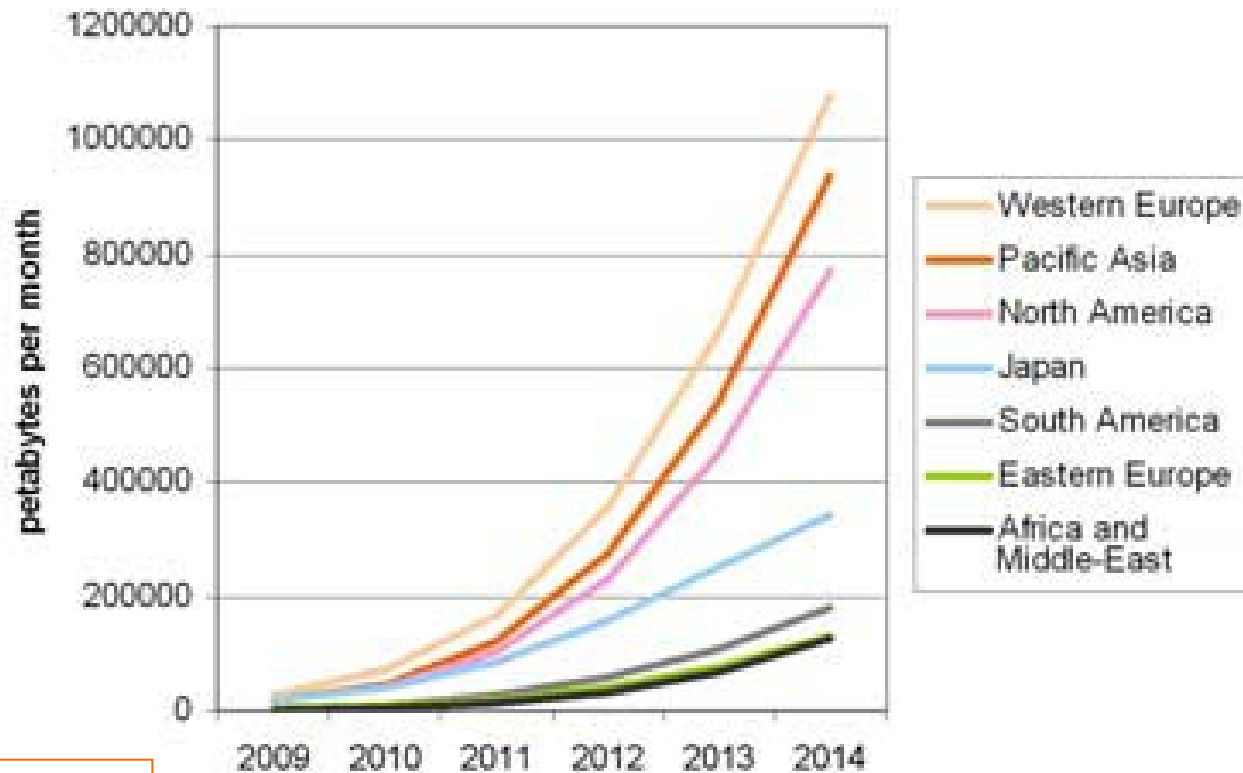
➤ TeliaSonera is the first operator to commercially launch, in December 2009, a LTE network (Stockholm/ Sweden & Oslo/Norway)

➤ according to the Global Supplier Association, 59 operators in 28 countries are involved in deploying an LTE network

➤ twenty-two operators are expected to offer a commercial service by the end of 2010, including Verizon Wireless (USA), NTT DoCoMo (Japan), and China Mobile

➤ LTE TDD will be demonstrated in Expo 2010 Shanghai China

mobile data traffic forecasts (2009-2014)



Source: Cisco

- mobile data traffic is expected to double every year through 2014, increasing 39 times between 2009 and 2014
- video should represent almost 66 % of the world's mobile data traffic by 2014

agenda



1

mobile broadband engine of traffic growth

2

IMT-Advanced: technical framework

3

IMT-Advanced: new services for users

4

conclusions

IMT-Advanced: current status at ITU

- two candidate Radio Interface Technologies (RIT) for IMT-Advanced were submitted to ITU-R in October 2009
 - **LTE-Advanced** (FDD&TDD) and
 - **IEEE 802.16m**
- LTE-Advanced is an evolution of LTE Release 8 that aims to meet the requirements defined by ITU-R for IMT-Advanced
 - IMT-Advanced requirements impose essentially two types of modifications to LTE:
 - the support of **larger bandwidths** (40 MHz)
 - **higher cell-average** and **cell-edge spectral efficiencies**

- evaluation of IMT-Advanced candidate RITs is performed by 14 independent evaluation groups (IEG)
 - evaluation results will be provided to the WP5D in **June 2010**



IMT-Advanced: next steps at ITU

- ITU-R WP5D is developing regulatory framework for IMT-Advanced:
 - **ITU-R Report [IMT Radio]**
 - October 2010: **evaluation** and **consensus building** work to be finalised
 - ITU-R will not endorse the capability of a proponent to reach values found by IEG, but will only confirm IEEE and 3GPP evaluation work through IEG work
 - only values from 3GPP and IEEE in the final report (values from IEGs could be annexed for information)
 - **ITU-R Recommendation [IMT.RSPEC]**
 - first half 2011: detailed **specifications** of IMT-Advanced technologies likely to be finalised
 - it will not be a copy and paste of 3GPP or IEEE specifications
 - ITU focuses on interoperability, intra-techno coexistence matters etc



evolution within a technological family – from HSPA to HSPA+ to LTE and LTE-Advanced

- LTE-Advanced: a very large number of organisations, with some 373 companies, including equipment suppliers and network operators, are involved in the preparation of the 3GPP radio access technology
- the initial version of LTE-A corresponds to Release 10 of 3GPP
 - Study Item started in May 2008 and ended in March 2010
 - to meet the ITU requirements, a set of new features has been considered to be added to the LTE Rel-8 basis:
 - carrier aggregation: for higher bandwidth and spectrum usage flexibility
 - MIMO enhancements in uplink and downlink: for increased capacity and user throughputs
 - Coordinated Multipoint transmission and reception (CoMP): for better cell-edge performance
 - relaying: for cost-efficient coverage, and cell-edge performance enhancement



capacity and cell-edge user throughputs

		Ant. Config.	Rel. 8 LTE ^{*1}	LTE-Advanced ^{*2}	IMT-Advanced ^{*3}
Capacity [bps/Hz/cell]	DL	2-by-2	1.69	2.4	-
		4-by-2	1.87	2.6	2.2
		4-by-4	2.67	3.7	-
	UL	1-by-2	0.74	1.2	-
		2-by-4	-	2.0	1.4
Cell-edge user throughput [bps/Hz/cell/user]	DL	2-by-2	0.05	0.07	-
		4-by-2	0.06	0.09	0.06
		4-by-4	0.08	0.12	-
	UL	1-by-2	0.024	0.04	-
		2-by-4	-	0.07	0.03

*1 See TR25.912(Case 1 scenario) *2 See TR36.913(Case 1 scenario)

*3 See ITU-R M.2135(Base Coverage Urban scenario)

Source: http://www.3gpp.org/IMG/pdf/2009_10_3gpp_IMT.pdf

LTE-Advanced: 3GPP status

- during Summer 2009, 3GPP performed the self evaluation of the LTE-A performance to verify that the IMT-Advanced requirements were met
 - results from the self evaluation are captured in technical report TR36.912
 - conclusion is that LTE-A meets the ITU requirements in all four environments (Urban macro, Urban micro, Rural macro and Indoor hot spot), both for FDD and TDD
- specification work on Release 10
 - exact set of features to be standardised in Rel-10 was defined at the 3GPP RAN Plenary meeting in December 2009
 - carrier aggregation and SU-MIMO enhancements (UL and DL) will be specified, as well as (inband and outband) Type 1 Relays
 - Enhanced MU-MIMO will also be specified in Rel-10



evaluation and coordination process

- coordination meetings to review the two radio technologies submitted to ITU-R as IMT-Advanced candidates:
 - 3GPP technology workshop, 17-18 December 2009
 - IEEE technology workshop, 13 January 2010
 - purpose : to facilitate communication between the proponents and the IEG and to facilitate the exchange of views among IEG
 - results of the experiments and analyses performed by the IEG correlate well with the results of the self-evaluations
- in February 2010, twelve preliminary evaluation reports were provided by the IEG for consideration by ITU-R WP 5D
- next coordination meetings are scheduled in Beijing:
 - IEEE on 17 May 2010
 - 3GPP on 18 May 2010
 - will provide opportunity to IEG to present their almost final results and discuss any problems



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1

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2

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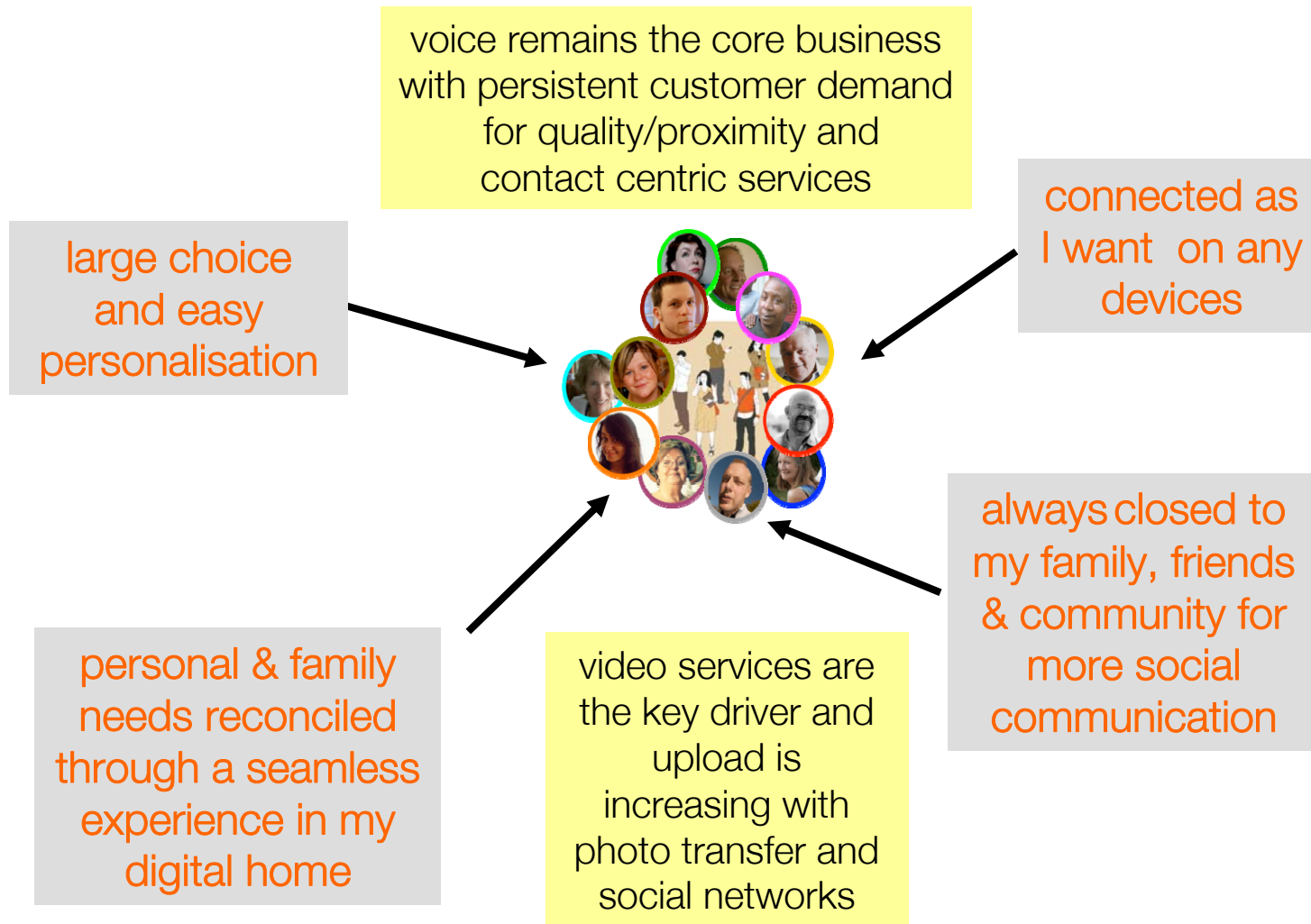
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my mobile also becomes a domestic device

- large **acceptance** of **technological advances** by the consumers
- the **usages** that will ensure the success of the IMT-Advanced services already exist e.g. communication, entertainment, time management ...
- the same kind of **usage at home** or **on the move**, regardless of the location
- very **high mobile broadband** is one mean by which many services can be enriched and popularised
- video and image **quality** will improve existing services
- symmetry of data flow enables **interactivity**



market/customer main trends



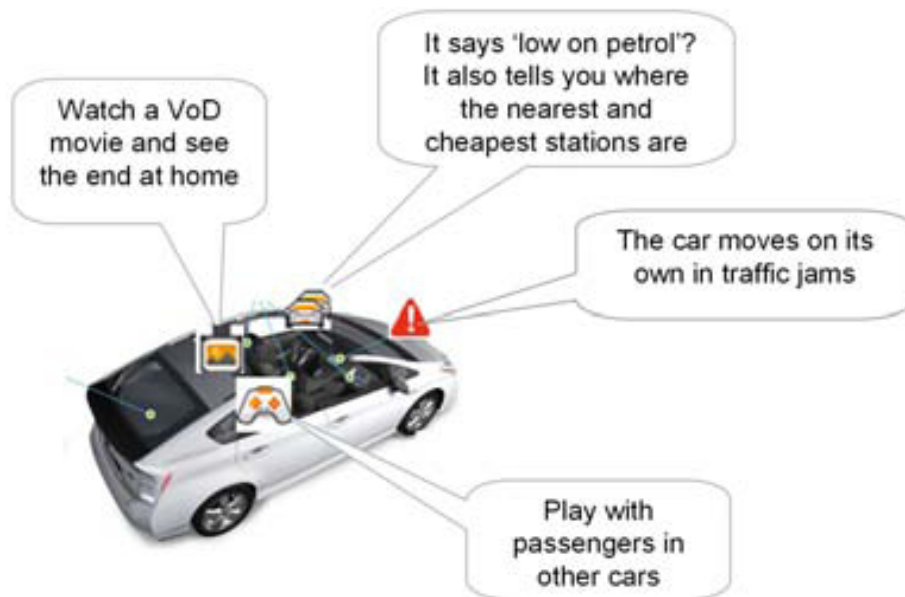
new mobile services and applications for the users

- deliver very high-definition images instantly anywhere in the world
- alerts enabled doctors to call their patients in the event of a risk and treat them remotely



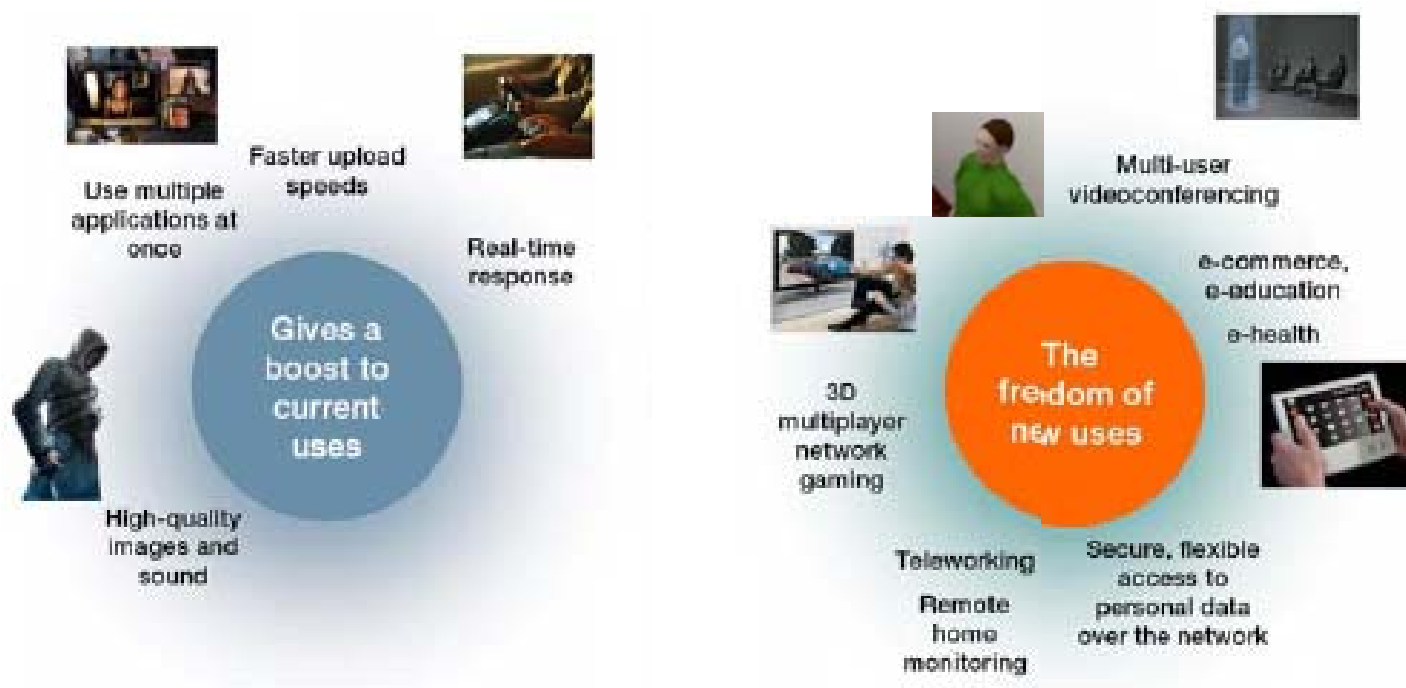
- distance learning as if in a real classroom
- strong M-payment uptake
- social networking: file transfers will explode

dreaming about it?
it will be possible with IMT-Advanced !



what if it were possible to act at a distance using one's own **avatars** in virtual business meetings?

IMT-Advanced will make it possible to satisfy increasingly bandwidth-consuming new usages and to plan for them !



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1

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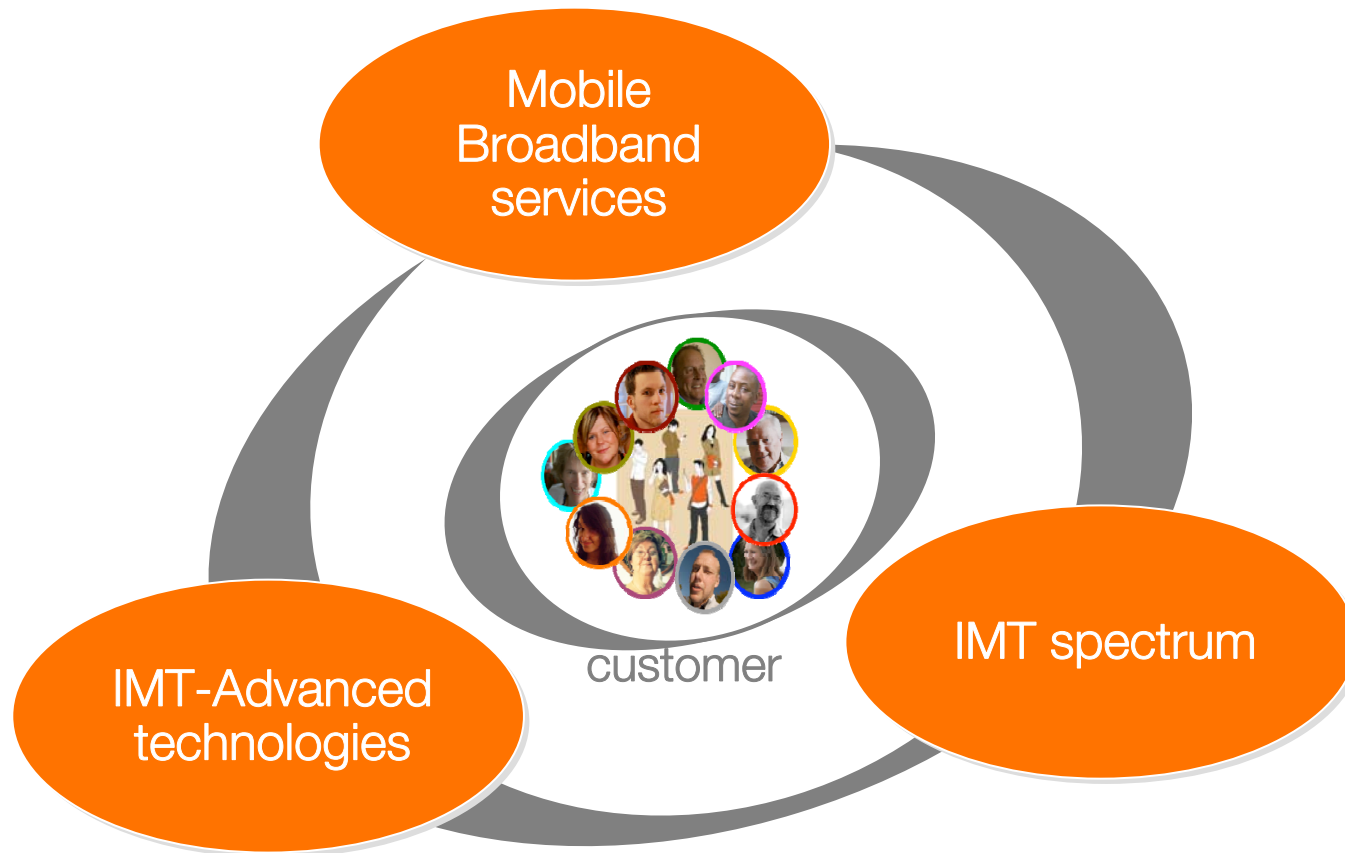
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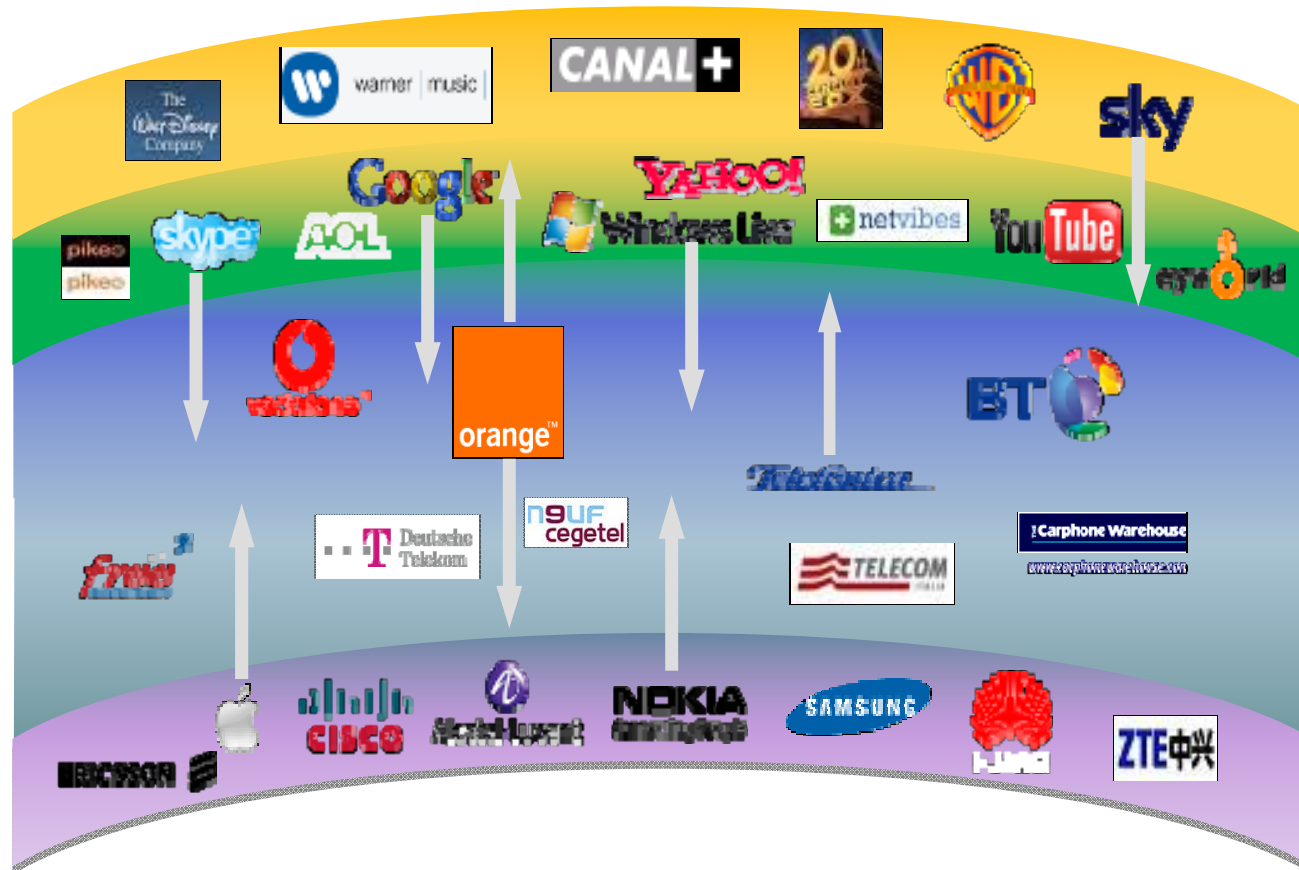
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3D image quality, increased file transfer capacity with no limits on file size, the addition of interactive functions, and the development of user-friendly technologies with ever greater multi-tasking capabilities

all value chain players compete to capture customer relationship and audience



conclusions

- mobile broadband penetration worldwide is increasing spectacularly with new IMT service offerings and global explosion in mobile data traffic
- mobile industry is constantly developing more efficient radiocommunication technologies to respond consumers expectations
- enhancements are still enabling operators to further increase their capability and capacity within available spectrum, however more resources will be required in the future



increasing bandwidth is a highly promising way of driving innovation in fields as diverse as e-Health, real-time video learning, smart transport and cloud gaming



thank you