#### Operators HSPA experience and path towards LTE

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#### UMTS Forum – Operators Group

Mobile operators can:

upgrades like LTE

- Exchange experience (Mobile TV copyright issues, cost of licences)
- Check success of deployment projects in other countries (HSPA, HSPA+, LTE)

Lobby for new spectrum needed for network



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- Get status about standardization development (3GPP, ITU...) and influence it
- Get information about new developing technologies



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#### Topics



- Global HSPA deployment
- Problem of rising traffic and how it can be solved
- Services aspect
- HSPA+ upgrade to mobile broadband
- Looking forward to LTE and 4G





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#### Data traffic problem



- Heavy users can generate large amount of traffic over 600 GB per month
- Average user generates about 1.3 GB per month
- Largest amount of traffic is due to video streaming (in future 66% of all traffic) and torrent downloads
- YouTube and Hulu generated 50 petabytes of traffic
- Watching YouTube video = sending 500.000 SMS
- Some operators have monthly subscriptions for unlimited amount of data download



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**Mobile Data Traffic M** by Type Total mor 2,000,000 Total Mobile Data Traffic (Tetabyte per Data 1,500,000 P2P 1.000.000 Video 500.000 Voice 2009E 2010E 2011E 2012E 2013E 2008 Source: Morgan Stanley promoting mobile Ò EUR and CIS Region roadband evolution th-6th May 201

# Coping with data traffic increase

- •Femtocells
- •Limiting heavy user usage



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#### Upgrading backhaul network

• AT&T is actively deploying fibre and layering Ethernet connectivity – 38% of 3G cell sites are fibre fed – 90% by end of 2011



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- Adding new cells
- Smaller cell greater capacity per area
- Efficient reuse of spectrum
- Time consuming and costly (new sites)
- Outdoor antenna can improve signal quality



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#### **Limiting Heavy** Users



- "Principle of fair use": unlimited speed until user downloads 20 GB, then speed drops to 384 or 128 kbit/s (depending on mobile operator).
- Other options:
  - No unlimited monthly download subscriptions
  - Data download speed limitations
  - Deep packet inspection to filter undesired traffic like P2P, video streaming (privacy issues)



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### Services on HSPA



- Mobile Internet (laptops, other devices)
- Mobile TV
- Social networking Rich **Communication Suite**
- RFID (Internet of things), QR Codes ٠
- NFC Mobile Commerce
- Remote Surveillance
- Smart phone connectivity (iPhone)



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41 HSPA+ networks in 26 countries

80 HSPA+ commitments in 41 countries

5 networks already support 28 Mbps

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Source: GSA



## Future Development Towards LTE

#### LTE offers:

- Increased spectrum efficiency
- Optimal cell size of 5 km, 30 km sizes with reasonable performance, and up to 100 km cell sizes supported with acceptable performance
- Theoretical peak DL speeds up to 326.4 Mbit/s
- Theoretical peak UL speeds up to 86.4 Mbit/s
- LTE-Advanced as software upgrade can reach speeds up to 1 Gbit/s
- Sub 5ms latency for small IP packets



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Country	Operator	Anticipated LTE
		service launch
USA	Verizon Wireless	2009-10
Canada	Telus	2010
Canada	Bell Canada	2010
Japan	NTT DoCoMo	2010
Japan	eMobile	2010
Norway	TeliaSonera	2010
South Korea	SK Telecom	2010
South Korea	KTF	2010
Sweden	TeliaSonera	2010
Sweden	Telenor Sweden	2010
Sweden	Tele2 Sweden	2010
USA	MetroPCS	2010
USA	CenturyTel	2010
Canada	Rogers Wireless	2010-11
China	China Mobile	2011
Germany	T-Mobile	2011
Ireland	Hutchison 3	2011
Janan	Softbank Mobile	2011
Snain	Telefonica O2	2011
USA	Cox	2011
USA	AT&T Mobility	2011
USA	Aircell	2011
Austria	T Mobile	2011-12
Austria	Mobilkom Austria	2011-12
Austria	Hutchison 3	2011-12
Austria	Orange	2011-12
China	China Telecom	2011-12
France	Orango	2011-12
New Zealand	Telecom NZ	2011-12
lanan	KODI	2012
Tahvan	Chunghwa Telecom	2012
Australia	Teletra	To be confirmed
Rebrain	Telsua	To be commed
Balirain	Zam	To be commed
Hong Kong	Smarrone-Vodatone	To be confirmed
Hong Kong	CELLimited	To be confirmed
Hong Kong	Talagam halls	To be confirmed
Dhilinging	Dileal	To be continued
rninppines	Filler	To be confirmed
various	vocarone	To be confirmed

 First commercial LTE deployment in Oslo and Stockholm by TeliaSonera

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- NTT DoCoMo planned LTE deployment of LTE in 2009, but postponed it until 2010. Similar plans for end of 2009 had Verizon Wireless.
- Motorola tests LTE in UK in 2.6 GHz band. Plans products for 700 MHz and 2.6 GHz. They made first LTE data call.





#### LTE - Need for new harmonized spectrum in Europe

- Better option: digital dividend (790 MHz 862 MHz)
- Most common option: 2.5 GHz

791- 796	796- 801	801- 806	806- 811	811- 816	816- 821	821 - 832	832- 837	837- 842	842- 847	847- 852	852- 857	857- 862
	Downlink				Duplex gap	Uplink						
	30 MHz (6 blocks of 5 MHz)					11 MHz		30 M	Hz (6 blo	cks of 5	MHz)	
	1	<b>6</b> 0										





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#### LTE and 4G



- LTE is 3.9G not 4G. LTE-Advanced will be 4G.
- 4G falls under IMT-Advanced.
- Objectives of 4G:
  - Data rate of 1 Gbit/s while client and station are in relatively fixed positions
  - Data rate of 100 Mbit/s while the client physically moves at high speeds relative to the station
  - A data rate of at least 100 Mbit/s between any two points in the world
  - Smooth handover across heterogeneous networks; seamless connectivity and global roaming across multiple networks
  - A spectrally efficient system
  - High network capacity: more simultaneous users per cell
  - High quality of service for next generation multimedia support (real time audio, high speed data, HDTV video content, mobile TV, etc)
  - Interoperability with existing wireless standards, and
  - An all IP, packet switched network



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# What does LTE-Advanced (1) 1 Gbit/s downlink mean?

Compare it with:

- USB 2.0: 480 Mbit/s (USB 3.0 4.6 Gbit/s)
- Fast Ethernet: 100 Mbit/s
- Giga Ethernet: 1 Gbit/s
- Bluetooth 3.0: 24 Mbit/s
- Typical disk access in 2008: 560 Mbit/s
- SATA: 3.0 Gbit/s











