

*Mobile World Congress 2011
Barcelona*

LTE Take Up and interest in 1800 MHz

Alan Hadden, President, GSA

Global mobile Suppliers Association
www.gsacom.com

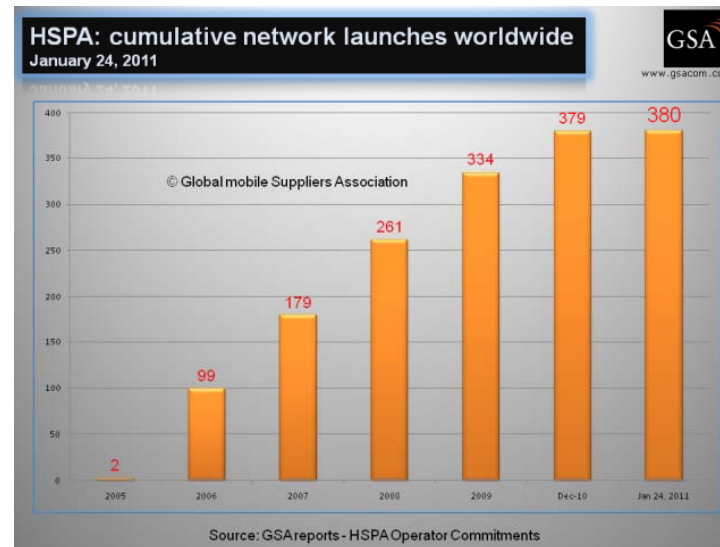
HSPA laid the foundation of MBB success



- ❑ 383 commercial WCDMA operators in 156 countries
- ❑ Over 99% have deployed HSPA;
 - ❑ 380 commercial HSPA networks in 155 countries
- ❑ On the way to 1 billion mobile subscriptions by end 2011
- ❑ 2,922 HSPA user devices launched in market by 255 suppliers
- ❑ Most operators include MBB in their offering
- ❑ MBB is driving traffic, revenue and profit growth in markets throughout the world

Band I	2100 MHz	2183 devices (c. 90%)
Band V	850 MHz	1125 devices (c. 46%)
Band I, II, V	850/1900/2100 MHz	817 devices (c. 33%)
Band I, V	850/2100 MHz	942 devices (c. 39%)
Band VIII	900 MHz	526 devices (c. 21%)
Band IV	AWS	107 devices (c. 4%)

Very small number of devices operate in 1800 MHz band today



Quick Facts

383 commercial WCDMA networks in 156 countries

Over 99% of WCDMA networks launched HSPA

25 commercial UMTS900 networks

526 UMTS900 user devices launched

65% HSPA networks support 7.2 Mbps peak downlink or higher

Over 35% of HSPA operators launched HSUPA – now live in 68 countries

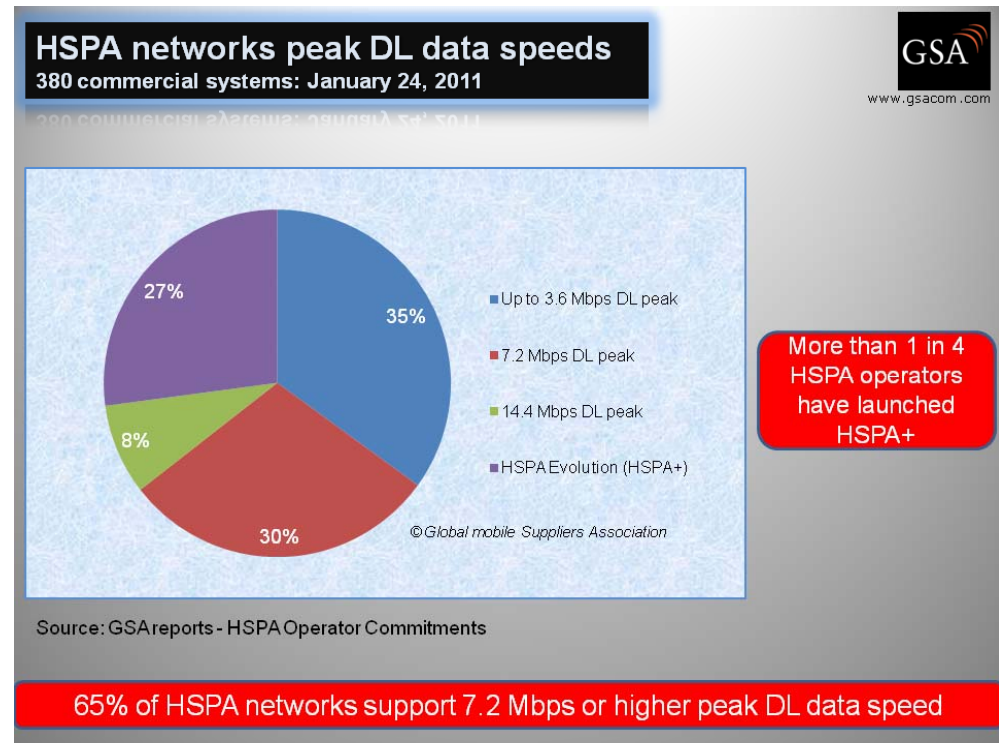
More than 1 in 4 HSPA operators launched HSPA+

- ❑ HSPA peak speeds are increasing
 - ❑ DL: 65% support 7.2 Mbps or higher
 - ❑ UL: 35% have launched HSUPA

- ❑ HSPA Evolution (HSPA+)
 - ❑ the major trend in 2010
 - ❑ delivering higher capacity and performance and an improved user experience of mobile broadband
 - ❑ > 1 in 4 operators launched HSPA+

- ❑ 103 commercial HSPA+ systems
 - ❑ launched in 57 countries
 - ❑ + 45 commitments/deployments
 - ❑ 92 HSPA+ user devices launched

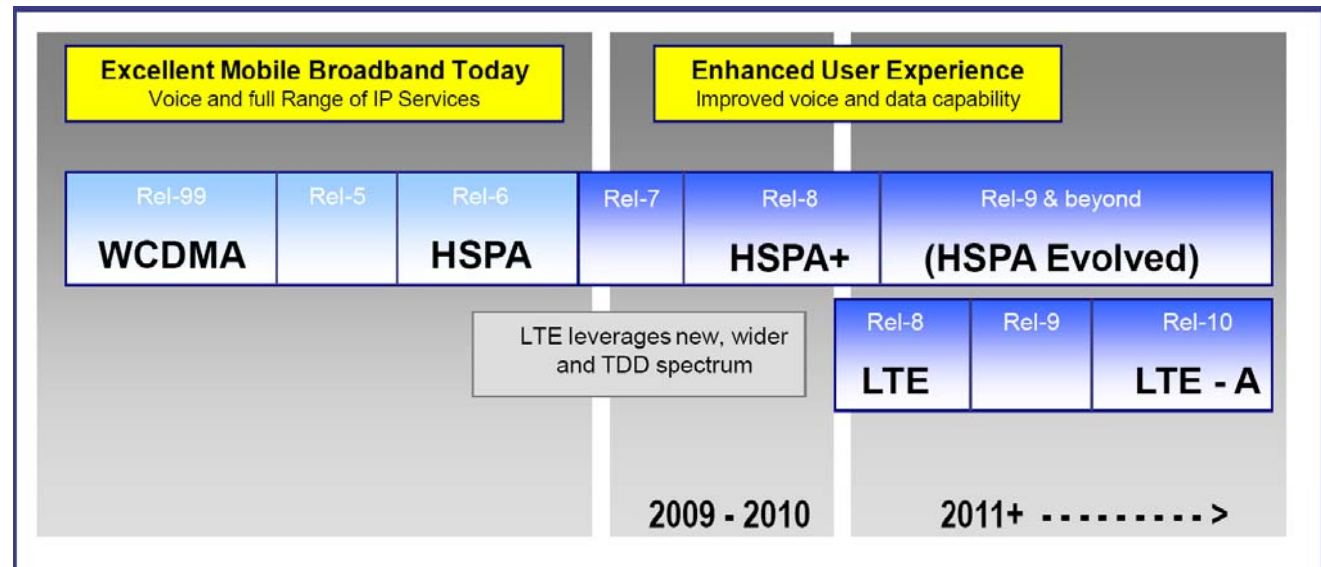
- ❑ 42 Mbps is market reality
 - ❑ 13 commercial DC-HSPA+ networks
 - ❑ at least 32 additional commitments



HSPA has a strong evolution path

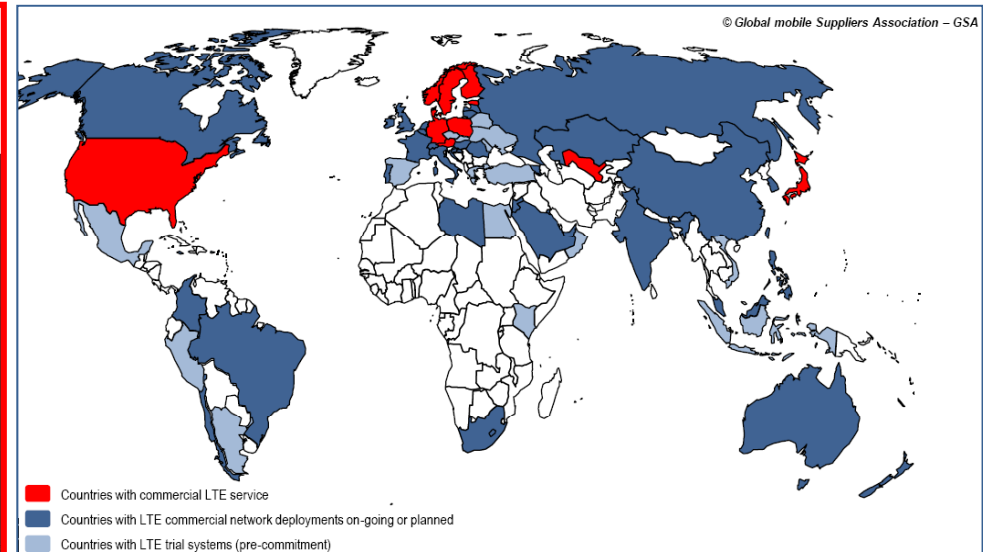
- ❑ Some operators are already preparing to introduce the next evolutionary step of 84 Mbps

- ❑ The next step in the user experience
- ❑ Essential to address and deliver mobile broadband to the mass market
- ❑ Significant performance gains and efficiencies introduced
- ❑ Can be deployed in new spectrum and existing (re-farmed) spectrum
- ❑ FDD and TDD modes
- ❑ Evolution continues with LTE-Advanced



180 operators in 70 countries are investing in LTE *GSA, January 12, 2011*

- 128 LTE network commitments in 52 countries
- 52 additional pre-commitment LTE trials
- 17 commercial LTE networks launched
- At least 64 LTE networks are anticipated to be in commercial service by end 2012



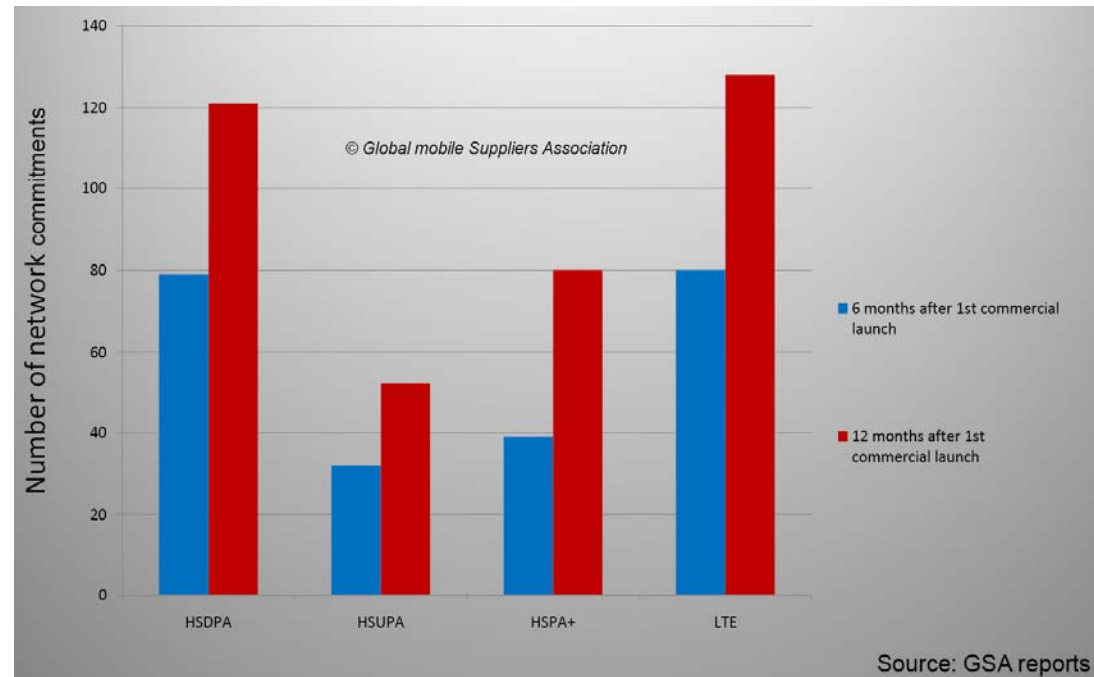
- ❑ Initial launches have been LTE-FDD
- ❑ Frequencies mainly 700, 2600 MHz
 - ❑ 1 system launched in 1800 MHz
 - ❑ 1 DD/800 MHz system launched
- ❑ Commercial LTE-TDD launches targeted for 2011
- ❑ *No. of operators investing in LTE in deployments or trials increased by > 140% in the past 12 months*
- ❑ *No. of countries where LTE systems are deployed or planned increased 85% in same period*

17 commercial LTE networks launched

Country	Operator	Launched
Norway	TeliaSonera	15.12.09
Sweden	TeliaSonera	15.12.09
Uzbekistan	MTS	28.07.10
Uzbekistan	UCell	09.08.10
Poland	Mobyland & CenterNet	07.09.10
USA	MetroPCS	21.09.10
Austria	A1 Telekom Austria	05.11.10
Sweden	TeleNor Sweden	15.11.10
Sweden	Tele2 Sweden	15.11.10
Hong Kong	CSL Limited	25.11.10
Finland	TeliaSonera	30.11.10
Germany	Vodafone	01.12.10
USA	Verizon Wireless	05.12.10
Finland	Elisa	08.12.10
Denmark	TeliaSonera	09.12.10
Estonia	EMT	17.12.10
Japan	NTT DoCoMo	24.12.10

It's official! LTE is the fastest developing mobile communications system technology ever

Until now HSPA had been the fastest developing mobile communications system. By comparing the number of operator commitments 6 months and 12 months after first commercial system launches for HSDPA, HSUPA, HSPA+ and LTE respectively, *LTE proves to be the fastest developing mobile communications system technology ever*



New report from GSA
February 9, 2011

❑ 63 LTE User Devices launched

❑ Includes modules, routers, m-tablets, notebooks, PC cards, phones, USB modems

❑ Most are dual mode;
 ❑ LTE and HSPA or HSPA+ or
 ❑ LTE and EV-DO

Supplier	Model	Form Factor	Freq	Other modes
AnyDATA	DTP960S LTE	Module	TBC	HSPA+
LG	WM300	Module	700	TBC
LG	L2000	Module	700	TBC
Novatel Wireless	Expedite E362	Module	700	HSPA+ EV-DO
Novatel Wireless	Expedite E371	Module	700	HSPA+ AWS EV-DO
Sierra Wireless	Airprime MC7700	Module	TBC	HSPA+
Sierra Wireless	Airprime MC7710	Module	TBC	HSPA+
Sierra Wireless	Airprime MC7750	Module	TBC	HSPA+ EV-DO
ST-Ericsson	M720	Module	TBC	HSPA+
ST-Ericsson	M700	Module	Quad	TBC
Acer	Iconia Tab A500	m-Tablet	700	TBC
Cisco	Cius	m-Tablet	700	EV-DO
Motorola	Xoom	m-Tablet	700	EV-DO
Samsung	Galaxy Tab LTE	m-Tablet	700	EV-DO
ZTE	Light2	m-Tablet	TBC	HSPA
ZTE	Light LTE	m-Tablet	700	EV-DO
GammaTech	D12C	Notebook	700	TBC
HP	Pavilion dm1-3010nr	Notebook	700	TBC
HP	Compaq CQ10-688nr	Notebook	700	TBC
Samsung	N350	Notebook	TBC	TBC
Samsung	N150	Notebook	TBC	TBC
Samsung	X430	Notebook	2600	HSPA
Fujitsu	Xi F-06C	PC Card	1500	HSPA
HTC	Thunderbolt	Phone	700	EV-DO
LG	VS910 Revolution	Phone	700	EV-DO
Motorola	Droid Bionic	Phone	700	EV-DO
Samsung	Galaxy S 4G LTE	Phone	700	TBC
Samsung	Craft SCH-R900	Phone	AWS	EV-DO
Samsung	Galaxy S SCH-R910	Phone	AWS	EV-DO
Cradlepoint	CBA750	Router	700	TBC
Cradlepoint	CTR500	Router	700	HSPA EV-DO
Cradlepoint	MBR1000	Router	700	HSPA
Cradlepoint	CBA250	Router	700	TBC

Cradlepoint	MBR1200	Router	700	TBC
Cradlepoint	CTR35 Travel router	Router	700	HSPA+
Dovado	4GR	Router	700	HSPA+
Dovado	3GN	Router	700	HSPA+
Netgear	MBR1000	Router	700	HSPA
Netgear	MBR1000 HSPA+	Router	700	HSPA+
Nexaira	Business Class II	Router	TBC	HSPA+
Novatel Wireless	MiFi 4510L	Router	700	EV-DO
ProLink	PWH2004	Router	TBC	HSPA
Samsung	4GLTE mobile Hotspot	Router	700	TBC
ZTE	MF92 mobile hotspot	Router	TBC	HSPA+
ZyXEL	ZLR-2070S	Router	700	TBC
AnyDATA	ADU960S	USB modem	TBC	HSPA+
Huawei	E398	USB modem	700	HSPA+ AWS
IP Wireless	LTE-USB Modem	USB Modem	1800	None
LG	Xi L-02C	USB Modem	1500	HSPA
LG	VL600	USB Modem	700	EV-DO
LG	Adrenaline AD600 (LTE upgradeable)	USB Modem	700	HSPA AWS
Motorola	USB-LTE 7110	USB Modem	TBC	TBC
Nokia	RD-3 multi mode	USB Modem	TBC	HSPA+
Novatel Wireless	Ovation MC551	USB Modem	700	EV-DO
Novatel Wireless	USB551L	USB Modem	700	EV-DO
Pantech	UML290	USB Modem	700	EV-DO
Samsung	GT-B3730	USB Modem	2600	HSPA+
Samsung	GT-B3710	USB Modem	2600	None
ZTE	AL600	USB Modem	TBC	HSPA+ EV-DO
ZTE	AL620	USB Modem	TBC	HSPA+
ZTE	AL621	USB Modem	TBC	TBC
ZTE	MF820	USB Modem	TBC	HSPA+
ZTE	MF29L	USB Modem	TBC	HSPA+

Errors & Omissions Excepted.

Updates to info@gsacom.com

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LTE1800 – promising option for many markets

- + Main motivation: coverage area about 2X larger than LTE2600.
- + Possibility to reuse antenna lines of UMTS2100 or GSM1800.
- + Possibility to deploy multi-RAN BTS with simultaneous LTE&GSM.
- + 1800 MHz (ITU band 3) widely available in Europe and APAC.
- + Not big regulatory issues: 1800 band often technology neutral.

- + Spectrum need for full LTE data speed 18.4 MHz when GSM and LTE base stations at same sites (coordinated case).
- + Often easier to refarm than 900 MHz.

Coordinated GSM-LTE case	Required spectrum
20 MHz LTE	18.4 MHz
15 MHz LTE	13.8 MHz
10 MHz LTE	9.4 MHz

- Terminal availability 6-12 months after LTE2600: not a real issue.
- LTE1800 can be estimated to be ready for mass market in 2012 with first network deployments and terminals in volume.

=> LTE1800: promising and available for mass market in time

LTE1800 network commercially launched: Mobyland, Poland



CSL Ltd, Hong Kong has launched an LTE/DC-HSPA+ network. LTE uses 2.6 GHz spectrum. 1800 MHz LTE sites are being introduced in a second phase

- Telstra is trialling LTE in 1800 MHz spectrum
- VHA is trialling LTE in 1800 MHz spectrum
- Optus is expanding its LTE trials to include 1800 MHz
- Elisa FI is planning LTE1800 deployment
- Bouygues Telecom is trialling LTE1800
- Cosmote has trialled LTE1800
- LTE1800 deployments in Russia may develop
- Deutsche Telekom / T-Mobile expressed a high interest to go for LTE1800 in some European markets (subject to refarming approvals etc.)



Mobyland Conference, 17 November 2010

PRESS RELEASE

**The first global
LTE 1800 modem
in the Mobyland network
is launched in Poland**

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tel.: 22 249 81 00
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www.mobyland.com

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Evolution to LTE Report www.gsacom.com



The 3GPP LTE system delivers capacity and data throughput enhancements and low latency, to support new services and features requiring higher levels of capability and performance. Users today browse the internet or send and receive e-mails using HSPA-enabled notebooks, or with HSPA modems and dongles, and send/receive video or music on HSPA phones. **LTE is the next step in the user experience**, enhancing more demanding applications such as interactive TV, mobile video blogging, advanced gaming, and professional services. Data rates are significantly higher. LTE supports a full IP-based network and harmonization with other radio access technologies. LTE reduces the cost per Gigabyte of data delivered, which is essential to address the mass market. LTE standardization, which covers FDD and TDD modes, is complete, and 3GPP Release 8 is the basis for initial LTE deployments. Infrastructure solutions offer an easy upgrade path to LTE. With the HSPA mobile broadband eco-system in place, LTE is the natural migration choice for GSM/HSPA network operators, and there is also a roadmap for CDMA operators to evolve to LTE as the clear mobile broadband system of choice.

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Sweden	Telia2 Sweden	15.11.10
Hong Kong	CSL Limited	25.11.10
Finland	TeliaSonera	30.11.10
Germany	Vodafone	01.12.10
USA	Verizon Wireless	05.12.10
Finland	Elisa	08.12.10
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Estonia	EMT	17.12.10
Japan	NTT DoCoMo	24.12.10

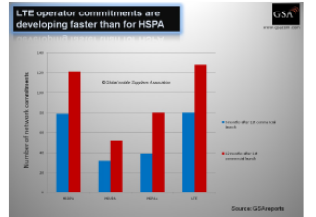
Commercial LTE network launches
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Evolution to LTE Report

LTE made excellent progress in 2010. The rapid increase in mobile data traffic which has been experienced over the past 3 years and which is currently supported primarily by HSPA and HSPA+ systems is driving the interest in deploying LTE as quickly as possible, attracting global industry support.

LTE operator commitments are developing faster than they did for HSPA, which had been the fastest developing mobile system. The chart below shows the number of operator commitments confirmed 6 months and 12 months after the first commercial systems launch for HSDPA, HSUPA, HSPA+ and LTE respectively, and confirms LTE as the fastest developing mobile system technology ever.



The uptake of LTE is a global phenomenon. All existing 3G technologies can harmonize to LTE. With LTE we have one single global standard, which in turn will secure and drive even higher economies of scale and also simplify roaming.

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GAMBoD

GSA Analyzer for Mobile Broadband Devices

Analyze the GSA's unique database of thousands of mobile broadband devices HSPA, HSPA+ and LTE

For use by GSA member organizations and network operators

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Lists 2,922 HSPA devices (February 7, 2011) some with LTE



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LTE1800

over 80 members

a subgroup of GSA

http://www.linkedin.com/groups?=&gid=3129390

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