

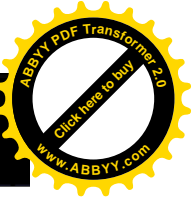
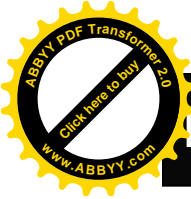
# LTE Deployment Update and Spectrum Issues

Alan Hadden, President, GSA  
Global mobile Suppliers Association  
[www.gsacom.com](http://www.gsacom.com)

GSA is a 3GPP Market Representation Partner

May 24, 2011



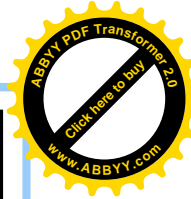
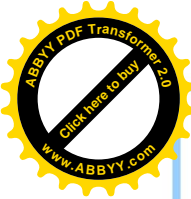


# HSPA laid the foundation of Mobile Broadband success



- ❑ Mobile broadband began with WCDMA and its first evolution - HSPA
- ❑ Today 99.5% of WCDMA operators have deployed HSPA;
  - ❑ 398 commercial HSPA networks in 160 countries
- ❑ Well on the way to 1 billion mobile subscriptions by end 2011 (current estimate c. 700 million)
- ❑ 3,071 HSPA user devices launched in the market by 262 suppliers
- ❑ Most operators include mobile broadband in their product offerings
- ❑ Mobile broadband is driving traffic, revenue and profit growth in markets throughout the world

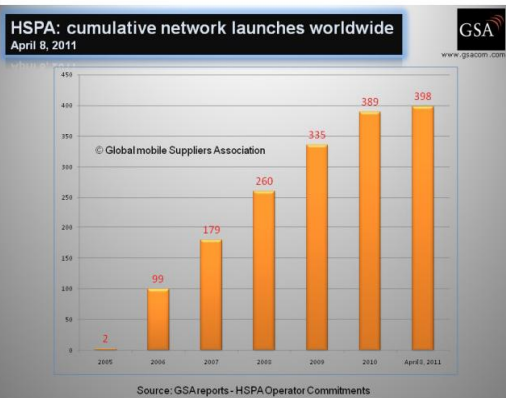




# WCDMA-HSPA and HSPA+ mobile broadband wallchart – April 2011



www.gsacom.com



**173 operators have committed to HSPA+**

**123 commercial HSPA+ systems in 65 countries**

**23 commercial 42 Mbps DC-HSPA+ networks**

**Quick Facts**

- 400 commercial WCDMA networks in 161 countries
- 99.5% of WCDMA operators launched HSPA
- 32 commercial UMTS900 networks
- 618 UMTS900 user devices launched
- Over 68% HSPA networks support 7.2 Mbps peak downlink or higher
- 39% of HSPA operators launched HSUPA in 73 countries
- Almost 31% of HSPA operators launched HSPA+
- 684 mil. WCDMA subs (Q1 11 estimate)

**429 HSPA operator commitments in 167 countries**

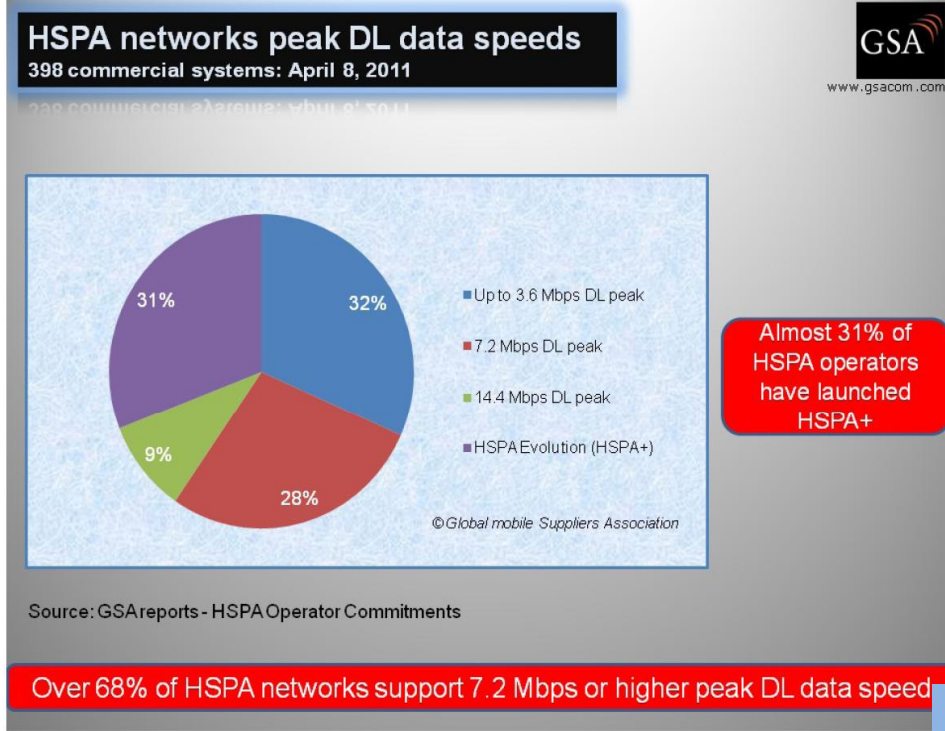
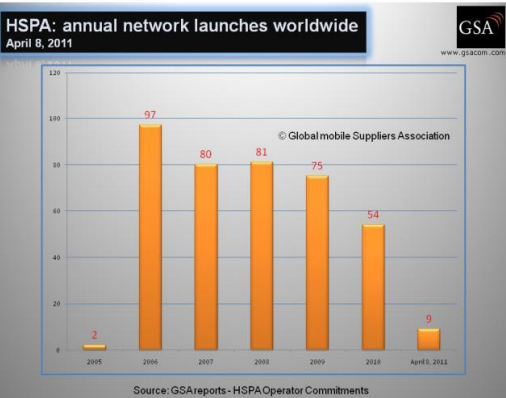
**398 commercial HSPA networks in 160 countries**

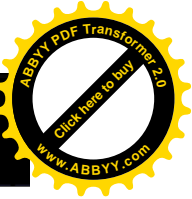
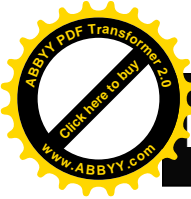
**Evolution to HSPA+ continues as the main trend in 2011**

- HSPA+ is a mainstream technology

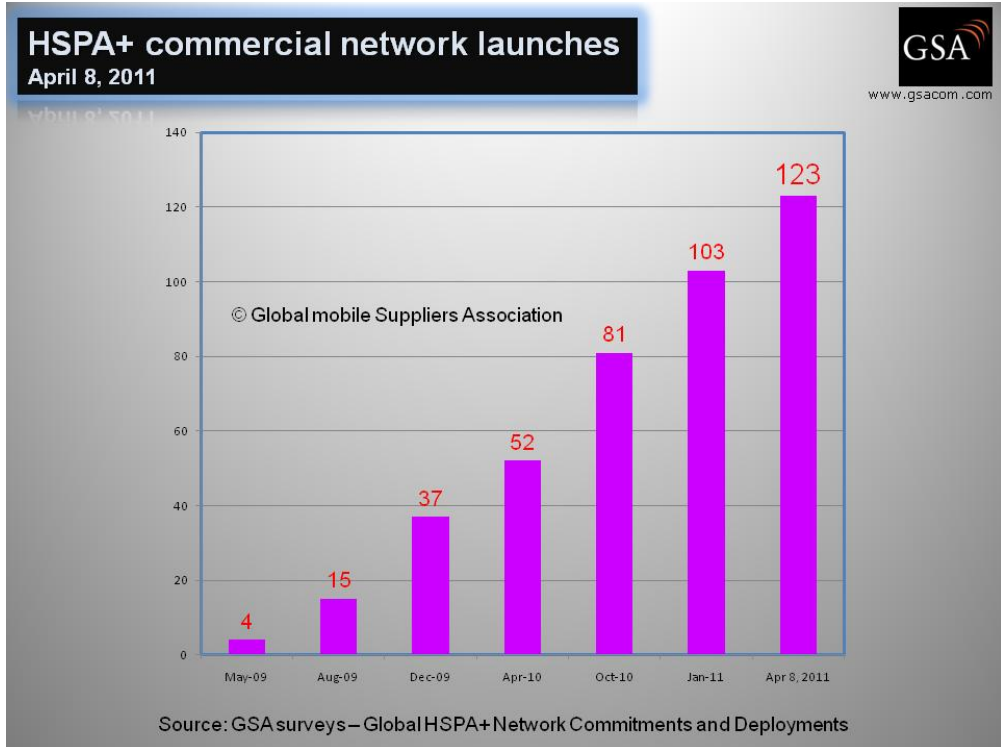
**3,071 HSPA devices launched in the market**

- includes 144 HSPA+ and 53 dual-mode HSPA-LTE devices



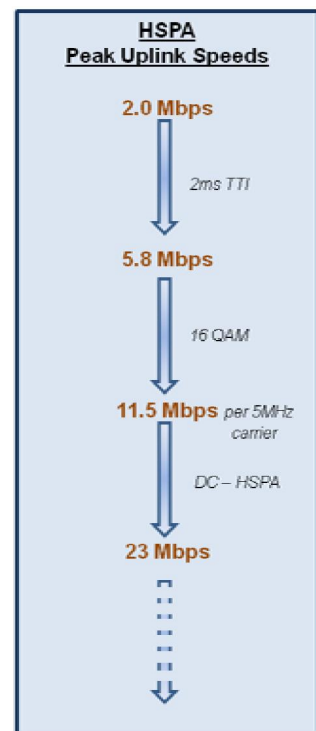
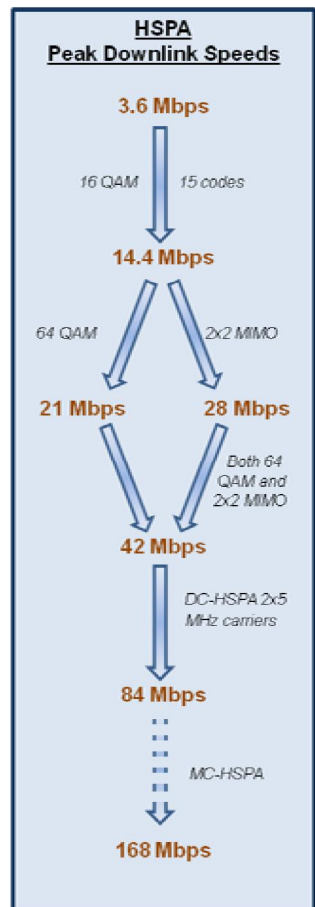


# Evolution to HSPA+ is the main trend globally



## 31% of HSPA operators have launched HSPA+

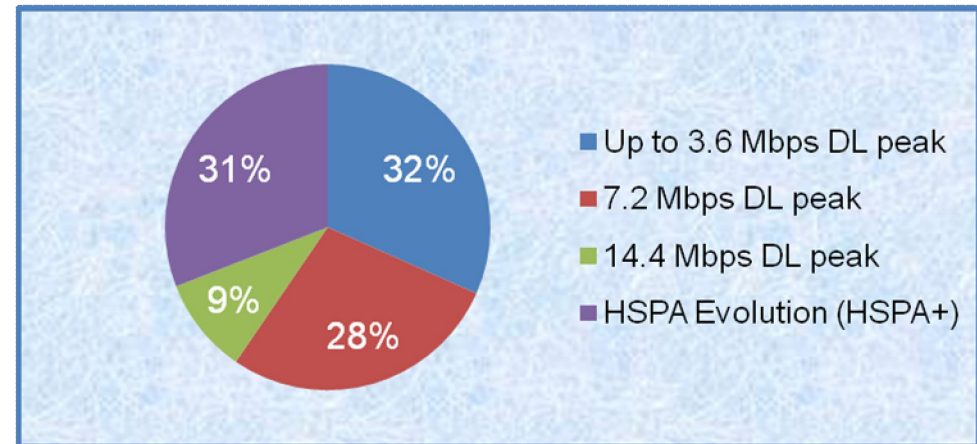
HSPA+ delivers higher capacity and performance and an improved user experience of mobile broadband





# Continuing performance and capacity improvements with HSPA

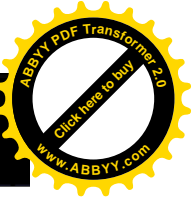
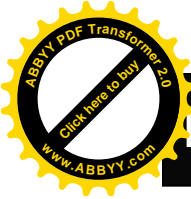
- ❑ HSPA peak speeds are increasing
  - ❑ DL: 68% support 7.2 Mbps or higher
  - ❑ UL: 39% have launched HSUPA
  
- ❑ 123 commercial HSPA+ systems
  - ❑ launched in 65 countries
  - ❑ Satisfying operators' current capacity and performance requirements
  - ❑ 50 additional HSPA+ commitments/deployments
  - ❑ 144 HSPA+ user devices launched
  
- ❑ 42 Mbps with DC-HSPA+ is market reality
  - ❑ 23 commercial DC-HSPA+ networks
  - ❑ at least 36 additional commitments
  - ❑ 45 DC-HSPA+ user devices launched



**GSA forecasts there will be at least 150 commercial HSPA+ systems in operation by end 2011**

HSPA has a strong evolution path

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



## Global HSPA+ Network Commitments and Deployments

**Global HSPA+ Network Commitments and Deployments**  
Global mobile Suppliers Association  
April 8, 2011  
**GSM/3G MARKET/TECHNOLOGY UPDATE**

**GSA confirms 173 operators in 77 countries have committed to HSPA+ network deployments**  
Armenia, Austria, Belarus, Bolivia, Brazil, Canada, Chile, China, Costa Rica, Czech Republic, Denmark, Egypt, Estonia, France, Finland, France, Germany, Greece, Hong Kong SAR, Hungary, India, Indonesia, Ireland, Israel, Italy, Japan, Jordan, Kenya, Kuwait, Latvia, Lebanon, Lithuania, Luxembourg, Macao SAR, Malawi, Malaysia, Mexico, Moldova, Monaco, Morocco, Norway, Netherlands, New Zealand, Norway, Pakistan, Philippines, Poland, Portugal, Puerto Rico, Qatar, Romania, Russia, Saudi Arabia, Serbia, Singapore, Slovak Rep., Slovenia, South Africa, South Korea, Spain, Sri Lanka, Sweden, Switzerland, Taiwan, Tanzania, Togo, Tunisia, Turkey, Turkmenistan, UAE, UK, USA, Uzbekistan, and Vietnam

**123 HSPA+ systems are commercially launched in 65 countries**  
30% of HSPA operators have commercially launched HSPA+

Widespread market acceptance of dongles, HSPA-enabled notebooks and netbooks, and the rapidly growing smartphone segment have pushed data consumption to unprecedented levels. Operators across the world are deploying HSPA Evolution (HSPA+) systems to meet this demand. GSA confirms that 123 HSPA+ systems are now commercially launched in 65 countries. A further 50 HSPA+ networks are in deployment or planned. This report lists all the HSPA+ network deployments and launches.

Taking account of those systems already launched, and the expected launch dates for networks currently in the deployment phase, GSA forecasts there will be at least 150 commercial HSPA+ systems in operation by the end of 2011.

HSPA+ is a mainstream technology, supported by a rapidly establishing device ecosystem. HSPA+ has a strong evolution path (see chart left). Several operators have confirmed their plans for evolution. Many operators have launched or are preparing their networks supporting 42 Mbps peak download capabilities. This is achieved today by combining 64QAM modulation and doubling the bandwidth by using dual carriers (2 x 2 MHz = 10 MHz) and is known as DC-HSPA+. This capability was introduced in 3GPP Release 8, which also standardized 42 Mbps capability by combining 2 x 2 MIMO and 64QAM in a single 5 MHz carrier.

For the uplink, using 10 QAM instead of QPSK modulation makes it possible to double the peak rate to 11.5 Mbps. Dual carrier extends the uplink performance up to 23 Mbps peak. 3GPP Release 9 combines multicarrier and MIMO technologies in 10 MHz bandwidth to reach 84 Mbps peak download. Using multicarrier on the uplink doubles the peak data rate to 23 Mbps. Standardization beyond Release 9 extends multicarrier to 20 MHz bandwidth, and combinations of multicarrier and MIMO enable download data speeds exceeding 100 Mbps to be reached. 3GPP has initiated new standardization work on Long Term HSPA Evolution, which would significantly boost capabilities further by using 8 channel multicarrier aggregation, coordination of multiple antennas, dual antenna beamforming, and MIMO in the uplink.

The world's first HSPA+ system was launched by Telstra in Australia on February 23rd, 2009. Using 64 QAM modulation, the Telstra Next3G™ mobile broadband system supported a peak download data rate of 21 Mbps and a peak uplink rate of 5.5 Mbps. Telstra subsequently launched an upgrade to 42 Mbps DC-HSPA+ peak downlink capability in June 2010.

A1 Telekom Austria launched the first commercial HSPA+ system in Europe on March 23rd, 2009. The network supported a peak downlink data rate of 21 Mbps and is being upgraded to 28 Mbps. A1 Telekom Austria has evolved the uplink to support 5.8 Mbps and several other operators have similarly upgraded. Starhub, Singapore launched Asia's first HSPA+ system on March 27th, 2009.

A total of 123 HSPA+ systems have entered commercial service in 65 countries, as listed in the following pages.

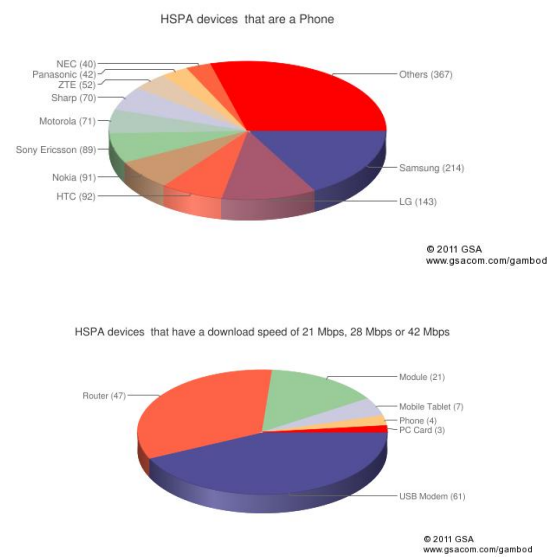
30% of HSPA operators have commercially launched HSPA+.

- 90 commercial networks support a peak download data speed of 21 Mbps using 64QAM with a typical user experience up to 8 Mbps, depending on device availability
- 10 commercial networks support 28 Mbps. TIM Italy launched the world's first 28 Mbps peak downlink HSPA+ system utilizing MIMO technology on July 17, 2009
- 23 commercial networks support 42 Mbps DC-HSPA+ plus at least 36 more operator commitments

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## HSPA User Devices



**Global HSPA+ Network Commitments and Deployments**  
Global mobile Suppliers Association  
April 8, 2011  
**GSM/3G MARKET/TECHNOLOGY UPDATE**

**429 HSPA Operator Commitments in 167 countries/territories**  
398 commercial operators launched in 160 countries including 123 commercial HSPA+ networks

The path to mobile broadband began with WCDMA. Its first evolution - High Speed Packet Access (HSPA), a 3GPP global standard, boosts capacity and user data speeds, and reduces latency. HSPA is the leading mobile broadband technology globally with 369 networks commercially launched. Over 99% of WCDMA operators have launched HSPA. The majority (85.3%) of HSPA networks support a peak download data speed of 7.2 Mbps or more. Typical user download data throughput approach 5.1 Mbps or higher, according to network and user device capabilities. Capacity and performance improve with HSPA Evolution (HSPA+) deployments, up to 42 Mbps on some networks today. Many operators successfully position HSPA as an alternative to fixed broadband, with the added value of mobility, and consistently report traffic and revenue growth for mobile broadband services enabled by HSPA. 155 networks (over 50% of commercial HSPA networks) have launched HSPA+ in 73 countries, including at least 78 networks (over 50%) supporting 5.8 Mbps peak uplink data speed, with a further 8 networks supporting 11.5 Mbps peak.

173 operators have committed to HSPA+ deployment in 77 countries, including 123 HSPA+ networks now in commercial service in 65 countries. GSA forecasts there will be at least 150 commercial HSPA+ systems by operation by end 2011. 90 HSPA+ commercial networks today use 64QAM delivering up to 21 Mbps peak on the downlink, 10 HSPA+ networks support 28 Mbps (10 QAM with MIMO) and 23 networks support 42 Mbps by combining 64QAM and 2 x 5 MHz carriers. According to GSA's research there are at least 36 more operator commitments to deploy 42 Mbps DC-HSPA+ on their networks. This capability was introduced in 3GPP Release 8, which also enables 42 Mbps to be achieved by combining 2 x 2 MIMO and 64QAM in a single (5 MHz) carrier. HSPA+ has which also enables 42 Mbps to be achieved by combining 2 x 2 MIMO and 64QAM in a single (5 MHz) carrier. HSPA+ has which also enables 42 Mbps to be achieved by combining 2 x 2 MIMO and 64QAM in a single (5 MHz) carrier.

For the uplink, using 10QAM instead of QPSK modulation means doubling the peak rate to 11.5 Mbps. HSPA+ is a strong evolution path. Release 9 combines multicarrier and MIMO technologies in 10 MHz bandwidth to reach 84 Mbps peak download. Using multicarrier on the uplink doubles the uplink peak data rate to 23 Mbps. Standardization beyond Release 9 may lead to download data speeds exceeding 100 Mbps.

Details in the GSA report "Global HSPA+ Network Commitments and Deployments" available at [www.gsacom.com](http://www.gsacom.com)

For updates on how mobile broadband using HSPA is driving traffic and revenue growth and profitably globally, see Beyond Release 8: Reports from HSPA Operators Worldwide at [www.gsacom.com](http://www.gsacom.com)

- For updates on how mobile broadband using HSPA is driving traffic and revenue growth and profitably globally, see Beyond Release 8: Reports from HSPA Operators Worldwide at [www.gsacom.com](http://www.gsacom.com)
- Mobile Broadband Growth - Reports from HSPA Operators Worldwide at [www.gsacom.com](http://www.gsacom.com)
- For UMTS/3GPP (HSPA) network deployments, launches, developments - see "UMTS/3GPP Global Status" report from GSA
- 2,922 HSPA devices have been launched, including many HSPA+ devices and initial dual-mode HSPA/LTE products
- For the latest information and trends see "HSPA Devices survey - Key Findings" at [www.gsacom.com](http://www.gsacom.com)

**429 HSPA network commitments in 167 countries/territories**

Americas: 35 countries | APAC: 31 countries | Europe: 82 countries | Middle East/Africa: 39 countries

**398 commercial HSPA operators in 160 countries/territories**

Americas: Argentina, Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, F. of the Americas, Guatemala, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Trinidad and Tobago, USA, and Venezuela

APAC: Australia, Brunei, Cambodia, China, East Timor, Hong Kong SAR, India, Indonesia, Japan, Laos, Macao SAR, Malaysia, Maldives, Mongolia, Nepal, New Zealand, Philippines, Singapore, South Korea, Sri Lanka, Taiwan, Thailand, and Vietnam

Europe: Albania, Armenia, Austria, Azerbaijan, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Rep., Denmark, Estonia, Finland, France, Germany, Greece, Greenland, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Spain, Sweden, Switzerland, Taiwan, Turkmenistan, UK, Ukraine, Uzbekistan, and Vatican

MEA: Angola, Bahrain, Bangladesh, Egypt, Ethiopia, Ghana, Israel, Jordan, Kuwait, Kyrgyzstan, Laos, Madagascar, Malawi, Maldives, Mauritius, Morocco, Mozambique, Nigeria, Oman, Qatar, Reunion, Rwanda, Saudi Arabia, Senegal, Seychelles, South Africa, Sudan, Syria, Tanzania, Tunisia, UAE, Uganda, and Zimbabwe

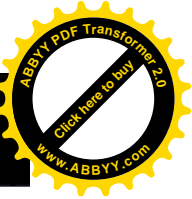
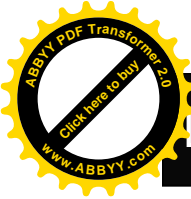
- Several MVNOs use these HSPA networks for commercial services, and are excluded from this survey
- Multi-band networks e.g. 800/110 MHz, 850/110 MHz etc. are counted as single networks
- 348 commercial HSPA networks (87.4%) support 3.6 Mbps peak or higher download speed
- 272 commercial HSPA networks (68.3%) support 7.2 Mbps peak or higher download speed
- 123 HSPA+ network commitments in 77 countries; 123 HSPA+ operators launched in 73 countries
- 164 operators have committed to HSPA+ in 77 countries; 155 HSPA+ operators launched in 73 countries
- 311 out of 429 HSPA network operator commitments (72.5%) have also committed to EDGE

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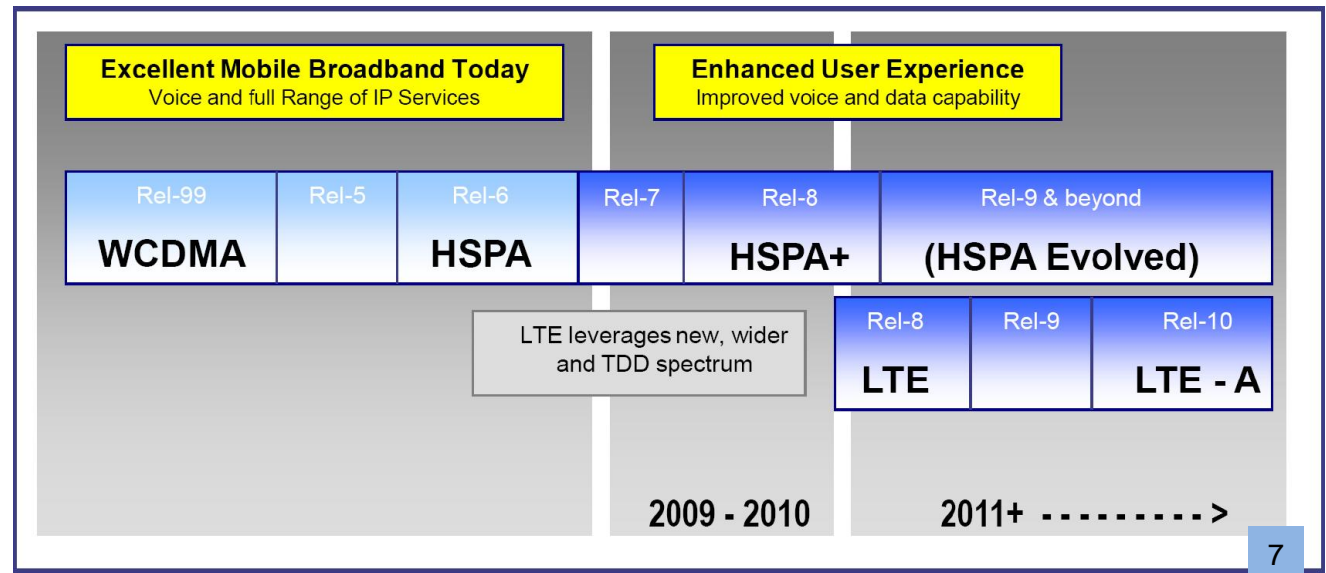
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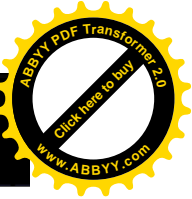
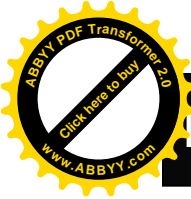
## HSPA Operator Commitments

GAMBoD analysis tool  
For GSA member companies and network operators



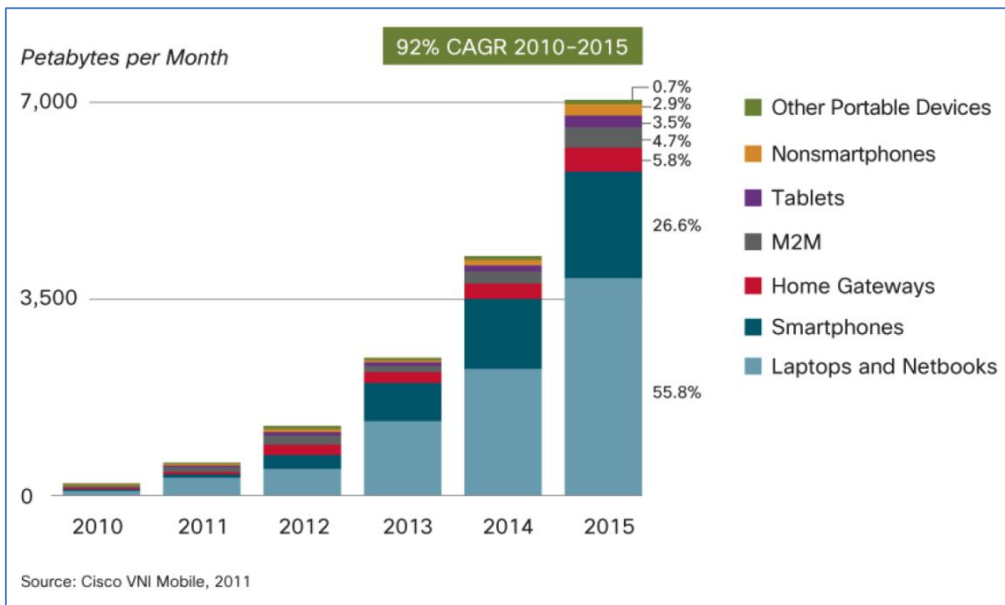
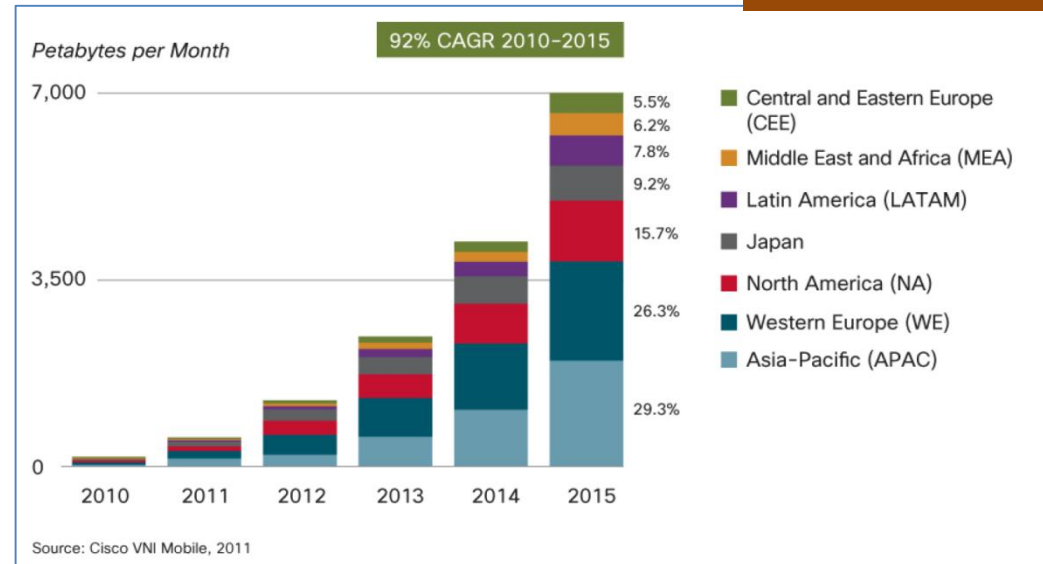
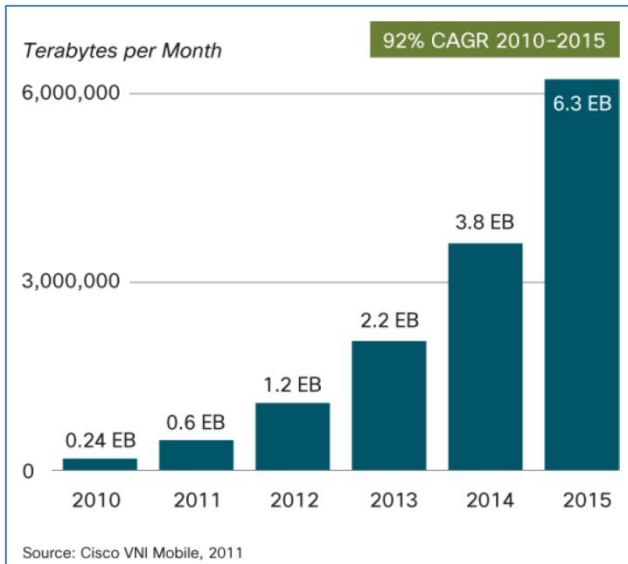
- ❑ The next step in the user experience and the main direction for the industry
- ❑ Builds on HSPA, HSPA+ successes and is typically complementary
- ❑ Essential to address and deliver mobile broadband to the mass market
- ❑ Significant performance gains and efficiencies introduced - FDD and TDD modes
- ❑ Can be deployed in new and existing (re-farmed) spectrum
- ❑ Global support
- ❑ Evolution of LTE continues with LTE-Advanced





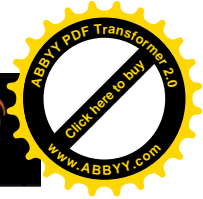
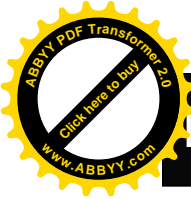
# LTE enables operators to support future mobile data demand

## Global mobile data traffic



Laptops and smartphones lead traffic growth



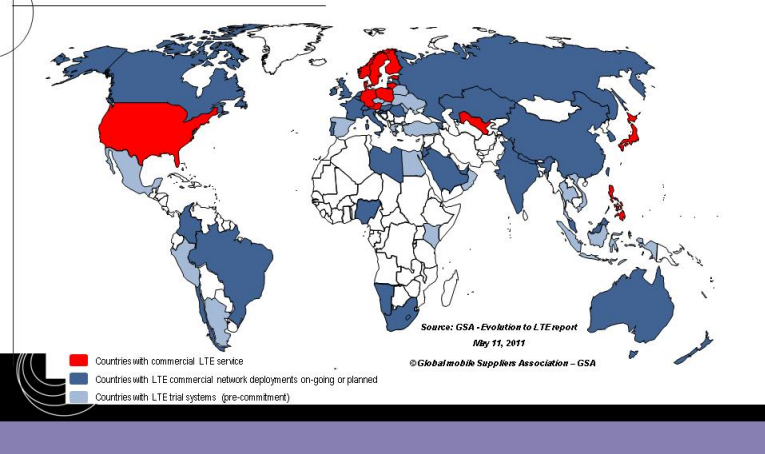


## 208 operators in 80 countries are investing in LTE GSA, May 11, 2011

- 154 LTE network commitments in 60 countries
- 54 pre-commitment trials in 20 more countries
- 20 commercial LTE networks launched
- At least 81 LTE networks are anticipated to be in commercial service by end 2012

**208 operators in 80 countries investing in LTE**

- 154 commercial LTE network commitments in 60 countries
- 54 pre-commitment trials in additional 20 countries
- 20 commercial LTE networks launched in 14 countries

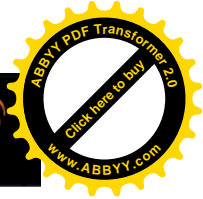
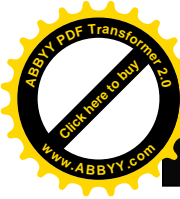


- Initial 20 launches have all been LTE-FDD mode
- Frequencies used are mainly 700, 2600 MHz
  - 2 commercial systems launched in 1800 MHz
  - 2 DD/800 MHz commercial systems launched
- Commercial LTE TDD launches targeted from 2011
- No. of operators committing to deploy commercial LTE systems increased by 98 since June 2010
- No. of countries increased by 32 in the same period

### 20 commercial LTE networks in 14 countries

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
Germany	Deutsche Telekom	05.04.11
Philippines	Smart Communications	16.04.11
Lithuania	Omnitel	28.04.11

GSA "Evolution to LTE" report – May 11, 2011



# 208 operators investing in LTE



Country	Operator	Expected launch
Norway	TeliaSonera	Launched 15.12.09
Sweden	TeliaSonera	Launched 15.12.09
Uzbekistan	MTS	Launched 28.07.10
Uzbekistan	UCell	Launched 09.08.10
Poland	Mobyland and CenterNet	Launched 07.09.10
USA	MetropCS	Launched 21.09.10
Austria	A1 Telekom Austria	Launched 05.11.10
Sweden	TeleNor Sweden	Launched 15.11.10
Sweden	Tele2 Sweden	Launched 15.11.10
Hong Kong	CSL Limited	Launched 25.11.10
Finland	TeliaSonera	Launched 30.11.10
Germany	Vodafone	Launched 01.12.10
USA	Verizon Wireless	Launched 05.12.10
Finland	Elisa	Launched 08.12.10
Denmark	TeliaSonera	Launched 09.12.10
Estonia	EMT	Launched 17.12.10
Japan	NTT DoCoMo	Launched 24.12.10
Germany	Deutsche Telekom	Launched 05.04.11
Philippines	Smart Communications	Launched 16.04.11
Lithuania	Omnitel	Launched 28.04.11
Armenia	Vivacell-MTS	2011
Australia	Telstra	2011
Australia	VHA	2011
Austria	T-Mobile	2011
Austria	Hutchison 3	2011
Canada	Telus	2011
Canada	Bell Canada	2011
Canada	Rogers Wireless	2011
Canada	Shaw Communications	2011
Colombia	UME EPM	2011
Denmark	3 Denmark	2011
Denmark	TDC	2011
Denmark	TeleNor	2011
Finland	DNA	2011
Germany	O2 (Telefonica)	2011
Hong Kong	PCGW	2011
Hungary	Magyar Telekom (T Mobile)	2011
India	Qualcomm India LTE Venture	2011
India	Reliance (LTE TDD)	2011
Ireland	Hutchison 3	2011
Japan	Emobile	2011
Japan	Softbank Mobile	2011
Jordan	Zain	2011
Poland	Aero2 (LTE TDD)	2011
Portugal	TMN	2011
Portugal	Vodafone Portugal	2011
Russia	Rostelecom	2011
Russia	Yota	2011
Saudi Arabia	Etisalat (Mobily)	2011
South Africa	Vodacom	2011
South Korea	LG Uplus	2011
South Korea	KT	2011
South Korea	SK Telecom	2011
Sweden	3	2011
Switzerland	Orange	2011
Switzerland	Swisscom	2011
UAE	Du	2011
UAE	Etisalat	2011
USA	Cox Comms	2011
USA	CenturyTel	2011
USA	AT&T Mobility	2011
USA	Aircell	2011
USA	BayRCS	2011
USA	Cellular South	2011
USA	LightSquared	2011
USA	Mosaic Telecom	2011
USA	Leap Wireless	2011
USA	US Cellular	2011
Austria	Orange	2011-12
Andorra	Andorra Telecom	2012
Australia	Vivid Wireless (LTE TDD)	2012
China	China Mobile (LTE TDD)	2012
China	China Telecom	2012
Croatia	VIPNet	2012
France	Orange	2012
Japan	KDDI	2012

Malaysia	P1 Networks (LTE TDD)	2012
Nepal	Ncell	2012
Philippines	Globe	2012
Taiwan	Chunghua Telecom	2012
Uruguay	Antel	2012
Malaysia	DiGi	2013
Monaco	Monaco Telecom	2013
Armenia	Armentel	To be confirmed
Armenia	Orange Armenia	To be confirmed
Australia	Optus	To be confirmed
Australia	EnergyAustralia	To be confirmed
Bahrain	Zain	To be confirmed
Belgium	Belgacom (Proximus)	To be confirmed
Brazil	Vivo	To be confirmed
Canada	MTS Allstream	To be confirmed
Canada	Sasktel	To be confirmed
Chile	Entel PCS	To be confirmed
Chile	Movistar	To be confirmed
Croatia	Hrvatski Telekom	To be confirmed
Estonia	Elisa	To be confirmed
Estonia	Tele2	To be confirmed
France	SFR	To be confirmed
Germany	E Plus	To be confirmed
Hong Kong	SmartTone-Vodafone	To be confirmed
Hong Kong	Hutchison 3	To be confirmed
Hong Kong	China Mobile	To be confirmed
Hungary	Telenor Magyarország	To be confirmed
India	Bharti Airtel (LTE TDD)	To be confirmed
India	Tikona Digital (LTE TDD)	To be confirmed
Italy	Telecom Italia	To be confirmed
Italy	Wind	To be confirmed
Jamaica	Claro	To be confirmed
Jersey	Clear Mobitel	To be confirmed
Kazakhstan	Kcell	To be confirmed
Kuwait	Zain	To be confirmed
Latvia	Bite	To be confirmed
Latvia	Tele2	To be confirmed
Latvia	LMT	To be confirmed
Libya	Al Madar	To be confirmed
Lithuania	Tele2	To be confirmed
Luxembourg	Orange	To be confirmed
Malaysia	Asiaspace	To be confirmed
Malaysia	U Mobile	To be confirmed
Namibia	Leo (Cell One)	To be confirmed
Netherlands	KPN	To be confirmed
Netherlands	Vodafone	To be confirmed
Netherlands	T Mobile	To be confirmed
Netherlands	Ziggo 4	To be confirmed
Netherlands	Tele2	To be confirmed
New Zealand	Telecom NZ	To be confirmed
New Zealand	Vodafone NZ	To be confirmed
Nigeria	Globacom	To be confirmed
Norway	TeleNor	To be confirmed
Philippines	Pititl	To be confirmed
Poland	ERA	To be confirmed
Qatar	Qtel	To be confirmed
Romania	Vodafone	To be confirmed
Russia	Svyazinvest	To be confirmed
Saudi Arabia	Zain	To be confirmed
Saudi Arabia	STC	To be confirmed
Singapore	M1	To be confirmed
Singapore	SingTel	To be confirmed
Singapore	StarHub	To be confirmed
South Africa	Cell C	To be confirmed
South Africa	MTN	To be confirmed
Sri Lanka	Dialog	To be confirmed
Sri Lanka	Mobitel	To be confirmed
Taiwan	Global Mobile (LTE TDD)	To be confirmed
Tunisia	Tunisia	To be confirmed
UK	Vodafone	To be confirmed
UK	O2	To be confirmed
USA	Agri-Valley Broadband	To be confirmed
USA	Cellicom	To be confirmed
USA	T-Mobile USA	To be confirmed
USA	Comnet Wireless	To be confirmed
USA	NetAmerica Alliance	To be confirmed
USA	Texas Energy Network	To be confirmed
USA	Public Service Wireless	To be confirmed

**154 LTE network commitments in 60 countries**

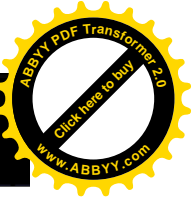
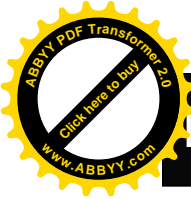


Country	Operator
Abkhaz	Aquafon
Argentina	Telefonica
Argentina	Personal
Belarus	BeST (Life)
Belarus	MTS
Belgium	Mobistar
Belgium	Telenet
Belgium	KPN Base
Bolivia	Entel Movil
Brazil	Oi
Brazil	Telefonica
Canada	Wind Mobile
Czech Republic	O2 (Telefonica)
France	Bouygues Telecom
Egypt	Vodafone
Egypt	Mobinil
Egypt	Etisalat Mlsr
Greece	Cosmote
Indonesia	Telkomsel
Indonesia	XL Axiata
Indonesia	Indosat
Latvia	Triatel
Lithuania	Bite
Kazakhstan	Vimpelcom
Kenya	Safaricom
Malaysia	Maxis
Malaysia	Celcom
Mexico	Telcel
Mexico	Telefonica
Moldova	Orange Moldova
Oman	Omantel
Peru	Telefonica
Poland	Poikomtel
Portugal	Optimus
Puerto Rico	Claro
Qatar	Vodafone Qatar
Russia	MTS
Russia	Vimpelcom
Russia	Tele2 Russia
Russia	Megafon
Russia	OAO Voentelcom
Slovak Republic	O2 (Telefonica)
Slovak Republic	Orange
Spain	Telefonica
Spain	Vodafone
Thailand	DPC/AIS
Turkey	Turkcell
UK	Clear Mobitel
UK	Arqiva
Ukraine	MTS-Ukraine
USA	CleanVire
Vietnam	FPT Telecom
Vietnam	VDC (VNPT)
Vietnam	Viettel

**54 pre-commitment trials**

GSA Evolution to LTE report: May 11, 2011





## LTE Operator Commitments

154 LTE network commitments in 60 countries

### Americas

- Agri-Valley Broadband, USA
- Aircell, USA
- AT&T Mobility, USA
- BayRICS, USA
- Cellcom, USA
- Cellular South, USA
- CenturyTel, USA
- Comnet Wireless, USA
- Cox Comms, USA
- Leap Wireless, USA
- Lightsquared, USA
- \* MetroPCS, USA
- Mosaic Telecom, USA
- NetAmerica Alliance, USA
- PSW, USA
- T-Mobile USA
- TEN, USA
- US Cellular, USA
- \* Verizon Wireless, USA
- Bell Canada
- MTS Allstream, Canada
- Rogers Wireless, Canada
- Sasktel, Canada
- Shaw Comms, Canada
- Telus, Canada
- Claro, Jamaica
- Vivo, Brazil
- Entel PCS, Chile
- Movistar, Chile
- UME EPM, Colombia
- Antel, Uruguay

### Europe

- Andorra Telecom, Andorra
- Armentel, Armenia
- Orange, Armenia
- Vivacell-MTS, Armenia
- \* A1 Telekom Austria
- 3, Austria
- T-Mobile, Austria
- Orange, Austria
- Proximus, Belgium
- Hrvatski Telekom, Croatia
- VIPNet, Croatia
- 3, Denmark
- TDC, Denmark
- TeleNor, Denmark
- \* Telia, Denmark
- \* EMT, Estonia
- Elisa, Estonia
- Tele2, Estonia
- DNA, Finland
- \* Elisa, Finland
- \* TeliaSonera, Finland
- Orange, France
- SFR, France
- E Plus, Germany
- \*Deutsche Telekom, Germany
- O2, Germany
- \*Vodafone, Germany
- Magyar Telekom, Hungary
- Telenor Magyar, Hungary
- 3, Ireland
- Telecom Italia, Italy
- Wind, Italy
- Clear Mobitel, Jersey
- Kcell, Kazakhstan

- Bite, Latvia
- Tele2, Latvia
- LMT, Latvia
- \*Omnitel, Lithuania
- Tele2, Lithuania
- Orange, Luxembourg
- Monaco Telecom, Monaco
- KPN, Netherlands
- Vodafone, Netherlands
- T Mobile, Netherlands
- Ziggo 4, Netherlands
- Tele2, Netherlands
- TeleNor, Norway
- \* TeliaSonera, Norway
- Aero2, Poland
- ERA, Poland
- \* Mobyland & Centernet, Poland
- TMN, Portugal
- Vodafone, Portugal
- Vodafone, Romania
- Rostelecom, Russia
- Svyazinvest, Russia
- Yota, Russia
- 3, Sweden
- \* Tele2, Sweden
- \* TeleNor, Sweden
- \* TeliaSonera, Sweden
- Orange, Switzerland
- Swisscom, Switzerland
- O2, UK
- Vodafone UK
- \* MTS, Uzbekistan
- \* Ucell, Uzbekistan

### MEA

- Zain, Bahrain
- Zain, Jordan
- Zain, Kuwait
- Al Madar, Libya
- Leo, Namibia
- Globacom, Nigeria
- Qtel, Qatar
- Etisalat, Saudi Arabia
- STC, Saudi Arabia
- Zain, Saudi Arabia
- MTN, South Africa
- Vodacom, South Africa
- Cell C, South Africa
- Tunisiana, Tunisia
- Du, UAE
- Etisalat, UAE



www.gsacom.com

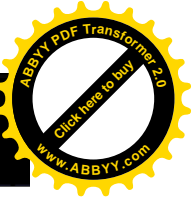
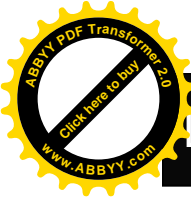
### Asia-Pacific/Oceania

- Energy Australia
- Optus, Australia
- Telstra, Australia
- VHA, Australia
- Vivid Wireless, Australia
- China Telecom, China
- China Mobile, China
- \* CSL Limited, Hong Kong SAR
- China Mobile, Hong Kong
- Hutchison 3, Hong Kong
- PCCW, Hong Kong SAR
- SmarTone-Vodafone, Hong Kong
- Bharti Airtel, India
- Qualcomm India LTE Venture
- Reliance, India
- Tikona Digital, India
- eMobile, Japan
- KDDI, Japan
- \* NTT DoCoMo, Japan
- Softbank Mobile, Japan
- Asiaspace, Malaysia
- P1 Networks, Malaysia
- U Mobile, Malaysia
- DiGi, Malaysia
- Ncell, Nepal
- Globe, Philippines
- \*Smart, Philippines
- Telecom New Zealand
- Vodafone New Zealand
- Pitell, The Philippines
- M1, Singapore
- SingTel, Singapore
- StarHub, Singapore
- KT, South Korea
- LG Telecom, South Korea
- SK Telecom, South Korea
- Dialog, Sri Lanka
- Mobitel, Sri Lanka
- Chunghwa Telecom, Taiwan
- Global Mobile, Taiwan

\* Commercially launched LTE systems

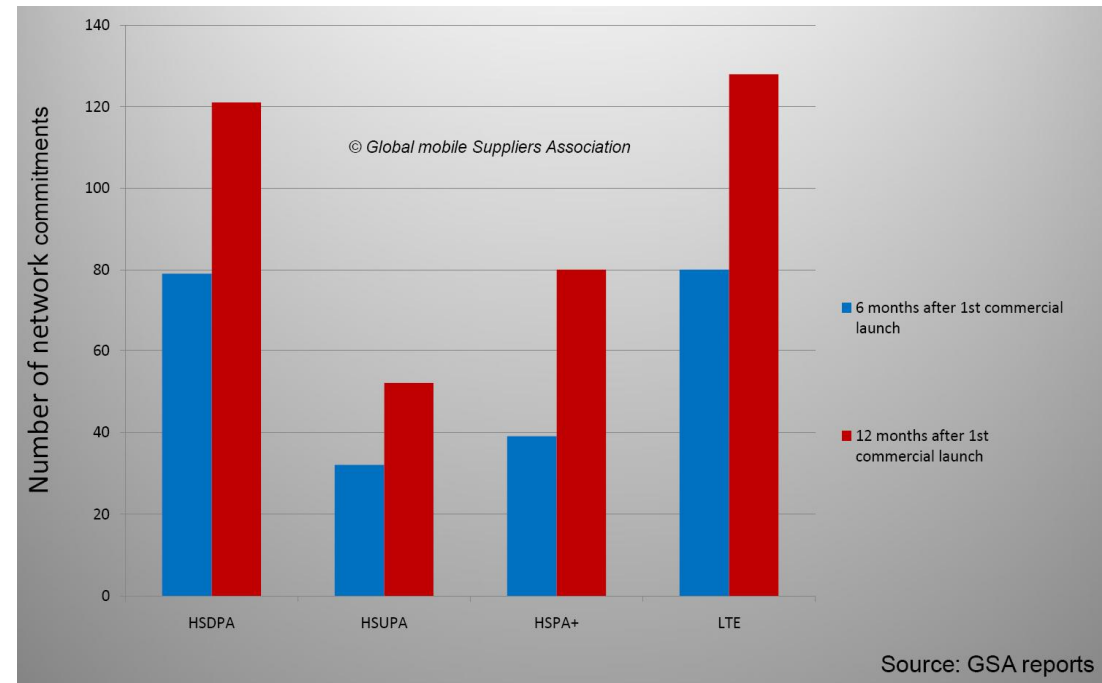
Source: Global mobile Suppliers Association (GSA)  
Evolution to LTE report (May 11, 2011) www.gsacom.com



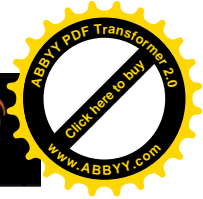
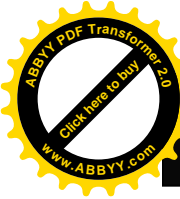


*It's official! LTE is the fastest developing mobile communications system technology ever !!*

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*








# Status of the LTE Ecosystem

GSA report:  
*Status of the LTE Ecosystem*  
March 16, 2011

- ❑ 98 LTE user devices launched
- ❑ Products include modules, routers, m-tablets, notebooks, PC cards, phones, USB modems
- ❑ Most LTE devices are dual mode;
  - ❑ LTE and HSPA or HSPA+ or
  - ❑ LTE and EV-DO
- ❑ Prime FDD bands supported are 700 MHz, 800 MHz, 2.6 GHz
- ❑ LTE1800 will also be a prime LTE band, led by deployments in Europe, APAC
  - ❑ approx. 10% of LTE devices today operate in 1800 MHz



**REPORT: Status of the LTE Ecosystem**  
March 16, 2011

This updated report from the Global mobile Suppliers Association (GSA) confirms how a robust user device ecosystem is rapidly establishing to support LTE which is the fastest developing mobile communications system technology ever

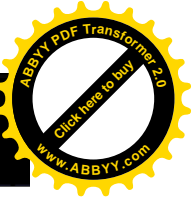
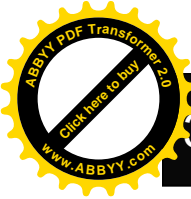
Global mobile Suppliers Association (GSA)  
www.gsacom.com

GSA LinkedIn Group: [www.linkedin.com/groups?gid=2313721](http://www.linkedin.com/groups?gid=2313721)

LTE1800 Group: [www.linkedin.com/groups?gid=3129390](http://www.linkedin.com/groups?gid=3129390)

Supplier	Model	LTE Operating Frequency	Other modes
<b>MODULES</b>			
AnyDATA	DT995S LTE	AWS, L-band	HSPA+
GCT	GDM740 chipset	Quad	TBC
Franklin Wireless	M700 LTE/HSPA+		TBC HSPA+
Franklin Wireless	M700 LTE/EV-DO	700	EV-DO
Huawei	EM920	TBC	TBC
LG	WM300	700	TBC
LG	L2000	700	TBC
Novatel Wireless	Expedite E551	700	EV-DO
Novatel Wireless	Expedite E562	700	HSPA+ EV-DO
Novatel Wireless	Expedite E571	700, AWS	HSPA+ EV-DO
Novatel Wireless	Expedite E573	Multiband	DC-HSPA+
Qualcomm	MDM9625 chipset	Multiband	DC-HSPA+ EV-DO TD-SCDMA
Qualcomm	MDM9225 chipset	Multiband	DC-HSPA+ TD-SCDMA
Renesas	SP2531 modem	Multiband	DC-HSPA+
Sequans	SQN3010 TD-LTE	Bands 38, 40, 41	None
Sierra Wireless	Airprime MC7700	700, AWS	HSPA+
Sierra Wireless	Airprime MC7710	800, 900, 1800, 2100, 2600	HSPA+
Sierra Wireless	Airprime MC7760	700	HSPA+ EV-DO
ST-Ericsson	M710 Multimode LTE		Quad HSPA
ST-Ericsson	Thor M720	Multiband	HSPA+
ST-Ericsson	Thor M730	Quad	None
ST-Ericsson	Thor M7400	Includes 700	DC-HSPA+ 2600
<b>M-TABLETS</b>			
Acer	Iconia Tab A500	700	TBC
Cisco	Cius	700	EV-DO
Motorola	Xoom	700	EV-DO
RIM	4G Playbook	700	EV-DO
Samsung	Galaxy Tab LTE	700	EV-DO
ZTE	Light2	TBC	HSPA
ZTE	Light LTE	700	EV-DO

Supplier	Model	LTE Operating Frequency	Other modes
<b>NOTEBOOKS</b>			
GammaTech	D12C	00	TBC
HP	Pavilion dm1-3010nr	700	TBC
HP	Compaq CQ10-688nr	700	TBC
Samsung	N350	TBC	HSPA+
Samsung	N150	2600	HSPA
Samsung	X450	2600	HSPA
<b>PC CARDS</b>			
Fujitsu	Xi F-05C	1500	HSPA
<b>PHONES</b>			
HTC	Thunderbolt		
LG	V5910 Revolution		
Motorola	Droid Bionic		
Samsung	Galaxy S 4G LTE (S2)		
Samsung	Capt SCH-R900		
Samsung	Galaxy S SCH-R910 Int'l		
<b>ROUTERS</b>			
AVM	FRITZbox 640		
C-motech	CLR-960		
Cradlepoint	CBA760		
Cradlepoint	CTR500		
Cradlepoint	MBR100		
Cradlepoint	CBA25		
Cradlepoint	MBR100		
Cradlepoint	CT 100		
Dovado	E592		
Dovado	E597	800, 900, 1800, 2100, 2600	TBC HSPA+
Huawei	E598	700, 2100	DC-HSPA+
Huawei	IP Wireless USB-D1101A-L-E	700, AWS, 800, 1800, 2600	DC-HSPA+
Huawei	IP Wireless USB-D1211A-L-E	800, 1800, 2600	DC-HSPA+
Huawei	IP Wireless USB-D1213A-L-E	700, 2600	None
Huawei	IP Wireless USB-D1215A-L-E	700, AWS	None
Lanco	LD100	700, AWS	None
NEF	X14-02C	2300	None
Ny	VL400	1550	None
Motorola	Adrenaline AD3000	1800	HSPA
Nokia	USB+TZ 7110	700	EV-DO
Novatel Wireless	RD-3 multi mode	700, AWS	HSPA
Novatel Wireless	Ovation MCE81	TBC	TBC
Planex	USB551L	TBC	HSPA+
Samsung	UML290	700	EV-DO
Samsung	GT-E5730	700	EV-DO
Samsung	GT-E5710	2600	HSPA
Samsung	GT-E5740	2600	None
Sierra Wireless	AirCard 320U	800, 1800, 2600	DC-HSPA+
ZTE	AL600	TBC	HSPA+ EV-DO
ZTE	AL620	TBC	HSPA+
ZTE	AL621	2600	HSPA+
ZTE	MF620D	plus 1800 later	HSPA+
ZTE	MF29L	800, 1800, 2600	HSPA+
ZTE	MF29L	TBC	HSPA+



# 3GPP-defined LTE spectrum bands



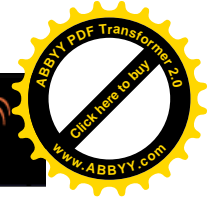
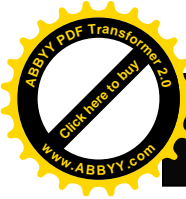
3GPP has defined around 30 potential bands for LTE deployments

Several bands used in initial deployments according to availability and national/regional needs



E-UTRA Operating Band	Band name	Uplink (UL) operating band BS receive UE transmit		Downlink (DL) operating band BS transmit UE receive		Duplex Mode
		F <sub>UL_low</sub>	F <sub>UL_high</sub>	F <sub>DL_low</sub>	F <sub>DL_high</sub>	
1	2.1 GHz	1920 MHz	1980 MHz	2110 MHz	2170 MHz	FDD
2	1900 MHz	1850 MHz	1910 MHz	1930 MHz	1990 MHz	FDD
3	1800 MHz	1710 MHz	1785 MHz	1805 MHz	1880 MHz	FDD
4	1.7/2.1 GHz	1710 MHz	1755 MHz	2110 MHz	2155 MHz	FDD
5	850 MHz	824 MHz	849 MHz	869 MHz	894 MHz	FDD
6 <sup>1</sup>	800 MHz	830 MHz	840 MHz	875 MHz	885 MHz	FDD
7	2.6 GHz	2500 MHz	2570 MHz	2620 MHz	2690 MHz	FDD
8	900 MHz	880 MHz	915 MHz	925 MHz	960 MHz	FDD
9	1700 MHz	1749.9 MHz	1784.9 MHz	1844.9 MHz	1879.9 MHz	FDD
10	Ext/ 1.7/2.1 GHz	1710 MHz	1770 MHz	2110 MHz	2170 MHz	FDD
11	1500 MHz lower	1427.9 MHz	1447.9 MHz	1475.9 MHz	1495.9 MHz	FDD
12	Lower 700 MHz	699 MHz	716 MHz	729 MHz	746 MHz	FDD
13	Upper 700 MHz	777 MHz	787 MHz	746 MHz	756 MHz	FDD
14	Upper 700 MHz public safety/private	788 MHz	798 MHz	758 MHz	768 MHz	FDD
15		Reserved		Reserved		FDD
16		Reserved		Reserved		FDD
17	Lower 700 MHz AT&T blocks B and C	704 MHz	716 MHz	734 MHz	746 MHz	FDD
18	800 MHz Band A	815 MHz	830 MHz	860 MHz	875 MHz	FDD
19	800 MHz Band B	830 MHz	845 MHz	875 MHz	890 MHz	FDD
20	UMTS LTE 800 EU	832 MHz	862 MHz	791 MHz	821 MHz	FDD
21	1500 MHz upper	1447.9 MHz	1462.9 MHz	1495.9 MHz	1510.9 MHz	FDD
24		1626.5 MHz	1660.5 MHz	1525 MHz	1559 MHz	FDD
...						
33		1900 MHz	1920 MHz	1900 MHz	1920 MHz	TDD
34		2010 MHz	2025 MHz	2010 MHz	2025 MHz	TDD
35		1850 MHz	1910 MHz	1850 MHz	1910 MHz	TDD
36		1930 MHz	1990 MHz	1930 MHz	1990 MHz	TDD
37		1910 MHz	1930 MHz	1910 MHz	1930 MHz	TDD
38		2570 MHz	2620 MHz	2570 MHz	2620 MHz	TDD
39		1880 MHz	1920 MHz	1880 MHz	1920 MHz	TDD
40		2300 MHz	2400 MHz	2300 MHz	2400 MHz	TDD
41		2496 MHz	2690 MHz	2496 MHz	2690 MHz	TDD
42		3400 MHz	3600 MHz	3400 MHz	3600 MHz	TDD
43		3600 MHz	3800 MHz	3600 MHz	3800 MHz	TDD

Note 1: Band 6 is not applicable  
Source: 3GPP TS 36.104 V10.2.0 (2011-04)



- ❑ Prime bands for LTE deployments are emerging, currently:
  - ❑ 700 MHz: Americas (digital dividend band)
  - ❑ 800 MHz: Europe (digital dividend band)
  - ❑ 2.6 GHz: Europe, APAC, MEA and some Latin American markets committed
  
- ❑ Re-farming of 1800 MHz for mobile broadband services is underway
  - ❑ *Initial LTE1800 launches will be followed by many more in 2011-2*

**In European markets, LTE FDD user devices need to support as a minimum:**

LTE 800/1800/2600 plus (for roaming) 700 MHz

+

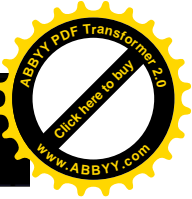
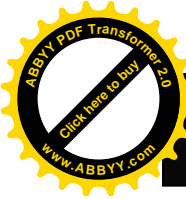
3G/WCDMA-HSPA+ in 850/900/1900/2100 MHz

+

GSM/EDGE/GPRS in 850/900/1800/1900 MHz

*More LTE (and HSPA) bands will be added in the future !*



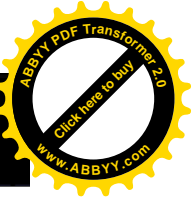
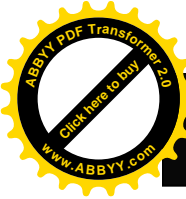


- ❑ More than 350 operators are estimated to have been allocated 1800 MHz spectrum
- ❑ Today 1800 MHz is mainly used for voice (GSM) service
- ❑ GSM traffic is peaking/reducing; momentum has swung to mobile broadband access
- ❑ Data traffic is growing significantly (for some, exponentially); operators need more capacity and to be able to deliver a better user experience of mobile broadband
- ❑ In many markets 1800 MHz represents the largest spectrum allocation
  - ❑ *60% of 1800 MHz spectrum in the top 7\* EU markets is available in 10 MHz or wider assignments*
- ❑ 1800 MHz band is harmonized, non-fragmented, and often only partially-utilized
- ❑ Potential to deploy HSPA or LTE in 1800 MHz
  - ❑ *FT/Orange confirmed throughput advantage of HSPA at 1800 MHz over 2.1GHz*
  - ❑ *Elisa, TeliaSonera and other LTE operators confirmed 2 x coverage advantage compared to 2.6 GHz*
- ❑ 1800 MHz RF components now available in volume production from multiple vendors

\* France, Germany, Italy, Norway, Spain, Sweden, UK (source: Qualcomm)







# 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).

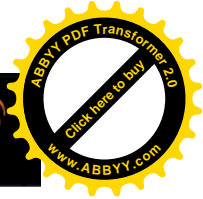
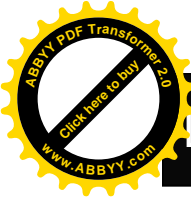
Coordinated GSM-LTE case	Required spectrum
20 MHz LTE	18.4 MHz
15 MHz LTE	13.8 MHz
10 MHz LTE	9.4 MHz

+ Often easier to refarm than 900 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**





## World's first LTE1800 network commercially launched by Mobyland, Poland

**Band 3**

Total spectrum: 2 x 75 MHz

Uplink: 1710-1785 MHz

Downlink: 1805-1880 MHz



MF820 USB Modem



Sierra Wireless A320U

Smartphone V5L



Poland	Aero2/ Mobyland	LTE1800 network launched – world's first
Lithuania	Omnitel	LTE1800 services launched
Hong Kong	CSL Limited	LTE2600/DC-HSPA+ launched. LTE1800 to be launched shortly
Australia	Telstra	LTE1800 in deployment for launch by end 2011
Germany	DT	LTE1800 in deployment for launch Summer 2011
Australia	Optus	Trials
Australia	VHA	Trials completed and the results have been presented
Estonia	Elisa	Interested
Finland	Elisa	Trials
France	Bouygues Telecom	Trials
Greece	Cosmote	Trials completed
Hong Kong	Smartone-Vodafone	Trials, deployment planned
Singapore	Starhub	Trials planned
Thailand	AIS-DPC	Seeking permission for trial
Europe - various	DT/ T Mobile	Deployments planned in selected markets
Europe	TeliaSonera	Deployments planned in selected markets
Latvia		Potential – in discussion
Namibia		Potential – in discussion
Russia		Potential – in discussion
South Africa	MTN	Trials
UK		Potential – in discussion

**LTE1800 LAUNCHED**

**LTE1800 LAUNCHED**

Very strong interest in LTE1800 and building momentum globally

# LTE1800 user devices

- ❑ At launch the IP Wireless dongle for Mobyland supported single-mode only LTE1800
- ❑ A new ZTE dongle supports LTE2600/1800/800 plus 42 Mbps DC-HSPA+ and GSM-EDGE
- ❑ Multi-mode Huawei E398 dongle (GSM-EDGE/HSPA/LTE) supports LTE2600/2100/1800/900
- ❑ LTE1800-capable devices shown at MWC '11, Barcelona (Feb 14-17) included:
  - ❑ Huawei E392 dongle
  - ❑ Huawei B593 router (multimode CPE)
  - ❑ Huawei E589 personal WiFi
  - ❑ Sierra Wireless AirCard 320U dongle



*Sierra Wireless AirCard 320U dual-mode dongle for Telstra will support LTE1800, LTE2600 and 42 Mbps DC-HSPA+*



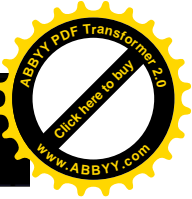
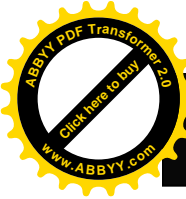
*IP Wireless LTE1800 dongle*



*Leading chipset manufacturers are confirming support for LTE1800 in their platforms*



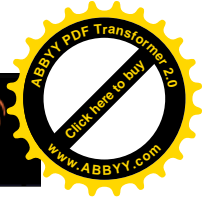
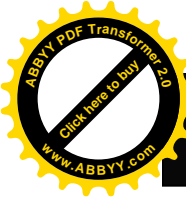
**.. a selection of LTE1800 devices will be available this year**  
In the first stage LTE USB dongles will be available for data support. In the near future multi-mode handsets and smart phones will be the mainstream devices



- Accessible via the banner on the home page [www.gsacom.com](http://www.gsacom.com)
- Convenient location gathering all LTE1800 resources
- Supports a global initiative to promote benefits of deploying LTE in 1800 MHz band and to encourage development of the supporting eco-system (chipsets, platforms, user devices)
- All the presentations from two GSA-GSM Association 1800 MHz mobile broadband seminars
  - Feb 17, 2011: Barcelona*
  - Mar 25, 2011: London*
- Several new WHITE PAPERS specifically addressing the LTE1800 opportunities, challenges, solutions and options produced by leading vendors are available
- Useful links including how to join the GSA's LTE1800 LinkedIn group [www.linkedin.com/groups?gid=3129390](http://www.linkedin.com/groups?gid=3129390)

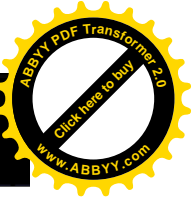
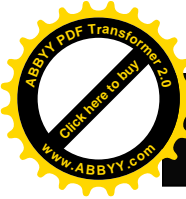






- ❑ USA leads the way – widespread LTE deployments in 700 MHz spectrum arising from early switchover from analog to digital TV
  - ❑ Verizon Wireless: *by end 2011, the Verizon LTE network is planned to be available in more than 175 markets, covering a population of more than 185 million people*
- ❑ In Europe digital switchover (from analog to digital TV) will largely be completed by early 2012
- ❑ Progress is being made to allocate digital dividend spectrum in 790-862 MHz band (800 MHz)
- ❑ Spectrum has so far been auctioned in Germany and Sweden
- ❑ Several more auctions are scheduled for completion in 2011-2012, with 800 MHz typically packaged with 2.6 GHz spectrum (LTE prime band for capacity/urban coverage)
- ❑ 2 LTE800 networks are now commercially launched, both in Germany, using LTE and initially targeting rural areas
- ❑ LTE in 800 MHz (LTE800) will be a prime LTE band and supported by device vendors



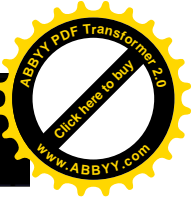
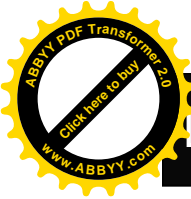


## Global TD-LTE Initiative launched at MWC 2011

*The Global TD-LTE Initiative (GTI) was launched at MWC 2011. Founding members were China Mobile, Bharti Airtel, Softbank Mobile, Vodafone, Clearwire, Aero2 and E-Plus. According to the press release “GTI will focus on creating value for stakeholders across the TD-LTE ecosystem to promote the fast development of the technology, promoting the convergence of LTE TDD and FDD modes to maximize the economies of scale, and sharing ecosystem with other TDD technology, e.g. eXtended Global Platform (XGP) to establish a growth focused business environment. The initiative aims to bring together leading industry partners to steer the TD-LTE ecosystem as a major standard in mobile broadband technology & drive the development of next generation mobile broadband networks.*

<b>Australia</b>	WiMAX™ operator Vivid Wireless trialed LTE TDD in Sydney for 2 months from December 2010 in high demand, high density, inner city conditions. Commercial network launch is expected by 2012
<b>China</b>	China Mobile has now launched large-scale LTE TDD trials consisting of more than 1,000 base stations in Beijing, Shanghai, Hangzhou, Nanjing, Guangzhou, Shenzhen, and Xiamen. Commercial services are expected in 2012
<b>Denmark</b>	Hutchison 3 has acquired 2.6 GHz TDD spectrum and plans to deploy a combined LTE FDD and TDD network
<b>France</b>	Orange has deployed a trial LTE network in Paris, initially with 10 MHz bandwidth supporting both FDD and TDD modes, upgraded to 20 MHz in May 2010. FDD-TDD co-existence tests are on-going
<b>Germany</b>	E-Plus is a member of the Global TD-LTE Initiative and is planning a LTE TDD field trial beginning in Q1 2011
<b>India</b>	RIL has committed to LTE TDD and is expected to commercially launch in 2011

	Bharti Airtel is committed to LTE TDD and has joined the Global TD-LTE Initiative  Qualcomm India LTE Venture is committed to LTE TDD  Tikona Digital is committed to deploy LTE TDD
<b>Ireland</b>	LTE TDD testing was completed June 2010
<b>Malaysia</b>	WiMAX™ operator Asiaspace is exploring deployment of 2.3 GHz LTE TDD
<b>Malaysia</b>	WiMAX™ operator Packet Networks (P1) is planning to deploy LTE TDD on existing WiMAX sites as an overlay network
<b>Japan</b>	Softbank Mobile is considering LTE TDD in the 2.5 GHz spectrum it owns and has joined the Global TD-LTE Initiative
<b>Oman</b>	Omantel showcased LTE TDD during the Salalah Tourism Festival in July 2010
<b>Poland</b>	Aero2 is testing and deploying LTE TDD in 2.6 GHz in Aleksandrów Łódzki and Łódź; commercial launch is planned in 2011. Aero2 has joined the Global TD-LTE Initiative
<b>Russia</b>	WiMAX™ operator Yota is shifting to LTE Rostelecom plans to conduct LTE TDD trials in 2.3 - 2.4 GHz spectrum
<b>Sweden</b>	Hutchison 3 has acquired 2.6 GHz TDD spectrum from Intel and plans to deploy a combined LTE FDD and TDD network
<b>Taiwan</b>	CHT has also completed LTE tests on the high-speed rail system using TDD and FDD modes in 2.6GHz spectrum  FarEasTone and China Mobile are co-operating on an LTE TDD trial in Taipei  The National Chiao Tung University conducted a trial of LTE TDD in 2010  WiMAX operator Global Mobile Corp will seek approval to allow a switch to LTE TDD once WiMAX coverage hits 70% of the population
<b>USA</b>	Clearwire requested 3GPP to standardize LTE TDD for operation in the band 2496 – 2690 MHz and has released results of trials the company carried out on LTE TDD and FDD systems in Phoenix, Arizona. Clearwire is a member of the Global TD-LTE Initiative



**1** "Evolution to LTE" Report

- \* Operator commitments, launches, trials
- \* Regulatory/market developments: FDD and TDD

Free download: [www.gsacom.com](http://www.gsacom.com)

**2** **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  
 LOG IN FIRST

Select the LTE feature in GAMBoD  
[www.gsacom.com/gambod](http://www.gsacom.com/gambod)

Lists 3,071 HSPA devices (April 2011) including 53 HSPA devices also supporting LTE

**Evolution to LTE Report**  
 Global mobile Suppliers Association  
 May 11, 2011  
**GSM/3G MARKET/TECHNOLOGY UPDATE**

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. **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 covers FDD and TDD modes. Infrastructure solutions offer an easy upgrade path to LTE. The HSPA and HSPA+ mobile broadband ecosystem is mainstream and LTE is the natural migration choice for GSM/HSPA network operators. CDMA operators and, increasingly, WIMAX operators are also deciding to evolve to LTE as the clear mobile broadband system of choice.

**20 commercial LTE networks in 14 countries**

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 & Centertel	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
Germany	Deutsche Telekom	05.04.11
Philippines	Smart Communications	16.04.11
Lithuania	Omnitel	28.04.11

Commercial LTE network launches - May 11, 2011  
 © Global mobile Suppliers Association (GSA)

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**GAMBoD - GSA Analyzer for Mobile Broadband Devices**

Explore the HSPA marketplace with GSA's easy to use HSPA Device Selector. Simply select the device options, then click the Search button. Matching devices are shown in the table below. [Click here](#) for more details on how the works. To make any comments about GAMBoD, please email [info@gsacom.com](mailto:info@gsacom.com).

Select your search criteria...

Suppliers:  Avaya  Nokia  Nokia Ink  Novatel Wireless  Nttcom

Form Factor:  Camera  Ebook reader  Femtocell  Mobile Tablet  Module

Features:  HD voice  EV-DO  A-GPS  GPS  EDGE

HSPA Speeds:  1.5 Mbps  2.0 Mbps  4.5 Mbps  5.76 Mbps  11.5 Mbps

HSDPA Speeds:  7.2 Mbps  10.2 Mbps  14.4 Mbps  21 Mbps  28 Mbps

Frequencies:  900  1700  1800  1900  2100

[Click to Search for Devices](#)

**3** **LTE1800 zone**  
 LTE in 1800 MHz spectrum  
 White Papers, seminar presentations, plus links to other key resources

**4** **LTE1800**  
 a subgroup of GSA (450+ members)  
[www.linkedin.com/groups?=&gid=3129390](http://www.linkedin.com/groups?=&gid=3129390)



**5** **GSA**  
 Global mobile Suppliers Association  
**REPORT: Status of the LTE Ecosystem**

"Status of the LTE Ecosystem" report  
 LTE User Devices - free download: [www.gsacom.com](http://www.gsacom.com)