Mobile HD voice: Global Update report

Global mobile Suppliers Association

April 23, 2015

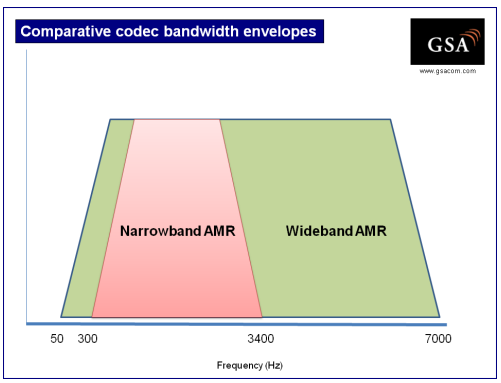
GSM/3G MARKET/TECHNOLOGY UPDATE

This report by GSA gives a status summary of mobile HD voice operator commitments & service deployments on 2G/GSM, 3G/HSPA & 4G/LTE networks (i.e. VoLTE), launches globally & the maturing W-AMR enabled mobile HD voice user devices ecosystem

Introduction

Mobile HD voice based on Adaptive Multi Rate Wideband (W-AMR) technology enables high-quality voice calls in mobile networks and an improved user experience. It provides significantly higher voice quality for calls between mobile phones supporting the feature and is deployed in GSM, UMTS (WCDMA-HSPA) and LTE networks around the world. The higher voice quality using HD voice improves the call experience, allowing people to better share feelings, do business and communicate information. HD voice transmits a broader spectrum of the human voice; therefore conversation is more natural and is likened to speaking to the other party in the same room. HD voice also helps people hear better in noisy environments.

HD voice helps operators to differentiate their offerings and enable high quality services e.g. voice dependent business like call centres, information and emergency services, etc. HD voice is ideal for conference calls and can contribute to a reduction in business travel and raise productivity while reducing environmental impact. Calls which are easier to hear and understand reduce the fatigue often associated with long conference calls. HD voice represents the greatest advance in voice on mobile networks in decades.



W-AMR speech technology is standardized in 3GPP Release 5. The W-AMR speech-compression algorithm doubles voice bandwidth (50–7000 Hz) compared to the current narrowband speech codec (300–3400 Hz) without extra radio or transmission requirements. According to 3GPP, 12.65 kbit/s or higher coding bit-rates provide high-quality wideband audio (lower bit-rates of 8.85 and 6.6 kbit/s are for temporary use during adverse radio conditions or periods of cell congestion). In subjective tests the HD voice wideband codec produces better results than the best narrow-band codec.

132 mobile operators commercially launched HD voice service in 81 countries

120 on 3G/HSPA networks
14 on 2G/GSM networks
16 on LTE networks (VoLTE)

** some operators offer HD voice service on more than one radio system*

HD voice service is commercially launched in Albania, Armenia, Australia, Austria, Bahrain, Belarus, Belgium, Bulgaria, Canada, Croatia, Czech Republic, Denmark, Dominican Republic, Egypt, Estonia, Finland, France, Germany, Greece, Hong Kong, Hungary, India, Indonesia, Ireland, Israel, Italy, Ivory Coast, Japan, Jordan, Kazakhstan, Kenya, Kuwait, Kyrgyzstan, Latvia, Lithuania, Luxembourg, Malawi, Malaysia, Mali, Malta, Mauritius, Moldova, Mongolia, Montenegro, Morocco, Myanmar, Netherlands, New Zealand, Nigeria, Norway, Oman, Philippines, Poland, Portugal, Qatar, Réunion, Romania, Russia, Rwanda, Saudi Arabia, Senegal, Serbia, Singapore, Slovakia, Slovenia, South Africa, South Korea, Spain, Sri Lanka, Sweden, Switzerland, Taiwan, Tajikistan, Thailand, Turkey, UAE, Uganda, UK, Ukraine, USA, Uzbekistan

Several countries have competing mobile HD voice operators. *Interconnection between these networks for end-to-end HD voice calling is a priority and in progress as well as provision for handling international HD voice calls, and for HD voice calling between fixed & mobile networks.*

The maximum benefits from using HD voice are realized when both calling and called party use HD voice phones on a compatible mobile network. Improvements in call quality are also observed even when using an HD voice phone to call a non-HD voice phone, due to improvements in the acoustic performance and advanced noise reduction capabilities of most HD voice phones. There is a strong business case for Mobile HD voice:

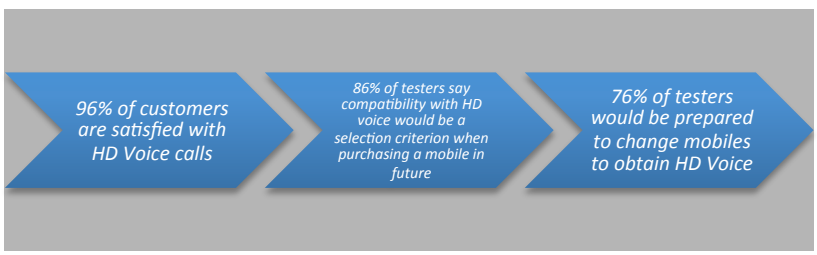
Worldwide

- There are over 300 million HD customers (Q1 2015 est.)

France

- < 50% of installed base has HD voice devices (Q1 2015)

Orange France studies confirmed:



GSA • PO Box 5817 • Sawbridgeworth • CM21 0BH • UK
Phone +44 1279 439 667 • e-mail: info@gsacom.com

Mobile HD voice: Global Update report

GSM/3G MARKET/TECHNOLOGY UPDATE

Network aspects

The voice payload for transport in the core network is usually PCM-coded at 64 kbit/s (ITU-T Rec. G.711). Narrowband AMR is transcoded to/from PCM but degrades voice quality, adding signal processing complexity.

Analog PCM-based transport cannot be used with W-AMR as G.711 only applies to narrowband voice. W-AMR must be based on one of two complementary 3GPP standards: tandem-free operation (TFO) or transcoder-free operation (TrFO).

Introduction of W-AMR into GSM systems requires TFO, which is part of 3GPP GERAN, which does not require substantial modification of the core network. W-AMR and TFO can also be introduced into UMTS.

A better option is to use the recommended TrFO. The combination of TFO and TrFO enables W-AMR calls between all types of 3GPP mobile devices (i.e. GSM/EDGE and UMTS/WCDMA-HSPA).

Most HD voice devices operate on 3G/HSPA networks, with some working on GSM networks. Many new models are delivered with HD Voice activated as default. A number of operators are now deploying HD voice capability on their 2G/GSM networks for which compatible phones are commercially available.

A growing number of LTE user devices incorporate W-AMR technology today and several LTE operators are deploying VoLTE with HD voice as the first service offer. HD service.

Note that with HD voice capable terminals some are operator specific and not compatible for use in other networks or available in all markets. This information in this report is for interest/guidance only for readers. Availability of the W-AMR feature in any device for a specific market must always be checked directly with the phone manufacturer concerned.

To continue the market development, GSA advocates that all smartphones should be delivered with W-AMR activated by default.

Many operators provide demonstrations of mobile network HD voice quality on their websites for customers to compare with standard mobile voice quality. The link below references one of the earliest demonstrations and has been listed to by over 89,000 visitors.

Hear HD Voice!

Martin Stanford (Sky News presenter)
www.youtube.com/watch?v=bwVPkt6vwEw&feature=player_embedded

A white paper "BT Global IP Exchange" (available in the Mobile HD voice Zone on www.gsacom.com) explains how operators can benefit from the opportunity to deliver and charge for cross-network, national and international and roaming HD calls. Since October 2012, Orange customers in Romania and Moldova can make HD voice calls between these countries. Orange supports international HD voice calls between two operators on fixed and/or any mobile network and launched an international HD voice call exchange for 3rd party operators and service providers. Other IPX providers include Aicent, BICS, iBasis, TI Sparkle, TSIC, and Tata Communications.

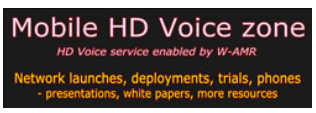
According to research by *Innovation Observatory* for BT, global retail revenue from cross-network HD voice services could reach GB £1.5 billion by 2015.

The **HD voice logo** is designed for operators and vendors to market and promote interoperable HD voice capabilities on their networks and end user products. Details about the logo, how to become a licensee, contacts etc., are available on the GSMA (GSM Association) website

http://www.gsma.com/network2020/hd-voice/

Since June 12, 2013 **DECT Cat-iq 2.0** certified devices may also use this logo.

HD Voice (W-AMR) discussion group:
www.linkedin.com/groups?=&gid=3032759



On the GSA website www.gsacom.com/hdvoice

Maps and charts relating to mobile HD voice are available as PDF files via the links on www.gsacom.com and also as JPEG files at www.gsacom.com/news/statistics.php4

White papers, market updates, graphics www.gsacom.com

White Paper: *Voice Handover in LTE Networks* - shows that the SRVCC technology performance is mature for commercial launch. It also means good voice quality in LTE network handover scenarios, non-noticeable interrupt time when doing a handover, as well as seamless HD voice between LTE and WCDMA.

www.ericsson.com/news/121026-voice-handover-in-lte-networks_244159017_c

GSA • PO Box 5817 • Sawbridgeworth • CM21 0BH • UK
Phone +44 1279 439 667 • e-mail: info@gsacom.com

Mobile HD voice: Global Update report

Global mobile Suppliers Association

April 23, 2015

GSM/3G MARKET/TECHNOLOGY UPDATE

OPERATOR	HSPA network	GSM network	LTE network	COUNTRY	HD voice service 1st launch date
Orange Moldova	☑			Moldova	09.09.2009
Orange France	☑			France	19.07.2010
Orange Armenia	☑			Armenia	24.02.2010
Orange UK	☑			UK	01.09.2010
SFR	☑			France	09.2010
Orange Spain (Catalonia region)	☑			Spain	10.09.2010
Mobistar	☑	☑		Belgium	16.09.2010
Vipnet	☑			Croatia	22.09.2010
Tata DoCoMo	☑			India	03.11.2010
Mobinil	☑			Egypt	09.11.2010
Megafon (initially HSPA, with GSM from 27.04.2011)	☑	☑		Russia	10.11.2010
Orange Luxembourg	☑			Luxembourg	08.12.2010
CSL Limited	☑		☑	Hong Kong	12.2010
Turkcell	☑			Turkey	17.01.2011
TIM	☑			Italy	27.01.2011
WIND Mobile	☑			Canada	02.2011
Vodafone Turkey	☑			Turkey	01.04.2011
Orange Mauritius	☑			Mauritius	07.04.2011
Orange Réunion	☑			Réunion	2011
Orange Romania	☑			Romania	13.05.2011
3 UK	☑			UK	05.2011
Orange Dominicana	☑			Dominican Republic	06.2011
Du	☑			UAE	06.2011
M-TEL	☑			Bulgaria	14.06.2011
Telstra	☑			Australia	24.06.11
Orange Uganda	☑			Uganda	07.07.2011
T-Mobile Poland	☑	☑		Poland	17.08.2011
Orange Kenya	☑			Kenya	25.08.2011
T-Mobile Austria	☑			Austria	29.08.2011
Mobitel	☑			Slovenia	06.09.2011
VIP Serbia	☑	☑		Serbia	12.09.2011
Orange Switzerland	☑			Switzerland	13.09.2011
T-Hrvatski Telekom	☑	Planned		Croatia	14.09.2011
TDC	☑			Denmark	26.09.2011
A1 Telekom	☑			Austria	10.2011
T-Mobile CZ	☑			Czech Republic	26.10.2011
DT	☑	☑		Germany	02.11.2011
3 Austria	☑			Austria	16.11.2011
Si.mobil	☑			Slovenia	15.12.2011
Bell Mobility	☑			Canada	24.01.2012
Swisscom	☑			Switzerland	01.02.2012
Dialog Axiata	☑			Sri Lanka	14.02.2012
KPN	☑			Netherlands	05.03.2012
Celcom Axiata	☑			Malaysia	07.04.2012
Vodafone Ireland	☑			Ireland	18.04.2012
Kcell	☑			Kazakhstan	2012
Play (P4)	☑			Poland	10.07.2012
T-Mobile UK	☑			UK	08.2012
SK Telecom			☑	South Korea	08.08.2012
LG U Plus			☑	South Korea	08.08.2012
Orange Jordan	☑			Jordan	11.08.2012
MTS	☑			Russia	12.09.2012
Telus	☑			Canada	21.09.2012
Meo (formerly known as TMN)	☑			Portugal	28.09.2012
Rogers Wireless	☑		☑	Canada	10.2012

GSA • PO Box 5817 • Sawbridgeworth • CM21 0BH • UK
Phone +44 1279 439 667 • e-mail: info@gsacom.com

KT			☑	South Korea	08.10.2012
Smart	☑			Philippines	22.10.2012
Bouygues Telecom	☑			France	11.2012
DTAC		☑		Thailand	11.2012
Ooredoo	☑			Qatar	27.11.2012
3 Denmark	☑			Denmark	20.12.2012
Airtel	☑			Nigeria	22.12.2012
Orange (Partner)	☑			Israel	25.12.2012
T-Mobile US (HSPA first, VoLTE launched 22.05.14)	☑		☑	USA	08.01.2013
Axis	☑			Indonesia	22.01.2013
DNA	☑			Finland	28.01.2013
Chunghwa Telecom	☑			Taiwan	05.02.2013
Orange CI	☑			Ivory Coast	28.02.2013
Airtel	☑			Kenya	05.03.2013
Airtel	☑			Malawi	05.03.2013
Airtel	☑			Rwanda	05.03.2013
StarHub (HSPA first, VoLTE launched 26.08.14)	☑		☑	Singapore	07.03.2013
Telenor	☑			Norway	19.03.2013
G-Mobile	☑			Mongolia	20.03.2013
Mobily	☑			Saudi Arabia	03.2013
STC	☑			Saudi Arabia	03.2013
Netcom	☑			Norway	04.2013
Cosmote	☑			Romania	15.04.2013
AIS	☑			Thailand	06.05.2013
Orange Slovakia	☑			Slovakia	16.05.2013
Cosmote	☑			Greece	11.06.2013
Cmogorski Telekom	☑	☑		Montenegro	24.06.2013
Vodafone	☑			Australia	25.06.2013
Magyar Telekom	☑			Hungary	01.07.2013
Vodafone	☑		☑	Germany	26.07.2013
Bite	☑			Lithuania	31.07.2013
Bite	☑			Latvia	05.08.2013
Kyivstar		☑		Ukraine	08.08.2013
Telenor Serbia	☑	☑		Serbia	16.09.2013
Vodafone	☑			New Zealand	07.11.2013
MTS	☑			Belarus	11.12 2013
Viva	☑			Kuwait	25.12.2013
Orange	☑			Mali	01.2014
2 Degrees	☑			New Zealand	21.01.2014
Orange Sonatel	☑			Senegal	14.02.2014
TeliaSonera	☑			Sweden	01.03.2014
Telefonica O2 incorporating E Plus	☑			Germany	12.03.2014
Nawras	☑			Oman	22.03.2014
Inwi	☑	☑		Morocco	24.03.2014
Tele2	☑			Sweden	25.03.2014
Viva	☑			Bahrain	29.03.2014
Zain	☑			Bahrain	31.03.2014
EMT	☑			Estonia	06.05.2014
3 HK			☑	Hong Kong	15.05.2014
Altel	☑	☑		Kazakhstan	15.05.2014
Etisalat	☑			Sri Lanka	22.05.2014
AT&T Mobility			☑	USA	23.05.2014
SingTel			☑	Singapore	31.05.2014
NTT DoCoMo			☑	Japan	06.2014
Beeline	☑	☑		Russia	16.06.2014
StarHub			☑	Singapore	28.06.2014
Vodafone	☑			Netherlands	02.07.2014

GSA • PO Box 5817 • Sawbridgeworth • CM21 0BH • UK
Phone +44 1279 439 667 • e-mail: info@gsacom.com

Orange	☑	☑		Poland	28.07.2014
Vodafone	☑			Albania	04.08.2014
Ooredoo	☑			Myanmar	15.08.2014
MTN	☑			South Africa	20.08.2014
Telenor	☑			Denmark	03.09.2014
Vodafone	☑			UK	11.09.2014
Verizon Wireless			☑	USA	15.09.2014
Tele2	☑			Lithuania	15.10.2014
Vodafone	☑			Spain	15.10.2014
T-Mobile	☑			Netherlands	11.2014
Tele2	☑			Latvia	14.11.2014
KDDI			☑	Japan	12.2014
Softbank	☑		☑	Japan	12.12.2014
Polkomtel / Plus	☑			Poland	22.12.2014
Megafon	☑	☑		Tajikistan	25.12.2014
Elisa	☑			Estonia	05.01.2015
Beeline	☑			Uzbekistan	24.02.2015
Beeline	☑			Kyrgyzstan	04.03.2015
Vodafone	☑			Malta	30.03.2015
Slovak Telekom	☑			Slovakia	21.04.2015
Total = 132 HD voice operators (enabled by W-AMR)	120 on 3G/HSPA networks	14 on GSM networks	16 VoLTE on LTE networks	81 countries	Excludes MVNOs

Many more operators are trialling or deploying HD voice capability in their networks.

HD voice (W-AMR) on LTE networks (VoLTE)

LTE systems are all-IP, optimized for data transfer. LTE does not include any circuit switched capability as used on previous technologies for voice and SMS services. Since voice and SMS generate in the region of 60-70% of operator revenues globally, voice service is needed on LTE networks and is a priority for many LTE operators as network coverage improved (increasingly nationwide) and as penetration and usage of LTE smartphones increased.


GSA
Global mobile Suppliers Association
April 9, 2015
Evolution to LTE report
4G MARKET & TECHNOLOGY UPDATE
VoLTE global status
LTE systems are all-IP, optimized for data transfer and exclude circuit switched capability as used on previous systems for voice and SMS. Voice service is a priority for many LTE operators as network coverage has improved and penetration and usage of LTE smartphones has grown. With the VoLTE solution (GSMA VoLTE IR.92 specification) subscribers can use HD voice and other richer communication services with LTE smartphones. An operator needs an IMS (IP Multimedia System) core network and the LTE radio access network. The Evolved Packet Core must also support VoLTE e.g. by software upgrade. 90 operators in 47 countries are investing in VoLTE deployments, studies or trials including 16 operators in 7 countries with commercially launched VoLTE-HD voice service. 186 smartphones (including carrier & frequency variants) support VoLTE according to GSA's latest research.
90 operators are investing in VoLTE in 47 countries
Country | Operator | VoLTE status
Canada | Rogers Wireless | Launched
Germany | Vodafone | Launched
Hong Kong | CSL | Launched
Hong Kong | 3 HK | Launched
Japan | KDDI | Launched
Japan | NTT DoCoMo | Launched
Japan | Softbank | Launched
Singapore | M1 | Launched
Singapore | SingTel | Launched
Singapore | StarHub | Launched
South Korea | KT | Launched
South Korea | LG Uplus | Launched
South Korea | SK Telecom | Launched
USA | AT&T Mobility | Launched
USA | T-Mobile US | Launched
USA | Verizon Wireless | Launched
Algeria | Algerie Telecom | In deployment
Australia | Optus | Trialling
Australia | Telstra | In deployment
Australia | Vodafone | In deployment
Austria | T Mobile | Trialling
Brazil | TIM | Trialled
Bulgaria | Mtel | Planned
Bulgaria | Max | In deployment
Canada | Sasktel | In deployment
Canada | Telus | In deployment
China | China Mobile | In deployment
Colombia | Avantel | In deployment
Czech Republic | O2 Czech | In deployment
Czech Republic | T-Mobile | Trial planned
Denmark | TDC | Trialling
Denmark | Telenor | In deployment
Ecuador | CNT | In deployment
France | Bouygues Telecom | In deployment
France | Orange | Planned
France | SFR | In deployment
Germany | DT | In deployment
Germany | O2 | In deployment
Greece | Vodafone | Trialled
Hong Kong | China Mobile HK | In deployment
India | Bharti Airtel | Trialling
India | RIL | Trialling
India | Videocon | Planned
Italy | Vodafone | Trialling
Kazakhstan | Altel | In deployment
Kuwait | Viva | Trialling
Kuwait | Zain | Trialled
Lebanon | Alfa | In deployment
Namibia | MTC | Planned
Netherlands | KPN | Trialling
Netherlands | Tele2 | In deployment
Netherlands | Vodafone | In deployment
New Zealand | Vodafone | Trialled
Nigeria | Smile | In deployment
Norway | Ice.net | Trials planned
Norway | Telenor | In deployment
Poland | Polkomtel | Trialled
Romania | Vodafone | Trialling
Russia | MTS | Trialled
Russia | Megafon | In deployment
Russia | Vimpelcom | In deployment
Saudi Arabia | Mobily | In deployment
Serbia | Vip Mobile | Trialled
Singapore | M1 | In deployment
Slovakia | Stovak Telecom | Planned
Slovenia | Telekom Slovenije | In deployment
South Africa | Vodacom | Trialling
Spain | Telefonica | Trialling
Spain | Vodafone | In deployment
Sweden | Tele2 | In deployment
Sweden | TeliaSonera | In deployment
Switzerland | Sunrise | In deployment
Switzerland | Swisscom | In deployment
Taiwan | Asia Pacific Telecom | In deployment
Taiwan | FarEasTone | In deployment
Taiwan | Taiwan Mobile | In deployment
Tanzania | Smile | Trialled
Turkey | Avea | Trialling
UAE | Du | In deployment
UAE | Etisalat | In deployment
Uganda | Smile | In deployment
UK | 3 UK | In deployment
UK | EE | In deployment
UK | Vodafone | In deployment
USA | C Spire | Planned
USA | KPU | In deployment
USA | US Cellular | In deployment
USA | Sprint | In deployment
USA | VTel | In deployment
Venezuela | Digitel | Testing
© GSA – Global mobile Suppliers Association www.gsacom.com
Copyright© GSA - Global mobile Suppliers Association
GSA • PO Box 5817 • Sawbridgeworth • CM21 0BH • UK
Phone +44 1279 439 667 • e-mail: info@gsacom.com
75
www.gsacom.com

In the first phase of voice evolution, voice calls are handled in a circuit switched network using CSFB (circuit switched fall back). The LTE data connection "falls back" to a legacy 2G/3G voice network connection prior to initiation of a voice call. This solution was favoured by many LTE operators initially, with VoLTE as the goal. Some LTE operators launched voice service with VoLTE in one step. With the VoLTE solution (GSMA spec. VoLTE IR.92, based on 3GPP standards), subscribers are able to use HD voice and other richer communication services using LTE smartphones.

An operator needs an IMS (IP Multimedia System) core network and the LTE radio access network and Evolved Packet Core must also support VoLTE (usually achieved by software upgrade).

The first VoLTE-based HD voice service commercially launched in 2012. 16 operators have now commercially launched VoLTE with HD voice service.

90 operators are investing in VoLTE in 47 countries (source: GSA – April 9, 2015). For a summary of VoLTE deployments worldwide download ***SNAPSHOT: VoLTE Global Status*** (shown left) from the GSA homepage www.gsacom.com

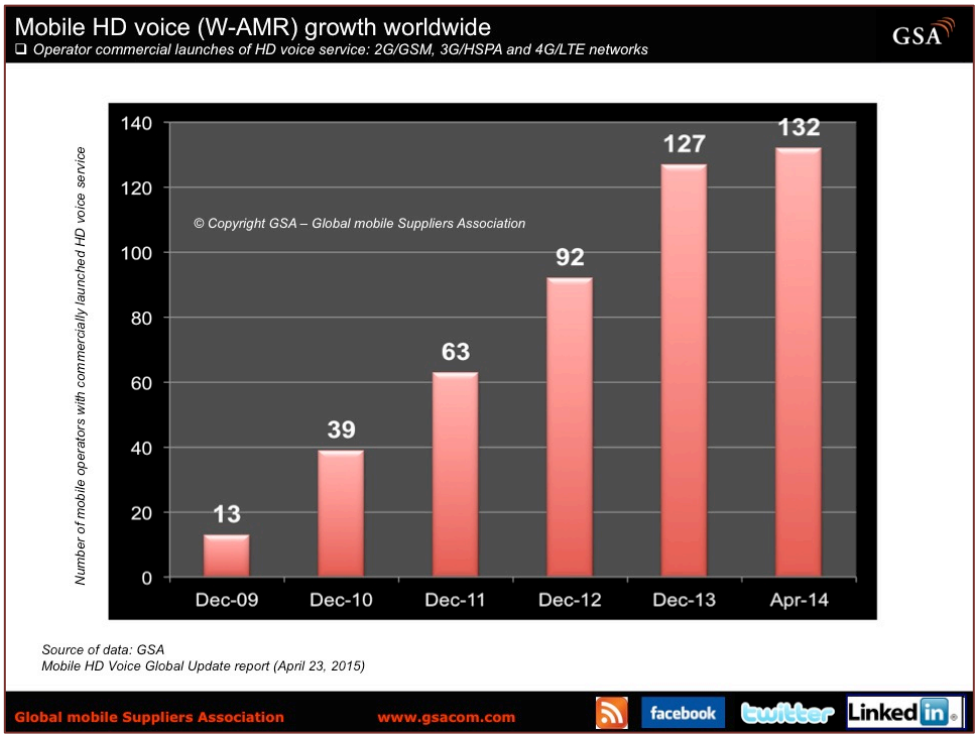
Mobile HD voice: Global Update report

Global mobile Suppliers Association

April 23, 2015

GSM/3G MARKET/TECHNOLOGY UPDATE

Global growth of HD voice (W-AMR) services



Download this chart from
http://www.gsacom.com/news/statistics

HD voice service launches 2009 - 2015

HD VOICE DEVICES ECOSYSTEM: 2G/GSM, 3G/HSPA and 4G/LTE - VoLTE

HD voice compatible user devices incorporating W-AMR technology are mainstream. Several hundred products have been launched in the market including by all the leading smartphone brands and models and across a wide range of price points, especially for use on 3G/HSPA networks. Support for W-AMR in smartphones is mainstream and as a result GSA no longer maintains a database of devices for use on 3G networks. Some suppliers also support the 2G/GSM HD voice market.

The ecosystem for **HD voice compatible VoLTE terminals** for use on 4G/LTE networks is now developing and GSA monitors and regularly reports on its progress. Initially operators have deployed VoLTE for delivering HD voice service for LTE users. On April 20, 2015 in its ***Status of the LTE Ecosystem report*** GSA confirmed that 196 VoLTE-capable devices (including carrier and frequency variants) including 177 smartphones have been announced by leading vendors including Apple, Asus, Fujitsu, Huawei, LG, Motorola, Pantech, Samsung, Sharp, and Sony Mobile. For more details about all LTE user devices download the *Status of the LTE Ecosystem report* from the GSA homepage www.gsacom.com

ABOUT GSA

GSA (Global mobile Suppliers Association) represents GSM/EDGE/WCDMA-HSPA/HSPA+, LTE/LTE-Advanced and future 5G suppliers. GSA brings together a global industry community of telecoms professionals through its website, reports, information papers and practical activities to inform, influence, educate, explain and promote the opportunities enabled by mobile broadband systems. The GSA website www.gsacom.com has over 67,500 registered users for knowledge gathering and information sharing of key facts, trends and analysis, and 24,000 followers using our social network platforms LinkedIn, Twitter and Facebook. Over 1 million GSA reports, presentations, information papers, maps, charts and other resources were downloaded from www.gsacom.com over the past five years.

Errors and Omissions Excepted

Updates for this report are welcome to info@gsacom.com

GSA • PO Box 5817 • Sawbridgeworth • CM21 0BH • UK
Phone +44 1279 439 667 • e-mail: info@gsacom.com