



REPORT: Status of the LTE Ecosystem

February 11, 2016

This report by the GSA (Global mobile Suppliers Association) confirms 4,416 LTE user devices launched in the market by 369 manufacturers, and provides an analysis of the main developments and trends. 1,770 new LTE user devices were verified as announced to the market and added to GSA's devices database since February 2015. This report covers LTE FDD and TDD (TD-LTE) modes. LTE is the fastest developing mobile communications system technology ever and is a mainstream communications system technology with global acceptance and supported by a mature and fast expanding devices ecosystem.

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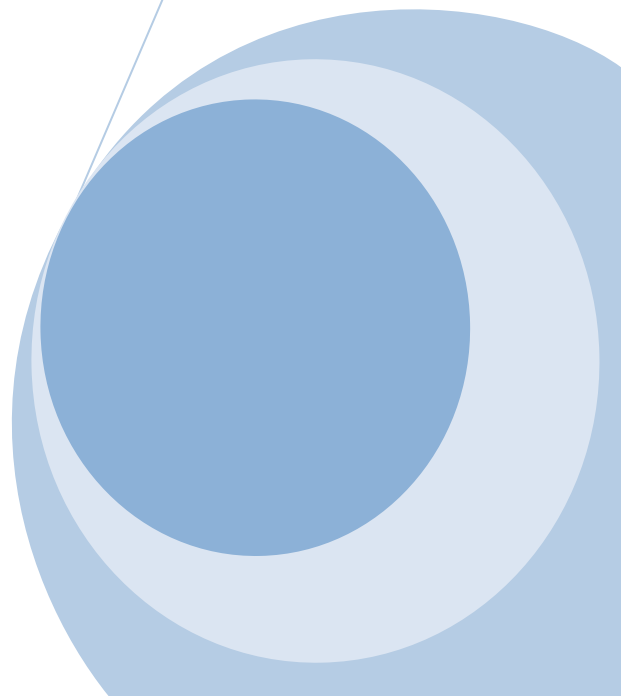
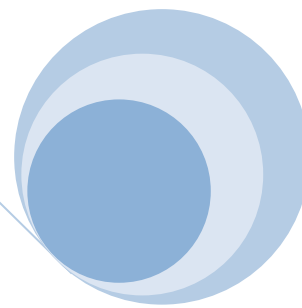
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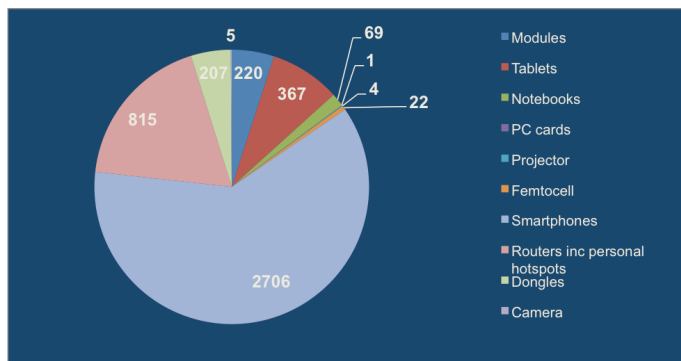
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4,416 LTE User Devices

GSA monitors and researches worldwide mobile broadband developments and publishes facts, statistics and trends. 480 LTE networks are commercially launched globally (GSA: *Evolution to LTE report: January 25, 2016*). GSA forecasts there will be 550 networks launched by end 2016. There were over 1 billion LTE subs globally by end 2015.

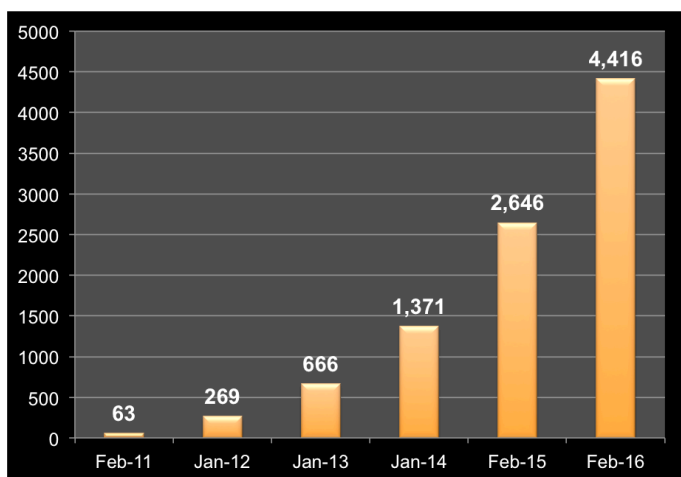
4,416 LTE user devices including frequency and operator variants from 369 suppliers are verified as announced by GSA. 1,770 devices are added to GSA's database (GAMBoD) since February 2015 i.e. 67% growth. The number of suppliers grew 34% in the same period (February 2015 = 275 suppliers).



4,416 LTE user devices - form factors

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The **smartphone** is the largest LTE device category. 2,706 smartphones including operator and frequency variants are announced, giving an improved 61.2% share of all LTE device types. The LTE tablet PC segment is also fast-growing.



LTE user devices growth

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Download above charts via the links on www.gsacom.com

Most devices operate in the FDD mode while the number of terminals that support LTE TDD (TD-LTE) continues to grow and gain share. 1,746 devices i.e. almost 40% of all LTE devices, support the LTE TDD (TD-LTE) mode.

LTE device frequency bands

LTE networks are operating commercially in several bands (see chart **“Spectrum used in LTE networks (FDD and TDD deployments)”** via the link on <http://www.gsacom.com>)

The table below confirms the **bands that are most supported** by the devices ecosystem. Several devices are multiband and/or multimode.

LTE FDD	
1800 MHz band 3	2,381 devices
2600 MHz band 7	2,083 devices
2100 MHz band 1	1,927 devices
800 MHz band 20	1,247 devices
800/1800/2600 tri-band	1,157 devices
AWS band 4	1,009 devices
850 MHz band 5	973 devices
900 MHz band 8	962 devices
700 MHz band 17	829 devices
1900 MHz band 2	803 devices
700 MHz band 13	545 devices
1900 MHz band 25	232 devices
APT700 band 28	260 devices
700 MHz band 12	188 devices

LTE TDD	
2300 MHz band 40	1,269 devices
2600 MHz band 38	1,074 devices
2600 MHz band 41	998 devices
1900 MHz band 39	882 devices
3500 MHz band 42/43	56 devices

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Note 1: Manufacturers have not declared operating frequencies or fallback modes for some products

Note 2: Certain products are carrier or country specific and are therefore not available in all markets

LTE / 3G fallback support

90.4% of all LTE devices can operate on a 3G technology, with breakdown as follows:

- 3,292 LTE devices can operate on either HSPA, HSPA+ or DC-HSPA+ networks
- 2,069 LTE devices support DC-HSPA+
- 793 LTE devices support TD-SCDMA
- 760 LTE devices support EV-DO

98% of LTE phones are multimode/3G capable
49.6% of LTE phones support DC-HSPA+

94.5% of LTE tablets are multimode/3G capable
45.8% of LTE tablets support DC-HSPA+

Category 4 UE devices

LTE UE device Category 4 offers an enhanced user experience and a theoretical peak downlink rate up to 150 Mbps with peak uplink up to 50 Mbps on compatible networks. LTE-Advanced deployment is a major trend with wide-scale commercialization of

carrier aggregation to combine different spectrum bands for greater bandwidth. Many operators have launched or are deploying networks supporting Cat 4 devices. **2,159 devices support UE Category 4 and beyond**, i.e. 49% of all LTE devices.

Category 6 UE devices

Deployment of LTE-Advanced systems supporting Category 6 user devices (theoretical peak downlink up to 300 Mbps where 40 MHz of paired spectrum is used) is a major industry trend. **259 devices support UE Category 6 and beyond** including small cells, routers, MiFis, smartphones and tablets.

Category 9 UE devices

At least 8 Category 9 devices are launched (up to 450 Mbps downlink) plus 2 Category 12 UE devices (up to 600 Mbps downlink, 100 Mbps uplink).

For an update on global LTE-Advanced network deployments, download these brief status reports (via the links on <http://www.gsacom.com>):

- **SNAPSHOT: LTE-Advanced global status**
- **LTE-Advanced Carrier Aggregation deployments: peak speeds** (note: this is a restricted access paper)

VoLTE User Devices

118 operators are investing in VoLTE enabling an HD voice experience for LTE users. **300 VoLTE-capable devices** (including carrier and frequency variants) including **275 smartphones** are announced, and offered by all the leading vendors.

eMBMS (LTE Broadcast)

Devices capable of supporting LTE Broadcast services are now identified in GSA's research.

1800 MHz: most popular LTE band

1800 MHz is the most popular spectrum for LTE deployments, used in over 44% of commercially launched LTE networks globally.

See GSA's **SNAPSHOT: LTE1800 global status** report.

GSA believes that 1800 MHz (band 3) will continue as the prominent band for LTE deployments for the foreseeable future and remain as the major enabling band for international LTE roaming.

1800 MHz (3GPP band 3) has the largest LTE user devices ecosystem. 54% of all LTE devices can operate in band 3 spectrum. **2,381 LTE1800 (band 3) user devices are announced**. 1,614 LTE1800 smartphones represents almost 68% of the total number of LTE1800 devices, and 152 are UE Category 6 devices. 204 LTE1800 tablets means 8.6% share of the LTE1800 device ecosystem.

US WCS 2.3 GHz spectrum

LTE networks are being deployed in band 30 (2305-2315 MHz / 2350-2360 MHz) spectrum. GSA is tracking the ecosystem and confirmed 13 band 30 user devices are announced (10 phones, 3 tablets).

LTE in 450 MHz band (LTE450)

3GPP band 31 devices (452.5 - 457.5 MHz / 462.5 - 467.5 MHz) are included in GSA's tracking.

3 LTE450 CPEs were identified in GSA's research.

APT700 band

Adoption of the APT700 band plan (698-806 MHz) by most countries across APAC and Latin America represents a major opportunity for global spectrum harmonization for LTE systems, paving the way for ensuring the greatest economies of scale for mobile broadband devices and capacity, and roaming.

APT700 FDD band plan (3GPP Band 28)

2 x 45 MHz plus guard band

- 703-748 MHz for the uplink
- 10 MHz guard band
- 758-803 MHz for the downlink

The FDD plan (Band 28) has the most support.

GSA is not aware of any country or regulator adopting or allocating spectrum according to Band 44 (TDD configuration 703-803 MHz).

APT700 is available on a near-global basis. 43 countries have allocated, committed to, or recommend allocating APT700 FDD spectrum (band 28) for LTE deployments in markets representing approaching 4 billion people. **12 operators have commercially launched networks using APT700 band 28 FDD spectrum.**

For more information about APT700 developments worldwide see GSA's **SNAPSHOT: APT700 global status** report – download via the link on <http://www.gsacom.com>

260 APT700 band 28 devices (i.e. FDD) comprising smartphones, tablets, CPEs & MiFis are announced by leading suppliers including Acer, Apple, Asus, Blackberry, Foxconn/InFocus, Fujitsu, HTC, Huawei, Lenovo, LG, Motorola, Oppo, Samsung, Sierra Wireless, Sony Mobile, TCL/Alcatel, and ZTE.

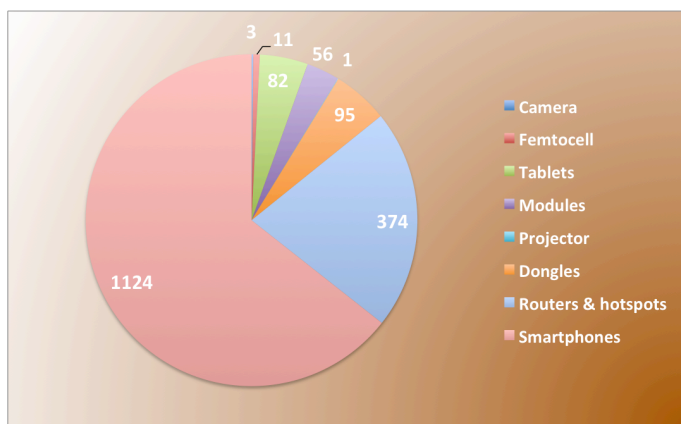
Visit the **APT700 community on the GSA website** <http://gsacom.com/communities/apt700/>

APT700 band LINKEDIN group: <http://www.linkedin.com/groups?gid=4759091>

LTE TDD devices

3GPP decided from the beginning that LTE must support both FDD and TDD modes with the minimum possible difference between the two modes. The emphasis has been on leveraging synergies between the modes to the largest extent possible. The result is that almost all parts of the LTE specifications are the same for both FDD and TDD. For the current worldwide LTE TDD market situation including network deployments and commercial launches see the **SNAPSHOT: LTE TDD (TD-LTE) global status** report – download via the link on www.gsacom.com

The availability of LTE user devices for TDD systems is well established. **1,746 devices can operate in LTE TDD mode (TD-LTE)**, supporting the growing number of LTE operators using unpaired spectrum. The smartphone is the largest device category: 1,124 smartphones are included in GSA's database. Several more products are progressing through GSA's verification process.



1,746 LTE TDD user devices - form factors

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Bands 40 (2.3 GHz) and 38 (2.6 GHz) have the largest choice of TDD terminals with bands 39 and 41 also being mature.

- Terminal support for band 40 = 72.7%
- Terminal support for band 38 = 61.5%
- Terminal support for band 41 = 57.1%
- Terminal support for band 39 = 50.5%
- Terminal support bands 42/43 = 3.2%

There is a good choice of multiband and dual mode FDD-TDD devices. The band 3/40 combination (relevant in India, for example) has 702 devices, while the band 7/40 combination has 549 devices.

Several operators are committed to deploying LTE TDD systems in 3.5 / 3.6 GHz spectrum (bands 42, 43), representing an exciting and important global opportunity for the industry. 56 LTE user devices for bands 42/43 are announced.

Devices analysis using GAMBoD

GSA's unique database of 4,416 LTE user devices referred to in this report is available for study by authorized users of our [GAMBoD-LTE](#) analysis tool. The database is updated quarterly.

GAMBoD - **GSA Analyzer for Mobile Broadband Devices**, is a unique search and analysis tool developed by GSA for mobile broadband devices, enabling searches of GSA's devices databases by supplier, form factor, features, peak downlink and uplink speeds, and operating frequency. Results are presented to the user as lists, spreadsheets or charts. Charts may be inserted into documents or presentations, referencing GSA as the source. An RSS feed can be set up by users to alert when GSA adds new devices to its databases.

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With GAMBoD-LTE search 4,416 LTE devices by:

- *Manufacturer name*
- *Product model number or name*
- *Form factor*
- *FDD selector bands 1,2,3,4,5,7,8,12,13,14, 17,20,21,25,28,30,31*
- *TDD selector bands 38,39,40,41,42/43,44*
- *Support for Cat 4, Cat 6, Cat 9, Cat 12 UEs*
- *Support for VoLTE*
- *Support for eMBMS (LTE Broadcast)*
- *3G fallback technology supported: HSPA, HSPA+, DC-HSPA+, EV-DO, or TD-SCDMA*

Access to GAMBoD is available only to qualified website users, which GSA defines as being either:

- Registered site users who are employees of the GSA Member companies
List of Member companies and Associates
<http://gsacom.com/members/>
- Registered site users who are employees of network operators (mobile or fixed)
- Registered site users who are employees of "Associate of GSA" enterprises (see below)

In all cases, users must be registered on the GSA website with their corporate email address.

ASSOCIATE of GSA SUBSCRIPTION

GSA offers medium and large-size enterprises the opportunity to subscribe as an "Associate of GSA" for which an annual fee is payable, with the principle benefits of a licence for its employees to use the GAMBoD database and analysis tool, as well as enabling access to all GSA reports including restricted materials such as the *Evolution to LTE report* (updated quarterly) and *LTE-Advanced Peak Speeds report* (updated quarterly). "Associate of GSA" is not a GSA membership category.

The annual fee for an enterprise to subscribe as an “Associate of GSA” on behalf of all its employees is only GBP 2,500.00.

A discount applies for telecom regulatory bodies.

The *Associate of GSA* fee also enables the opportunity to promote on the GSA website one piece of corporate collateral during the subscription year e.g. a white paper, presentation, thought-piece, etc. to GSA’s highly targeted global industry audience and generating several hundred of high quality downloads.

Benefits commence on receipt of payment.

Influential analysts and consultancy companies and regulatory authorities are amongst several organizations that currently benefit from subscribing as an Associate of GSA, thereby gaining access to GAMBoD, which allows those who are shaping policy to fully appreciate developments, its value, industry trends and the current status of the devices ecosystem for mobile broadband services, including 4G/LTE systems.

Visit www.gsacom.com/gambod

An organization wishing to apply to become an Associate of GSA is invited to contact GSA via email to marketing@gsacom.com

Membership of GSA is open to any supplier of products, systems or services related to the mobile industry and brings many benefits including access to GAMBoD. The range of benefits includes enhanced discussion, networking and influencing opportunities on the key industry topics, and unique promotional/visibility opportunities for your company name, capabilities, positioning and messages. More details can be found at www.gsacom.com/about/join.php4

For information about Membership benefits and annual fee, send email to marketing@gsacom.com

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 70,000 registered users for knowledge gathering and information sharing of key facts, trends and analysis, and over 25,500 connections 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 in under five years.

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