

# Handset Connectivity Technologies

**Handset Connectivity Technologies** is the fourth consecutive report from Berg Insight analysing the latest trends on the worldwide market for GNSS, Bluetooth, WLAN and NFC technologies in mobile handsets.

This report in the NGT Research Series from Berg Insight provides you with 150 pages of unique business intelligence including 5-year industry forecasts and expert commentary on which to base your business decisions.

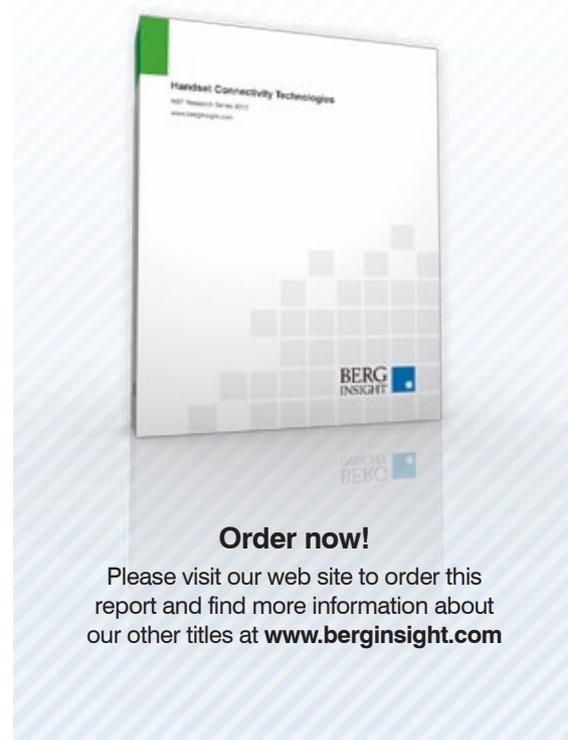
## ***This report will allow you to:***

- **Benefit** from numerous executive interviews with market leading companies.
- **Learn** about the strategies of the leading chipset and handset vendors.
- **Gain** access to the latest data and statistics about handset shipments.
- **Identify** the opportunities and challenges with integration of multiple connectivity technologies in mobile handsets.
- **Realize** the importance of Assisted-GNSS and hybrid location technologies.
- **Comprehend** how NFC technology in handsets can enable new services.
- **Understand** the drivers and barriers for industry-wide adoption of new technology.
- **Predict** future connectivity design trends and technology developments.

## **Berg Insight's NGT Research Series**

How will the mobile market evolve in the future? Berg Insight's Next Generation Technologies Research Series examines the latest advances in mobile technology and the new business opportunities they create. Each title analyses development roadmaps, potential applications and addressable market segments for a technology. Topics currently covered by the series include smartphones, small cells, mobile broadband and short-range handset connectivity.

[www.berginsight.com](http://www.berginsight.com)



See inside for further details →



## Which wireless connectivity technologies will be essential in future handsets?

Global handset shipments grew only 3 percent in 2012 to reach 1.6 billion units. The increase was driven by the popularity of smartphones. Sales of smartphones grew almost 47 percent in 2012 to 690 million units, compared to 470 million units in 2011. Berg Insight estimates that 4.4 billion people, about 62 percent of the world's population, owned at least one mobile phone at the end of 2012. The global active installed base of smartphones grew to 1.2 billion units, which is about 23 percent of all mobile phones in use. Multiple factors are driving the fast transition to smartphones. Customers put more emphasis on the user experience including support for apps and the web. At the same time, mobile operators have found smartphones to be an important driver of data and app revenues and have therefore been willing to subsidise these handsets. Mobile phone vendors have adopted smartphone operating systems in order to reduce development time and cost for new advanced handset models.

A broad range of wireless connectivity technologies are becoming standard features across more handset segments. Bluetooth can be used to connect headsets, fitness and medical sensors. WLAN can be used for Internet access, peer-to-peer file sharing, or HD video and audio streaming. New standards such as Wi-Fi Passpoint also enable mobile devices to discover and connect to WLAN networks automatically without user intervention. WLAN can thus be used as a cost-effective data offloading solution to handle the rise in data traffic from smartphones. Near Field Communication (NFC) is a standard for short-range wireless, point-to-point communication over distances of about 10 centimetres. When deployed in mobile phones, NFC can be used for countless applications, ranging from information exchange and device pairing, to electronic ticketing and secure contactless payments. The most important driver for GPS integration in handsets today is arguably the interest in location-based services (LBS), although emergency call location mandates are being introduced in several countries. In contrast to emergency call services relying on occasional push to fix positioning, consumer-oriented LBS pose new challenges. Handsets thus need to support services that require both infrequent push to fix updates in addition to continuous position updates – all whilst conserving battery life. The revised emergency call mandates in the US may well require approaches such as using improved hybrid location technologies in all handsets.

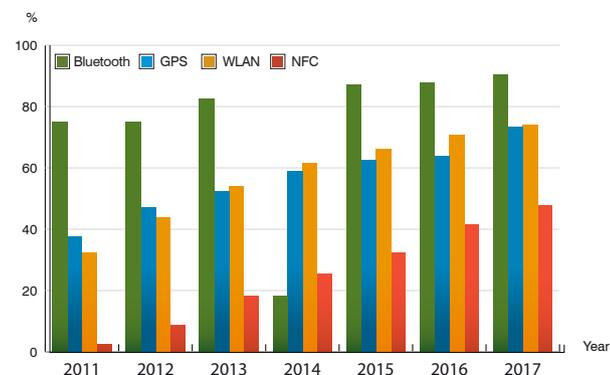
GPS technology for handsets has matured, offering much better performance in terms of sensitivity, power consumption, size and price than was possible a few years ago. Support for other global

▶ navigation satellite systems (GNSS) such as GLONASS, Compass/BeiDou 2 and Galileo will also be added over time. Handsets with GPS/GLONASS receivers have been available since 2011. The first devices compatible with the Chinese BeiDou 2 system are expected later in 2013. Using multiple satellite systems concurrently ensures additional visible satellites and incrementally better performance in urban canyons. However, in order to improve indoor performance, hybrid positioning systems are needed. Hybrid positioning systems can fuse data from sensors to provide input to position calculations. Examples include inertial sensors such as accelerometer and gyroscope, as well as compass and pressure sensors. Low data accuracy and high drift obtained from low cost sensors as well as high power consumption, still make dead reckoning for extended periods of time unfeasible. Yet, if periodic calibrations can be made using various network signal measurements, the system performance can be improved and provide valuable augmentation in the form of smoother trajectories and bridging of gaps.

The Bluetooth attach rate reached 75 percent across all handset segments in 2012. The attach rate for WLAN connectivity in the smartphone segment grew to 96 percent in 2012, but only reached 4 percent in the featurephone segment. The latest WLAN IEEE 802.11ac standard enabling faster throughput and higher network capacity became available in the first high-end smartphones at the end of Q1-2013. Relatively low additional cost will enable rapid transition from WLAN 802.11n to WLAN 802.11ac in the next couple of years. The attach rate for GPS in handsets grew from 37 percent in 2011 to nearly 47 percent in 2012. GPS connectivity has now become a standard feature on most smartphone models across all air interface standards, as well as in nearly all CDMA featurephones. Adoption of NFC accelerated in 2012 when the top-ten handset vendors released nearly 100 NFC-enabled models. Berg Insight estimates that NFC handset shipments grew 300 percent in 2012 to 140 million units worldwide. Growing at a compound annual growth rate (CAGR) of 48.2 percent, NFC handset shipments are forecasted to reach 1 billion units by 2017.

### This report answers the following questions:

- What is the current state of NFC adoption in the handset market?
- What is the roadmap for integration of new WLAN standards in mobile phones?
- What is driving the adoption of GPS technology in GSM/WCDMA handsets?
- What are the benefits with Assisted-GPS, A-GNSS and hybrid location technologies?
- Which features are supported in the latest Bluetooth standard?
- Who are the leading developers of cellular and connectivity chipsets?
- Which connectivity technologies are being adopted by leading handset vendors?
- What impact will new technologies have on the wireless chipset value chain?
- How is the greater diversity of radios affecting wireless chipset and handset design?



Projected attach rate for handset connectivity technologies (World 2011-2017)

## ► Table of Contents

<b>1 Mobile handsets and smartphones</b>		
<b>1.1 Introduction</b>		
1.1.1 Mobile voice and data subscribers		
1.1.2 Handset sales by technology and region		
1.1.3 Wireless connectivity attach rates driven by higher smartphones sales		
<b>1.2 Wireless communication technologies</b>		
1.2.1 Spectrum and interference		
1.2.2 Cellular communication technologies		
1.2.3 Personal area networks		
1.2.4 Local area networks		
<b>1.3 Wireless broadcast technologies</b>		
1.3.1 Radio		
1.3.2 Mobile TV		
1.3.3 Global navigation satellite systems (GNSS)		
<b>1.4 Mobile handset trends</b>		
1.4.1 The featurephone to smartphone transition is accelerating		
1.4.2 Handset form factors and user interfaces		
1.4.3 Smartphones and tablets are becoming the main computing platform		
1.4.4 Wireless connectivity developments		
<b>2 Handset hardware platforms</b>		
<b>2.1 Overview of handset hardware platforms</b>		
2.1.1 Handset hardware components		
2.1.2 Mobile application processor technologies and architectures		
2.1.3 Horizontal and vertical integration of connectivity technologies		
2.1.4 Host interfaces		
2.1.5 Connectivity chipset integration challenges		
<b>2.2 The handset chipset industry</b>		
2.2.1 Industry consolidation and reorganisation will continue		
2.2.2 Handset semiconductor revenues		
2.2.3 Baseband and application processor vendors and market shares		
2.2.4 Connectivity chipset vendors and market shares		
<b>2.3 Cellular platform vendor profiles</b>		
2.3.1 Broadcom		
2.3.2 Intel		
2.3.3 Marvell		
2.3.4 MediaTek		
2.3.5 MStar Semiconductor		
2.3.6 NVIDIA		
2.3.7 Qualcomm		
2.3.8 Renesas Mobile Corporation		
2.3.9 Spreadtrum Communications		
2.3.10 ST-Ericsson		
<b>3 GNSS technologies</b>		
<b>3.1 Overview of global navigation satellite systems</b>		
3.1.1 Global Positioning System (GPS)		
3.1.2 Galileo		
3.1.3 GLONASS		
3.1.4 Compass/BeiDou 2		
<b>3.2 Mobile location technologies and platforms</b>		
3.2.1 Mobile network-based location technologies		
3.2.2 Assisted GPS and A-GNSS		
3.2.3 Bluetooth and Wi-Fi positioning		
3.2.4 Hybrid and indoor location technologies		
<b>3.3 GPS and GNSS chipsets for handsets</b>		
3.3.1 Standalone receivers		
3.3.2 Host-based receivers		
3.3.3 Integrated receiver architectures		
3.3.4 Software-based receivers		
3.3.5 GNSS receivers for handsets		
<b>3.4 GNSS chipset vendors</b>		
3.4.1 GNSS IC vendor market shares		
3.4.2 CellGuide		
3.4.3 CSR		
3.4.4 u-blox		
<b>4 Connectivity technologies</b>		
<b>4.1 Bluetooth technologies</b>		
4.1.1 Bluetooth specifications		
4.1.2 Bluetooth applications and profiles		
<b>4.2 Wireless LAN technologies</b>		
4.2.1 IEEE 802.11 WLAN standards		
4.2.2 Wi-Fi certification and specifications		
4.2.3 Operator interest in Wi-Fi for mobile data offloading continues to grow		
4.2.4 WLAN chipsets and handset integration issues		
4.2.5 WLAN handset shipments trends		
4.2.6 WLAN chipset vendor market shares		
<b>4.3 Near Field Communication technologies</b>		
4.3.1 NFC Forum specifications		
4.3.2 NFC communication modes		
4.3.3 NFC solution architectures and chipsets for handsets		
4.3.4 NFC controller vendor market shares		
4.3.5 Mobile wallet ecosystems		
4.3.6 NFC handset availability and sales accelerated in 2012		
<b>4.4 Wireless charging technologies</b>		
4.4.1 Introduction to inductive charging technologies		
4.4.2 Alliance for Wireless Power (A4WP)		
4.4.3 Power Matters Alliance (PMA)		
4.4.4 Wireless Power Consortium (WPC) – Qi		
4.4.5 Overview of wireless charging-enabled handsets		
<b>4.5 Connectivity chipset vendor profiles</b>		
4.5.1 Inside Secure		
4.5.2 Nordic Semiconductor		
4.5.3 NXP Semiconductors		
4.5.4 Redpine Signals		
4.5.5 Renesas Electronics		
4.5.6 Samsung Electronics – System LSI		
4.5.7 STMicroelectronics		
4.5.8 Texas Instruments		
<b>5 The global handset market</b>		
<b>5.1 Handset market trends</b>		
5.1.1 Smartphone ecosystem developments		
5.1.2 Smartphone platform market shares		
5.1.3 Handset vendor market shares		
5.1.4 Best-selling smartphones in 2012		
<b>5.2 Handset vendor profiles</b>		
5.2.1 Apple		
5.2.2 BlackBerry		
5.2.3 HTC		
5.2.4 Huawei		
5.2.5 LG Electronics		
5.2.6 Motorola Mobility		
5.2.7 Nokia		
5.2.8 Samsung Electronics		
5.2.9 Sony Mobile Communications		
5.2.10 ZTE		
5.2.11 Lenovo		
5.2.12 Micromax		
5.2.13 Pantech		
5.2.14 TCL Communication		
5.2.15 Yulong – Coolpad		
<b>6 Market trends and forecasts</b>		
<b>6.1 Market trends</b>		
6.1.1 Smartphone adoption drives connectivity attach rates		
6.1.2 Consolidation in the wireless chipset industry set to continue		
6.1.3 Cost requirements favour development of integrated chipsets		
6.1.4 Hybrid location technologies drive performance improvements in handsets		
<b>6.2 Handset shipment forecasts</b>		
6.2.1 Handset shipment forecasts by region and primary access technology		
6.2.2 Handset shipment forecasts by category and price segment		
6.2.3 GNSS-enabled handset shipment forecasts by segment		
6.2.4 GNSS-enabled handset shipment forecasts by geographical region		
6.2.5 WLAN-enabled handset shipment forecasts		
6.2.6 NFC-enabled handset shipment forecasts		
<b>6.3 Connectivity chipset shipments and revenue forecasts</b>		
6.3.1 GNSS receiver chipset revenue forecasts		
6.3.2 Bluetooth, WLAN and NFC chipset revenue forecast		
<b>Glossary</b>		



## About the Author

**André Malm** is a Senior Analyst with a Masters degree from Chalmers University of Technology. He joined Berg Insight in 2006 and his areas of expertise include location-based services, handset technologies and wireless M2M markets.

**Berg Insight** offers premier business intelligence to the telecom industry. We produce concise reports providing key facts and strategic insights about pivotal developments in our focus areas. From time to time we also perform custom research assignments. Our vision is to be the most valuable source of intelligence for our customers.

### Who should buy this report?

**Handset Connectivity Technologies** is the foremost source of information about this market. Whether you are a telecom vendor, mobile operator, manufacturer, investor, consultant, application developer or government agency, you will gain valuable insights from our in-depth research.

### Related products

- Mobile Navigation Services and Devices
- Mobile Location-Based Services
- Mobile Wallet Services
- Mobile Advertising and Marketing

## Order form – TO RECEIVE YOUR COPY OF HANDSET CONNECTIVITY TECHNOLOGIES

You can place your order in the following alternative ways:

1. Place your order online in our web shop at [www.berginsight.com](http://www.berginsight.com)
2. Fax this order sheet to us at fax number: +46 31 711 30 96
3. Mail this order sheet to us at: Berg Insight AB, Viktoriagatan 3, 411 25 Gothenburg, Sweden
4. Email your order to: [info@berginsight.com](mailto:info@berginsight.com)
5. Phone us at +46 31 711 30 91

### Choose type of format

- Paper copy ..... 1000 EUR  
 PDF 1-5 user license ..... 1500 EUR  
 PDF corporate license..... 3000 EUR

Family/Surname	Forename	Position	Company
Address		Country	Postcode
Telephone	FAX	Email	

VAT is chargeable on all orders from Sweden. Orders from all other countries in the European Union must include the buyer's VAT Registration number below in order to avoid the addition of VAT.

Your PO number	Your VAT/TVA/IVA/BTW/MWST number
----------------	----------------------------------

### Please charge my credit card

- VISA    Mastercard

Card number	Expiry date (MM/YY)	CV code
Cardholder's name	Signature	
Billing address		
Postcode	Country	

- We enclose our cheque payable to Berg Insight AB  
 Please invoice me

Signature	Date
-----------	------

Reports will be dispatched once full payment has been received. For any enquiries regarding this, please contact us. Payment may be made by credit card, cheque made payable to Berg Insight AB, Viktoriagatan 3, 411 25 Gothenburg, Sweden or by direct bank transfer to Skandinaviska Enskilda Banken, 106 40 Stockholm, Sweden.

Account Holder: Berg Insight AB  
 Account number: 5011 10 402 80  
 BIC/SWIFT: ESSESESS  
 IBAN: SE92 5000 0000 0501 1104 0280

