

Design Notes & Market Reports

Smartphones to Drive Semi Device Market to \$170B

Mobile handset semiconductors, including processors, RF, power management, and wireless connectivity, grew to more than \$30 billion in 2011. The worldwide market generated more than \$120 billion in revenue over the last five years and will generate more than \$170 billion during the next five years.

Recent growth spurred by the burgeoning smartphone market has accounted for almost 60% of total revenues in 2011. Revenue growth has been led by more advanced modems, applications processors, and wireless connectivity ICs.

“The smartphone market to date has largely been focused on producing high-end devices,” says Peter Cooney, practice director, semiconductors. “OEMs have demanded increasingly powerful processors to help differentiate their products in a crowded market, leading to an arms race among applications processor vendors.”

Applications processor shipments will continue to grow year-on-year through 2016, however, slowing handset shipments, falling average selling prices for ICs, and increased integration will force total revenues to peak in 2014 before beginning a gradual decline.

“The applications processor market will continue to see significant growth for the next few years,” adds Cooney. “But it will become increasingly competitive and once revenues start to decline after 2014 it will leave one or two vendors thinking twice about their place in the market.”

—ABI Research
abiresearch.com

Skyworks Remains Largest GaAs Device Manufacturer

GaAs device market growth slowed considerably in the second half of 2011, dropping overall revenue increases to only six percent. Despite this slowdown, Skyworks Solutions—with revenue growth of 27 percent—has solidified its position as the largest GaAs device manufacturer. The Strategy Analytics GaAs and Compound Semiconductor Technologies Service (GaAs) Insight, “Skyworks Remains the Largest GaAs Device Manufacturer,” explores 2011 GaAs device revenue results and growth trends, as well as revenue performance of leading device manufacturers, like RFMD, Skyworks, TriQuint Semiconductor, Avago Technologies, Renesas Electronics, Hittite and WIN Semiconductors.

“While the 2011 growth rate of the GaAs device market was right around its historical average of 6 percent, Skyworks and WIN Semiconductors did more than sig-

nificantly better,” noted Eric Higham, Director of the Strategy Analytics GaAs and Compound Semiconductor Technologies Service. “The big increase at Skyworks is a testimonial to their efforts for diversifying smartphone customers, products, technology and market applications.”

Asif Anwar, Director, Strategy Analytics Strategic Technologies Practice, added, “The growth at WIN Semiconductors indicates their commitment to expansion, and also reflects success for outsourcing foundry operations in the GaAs device industry.”

This Strategy Analytics Insight summarizes total revenue performance of the GaAs device market in 2011. Additionally, it identifies the top ten GaAs device manufacturers. Analysis of factors responsible for the 2011 quarterly GaAs revenue growth profile and discussion of trends and drivers to monitor in the GaAs device industry in 2012, can also be found in this report.

—Strategy Analytics
strategyanalytics.com

RFID Market to Exceed \$70B Over Next Five Years

The market for RFID transponders, readers, software, and services will generate \$70.5 billion from 2012 to the end of 2017. The market was boosted by a growth of \$900 million in 2011 and the market is expected to grow 20% YOY per annum. Government, retail, and transportation and logistics have been identified as the most valuable sectors, accounting for 60% of accumulated revenue over the next five years.

Group director John Devlin comments, “To date, the automotive sector has been a strong proponent of RFID, largely for immobilization and keyless entry. However, penetration is already high and it will be constrained by the slower rise in automotive production volumes. As a result, it will lose status as a leading RFID market due to other established markets for RFID retaining excellent potential for further adoption. Retail in particular is set to experience very strong growth; in fact, it will become the single largest RFID sector in 2015.”

Efficiency and improved operational capability are the overriding goals behind this adoption. Retail growth is driven by the proven returns that item level tagging can deliver. Stock is less likely to get lost, shop floors better stocked, and the ordering process will get smarter. RFID will cross over into customer-facing services with NFC for product information and smart marketing.

Government is a high-value sector, with strong uptake of contactless/RFID in documents and credentials. However, the drive for increased efficiency in applications

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such as asset tracking, fleet management, personnel location, and security are increasing the sector's acceptance and uptake of RFID solutions.

Transportation and logistics increasingly make use of the ability to accurately track and trace items and goods at item, pallet, and container level as service providers look to generate more detailed data for themselves and their customers. Also, smarter public transit systems are utilizing contactless ticketing as the basis for better managed and cost effective services.

—ABI Research
abiresearch.com

Book Review

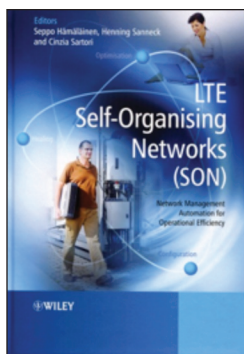
LTE Self-Organising Networks (SON)

Edited by Seppo Hämmäläinen, Henning Sanneck, and Cinzia Sartori

Published in the UK by John Wiley and Sons, Ltd. 2012, 398 Pages

It is expected that upwards of 5 billion people will be connected either wirelessly or through wire-line connections by the year 2015. Users of wireless services will want the same experience they now get from fixed networks. With huge increases in network traffic and an increased demand for a wide range of content services the Third Generation Partnership Project (3GPP) is standardizing the new generation of cellular networks referred to as Long Term Evolution (LTE). LTE is a major step forward and designed to meet the needs for high-speed data transport as well as high capacity voice support for carriers. LTE for some time to come will have to coexist with existing 2G and 3G networks. Thus the concept of Self Organizing Networks (SON) is a key enabler for simplifying and maintaining next generation mobile networks.

This book focuses on LTE and the new technology SON features that can be implemented from the start. Covering the functional areas of LTE SON the book introduces the topic at an advanced level before addressing state-of-the-art concepts. The required background on LTE network scenarios and general SON concepts is first presented to give readers basic knowledge of mobile networks and to provide an understanding of key SON functional areas such as self-configuration, optimization and self-healing. The book provides details and references for



those already familiar LTE and SON including the latest 3GPP standards.

The book offers a comprehensive look at a SON-enabled system with its enabling technologies, architecture, and operation. “Heterogeneous networks” (HetNet) including cell hierarchy levels and multiple radio access technologies as a new driver of SON are presented.

The book provides a complete list of abbreviations and acronyms used in the discussion of mobile networks as well as detailed discussion of the business and financial effects of SON expressed as Total Cost of Ownership in the context of telecom infrastructure equipment.

—Scott L. Spencer
HFE Publisher

Book Review

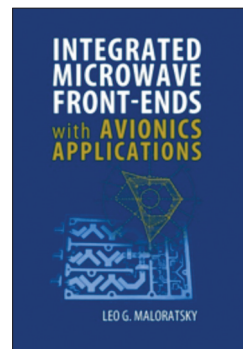
Integrated Microwave Front-Ends with Avionics Applications

By Leo G. Maloratsky

Published in the U.S. by Artech House Inc., 2012, 350 pages

The last four decades have been marked by rapid developments in RF and microwave integrated circuits and by their wide application in a variety of commercial and military systems. Integration of microwave front-ends offers the advantages of compact, lightweight, designs with enhanced performance, higher reliability, and low cost. This book is unique in several ways, notably for the following topics: architecture and characteristics of microwave front-ends; modern planar transmission lines; novel passive elements and devices; active devices including LNA, filter, mixer, antenna, and cable; avionics antennas and antenna beam forming networks; different front-end avionics systems; various self-test and calibration networks; integrated multifunctional front-ends; technology processes, multilayer and 3D design.

The author has done an outstanding job of writing a book that focuses on integrated microwave front-ends that use different passive and active devices, various receiver architectures, and modern technology processes and materials. The book describes two aspects of integrated microwave front-ends: circuit integration and system integration. More importantly, this book considers the microwave front-ends in a variety of avionics systems:



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microwave landing systems, radio altimeters, global positioning systems, traffic collision avoidance systems, transponders, distance measuring equipment, universal access transceivers, automatic dependent surveillance-broadcast, and weather radars.

Containing 14 chapters, the book introduces the reader to the main aspects of integrated microwave front-ends followed by basic front-end architecture and performance of avionics front-ends. The characteristics of the commonly used microstrip, stripline, suspended stripline, coplanar waveguide, and slotline are covered as are distributed and lumped elements. Analysis and design of RF and microwave passive devices from directional couplers, power dividers/combiners, filters, baluns, to ferrite isolators and circulators are discussed along with control devices such as switches, limiters, and phase shifters. Duplexers and diplexers are considered. Entire chapters are devoted to low noise amplifiers, with modern schematics including balanced amplifiers, different types of microwave mixers, various avionics front-ends, and avionics multi-mode and multifunctional front-ends. Problems of interference of avionics systems are addressed along antennas and cable assemblies. Included are topics of self-test and calibration of avionics front-ends, some fabrication technology aspects, material characteristics, packaging, multilayer and 3-D design, and design flow of modern integrated microwave front-ends.

This highly practical resource offers engineers an in-depth understanding of microwave front-end integration and how it is applied in the avionics field. Supported with nearly 200 illustrations and more than 160 equations, this book is a valuable professional reference and also serves well as a postgraduate textbook.

—Scott L. Spencer
HFE Publisher

Global Microcell BTS Market Poised for Commercial Volumes in 2014

The global microcell base transmitting station (BTS) market will be ready for commercial volume shipments in 2014, according to the latest report from EJM Wireless Research titled “Global Microcell Base Station Market Analysis and Forecast, 1st Edition, 2011-2016.”

“We believe that a combination of 3G/4G/WiFi and WiFi only enabled microcell BTS will be a critical part of each OEM’s base station product portfolio to support future heterogeneous network topologies and provide mobile operators with an effective way of dealing with the explosive growth of data traffic on their networks,” says founder and President, Earl Lum.

The report provides a unique perspective on the global demand for microcell base station equipment covering all air interface standards and frequencies including 802.11ac WiFi and major OEMs including Alcatel-Lucent, Ericsson, Huawei Technologies, Nokia Siemens Networks (including Motorola), and ZTE. This report focuses only on the outdoor microcell base station market defined as base stations having 5W-10W RF output power per TRx and not products that are in the 250mW to 1W per transceiver (TRx) category such as picocells and femtocells.

Some key predictions from EJM Wireless Research LLC for 2014-2016:

- EJM Wireless Research LLC predicts WiFi-only microcell BTS will account for over 50% of the total market opportunity in unit volumes
- EJM Wireless Research LLC predicts total microcell BTS revenues will exceed USD \$7 billion by 2016
- EJM Wireless Research LLC predicts Asia Pacific region represents 46% of global microcell BTS unit opportunity

“Our analysis covers seven regions and 78 countries globally and provides a very realistic view by country and region for microcell BTS opportunities. We believe that the microcell ecosystem continues to evolve as both the backhaul and access technologies will undergo field trials in 2012-2013 and should be ready to go by 2014,” says Lum.

The report is currently available for purchase and information can be downloaded at www.ejmwireless.com.

—EJM Wireless Research LLC
ejmwireless.com

Defense Industry Continues Forward Move

Despite the uncertainties that continue to dog the defense industry in all sectors, including radar, communications, electronic warfare and other systems, March showed robust activity. The Strategy Analytics Advanced Defense Systems (ADS) service report, “Defense Electronics Industry Review: March 2012,” includes significant defense industry news, discussing business events, product announcements, milestones and contract activity.

“Despite the countdown to sequestration in the US, and budgetary constraints in the global environ, defense industry activity remains robust from platforms down to components,” noted Asif Anwar, Director of the ADS service. “The Saab Gripen project appears to be on track with commitments from the Swedish Armed Forces; and

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Boeing is delivering aircraft to the US Navy under two separate contracts.”

“Component technology development included DARPA (Defense Advanced Research Projects Agency) funded efforts, resulting in TowerJazz and UCSD demonstrating a SiGe (silicon germanium) -based wafer-scale phased array,” observed Eric Higham, ADS Service Director North America. “GaN (gallium nitride) also continues to cement its position as a key enabling technology, as seen at TriQuint, which released product at GOMACTech 2012.”

Other highlights in March included:

- The AESA (active electronically scanned array) radar from THALES being fielded on the Dassault Rafale fast-jet platform.
- AESA technology was also evident as the US Army awarded contracts for the AN/TPQ-53 Firefinder Radar to Lockheed Martin.
- Raytheon received a number of radar contracts, including improvements for the Counter Rocket Artillery and Mortar Sense & Warn (C-RAM S&W) systems, for which Raytheon will produce a Ku-band radar.
- Northrop Grumman continues to demonstrate market leadership in the optoelectronics space with contracts and milestones around the company’s Large Aircraft Infrared Countermeasures (LAIRCM) and LITENING pod technologies.
- Communications contracts continued to be dominated by Harris.

—Strategy Analytics
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Qualcomm Leads Cellular Baseband Market

The global cellular baseband processor market grew an impressive double-digit 15 percent year-on-year, to reach \$15.1 billion in 2011, according to the report from the Strategy Analytics Handset Component Technologies

(HCT) and RF and Wireless Components (RFWC) services, “Baseband Market Share Tracker: Qualcomm and Intel Together Capture 60 Percent of 2011 Baseband Revenue.”

In 2011, increased demand for smartphones, intense competition in low-end phones and new air interface technologies - such as LTE and TD-SCDMA - created opportunities and altered the market share landscape. Also, baseband-integrated smartphone applications processors and cellular-enabled non-handset devices—such as USB dongles, M2M, e-book readers and tablets—provided a significant boost to some baseband companies.

Some of the highlights of this Strategy Analytics report include:

- Qualcomm, Intel, MediaTek, Texas Instruments and ST-Ericsson grabbed the top-five baseband revenue spots in 2011.
- Qualcomm led the cellular baseband market with 45 percent revenue share in 2011, with the help of its dominant market position in CDMA, LTE and W-CDMA basebands.
- With 15 percent revenue share in 2011, Intel ranked number two. Multiple popular products from global tier-one handset manufacturers used Intel basebands in 2011.
- Broadcom and Spreadtrum baseband growth outstripped market growth in terms of both units and revenue.
- The market for basebands for LTE, in unit terms, grew faster than basebands supporting any other air interface in 2011.

According to Stuart Robinson, Director, Strategy Analytics Handset Component Technologies (HCT) service, “Qualcomm is well-positioned to make significant share gains in the emerging LTE baseband market in 2012. Qualcomm continues to leverage its baseband modem expertise to ride the 3G / 4G wave, and captured 45 percent share of the baseband market in 2011.”

Sravan Kundojjala, Senior Analyst, added, “Broadcom showed strong double-digit year-on-year growth in baseband units and revenues in 2011. The company continued to improve its product-mix. W-CDMA basebands accounted for 16 percent of its total 2011 baseband shipments, nearly doubled from 2010. On the strength of its baseband-integrated smartphone processors momentum, Broadcom’s W-CDMA baseband share will again improve dramatically in 2012.”

—Strategy Analytics
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