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EXECUTIVE SPOTLIGHT:

Evolving Trends, Technology Advancements Mark 2016

Greg Henderson

Vice President of the RF and Microwave Business Unit, Analog Devices

Onward and upward seems to be a pervasive trend in the RF and microwave market over the past few years, and the shift has not been gradual. There is exponential demand for wider bandwidths, higher frequencies, more integrated solutions to support an increased proliferation of radars, sensors, and broadband wireless communications.

Within this market, customers are looking for complete end-to-end solutions that allow them to bring products to market faster. While individual discrete components are important and will continue to make up a substantial percentage of future RF and microwave products, full signal chain solutions that allow customers to focus on end applications have been gaining significant momentum.

Just a few years ago, the majority of our customers were interested in discrete components operating in RF and microwave bands. Whereas this year, ADI's fully integrated E-band (71 GHz to 86 GHz) packaged chipsets, which support up to 10 Gbps data for point-to-point radios, have been one of the major highlights for us. This shows how quickly customers have shifted to higher frequency bands, and more integrated and complete signal chain solutions, to meet their ever growing global data needs.

Similarly, Analog Devices is seeing manufacturers of test and measurement instruments are focusing more on software-based solutions, and are asking for common hardware architectures that can be reused multiple times, across different platforms. This allows them to spend less time on their hardware design, and focus more on software differentiation, leverage economies of scale, and introduce products quicker.

Technologies Taking Center Stage

From a technological perspective, there is heavy interest among customers for highly integrated silicon technologies for applications such as integrated 24 GHz radar and RF switches, and GaN (gallium nitride) for more power-efficient, high power amplifier designs. These technologies are taking center stage as the preferred solutions for the majority of future RF, microwave, and millimeter wave products. They offer customers higher performance, smaller size, higher power efficiency, and cost-effective design options, and enable a new set of applications that were not possible before.

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In terms of communications applications, there is increasing interest in very high throughput, microwave and millimeter wave wireless technologies such as next-generation satellite broadband (VSAT) and the emerging 5G communications standard. As a concept, 5G systems received a lot of attention. Test and measurement equipment makers are already rising to the challenge by preparing to develop wideband instruments that are capable of testing 5G devices, and that can be easily adapted as the standard evolves.

Next-Generation Technology and the Industrial Space

RF, microwave, and millimeter wave products are becoming much more prominent in the industrial space. In addition to conventional test and measurement instrumentation equipment, an increasing demand for radar and sensors in industrial applications is helping to define the

early stages of IoT (Internet of Things) infrastructure. We expect these RF and microwave radar and sensor devices will serve a vast array of applications ranging from collision avoidance in drones (UAVs), factory robotics, motion-sensing security cameras, smart traffic lights for traffic management, remote monitoring to measure tank levels, proximity sensors to detect objects, and vital signs monitoring for eHealth.

The second phase of this revolution will require that these devices connect to a system or network to enable cloud-based monitoring—much of which will be wireless through networks such as 5G. And finally, the third phase will entail the addition of higher level intelligence to utilize all of the data generated by these networks to help them make proactive decisions.

Evolving Technologies, Increasing Consumer Applications

Innovations and development in the RF and microwave world are enabling the next generation of systems that will offer ubiquitous connectivity, sensing, and automation, and near limitless data throughput. Current system-level radio technologies are enabling radios that are more than 10 times smaller and deliver more than 10 times higher throughput than existing generations. This means that OEMs can develop wireless infrastructure platforms that are many times faster, and more cost effective and reliable, which will provide consumers with assured access to information and intelligent automation.

With RF and microwave technologies becoming more accessible (in terms of price, performance, and options), there is a revolution in their applications. Autonomous driving, smart drones with collision avoidance systems, intelligent traffic lights to optimize traffic flow, and in-flight internet are just a few of the many examples of how RF and microwave technologies are bringing benefits to consumers in their daily lives. The applications today are just the beginning of a new world of increased connectivity, sensing, and automation for all of us.

About the Author

Dr. Greg Henderson is Vice President of the RF and Microwave business unit of Analog Devices. In this role, Dr. Henderson is responsible for the creation and execution of Analog Devices' strategy for the full suite of RF and microwave products and solutions.

Dr. Henderson has served in leadership roles in the microwave, semiconductor, and wireless communications industry for more than 20 years. Most recently, Dr. Henderson served as Vice President of the RF and Microwave business unit of Hittite Microwave Corporation—prior to the acquisition by Analog Devices. From 2009 to 2013, Dr. Henderson served as the director of broadband products and later as the director of product management, for the Public Safety and Professional Communications Division of Harris Corporation. Prior to Harris Corporation, Dr. Henderson held various management and R&D/product development positions at TriQuint Semiconductor, IBM, and M/A-COM.

Dr. Henderson earned a B.S. in electrical engineering from Texas Tech University and was granted a Ph.D. in electrical engineering from the Georgia Institute of Technology. He holds seven patents in wireless communications and semiconductor technologies and has published over 20 conference and journal papers.

Analog Devices, Inc.
Worldwide Headquarters

Analog Devices, Inc.
One Technology Way
P.O. Box 9106
Norwood, MA 02062-9106
U.S.A.
Tel: 781.329.4700
(800.262.5643, U.S.A. only)
Fax: 781.461.3113

Analog Devices, Inc.
Europe Headquarters

Analog Devices GmbH
Otl-Aicher-Str. 60-64
80807 München
Germany
Tel: 49.89.76903.0
Fax: 49.89.76903.157

Analog Devices, Inc.
Japan Headquarters

Analog Devices, KK
New Pier Takeshiba
South Tower Building
1-16-1 Kaigan, Minato-ku,
Tokyo, 105-6891
Japan
Tel: 813.5402.8200
Fax: 813.5402.1064

Analog Devices, Inc.
Asia Pacific Headquarters

Analog Devices
5F, Sandhill Plaza
2290 Zuchongzhi Road
Zhangjiang Hi-Tech Park
Pudong New District
Shanghai, China 201203
Tel: 86.21.2320.8000
Fax: 86.21.2320.8222

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