

## Lorne Graves, Technical Director Mercury Systems, Inc.



**MPD:** *If your company serves the defense market, which application or applications do you believe will be the most lucrative from an RF and microwave standpoint in the coming year?*

**LG:** As a manufacturer of RF subsystems for many DoD programs, Mercury works hard to stay abreast of developments in both new systems and upgrades to existing ones. As a result, we strongly believe that three major areas, electronic warfare, radar, and communications, will drive RF and microwave industry revenues in 2016 and for that matter, the ensuing years to come. There are many reasons for this, some obvious some not. First let's look at EW, which has many facets: electronic attack (jamming), electronic protection (formerly electronic counter-countermeasures), electronic support measures (ESM), ELINT, and SIGINT. Each of these subsets of EW offer potential for this industry as all rely extensively on RF and microwave technology.

EW has since the end of World War II been a cornerstone of America's military readiness. However, between the end of the Cold War and until about a decade ago it received less attention. That has changed dramatically and DoD has stated emphatically that the "spectrum dominance" afforded in large measure by EW is being challenged by China, Russia, and other countries as their technologies catch up with our own. As a result, EW technology and system development have accelerated and will continue to do so for many years.

An equal amount of attention is being applied to air, land, and sea-based radar sys-

tems, offering numerous opportunities for RF and microwave manufacturers. Legacy systems, some decades-old, are being transformed to benefit from the advantages of the AESA architecture, high-speed digital signal processing as well as GaAs and increasingly GaN technology. New radar systems, either in late stages of development or early production, all are based on the AESA-based architecture as well.

Finally, to guarantee situational awareness we need tightly coupled & unfettered communications. Most communication systems and especially battlefield radios, from handheld to soldier-mounted systems, are being manufactured in high volumes and reduced in size and weight thanks in part to advances in RF and microwave technology. Some of these radios are the size of a smartphone yet deliver higher performance, longer battery life, and much greater functionality. There are many other applications besides those mentioned here that along with EW, radar, communications should make 2016 if not a record-breaking year for the industry then certainly a respectable one.

**MPD:** *What emerging commercial applications or applications of RF and microwave technology do you believe will begin to deliver a respectable amount of revenue for the industry in 2016?*

**LG:** In the coming years, the automotive industry probably offers the widest array of opportunities for RF and microwave manufacturers. Millimeter-wave radar systems for collision avoidance that appeared first in luxury cars are finding their way further and further "down scale" and soon will be available across most

auto manufacturers' product lines. However, the most lucrative opportunities remain to be exploited as industry and government work to increase automotive safety. This will require huge amounts of RF and microwave hardware for communication between vehicles and between vehicles and roadside sensors.

**MPD:** *Referring to the defense market again, is your company experiencing any effects from DoD's Better Buying Power 3.0 and open RF architecture initiatives?*

**LG:** DoD is very serious about cutting costs across the board and the Better Buying Power (BBP) initiative either already has or soon will affect every RF and microwave manufacturer whose products are used in military systems. It is a mandate within virtually every organization within DoD that buys anything, even components, and unlike some other DoD initiatives (COTS comes to mind) it is almost certain to have a widespread impact on the defense industry.

The open RF architecture initiative is actually an integral part of BBP, and one in which Mercury has played a pioneering role. In September 2014 Mercury introduced OpenRFM™, which was and remains the only plan put forward by private industry to modularize the design, fabrication, and testing of Integrated Microwave Assemblies (IMAs). OpenRFM covers design, test, and control elements of IMAs and standardizes them within the 3U and 6U form factors of OpenVPX (VITA 65) and VXS/VME. Since it introduced OpenRFM, Mercury has supplied a wide variety of subsystems that employ it to both the government and prime contrac-

tors.

We recognize that it will take some time before open RF architectures such as OpenRFM will replace conventional IMAs on a large scale. That said, the trend is clearly in this direction. It has been embraced by the Army, Navy, and Air Force that are working both independently and together to ensure that open RF systems become the norm not the exception in the future.

**MPD:** *Do you believe that emerging machine-to-machine communications (that is, IoT) will have a major positive impact on the RF and microwave industry in 2016?*

**LG:** IoT offers enormous potential for some companies in the RF and microwave industry but I believe they will be mostly in small-signal devices, SoCs, and other high-volume semiconductor-based products. That is, more traditional, comparatively low-volume microwave hardware is less likely to benefit from what will ultimately become the ubiquitous presence of connected devices. That said, although Mercury's focus is almost exclusively in the defense sector, some of the technology being developed for IoT will without doubt find its way into military systems, probably sooner than later. 