



X/Ka terminal on ship trials for the RAN



High value systems

EM Solutions was established in 1998 to deliver communications solutions for the defence, maritime, broadcast and telecommunications sectors around the world. The company has historically manufactured a wide variety of microwave subsystem products, including block up converters (BUCs) with microwave solid state power amplifiers (SSPAs), filters, Ka-band and X-band LNBS, frequency synthesisers and linearisers. More recently, it has developed high value systems incorporating these products, in particular its multi-satellite communications on the move (COTM) terminals. Amy Saunders spoke with Rowan Gilmore, Managing Director of EM Solutions, about the changing market and key technologies.

Question: Can you provide an overview of the services and solutions that EM Solutions provides today?

Rowan Gilmore: Our focus in the satellite communications industry is on the design and manufacture of high-end products and systems that are distinguished by their reliability and ability to meet very demanding customer requirements. Specifically, that has meant that our BUCs and LNBS deliver higher linear power in smaller form factors, and that our on-the-move terminals are the most robust and accurate on the market. We are unique in that many of our products work across multiple frequency bands and satellites, and we can cost effectively combine technologies we already have

in-house to quickly create new and relatively complex communications systems. We work mainly at X and Ka-band frequencies, although we also develop products at Ku-band as well as up at E-band.

Question: What can you tell us about EM Solutions' market presence, and how has this changed in recent years?

Rowan Gilmore: Our customers include most of the blue-chip prime contractors to defence in Asia-Pacific, North America, Middle East, and Europe. Customers come to us to develop demanding products with features not available in mass-market products – for instance, BUCs with specific management features or that

meet particular military or airborne standards; or terminals that operate across both commercial and military networks in very rugged conditions. In recent years, we have moved beyond supplying highly regarded stand-alone products such as BUCs and LNBS to integrating these into our own on-the-move satellite ground terminals. As a result, our market presence has increased as we participate in much larger contracts and develop logistic support relationships in more countries. We are keen to do more of this.

Question: The satellite industry is undergoing major upheaval right now with new technologies changing the face of the industry. Where does EM Solutions expect to see the greatest opportunities in the next few years?

Rowan Gilmore: EM Solutions has a strong R&D team that is able to respond quickly to such upheaval. We have always been at the forefront of developing terminals and subsystems that take advantage of HTS satellites – for instance, by offering highly efficient BUCs with high linear power, much greater bandwidth, and in the case of our terminals – on-the-move systems that can seamlessly switch from military to commercial Ka-band, or simultaneously operate at both X and Ka bands. Going forward, because of our innovative technologies in stabilised platforms and antenna systems, we hope to take greater advantage of new opportunities requiring higher speed communications mobility – for instance, transmitting to UAVs, or low Earth orbit satellite systems.

Question: As a major player in the maritime sector, what are the key emerging challenges and trends, and how will EM Solutions respond to them?

Rowan Gilmore: We have seen the heavyweight maritime players demanding both assured communications and high capacity. We responded by developing the Cobra series terminal, which we first deployed in 2016 on eight Cape Class vessels for the Australian Border Force. The Cobra uses closed-loop monopulse pointing technology to substantially improve satellite tracking in adverse sea states. It also utilizes a unique radio transceiver and antenna system that is capable of switching between either military Ka-band frequencies or commercial Ka-



Rowan Gilmore, Managing Director of EM Solutions



band frequencies (for instance, on the Inmarsat GX network), thereby avoiding congestion or failure if one network deteriorates. Furthermore, now being deployed by the Royal Australian Navy, the most recent Cobra terminal utilizes an innovative broadband antenna feed and multi-band transceiver system that can simultaneously transmit at both X and Ka-bands, for instance with a WGS satellite, thereby increasing capacity and overcoming the impact of poor weather that may affect one band over the other. The icing on the cake though is that the system comes in a manageable size (1m antenna) and at an affordable cost.

Question: When we last spoke in 2016, you commented that multi-band mobile antennas would be a significant focus going forwards. Can you outline what developments EM Solutions has made in this area?

Rowan Gilmore: We partnered with Inmarsat and developed a broadband antenna system that was able to receive and transmit in both the Inmarsat (commercial) and military partitions of Ka-band, as well as transparently pass through the monopulse signals we use for accurate tracking. We also collaborated closely with Intellian to integrate their implementation of the iDirect GX modem and signalling channel into our system, so we could reach the market quickly. That terminal is now undergoing final WGS certification. After installation of those terminals on vessels for the Australian Border Force, we have started delivering terminals to the Australian Navy that not only operate across the

two Ka-bands, but also simultaneously support X-band transmission at the same time as military Ka-band, as is possible on the WGS constellation. This particular terminal is unique, in that (again in a 1m antenna) it is broadband to support high capacity, multi-channel communications, and supports monopulse tracking, which has been proven to offer the best possible pointing accuracy to deliver maximum link budget and uptime.

Question: Next-generation flat panel and phased array antennas are set to be big news this year with several new systems set for commercial launch. How will EM Solutions compete with this technology?

Rowan Gilmore: The parabolic style antenna used on Cobra and Taipan series terminals will always offer the highest gain, thus the fastest data rates and maximum uptime. Unlike flat panels, parabolic antennas can also be configured to support multi-band, multi-satellite operation. However, we recognise that some customers are prepared to accept lower performance and higher operating costs to achieve the low profile that flat panel systems can bring. For this reason, we have a large ongoing R&D collaboration with the University of Queensland looking at very low cost printable flat panel technologies that can be monopulse steered, to overcome some of the disadvantages of competing systems. This has already produced some very exciting results, and we hope to demonstrate first prototypes of a revolutionary system in 2018.

Question: 2016 was a big year for EM Solutions in terms of new technology and major defence contracts. What does EM Solutions see as its biggest achievement during the year?

Rowan Gilmore: We had three big achievements in 2016. The first was delivering new Mil-Std transceiver systems to several major US defence contractors for their own new satellite terminals. These transceivers combine both LNBS and BUCs into the smallest possible footprint module. The second was partnering with Inmarsat to successfully deliver and install multiple dual Ka-band maritime Cobra terminals on ships for the Australian Border Force. These communicate primarily on the WGS network, but fall back to the Inmarsat GX network in case of congestion. The third was winning the

confidence of the Royal Australian Navy to be selected to directly supply the Navy with our new 1m multi-band Cobra terminal, which does all of the above and also simultaneously transmits in X-band. The confidence that the Border Force, Australian Navy, and US defence primes have in us has inspired us to even greater heights.

Question: What's on the horizon for EM Solutions in the rest of 2017 and beyond?

Rowan Gilmore: More excitement because our order book is the largest it has ever been! For instance, we are about to deliver to the US government two on-the-move terminals that contain E-band (75 GHz – 85GHz) radios, initially for ship-to-shore communications. At the same time, we are continuing to deliver multi-band terminals to the Australian Navy on other ships. Because we have proven that our on-the-move technology provides the most robust pointing off-road or in very severe sea states, we are confident that as we evolve our Taipan land terminals and Cobra maritime terminals to meet different configurations, we will be able to continue meeting the difficult demands customers request of us. ■

