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## Powering military communication devices ● ●

Communication plays a fundamental role in every industry. For the military, effective and reliable communication relies on a complex communication network of equipment, personnel and protocols to share information between multiple parties. Michele Windsor, Global Marketing Manager of military battery manufacturer Ultralife Corporation, explores how developments in battery technology can further advance military communications.

**Despite the existence of radio technology**, British and French commanders were reported to use pigeons to communicate back to headquarters during World War I. This was because many devices were found to be unreliable in the thick of a battle and so military officials were forced to resort to traditional methods of communication.

Fortunately, devices now are far more reliable than the communication technology used in the war and Industry 4.0 has transformed the modern battlefield. The development of remote and wireless communication devices has made it easier for soldiers on deployment to notify officials of any warnings or problems so immediate action can be taken.

By embracing the communications revolution and turning to a new generation of technological systems, safety risks to soldiers on operations are significantly reduced. This is because the multiple devices available to the military can provide faster, richer and more flexible communications at a reduced cost.

In fact, a 2016 global military spend report stated that \$90.67 billion was spent on command and control, communication, computer, intelligence, surveillance and reconnaissance (C4ISR) and electronic warfare systems in 2016.

While the days of communicating by pigeon are far behind

us, communication is pivotal to the success of an operation and the devices used must be able to withstand far more extreme conditions than the latest smartphone. This is just one issue that device manufacturers face when designing reliable communication devices.

### Long-lasting

One of the biggest, and often overlooked, issues for portable devices is that the power requirements are outgrowing existing power solutions. This is a concern because for network-centric environments like a military operation, data must be communicated at high capacity in real-time.

Depending on the mission at hand, soldiers can expect to be deployed for up to 72 hours. This means that each soldier is prepped with equipment that is able to last for at least this amount of time, if not for even longer periods, as reliable power sources are not always available.

Therefore, accurate and extensive fuel gauging of the device is also critical so that soldiers know when they need to charge their device, ensuring they do not fail in the middle of a warzone. This is particularly important as there can be unexpected extensions for soldiers between deployment operations.

Many of us have experienced the frustration of the battery dying on our digital camera, mobile or any other electrical device at an inconvenient time. In the military, losing power for any device would go beyond an inconvenience and could be life threatening.

The growing list of battery operated applications that are used in the military in addition to communication devices includes ground sensors, miniature unmanned aerial vehicles (UAV) and weapon systems.

As manufacturers make more complex devices, how the device will be powered should be an early consideration in the design process. Currently, this is not always the case and the demands of the device strain the power source's capacity, resulting in a shorter life cycle per battery.

### Out with the old

So, how can manufacturers overcome these issues? To prevent problems like this occurring, original equipment manufacturers



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(OEMs) should integrate regenerable power sources like Lithium-ion battery technology into their devices, which offer high energy density.

Proven to be a suitable alternative, both chemistries have replaced the traditional nickel-cadmium batteries (Ni-Cd) that was found to provide limited capability in extreme environments. For military use, soldiers need to use power sources that can withstand high and low temperatures to ensure they are equipped for deployment in any location.

### Power requirements

Although demand for greater power is at the forefront of newly-developed communication devices and military systems, keeping soldiers mobile and agile is a fundamental consideration to the design of modern technologies.

A soldier's kit can weigh anything between 40kg and 80kg, so the challenge for battery manufacturers is to create a battery that when attached, directly or indirectly, does not impact the soldier's speed or performance. This means creating a device where size, weight and power (SWaP) are fundamental in the design without jeopardising the quality.

This can be particularly difficult for OEMs as they implement more features into communication devices or other military related systems and equipment.

For example, many heavy-duty military vehicles were originally designed so that the batteries fitted supplied just enough power to turn on the engine and operate any ancillary equipment. Today's military vehicles, however, are designed to

include the latest electronics and electrical advancements, including mission-critical sensors, communication devices and control systems.

### Unlimited data

The rise of Industry 4.0 has also significantly improved the amount of data that can be collected in the middle of the battlefield. Whereas commanders in World War I were limited to the amount of paper they had available, Industry 4.0 has enabled the military to collect vast amounts of real-time data that can be pivotal to a winning strategy.

This data collection has also been integrated into the next generation of wearable devices, which can monitor a soldier's vital statistics. Designed to report any emergency or critical data, the device must be able to withstand any heavy impact or blow that the soldier could endure and still be able to accurately report back data.

Device manufacturers need to power their equipment with batteries that are designed for use, in tough and extreme weather environments. At Ultralife, for example, we have several battery ranges designed to operate effectively in temperatures varying from -32 to 60 degrees Celsius.

By considering the demands and requirements of a device, OEMs can integrate a suitable power source to ensure their device is combat-ready. Failure to deliver reliable equipment, particularly communication devices, could prove costly to an operation and, worse still, leave a soldier with only a homing pigeon for support.

**GMC**



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