COMMUNICATIONS

making a difference
The Ultra Electronics Group manages a portfolio of specialist capabilities, generating highly-differentiated solutions and products in the DEFENCE & AEROSPACE, SECURITY & CYBER, TRANSPORT and ENERGY markets, by applying electronic and software technologies in demanding and critical environments to meet customer needs.

Ultra businesses constantly innovate to create solutions to customer requirements that are different from and better than those of the Group’s competitors. By applying these differentiated solutions to a wide range of international platforms and programmes, Ultra has built an exceptionally broad range of specialist capability areas. Where the Group has a number of complementary capabilities it can also combine those to offer wider solutions. Furthermore, the products, capabilities and the associated domain expertise uniquely position Ultra to be able to provide system and sub-system solutions. These solutions are underpinned by through-life management support offerings that ensure the capabilities are delivered and sustained in service. The Group has an active programme of reinvestment of funds to strengthen its capabilities in its specialist markets.

Ultra offers solutions to its customers through the design, delivery and support phases of a programme. Ultra’s businesses have a high degree of operational autonomy so that they provide exceptionally able and responsive support to customers and partners normally associated with a smaller business. These benefits of customer focus and agility are augmented by the access to wider and complementary technology and expertise that lies elsewhere in the Group and by Ultra’s strong financial position.

Ultra is a world-leading supplier of secure communication equipment and systems that enable accurate and timely exchange of voice, video and data to military, government, law enforcement agency, industry and commercial customers.

Satellite systems
An industry leader for mobile and fixedway satellite earth stations, Ultra offers satellite systems for any environment, whether fixed, vehicle-based or transportable. Adaptable to both defence and civil applications, Ultra satellite systems can be easily configured for specific operations.

Data link systems
A world leader in tactical, command and control (C2) and video data link systems, Ultra provides critical data exchange capabilities and situational awareness to naval, land and airborne users. Exploiting Ultra’s ability to innovate, Ultra has developed the capabilities that encompass C2, information exchange, tactical, video exchange and training support at all security levels.

Encryption solutions
With a long-standing history in exceptional encryption solutions, Ultra offers a comprehensive range of products to suit any level of security requirement. From pocket-sized, dual-authentication personal encryptors to those that can encrypt whole networks at the highest level of government classification, Ultra is trusted worldwide to develop and implement secure communication architectures.

Radio Systems
Ultra integrates a carefully selected blend of leading edge commercial information technology and high-capacity military radio technology to provide high performance, high reliability communications solutions to meet the requirements of today’s military. Ultra can provide complete integrated communication solutions incorporating only best-of-breed technologies, including line-of-sight radio, encryption, and VHF capabilities.

Specialist systems
Ultra more specialist niche capabilities include personal protective gear communications, ‘Hyperscale’ acoustic hailing devices and magneto-inductive ‘through-the-earth’ communication products.

Ultra’s broad range of specialist capabilities
Ultra focuses on developing specialist capabilities that provide highly-differentiated solutions to customers’ requirements. Eight clearly defined market segments allow Ultra to provide more complex offerings from across the full range of the Group’s capabilities. The eight capability segments are:

- **Underwater warfare**
  - Capabilities related to underwater warfare covering military, paramilitary and civil domains. These include transducers, hydrophones, sonobuoys, sonobuoy receivers, towed arrays, periscope detecting radars, torpedo defence systems, acoustic countermeasures, and surface ship local systems.

- **Maritime**
  - Capabilities related to signal and power management, operating, controlling, supporting and maintaining maritime (surface and sub-surface) military platforms, both manned and unmanned.

- **Land**
  - Capabilities related to operating, controlling, supporting and maintaining land military platforms, both manned and unmanned, and the dismounted soldier.

- **Aerospace**
  - Capabilities related to the design, manufacture, production, operation, support and maintenance of commercial and military aircraft, both manned and unmanned.

- **C2ISR***
  - Capabilities related to C2, Security and Surveillance solutions, covering both military and civil domains as well as military Electronic Warfare, reconnaissance and targeting systems, and forensic solutions for law enforcement.

- **Communications**
  - Capabilities related to the secure communication and timely exchange of data, voice and video information providing some of the most capable communication systems, platforms and integration support in the world.

- **Nuclear**
  - Capabilities related to nuclear, covering both civil energy, national radiation monitoring systems through defence to radiation monitoring on tactical platforms.

- **Infrastructure**
  - Capabilities related to airport and airline information systems, rail transit power conversion and control, as well as non-nuclear civil energy related capabilities.

2016 revenue by segment

<table>
<thead>
<tr>
<th>Segment</th>
<th>Revenue Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underwater warfare</td>
<td>25%</td>
</tr>
<tr>
<td>Maritime</td>
<td>7%</td>
</tr>
<tr>
<td>Land</td>
<td>3%</td>
</tr>
<tr>
<td>Aerospace</td>
<td>17%</td>
</tr>
<tr>
<td>C2ISR*</td>
<td>21%</td>
</tr>
<tr>
<td>Communications</td>
<td>15%</td>
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<tr>
<td>Nuclear</td>
<td>8%</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>4%</td>
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</tbody>
</table>

* C2ISR:* Command & Control, Intelligence, Surveillance and Reconnaissance

Did you know?

ULTRA’s broad range of specialist capabilities are positioned on over 350 platforms and programmes worldwide, often in high integrity or safety critical applications.

To see how Ultra’s capability segments map to each business, see pages 13-14.

visit: ultra-electronics.com
Communications

Satellite systems

Ultra is an industry leader in vehicle-based and transportable satellite earth stations, with a focus on wireless broadband communications as the core technology.

Fixed Satellite Earth Stations
Extending its engineering skills base to fixed earth stations, Ultra can provide fixed antennas from less than 1.0m, to over 9.3m diameter.

A key feature of the smaller antennas is the speed of assembly, which allows on-site work to be kept to a minimum and enables service to start very soon after arrival.

Ultra has qualified its fixed antennas with virtually every satellite operator. Its installation team has worldwide experience of adapting the system to local conditions, providing full turnkey services.

Frequency Converters
Ultra manufactures a complete range of up-converters and down-converters to meet virtually any satellite communications requirement.
The compact, fully modular design, fully weather-proof outdoor packaging and the extended operational temperature range, standard on all Ultra products, guarantees high performance in virtually any environment.

Antenna Controllers
Ultra’s STC series of antenna controllers is specifically designed for use with fly-away, drive-away and fixed antenna systems, but also with any other motorised antenna with positional feedback.

Comprehensive software features allow antennas to automatically point to up to 99 programmable coordinates. Where satellite inclination is known and programmed into the controller, the software can calculate the actual satellite position, at any time of day, and will accurately point the antenna to its known position, before entering peaking and tracking modes.

Vehicle-Based and Transportable Satellite Earth Stations
Ultra provides a comprehensive range of transportable and vehicle-based antennas. Both series feature the innovative cartridge feed arrangement, allowing them to be quickly configured for operation in C, X, Ku and Ka frequency bands. Both series of antennas are available in a comprehensive range of diameters.

Full motion 3-axis motorisation, combined with Ultra’s STC-100 antenna controller, allows antennas to automatically acquire satellites minutes after deployment. An integral tracking receiver will keep the signal peaked.

Ultra’s MIL-STD-810 and Wideband Global SATCOM/Defence Satellite Communications System approved fly-away antennas and systems are rugged, compact, easy to transport and to deploy – with guaranteed compliance to all satellite authority specifications. The FA series of antennas is specifically designed to survive the tough environment of satellite news gathering (SNG), but its highly innovative packaging, with robust, lightweight carbon-fibre construction, has made it the preferred choice for a wide variety of other applications. Today, FA series antennas are in service worldwide for sporting events, emergency data restoration and military/government communications.

Ultra’s drive-away antennas are designed with minimum weight and an ultra-low profile, minimum-drag coefficient construction. This makes them simple to install on most vehicles, without affecting the driving characteristics.

An integrated equipment pod provides a secure mounting position for amplifiers and up-converters. This creates extra space and reduces noise and heat inside the vehicle.

Ultra’s DA-100 antenna is small and light enough to travel as commercial aircraft checked baggage and then install on a vehicle roof-rack, turning it into a rapid-reaction SNG vehicle for breaking news.

Along with Ultra’s satellite communication systems, the Ultra Communicate product line offers a seamless global roaming capability. This enables efficient, resilient and rapidly-deployable communication solutions for man-portable, in-vehicle and maritime applications in both the commercial and defence sectors.

Designed to survive the tough environment of satellite news gathering.
Data link systems

Ultra provides critical tactical data exchange capabilities and tactical data link systems to military users.

TACTICAL DATA LINKS

Through the secure networking of sensors, platforms and systems, operational decision-makers are able to co-ordinate and maximise battlefield effects. Ultra is a key supplier of the enabling technologies, including Link-11, -16 and -22, which optimise the warfighter’s effectiveness by facilitating the timely dissemination of situational awareness and communications data across the battlespace.

Ultra’s secure tactical data link systems and products are in service on helicopters, fixed-wing aircraft, surface ships and submarines worldwide. Ultra’s multi-link processor family of products provides a compact, single Line Replacement Unit (LRU), innovative and versatile solution to single or multiple tactical data link operations.

Ultra’s Air Defence Systems Integrator (ADS) is used on aircraft carriers and command ships, in tactical and air operations centres, in airspace integration systems and in joint command centres around the world.

The system provides joint-certified tactical data link forwarding software, combined with tactical data link, radar and electronic intelligence interfaces.

Supporting capabilities include network planning, toolkits for analysis, secure data transfer networks and remote equipment control and status monitoring data for a distributed network of unmanned remote facilities.

Ultra provides a range of hand-held command, control, communications and computer (C4) systems for the dismounted soldier.

Leveraging its expertise in both human factors engineering and traditional hard controls, Ultra’s most recent development projects focus on the dismounted soldier. The warfighter today has to be ready to take immediate and appropriate action at the tactical edge and requires the tools to do so. Whether it is C2 of a UGV, local situational awareness or receiving secure full-motion video from supporting airborne assets.

Recognising the need for lightweight, soldier-portable controls, which concentrate functionality and asset accessibility into the warfighter’s hands, Ultra introduced the first fully-navigated game-style controller in 2004. By using a form of hand controller familiar to today’s soldiers, Ultra was able to militarise a control system which reduced training time and has become an ideal controller for the operation of numerous UGVs.

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Communications

Encroachment solutions

Ultra is a global provider of information assurance (IA) solutions with the capability to address a variety of complex requirements and provide sovereign protection to the most sensitive information.

CRYPTOGRAPHIC EQUIPMENT
Since the 1950s, Ultra has been designing, developing, manufacturing and supporting secure communications equipment, making it one of the most trusted and respected cryptographic systems providers in the world. Over the years, it has built up an enviable track record in the provision of certified End Cryptographic Units (ECUs) and key management capabilities to secure information at the highest levels of classification within government.

HIGH GRADE PROGRAMMABLE CRYPTOGRAPHIC DEVICES
Today, Ultra is supporting crypto modernisation initiatives in both the UK and the US, delivering the next generation of high-grade programmable cryptographic devices into service.
At the heart of the UK government solution is the Ultra-C3, a high grade cryptographic capability which provides legacy compatibility and most critically, can support modern and interoperable communication modes in the same cryptographic device. The devices are software definable making them compatible with future emerging requirements. Utilising the C3, Ultra is providing a form, fit and function replacement, enabling the deployment of the C3 in a range of cryptographic communications products to reduce installation and integration costs.

SECURING VIRTUAL PRIVATE NETWORKS
The increase in e-commerce and the use of Virtual Private Networks (VPNs) has made encryption a vital component of any network’s gateway to the wider world. Ultra offers VPN encryption and remote access devices, tested and accredited to commercial and government standards.

The Ultra Encrypt range provides organisations across the public and private sectors with the ability to protect sensitive or government classified data traversing IP networks. These products have the appropriate levels of assurance from the relevant authorities both domestically and for export markets. They include all the functions and features required to operate in today’s complex networking environments to safeguard site-to-site, remote access and wireless LAN network communications.

Ultra offers trusted and future proof cyber defence solutions and has extensive experience of protecting military, public sector and enterprise systems.

CYBERSECURITY FOR CRITICAL INDUSTRIAL SYSTEMS
Cyber-attacks are threatening our nation’s critical infrastructure even as operators are pressured to protect disparate legacy systems with limited budget and resources. Today it is imperative to maintain peak readiness and adjust for ever shifting threats while containing costs, streamlining operations and adhering to recommended requirements.

Ultra’s CyberFence solutions are designed to easily embed security into industrial automation and control systems to shield critical infrastructure against cyber-attacks without interruption. Ultra understands that cyber security is essential in today’s turbulent environment – that’s why our CyberFence devices are independently validated for robustness by widely recognised global standards bodies, government and military agencies. CyberFence surpasses basic firewall, perimeter and signature-based defense, extending protection to Supervisory control and data acquisition (SCADA) and other protocol-specific parsing and whitelisting to assure data integrity.

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The Ultra Encrypt product lines provide data confidentiality and source authentication for network traffic. This enables high confidence VPN communications for information transported across an IP network, such as the Internet, allowing the connection of corporate networks to remote offices, embedded and mobile workers, securely and cost effectively. Ultra Encrypt is the defacto VPN gateway and remote access platforms device for the overwhelming majority of UK Government communications requiring high assurance. Ultra offers trusted and future proof solutions and has extensive experience of protecting critical infrastructure for military, government and industrial public sector markets.

KEY MANAGEMENT
Ultra has a proven background across the whole key management lifecycle. Its COMSEC Accounting, Reporting and Distribution System (CARDS), Remote COMSEC Management System (RCMS) and Solitaire products provide a complete solution for cryptographic key request, revocation, distribution (black and red), storage and tactical loading along with equipment inventory and configuration management and are in service across the world.

Ultra also boasts the world’s only network-attached Hardware Security Module (HSM) utilising a cryptographic module that is certified to FIPS 140-2 Level 4 overall. The ultimate in HSMs, the Ultra Safe Keyring is a special-purpose HSM that provides high-assurance digital signing and key generation and management services.

A derives platform, the Ultra Encrypt Net CA is the first ever CESG accredited Public Key Infrastructure (PKI) component that supports the centralised key management capability for the Ultra Encrypt Net product range. There are in excess of 150 operational application specific dedicated PKIs in operation. By enabling assured data separation between the encryption domains, Net CA provides the ability to manage cryptographic communities of interest and to separate different user communities within an organisation, making it ideal for service providers and end users alike. Using Net CA, projects can perform over the air re-keying, including via satellite, for very large scale networks in a matter of minutes. Better key management leads to better availability. For over a decade Ultra has provided both increased key management usability and increased security.

The Ultra Safe platform is used to secure billions of dollars of payment transactions and ATM withdrawals around the world as well as underpinning mission-critical security systems for a number of the world’s largest companies, many national Top Level Domains and the root of the Internet’s Domain Name System (DNS).

Ultra offers trusted and future proof cyber defence solutions and has extensive experience of protecting military, public sector and enterprise systems.

MILITARY-CLASS SECURE VIDEO TELECOMMUNICATIONS
Highly interactive, visual collaboration systems allow participants to dynamically interact with content in video teleconference (VTC) meetings. Whether participants are in the command center, at their desks, or in the field, teams can collaborate easily with VTC via video teleconferencing. Ultra's Criticom ISEC (Integrated Secure Encryption Console) solutions deliver fully automated periods Processing as defined by US Department of Defense to seamlessly switch video conferencing systems between two different security classification networks.

Delivering M2M cyber security for mission critical systems.

visit: ultra-electronics.com
Ultra provides high-capacity, reliable radio communications systems for defence, security and public safety applications.

Interoperable with more than 50,000 radios fielded around the world.

The Ultra ORION product family consists of two or three channel, multiband high-capacity radios within a small form factor. Built on common software-defined radio technology, the Ultra ORION supports Point-to-Point (PTP), Point-to-Multipoint (PMP) and mesh capabilities. It can operate on fixed and mobile platforms, sharing multiple waveforms to support land, sea and air missions. Ultra’s rapidly deployable high capacity wireless communications systems provide headquarters-to-tactical edge real-time sharing of C2 and ISR data to improve situational awareness, while also meeting the full range, security and frequency requirements of the military.

Ultra ORION: performance and operational flexibility in a small form factor.

Ultra has an extensive, proven portfolio to protect the integrity of very sensitive data, which is reliable, survivable and resilient.

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Radio systems

Ultra supplies solutions for applications such as delivering real-time data and video from vehicles to monitoring centres, conducting wireless video surveillance and monitoring building access and public activity.

Specialist systems

Ultra’s more specialist niche capabilities include personal protective gear communications, Hyperspike acoustic hailing devices and magneto inductive ‘through-earth’ communication products.

ACOUSTIC HAILING AND NON-LETHAL DETERRENT CAPABILITY

Ultra’s Hyperspike acoustic hailing devices are highly-directional speakers, designed to focus sound in a narrow beam. They are the lightest and loudest acoustic hakers in the world and have been proven in all environments.

The unparalleled range, clarity and ease-of-use of Hyperspike render it ideal for maritime hailing, military operations and infrastructure protection.

The ability to clearly communicate and determine intent at a safe range, allows stand-off distances to be enforced and reduces the necessity of carrying out boarding operations, thus protecting both people and assets. Hyperspike also supports covert (non RF) communications, during such tasks as replenishment at sea.

Providing unparalleled acoustic deterrence and authoritative commands combined with a protective riot shield, Hyperspike is ideal for sound reinforcement in a crowd and riot control environment.

SEcure wireless mesh networks

Ultra’s AirGuard solutions are highly secure wireless networks which enable critical information exchange, vital systems security and infrastructure security. The Group provides custom communication solutions which can securely connect enterprise campuses, branch-bases, vessels and sensor systems by leveraging an innovative, self-forming, self-healing, route-optimised mesh structure to meet specific availability and confidentiality needs in military, government, and industrial markets. AirGuard can be used for applications such as delivering real-time data and video from vehicles to monitoring centres, conducting wireless video surveillance and monitoring building access and public activity.

TERRCOMM™ TACTICAL UNDERGROUND COMMUNICATION SYSTEM

Ultra’s TerrCOMM™ is a wireless, two-way, through-earth voice communication system, designed for tactical underground operations. TerrCOMM™ provides personnel in subterranean environments – tunnels, caves, culverts, municipal infrastructure – with the ability to speak with personnel located above ground. TerrCOMM™ enables direct, point-to-point communications. The robust signal can penetrate physical barriers, line-of-sight obstructions and conductive media, enabling secure and reliable communications in RF-denied environments.

Enabling critical information exchange, vital systems security and infrastructure security.
Ultra has a broad portfolio of specialist capabilities which can be combined flexibly to generate innovative, highly-differentiated solutions, which are delivered in close collaboration with customers, partners and suppliers.

Ultras is well positioned to support customers and provide solutions to complex needs across the Defence & Aerospace, Security & Cyber, Transport and Energy markets.

- **Underwater warfare**: Capabilities related to underwater warfare covering military, paramilitary and civil domains. These include transducers, hydrophones, sonobuoys, sonobuoy receivers, towed arrays, pectoral detecting radars, torpedo defence systems, acoustic countermeasures, and surface ship sonar systems.

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- **Land**: Capabilities related to the design, manufacture, production, operation, support and maintenance of commercial and military aircraft, both manned and unmanned, and the dismounted soldier.

- **Aerospace**: Capabilities related to signal and power management, operating, controlling, supporting and maintaining maritime (surface and sub-surface) military platforms, both manned and unmanned.

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*Command & Control, Intelligence Surveillance and Reconnaissance

The matrix on the left shows how Ultra’s core capabilities map to each Ultra business.
Ultra Electronics businesses within the Communications segment come capability area

Ultra Electronics reserves the right to vary these specifications without notice.

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