

MILITARY INSTALLATION OF THE FUTURE

Military installations are the fundamental backbone of the US Department of Defense (DoD). While smart, secure, and energy-efficient technologies are slowly being put into use on military bases, there will continually be significant new and evolving security, operational, resiliency, and economic benefits on the horizon. In response to this challenge, Vectrus created the Vectrus Resiliency Program Initiative™



(VRPI). This strategic corporate initiative was created to bring integrated, innovative, smart, secure, and energy-efficient technologies and capabilities to many of the new challenges and changes that will have National Security implications to the DoD. We firmly believe that Deputy Assistant Secretary of the Army, Strategic Integration Mr. Richard G. Kidd, IV said it best: "Tomorrow's installations can't be designed using yesterday's reflection." Our VRPI initiative ensures the military Installation of the Future has direct benefits to the warfighter. Vectrus' VRPI is being led by Cori Minton-Package, Vectrus Vice President of Operational Technology, an advanced technologies organization that combines engineering and digital integration programs with selected solutions and business partners.

VECTRUS CAPABILITY STATEMENT AND INSTALLATION OF THE FUTURE VISION

Vectrus Systems Corporation (VEC) is a publicly traded company, with 2018 revenues of \$1.3B. We are headquartered in Colorado Springs, Colorado, with offices in northern Virginia (our Solutions and Alliances organization) and a global presence. With more than 70 years' experience, Vectrus has operated globally in a wide range of conditions, from modern technologically advanced areas to austere contingency-based locations. Primary geographic areas of operation currently include: the Middle East (Kuwait, Qatar, and Bahrain), Central Asia (Afghanistan), Asia (Japan and Korea), Europe (Germany, the United Kingdom, Turkey, Italy, Spain, Greenland, and Romania), and the United States (see Figure 1).

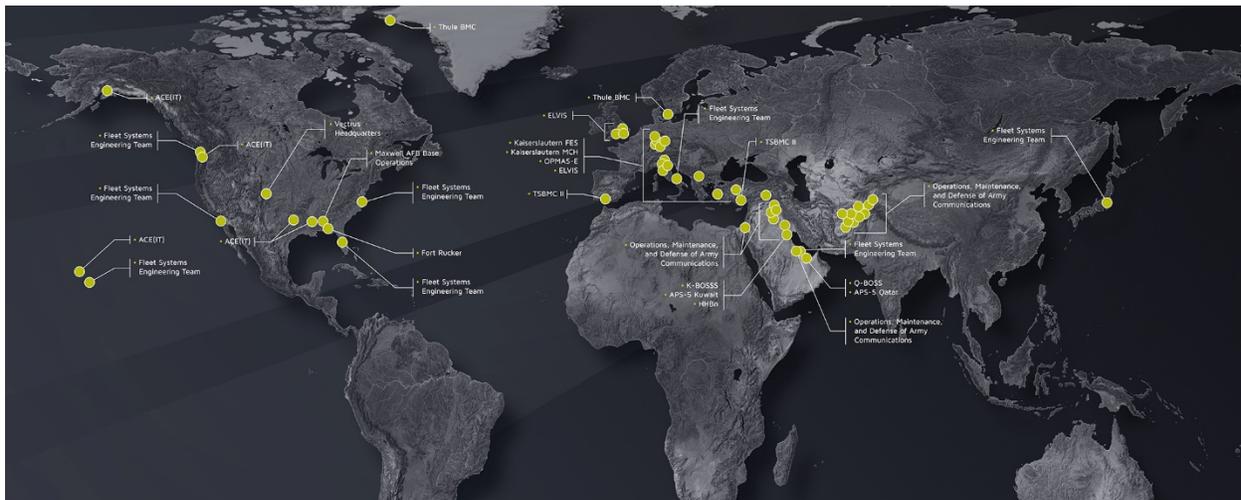


Figure 1. Vectrus' Global Presence

Vectrus' overall core capabilities supporting the warfighter include: Facilities and Base Operations; Supply Chain and Logistics Services; Information Technology (IT) Mission Support; Engineering and Digital Technology; and Strategic Programs Support. In 2016, the Vectrus Leadership Team began making long-term investments to build-out and solution the smart, secure Installation of the Future. Our approach had multiple components: Create our vision and strategy for the Installation of the Future; target specific mergers and acquisitions; consummate select

technology and business partnership agreements; hire “smart city” professionals; and ensure solutions and strategies align completely with the DoD’s priorities of readiness, modernization, reform, and ensuring the safety for our military and their families.

With more than 70 years’ experience providing all facets of facilities and base operations support to the DoD, we leveraged our experience in how installations are being supported today with how they should prepare for the future fight, including the roles all military, contractors, and their families will be expected to perform. We created VRPI to meet that challenge.

For example, in response to the challenges the US Government has with various installations (some of which are hundreds of years old, with vital historical significance), including the convergence of IT and Operational Technology (OT), sometimes referred to as Internet of Things (IoT); environmental issues on a military installation; and the amount of square footage under Government management, Vectrus created the Vectrus Installation of the Future platform (see Figure 2). This Installation of the Future command and control (C2) platform enables sensor integration (regardless of source); secure communications between any devices; analytics that not only report on an event, but also on what *will* happen (aka Vectrus Analytics – Business Partners); easy-to-use C2 visualization; and the ability to incorporate a CONOPS with measurable outcomes.

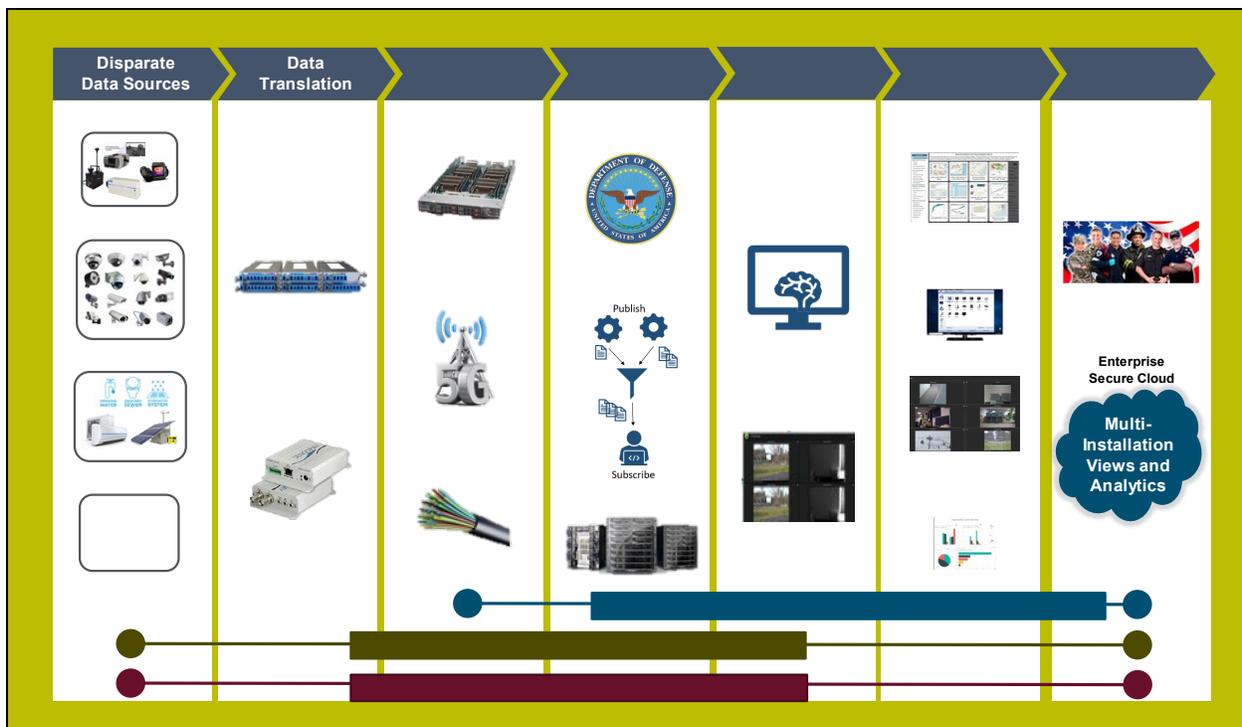


Figure 2. Vectrus’ Installation of the Future Platform

Another example, also highlighted in Figure 2, is Vectrus’ Installation of the Future solutions, including the strategic acquisition by Vectrus of Advantor Systems, which provides integrated security for Integrated Monitoring systems, Intrusion Detection systems, Access Control systems,

Video Management systems, and ID Badging systems for comprehensive security of the Installation of the Future – all in compliance with DoD specifications (see Figure 3).

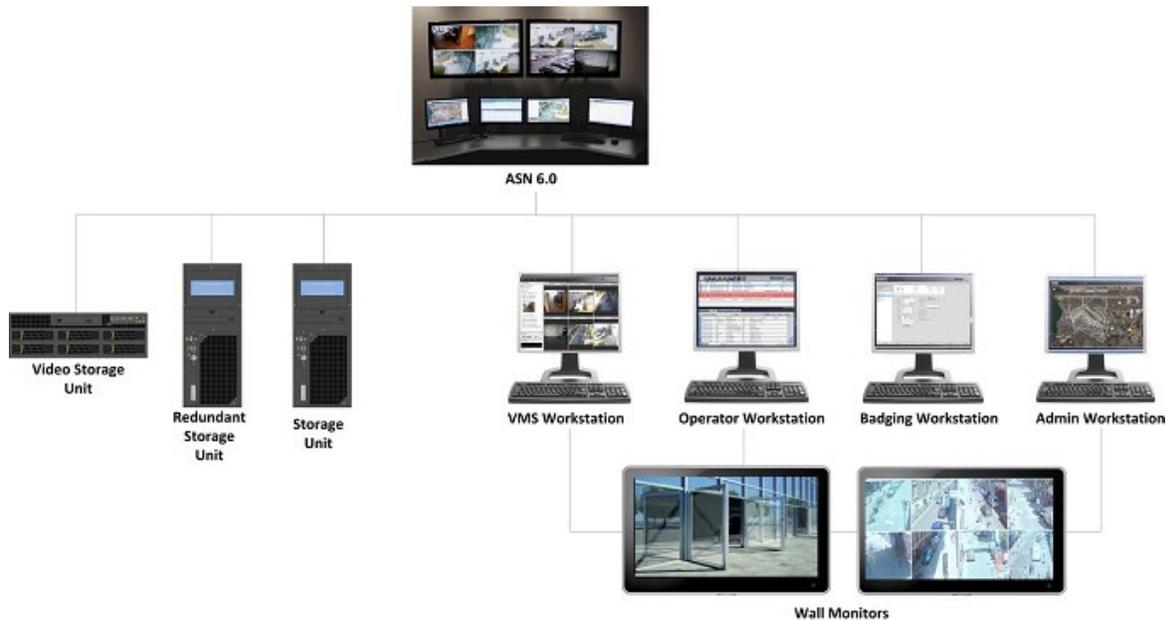


Figure 3. Vectrus' Integrated Security Platform – aligned with VRPI

DIRECT AND INDIRECT BENEFITS TO THE DEPARTMENT OF DEFENSE

As a facilities and base operations contractor to the DoD, Vectrus has created smart, secure Installation of the Future solutions in response to many of the trends, and consequences of those trends, that the DoD is tracking (see Attachment 1). Smart Installations of the Future must be resilient to disruptions and perform as strategic support areas, critical to multi-domain operations. Tables 1 and 2 illustrate Vectrus' smart, secure Installation of the Future solutions that have direct and indirect benefits to the DoD.

Trends and Technology Areas the DoD Is Watching	Trends Vectrus Is Implementing and/or Integrating into VRPI – Installation of the Future	Direct Benefit to the DoD	Indirect Benefit to the DoD
Climate Change and Resource Competition	Vectrus thermal coating	Energy savings	✓
Increase Level of Human Performance	VRPI –secure, smart infrastructure to maximize warfighter capabilities	Maximum military readiness	✓
Cyber and Space	Multiple business partnerships	IT, OT, IoT security	✓
Economic Rebalancing	VRPI solutions based on readiness, modernization, reform, and warfighter safety	Secure and efficient installation	✓
Human/Computer Interaction	Multiple business partnerships	Agile development core to VRPI and associated solutions; fast and iterative solution upgrades	✓
Artificial Intelligence	Multiple business partnerships	Vectrus Installation of the Future platform – VRPI	✓

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Demographics and Urbanization	Leveraged smart city processes and programmatic solutions in the build-out of VRPI	Maximizes installation resources	✓
Technology, Engineering, and Manufacturing	Multiple business partnerships, and mergers and acquisitions (M&A)	Advantor – best practices	✓
Big Data	Multiple business partnerships	Vectrus Installation of the Future platform–VRPI	✓
Collective Intelligence and Social Media	Multiple business partnerships	VRPI and associated solutions bring collective intelligence to the warfighter and real-time decision making.	✓
Robotics	Studying smart warehousing (in work)	Studying smart warehousing (in work)	✓
Power Generation and Storage	Multiple business partnerships	Cost of energy savings and energy efficiency	✓

Table 1. DoD Trends and VRPI Integration

Installation Technology Areas (Installation of the Future Solutions)	VRPI – Installation of the Future Solution	Direct Benefit to the DoD	Benefit to the DoD
Energy	Multiple business partnership(s) — Vectrus has a super capacitor capability for energy storage that is the leading-edge storage battery in the industry.	VRPI – Installation of the Future (solution)	✓
Water	Multiple business partnership(s) — Vectrus has a hydrodynamic cavitation capability that revolutionizes wastewater treatment.	VRPI – Installation of the Future (solution)	✓
Smart Lighting	Multiple business partnerships	VRPI – Installation of the Future (solution)	✓
Connected Everything	VRPI solutions based on readiness, modernization, reform, and warfighter safety	VRPI – Installation of the Future (solution)	✓
Traffic Management	Base operations support today	Base operations support today	✓
Force Protection	Base operations support today	Base operations support today	✓
Efficient Buildings	Multiple business partnership(s) — Vectrus provides secure enterprise solutions for energy and facilities management across all market verticals.	VRPI – Installation of the Future (solution)	✓

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Predictive Analytics	Multiple business partnerships and M&A	VRPI – Installation of the Future (solution)	✓
Disaster Management	Base operations support today	Base operations support today	✓
Emergency	Base operations support today	Base operations support today	✓
Security (Physical)	Vectrus acquired Advantor – end-to-end physical security capability (ATO by the USAF)	VRPI – Installation of the Future (solution)	✓
Security (Cyber and IoT)	Business partnership(s) for ICS/SCADA and IT/OT/IoT security	VRPI – Installation of the Future (solution)	✓
Land Management and Threatened and Endangered Species	Base operations support today	Base operations support today	✓

Table 2. DoD Installation of the Future and VRPI Solutions Alignment

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ATTACHMENT 1

SUSTAINABLE TECHNOLOGY AND SERVICES

- **HYBRID POWER GENERATION AND STORAGE** – This Vectrus solution is centered on a super capacitor storage technology called Hybrid Super Capacitor Graphene+ (HSCG), “batteries” that charge in only a few minutes (typical of capacitors) but discharge slowly like batteries (unique). This gives the solution the ability to store energy quickly and then turn off generators. Systems can be designed to generate as low as 8 kilowatts or up to several megawatts, making them a fit for expeditionary and stationary implementations. No energy is wasted, as it is drawn from our HSCG batteries. Fuel savings can be enormous.
- **SUSTAINABLE AND ENERGY CONSULTING SERVICES** – The Vectrus Smart + Connected service capabilities are a comprehensive turnkey offering that includes project management, visioning, assessments, planning services, architecture, energy conservation measure (ECM) evaluation, deployment, and ongoing operational support. The key focus is on people and operational efficiencies, including the consolidation of unconnected or siloed systems. This end-to-end service offering ensures key people are onboard with a clear roadmap so savings can be realized, measured, and reported.
- **OPERATIONAL TECHNOLOGY CYBER SECURITY (SOLUTION)** – While the cost and operational benefits for networking building management and operational systems are easily quantifiable, many of the building management and control systems connected to the network have vulnerabilities hackers exploit. Part of the challenge is that these devices are generally not standardized and leverage hundreds of different protocols, making normalization and control difficult. In recent years, most breaches have occurred via these OT assets. This OT Cyber Security offering provides a hardware-protected environment that is protocol agnostic, allows the systems to run as they do today, and includes alerts when assets act in an anomalous way.
- **LED LIGHTING** – LED lighting solutions are available for new and retrofit needs, indoor or outdoor applications, including street, parking, and area coverage. These fixtures are robust, carry a five-year warranty, and can be shipped globally. Occupancy and other types of “smart sensing” can be included, adding to energy efficiency and improved physical security profile (alerting on movement where movement is not expected). A LED lighting retrofit can save 50–60% in lighting costs.
- **ENTERPRISE SUSTAINABILITY PLATFORM** – This software monitors and manages energy-consuming systems in buildings and facilities. The platform, which scales to thousands of buildings, accesses, collects, normalizes, and analyzes data from a variety of equipment, software, and applications. It provides insight and transparency into the operations and process across the enterprise from a single master-data warehouse. This analysis gains efficiencies in energy operations and maintenance (O&M), allowing organizations to manage all facets of facilities and energy management in one centralized global-access portal solution.
- **THERMAL COATING** – This thermal covering is a single-component thermal barrier “paint” embedded with ceramics and acrylics that adds a reflective, non-heat-transferring insulative coating. This product, available in multiple colors, enhances the performance of insulation; HVAC duct work; fuel tanks; and wall and roof systems for all types of substrates, including metal, brick, cement block, concrete, wood, or drywall. The product is also anti-corrosive and fire retardant. Reduction in evaporation and cooling costs of 10-15% is realistic, particularly in hot regions.
- **WATER TREATMENT (CHILLER TOWER, GRAY AND DRINKING WATER)** – This cavitation-based offering has gone through extensive EPA testing, with unprecedented results for removing TDS, heavy metals, and bacteria. The system can treat all types of municipal, agricultural, and industrial water at a fraction of the size and cost of other treatments. Each

reactor can treat over 400K gallons of water per day, and its 16- by 8-foot mobile unit can treat up to 4M gallons daily. The reactor is virtually maintenance free and energy efficient, operating at a mere 100 psi (water).

- **PHOTOVOLTAICS (PANELS/SITE PLANNING/DEPLOYMENT MANAGEMENT)** – Along with complete solar power systems, field or structure based, installation and ROI calculation, various financing options are available. Solutions include generation reporting (in dollars and kWh), solar portfolio monitoring, track project installation, and a consolidated portfolio return.
- **IT AND OT CYBER SECURITY SERVICES** – The company has deep qualifications and experience in both IT and OT cyber security. When connecting to a local area network (LAN), the platform must be managed and secure from all aspects. The company, along with its partners, delivers code and hardware reviews, enterprise cyber security assessments, social media assessments, and NIST and ISO standard certification support.
- **GAS ANALYSIS AND CHEMICAL DETECTION** – This solution is based on mid-infrared (IR) chemical detection instruments. This technology has played an important role in the safety, security, and defense space for decades, where it detects chemical warfare agents and toxic industrial chemicals in milliseconds from distances of up to 5 km away. This includes quantum cascade laser (QCL) analyzers and mid-IR laser sources with wide tuning range and fast chemical analysis, allowing these open-path gas detectors (which can integrate into existing imaging and sensing solutions) and passive standoff products to identify gas leaks and fugitive emissions.
- **POWER QUALITY/CONDITIONING** – These physical units are installed in parallel, connected to a breaker on mains and sub-panels, with no disruption to operation. They allow power to be consumed more efficiently through kW spike clipping, voltage optimization, harmonic filtration, phase balancing, power factor correction, sag and surge mitigation, and surge and lightning suppression. Power reduction per building, dependent on loads, ranges from 10 to 20%.
- **INTELLIGENT HEATING, VENTILATION, AND AIR CONDITIONING** – We deliver cutting-edge heating, ventilation, and air conditioning (HVAC) equipment, automation, and controls to minimize energy consumption, maximize comfort, and enhance productivity. In addition to HVAC equipment integration, fire safety and security products are also integrated, deployed, and managed.
- **INTEGRATED SECURITY SYSTEMS** – This Vectrus solution (Vectrus' acquisition of Advantor) provides the latest security technology for your facility, but perhaps most importantly, we integrate legacy systems to ensure you're getting the most from your overall security systems. The Advantor Suite for Networks (ASN) is a powerful command, control, and display (CCD) system designed to be the nerve center of an integrated security solution. This central-station system provides the highest level of integration available with information assurance, password controls, access rights, and reporting and auditing functionalities.

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