

# COTS Technology Digitizes the Stryker Brigade Motorpark

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**T**he Product Management Office for Defense Communications Systems-Europe (PM DCS-E) recently completed a project leveraging commercial-off-the-shelf (COTS) products and technologies to support warfighters in Europe. PM DCS-E serves as one of three theater-specific PMs (Europe, CONUS and Pacific) reporting to the Project Manager Defense Communications Systems and Army Switched Systems, and its mission is to implement LandWarNet (U.S. Army enterprise network) through the Army's Installation Information Infrastructure Modernization Program (I3MP). PM DCS-E reports to the Program Executive Office for Enterprise Information Systems.

Strykers from 1-14 Cavalry, 3rd Brigade, Stryker Brigade Combat Team (SBCT), 2nd Infantry Division from Fort Lewis, WA, provide security in Mosul, Iraq. (U.S. Army photo by SPC John S. Gurtler.)

PM DCS-E provided cutting-edge data network support for the transformational 1st Stryker Brigade, which relocates from Fort Lewis, WA, to Grafenwoher, Germany, this summer. In coordination with the 5th Signal Command and U.S. Army Europe, PM DCS-E designed, engineered and implemented an expansion of the original Grafenwoher I3MP project, including the 1st Stryker Brigade headquarters and seven Stryker brigade motor pools at Vilseck, Germany. The next-generation Stryker Digital Motorpark (SDM) is a secure, standards-based, low-maintenance data network. It provides high-speed data connectivity to Stryker vehicles at their tactical motor pools, while requiring minimum support to maintain and operate. PM DCS-E completed the Systems Acceptance Test (SAT) for the Stryker I3MP project well ahead of schedule because of the adaptation and integration of COTS products into a military environment.

### Digital Motorpark

Stryker battalions are assigned approximately 72 Stryker vehicles. Tactically,

the battle command systems in each vehicle are networked using secure digital radios for communicating with the Tactical Operations Center, Internet Controller, Tactical Multinet Gateway or other network control centers operated by a signal company. In garrison, a Stryker brigade's vehicles are typically in the same motor park, which may cause their tactical radios to be inoperable because of interference, host-nation requirements or other operational considerations.

The SDM, installed by PM DCS-E at Grafenwoher, provides networking to all brigade Stryker vehicles by using various interfaces at seven Stryker motor pools. The ultra-high-speed (10 gigabit per second) data backbone installed by PM DCS-E at Grafenwoher was the fastest ever installed for an I3MP project. It ensures consistent, reliable

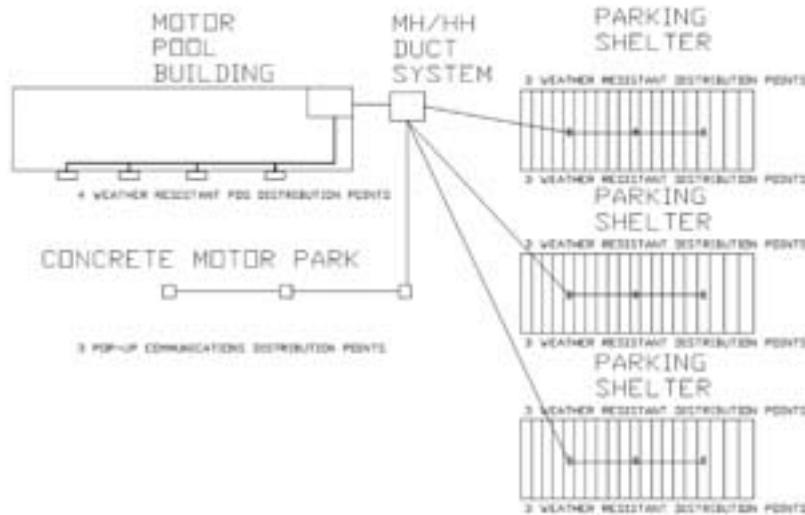
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interconnection of all the brigade's motor pools and guarantees high-capacity access to LandWarNet supporting the network-centric Stryker brigade. All Stryker vehicles in the motor pool can connect to each other by accessing any of several communications distribution points at multiple locations. These points are connected via fiber optic cable through an underground duct system as depicted in the figure. The end result is the Stryker brigade can conduct training, simulations or operational planning in a garrison environment using equivalent (or better) connectivity than what's available in the field.

### Motor Pool Distribution Point

The Motor Pool Distribution Point (MPDP) is a key SDM component because it provides on-the-ground data

### Stryker Digital Motorpark Design



connectivity allowing Stryker vehicles linkage to the brigade network and LandWarNet. Each MPDP, located in the motor pool's cement floor, has two compartments. One compartment has a removable cover for maintenance and accessing a data cable distribution case known as a cable splice tray. The other compartment contains a Pop-up Communications Distribution Point (PCDP) that extends above the ground for easy data network access.

While in a closed position, the PCDP remains flush with the ground and can support heavy vehicular traffic (up to 90 tons) that passes directly overhead.



The PCDP allows quick and easy connection to a variety of Stryker vehicle network interfaces greatly speeding up connectivity to the brigade network and LandWarNet. (U.S. Army photo courtesy of PM DCS-E.)

To raise the distribution point, the Soldier turns and lifts a recessed aircraft-type handle. The distribution point requires only two pounds of pressure to release, and then rises automatically to a height of approximately three feet. Once above the ground, the Soldier can easily access any four sides of the distribution point, which are configured with multiple data network interfaces. This allows quick and easy connection to a variety of Stryker vehicle network interfaces, including eight RJ-45 copper Ethernet connectors, eight fiber optic connectors and two tactical fiber optic cable assembly connectors. Each connector provides 10/100 megabit-per-second connectivity to the brigade network and LandWarNet.

The PCDP was modified from an existing COTs product that provides convenient power access used in commercial industry at airports, shopping complexes and outdoor activities. The original COTs product (the Schacht EK 808) provides electrical and grounding connections primarily at airports including Frankfurt (Germany) International — Europe's busiest. PM DCS-E modified the original design for the Stryker project to provide quick, accessible data connectivity instead of power.

The PCDP provided leverage to a proven design used successfully in commercial environments that were just as demanding as a tactical military motorpool. Because of its demonstrated reliability in commercial applications, PM DCS-E had high confidence in the Schacht EK 808 modified version's potential to perform successfully in the field supporting Stryker. PCDP use was consistent with the overall I3MP philosophy of using commercial products and standards to quickly and effectively field cutting-edge data networks to the Army. This was the first time the physical design of commercial hardware was modified for a major I3MP project.

### Industrial Ethernet Switch

Another COTS product proven critical to the SDM's success is the industrial Ethernet switch. Most Stryker vehicles use standard RJ-45 Ethernet connectors for network access. However, because the typical Stryker motor pool area exceeds the 90-meter distance limitation on Category 5 Ethernet cable, it was impossible to install an Ethernet-only network. The only vehicles connecting would be parked directly next to the motor pool building, which was impractical given the number of vehicles in a Stryker battalion. RJ-45 Ethernet connections were needed at the distant motor pool areas. PM DCS-E overcame the distance limitation by installing fiber optic cabling in the motor pool duct system and using the industrial Ethernet switch in the communications distribution points providing RJ-45 Ethernet connectivity for any Stryker vehicle.

The industrial Ethernet switch is a commercial product of the same type and manufacturer as the tactical Ethernet switch operating successfully on the Stryker vehicle. It has no moving



PM DCS-E has high expectations for this Ethernet switch based on its reliable performance in rugged industrial applications and in battle-proven performance of the tactical Ethernet switch on Strykers in the field. (U.S. Army photo courtesy of PM DCS-E.)

parts, a meantime between failure rate of more than 1 million hours of operation, works effectively between -40 to +70 degrees Centigrade, and meets military electrical surge and spike protection standards. PM DCS-E had high expectations for the switch based on its reliable performance in rugged industrial applications and in the battle-proven performance of the tactical Ethernet switch supporting Stryker in the field. Including the industrial Ethernet switch as a “drop-in” solution to the SDM saved PM DCS-E significant time, cost and effort during the design and integration phases, while

continuing maximum reliability with minimal required maintenance.

### Securing the SDM

Security was a critical SDM design element. PM DCS-E ensured that network and physical security were built into the original design so the Stryker network would remain completely secure even though it was easily accessible. The design gives the local Network Control Facility (NCF) total oversight. Security is essential because the Stryker network is a closed private network connecting only to the motor pool access points at the NCF. It has complete control over the tactical network including who can talk to whom, activation or deactivation of network ports and turn-on or -off access for any port in any motor pool.

By default, the Stryker network is not connected to the Non-classified Internet Protocol Router Network or the Secret Internet Protocol Router Network. These network connections are activated only when authorized by the commander. Network physical security is guaranteed because access to all data ports on the PCDP is controlled by a physical switch inside a secure

room in the motor pool, which enables or disables power. Without the switch activation, it is impossible to raise a distribution point from the motor pool and access the network. All Protected Distribution System network distribution boxes in the motor pool remain locked until needed.

The benefits of using COTS products and technologies to support the SDM are remarkable. PM DCS-E expedited the system design and integration phases, completing the SAT more than two months ahead of schedule. The solution met all stringent security, reliability and durability requirements. While some COTS products, like the industrial Ethernet switch, can be added into a military-specific design, others — such as the Schacht EK 808 — can be successfully modified for military use. The SDM project demonstrates a tremendous advantage in leveraging commercially available solutions to the warfighter for immediate tactical benefit.

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The SDM project demonstrates the numerous advantages of leveraging commercially available solutions to provide immediate tactical benefit where and when Soldiers need it most — on the battlefield. Here, SPC Tyler Sloan, 2nd Battalion, 1st Infantry Regiment, 172d SBCT, provides point security near Mosul, Iraq. (U.S. Army photo by SSG James L. Harper Jr.)