



Achieving Enhanced Situational Awareness through Virtualization

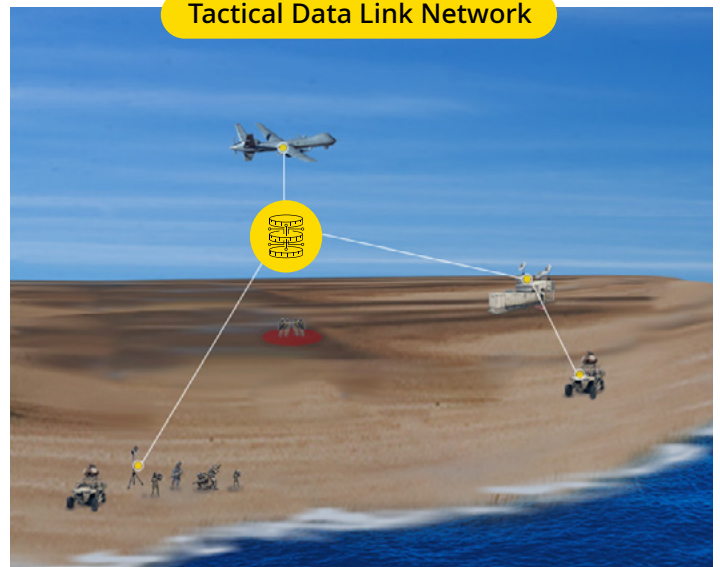
Overview

If you're a consumer of popular media, you've no doubt watched a movie where the military top brass are gathered around a screen showing them what's happening in the battlespace. It's easy to tell everyone apart – good guys are the “blue” blips, and bad guys are the “red” blips. The officers make rapid-fire decisions based on what they see on those screens, sending troops, aircraft and ships in response to (or in anticipation of) enemy actions.

Hollywood doesn't typically get everything right about these systems, but in practice the idea is realistic. Command officers must have that 10,000-foot view of the entire battlespace to affect accurate and timely decisions. What you never see is the complexity behind the screen. It's nowhere near as straightforward as it seems in the films because each branch of service and allied force uses different communication protocols.

How do command posts synthesize all those inputs into actionable data? They employ Tactical Data Links (TDLs).

Tactical Data Link Network





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Important Acronyms

C2 – Command and Control

Command is the process of assessing the situation on the battlefield and issuing orders in response, while Control refers to the verification of the data and assessments. C2 systems operate within a TDL network and can source data directly from a wide variety of resources like radars, national intelligence systems and even manual data inputs.

Tactical Data Links and Situational Awareness

Tactical Data Links are a shared data link used by the US Military Services, our NATO allies and other friendly nations as a common way to obtain and share vital operational intelligence across the air, land and sea domains. TDLs also provide the ability to relay data back to the assets on the ground, the sea and in the air.

We've already pointed out how different forces have their own communications protocols. Allowing them to communicate and report their data requires an ad hoc network of gateways and connectors between them. This is called a Multiple TDL Network (MTN).

Multi-TDL Network



In the field, C2 must depend on communication across different branches of the service as well as between coalition forces. However, there are multiple communications protocols, and every combatant force has different “channels” they have to monitor to keep on top of operations. For example, US forces use Link 16 protocols, but each branch of service has implemented them differently, making communication more difficult even within our own military forces.

The problems with this disconnect are obvious, but perhaps the most urgent is a loss of situational awareness – that 10,000-foot view of the battlespace. Success on the battlefield is highly dependent on integrated communications between all allied forces.

The ideal solution is to create a TDL gateway that can interconnect all these protocols and deliver a cohesive picture of the battlefield for the real-time decision-making that makes a difference in successful engagements.



30+ Years of TDL

The Air Defense Systems Integrator (ADSI®) is the most interoperable, widely tested and operationally fielded real-time, tactical command and control system offered anywhere. With 2,500 ADSI products installed worldwide, the combat-proven ADSI remains unmatched in its ability to provide joint-certified tactical data link forwarding software combined with an unparalleled number of tactical data link, sensor and electronic intelligence interfaces.



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ADSI Key Features

- Dynamic Link Reconfiguration – Add/delete/edit interfaces while the system is running without interfering or disrupting other interfaces
- Drag-and-drop Configuration Wizard – An intuitive user interface for making rapid and reliable changes
- Wizard-based filters – Easily access, define and enable data link filters
- Wizard-based Link 16 Terminal Control Application – Access a Link 16 RF network in just four mouse clicks
- Full Digital Air Control – Perform handovers, mission assignments, vectors, controlling unit change, correlation and target sorting
- Autostart – Configure the start function to boot automatically or with just two mouse clicks
- MIL-STD-6011, MIL-STD-6016 and MIL-STD-6020 compliant – Provides the latest functionality and standards compliance
- Robust Information Assurance (IA) functionality – Create/configure secure network connections while maintaining persistent data availability
- Updated operating system support for Microsoft® Windows®10 and Red Hat® Linux

For the last 30+ years the U.S. military has relied on the ADSI during every major crisis. Today, it is used on aircraft carriers and command ships, in tactical and air operations centers, in airspace integration systems and in joint command centers around the world. The ADSI supports critical missions by integrating land, air and sea domains, providing command and control of tactical units and reporting real-time sensor information across the battlespace.

With the capability to reliably connect to 32 different simultaneous data links and a 16,000-track capacity, the ADSI can handle anything the battlefield throws at it, no matter how complex or crowded. However, the battlefield is changing rapidly, but fortunately technology is changing as well.

To understand how battlefield situational awareness is evolving, it's important to know a little bit about virtualization.



Virtualization in a Nutshell

A virtual machine, or VM, is a software application which emulates a computer running an Operating System, such as Windows or Linux. A VM is essentially a software server running on a physical server. Running multiple VMs allows a server to support more users than without VMs.

Deploying multiple VMs on a single server provides better utilization of the physical server's resources making virtualization a powerful and cost-effective computing solution across the public and private sectors. In addition, virtualization allows IT departments to better manage and more efficiently utilize their resources while reducing costs.

In hardware virtualization, which is the kind we're talking about (there's also containerization and desktop and several more), the host machine is the physical machine running the virtualization, and the guest machine is a VM. The software or firmware that creates a virtual machine on the host hardware is called a hypervisor or virtual machine monitor.

VMs allow for many benefits. Among them are the consolidation of computing resources, as well as seamless failover. VMs remain in lock step during operations. When one VM or hosting server goes down (it happens, and usually at the absolute worst moment), another VM takes over. There's no need to stop and call in IT techs before commanders are able to issue orders again, and operations continue as if nothing happened.



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Failover is a prime example of why virtualization is desirable, ensuring that the flow of data remains uninterrupted.

Virtualizing Battlefield Situational Awareness with the Virtual ADSI

Benefits

- Combat-proven command and control
- Real time situational awareness
- Multiple communications and radar interfaces (JTIDS, SADL, satellite, *EPLRS)
- Multiple tactical data links, including Link 16 and Link 11
- Extensive message filtering
- Supports multiple remote workstations
- COTS hardware provides affordable decrease in Size, Weight and Power (SWaP)
- Expert support, available 24 hours
- World class training and reference media

The latest version of ADSI system significantly increases the warfighter's interoperability with 32 simultaneous and dynamically reconfigurable data links—tested and reliable—with an increased track capacity of 16,000 tracks. Most importantly, the completely revamped user interface greatly improves the entire ADSI user experience, from system configuration to system operation. Now, with the addition of a virtual environment, the system can be reconfigured without downtime.

Configuration wizards safeguard the system from inadvertent operator error. Persistent system and interface status is shown graphically. With its strict adherence to all relevant military standards, including the latest MILSTD-6016, the ADSI system ensures reliable interoperability.

The virtual ADSI (vADSI) is the only Joint Interoperability Task Force (JITC) certified software-only solution that combines the benefits of a Tactical Data Link Gateway with Command, Control and full C2 capabilities. Military units required to operate in any number of TDL operations can leverage the vADSI capabilities to participate in multiple



LINK-16, LINK-11, or other legacy protocols that enables commanders to correlate, translate, and forward data among tactical platforms.

Using these capabilities in a virtual environment, operators can easily employ the solution within their existing system hardware so there is no need for additional hardware which saves on size, weight and power - commonly referred as SWaP - which also translates to cost savings.



Preceding versions of the ADSI solution came in a large chassis that required specific computer components, but now with the virtual capabilities, Ultra can easily install and operate the ADSI on any platform to include airborne and even unmanned arial vehicles without adding any extra hardware.



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Having a system failure during a crucial time during any operation could have dire outcomes. That is why having our solution operating in a virtual environment with automatic failover capabilities can prevent loss of data during those critical times.

Ultra field engineers have seen many times how the ADSI has operated in locations where power was unstable and produced by small generators. The older but combat-proven method of implementing the ADSI was through distributed processing and multiple CPUs, hot swappable power supplies, removable hard drives and protecting the entire chassis with a dedicated uninterruptible power supply. The ADSI has repeatedly worked continuously through both “brown outs” and power spikes with no issues. That particular flexible capability laid the groundwork for the virtual ADSI.

Because the ADSI virtual solution follows military standards and is tested and certified, the system is widely used as a gateway to forward data between other tactical links. That means the ADSI will ensure data flowing through it meets the protocol standards. This is critical when data is forwarded between units from different branches such as the US Army, Air Force, Navy, and Marines. Furthermore, the ADSI is extensively used by allied forces helping to keep the flow of data mil standard compliant.

As of 2020, [92%](#) of organizations are using virtual servers. This now time-tested technology unlocks new possibilities for attaining and maintaining a complete and continually updating picture of the entire battlespace.

Learn more at
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ultra.group/intelligence-communications

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