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TDL Technology

Published by SyntheSys for the Tactical Data Links Community

Issue 8
Spring 2019

www.synthesys.co.uk

SyntheSys

Are you Involved in the TDL Capability Team Interoperability Test Syndicate?

Introduction to TDL Interoperability Testing Course

A SyntheSys one-day course which equips you to fully understand the benefits of participation in the Test Syndicate

The course provides an in depth understanding of the process involved when a platform team participates in a North Atlantic Treaty Organisation (NATO) / Partner Tactical Data Link Interoperability Test (PTDLIOT).

We teach operational, engineering, and project management professionals how to get the most out of being involved in the Test Syndicate.

You will learn:

- Background to Tactical Data Link Capability Team Interoperability Testing Syndicate (TDL CaT ITS)
- Details of Rig-Based Testing
- An understanding of the TDL Interoperability Test Schedule
- How to maximise your participation

Letter from the MD

Editorial

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Sharing Best Practice

Dr J S Hartas Managing Director

Welcome to Issue 8 of TDL Technology magazine.

It continues to delight me that our readership grows for each issue, and even after almost four years of running, TDL Technology magazine remains popular.

In my last letter, I spoke about how we were looking forward to a successful 2019, and we are finding that the year is already proving to be a busy, dynamic year for us here at SyntheSys.

Our most notable success so far has been our winning bid to provide Tactical Data Link (TDL) Problem Evaluation Services (PES) for United Kingdom Ministry of Defence, which is a significant stake in the ground for us in terms of delivering Cyber Security services in a TDL domain. Further insight about this noteworthy success can be found on Page 5.

Regular readers will know that we offer a 'Free Resource' in each magazine. For this issue, readers can download a 'Guide to Choosing a TDL Capability'. Information about how to download the guide can be found on Page 16.

I'd like to extend my personal thanks to Major Aaron Sprecher and Major Sameek Parsa (USAF, NAEW&C) for the curated 'Gateway to Multi-Domain Command and Control' article (Page 8). The article takes an interesting look at the E-3A Final Lifetime Extension Program, which I am positive will be of interest to the TDL community.

TDL Technology is designed to add value to the community and provides a platform for sharing. If you or your organisation would like to contribute an article, please contact us via the editor. Likewise, if you have any feedback, suggestions or areas that you would like to see discussed or improved in TDL Technology, we will be pleased to hear from you.

Very best regards

John S Hartas

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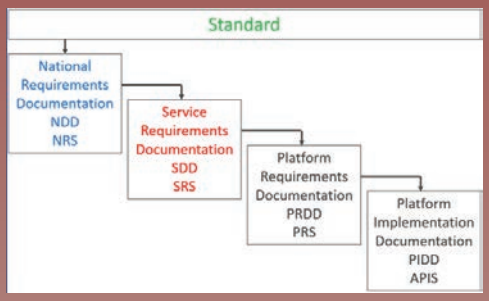
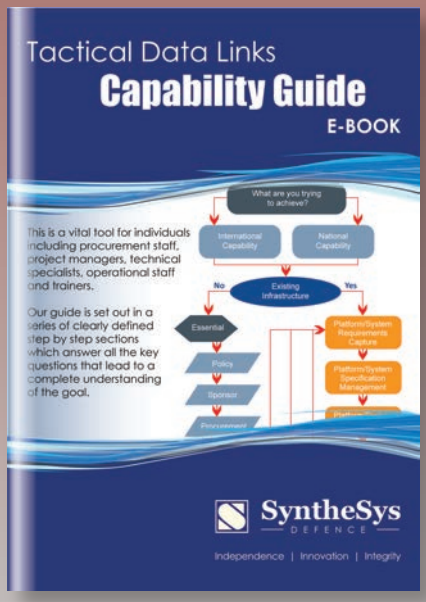
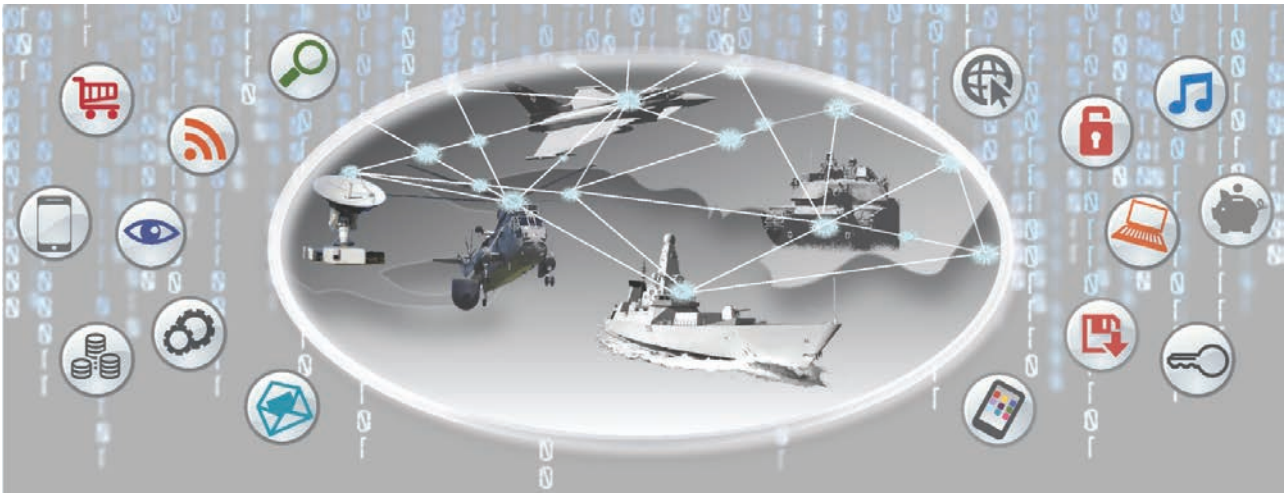




SyntheSys News

United Kingdom (UK) Ministry of Defence (MOD) selects SyntheSys, and its partners, to provide Tactical Data Link (TDL) Problem Evaluation Services



SyntheSys is thrilled to announce that they have been selected to deliver Problem Evaluation Services (PES) for UK TDL Terminals and associated platforms for the UK MOD. SyntheSys teams with C3 Systems Consulting (C3SC) and Mandalorian Security Services (MSS) to provide a unique solution to a complex requirement.

The contract aims to identify, investigate and resolve interoperability issues across TDL and associated platforms whilst supporting the Link 16 sustainment program to implement Joint Tactical Radio System (JTRS) Terminals. On behalf of Situational Awareness Command & Control (SACC) Delivery Team (DT), SyntheSys will be providing a powerful team of Subject Matter Experts (SMEs) to identify problems in achieving effective interoperability.

The initial 12-month contract will see the SyntheSys project team develop, maintain and implement an effective problem resolution mechanism, provide expert TDL advice and recommendation, and support TDL communities through various meetings. Of significance is the Cyber Security directives which include various Cyber Vulnerability Investigations (CVI) amongst other detailed cyber testing and assessment activities.

SyntheSys' Managing Director, John Hartas, comments:

"Whilst SyntheSys has provided TDL support to UK MOD for over 20 years, this contract win is a significant stake in the ground for us in terms of working with customers to deliver Cyber Security services in a TDL domain and we are delighted to be teaming with C3SC and MSS to provide an unrivalled depth of experience and knowledge. This is another great example of where our extensive experience of delivering TDL Interoperability Assurance and Assessment programmes globally ensures we continue to add unique value to customers in the TDL market.''

SyntheSys Accepted for the Aurora Engineering Partnership

SyntheSys is delighted to have been accepted to join the Provider Network for the Aurora Engineering Partnership, who have been appointed by the Ministry of Defence (MOD) as their Engineering Delivery Partner (EDP) for Defence Equipment & Support (DE&S).

The partnership – formed by QinetiQ, Atkins, a member of the SNC-Lavalin Group, and BMT – will help the MOD to reduce costs of their engineering services, while ensuring the UK's Armed Forces receive the best equipment and support. SyntheSys has been a long-standing supplier of engineering support to the MOD.

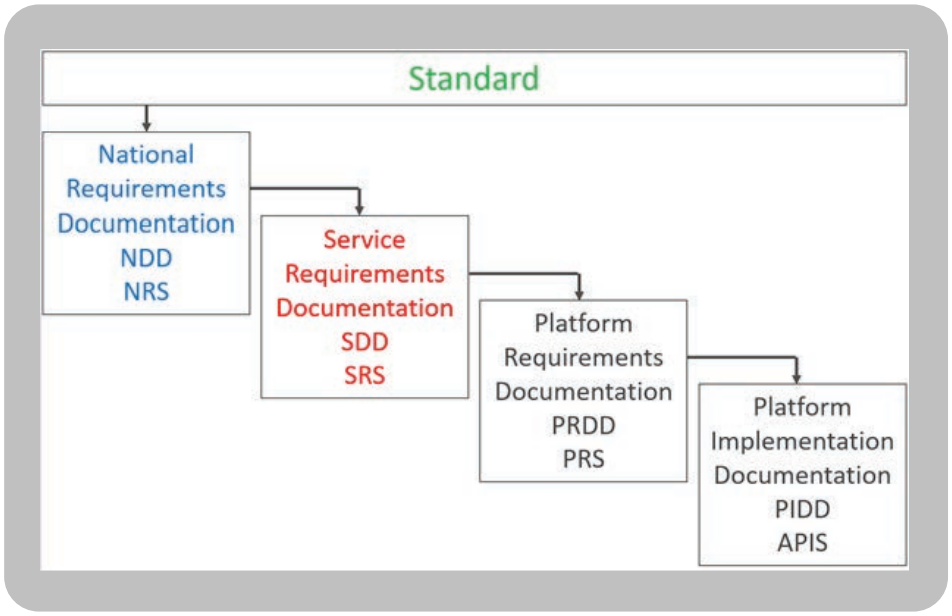
We look forward to future opportunities to provide specialist knowledge and support solutions to the Aurora Engineering Partnership.

The iSMART Document Suite Explained

When you purchase an expensive item such as a new car, how do you go about deciding what you do and don't need? Do you really need lane departure warning, adaptive headlights, or a baby bottle warmer? Maybe you do, and maybe you don't, but you can be sure of one thing – the car salesman will try and convince you that every gadget is an absolute necessity. So how do you decide what's needed and what's not, and how do you convey that to the salesman?

The same thought process is needed when defining the functionality needed for our Tactical Data Link (TDL) systems. The standards give us a huge amount of capability but, as with the car, which elements do we need, and what can we leave out, and how do we document the decisions that were made?

To help us with this complex issue the interoperable Systems Management And Requirements Transformation (iSMART) process has been developed. A progression of the United Kingdom (UK) Ministry of Defence's (MOD's) Through Life Interoperability Process (TULIP), iSMART supports a suite of documents which define the TDL requirement in a hierarchy as discussed below. iSMART is an open process that can be employed by any organisation to assist in the management of interoperability (IO).



The diagram above gives an overview of the iSMART document suite

While the iSMART process can be performed manually for any information exchange it may be supported by software tools such as the System Process for Interoperability Requirements and Implementation Testing (SPIRIT) or the enhanced Systems Management And Requirements Transformation (eSMART).

So, what documents does iSMART provide for us?

The choice of using the North Atlantic Treaty Organisation (NATO) Allied Tactical Data Link Publication (ATDLP) or the United States (US) Military Standard (MIL-STD) will generally be governed by who we wish to operate with and other requirements such as doctrine determined by Concept of Operations (CONOPS) and other high level policy. These requirements help in determining the Information Exchange Requirements (IERs) which in turn determine the TDL we will utilise. (We will use Link 16 for our example, but the process could apply to any other TDL.)

Once we have determined which TDL to use, we also need to decide which edition of the standardisation document we will use. In our case we have chosen the NATO ATDLP-5.16 Edition B Version 1.

This now becomes our baseline document from which all the iSMART documentation is derived.

As mentioned earlier, the iSMART process uses a hierarchal system which, after the chosen standardisation document, moves to the national level. At each level a positive and negative document is produced. At the national level the positive document states which elements of the standardisation document (ATDLP-5.16 Edition B Version 1) will be implemented by that nation. The negative document details the functionality which will not be implemented by that nation, and a rationale behind each decision.

Therefore, within the positive document, after defining the functional areas of interest for our platforms, we can then describe which messages, words within those messages, data elements and items we shall implement. For the negative document we determine which areas etc. we shall not implement. At the national level these documents are known as the National Requirements Specification (NRS) – the positive document, and the National Difference Document (NDD) – the negative document.

The next level down provides the Service level documentation. These documents provide information regarding the requirements of each service i.e. Army, Air Force, Navy. The format of the documents is similar to that at the National level and the documents in this case are named the Service Requirements Specification (SRS) – positive, and the Service Difference Document (SDD) – negative. As most nations do not have individual forces large enough to justify the use of these documents, this level is not utilised by most nations. It is believed that only the US forces use the Service level documentation.

After the Service level documentation, the next level refers to individual platforms. Each TDL equipped platform type e.g. Typhoon, Type 45 Destroyer etc. will have a Platform Requirements Specification (PRS) – the positive document, which describes that platform's TDL implementation down to the data item/bit level for both transmission and reception. The Platform Requirements Difference Document (PRDD) – the negative document, describes the areas not implemented by that platform, and once again the rationale behind the non-implementation. The PRS document is the specification used to define the requirements to a manufacturer.

To provide a starting point, the ATDLP provides a set of minimum requirements for a number of functions that a platform may choose to implement. For each chosen function, there are defined messages, message transmit and receive tables and message data element content.

For a Command and Control (C2) platform, these functions are:

a. **Basic** – This function defines the requirements for a Joint Tactical Information Distribution System/Multifunctional Information Distribution System (JTIDS/MIDS) Unit (JU) to participate on a Link 16 interface and is broken down into 2 further sub-functions:
   - **Terminal** – This sub-function defines the message requirements for the terminal to support JU participation on a Link 16 interface.
   - **Host**– This sub-function defines the JU host message requirements to support friendly position and status, as well as message exchange capabilities.
b. **Platform Situational Awareness**
c. **Network Management**
d. **Air Surveillance**
e. **Surface Surveillance**
f. **Subsurface Surveillance**
g. **Land Surveillance**
h. **Space Surveillance**
i. **Ballistic Missile Defence Operations**
j. **Electronic Warfare**
k. **Weapons Unit**
l. **Air Controlling Unit**
m. **Command**
n. **Surface-to-Air-Missile (SAM) Controlling Unit**
o. **Unmanned Aerial Vehicles (UAV) Controlling Unit**
p. **Network Enabled Weapon Controller**
q. **Network Enabled Weapon In-Flight Target Update Third Party Source**

The final level of the iSMART documentation describes the delivered TDL capability. It is recognised that during the platform build process implementation issues or problems discovered during testing may result in changes to the functionality originally requested in the PRS. Therefore, this set of documents will identify any changes which occur during this final phase. The positive document is known as the Actual Platform Implementation Specification (APIS) while the negative document is referred to as the Platform Implementation Difference Document (PIDD). The APIS document may be utilised as the baseline at which platform testing is carried out.

Summary

Due to the complexity of TDL implementation and to improve IO it is imperative that the iSMART documentation suite or other similar documents are utilised. The use of iSMART is mandated for TDLs in both the UK and US, and it is also adopted by many other nations. Not only does the document suite provide a record of the platform implementations, it can also be used to carry out interoperability evaluations between platforms by comparing one implementation against another which in turn will improve operational effectiveness.

Tony Castle
SyntheSys Defence Business Group Manager

Gateway to Multi-Domain Command and Control

Article courtesy of Major Aaron Sprecher and Major Sameek Parsa, USA AF, NAEW&C as featured in the JAPCC Journal Ed 25

Introduction

Since NATO's inception, airpower's role has evolved from a key enabler of military capability to that of a primary means of executing the Alliance's three core tasks: collective defence, crisis management and cooperative security. With today's fluid political landscape and rapid technological advancement, NATO has begun to anticipate future security environments in which it may have to operate, including a Contested, Degraded, and Operationally limited (CDO) environment. NATO's military forces must be prepared to match not only rapid developments in technology but also an adversary with the political will and capacity to employ these capabilities to decisively alter the geopolitical landscape. The JAPCC's 2016 conference brought focus to this narrative, concluding that after nearly two decades of uncontested air operations, today's environment is in fact CDO. The conference further provided clarity, defining the contested as 'things the adversary does to directly hamper the mission' (e.g. electronic warfare, cyber attacks); the degraded environment as 'things that happen in the natural course of events' (e.g. stuff breaks); and the operationally limited as 'caused by the physical or operational environment' (e.g. capacity-limited Link 16 network).[1] It was also agreed that the particular challenges for the CDO environment of the foreseeable future are instantaneous effects from increasing multi-dimensional threats.

Given these challenges, NATO must learn how to employ its joint capabilities as a cohesive multi-domain force. This will allow for dynamic action across the domains to provide precision engagement with the desired amount of force, at the desired time, regardless of the battlefield conditions. These synergistic effects cannot be accomplished using the traditional approach of separate components coordinating in traditional supported-supporting relationships, where each component still subordinates Joint Force objectives to priorities in its own domain that constrain the capabilities provided to the Joint Force Commander (JFC). For success in future warfare, JFCs must have real-time situational awareness of all assets in the battlespace and the ability to communicate and re-direct forces as the environment dictates. A critical component in providing NATO with this strategic advantage is its airborne Battle Management Command and Control (BMC2) capability, specifically the NATO E-3A Airborne Warning and Control System (AWACS). Current efforts to modernize the AWACS will provide Multi-Domain Command and Control (MDC2) capability required to meet challenges of future operational environments.

From Joint to Multi-Domain Operations

Over the last quarter century, operational airpower has been a key and critical component to maintain the Alliance's strategic advantage. Operational concepts such as 'Air-Land' and 'Air-Sea' Battle were pivotal evolutions in defining how airpower can deliver cross-domain synergy.[2] However, in 2011, then Chairman of the United States Joint Chiefs of Staff General Martin Dempsey asked 'What's after joint?'[3] The answer is multi-domain. Multi-domain operations are the 'exploitation of asymmetric advantages across multiple domains (air, land, sea, sub-surface, space and cyberspace) to achieve freedom of action required by the mission.'[4] Quite possibly the most unique challenge to achieving this is understanding MDC2. MDC2 can be defined as C2 across all domains that protects, permits and enhances the conduct of operations to create desired effects at the time, place and method of choosing.[5]

Recently, the Chief of Staff of the US Air Force published a white paper that describes three characteristics of MDC2: situational awareness, rapid decision-making, and the ability to direct joint forces to achieve Commander's intent.[6] The challenges with operationalizing this concept reside in three domains: technical, policy, and human. In the technical domain, MDC2 systems must have a network that supports the exchange of 'big data', removes stove-piped data streams, and improves interoperability.

Further, we must be able to identify and remove policy barriers to interoperability to shorten the time from data to decision. Last, in the human domain, command authorities must be established and easily delegated to the tactical level so that those with Tactical Control (TACON) can produce effects across domains, in real-time. This authority, when distributed to the right level, will link the Commander's intent to tactical action, employing the right amount of force, at the right time, in the right place and with the right method of choice for maximum effectiveness.

To this end, NATO continues to transform its military force structure in separate air, land and maritime components. To ensure effective MDC2, however, a platform must be selected which can readily observe and communicate across the space, air, ground and surface domains. As NATO's key airborne tactical BMC2 asset, the E-3As are the logical platform for future MDC2 operations. They are uniquely qualified to engage in multi-domain operations, as they already engage in air, ground and surface BMC2. The next evolution of the E-3A will expand its capabilities in the space domain and enhance many of its existing air, ground and surface abilities, to provide the technical capability for effective MDC2 in NATO 2025 and beyond.

Evolution of the E-3A: Mission and Modernization

Four major modifications to the E-3A fleet in the past 25 years prove the platform can respond to military challenges or changing political environments.

Near-Term Modification Program. The first modification, known as the Near-Term Modernization Program, was conducted in the early 1990s, while the world was still adjusting to the collapse of the Soviet Union. It significantly enhanced the radar capabilities allowing detection of smaller and slower targets at the expanded range, and it added electronic surveillance measures for improved passive detection of static and mobile emitters. To effectively communicate with maritime elements, the E-3A's communications capabilities were also upgraded to include anti-jam Ultra High Frequency (UHF) radios and Link-16.

The E-3A Final Lifetime Extension Program

NATO Mid-Term Program. During NATO's involvement in Bosnia and Kosovo in the 1990s, the E-3A's role was expanded from a simple Airborne Early Warning platform to that of a flying Command and Control (C2) entity. This second round of modifications, known as the NATO Mid-Term Program, was approved in 1997. The C2 enhancements included the addition of new situational display consoles to allow for additional mission crew in-flight, multi-sensor integration for improved target identification and tracking, the addition of full-spectrum VHF radios for communications with a wider range of aircraft and ground forces, and an improved internal communications network and satellite communications system for long-range voice and data transmission.

Large Aircraft Infrared Counter Measures. The third modification of the E-3As began for the 2001 deployments to Afghanistan in support of the International Security Assistance Force (ISAF). The mission required a Large Aircraft Infrared Counter Measures (LAIRCM) system to operate from within the theatre of operation. LAIRCM is an automated system designed to protect aircraft during take-off and landing when they are vulnerable to MANPADS and other portable infrared guided missiles. Following the addition of LAIRCM, NATO E-3As were able to support ISAF from bases within Afghanistan itself, not only increasing on-station availability while substantially reducing fuel requirements, but also allowed Commander's to accept greater risk with a traditionally low-risk platform.

Follow-on Upgrade Program. To keep pace with the civil aviation requirements in NATO countries, the fourth modification, known as the Follow-on Upgrade Program, was implemented in 2010. This upgrade included a Next Generation Identification Friend or Foe (IFF) (Mode 5) and enhanced Mode S capability for improved identification capability and replacement of the analogue flight instrumentation with the new Communication, Navigation and Surveillance/Air Traffic Management (CNS/ATM) 'Glass Cockpit' system to ensure access to global airspace.

These modernization efforts helped the E-3As to adapt and perform missions beyond those for which they were originally designed. In the aftermath of the drawdown from operations in Afghanistan, NATO shifted its strategic direction and reaffirmed the need to modernize the E-3As to remain 'operationally relevant through 2035'. To extend the E-3A's operational life for another ten years, the NAEW&C Force with the support of Supreme Headquarters Allied Powers Europe (SHAPE) identified key capability gaps to advance and modernize the fleet to meet the strategic directive.

Final Lifetime Extension Programme

Since 2014, the NATO Airborne Early Warning and Control Force Program Management Agency (NAPMA) managed development of the Final Lifetime Extension Program (FLEP) to fill those capability gaps. The engineering, manufacturing, and development phase is scheduled to commence in 2019, where NAPMA will work with US and European contractors to provide a modernized, networked, secured, multi-domain capable Battle Management and Command & Control platform to serve until a replacement is fielded. FLEP will address six major areas to improve the E-3A's MDC2 capabilities.

These areas include:

Tactical Data Links (TDL). The FLEP will replace the existing terminal with a modern, crypto-compliant terminal capable of Concurrent Multi-netting and add Internet Protocol (IP)-based, beyond line-of-sight capability with Joint Range Extension Applications Protocol C encapsulation.[7] This capability will not only aid in alleviating the capacity constraints of current Tactical Digital Information Link networks, but will also allow for the adaptation of future waveforms for greater and more secure information exchange, communication and enhanced situational awareness. Alleviating the capacity constraints of today's data network environment is a pre-requisite to the amount of data that can be collected by 5th generation sensors and platforms.

Secure Communications. To meet external mandates, the voice, data, and TDL cryptographic units will be replaced with modernized units to ensure secure communications and interoperability with NATO partners.

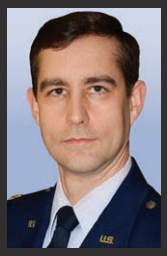
Airborne Networking. The wide-band SATCOM antenna installed under the CNS/ATM project will be modified to increase data streaming capability to 2 Mbps, a massive increase over today's capability. This will support the integration of advanced information sharing capabilities and handle the 'big data' (e.g. off-board sensor data) required to support operations beyond 2025.

Anti-Jam Communications. Current VHF and UHF radios will be replaced with modern, securable, anti-jam capable radios to establish and maintain communications with air, ground and surface forces in contested electromagnetic environments.

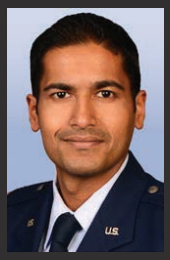
Passive Detection. The Electronic Surveillance Measure system will receive a much needed upgrade in processing capability to allow for faster emitter identification and reduction of unknown emitters. The ability to provide more timely and accurate identification of potential threats will allow the E-3A to bring order to chaos in the fight of the future.

Mission System. Due to the number of improvements added under FLEP and the advancements in computer technology since the last upgrade, the Mission Computing system will receive new hardware and a significant change in software architecture. The new features and capabilities will alleviate capacity and processing constraints of existing computer technology that is ill-equipped to handle the massive amounts of data provided by organic and inorganic sensors.

Most notably E-3As will continue to provide accurate and timely identification of air and surface targets and will gain the ability to detect, track, and identify ground targets and emitters through the ability to process off-board, Ground Moving Target Indications (GMTI). The ability to detect, track, and identify enemy movement in the air, land, and surface domain and communicate these threats beyond line-of-sight will support



Major Aaron Sprecher earned his commission through the USAF Officer Training School in 2003 as a Developmental Engineer after earning his BS in Electrical Engineering. He earned an MSEE from the Air Force Institute of Technology 2008 and is certified through the Defense Acquisition University in Program Management, Test & Evaluation, and Systems Planning, Research, Development and Engineering. Major Sprecher has also provided electronic warfare support to combat forces and was forward deployed as an MC-12 liaison officer. Major Sprecher currently serves as the NATO E-3A Strategic Development Project Manager at the NATO Airborne Early Warning and Control Force Headquarters. Major Sprecher is responsible for strategic planning and requirements development for future capabilities of the NATO E-3A fleet.



Major Sameek Parsa earned his commission through the Reserve Officers Training Corps in 2007. He is a Senior Air Battle Manager with experience in the NATO E-3A, and USAF E-3B/C/G, E-8C JSTARS and possesses qualifications as an Evaluator Senior Director/Fighter Allocator and Instructor Air Weapons Controller. During previous assignments, he served in the Combined Air Operations Center, United States Central Command and has over 1,700 flight hours supporting operations in the Pacific, Central America, and Middle East area of operations. Currently, he is the Deputy Chief of Requirements at Headquarters, NATO Airborne Early Warning & Control Force and serves as a focal point for strategic requirements development for NATO Airborne Early Warning and Control systems in support of NATO Defence Planning.

enhanced situational awareness and enable rapid decision making at the tactical and operational levels, allowing forces to achieve Commander's intent. Moreover, the enhanced airborne networking capability provides the necessary bandwidth to process 'big data' to ensure timely and decisive action.

For these technologies to be effective in 2025 and beyond, we must also examine the barriers in policy that prevent the rapid and free-flowing exchange of data between sensors, systems, platforms, networks, and people. While the commitment of national resources to the Alliance continues to be a source of strength, we must also consider the barriers invoked by policy that can diminish interoperability and our strategic advantage. MDC2 within NATO will require strategic alignment of people, plans, resources, requirements and technologies in order to preserve a competitive advantage. From a systems perspective, MDC2 is neither capabilities-based nor effects-based; it instead relies on resilience, interoperability and authority. Systems must be resilient in order to be effective in a multi-domain environment; they must also be able to communicate with each other and appropriate command.

Last, while traditional air power capabilities have been measured by speed and reach, MDC2 systems will be measured by their ability to achieve Commander's intent, its level of adaptiveness and finally its survivability. The only way this last part is achieved is through the systematic integration of people, ideas, weapons and platforms so MDC2 systems can adapt these variables to the situation as we can never wargame the perfect storm. We must therefore also seek to find those emerging enablers vs technological game-changers in order to achieve operational agility.

Conclusion

The imperative for effective MDC2 is clear. The ability to harness capabilities across multiple domains and more importantly, provide effective command and control across domains, produces dilemmas for our adversaries at a pace they will never match. Airborne C2 nodes such as the E-3A will continue to be critical in gapping the tyranny of distance in a boundary-less, multi-domain environment. The ability to overcome fog, friction and chance through on-scene or localized situational awareness remains the E-3A's most competitive advantage in 2025 and beyond. MDC2 systems, like a rapidly-deployable and FLEP-modernized E-3A, will provide operational commanders with an action arm in the battlespace to achieve desired effects. Moreover, it will require the strategic alignment of people, plans, resources, requirements and technologies in order for NATO airpower to preserve its competitive advantage in 2025 and beyond.

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3. Reilly, J. Multidomain Operations. ASPJ, Spring 2016. Retrieved from: http://www.airuniversity.af.mil/Portals/10/ASPJ/journals/Volume-30_Issue-1/ASPJ-Spring-2016.pdf

4. Ibid., p. 62.

5. Definition adapted from: Col Joshua Conine, USAF (2017). Multi Domain Command and Control [PowerPoint slides].

6. Gen David Goldfein, USAF (2017). Enhancing Multi-domain Command and Control … Tying It All Together. Retrieved from: http://www.af.mil/Portals/1/documents/csaf/letter3/Enhancing_Multi-domain_CommandControl.pdf

7. JREAP C makes use of the Internet Protocol (IP) in conjunction with either the User Datagram Protocol (UDP) or Transmission Control Protocol (TCP). The IP suite is a standard set of protocols that is deployed worldwide in commercial as well as military networks. By using JREAP encapsulation over IP, JRE can be performed over IP-based networks that meet operational requirements for security, speed of service and so on.

> ***"Airborne C2 nodes such as the E-3A will continue to be critical in gapping the tyranny of distance in a boundary-less, multi-domain environment."***

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In the News

From the Tactical Data Link (TDL) & Related Defence Industry

A digest of news and website updates since the last issue of TDL Technology

Systematic Develops Variable Message Format (VMF) Gateway for SitaWare Headquarters

Date: 27 November 2018

Systematic has developed a new VMF gateway for its SitaWare Headquarters C2 software.

For the full original article, see:
https://bit.ly/2EWyi1N

Engility to Deliver Engineering and Integration Services to USAF

Date: 27 November 2018

The US Air Force (USAF) has awarded a contract for remote sensing systems engineering and integration services to Engility Holdings. This builds upon the work that has been carried out by Engility on the Space Based Infrared System (SBIRS) programme since 2010.

For the full original article, see:
https://bit.ly/2Jcg95j

Slovakia to Purchase 14 F-16V Fighters to Replace its Ageing MiG-29 Jets

Date: 03 December 2018

Ministry of Defence of Slovak Republic (MoD) is moving on with plans to equip its force with the latest and most advanced 4th generation fighter to replace its ageing MiG-29 jets. According to an MoD statement, this covers the procurement of 14 U.S. F-16V aircraft, aerial munitions, logistics support, and flying and ground personnel training. It is expected that they will be delivered by the end of 2023.

The Lockheed Martin F-16V is the latest and most advanced F-16 on the market today. The core of the F-16V configuration is an Active Electronically Scanned Array (AESA) radar, a modern Commercial Off-The-Shelf (COTS)-based avionics subsystem, a large-format, high-resolution display; and a high-volume, high-speed data bus. Operational capabilities are enhanced through a Link 16 Theatre Data Link, Sniper Advanced Targeting Pod, advanced weapons, precision Global Positioning System (GPS) navigation, and the Automatic Ground Collision Avoidance System (Auto GCAS).

For the full original article, see:
https://bit.ly/2UGXcJ6

Bittium Corporation's Tactical Backbone Network as Part of the New Austrian Defence Forces' Tactical Communications System

Date: 10 December 2018

Bittium's tactical backbone network has been selected by the Austrian defence force as part of its new tactical communication system.

For the full original article, see:
https://bit.ly/2O4UJ9e

Thailand's Military is Working to Further Link Major Weapon Systems

Date: 11 December 2018

The Royal Thai Air Force's Wing 7, located at Surat Thani Air Force Base, is known for being the home of Thailand's 11 Gripen fighter jets, but its squadron commanders and pilots say the Thai military's indigenous network, called Link T, is just as critical to the wing's future.

Link T, a tactical data link manufactured by Saab and managed by Thailand, makes it possible for Wing 7's Gripens and its two Saab 340 airborne early warning aircraft to share a common battlespace picture.

For the full original article, see:
https://bit.ly/2TerXE2

Finnish Defence Forces to use Bittium Tactical Radios

Date: 15 December 2018

Bittium Wireless and Finnish Defence Forces Logistics Command have signed an Agreement on the purchase of Bittium Tough SDR handheld and vehicle radios, and their related accessories.

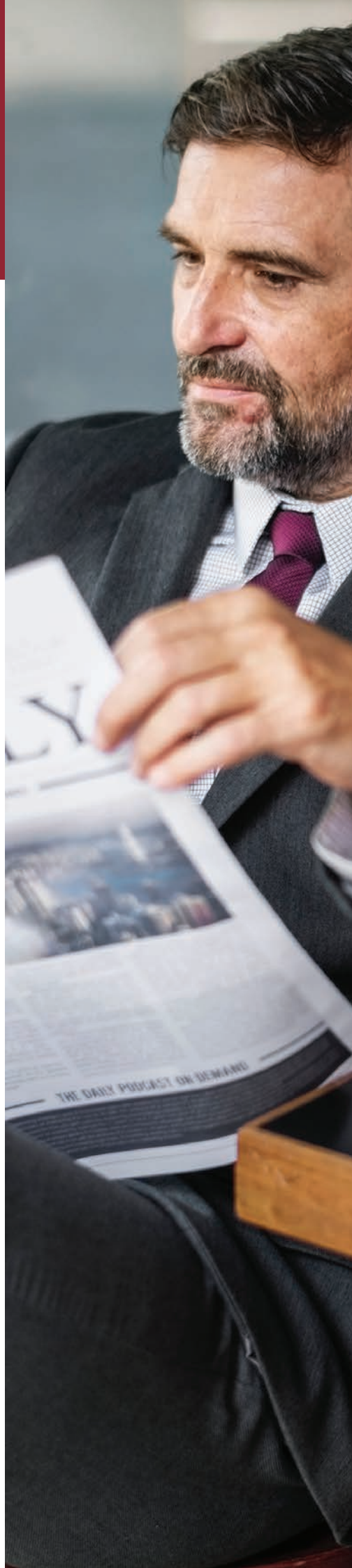
For the full original article, see:
https://bit.ly/2TNSgoL

South Korea Approves Plan to Develop Homegrown Aegis Destroyer

Date: 26 December 2018

South Korea on Wednesday approved a basic plan to develop a homegrown Aegis-equipped destroyer that will enhance the Navy's capabilities to defend greater maritime interests, Seoul's arms procurement agency said.

For the full original article, see:
https://bit.ly/2T2rULh



U.S. Army to Upgrade Additional 174 Abrams Main Battle Tanks

Date: 08 January 2019

General Dynamics Land Systems announced Tuesday that the U.S. Army has signed a delivery order to upgrade an additional 174 M1A1 Abrams Main Battle Tanks to the state-of-the-art M1A2 System Enhancement Package Version 3 (SEPv3) configuration.

This configuration includes technological advancements in communications, integrating Joint Tactical Radio System (JTRS) handheld, man-pack, and small form fit radio to ensure network readiness and interoperation with future Brigade Combat Teams (BCTs).

For the full original article, see: https://bit.ly/2QYueSu

Extending the Wireshark Network Protocol Analyser to Decode Link 16 Tactical Data Link Messages

Date: 15 January 2019

A tactical data link message dissector has been developed for the Wireshark network protocol analyser. These extensions provide simulation engineers with a tool to troubleshoot Link 16 simulations.

For the full original article, see: https://bit.ly/2VYqnYG

Saab Signs Support Contract for Land-Based Radars with UK

Date: 18 January 2019

Saab has signed a contract with the UK Ministry of Defence for support and services related to the land-based Giraffe AMB radar systems. The contract period runs from 2019 to 2024.

For the full original article, see: https://bit.ly/2TwhVmz

Tactical Data Link with Cognitive Anti-Jamming Capability and its Simulator

Date: 28 January 2019

In this paper, we design a simulator using Matlab / Simulink that evaluates the anti-jamming capability of a Tactical Data Link (TDL) system, called Link-16. We analyse the Bit-Error-Rate (BER) performance of the Link-16 simulator over partial-band noise jamming. Especially, we consider a TDL system with the cognitive anti-jamming capability that senses the jamming signal and opportunistically avoids the jamming spectrum.

Using that simulator, we verify that the presented TDL system with cognitive anti-jamming capability improves BER performance compared to existing TDL system over jamming environments.

For the full original article, see: https://bit.ly/2u1MWjc

Navy Asks Thales to Provide Radio Frequency (RF) and Microwave Power Amplifiers for AN/USC-61(C) Shipboard Communications

Date: 28 January 2019

Officials of the Space and Naval Warfare Systems Command (SPAWAR) in San Diego are asking Thales Defence and Security Inc. in Clarksburg, Md., to continue building and delivering High Frequency Distribution Amplifier Group (HF-DAG) system components and engineering services.

The HF-DAG supports automated communications in a wide band of frequency spectra that supports transmit and receive communications modes like duplex/simplex voice, Continuous-Wave (CW), teletype, digital exchange, Amplitude Modulation (AM) and Link 11 HF networking.

For the full original article, see: https://bit.ly/2G0edKE

Lockheed's Blockbusters

Date: 12 February 2019

Lockheed Martin has received a $1.12 billion contract from the US Government to produce 16 new advanced F-16 Block 70 fighters for the Royal Bahraini Air Force (RBAF).

For the full original article, see: https://bit.ly/2u5wDSA

L3 to Provide Equipment, Support Services for Navy's Tactical Data Link Terminal System

Date: 15 February 2019

L3 Technologies has received a $29.6M delivery that covers equipment, program management, integration and fitting services for the military branch's Tactical Common Data Link Maritime Shipboard Terminal Surface Terminal Equipment system.
For the full original article, see: https://bit.ly/2XVP8Xa

Lockheed Martin Offers India Enhanced F-16 Block 70 Multirole Combat Aircraft Dubbed "F-21"

Date: 20 February 2019

Lockheed Martin has just unveiled the new jet the giant U.S. defence company is offering India in response to the Indian Air Force's RFI (Request For Information) for 110 fighters, worth over 15B USD. The aircraft would be built locally in partnership with India's Tata Advanced Systems.

For the full original article, see: https://bit.ly/2EXrDEt

Navy Retooling Fire Scout Program to Focus on More Complex Warfare Missions

Date: 20 February 2019

The Navy is rethinking how it will employ its emerging MQ-8C Fire Scout rotary-wing unmanned vehicles to help Littoral Combat Ships take on tougher targets in a new age of great power competition. Nothing specific has been said about the future systems planned for the MQ-8C but in 2017 Fire Scout builder Northrop Grumman said the company was looking at integrating the Leonardo Osprey 30 Active Electronically Scanned Array (AESA) and a Link 16 datalink for the C variant.
For the full original article, see: https://bit.ly/2Hjew3S

Continuous Development of Polish Automated C2 Systems for Military Operations

Date: 01 March 2019

TELDAT company from Bydgoszcz continues to develop its flagship product called Network Centric Data Communication Platform JASMINE.

JASMINE is a unique large collection of unified / fully consistent military software solutions. It has the highest number of implemented interoperability standards (e.g.: MIP DEM B2/3/3.1/4, NFFI, ADatP-3, ADatP-37, Link 16, Link 11B, APP-6A/B/C, NVG, OTH-GOLD, VMF, WMS and HLA). This guarantees effective integration of other national and allied C2 class systems, reconnaissance, combat targeting (including Air Defence) as well as training and simulation of combat operations.

For the full original article, see: https://bit.ly/2Jk361A

New Life for the B-52

Date: 02 March 2019

The U.S. Air Force is planning to keep its fleet of 76 Boeing B-52H Stratofortress bombers in service until at least 2050, when the youngest aircraft will be 88 years old. To facilitate this, the venerable "Buff" is undergoing a series of upgrades. These include the Combat Network Communication Technology (CONECT) upgrade that added digital display screens, computer network servers, and real-time beyond-line-of-sight communication links. Link 16 will be integrated from 2020.

For the full original article, see: https://bit.ly/2EpMdx4

Demystifying Tactical Data Links

TDL Standards

Digital tactical communications, their associated technologies and their application are as deep and complex as they are diverse. Few, if any, of us understand them in their entirety. This is the second in a series of articles that aims to cast light on the entire range of technologies and applications, providing an insight into some of those areas that we often gloss over.

Following our first article, which introduced digital tactical communication systems, we now become more specific by discussing that class of tactical communications systems referred to as Tactical Data Links (TDLs) and the standards that define them and their operation. These standards define how the TDL works, the structure and content of messages, operating procedures for each TDL and operating procedures for systems using particular TDLs. The technical specification documents are normally North Atlantic Treaty Organization (NATO) Standardisation Agreements (STANAGs) or United States (US) Military Standards (MIL-STDs). TDL STANAGs are in the process of being rebadged as Allied TDL Publications (ATDLPs). The term ATDLP is used in the rest of this article, although some TDL standards have not yet been converted to ATDLPs. Operating procedures are defined in NATO document ATDLP-7.33 and the US Joint Multi-TDL Operating Procedures (JMTOP).

ATDLPs

These documents are intended to "enhance NATO's operational effectiveness and efficiency" by ensuring that TDLs built for and operated by any NATO force are compatible, interoperable, and interchangeable. In practice despite the best efforts and intentions of the countries involved, it is rare for these aims to be realised.

The documents themselves are not always complete, consistent, and unambiguous. Even when they are, requirements may even be overridden during implementation due to cost limitations or the need to support national industries.

MIL-STDs

MIL-STDs are the United States' equivalent to NATO ATDLPs. As most TDLs were originally built to US specifications, the MIL-STD is usually the original document. Where NATO has then determined a similar requirement, an ATDLP has been produced. As a general rule, US systems are specified to MIL-STDs, whereas NATO systems are specified to ATDLPs. While both documents are generally alike, there are some differences that may give rise to interoperability issues.

ATDLP-7.33 and US JMTOP

These documents define operational procedures that should be used for each TDL to standardise actions to be taken by TDL operating units and commanders.

For example:

- Establishing and terminating TDL operations.
- Entry into, and exit from, operating TDL structures.
- Altering the structure of an operating TDL.
- Operation of associated voice coordination circuits.

In addition, ATDLP-7.33 provides information about how to plan Multi-TDL networks and other information, such as the level of Implementation of TDL-equipped units and definitions of terms and codewords (including net control codewords) applicable to each TDL.

Standard

In the context of this article, we are referring to technical standards. The technical standard is "an established norm or requirement regarding technical systems. It is usually a formal document that establishes uniform engineering or technical criteria, methods, processes and practices."

The types of technical standards referred to in this article are:

- Standard specification: an explicit set of requirements for an item, material, component, system, or service.
- Standard practice or procedure: a set of instructions for performing operations or functions (e.g. standard operating procedures).

From Wikipedia.

STANAG

In NATO, a STANdardisation AGreement (STANAG) defines processes, procedures, terms, and conditions for common military or technical procedures or equipment between the member countries of the alliance.

Formerly, all the ATDLPs were referred to as STANAGs with their own unique number.

From Wikipedia.

Interoperability

The ability to act together coherently, effectively, and efficiently to achieve Allied tactical, operational and strategic objectives.

From the NATO Glossary of Terms and Definitions (AAP-06 Edition 2018).

Operational Tasking (OPTASK) Link

In addition to the above documents, there is a range of operational documents that either expand on procedures within the ATDLP-7.33 and US JMTOP, define TDL procedures that are system-specific, or that give details of procedures for TDL tasking. Of these, the most significant is the NATO OPTASK Link. The OPTASK Link is a long and detailed NATO message (also used by the US Navy and US Air Force) that covers all TDLs and is published by a commander to task units with TDL operations. It is a set of instructions to all units that are tasked to take part in TDL operations during a particular exercise, operation, or over a stated period of operations. The only problem with the OPTASK Link is that the US Army does not tend to use it - they prefer to use a communications annex to their Operations Orders.

TDL Standards & Responsibility

Within NATO, the organisation responsible for the development, maintenance, and configuration management of NATO Procedural Interoperability Standards (NPIS) for NATO TDL is the TDL Capability Team (CaT). The TDL CaT is a multi-national working group with representatives from NATO nations.

The TDL CaT is responsible for the standards shown in the table on the right. *(Latest versions shown.)*

Policy and instructions for tactical data link standardisation and interoperability in the United States are set out in the Chairman of the Joint Chiefs of Staff Instruction (Ref. CJCSI 6610.01E) dated 10 April 2014.

This instruction cites the standards in the table below.

TDL	Associated Publications
Link 4A	MIL-STD-6004
Link 11/11B	MIL-STD-6011
Link 16	MIL-STD-6016 and STANAG 5516 [now ATDLP-5.16]
Link 16 Terminal (MIDS)	STANAG 4175 [now ATDLP-1.75] - no US MIL-STD equivalent
VMF	MIL-STD-6017
IBS CMF	MIL-STD-6018
JREAP	MIL-STD-3011 and STANAG 5518 [now ATDLP-5.18]
Link 22	STANAG 5522 [now ATDLP-5.22] - no US MIL-STD equivalent
TDL Data Forwarding	MIL-STD-6020
MADL	Technical Interface Design Plan / Test Edition (TIDP/TE) in development
CoT	TIDP/TE in development

Standard Title	Publication Number
Interface Control Definition for the International Exchange of MIDS/JTIDS Network (NETMAN T/1)	ATDLP-7.03(A)(1)
NATO Improved Link Eleven (NILE) - Link 22	ATDLP-5.22(B)
Multi-Link Standard Operating Procedures for Tactical Data Systems Employing Link 11, Link 11B, Link 16, IJMS, Link 22 and JREAP	ATDLP-7.33(A)(1)
NATO Bit-Oriented Message (BOM) Tactical Data Exchange - Link 16	ATDLP-5.16(B)
NATO Implementation Codes and Rules (NICR T/1)	ATDLP-7.02(A)(1)
NATO Qualification Levels for Tactical Data Link Personnel	STANAG 5555 Ed 1
NATO TDL Implementation Plan (NTDLIP T/1)	NTDLIP Rev.3
Standard for Joint Range Extension Application Protocol (JREAP)	ATDLP-5.18(B)
Standard Interface for Multiple Platform Link Evaluation (SIMPLE)	ATDLP-6.02 Edition A
Standard Operating Procedures for Link 1	ATDLP-7.31(A)(1)
Standard Operating Procedures for the Ship-Shore-Ship Buffer (SSSB) and the CRC-SAM Interface - VOL I & II	ATDLP-7.12(A)(1)
Standards for Data Forwarding between Tactical Data Systems	STANAG 5616 Ed 7
Standards for Interface of Data Links 1, 11, and 11B Through a Buffer	ATDLP-6.01 Edition A
Tactical Data Exchange - Link 1 (Point-to-Point)	ATDLP-5.01 Edition A
Tactical Data Exchange - Link 11/11B	ATDLP-5.11(B)
Technical Characteristics of the Multifunctional Information Distribution System (MIDS) - VOL I & VOL II	ATDLP-1.75 Edition A
xTDL Framework Document [for Representation of TDL in eXtensible Markup Language (XML)]	ATDLP-7.04(A)(1)

From https://nhqc3s.hq.nato.int under 'NISPViewer'

CRC = Control & Reporting Centre

SAM = Surface to Air Missile

JTIDS/MIDS = Joint Tactical Information Distribution System/ Multifunctional Information Distribution System

VMF = Varable Message Format

IBS = Integrated Broadcast Service

CMF = Common Message Format

JREAP = Joint Range Extension Application Protocol

MADL = Multifunction Advanced Data Link

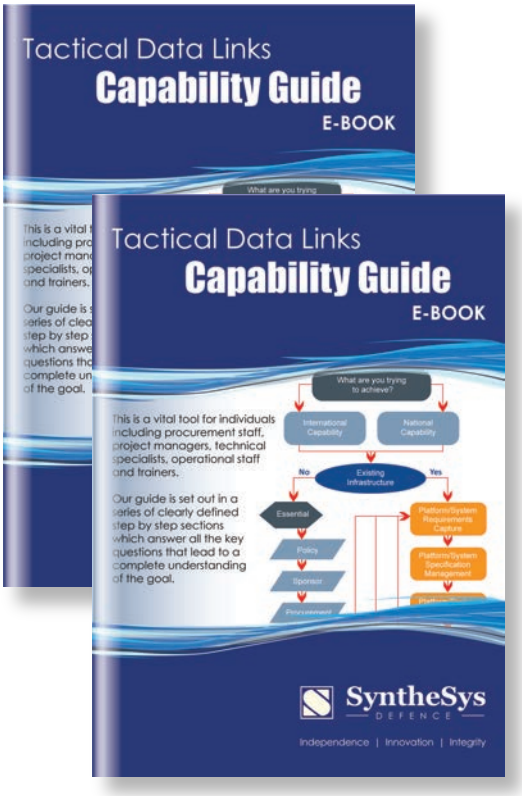
TIDP/TE = Technical Interface Design Plan/Test Edition

CoT = Cursor on Target

Free Resource

This free resource is a pragmatic guide to choosing a TDL capability

As experience shows, getting the right TDL capability is a harder task than may be first imagined. There are so many variables to take into account. Consequently, our guide is set out in a series of clearly defined step by step sections which answer all the key questions that lead to a complete understanding of the goal.



The five sections in which you insert your own answers or obtain the relevant information are as follows:

- **STEP 1: What are you trying to achieve?**
- **STEP 2: Do you have an existing national TDL infrastructure capable of supporting your answer at Step 1?**
- **STEP 3: Deciding what capability you want and how to specify it**
- **STEP 4: Purchasing and testing your capability**
- **STEP 5: Maintaining your capability**

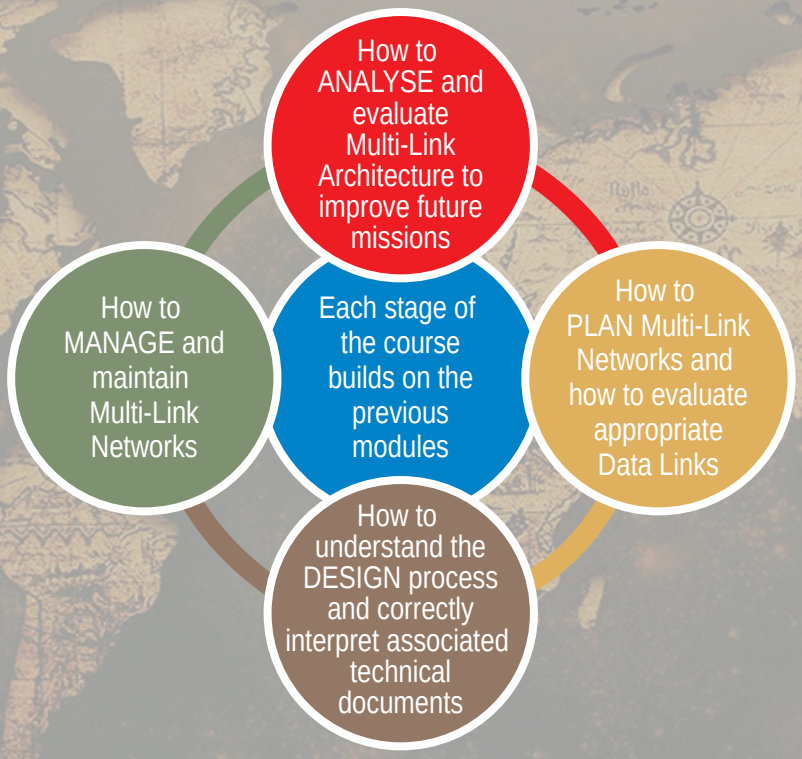
This is a vital tool for individuals including procurement staff, project managers, technical specialists, operational staff and trainers. It could not be easier to access.

Just go to our Defence Community Portal by visiting: http://www.tdl-technology.com/community-portal to read or download the entire feature article. We are confident that you will find this is an essential resource to print off and keep handy in any desk drawer or file.

Data Link Manager / Interface Control Officer (DLM / ICO) Training Course

10 - 28 June 2019 | Halmstad | Sweden | Booking Now Open

The DLM / ICO Course is designed to provide working knowledge to personnel whose role is to plan, build, manage, interact, develop and engage in Multi-Tactical Data Link (TDL) Architectures and operations.



At the request of the Swedish Joint Data Link Operations Cell (JDLOC), SyntheSys will be delivering a further 15-day DLM / ICO Course, which is now available for students to book and attend.

The course provides students with an in depth understanding of TDL systems, operations and the roles and responsibilities of a DLM / ICO.

To book: **http://www.synthesys-defence.co.uk/tdl-ico-june-2019/**

Meet Us At

SyntheSys staff will be attending various industry events during 2019

Date	Event	Location	Further Information
28 March	Defence, Procurement, Research, Technology and Exportability 2019 (DPRTE 2019)	Farnborough United Kingdom	UK's leading defence procurement and supply chain event.
1-4 April	22nd NATO Tactical Data Link Symposium (NTDLS)	Calpe, Spain	For NATO and partner nations to discuss general concepts on NATO TDLs.
13-15 May	Tactical Communication Forum 2019 (TCF 2019)	Salzburg, Austria	One of the only events globally which provides members of the entire Tactical Communications community with a unique and productive environment for discussion.
4-6 June	Diginext TDL&S Symposium	Aix-en-Provence, France	11th Edition of the TDL&S Symposium which is the annual opportunity to share and learn with the Tactical Data Links & Simulation community as well as to influence our products developmental road map with the User Group.

Training Schedule 2019

March 2019	• Multifunctional Information Distribution System (MIDS) Link 16 • Joint Range Extension Application Protocol (JREAP)
May 2019	• Variable Message Format (VMF)
June 2019	• Data Link Manager / Interface Control Officer (DLM / ICO)
July 2019	• MIDS Link 16 • Joint Range Extension Application Protocol (JREAP)
Aug/Sept 2019	• Data Link Manager / Interface Control Officer (DLM / ICO) • Link 22
October 2019	• Variable Message Format (VMF)
November 2019	• Joint Range Extension Application Protocol (JREAP)

We take a flexible approach to delivering our training.
All of our courses can be held at customer premises globally, as required.
We tailor our training according to customers' needs and abilities.

www.synthesys-defence.co.uk