

# TDL Technology

Published by SyntheSys for the Tactical Data Links Community

Special Edition  
November 2015



**Interoperability Assurance with  
Swedish Defence Material  
Administration**

*Sweden participates in its first  
TDL CaT ITS test event  
Page 8*

**Standards Conformance  
Testing**

*Application to VMF  
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**Free TDL Manual for Every  
Reader**

*An 'Introduction to TDLs'  
Page 14*

# 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 project managers, as well as engineering and operational professionals how to get the most out of being involved in the Test Syndicate.



### You will learn:

✓  
Background to TDL CaT ITS

✓  
Details of Rig-Based Testing

✓  
An understanding of the TDLIOT Schedule

✓  
How you can maximise your participation



# Letter from the MD

## Editorial

**Editor:**  
Sarah Thomas

**Copy Editor:**  
Penny Morgan

**Contributors:**  
John Hartas, Tony Castle,  
Paul Czajkowski, Mark Hudspeth,  
Mark Williamson, David Clarke,  
Michael Morgan, Michele Sutcliffe

**Head of Business Development:**  
John Miller

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November 2015: Special Edition

## Letter

Dear colleagues and customers

Greetings and a warm welcome to our special  
edition issue of TDL Technology.

We are very pleased to offer this industry  
magazine that presents a collection of articles  
about all aspects of Tactical Data Link implementation, integration, and  
management. We hope that you, our colleagues and customers  
throughout the TDL community, will find it both interesting and useful.

For those of you who don't know SyntheSys, we provide services to government  
and industry about the design, testing, delivery and maintenance of information  
systems. One of our key areas of specialisation is military tactical communication  
systems.

SyntheSys is a tele-working company that has been operating from our head office  
in the UK since 1991. Our recent successes include the Multi-Link Test Facility,  
which we use to support international tests such as the those involving the Swedish  
ASC890 aircraft (described on Page 8) and the UK interoperability trials  
programme for the F35 Lightning Joint Strike Fighter.

I'm also pleased to report that we are enjoying success with our SPIRIT (System  
Process for Interoperability Requirements and Implementation Testing) process and  
toolset, which is now in use in several countries around the world.

We are continuing to expand our work outside defence where our systems  
engineering training is enjoying particular success. Our training clients now include  
professional UK engineering institutions and leading international motor  
manufacturers. We have also launched CloudbaSE – a comprehensive suite of  
software to support the systems engineering process that is accessed through the  
Cloud and can be rented on a monthly basis.

Finally, I welcome any feedback that you may have on our magazine, what we've  
done well, what we could do better, and what type of articles you would like to see.  
Please do not hesitate to contact me at [info@synthesys.co.uk](mailto:info@synthesys.co.uk).

Very best regards

*John S. Hartas*



**Dr J S Hartas Managing Director**

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A must-read for those new to the world of TDLs or those wanting the essential basics all in one place





# SyntheSys News

## SyntheSys' Cogs Turn in a Different Direction with Successful Delivery of Training to Mechanical Engineers

An ongoing commitment to diversification during 2014 has given SyntheSys the capability to successfully deliver our 'Introduction to Systems Engineering' Training Course on behalf of the Institute of Mechanical Engineers (IMechE). We are delighted to be supporting the bi-annual delivery of the course which is aimed at both new and established systems engineers alike.

This unique foundation level course combines practical experience with the International Council on Systems Engineering (INCOSE) SE Handbook material, to inform students of the fundamentals and processes of Systems Engineering. Students from a range of different

organisations benefit from practical exercises and tutorials, thus gaining an understanding of key themes from general systems engineering principles through to Test and Acceptance procedures.

*"We are pleased to be working with such a prestigious organisation to deliver, what we feel, is a truly value added training solution. Feedback from the course we have delivered thus far has been encouraging and we are happy to be building relationships in what is, for us, a different avenue from our traditional military market"*

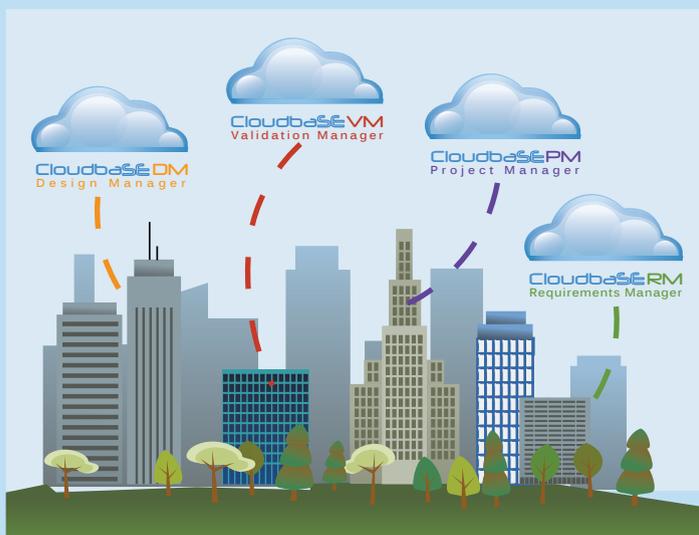
- commented Mark Williamson, SyntheSys' INCOSE Practitioner and course tutor.

Our capability does not end there, we also offer Associate Systems Engineering Professional (ASEP) and Certified Systems Engineering Professional (CSEP) certification preparation courses which are based on the INCOSE Systems Engineering handbook. Our course material is always relevant to the most current published version of the INCOSE Systems Engineering Handbook, in this case V3.2.2. Version 4 course material to be published early 2016.

**“ A GOOD INTRODUCTION TO SYSTEMS ENGINEERING. WELL PRESENTED AND RELEVANT ”**

Paul Vosper, Ministry of Defence  
April 2015

## CloudbaSE - Expanding our Cloud Footprint



SyntheSys now offers CloudbaSE, our Software-as-a-Service licensing toolset for IBM Rational Software.

This new release marks a change for us in terms of delivery mechanisms we can now offer our customers.

The CloudbaSE portfolio boasts 4 core products: CloudbaSE Requirements Manager, CloudbaSE Design Manager, CloudbaSE Validation Manager and CloudbaSE Project Manager.

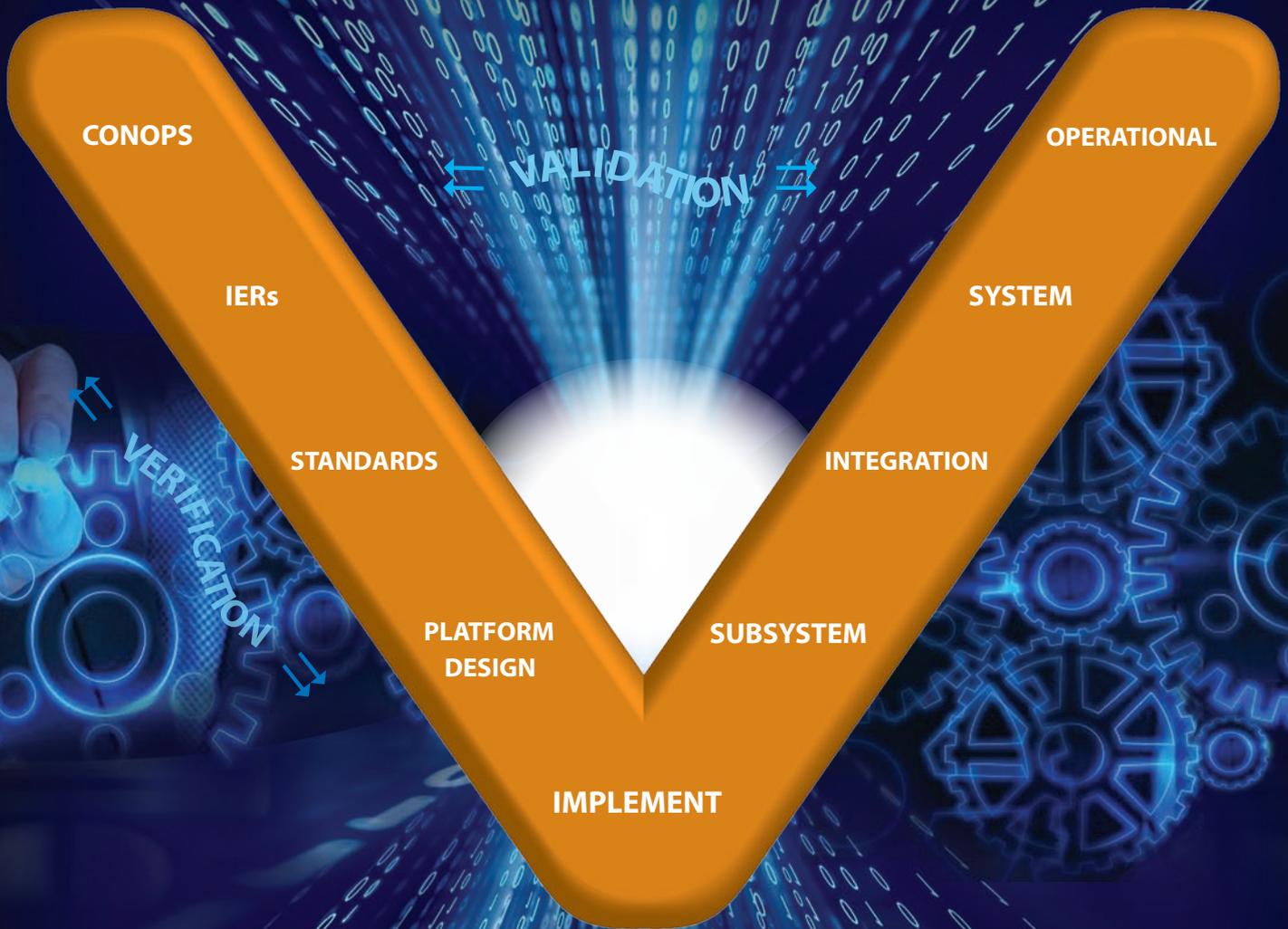
CloudbaSE utilises the flexibility and versatility of Cloud computing to provide IBM Rational software in a more economical, adaptable way with no upfront costs or minimum license term. The mix of powerful IBM software, flexible licensing options and extensive experience, offers powerful solutions to everyday challenges faced by many Systems & Software Engineers, Developers and Testing professionals.

The CloudbaSE portfolio enhances communication and collaboration within the Systems & Software Engineering Lifecycle which offers more ways for companies and their employees to leverage technology, from managing requirements to highlighting quality issues.

For more information visit: [www.cloudbase.eu.com](http://www.cloudbase.eu.com)

# Interoperability just got interesting...

Introducing **SPiRiT**, the SyntheSys centralised solution for Interoperability Requirements & Implementation Testing



Achievement of interoperability requires a structured approach, a clear expression of information exchange requirements, auditable compliance to requirements standards and through-life support. We achieve this across the entire range of TDL testing through our SPIRiT process.



Dynamic  
UML  
Modelling

Full  
Lifecycle  
Coverage

Platform  
Specification



# TDL IO Assurance

***In this article, we take a light-hearted look at Tactical Data Link (TDL) Interoperability (IO) assurance challenges by using simple analogies, and conclude with a seven-point guide as to how those challenges can be met.***

## What is Interoperability Assurance?

TDLs provide real-time communications that enable coordinated action by platforms and people in response to changes in the operational environment. They are effective only if information is transferred in a timely manner without loss of meaning, only if the communications are *interoperable*. The process of ensuring that TDLs are interoperable is referred to as *interoperability assurance*.

## The Military System-of-Systems

A good working definition of a system-of-systems for immediate purposes is that a system-of-systems is a *collection of systems interacting together in which the individual systems are autonomous in both function and lifecycle*. By this definition, the military enterprise is a system-of-systems in which the individual systems can be people, equipment, units, or forces, which are referred to here, generically, as *force elements*.

## Coordinating the Military Enterprise

If individual force elements are autonomous in function, how can they be coordinated to enable the overall military enterprise achieve its objectives?

One method of coordination is by scripting, the obvious example of which is a theatrical play. By the definition above, the play and its actors, associated props and equipment can be considered to be a system-of-systems. The play achieves its objectives of delivering entertainment to the audience by working to a script.

But the script would soon break down if, for example, a member of the audience jumped onto the stage with the deliberate intent of disrupting the performance. Of course, this scenario is much more like the military situation in which an adversary deliberately tries to disrupt your operations.

Another method of coordination is through timely communications that enable coordinated reactions to unplanned events as they happen. In the case of the play, the actors could shout warnings and coordinate actions with the aim of ejecting the intruder from the stage and allowing the performance to continue. In practice, the military enterprise coordinates using both methods. The scripting comes about through training and planning, and real-time

communications come about through a range of mechanisms from simply talking, to the use of sophisticated electronic communications such as TDLs.

## Effective Coordination

A theatrical play can only be effective when the actors perform to exactly the same script. If the actors had learned their lines from differing scripts, even small changes would confuse and disrupt the performance. In the military context, harmonising the script equates to harmonising the planning and training.

What if the actors are of different nationalities that do not understand each others' language? They can still work to a common script. After all, many children can recite the song 'Alouette' without knowing what it means. However, it is more difficult to envisage apprehension of the intruder if the members of our multi-national cast shouted the equivalents of "Watch out!" or "Get him!" in their own language. The point here is that, if the coordinated action is to be effective, not only must the plans and training be harmonised, so must the message standards that are the basis of the communication.

## Harmonisation of Communications

Returning now to the real-world military enterprise, how do we harmonise the communications systems? A large part of the answer is through the common adoption of standards, an approach sometimes referred to as *standards-based interoperability*. If all force elements adopt the same standards, then all force elements should be able to communicate with each other in a timely manner without loss of meaning.

Of course, this is true only if the standards used are complete, consistent, and correct. Unfortunately, in the TDL world this is not always true because:

- the standards are evolving;
- the standards are implemented by different people who interpret them differently;
- platforms diverge from the standards in stove-piped acquisition approaches;
- platforms implement different versions of the standard at different points in time;
- there is not always a real incentive for industry to get things perfectly right: governments pay money to correct inconsistencies in standards and to correct system implementations that cannot interoperate.

The real-world problems and complexities of TDL interoperability assurance can be reduced by applying the seven simple principles shown to the right. - *John Hartas*

## Seven Steps to TDL Interoperability

### 1. Define the Interoperability Vision:

Effective TDL interoperation depends on the establishment and maintenance of an *Interoperability Vision* that defines a coherent set of concepts, policies, and standards that are applied to all force elements in the operating community.

### 2. Computerise:

The documentation that defines the Interoperability Vision is best developed, maintained, and applied under appropriate governance through the application of tools that ensure self-consistency, traceability, and effective application of the vision across all force elements in the operating community.

### 3. Comply:

Force element specifications should comply with the parent standard without deviation for all the functions required to be supported.

### 4. Validate:

Interoperability of force elements should be validated against the Interoperability Vision, not the standards that they were built against.

### 5. Contract:

Avoid the excessive costs and risks caused by retrospective testing and re-work by incorporating standard interoperability test cases into the contract for procurement of a force element.

### 6. Consolidate:

All engineering documentation (e.g. requirements documentation, test cases, test results) for all force elements should be maintained in a single, consolidated database to enable traceability between different levels of requirements and their associated test documentation and data.

### 7. Sustain:

During the in-service phase, a force-element's interoperability should be assessed against the Interoperability Vision on each occasion that the vision is upgraded so as to identify any new differences that may have been introduced.



**SPIRIT is a low-cost, low-risk approach to IO assurance**





# SyntheSys Adds Value to Swedish Defence Material Administration (FMV) with Test Support

The Swedish Defence Material Administration, Försvarets Materielverk (FMV) is constantly investigating different ways to exploit existing products as well as developing new, innovative solutions. FMV has a collaborative approach to its projects which has given SyntheSys the opportunity to support various test programmes.

An initial collaboration saw SyntheSys represent FMV at the Tactical Data Link Capability Team Interoperability Test Syndicate (TDL CaT ITS) with a view to test participation of their Airborne Surveillance and Control (ASC) 890 platform. As part of the TDL CaT ITS rules, a platform should generally participate passively initially, i.e. without transmitting any data on the test network. Upon second participation, they are usually semi-active, transmitting own unit information only. It is only on the third participation that the platform can be fully active and be fully integrated into the test.

As Sweden is not a member of the North Atlantic Treaty Organisation (NATO), the ASC890 had to participate in a Partner Tactical Data Link Interoperability (IO) Test (PTDLIOT).

Since these tests occur only once every two years, FMV would get no real value from their test participation for several years.

Another consideration was that Sweden does not have a representative system rig available at their chosen test site, and therefore needed to use a real operational aircraft to perform the testing. Aircraft are high value assets and, as such, are very difficult to tie up for test events.

SyntheSys approached the FMV representatives with a proposal to enable the ASC890 aircraft to participate in its first PTDLIOT in a fully active capacity.

The first task involved a derisking test between the ASC890 and the UK's Sentry E-3D, evidence of which was passed to the TDL CaT ITS forum in support of a request for permission to participate actively on first joining the tests.

SyntheSys was tasked by the Swedish FMV to organise the test between Sweden and the UK, to provide the detailed test plans and associated test procedures, to act as Test Director and to report on the test conduct.

**Mark Hudspeth, the SyntheSys lead for the ASC890 support, commented:**

***“The ASC890 team of engineers and operators were highly focused and extremely professional, it was great to be part of their team for the TDL CaT ITS test event.***

***Not only did they identify interoperability issues with their own platform, they also contributed actively to what was a highly successful first event for FMV.”***

The test was successfully undertaken and the subsequent report provided evidence to the TDL CaT ITS forum that the ASC890 test configuration would not adversely affect the test network. The forum approved the ASC890 to participate actively in the second TDLIOT of 2014 (PTDLIOT 14-02).

Following the forum approval, SyntheSys was further tasked by FMV to provide full platform support to the ASC890 test participation. This involved representing the ASC890 at the TDL CaT ITS planning and analysis sessions, which included briefing on the platform test objectives at the planning session and on the test conduct at the analysis session. SyntheSys personnel acted as Platform Test Director for the duration of the PTDLIOT 14-02 formal event and were also responsible for performing the detailed analysis and for providing the formal observed issues for subsequent discussion and agreement at the analysis meeting.

SyntheSys' involvement in the ASC890 TDL CaT ITS participation was instrumental in ensuring that the ASC890 could join the first test as an active participant allowing them to realise immediately the benefits of testing IO with other nations, saving our customer, the FMV, both time and money achieving its IO goals.

In addition, SyntheSys enabled maximum benefits to be achieved by helping derive focused platform objectives, guidance in following the test process and full technical event support, all contributing to an extremely successful test event for Sweden's first participation in PTDLIOT.



Photo (and opposite page): André Caldenius

SyntheSys lead Mark Hudspeth (second right) and the ASC890 Team

## The SyntheSys

### *Flexible Interoperability Testing Service*

- ✓ Independent
- ✓ Reduces testing costs
- ✓ Increases effectiveness
- ✓ Supports testing in all phases of the lifecycle
- ✓ Delivered for individual activities or as an end-to-end package

**SyntheSys**  
MILITARY SYSTEMS





**SyntheSys Training and Operational Services Manager Tony Castle says: “Tactical Data Links are the backbone for information exchange within a modern battlefield on land, sea and air. This key advantage holds true with all arms of the forces, with the information being exchangeable between all three services.”**

Tony, 58, of Bardney, near Lincoln, has 30 years' experience in the RAF as an Aerospace Systems Manager, bringing 20 years of direct operational knowledge of TDLs to all training course development. Since joining SyntheSys in 2005, he has gained a worldwide reputation

for providing highly informative and pertinent training in many subject areas.

“TDLs are a key enabler in making informed decisions, providing timely and accurate information.” Tony comments that the world of TDLs has been subject to huge development over the past two decades. “So many more countries are now operating TDLs, and the other major development is the shift towards the utilisation of systems employing internet and other network enabling protocols.”

“At present, TDL networks have to be pre-planned which requires knowledge of exactly what type of ships or aeroplanes are taking part. But in moving towards Internet Protocol (IP) type systems, a lot of this pre-planning goes away. It means that for anyone wanting to become part of the TDL network, they won't necessarily have to have been part of the pre-planning, or this process will be minimal. “This will take away the huge infrastructure and make it a far more flexible system.”

“TDLs are currently being used by countries who have more recently joined NATO, with many of these newer NATO nations looking to acquire systems, he said, but now also some of those outside of NATO have joined, including Pakistan and Taiwan.”

“Ongoing Training is vital and we are a world leader in the training of TDL Systems”

Tony says: “Anyone wanting data link training must first have a clear picture of what they want. At SyntheSys, we offer a free service which can help our customers identify exactly this. They also need to know whether they want a theoretical, or theoretical and practical experience. One of our main advantages is that we have an extensive simulation capability, which our competitors do not.”

As an expert trainer, Tony says that it is most satisfying when he knows that his students have understood the sometimes very complex areas covered. “My teaching style is very relaxed. I never wear a suit and try to get away from the stuffy image of a trainer. One of my trademarks with students who are not native English speakers is to speak clearly and not rush. It's very satisfying when students from all backgrounds take in the information.”

“I also try to approach a particular point from different angles. If at first students don't understand, I come at the problem from another direction. I like drawing diagrams; it's an international language and a picture tells a thousand words.”

“It's vitally important to establish a rapport with your students and encourage them to comment and ask questions. Interaction between myself and the class is an essential part of the process.”

# Meet the Trainer

**“Tactical Data Links are a key enabler for passing vital and sensitive data around the battlefield or operational area.” says experienced SyntheSys trainer Paul ‘Ski’ Czajkowski.**

Training Consultant Ski, 43, who lives in Norfolk, is a retired Royal Air Force (RAF) JTIDS/MIDS Network Designer, Manager and Multi-TDL Planner. Ski has 22 years RAF experience having served at stations in the UK and overseas. For the last three years as a civilian, he has delivered many Multi-TDL training courses worldwide to a variety of organisations and nations and has been accredited a UK Civilian Award in Education and Training.

He says: “It's possible to keep aligned with any asset in a theatre of operations regarding what they are doing, or what they are going to do. This is vital in the chain of command's decision making process and makes for more effective decisions as the data is more accurate and up to date.”

Ski says this was illustrated in the recent testing of NATO and UK airspace reaction and detection ability by Tu-95 ‘Bear’ and Tu-160 ‘Blackjack’ Russian bombers and their interception and shadowing by NATO fighter aircraft. Here, timely TDL information data was sent to Combined Air Operations Centre (CAOC) Uedem, the Northern NATO headquarters on the Dutch/German border.

The main difference as opposed to 25 years ago, he explains, is that so much more information is now readily available to the user because of TDLs. The protection of personnel and assets has increased due to the continuous development of TDLs and their employment. “Previously, you would have to send a pilot, a high value asset, potentially into harm's way who could be shot down by a missile or an enemy pilot. But now you can launch a network enabled weapon to do the same job and, if it gets shot down, you can launch another weapon, or take other action.”

“The future for TDLs hinges on the overall assumption that the whole community involved will continue to strive for full interoperability. The utopia of full TDL interoperability is something that should not be looked at with a view of, its never going to happen, but it will happen to the benefit of all. The principle is to progress to get better, defining and implementing a more cohesive way forward, but this is not easy as currently the TDL field is very complicated.”

“But the ideal is to strive for this.”

Ski describes his teaching style as interactive, employing a lot of information presented in an enthusiastic way. “I enjoy teaching and meeting new people, including students from different backgrounds. You can learn from them too.”

“My top tip for anyone looking for TDL training would be for the audience to identify whether



it wants operational or technical training, or a bit of both. But no matter what, it has to be interactive and interesting and that is why we use a simulator to teach whenever possible. Not many people like PowerPoint slide after slide for a whole course, they want to be involved and to use all of their senses to support the learning process. Students continue to tell us that it's the hands-on interaction and the balance of theory and practical that really helps them understand the sometimes complex world of TDLs.”

“This is low cost and beneficial for students to get a real feel for what is going on.” There is no better feeling as an instructor than to hear the words, ‘I get it!’”

# Ask the TDL Expert

## Dynamic Network Management - a Divisive Subject



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**Q:** Should I build DNM into my network and encourage its use?

**A:** *'Dynamic Network Management' or DNM is a concept that some choose to fully support whilst others take more of a luke-warm approach to the idea.*

So what is DNM? Well simply put, it is the ability by a network manager to respond to the changing needs within a Multifunctional Information Distribution System (MIDS) Network through the use of specific Link 16 network management messages. To those that have not experienced MIDS operations, this would seem totally sensible. It immediately provides *flexibility* and, after all, flexibility is a key component of Air Power.

However, so too is *reach* and *ubiquity*, and the network manager for a number of reasons may not be in a position to react to the needs of the network.

Recent operational theatres have provided substantial challenges to a Data Link Manager/Interface Control Officer (DLM/ICO). The ability to respond to the operational environment should be viewed as foremost to a DLM/ICO in achieving their aims. Yet some nations have chosen not to process DNM messages on their platforms.

Consider this; we have an airborne C2 surveillance platform operating in an area with initial sufficient capacity to achieve their normal operational tasking. We also have a DNM system and a highly trained network manager monitoring the network.

Now as the operational scenario develops, the airborne C2 unit needs more capacity, and the network manager, through use of the DNM system, quickly identifies this.

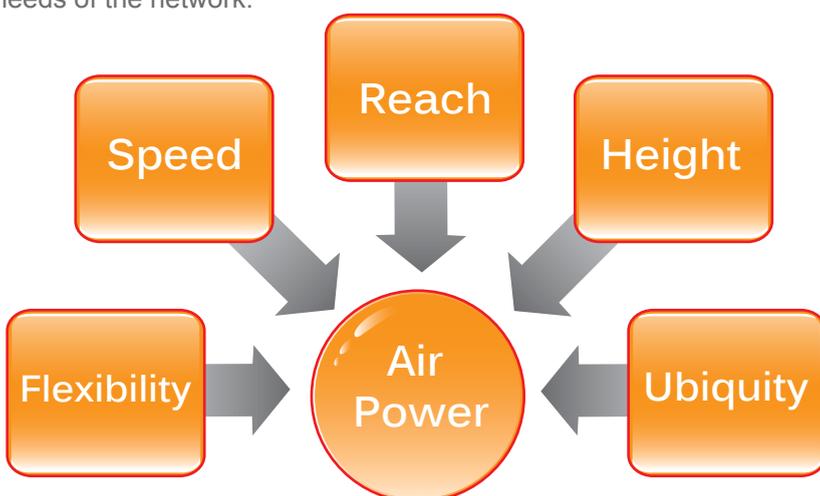
The network manager is then able to act and allocates extra capacity to ensure the airborne C2 continues to both provide, and maintain, full situational awareness.

Nonetheless, the functionality to be able to process those network management messages is in essence, either 'on' or 'off'.

So why is it not always set to 'on'? Does a fear factor exist or do users basically not want someone on the ground manipulating their Time Slot Block data? Worryingly, some nations may invest in a DNM system, only to later discover their platforms are initially set to 'off'.

No matter how much one may endorse its use, DNM cannot always be employed and thus it's not always the answer. But, ultimately, understanding how it works and how it can support the user and sway the doubters is simply down to education. Learning what it can bring to the operational community and how, when and why a network manager would take action, is key.

It was once said, "It is not the strongest of the species that survive, nor the most intelligent, but the one most responsive to change. To remove flexibility cannot benefit anyone other than the enemy."  
- Paul Czajkowski



# SyntheSys Training Services

## The Route to Knowledge



### Tactical Data Links & Related Training

- DLM/ICO
- Link 11, Link 16 & Link 22
- VMF & Combat Net Radio
- JREAP
- SIMPLE (STANAG 5602)

In today's fast paced TDL Environment, knowledge is everything.

Much of our success hinges on how well we can empower our customers via TDL & Related Training - and we achieve that on a daily basis.

Whether you are new to TDLs or an established user, SyntheSys Training Services will cover what you need to know to effectively understand, manage and maximise TDL usage and implementation in your organisation.

### Why Choose Us?

**Access to Unrivalled  
Training Tools**

**Expert  
Trainers**

**Custom Training  
Available**

**5% Discount for  
Military ID Card  
Holders**

Read more about our training tools e.g. the Data Link Training Suite & Qwizdom here: [www.synthesysstraining.co.uk](http://www.synthesysstraining.co.uk)



# Standards Conformance

## Application to VMF

***Variable Message Format (VMF) is a flexible capability that is increasingly being used to provide time critical digital data exchange.***

Unlike existing digital data communication systems in use in both military and civilian environments, VMF has three separate but interdependent elements that are needed to carry data. Each element needs to be addressed from a standards conformance perspective – for both implementation specification and testing, but what does standards conformance testing look like for VMF? In this article we explore how it can be applied effectively.

### Three Key Elements of VMF

The VMF digital data stream has three elements – the data itself, routing and addressing information, and the transportation media. Embedded in each element is a system of protocols and capabilities that determine how the received data is to be interpreted, used and exploited. The composition of the elements can change over time and use as the needs of the participants change. Notwithstanding this, the adherence to internationally agreed standards provides the backbone for successful data exchange and interpretation.

When exploring this, it is useful to look at the foundations of VMF communications and how they are used to exchange digital tactical, logistic, and administrative data, over a variety of media between one or more participants in a point-to-point or networked architecture. Data is contained in variable length packets which conform to an internationally agreed standard. The advantage of VMF over other digital communications systems is the 'variability' of the data stream, the wide choice of media and the advantageous use of bandwidth.

### Robust Baseline and Test Cases

So where does standards conformance testing sit? A rigorous approach to standards conformance testing provides the evidence that systems are truly interoperable without the need for 1-1 testing. The key to successful standards conformance testing is a common set of test cases that fully expose the implementation to the agreed protocols, conventions and structures.

The initial step in developing standards conformance testing, and that underlying the principle behind standards conformance implementation, is to verify that the standards themselves are robust, complete and correct. That is, there is no need for interpretation nor 'guesswork' on the part of the implementer, which often leads to differing but compliant solutions. Indeed, the standard should be viewed as an implementation that encompasses the totality of the capability embedded in the standard. In order to 'validate' the standard, modelling is often useful. Dynamic state modelling can verify the logical paths through the standard, and themselves provide direction for the generation of test cases.

Standards conformance test cases provide the top level structure for standards conformance testing. The test case provides the stimulus, pre-requisites, test steps and expected results. Test cases are aligned with the dynamic model, or static versions which provide a clearer and more easily understood view of the model. The test cases provide the overall coverage of the capability. Implementation testing may only require a percentage of the total coverage to be conducted to provide the necessary assurance of conformance. A system that provides automatic allocation of test cases to implemented capability traces results and provides analysis data aids in the task of verifying conformance.

### Test Tools

The other key component of standards conformance testing is the test tool itself. A common test tool reduces the possibility for claims that the test tool influences the overall testing results.

### Testing of the Three Key Elements

Each of the three elements of VMF need to be addressed from a standards conformance perspective – for both implementation specification and testing. Test cases are required for each element, and each element needs to be subject to both isolated and combined testing.

There is no point testing the actual data elements if the underlying transmission and routing and addressing protocols are non-compliant.

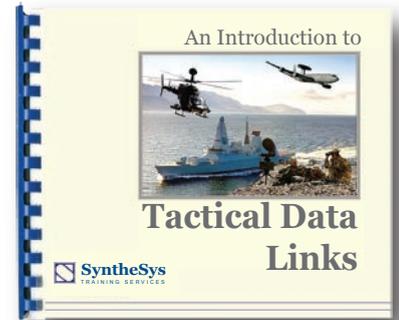
Similarly, the ability to transport data successfully from one participant to another is voided if the data cannot be successfully interpreted.

### Conclusion

Bespoke implementations may be fit for purpose at the time, but hardly survive the test of time as systems and needs evolve, and leave these bespoke systems behind in the race for common understanding through the digital data exchange.

In conclusion, the key to successful data exchange is a common understanding of the content of the data stream. Internationally agreed standards are essential for this common understanding. Adherence to these standards is the driver behind differing systems communicating seamlessly and efficiently. Where systems deviate from the agreed standard, for reasons such as cost or simplicity of implementation, through-life interoperability is at risk.

- David Clarke



# Introduction to TDLs

Download your FREE 'INTRODUCTION TO TDLs' Guide - an essential guide to Tactical Data Links

We are giving away a FREE condensed copy of our Introduction to TDL manual to every reader - worth £20.00

This Foundation level guide introduces some of the basic concepts of Digital Data Links (DDLs) and discusses the values of these techniques to military applications and examines some of the DDLs that have been used by North Atlantic Treaty Organisation (NATO) to support tactical operations during the last few decades.

Although some DDLs have been developed specifically for strategic and other uses, this book focuses on those systems which can be defined as Tactical Data Links (TDLs). Visit: [www.synthesysstraining.co.uk/tdl.html](http://www.synthesysstraining.co.uk/tdl.html).



*A must-read for those new to the world of TDLs or those wanting the essential basics all in one place*

## Meet Us At

Date	Event	Location	Further Information
3-6 November 2015	IDLS 2015	Shaw Centre, Ottawa, Canada	Theme: Enabling Technologies to Increase Modern Warfighting Capabilities
17-18 November 2015	INCOSE UK ASEC 2015	Heythorp Park, Oxfordshire, UK	'Systems Engineering Comes of Age'
4-7 April 2016	19th NTDLs	Calpe, Spain	Published dates of the 2016 event



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# Training Schedule 2016

January 19-21	Introduction to Variable Message Format (VMF)
March 15-17	JTIDS/MIDS Link 16
April 26 & 27	Link 22
May 9-12	Link 16 Network Management & Design
July 6 & 7	Combat Net Radio (CNR)
August 17 & 18	Systems Engineering
September 20-22	JTIDS/MIDS Link 16
October 4 & 5	Link 22
November 15-17	Introduction to Variable Message Format (VMF)

*All the above courses will be held at Branston Hall Hotel, Lincoln, UK.*

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.