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 technical 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.

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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.

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