JREAP vs SIMPLE

What's the Verdict?

Joint Range Extension Application Protocol (JREAP) vs Standard Interface for Multiple Platform Link Evaluation (SIMPLE)

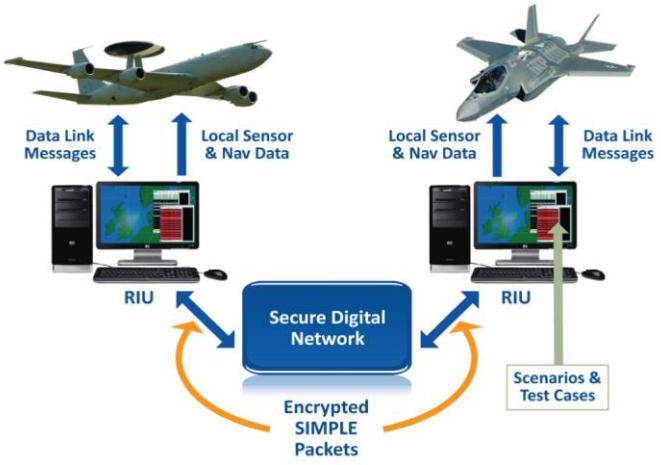
Within the capability streams for distributing Tactical Data Link (TDL) information beyond normal communication limits there exists two military standards: JREAP and SIMPLE.

Military staff have therefore asked the question "Which should I implement that can support operations?".

Both are NATO standards born out of the need to distribute information beyond the typical communication limits and provide a mechanism for linking into TDL systems. JREAP was originally implemented through Military Standard (MIL-STD)-3011 but has now been adopted under NATO cover Allied Tactical Data Link Publication (ATDLP)-5.18 (STANAG 5518) and SIMPLE through ATDLP-6.02 (STANAG 5602).

In short, JREAP is a deployable tactical capability whereas SIMPLE is used in a test environment. However, this article scrutinises the capabilities and implementation of each and provides a comparison of abilities to support front-line operations.

JREAP was developed due to the need to communicate data over long distances, i.e. Beyond Line of Sight (BLOS), without degradation to the message format or content. JREAP takes the message from the format it was originally in and encapsulates it within a JREAP wrapper so that the message can be transmitted over BLOS media and to those platforms not equipped with traditional Link 16 equipment such as Multifunctional Information Distribution Systems (MIDS) terminals. If one was to examine the history of JREAP publications the first MIL-STD-3011 issue is a cut down version of STANAG 5602 Edition 1 with additions to operate over a number of specified communication bearers.



SIMPLE was developed by the Tactical Data Link Capability Team Interoperability Testing Syndicate (TDL CaT ITS) to support a test setting within which geographically dispersed test laboratories can be linked together operating in the same virtual harmonised environment. STANAG 5602 was born out of a Space and Naval Warfare Systems Command (SPAWAR) equipment Interface Specification and adopted for military testing and designed to support multiple TDLs and is easily extensible through its message catalogue. Currently SIMPLE supports Link 11A/B, Link 16, Link 22 and Variable Message Format (VMF). Whereas JREAP provides for transport of: Link 16 Messages to include all message words; X-Series Management Messages, and planned future implementation of VMF; Common Message Format (CMF); Integrated Broadcast Service (IBS) and Link 22. However, it must be stressed that currently this is limited to Link 16 messages only.

JREAP architecture in its simplest and commonly used form, consists of two JREAP nodes connected over an Internet Protocol (IP) path using either Transmission Control Protocol (TCP), or User Datagram Protocol (UDP).

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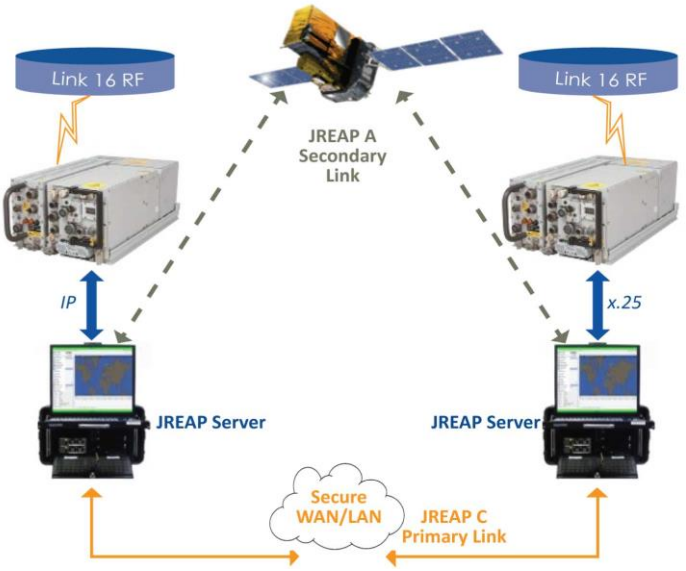
Nonetheless, in many operational scenarios multiple Server/Client connections exist, and all are joined together in a complex network potentially operating over multiple media paths. SIMPLE user nodes are commonly referred to as Rig Interface Units (RIU) which provide a physical connection to the platform under test to the rest of the test network.

However, it must be stressed that the protocols deployed by SIMPLE are not designed to operate in operational warfare as they allow messages to be broadcast with no priority consideration and no concept of network capacity or transmission rules.

SIMPLE networks include architectures that allow either TDL terminals to be emulated or positioned as in-line equipment. Thus, to cater for both architectures there is no concept of network initialisation within SIMPLE and therefore no knowledge of other network users, such as their Joint Tactical Information Distribution System (JTIDS) Units (JUs) Source Track Number (STN), prior to joining the network. If deployed in an operational environment this could allow erroneous transmission of messages across the real network and cause undesirable impacts on message processing.

JREAP is able to manage disparate Link 16 networks by monitoring JUs and transmission of J2.0 Indirect Precise Participant Location and Identification (PPLI) messages, which automatically indicate to a JU on one network that the other unit is not directly contactable without accessing an Interface Unit (IU).



SIMPLE does not recognise the process of Indirect PPLI and therefore replication of Source Track Numbers (STNs) between individual networks may occur, unless very careful planning is conducted.

SIMPLE includes the mechanism of Round Trip Timing (RTT) to calculate the average transmission time from one user on the network to another, thus data can be extrapolated to give more accurate positioning information.

This RTT should not be confused with the Link 16 RTT function which allows terminals to become in Fine Synchronisation with each other. Within JREAP a Common Time Reference (CTR) is negotiated between JREAP nodes to allow for data extrapolation. Extrapolation of data allows the positional information for messages which contain an element of movement, to be updated to a predicted position, allowing for the time taken to deliver that data between the nodes. The JREAP time function is far more accurate than SIMPLE as the RTT calculation can vary with time and network demands and message latency.

In conclusion, JREAP is the choice for operational networks where Link 16 messages require extended transmission range, as it has been developed for the operational environment to provide a formal standard between operational platforms. Whereas SIMPLE has been designed for easy extensibility to transmit between geographically dispersed test environments, different TDL messages for testing of platform message implementation.

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