Advanced Demonstration, Test & Evaluation (ADT&E)

THE CHALLENGE

The ADT&E department at Marine Aviation and Weapons Training Squadron (MAWTS)-1 conducted an Electromagnetic Warfare Situational Awareness (EWSA) TACDEMO during WTI-14. The EWSA TACDEMO, as part of a Digital Interoperability (DI) TACDEMO, attempted a first ever, over 200nm, long-range raid. Technical issues and loss of network connectivity caused the initial attempt to fail objectives. CSCI was asked to assist in pinpointing the technical problems encountered in the EWSA/DI TACDEMO due to its unique experience in Content Management in the Transport Layer over Tactical Communications systems.

THE STRATEGY

CSCI's engineers conducted a series of quick technology reviews of the many different technologies associated with the EWSA/DI TACDEMOs. The technology reviews focused heavily on two core areas: Communications and Content Providers. Tactical communications technologies have inherent design and performance limitations or "ceilings." Content Providers are defined as any asset, service, or system pushing bits on the wire or wireless tactical communications systems. High volume content providers, such as Full Motion Video/Imagery (FMV/I) sensors can turn into self-inflicting, unintentional Distributed Denial of Service (DDoS) systems on tactical communications systems if they are not properly regulated.

During the week leading up to the second TACDEMO, scheduled for 22October 2013, the collective team took a more traditional Test & Evaluation (T&E) approach to identify the technical issues. On Friday, 18October 2013, the EWSA/DI TACDEMO had a successful dry run. The technical goal was to execute command and control from Yuma, AZ of the MQ-9 Reaper's EW payload in China Lake (over 200nm away) was accomplished. In order to achieve this goal, the team reduced the complexity and volume of content providers so that the Reaper was the single Content Provider, with three other aircraft used as communications relays. On 22 October 2013, the EWSA/DI TACDEMO was able to reproduce the success from the dry run, as well as control an experimental payload on an RQ-21 flying in China Lake from Yuma, AZ. The dry run and the second EWSA/DI TACDEMO were technical demonstration successes as well as helping to identify challenges to be addressed going forward.

THE RESULTS

A short-term solution for successful DI TACDEMO efforts will be to conduct extended network planning. The planning needs to identify: who are the content providers, what type and size of content are they distributing, what is the format of the content, and can the content be compressed? Additionally, the plan needs to address the identity and network location of the consumers and what content they require. This information allows network utilization management by knowing how much data is planned to be pushed through what links. This expanded network planning would ensure there is enough bandwidth to support the data size or to identify the need to stage the data dissemination in phases.

A long-term solution is to evolve toward Network Aware services. In the Marine Corps Tactical System Support Activity (MCTSSA) assessment, CSCI Network Aware services demonstrated an impressive, in-band form of content and bandwidth management capabilities. Network Aware services rely on active network monitoring, allowing Content Providers to be directly informed by a Network Governance Service on their allowable network participation thresholds. If the content provider was to exceed its allotted amount of bandwidth, then the content provider (or a Network Governance service) would immediately resize the content being broadcasted to fit network bandwidth availability.

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