

HF Industry Association Presentation

HFIP/SNR Test Results from FY06

Working to improve the QoS levels for a multi-cast/multi-level HF and UHF bearer service

1 Feb 2007

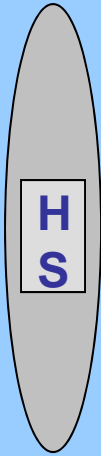
*Presented by: James Mahan
Sr Systems Engineer
Network Systems & Services
Naval & Maritime Solutions*

Trident Warrior 2006 Overview

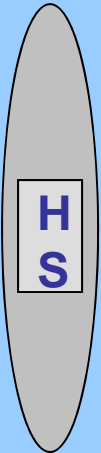
- **TW 06, led by the Naval Network Warfare Command (NETWARCOM) and co-sponsored by Space and Naval Warfare Systems Command (SPAWAR), seeks to accelerate the delivery of network-centric warfare capabilities to the warfighter**
 - **As the primary Forcenet Sea Trial exercise, Trident Warrior exploits candidate advanced technology concepts to provide the war fighter with information superiority over an adversary to give superior decision-making and execution capability for success in the battle space**
 - **At Sea event began in San Diego on 19 Jun and ended in Hawaii on 4 Jul 2006**

TRIDENT WARRIOR 06 Ships

BONHOMME
RICHARD



PINCKNEY



HMAS
STUART



RUSHMORE



HMCS
REGINA



HMAS
MANOORA



HMCS
VANCOUVER



HMCS
ALGONQUIN



Trident Warrior 2006 – Comms Report

Successes:

- Through out the exercise the best available UHF and HF frequencies were utilized based upon the conditions at hand (frequency in use, frequency to close to another in use, noise, weather, and time of day).
 - Five assigned HF frequencies for HF IP were in the 4.2 MHz range and the 8.9 to 9.0 MHz range.
 - Five assigned UHF frequencies for SNR were in the range of 230 MHz to 278 MHz
- An average of five ships participated in the SNR networking experiment at any one time
 - The average data rate over the test period for SNR connectivity was 38,400 bps to maintain it's network infrastructure support environment with stability for 90% of the test hours continuously each day
 - Speeds of 38,400 allowed for SNR to operated quite stability up to distances of 15 miles

Trident Warrior 2006 - Comms Report

Successes:

- An average of three ships participated in the HF-IP networking in the IT orientation known as multi-cast to send and receive data in a universally shared network space
- The average data rate over the TW'06 exercise period for HF IP was 8000 bps
 - HF IP was able to maintain its token rings in a stable manner about 85% over the test period, which could have been better but for the drops and restarts within those periods caused by ship's power failures
 - As environmental and nodal proximity conditions allowed the multi-node HF-IP network kept a reasonably stable HF IP token ring at ranges up to 150 miles based on the operational test scenarios of the Battle Group(s)
 - Maximum distance limitations were never fully evaluated

Trident Warrior 2006 - Comms Report

Challenges:

- **The V/UHF couplers group 4 radios into one coupler and one antenna, therefore, all 4 radio frequencies patched to that coupler must be disparate enough as to prevent collisions**
 - In the case of the BHR, only a few UHF radios functioned well enough to be of use for us
 - On other ships, we had to make sure that the functioning radios for both US and Allied-Coalition that may use similar frequencies were not on the same coupler
- **All of the ships receive the same HF channel list that was given to the TW06 ship riding crew**
 - This became a problem as soon as we got underway because when other circuits came up it was found that they were using the same 5 frequencies (range from 2-10 MEG) that were given to TWO6
 - This became a real problem because Link 11 has a lot of bleed over (this is because of the ping pong)
 - Other circuits included Navy Red, Command Comm., and various circuits that are deemed mission essential

Trident Warrior 2006 - Comms Report

Lessons Learned:

- **Establish the UHF radio performance levels prior to testing new technologies with them**
 - Groom them into a common functional performance level
- **Perform pre-test and operational verification with all circuits in operation**
- **Gather a broader range of frequencies for both UHF and HF and manage them well**
- **Test the ranges – Ad Hoc entry and departures into this ELOS-WAN with a fully burdened network**
 - Measure transitions and fail-overs