

AIR WARFARE DESTROYER PROGRAM

**Implementation and Integration of TDL's in
Maritime Platforms (AWD).**

CAPT James Nash – SEA 4000 FMS Director

**Building Australia's Future Air Warfare Capability
www.ausawd.com**

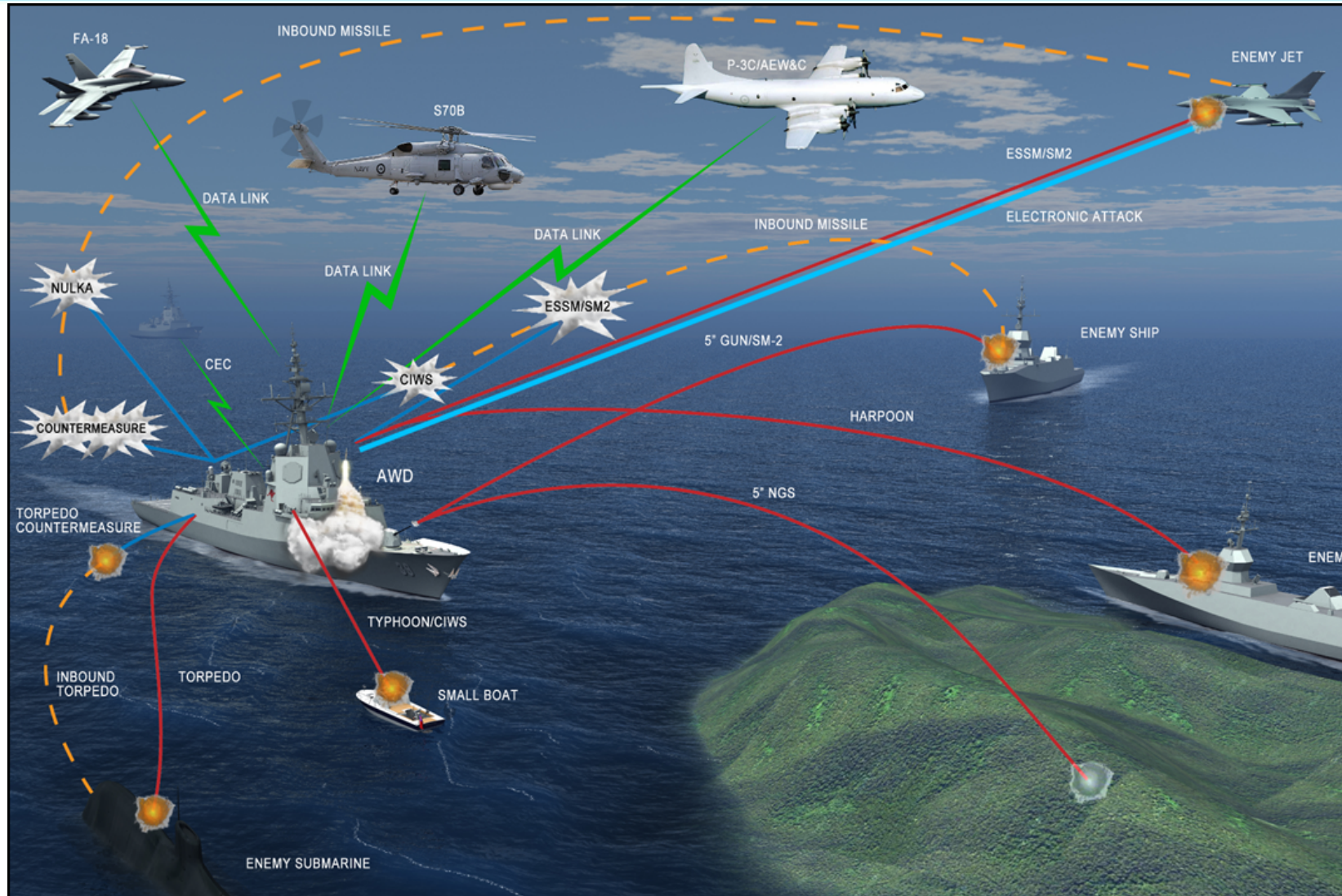


- **DDG Combat System**
 - Mission
 - Architecture
- **DDG Tactical Data Links and Interoperability interfaces**
 - Overview of Capabilities and Interfaces
 - Shore based Command Team Trainer
 - USN DDG TDL Improvement Program
- **Certification Approach**
 - Challenges and Opportunities



AIR WARFARE DESTROYER PROGRAM

HOBART Class DDG OV-1

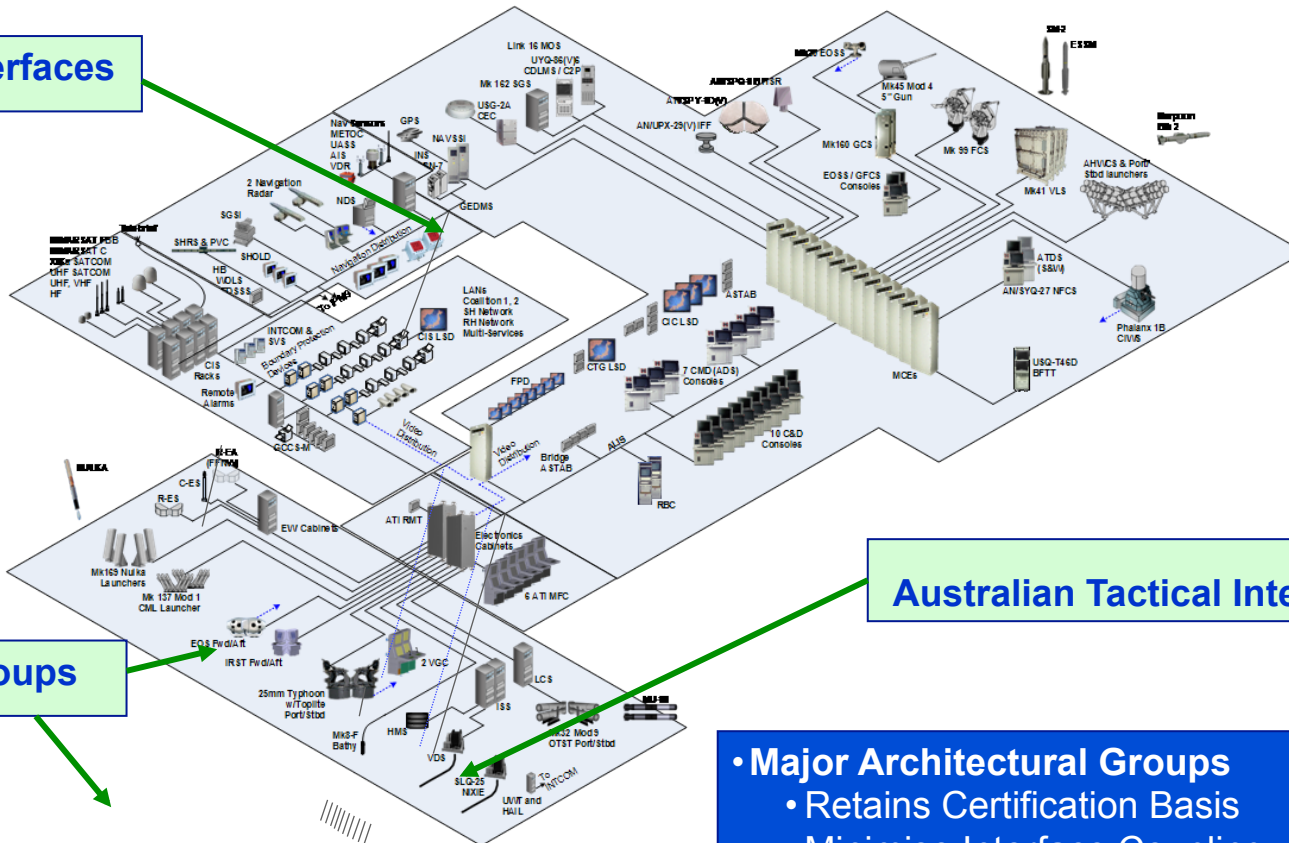




AIR WARFARE DESTROYER PROGRAM

DDG CS Architecture

Simple / Low Risk Interfaces



Australian Tactical Interface

Major Architectural Groups

- Major Architectural Groups
 - Retains Certification Basis
 - Minimise Interface Coupling
 - Supports Parallel Piecewise Integration
 - Supports Technology Refresh
 - Supports Sustainment Through Life
- Minimises Integration Risk



Key Joint Interoperability Interfaces

Interface	Standards / Equip Version	Considerations
Line of Sight (LOS) TDL	AN/UYQ-86 (V)6, AN/URC-141(V)3(C) MIL-STD-188-203-1A, MIL-STD-6011C, OPSPEC 411.3 STANAG 5516 ed 1, MIL-STD-6016C, OPSPEC 516.2 and STANAG 4175 ed 3	US interoperability demonstrated at LINKEX activities Shore based integration currently underway at HMAS Watson
Beyond LOS TDL	S-TADIL J	Growth path to JREAP-C
Global Command and Control System - Maritime	GCCS-M Version 4.0.3	Compatible with v4.1 that will be deployed across HQJOC and Fleet
Cooperative Engagement Capability	USG-7B	Growth path to Naval Integrated Fire Control – Counter Air (NIFC-CA)
Naval Fires – Digital Call for Fire	AN/SYQ-27, supports VMF via AN/PRC-117G tactical radios	USN has demonstrated interoperability with AFATDS v6.8, requires Army upgrade from v6.7 (planned to be achieved in required timeframe)



AIR WARFARE DESTROYER PROGRAM

Naval Fires Control System



Naval Fire Support



Today



1+ Minute



With NFCS



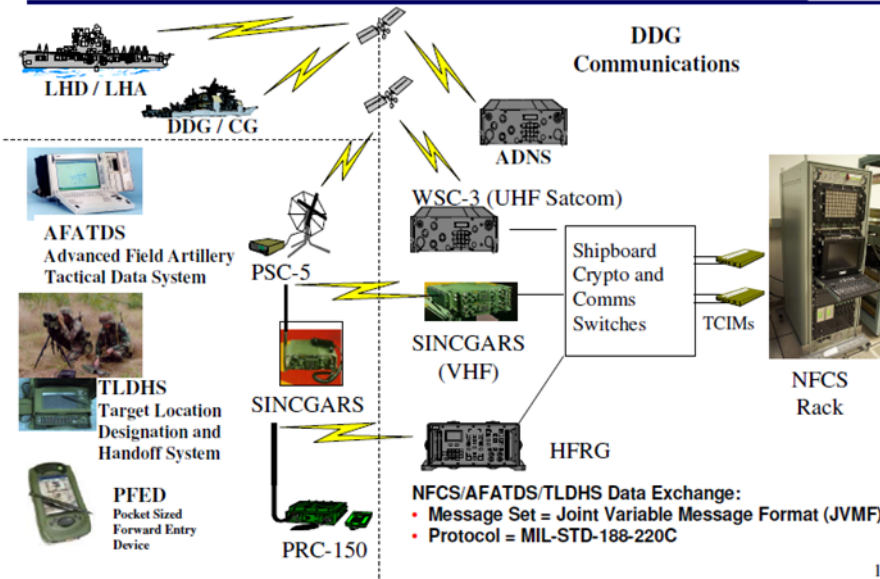
10 - 45 Seconds



7



The Digital Battlefield



10

from: 'Naval Fires Control System (NFCS) Information Brief - 21 Sept 2006, Daniel Thomas



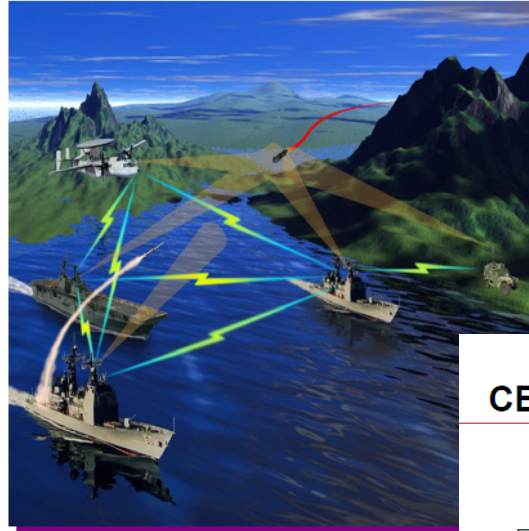
Cooperative Engagement Capability

Raytheon
Integrated Defense Systems

System Description:

CEC brings revolutionary capability to air defense, not by adding new radars or weapon systems, but by distributing existing sensor tracks in a significantly different manner. Benefits include improvements in:

- Track accuracy
- Track continuity
- Consistent identification
- Decision-making time
- Target engagement range



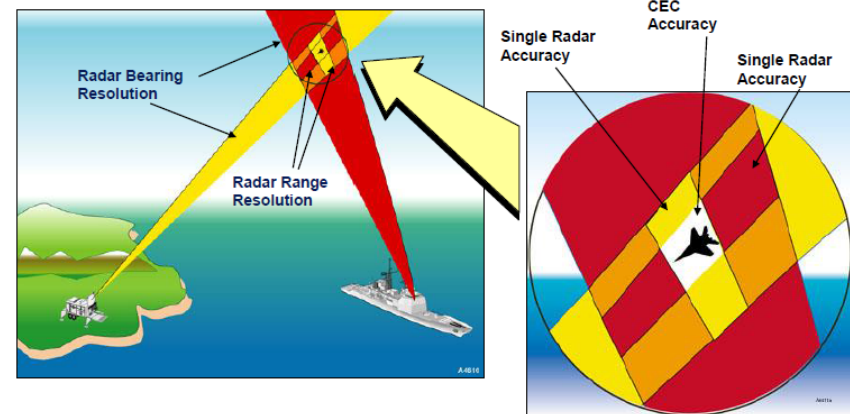
Accurate, continuous target tracks

Distribution Statement A – Approved for public release; distribution is unlimited (14Nov2014) (NAVSEA#610-14)

CEC Track Accuracy

Raytheon
Integrated Defense Systems

Combining Radar Measurements –
The CEC Composite Tracking Process



CEC delivers precise tracks

Distribution Statement A – Approved for public release; distribution is unlimited (14Nov2014) (NAVSEA#610-14)



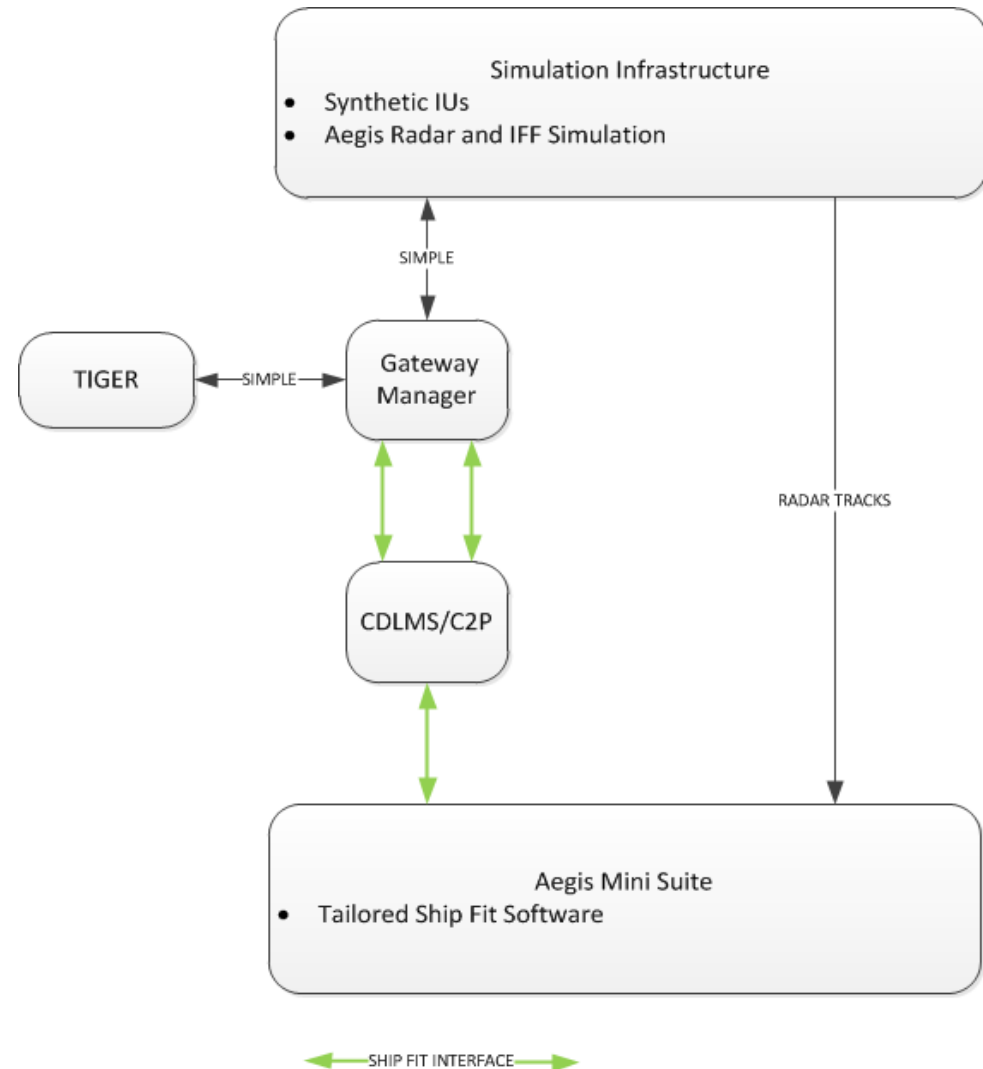
Key Joint Interoperability Interfaces

Interface	Standards / Equip Version	Considerations
Collaborative Training	AN/USQ-T46D Distributed Interactive Simulation IEEE 1278.1-1995, and 1a-1998	Integrates with the Distributed Test and Evaluation Network (DTEN) node at DEFCOMMSTA Sydney Integration at HMAS Watson will demonstrate interoperability between Ship and Shore systems
Secure Voice	HF, V/UHF radios with KY-58 and ANDVT cryptos AN/PRC-117G VHF Tactical radios	Standalone cryptos supports growth path to next generation cryptos Radio growth path to HAVEQUICK II / SATURN
Coalition Networks	Subnet Relay (SNR) High Frequency Internet Protocol (HFIP) Two independent coalition networks configured for CMFP/ CNFC	Utilised SEA1442 solution to maximise interoperability and through life support Awaiting SPAWAR solution for obsolescence issue in HFIP
On-board Networks	SEA1442 MTWAN connectivity	Compatible with current FIE, low risk growth path to SIE Integration with GCCS-M, BFTT, IBS, ATI



Shore Based Hobart Class Command Team Trainer

- Includes ship fit Aegis and CDLMS
- Gateway manager product emulates Link 11 and Link 16 terminals
- COTS Simulator augmented with 6016C Chg1 and 6011C Compliant Link Simulations
- Currently performing integration testing of Link capabilities, supported by ADFTA
- Opportunity for shore based interoperability characterisation





As stated at the Combat System Critical Design Review in October 2009, the AWD Alliance declared that the data link certification activity required by the AWD Alliance would be agreed with the Directorate of Naval Warfare Systems (DNWS) by June 2010. This agreement would cover the delivery and support strategy for all of the TADIL equipment, which includes the Link 11, Link 16 and Variable Message Format (VMF) equipment being installed on the Air Warfare Destroyers (AWD).

- **As a result of series of meetings between AWD Alliance/DNC/DNWS/ADFTA the following was developed**
 - **AWD TADIL IMPLEMENTATION STRATEGY**
 - **AWD TADIL SUPPORT STRATEGY**
- **These documents were provided to DGNCIW for concurrence in Nov 10**
- **Response confirming proposal was suitable was provided in Jul 11**
- **DNCIW was approached in late 2011 for personnel to attend US testing, however no personnel were available to attend US testing.**



As stated at the Combat System Critical Design Review in October 2009, the AWD Alliance declared that the data link certification activity required by the AWD Alliance would be agreed with the Directorate of Naval Warfare Systems (DNWS) by June 2010. This agreement would cover the delivery and support strategy for all of the TADIL equipment, which includes the Link 11, Link 16 and Variable Message Format (VMF) equipment being installed on the Air Warfare Destroyers (AWD).

- **As a result of series of meetings between AWD Alliance/DNC/DNWS/ADFTA the following was developed**
 - **AWD TADIL IMPLEMENTATION STRATEGY**
 - **AWD TADIL SUPPORT STRATEGY**
- **These documents were provided to DGNCIW for concurrence in Nov 10**
- **Response confirming proposal was suitable was provide in Jul 11**
- **DNCIW was approached in late 2011 for personnel to attend US testing, however no personnel were available to attend US testing.**



- **Implementation Strategy Agreed in 2010/11 Time frame**
- **CGM Baseline is Link Certified and has conducted a USN Joint Interoperability Test (JIT) – This forms the basis of the AWD Software.**
- **As confirmed in the Implementation Strategy the following testing has been undertaken or is planned:**
 - **US Based Tests – delivered under the FMS Case**
 - **Nil Link Certification required – CGM Baseline testing still valid**
 - **LINKEX conduct to validate interoperability with AWD Non-Aegis combat system elements , including ATI**
 - **Interoperability testing that may occur as a result of test program.**
 - **Shipyard Test**
 - **Independent live test event utilising local assets to validate end to end link communications**



- **Determining level of OQE provided.**
 - What is the correct amount.
- **Introduction of CEC**
 - Testing required for certification of CEC
 - Is CEC a TDL ?
- **Leverage of USN growth path**



- **Accelerated Midterm Interoperability Improvement Program**
 - USN initiated to improve interoperability across multiple baselines
 - Improves integration of Aegis, Cooperative Engagement Capability, CDLMS and Shipboard Gridlock System
 - USN has been testing/fielding since 2012
- **Hobart Class Aegis AMIIP development planned to be delivered in Q1/2 2017 for Provisional Acceptance of the HMAS Hobart**



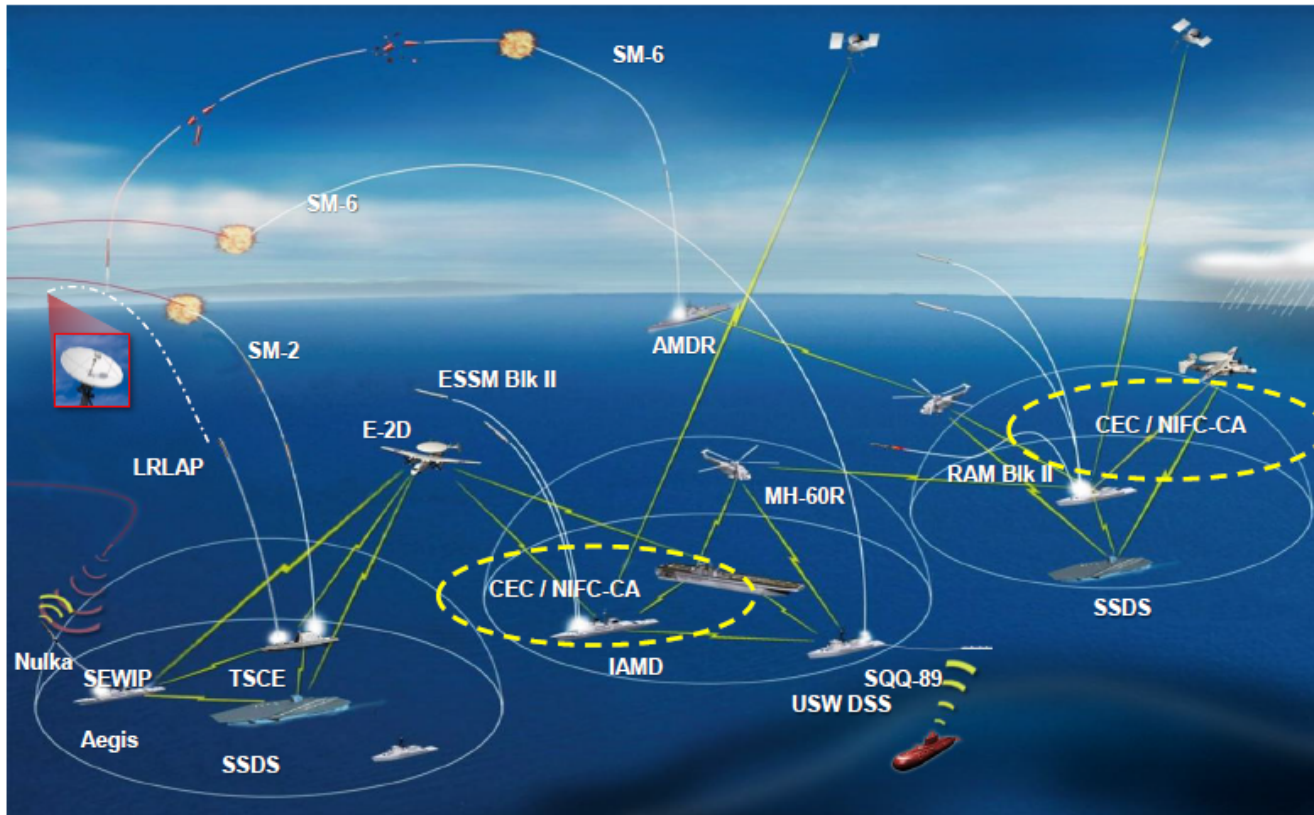
- **Multi Site Tests (MSTs) conducted to uncover design related system issues in simulated strike group test environment**
 - Verify new functionality introduced in incremental builds
 - Verify fixes for issues uncovered during previous test/MSTs
- **MSTs enhances test environment**
 - Number of participating platforms
 - Different unit types included
 - Non-CEC and non-AMIIP units includes
 - Variety of configurations exercised
- **All MST events followed by Collaborative Analysis Team (CAT) Data Analysis Working Group**
 - Validate processing/functional data paths
 - Adjudicate TORs written during MST
 - Calculate system wide metrics and root cause issues effecting them



Growth Interface	Considerations
Link22	Growth path requires addition of adjunct processor to the CDLMS system, and a KIV-21LLC crypto
HAWKLINK	Required to maximise capability of embarked MH-60R
CDL	Option to provide high bandwidth LOS comms (eg: UAV sensor data streaming). Requires new topside antenna.
Integrated Broadcast Service	Provides real time intelligence data from US satellite network. Low impact growth path available through existing UHF Satcom system.
Long Range Strike	Aegis provides a growth path to TACTOM. Growth path optionally requires EHF comms to interface to the planning network
Naval Integrated Fire Control – Counter Air	Growth path is based on the extant DDG CEC capability. Requires Aegis upgrade (Baseline 9+) and SM6 missiles.



Combat System Concept of Operations



from: 'Navy IAMD Capabilities', RADM Horn, USN, July 11, 2013