

2nd Annual IAMD Symposium

IAMD Requirements, Plans, and Programs



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OPNAV N86

- **Evolving Threat**
- **Anti-Air Warfare**
 - AAW Weapons
 - NIFC-CA
- **Ballistic Missile Defense**
 - BMD Weapons
 - Modernization and Shipbuilding
 - Aegis Ashore and SBX
- **Summary**

The Evolving Threat - AAW

- Quiet diesel and nuclear submarines armed with anti-ship cruise missiles
- Manned aircraft
- Swarming fast attack craft with short range ASCM
- Coastal defense cruise missiles



Countered With New Ships, Sensors, Weapons

MISSILE SYSTEMS

RAM Blk 2

ASMD

ESSM

AAW (SR)

SM-2 BLK IIIB

AAW (MR)

SM-2 BLK IV

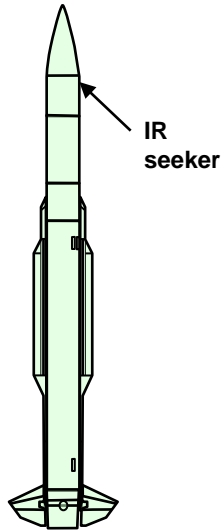
AAW (ER)

SM-6

Advanced IAMD

SM-3

BMD



MK72
Booster

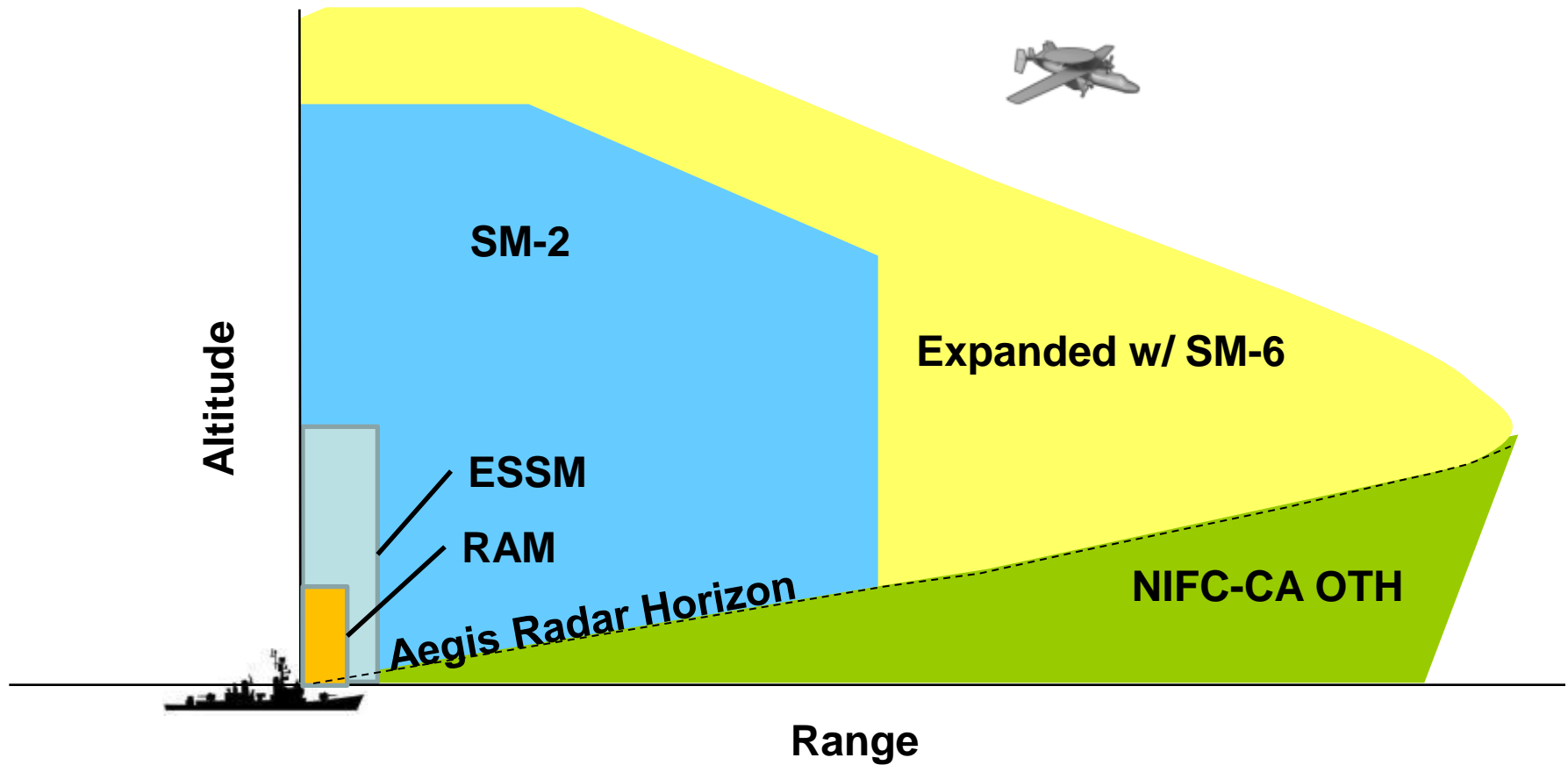


Dual Mode
Active/
Semi-Active
Seeker



Kinetic
Kill
Vehicle

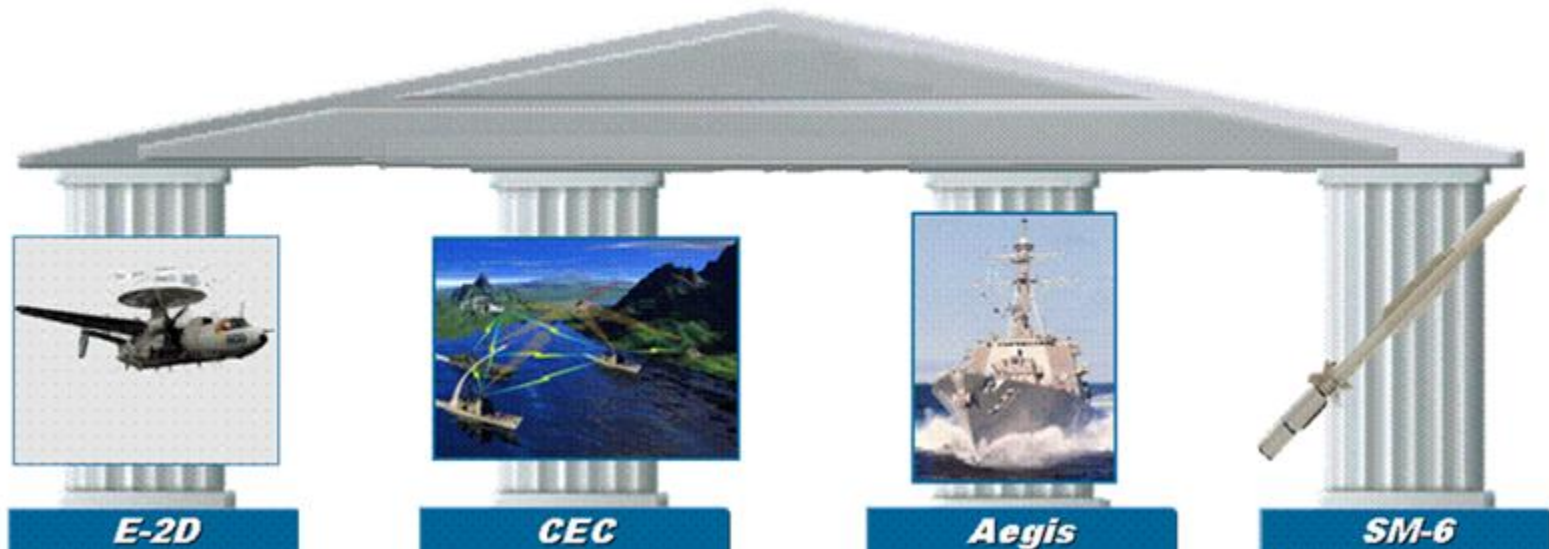
IAMD Engagement



PB12 AAW Funding Profiles

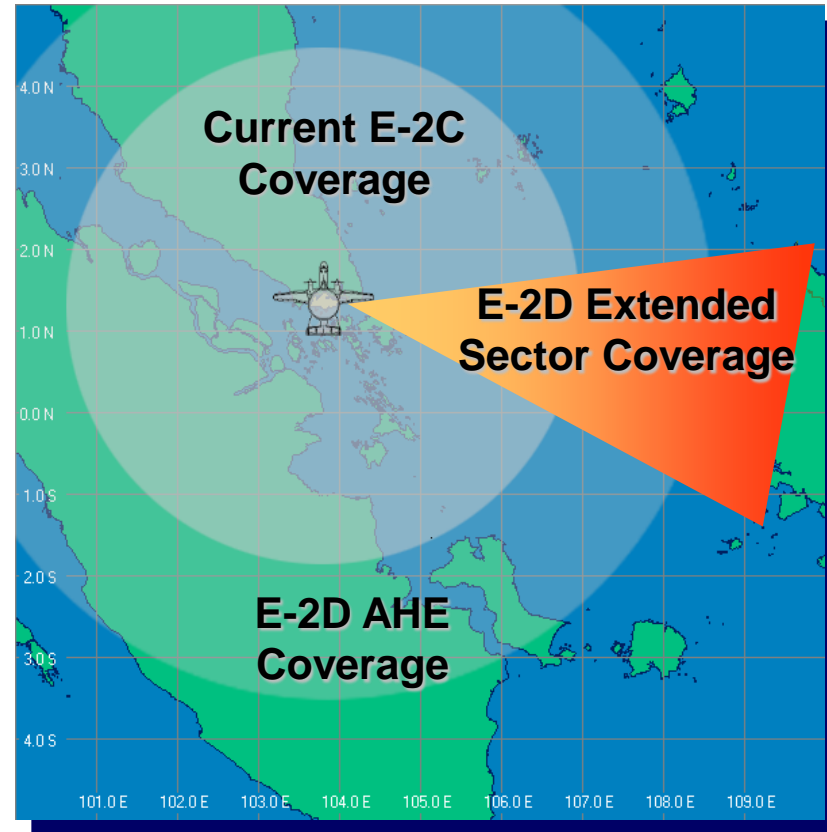
	PB12	<u>FY10</u>	<u>FY11</u>	<u>FY12</u>	<u>FY13</u>	<u>FY14</u>	<u>FY15</u>	<u>FY16</u>	<u>FY12- FY16 Total</u>
RAM	Proc Qty	90	90	61	62	64	90	90	367
	TY\$M	109.2	88.3	71.8	69.8	70.5	84.8	86.9	403.1
ESSM	Proc Qty	43	33	35	35	51	94	94	309
	TY\$M	71.6	63.6	62.8	62.7	81.9	126.1	128.3	461.8
SM-6	Proc Qty	11	59	89	121	129	152	168	659
	TY\$M	211.1	356.1	449.7	560	587.6	658.4	735.3	2991

Naval Integrated Fire Control – Counter Air (NIFC-CA)



- Provides Engage-On-Remote and OTH capability to counter manned aircraft and cruise missiles
- Links E-2D elevated sensor to Aegis ships and Navy fighter aircraft to expand Air Defense battlespace
- Utilizes full kinematic range of active missiles

- Long-range detection of air and cruise missile threats
- Sea target tracking out to the horizon
- Precision tracking of maneuvering targets against ground clutter
- Integrates air and missile defense with strike support
- NIFC-CA IOC FY15
 - Aligned to IOC of first E-2D squadron

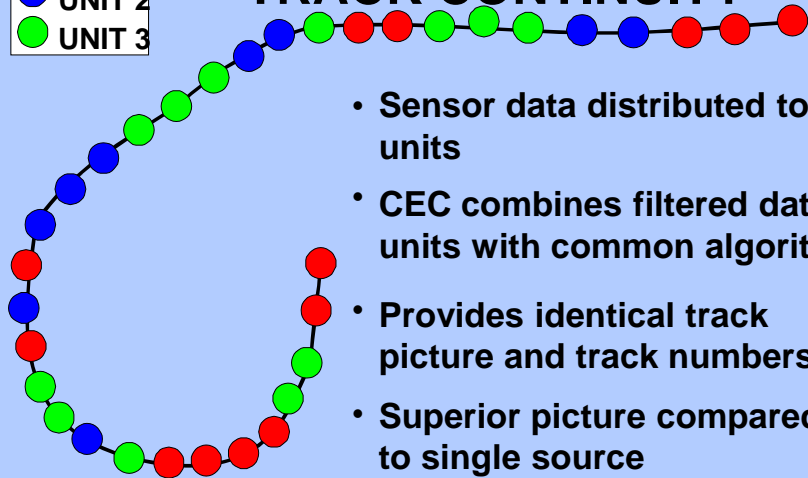


Key Enabler for NIFC-CA Capability

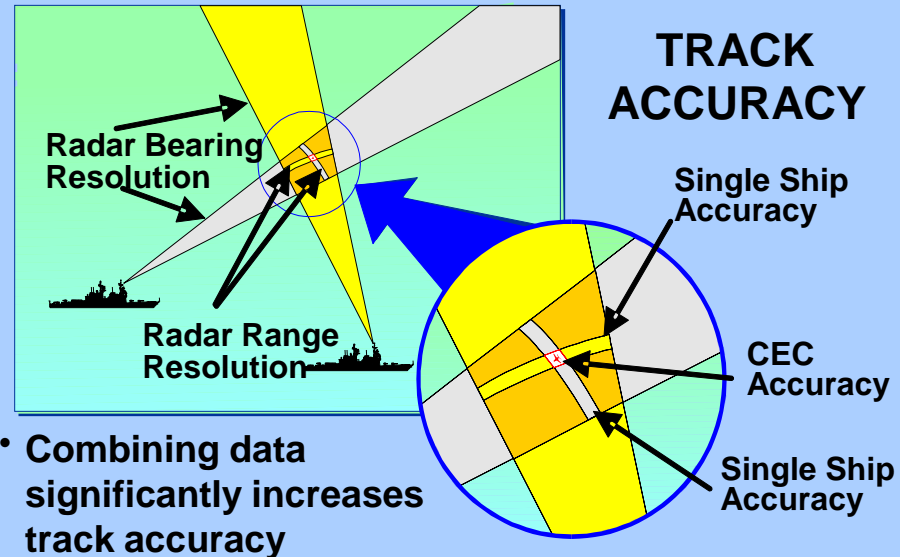
Cooperative Engagement Capability (CEC)

COMPOSITE TRACKING & TRACK CONTINUITY

- UNIT 1
- UNIT 2
- UNIT 3



- Sensor data distributed to all units
- CEC combines filtered data for units with common algorithms
- Provides identical track picture and track numbers
- Superior picture compared to single source



- Combining data significantly increases track accuracy

Real Time Force Level Sensor Fusion

- Integrates platforms via a real time sensor fusion network
- Fuses local and remote sensor measurements into Composite Tracks
- Exploits sensor capabilities, geometric relationships, and frequency diversity to overcome tracking discontinuities and improve tracking accuracy

Advanced Capability Build 12 (ACB-12)

- Road to Open Architecture
- Common Processor & Display System
- OA System Track Manager / Track Server
- Enables Rapid Capability Insertion Process
- Allows full kinematic range of the SM-6 missile (NIFC-CA)
 - All sensors considered
 - SM-6 Active Homing
 - Fire-control quality data in real-time
- Foundation of DDGs 113+, DDG/CG Modernization, Aegis Ashore



STANDARD MISSILE-6

■ Mission:

- Provides theater air defense, fleet area defense, and ship self-defense for sea and littoral forces

■ Description:

- Solid propellant, tail-controlled, surface-to-air missile
- Separable booster with increased air defense range
- Allows for OTH engagements

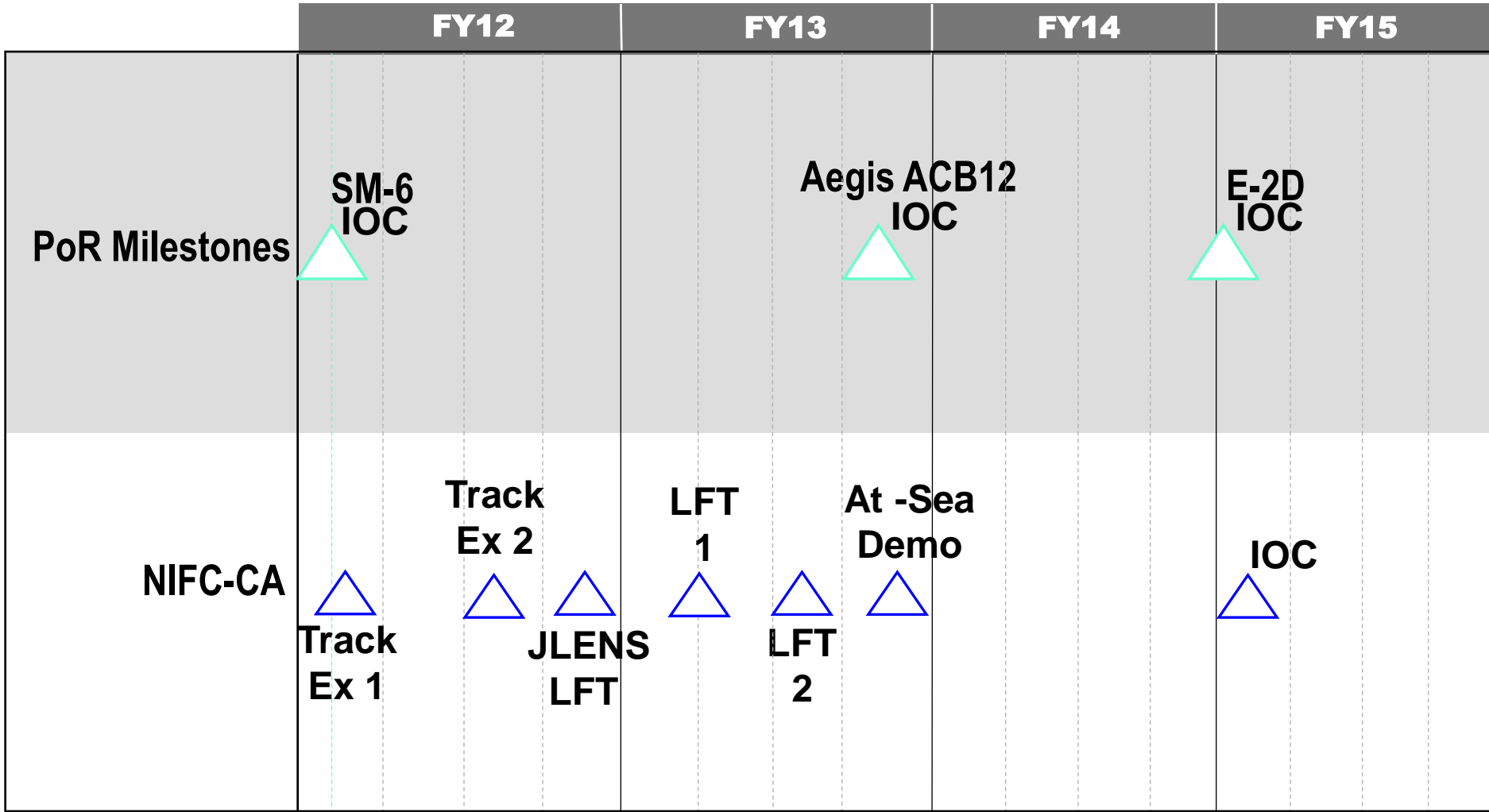
■ Employment:

- Primary air defense weapon for U.S. Navy AEGIS Cruisers & Destroyers

■ IOC 2012 / FRP late 2012



NIFC-CA FTS Program Plan



LFT- Live Fire Test

JLENS – Joint Land Attack/Cruise Missile Defense Elevated Netted Sensor System

Ballistic Missiles

Short Range Ballistic Missiles



CSS-6 Mod 2



SCUD B



Shaheen

Medium Range Ballistic Missiles



Ashura



No Dong



Agni II



Shahab 3

Long Range Ballistic Missiles



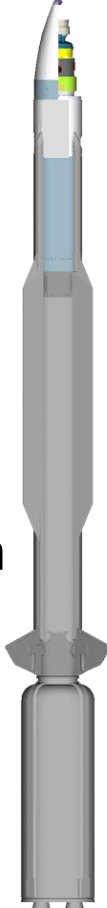
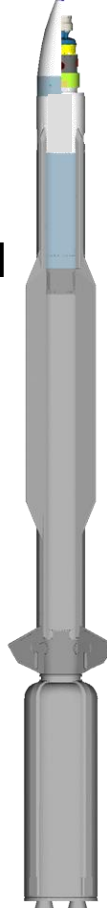

CSS-4



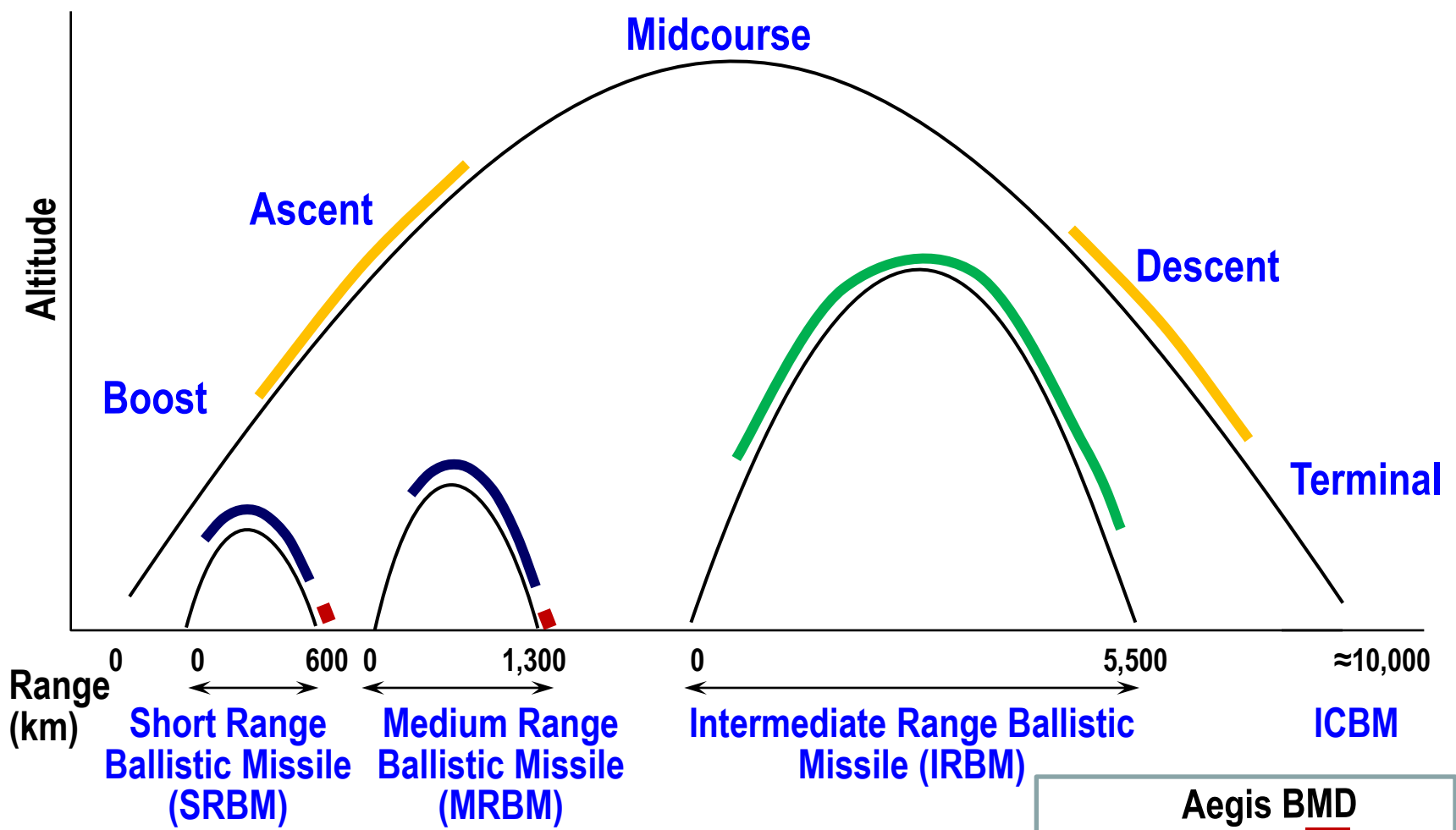
Taepo Dong II

Increasing Numbers and Complexity

Aegis BMD SM-3 Evolution

SM-3 BLK IA	SM-3 BLK IB	SM-3 BLK IIA
<ul style="list-style-type: none"> ▪ BLK IA KW <ul style="list-style-type: none"> • 1-Color Seeker • Pulsed DACS ▪ 13.5" Propulsion <ul style="list-style-type: none"> • 2nd & 3rd Stage ▪ MK 72 Booster ▪ MK 41 VLS Compatible 	<ul style="list-style-type: none"> ▪ BLK IB KW <ul style="list-style-type: none"> • 2- Color Seeker • All-Reflective Optics • Advanced Signal Processor • TDACS ▪ 13.5" Propulsion <ul style="list-style-type: none"> • 2nd & 3rd Stage ▪ MK 72 Booster ▪ MK 41 VLS Compatible 	<ul style="list-style-type: none"> ▪ 21" Nosecone ▪ Large Diameter KW <ul style="list-style-type: none"> • Adv Discrim Seeker • High Divert DACS (Design TBD) ▪ 21" Propulsion <ul style="list-style-type: none"> • 2nd & 3rd Stage ▪ MK 72 Booster ▪ MK 41 VLS Compatible 
<p style="text-align: center;">IOC 2006</p>	<p style="text-align: center;">IOC 2012</p>	<p style="text-align: center;">IOC 2018</p>

The Evolving Threat - BMD



Aegis BMD	
SBT	Red
SM-3 BIK IA	Dark Blue
SM-3 BIK IB, IIA	Green
SM-3 BIK IIB	Yellow

CG Modernization



Navy Precision Fires

5"/62 Gun / MK 160 GCS



Force Protection

SPQ-9B
CIWS BLK 1B



ASW

AN/SQQ-89A(V)15
Multi-Function Towed Array



ACB



ESSM



SM-6

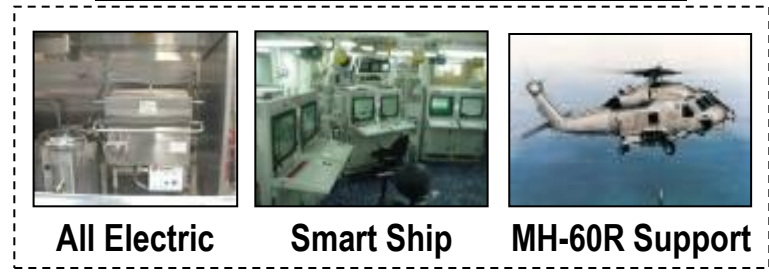


SM-3

Improved Air and Missile Defense

- Aegis Advanced Capability Build (ACB)
- Cooperative Engagement Capability (CEC)
- Naval Integrated Fire Control – Counter Air (NIFC-CA)
- Integrated Air & Missile Defense with BMD (CGs 65-73)
- SM-6 & SM-3
- Evolved Sea Sparrow Missile (ESSM)

Hull, Mechanical & Electrical



All Electric

Smart Ship

MH-60R Support

DDG Modernization

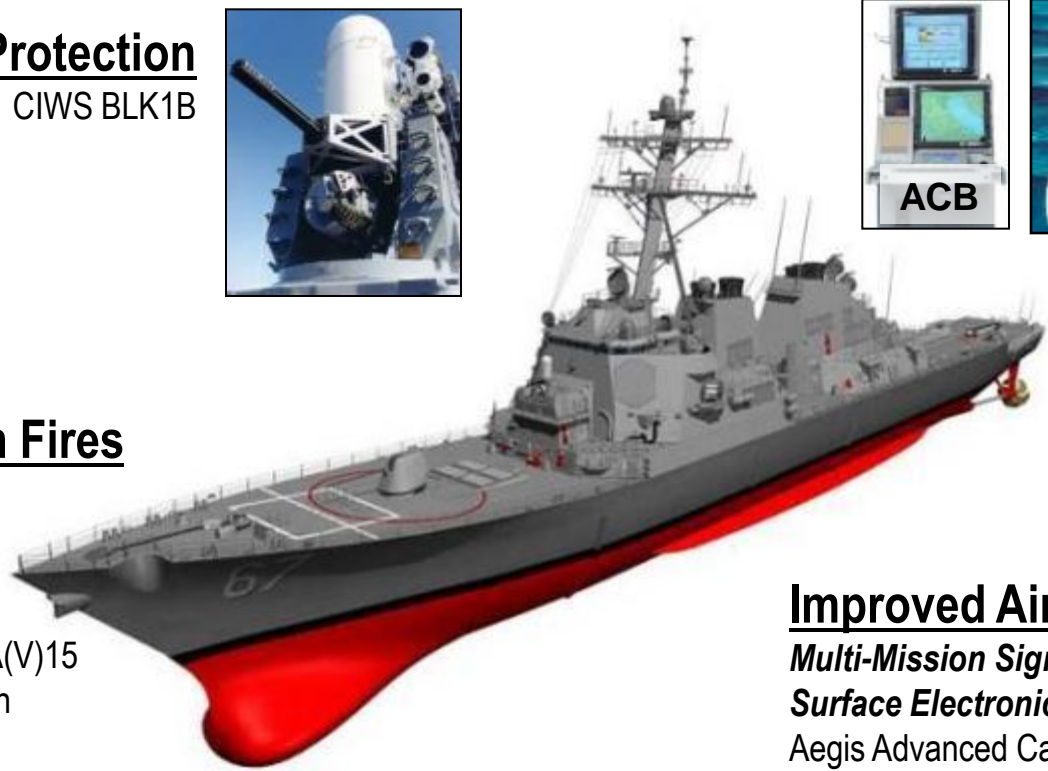
Force Protection

CIWS BLK1B



Navy Precision Fires

MK 160 GCS



SM-6



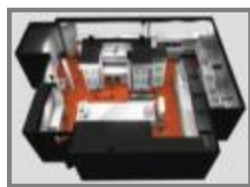
SM-3



ASW

AN/SQQ-89A(V)15
Multi-Function
Towed Array

Hull, Mechanical & Electrical



Advanced Galley



Machinery Control System



MH-60R Support

Improved Air and Missile Defense

- Multi-Mission Signal Processor
- Surface Electronic Warfare Improvement Program
- Aegis Advanced Capability Build (ACB)
- Cooperative Engagement Capability (CEC)
- Naval Integrated Fire Control – Counter Air (NIFC-CA)
- Integrated Air & Missile Defense with BMD
- SM-6 & SM-3
- Evolved Sea Sparrow Missile (ESSM)

DDG 51 Restart / Flight III

- **Flight IIA Restart**
 - New construction
 - Hulls 113-121
 - BMD capable



- **Flight III**
 - Integrated Air and Missile Defense
 - Air and Missile Defense Radar
 - Replaces CGs



Air and Missile Defense Radar



AMDR X-Band

AMDR S-Band

■ AMDR:

- AMDR S-Band – volume search, tracking, Ballistic Missile Defense discrimination, missile communication
- AMDR X-Band – horizon search, tracking, missile communication, terminal illumination
- Radar Suite Controller – resource coordination between AMDR-S, AMDR-X, and combat system

PB-12 Balanced Capability & Capacity Option (BCCO)

	By 2011	FY11	FY12	FY13	FY14	FY15	FY16
CG							
DDG							
Funded Ships		24	29	32	36	38	41
Ready for Tasking		23	28	29	30	29	36



- EPAA Phase 2 BMD mission
- BMD 5.0 functionality for detection, discrimination, SM-3 engagement and control
- Aegis Weapon System (AWS) hardware and SPY-1D(V) array faces
- Vertical Launching System (VLS) with 24 SM-3 Block IB missiles; future upgrades to Block IIA and IIB



UNCLASSIFIED

Sea Based X-Band Radar

- Strategic asset for the homeland missile defense mission
- X-Band Radar with 45,000 transmit/receive modules and 4,800 km range, 8 knot transit speed
- Provides cued track and discrimination for the Ground Based Midcourse Defense (GMD) fire control system
- MDA transitioning responsibilities for vessel operations and sustainment to Navy
- MDA retaining responsibility for O&S of the XBR



BMDS - Ballistic Missile Defense System

Sensors



Overhead Persistent Infrared



UAV Based Sensor



Precision Tracking Space System



Sea-Based Radars



Early Warning Radar



Midcourse X-Band Radar



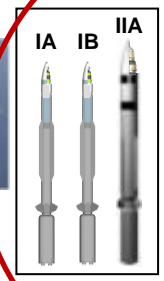
AN/TPY-2



SPY-1



Airborne Laser (Testbed)



SM-3



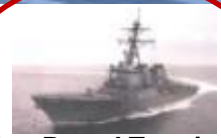
Aegis BMD



Ground-Based Midcourse Defense



Terminal High Altitude Area Defense



Sea-Based Terminal



Patriot Advanced Capability-3

Command and Control, Battle Management & Communications



NMCC STRATCOM NORTHCOM PACOM EUCOM CENTCOM

- Evolving AAW weapons and combat systems pace littoral threat
- Fielding BMD systems to counter proliferating ballistic missiles
- Growing capability and capacity to answer COCOM demands for Navy IAMD



IAMD... Key to Assuring Access