XI. CONCEPTUAL ARCHITECTURE

A. INTRODUCTION

The Navy and Marine Corps need an ExWar Force that can accomplish OMFTS, STOM, and Sea Basing through upgraded integrated capabilities in the areas of amphibious lift, firepower, aviation support, Information Operations, Force Protection, C4ISR, and Expeditionary Logistics.

The Conceptual architecture adopted by the NPS Integrated Project Team is an alternative to the Planned architecture of the USMC MAGTF in the 2015 – 2020 timeframe. After adjusting for the known or planned replacements envisaged in the existing USN's and USMC's force development programs, such as the MV-22, JSF, HLCAC, LCU(R), AAAV etc, the key platform differences are the new set of amphibious assault ships and supporting logistics ships; and the introduction of a heavy lift aircraft. Otherwise, the force structure remains relatively similar to the Planned architecture with adjustments in the C2 structural organization to exploit the possibilities of new and advanced C4I capabilities.

The Conceptual architecture introduced here is also sized according to the force size envisaged to meet the conventional littoral combat requirements based on the Burma scenario designed exclusively for the ExWar studies. The envisaged force size includes a heavy mechanized MEB with a legacy M1A1 tank battalion. Like the Planned architecture, the only distinctive difference in the Conceptual architecture as compared to the Current architecture, is the focus on the Sea Basing concept, but taken further.

A common hull form for both the amphibious assault ship class and the supporting logistic ship class based on a modular design concept is proposed here. This attempt in creating a hybrid dual-purpose ship which can be transformed by either swapping combat or logistics modules aims to reduce the complex interfaces between the amphibious assault ship and the logistics support ships in the full fledge operational Sea Base. In the integrating project team's investigation and exploration with this new architecture, a special assumption has been adopted to ignore legacy amphibious assault and logistics ships, replacing them all with the new ship design undertaken by NPS's

TSSE team, so as to be able to better distill the capabilities offered by this radical change. From these new platforms, the command and control, power projection, and logistical support to the MEB ashore will be executed directly from the sea. There will be an elimination of the traditional "Iron Mountain", a definite reduction in footprint and an attempt at a full application of STOM supported by the improved combat and transport platforms.

While the MEB still maintains the integrity of the CE, GCE, ACE, and CSSE, a smaller command element being projected ashore is featured together with a shift towards remote command at sea and from the sea, leveraging on the future C4I network centric capabilities.

B. STRUCTURE AND ORGANIZATION

The conceptual MEB will be organized as a lean and mean force, robust yet flexible, and capable of accomplishing missions deep into enemy territory. The MEB for the Conceptual architecture is task organized to respond to a wide range of operations. It will be a capabilities-based force, leveraging on technology to be equipped with state of the art weapons, platforms, and equipment. It will have superior C4I capabilities based on the concept of network centric warfare. Other than the technology associated reduction in manning, the structure and organization of the MEB for the Conceptual architecture is relatively similar to that of the Planned architecture. Ultimately, the integrity of the CE, GCE, ACE and CSSE concept of organization remains identical to the Current and Planned architectures.

1. Command Element (CE)

As in the Current and Planned architectures, the MEB CE is embedded in the MEF command element. The MEB CE maintains the C2 and reconnaissance/surveillance assets, sourced from the MEF staff with the Deputy MEF Commander as the MEB Commander. However, the MEB will exploit improved C4I

technology to enhance its command and control over the fighting force. Utilizing the same advance technology, the CE has the option of basing at sea on the amphibious ships instead of on land in order to reduce footprint ashore and enhance survivability. A small forward command element can be sent forward when necessary.

2. Ground Combat Element (GCE)

Similar to the Current and Planned architectures, the GCE is built on an Infantry Regiment as the main maneuver force, integrated with a wide range of ground combat support elements as follows to accomplish its ground combat missions. As technology advances and more capable and lethal weapon systems are introduced, the conceptual GCE will be leaner and yet capable of providing the same or a higher combat power. There will also be reduced footprint ashore as new long-range precision weapons are employed.

1 x Infantry regiment (3 x Infantry battalion)
1 x Artillery battalion
1 x Tank battalion
1 x AAAV battalion
1 x Combat Engineer battalion
1 x Light Armored Reconnaissance Company
1 x Headquarters battalion

3. Aviation Combat Element (ACE)

The ACE in the Conceptual architecture now have more heavy lift capabilities, comprises a totally new combination of fixed and rotary wing aircraft, supported by anti-air and support squadrons to accomplish air combat missions. A new heavy lift aircraft will replace the CH-53E to enhance the heavy lift capability of the MEB.

a. The MACG mainly comprises headquarters elements, communications detachments and a LAAD battalion.

b. The MWSG is formed by two MWSSs, one for fixed wing and another for rotary wing aircraft. They provide technical support for all aircrafts within the ACE.

c. Marine Air Group (Fixed Wing) comprises
1 x Marine Aerial Refueler Transport Squadron (VMGR)
1 x Marine Tactical Electronic Warfare Squadron (VMAQ)
1 x Marine Attack Squadron (VMA)
2 x Marine Fighter Attack Squadron (VMFA)
1 x Marine All-Weather Fighter Attack Squadron (VMFA-AW)

d. Marine Air Group (Rotary Wing) comprises
2 x Marine Heavy Helicopter Squadron (HMH)
3 x Marine Medium Helicopter Squadron (HMM)
1 x Marine Light/ Attack Helicopter Squadron (HMLA)

4. Combat Service Support Element (CSSE)

The CSSE retains its critical role of a logistical support function undertaken by the BSSG. The BSSG comprises a wide range of service and support elements capable of supporting the entire MEB directly from the sea in all its missions. The main components of the BSSG remain as follow.

Headquarters battalion
Maintenance battalion
Supply battalion
Engineer Support battalion
Transportation Support battalion
Health Services Company

5. Amphibious Ships

The amphibious fleet in the Conceptual architecture, supporting a MEB, is formed by 3 NESGs. However, in the Conceptual architecture new amphibious platforms will replace those in the Current and Planned platforms. Each NESG now consists of 2 new large-deck amphibious assault ships, the ExWar Combat Ships. Additionally, there are 3 ExWar Logistic Ships that will sustain the MEB for 30 days and may form the Sea Base at sea. The amphibious fleet in this architecture comprises the following sea platforms.

a. 6 x ExWar Combat Ships
b. 3 x ExWar Logistic Ships
c. 12 x LCU (R)
d. 12 x HLCAC

C. CAPABILITIES

The operational capabilities of the MEB in the Conceptual architecture take on new dimensions with the new concept of Sea Basing, integrated with the new equipment platforms upgrades and replacements like the Planned architecture. Specifically, a more robust system of systems in exploiting the benefits of the concepts of OMFTS and STOM is now possible and effectively in operations. The standard capabilities offered by the Conceptual architecture are similar to those of the Planned architecture, but with higher speed and further reach and better projection capabilities. The key tactical-level tasks and the capabilities to fulfill them are repeated below for easy reference:

1. Deploy forces/ Conduct maneuver

a. Sufficient sealift to rapidly position naval expeditionary forces and sustain power-projection operations once committed.

b. Capacity onboard amphibious ships to maneuver forces into an advantageous position and to conduct en route planning and coordination with supported and supporting forces.

c. Ability to conduct all aspects of expeditionary maneuver warfare, including OMFTS and STOM.

d. Ability to establish an AOA, provide tactical control within the defined battle space, and control/ coordinate surface and strike warfare.

e. Surveillance, reconnaissance and reachback assets sufficient to provide active and passive hydrographic survey, surf observation, and climatological, meteorological, and tactical oceanographic analysis in support of amphibious operations.

f. Amphibious ships capable of supporting independent air operations.

g. Flexibility to conduct individual ship and split-ARG operations, as well as ATF operations independent of a CVBG.

h. Ability to employ Naval Special Warfare units in advance-force and special operations.

i. MPF capable of at-sea arrival and assembly of forces and equipment, eliminating the need to use airfields and ports in the immediate area of operations.

2. Develop Intelligence

a. Access to a variety of sensor networks, both organic and supporting.

b. Ability to task and focus sensor networks as required.

c. “Reachback” to theater, joint and national intelligence assets.

d. Rapid and thorough processing of intelligence data.

e. A secure, accurate, and accessible database, available to all levels of command on “push/pull” basis.

f. Timely and secure transmission to and from all levels of command

g. En route coordination and planning with surge and augmentation forces.

3. Exercise Command and Control

a. Display and transmit data in real time to accurately develop a common operational picture.

b. Control efficient strikes, artillery and close air support operations.

c. Share information, coordinate and plan with forces closing from out of theater.

d. Plan, train and conduct virtual rehearsal en route to seamlessly transition to assault phase.

e. Plan, execute, exploit and defend against the various Information Warfare threats.

4. Employ Firepower

a. Use all fires from all assets – naval, joint and combined.

b. Conduct offensive and defensive operations against an enemy, both at sea and in support of forces ashore.

c. Coordinate all fire support functions from a Sea Base or ashore.

d. Process targets.

f. Organize and integrate fire support assets.

1. Perform Logistics and Combat Service Support

a. Provide total asset visibility and conduct selective offload operations.

b. Provide bulk liquids, particularly fuels and potable water quickly and efficiently to landing force elements during OMFTS/ STOM operations.

c. Provide immediate maintenance and repair support for both Sea Based aviation and ground equipment.

d. Provide all medical and dental support at sea, to include casualty operations and mortuary affairs, taking into account the type and volume of casualties that could result from WMD and urban combat operations.

e. Support logistically individual ship, split-NESG, and independent ATF operations.

f. Reconstitute the forces ashore and redeploy in support of other operations, in or out of theater.

g. Conduct underway replenishment operations and sustain naval expeditionary ships at sea.

h. Conduct recovery and salvage operations.

6. Protect the Force

a. Self-protection measures that ensure each ship can operate independently in a threat environment.

b. Interoperability sufficient to become an integral part of a CEC force.

c. Passive defensive capabilities to protect against CBR attack.

d. The ability to remove battle space hazards, including decontamination and EOD support.

e. The ability to conduct rescue and recovery operations, including SAR and non-combatant evacuation.

f. The ability to ensure ship security in port using both active and passive measures.

D. CONCEPT OF OPERATIONS

The Conceptual architecture for a notional MEB size force in 2015-2020 will be robust, flexible, and a potent force enabler -- capable of projecting combat power deep from the sea to deep inland. The Navy and Marine Corps team will have the capability to launch from 75 miles from the sea to 200 miles inland within 24 to 48 hours -- upon arriving at the launching area. The future conceptual expeditionary force will be scalable and capable of operating jointly with the CVBG and Allied forces. Additionally, the

Conceptual architecture for a notional MEB will have the ability to sustain itself for 30 days, as well as provide indefinite sustainment to the forces ashore.

Logistically, the Conceptual architecture for a notional MEB will be re-supplied by 3 dedicated shuttle ships, as well as commercial and other logistic ships. The 3 shuttle ships will have similar characteristics as the 6 "X" ships that make up the Sea Base, but will provide a logistical support role only. The 3 shuttle ships will transit between the off shore base and the 6 "X" ships, indefinitely sustaining the Sea Base as needed. The transfer of supplies to the combat forces ashore will come from both air and sea transporters. Ideally, the MV-22 and the conceptual Heavy Lift Aircraft will be the main logistic supplier to the combat forces ashore. In the event that air transporters cannot meet the daily re-supply requirements of combat forces ashore, then both air and sea transporters will be utilized.

The requirement to conduct beach landings remains because AAAV and the M1A1 are too heavy transport to the objective by air. Heavy Lift Landing Craft Air Cushion (HLCAC) and Landing Craft Utility (Replacement) LCU(R) with their enhanced capabilities will give the Expeditionary Force of the future an OTH strike capability -- unlike amphibious operations of the past. An OTH capability makes the Sea Base less vulnerable and enhances the element of surprise. With the added capabilities of the future Conceptual architecture for a notional MEB, the enemy will have disperse their forces to covers a larger area -- the objective, along the entire coastline, and all major ports.

Figure 1 depicts the flow of a conceptual ExWar concept. The notional MEB will arrive at the arrival and assembly area from forward deployed assets as well as from CONUS. Unlike amphibious operations of the past, the future conceptual design of ExWar does not rely on friendly ports or airfields in country, but projects and sustains power from entirely from the sea. The notional MEB will move to the launch area and project combat power ashore by both air and sea transporters. Air transporters will carry the notional MEB directly to the objective while sea transporters will project forces and equipment to the objective via a beach landing area with minimal operational pause operational pause.

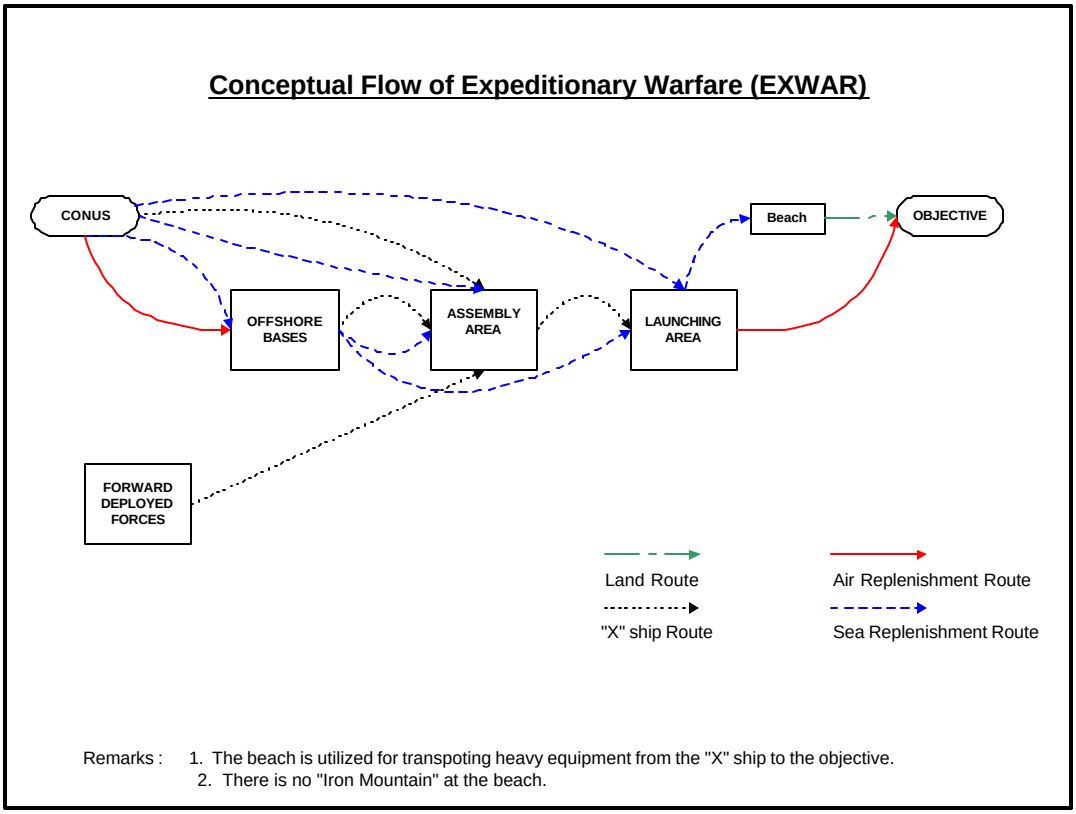


Figure XI-1: Conceptual Flow of Expeditionary Warfare

The fire support coverage will come from both air and naval assets within the conceptual ExWar design. The Sea Base will be protected by an array of future and legacy ships and aircrafts that will provide fire support with extended range precision-guided weapons and precision guided bombs.

At the end of the conflict or anytime during the conflict, the notional MEB will have the ability to be reconstituted and transported back to the "X" ships, where they may be tasked for a follow-on mission.

E. ENHANCED CAPABILITIES

The future of Expeditionary Maneuver Warfare is primarily based on two operational concepts, OMFT and STOM. As in the Planned architecture, the design requirements given to the Aero and TSSE concept design teams were driven to maximize the effectiveness of OMFT and STOM.

The functional analysis of the Current architecture revealed that there was a need for a heavy lift aircraft to supplement or replace the current CH-53's. The nature of STOM is maneuverability and speed therefore; two of the most important requirements for the Aero design were greater operational speed and range.

In the case of the TSSE concept design, the most important, and perhaps the most complex requirement was the ability to perform Sea Basing. Although not completely defined, current Sea Basing operational concepts have many important implications in the design of future platforms.

Sea Basing attempts to reduce the logistical footprint and the operational pause at the beach. Combat forces ashore therefore, can maximize maneuverability and reconstitution. Reducing the footprint ashore transfers missions such as medical care, equipment maintenance, command and control, and operational fires among others to the Sea Base platforms. The requirement of the Sea Base to indefinitely sustain the forces ashore implies an inherent transfer at sea capability not only with MSC platforms, but also with commercial shipping. STOM relies heavily on aircraft operation for the transport of personnel and supplies therefore, demanding a greater number of aircraft and flight deck space.

The enhanced capabilities for the conceptual architecture extend not only to the Aero and TSSE designs, but also across the entire ExWar spectrum. The following list of capabilities, according to both *Expeditionary Maneuver Warfare* and *Operational Maneuver From the Sea*, are the cornerstone of future ExWar and are critical components of the Conceptual architecture design.

1. MOBILITY

According to OMFT, mobility is the ability to move units from ships lying over-the-horizon to objectives lying far from the shore, crossing great distances, reducing the limitations imposed by terrain and weather, and most importantly, to seamlessly transition from maneuvering at sea to maneuvering ashore and vice-versa.

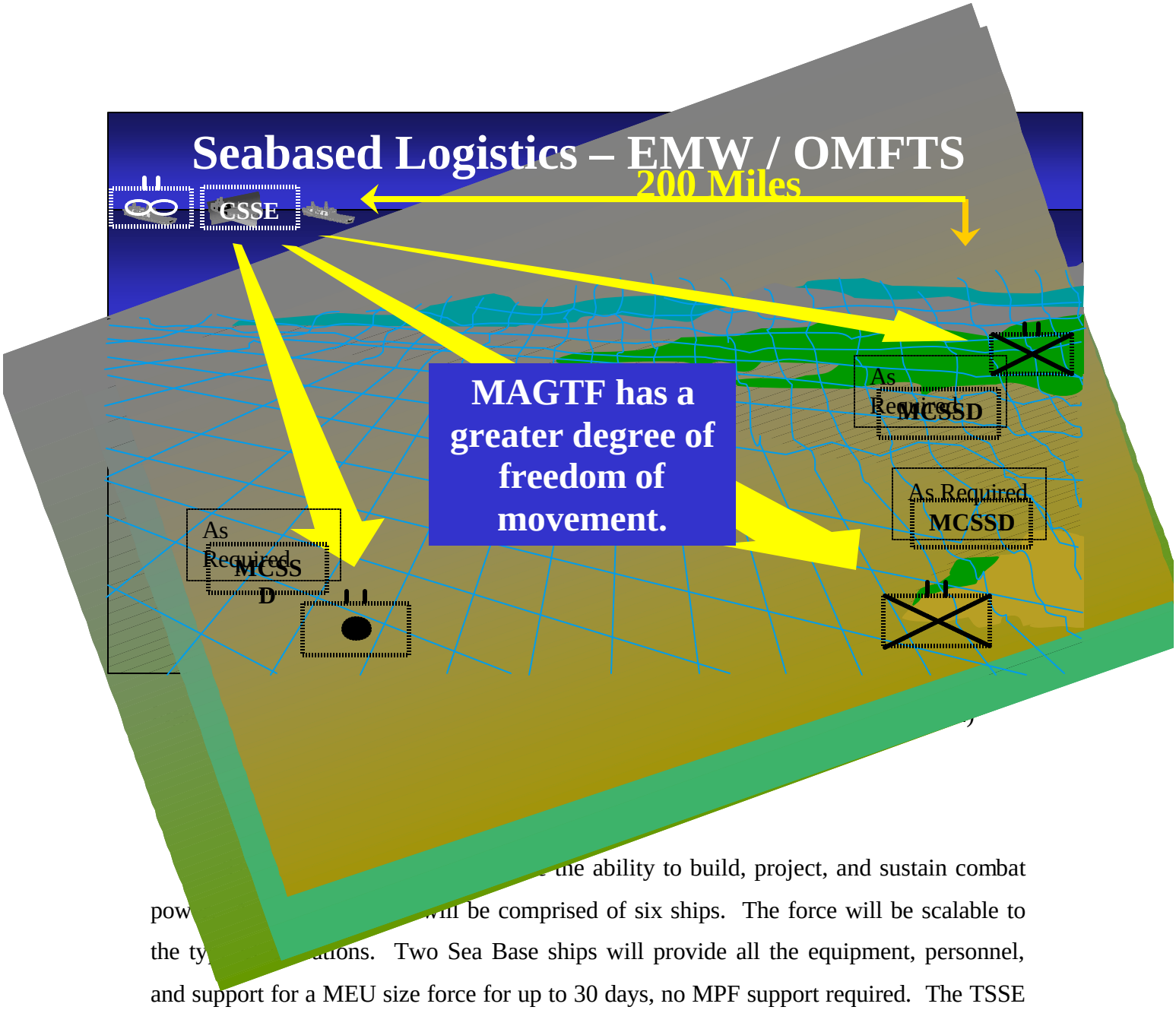
Both TSSE and Aero design have taken into account this important capability. The TSSE design is a self-deployed, self-sustained, platform. It is a combination of

LHA, MPF, and LMSR ships. The ship will have a transoceanic capability with minimum refueling, and speeds greater than 27 knots (current LHA top speed is 22 knots). Its trimaran hull form is designed to reduce friction making the engineering plant more efficient and reducing fuel consumption. The propulsion plant will be a combination of Gas Turbine Engines and Electric Generators. This engineering plant will enable the ship to transition from “cold iron” to “ready for sea” in less than an hour. Therefore, the TSSE design will provide the maneuverability at sea to the Expeditionary Strike Group. The seamlessly transition from the sea to shore will be the task of the compound helicopter designed by the Aero team.

The Aero design also enjoys capabilities, which make the aircraft highly flexible and maneuverable. The driving concept for the design is the use of a wing that at cruise speed will provide most of the lift to the aircraft; the aircraft’s main rotors will provide more horizontal thrust. With an internal payload of 37,500 lbs, and an un-refueled range of 400 NM, the compound helicopter will be able to carry up to 80 fully loaded troops at speeds up to 200 knots. Variants of the aircraft can be used as re-fueling stations for land vehicles and aircraft, and even as gun ship to provide fire support to the troops.

2. SEA BASE LOGISTICS

The requirement to sustain fast-moving, powerful, combined arms forces conducting ship-to-objective maneuver will strain the best logistics system. Speed and mobility comparable to the assault forces will be necessary for CSSEs responding to the dynamic demands of OMFTS. The Combat Service Support flow must be efficient, secure, and timely, with the option to remain Sea Based or to buildup support areas ashore. Delivery means and material handling demands are great, as is the need for a command and control system capable of rapidly communicating requirements and flexibly managing "right time, right place" support (Operational Maneuver From The Sea, 1996).



the ability to build, project, and sustain combat pow ill be comprised of six ships. The force will be scalable to the ty ations. Two Sea Base ships will provide all the equipment, personnel, and support for a MEU size force for up to 30 days, no MPF support required. The TSSE ship features a highly automated requisition and distribution management systems that reduces human input, accelerates materiel movement and reduces costs. The ship's warehousing capabilities include storage for over 325,000 ft ^{3} of provisions, ammunition, and spare parts. Selective on load, and off load, will allow the Sea Base to reduce inventories and provide for faster retrieval and delivery of supplies. This feature combined with the highly automated nature of "just in time" logistics will allow a management by exception approach. Enhanced knowledge of in-transit inventories through total asset visibility will refine allocation of transportation resources, improve item availability and increase velocity of materiel movement through the system.

b. Warehousing and Redistribution

Using Sea Based Logistics as the primary design philosophy, the ship will provide an integrated OTH floating distribution center and workshop providing indefinite sustainment. Reducing or eliminating the logistics footprint on shore will be the primary objective of Sea Based Logistics. It will reduce double handling of materiel by cutting out the intermediate step of establishing shore-based logistics activities and eliminating the operational pause associated with that effort. Each of the Sea Based ships will have 16 helicopter spots, maximizing air operations and assets. Through massive airlift, forces ashore will not be required to protect logistics bases and extensive interior lines of communication. It will allow greater operational initiative and maneuver freedom. Each of the Sea Base ships will be able to carry and operate 4 LCACs , and 2 LCU (R) that will provide transport, for land mobile combat service support forces, will discharge logistics trains that will operate with maneuver forces, allowing lines of communication to close behind them. Replenishment of bulk fuel, water and supplies will be accomplished vertically or via surface transport on reopened ground supply routes. Caches of logistics support items will be established at selected locations for rendezvous with maneuver forces. Forward arming and refueling points will be established through aerial delivery or by mobile ground units deployed ashore.

c. Maintenance Facilities and Support

Sea Basing maintenance for aviation, ground combat equipment, and the Expeditionary Strike Group will be provided in order to maintain high up-tempo for extended periods and the ability to reconstitute equipment after an operation has been completed. Other special functions such as logistics over the shore systems, medical support, and specialized sustainment will be integrated as required. The TSSE design also features modularity and growth margin that will enable to interface with future platforms as they are designed and fielded.

d. Indefinite Sustainment and Reconstitution

Shuttles with strategic and inter-theater lift and worldwide commercial distribution systems will provide indefinite sustainment. The Sea Base ships will be able to transfer standard 20 ft containers, unpack, and store the supplies. The Sea Base will essentially serve as a primary distribution center with the capability to transship cargo from containers and distribute ready for issue materiel to forces ashore.

While the principal focus of Sea Based Logistics is sustainment of operating forces, facilitating the build-up of amphibious combat power is well within its capability. As missions expand, Sea Based Logistics can support the closure of joint and coalition forces arriving in theater. As littoral operations enter new phases, Navy and Marine Corps Forces will have the unique capability to rapidly reconstitute at sea for redeployment to follow-on operations.

e. Health Service Support

Supporting the health of the military force on the Sea Base ships will be provided by a 500-bed hospital, and 4 operating rooms. Expeditionary casualty care for the 21st Century is founded on the principles of a healthy and fit force, casualty prevention, and capability based casualty care and management. Battle casualties will be handled using rapid stabilization, far forward surgery, essential care and hospitalization in theater.

3. INTEGRATED FIRES

Fire support of ship-to-objective maneuver must provide immediate and responsive high volume suppression and neutralization fires in support of all landing force elements. Unit commanders at all levels will call for and control the fires of organic and supporting arms. Fire support systems must be capable of providing highly accurate and lethal long-range fires to simultaneously satisfy the needs of both the vertical assault and the surface assault. Furthermore, these fires must be available "around the clock" and in all weather conditions. Fire support agencies must respond to calls for fire with sufficient speed and accuracy to support landing force maneuver (Ship to Objective Maneuver, 1997).

a. ***Close Air Support***

Close air support will be provided by organic Sea Base elements. The TSSE ship was designed with the capability to operate both rotary and fixed wing ACE aircraft simultaneously. Each Sea Base ship has a complement of 6 Joint Strike Fighter (JSF), and 4 Aero design Compound Helicopters for a total of 24 JSFs and 16 Compound Helos. The large tram flight deck will allow the JSF to horizontally take off fully loaded. A version of the Aero design aircraft can be used for air re-fueling, increasing the range of the JSF. With the capability for in-flight refueling, JSFs can be loitering in the vicinity of the objectives to provide immediate close air support to the ground troops, and take advantage of targets of opportunity.

Another version of the Aero design could also be used for close air support in the same fashion as the MC-130 gunship. Fitted with 30 mm cannons and 105 mm howitzers, infrared, and forward looking infrared (radar) sensors, the Compound Helicopter could be a formidable close air support asset. Each ship also has a complement of 4 AH-1Z Super Cobras for a total of 24.

Figure XI-3: Integrated Fires (Source: Navy Concept Development & Experimentation, 2001)

b. Naval Gun Fire Support

For many years, Naval Gun Fire Support has been a forgotten mission for the Navy. The nature of OMFT, STOM, and Sea Basing requires the revival of this important mission. Troops ashore require long range, precision fire in support of their operations. A unit commander ashore should be able to call for support fires, any time of day, any weather condition, and have either close air support or NGFS within minutes to suppress enemy positions. The Conceptual architecture will be able to provide solid and sustained close air support. To complement the integrated fires mission, the TSSE ship design will rely on an Electromagnetic Rail Gun. The ship will be equipped with 300 NM capable railguns that will shape the battle's pace with deep fires, simultaneously supporting forcible entry, and providing force protection - twenty-four hours a day in all weather conditions. Railguns eliminate explosives hazards, enhancing ship survivability and greatly simplifying magazine safety, ordnance logistics handling, off-loads, transportation and storage. The hypersonic projectiles will be fitted with a GPS sensor increasing their precision and lethality.

4. FORCE PROTECTION

Increased asymmetric and conventional threats will make protection of naval, joint, and combined forces increasingly challenging. The improvement of the capabilities necessary to protect the Sea Base and personnel throughout all dimensions of the battle space is a high priority. Enhancing our ability to effectively counter terrorism, to respond to chemical or biological attack, operate in a "dirty" environment, and to treat and process mass casualties is essential. The extension of an effective missile defense umbrella, effective counter-mine capabilities, and the ability to locate and negate or destroy key enemy weapon systems are also fundamental to our efforts to achieve full-dimensional protection (Naval Vision, 2020).

Sea Basing will dramatically reduce force protection requirements because the need to protect land bases, maintenance installations, supply lanes and depots is no longer required. Depending on the level of threat, the Sea Base will still require protection

against enemy aircraft, anti-ship cruise and theater ballistic missiles, surface combatants, submarine and mines. Although the Expeditionary Strike Group will execute many of the force protection missions, the TSSE design incorporated organic self-defense capabilities that will allow it to operate independently if so desired. The ships combat systems suite will be described in the following paragraphs.

a. Air Warfare

- 3-D Phase Array Air Search
- Air/Fire Control
- SPG-9E (or upgrade)
- Range: 1-20 NM
- Secondary Fire Control System
- AN/UPX-29 IFF System
- Free Electron Laser (x2)
- Range: NMT 10 km (~33000 ft)
- Rail Gun (x2)
- Range: 200-300 nm
- MK 53 NULKA (part of AIEWS – follow on to Mk 36 SRBOC R)

b. Surface Warfare

- Surface Search/Fire Control Radar
- AN/SPS-73 Surface Search/Navigation Radar
- Range: 73 nm
- SPQ-9E or higher
- Range: 1-20 NM
- Free Electron Laser
- Range: NMT 10 km (~33000 ft)
- Rail Gun
- Range: 200-300 nm in 6+ minutes

- ADV: four-fold increase of onboard projectiles, recoil forces less than the existing 5”/62 naval gun, less stressing automated projectile handling, eliminated explosive hazard.

c. Submarine and Mine Protection

- AN/SQS-56/DE1160(I) or upgrade
- Active Towed Array or Hull Transducer
- Frequencies: 3.75Khz, 7.5Khz and 12Khz
- Mk-32 SVTT (upgrade) w/Mk-50 (upgrade)
- Range: ~3000+ yds max range
- ALMDS: Airborne Laser Mine Detection System
- Range: 500-1000yds.
- Depth: More than deepest draft of available ships (actual number classified).
- Electroptics based system that will detect and localize drifting/floating and shallow-water moored mines from the CH-60 helicopter.
- LMRS – Long Term Mine Reconnaissance System
- Uses 2 unmanned undersea vehicles (UUVs) such as SAHRV for mine detection and reconnaissance
- Range: 120 NM
- AN-SLQ-48 Mine Neutralization System or EMNS
- EMNS demonstrated dramatic reductions in mission time, cost, weight and handling requirements.
- Remotely operated vehicles can keep harbors and sea lanes clear of bottom and moored mines
- RMS – Remote Mine hunting System
- RAMICS – Rapid Mine Clearance System

d. *Chemical Biological and Radiological Defense*

•Remote sensing lasers - Sample molecules in air to detect contents

•Range: 10 to 100 km right now.

•Ship will utilize non-absorbent material (paints, non-skids, other exterior features).

•Airlocks will be incorporated in well deck and on elevators.

5. INTELLIGENCE

Intelligence must support decision making by maintaining situational awareness, monitoring indications and warnings, identifying potential targets, and assessing the adversary's intent and capabilities at all levels of operations. This requires establishing an intelligence baseline that includes order of battle, geographical factors, and cultural information; all contained in a universally accessible database (Expeditionary Maneuver Warfare, 1996).

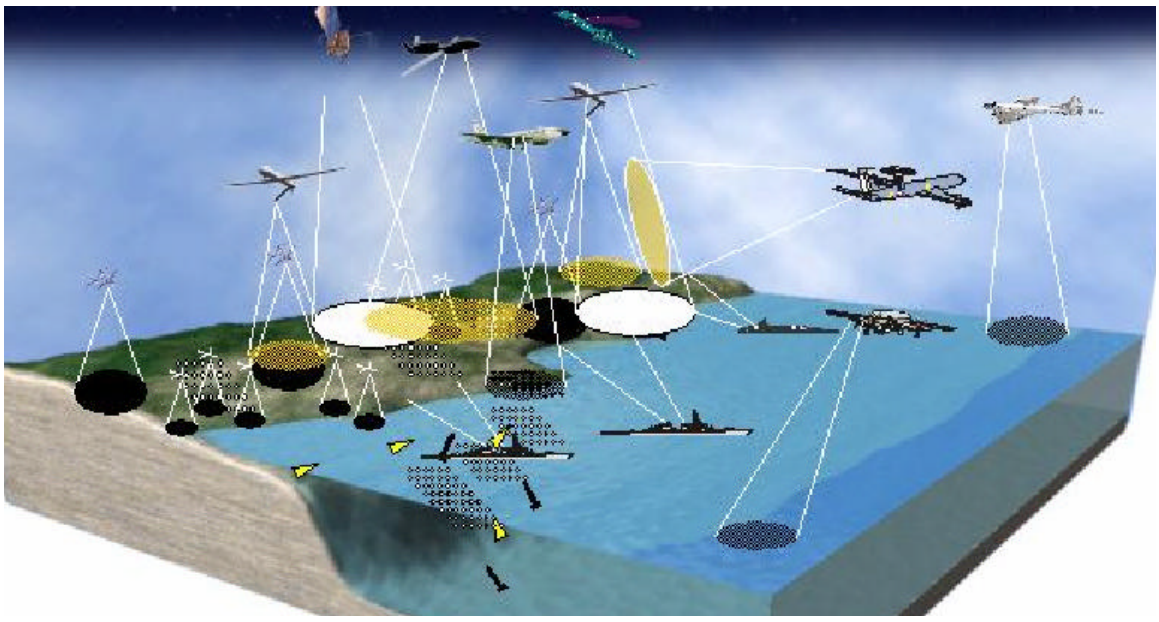


Figure XI-4: Expeditionary Sensor Grid (Source: Navy Concept Development & Experimentation, 2001)

6. COMMAND AND CONTROL

Expeditionary Maneuver Warfare requires adaptable and intuitive C2 architecture and systems that fully integrate with joint and are compatible with multinational assets. Expeditionary forces will be able to access, manipulate, and use information in near real time, developing a common tactical and operations understanding of the battle space. They will have connectivity to theater, and national assets and the ability to disseminate information throughout the force. This will support fully integrated collaborative planning efforts during both deployment and employment (Expeditionary Maneuver Warfare, 1996). Detailed information on the TSSE and Aero design concepts can be found in Chapters XIV and XV