

Richard Handweg (561)494-2417
Richard.j.handweg@lmco.com

Information to fill out FCC form 442 along with exhibits

Correspondence #3805, 3804

FCC File # 0214-EX-PL-2005 corrected 0290-EX-PL-2005

Confirmation number EL726491 Corrected EL138014

Section 1

Lockheed Martin Maritime Systems and Sensors
100 E. 17th St.
Riviera Beach, Fl
33040

Section 2(a)

New Station

Section 2(b) N/A

Section 3.

This application requests power of 10 watts (peak) which exceeds the normal value for 802.11B.

Section 4

See Exhibit 1

Section 5(a)

Operation will be mobile.

Section 5(b)

See section 5(c)

Section 5(c)

Location:

See exhibit 2

Section 5(d)

Datum NAD 83 is used.

Section 6

A directional antenna will be used

Beam width at half power point is 30°.
Orientation in the horizontal plane will be variable.
Orientation in the vertical plane will be 0°

Section 7

This authorization will be used to fulfill the requirements of a government contract.
See Exhibit 3

Section 8

This equipment is not being built for export.

Section 9

This authorization will provide communication essential to a research project. Radio communication is not the objective of the research project.
See exhibit 4.

Section 10

N/A

Section 11 (a)

The estimated time required for ADUUV testing and all follow on testing will exceed two years. The above contract and anticipated follow on contracts from the same contracting authority are expected to continue five years from the application date.

Formatted: F

Section 11(b)

N/A

Section 12

No significant environmental impact is expected.

Section 13

List of radio equipment to be installed.

Manufacturer	Model Number	Number of units
Cisco	AIR-BR350-A-K9	2
HyperLink Technologies	Hyperamp HA2410	2
Cushcraft	PC2415N	1
Cushcraft	S2403B	1
Aeroantenna	AT2775-240	1

--	--	--

Section 14

Is this equipment capable of station identification pursuant to 5.152?

No. This equipment is not capable of either voice or morse code identification. The SSID can be set to a call sign up to 32 characters. This can be readily monitored using any computer equipped with an 802.11b/g radio.

Section 15

No. This is a mobile application. The antennas will be mounted on the deck of a boat and on a 36" mast on a submersible vehicle.

Section 16

Applicant is a corporation.

Section 17

Applicant is not a foreign government or a representative of a foreign government.

Section 18

Has applicant or any party to this application had an FCC station license or permit revoked or had any application for permit, license, or renewal denied by this commission? Not as far as we know.

Section 19

Will the permit holder be the operator of this station?

Yes.

Section 20

Richard Handweg, Staff Engineer, 561-494-2417

Section 21

Applicant anti drug abuse certification.

Yes

Section 22

List all exhibits in numerical sequence and the item number of the form requiring the exhibit identified.

Exhibit number	Item no. of form				
1	4				

2	5(c)				
3	7				
4	9				

Section 23

Certification:

Exhibit 1**Ref Section 4**

Frequencies, power and modulation types. These conform to 802.11b standard except for increased power (10 W).

Frequency (GHz)	Power			Emission	Modulating Signal	Bandwidth (kHz)
(A)	(B)	(C)	(D)	(E)	(F)	(G)
2.412	10 W	79.4W ERP	Peak	DSSS/OFDM D8D	Digital Data	22000
2.417	10 W	79.4W ERP	Peak	DSSS/OFDM D8D	Digital Data	22000
2.422	10 W	79.4W ERP	Peak	DSSS/OFDM D8D	Digital Data	22000
2.427	10 W	79.4W ERP	Peak	DSSS/OFDM D8D	Digital Data	22000
2.432	10 W	79.4W ERP	Peak	DSSS/OFDM D8D	Digital Data	22000
2.437	10 W	79.4W ERP	Peak	DSSS/OFDM D8D	Digital Data	22000
2.442	10 W	79.4W ERP	Peak	DSSS/OFDM D8D	Digital Data	22000
2.447	10 W	79.4W ERP	Peak	DSSS/OFDM D8D	Digital Data	22000
2.452	10 W	79.4W ERP	Peak	DSSS/OFDM D8D	Digital Data	22000
2.457	10 W	79.4W ERP	Peak	DSSS/OFDM D8D	Digital Data	22000
2.462	10 W	79.4W ERP	Peak	DSSS/OFDM D8D	Digital Data	22000

Exhibit 2.

Location of operations (Section 5c)

Each of these locations will include two mobile stations (antennas) which will operate within the stated area.

Formatted: Fo

Location 1.

Testing will take place from time to time in this location.

100 E. 17th st.

Riviera Beach Florida

33404

Actual testing will take place on and around the dock area which extends into Lake Worth Lagoon and out to Lake Worth Inlet. This also covers the transit route from location 1 to location 3.

This area is bounded by the lines of latitude and longitude 80°3'30"W, 80°01'00"W 26°47'00"N, 26°45'00"N

Formatted: Fo

Deleted: With point at 80°3'5.1 Eastern half cir

Deleted: ¶

Location 2

Testing will take place from time to time at this location.

1400 Northpoint Parkway

Suite 100

West Palm Beach Florida

33404

Indoors and in the surrounding parking lot area.

Within 1000 ft radius of the location: 80° 5'58.7" W, 26°, 45'45.6"N (GPS)

Formatted: Fo

Location 3

At sea test area. The largest portion of testing will take place from mobile unit to mobile unit in this location.

In the Atlantic ocean off the coast of West Palm Beach and Palm Beach Florida in an area bounded approximately by **Latitude 26°55'48"N and 26°31'30" N, Longitude 77°55'42"W and 80°02'30"W** Testing will take place a minimum of one mile off shore. Refer to nautical chart below.

Formatted: Fo

Deleted: (26°5 (26°55'48"N, 80 N, 77°55'42"W) 80°02'30"W)

ADUUV AT-SEA OPERATIONS AREA

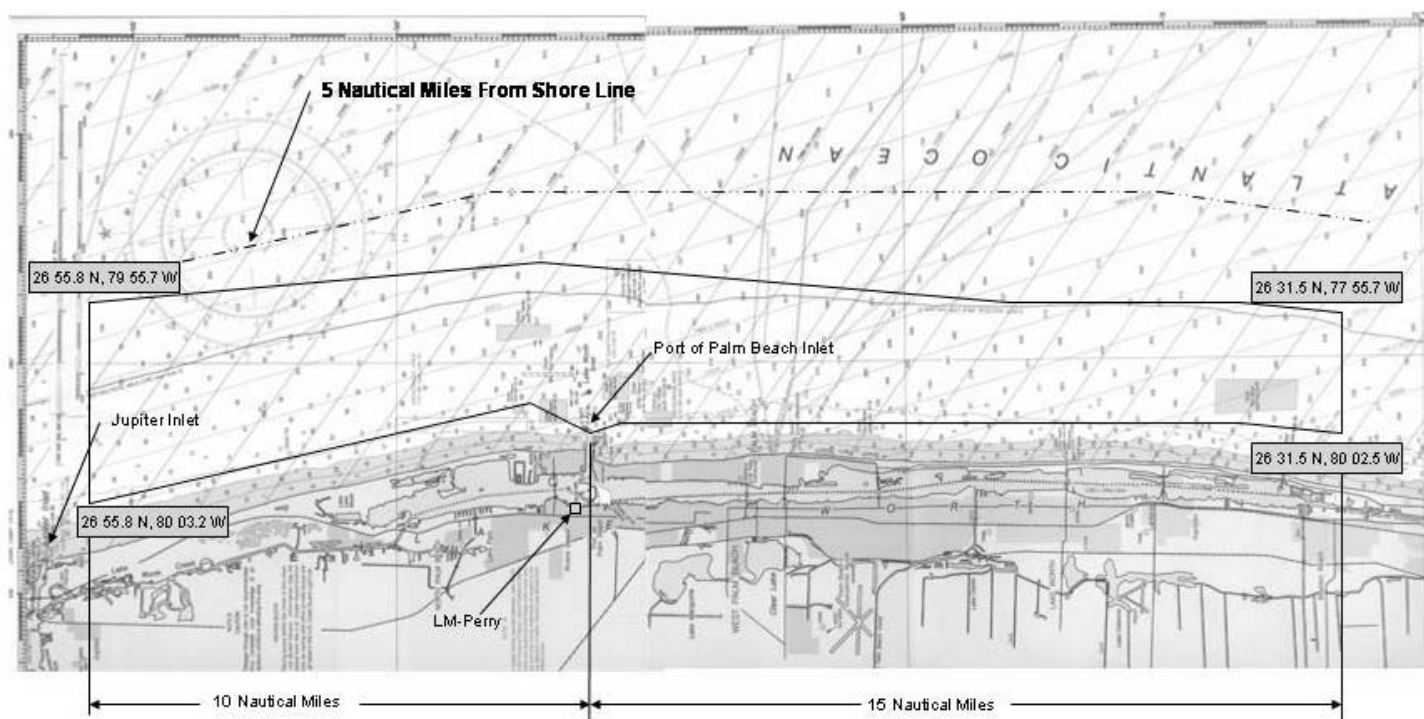


Exhibit 3:

Section 7

U.S. Government contract information.

Contract number N00024-03-C-6308

Naval Sea Systems Command

1333 Isaac Hull Avenue

Washington Navy Yard

Washington DC

20376

Contracting officer:

Mindy L. Daniel

202-781-2928

Information related to this contract is for official use only.

Distribution statement D: Distribution authorized to department of defense and dod contractors only. (Critical technology and administrative or operational use) (Oct. 2002). Other requests shall be referred to the program manager for unmanned undersea vehicles (PMS403).

This application is in support of the Advanced Development Unmanned Underwater Vehicle (ADUUV) project. This communication will be used for remote monitoring and control of an underwater vehicle, at sea, by a surface ship. This mode of communication, 802.11b, is a requirement of the contract. The proposed use of a directional antenna (on the ship) and increased power (on the ship and on the remote vehicle) is required to meet the range requirements of the contract. The installation on the vehicle will use a custom omnidirectional antenna mounted on a mast with a maximum height of 36 inches above the ocean surface. The ship installation will use an omni directional antenna and a directional antenna mounted approximately 20 feet above the ocean surface. This communication will be used to support testing of the vehicle during development testing prior and subsequent to delivery to the Navy.

Exhibit 4
Section 9

(a) The nature of the research project being conducted:

This project seeks to deliver an autonomous unmanned under water vehicle to the United States Navy. The requested communications facilities will support remote monitoring and control of the unmanned submersible vehicle during testing.

(b) The communications facilities are necessary for the research project involved. During development testing the ADUUV will operate autonomously under water. From time to time, the ADUUV will return to the surface to communicate with the mother ship. During these times the mother ship will send directions (mission plans) and other mission parameters to the ADUUV vehicle. The ADUUV vehicle will send accumulated sensor and performance data to the mother ship. Communications tests will take place at any of the locations listed in Exhibit 2 to verify operation of the communications system prior to at sea testing in order to reduce risk. This mode of communication is specifically required by contract.

(c) The existing communications facilities are inadequate.

This is a new communications facility.

This application will use standard, off the shelf 802.11b communications hardware and seeks only to allow a higher radiated power limit through the use of amplifiers and a directional antenna in order to meet the communications range requirements of the contract. The contract calls for communications at 10Mb/Sec at 1 mile and 1Mb/Sec at 10 miles.

Other communications facilities were considered.

Acoustic (through the water) communications were much too slow and limited in range.

Standard 802.11B communications were fast enough but limited in range due to low power and adverse propagation characteristics in the open ocean, close to the surface of the water and the fact that the vehicle antenna is mounted on a very unstable platform. More power was required to achieve acceptable range and throughput.

Various military radios (Singars, JTTRS) were considered but for reasons of cost, weight, availability, the requirement for crypto key loading, space, compatibility and power consumption, these were deemed unacceptable.