SECURITY SUMMARY & SPECIAL HANDLING REQUIREMENTS

It is your responsibility to ensure that each page of this application is marked in accordance with the procedures in your security manual. The following summaries are provided for that purpose.

APPLICATION TITLE: (U) Thales TRC-9310AP VHF Frequency Hopping Transceiver

OVERALL CLASSIFICATION: UNCLASSIFIED

SPECIAL HANDLING: A - Approved for public release; distribution is unlimited (DoD Directive 5230.24).

DERIVATIVE CLASSIFICATION(S):

ORIGINAL CLASSIFICATION AUTHORITY:

REASON(S) FOR CLASSIFICATION:

DECLASSIFICATION INSTRUCTIONS:

DECLASSIFICATION DATE:

DECLASSIFICATION EVENT:

DOWNGRADING CLASSIFICATION:

DOWNGRADING DATE:

SECTION	STARTING PAGE #	CLASSIFICATION
DOD GENERAL INFORMATION	1	UNCLASSIFIED
TRANSMITTER EQUIPMENT CHARACTERISTICS #1	3	UNCLASSIFIED
RECEIVER EQUIPMENT CHARACTERISTICS #1	5	UNCLASSIFIED
ANTENNA EQUIPMENT CHARACTERISTICS #1	6	UNCLASSIFIED
NTIA GENERAL INFORMATION	7	UNCLASSIFIED

APPLICATION FOR EQUIPMENT FREQUENCY ALLOCATION	CLASSIFICATION **UNCLASSIFIED**	DATE 03 Sep 2010	Page 1 of 7

DOD GENERAL INFORMATION

TO Army Spectrum Management Office (ASMO) 2461 Eisenhower Ave., Suite 1204 Alexandria, VA 22331-2200	**FROM** Raytheon Integrated Defense Systems ATTN: Steven McPherson 350 Lowell St. Andover, MA. 01810 978-470-7036

1. APPLICATION TITLE (U) Thales TRC-9310AP VHF Frequency Hopping Transceiver

2. SYSTEM NOMENCLATURE (U) PATRIOT Launcher Data Link Communications

3. STAGE OF ALLOCATION (U) ☐ a. STAGE 1 CONCEPTUAL ☐ b. STAGE 2 EXPERIMENTAL ☑ c. STAGE 3 DEVELOPMENTAL ☐ d. STAGE 4 OPERATIONAL

4. FREQUENCY REQUIREMENTS *(See Remarks)

a. FREQUENCY(IES) (U)	b. EMISSION DESIGNATORS (U)
30 MHz - 87.975 MHz	25K0F1D (Hopping) 25K0F1E (Hopping) 25K0F3E

5. TARGET STARTING DATE FOR SUBSEQUENT STAGES

a. STAGE 2 (U) NA **b. STAGE 3** (U) NA **c. STAGE 4** (U) 01 Jan 2013

6. EXTENT OF USE (U) Intermittent use, approximately 8-10 daylight hours daily.

7. GEOGRAPHICAL AREA FOR

a. STAGE 2 (U) NA

b. STAGE 3 (U) White Sands Test Center NM, Aberdeen Proving Grounds/Aberdeen Test Center MD, Eglin AFB FL, Santa Rosa Island FL, Patuxent River Naval Base MD, Pelham NH, Andover MA.

c. STAGE 4 (U) UAE

8. NUMBER OF UNITS

a. STAGE 2 (U) NA **b. STAGE 3** (U) 3 **c. STAGE 4** (U) 5

9. NUMBER OF UNITS OPERATING SIMULTANEOUSLY IN THE SAME ENVIRONMENT (U) 5 units in rotation, one unit at a time, each 1.6 second communication cycle

10. OTHER J/F 12 APPLICATION ID(S) TO BE

a. SUPERSEDED (U) NA

b. RELATED (U) NA

11. IS THERE ANY OPERATIONAL REQUIREMENT AS DESCRIBED IN THE INSTRUCTIONS FOR PARAGRAPH 11? *(See Remarks)

(U) ☑ a. YES ☐ b. NO ☐ c. NAVAIL

12. NAMES AND TELEPHONE NUMBERS

a. PROGRAM MANAGER (U)		b. PROJECT ENGINEER (U)	
NAME	Edward Geisler	**NAME**	Steven McPherson
COMMERCIAL	978-436-6278	**COMMERCIAL**	978-470-7036
DSN	NA	**DSN**	NA
EMAIL	edward_geisler@raytheon.com	**EMAIL**	steven_f_mcpherson@raytheon.com

13. REMARKS

(U) Item 4:
2320 Channels with 25KHz spacing

(U) Item 11:
UAE

(U) Other Contacts:

DOWNGRADING INSTRUCTIONS	CLASSIFICATION **UNCLASSIFIED**

DOD GENERAL INFORMATION

Eric Melville
AMRDEC FMO
256-842-5758
eric.melville@amrdec.army.mil

(U) DOD General Information Remarks:
Thales TRC-9300 family of radios are already present in UAE.

Target start date for stage 3 is from March 2011 - December 2012 (CVT/SPVT/Live Firing).

TRANSMITTER EQUIPMENT CHARACTERISTICS

1. NOMENCLATURE, MANUFACTURER'S MODEL NO.	2. MANUFACTURER'S NAME
(U) TRC-9310-AP	(U) Thales
3. TRANSMITTER INSTALLATION (U) PATRIOT Shelters (EDS, CRG) and Launchers (LS)	**4. TRANSMITTER TYPE** (U) FM Communications
5. TUNING RANGE (U) 30 MHz - 87.975 MHz	**6. METHOD OF TUNING** (U) PLO Synthesizer

7. RF CHANNELING CAPABILITY (U) 30 MHz, 25 KHz increments, 2320 channels

8. EMISSION DESIGNATOR (U) 25K0F1D

12. EMISSION BANDWIDTH (U) ☐ Calculated ☑ Measured

a. -3 dB	b. -20 dB	c. -40 dB	d. -60 dB	e. OC-BW
NAvail	25 kHz	NAvail	NAvail	NAvail

13. MAXIMUM BIT RATE (U) 16 kbps

14. MODULATION TECHNIQUES AND CODING (U) Frequency Modulation - Hopping

15. MAXIMUM MODULATION FREQUENCY (U) 6.5 kHz

17. DEVIATION RATIO (U) 1

18. PULSE CHARACTERISTICS

a. RATE (U)	b. WIDTH (U)	c. RISE TIME (U)	d. FALL TIME (U)	e. COMP RATIO (U)
NA	NA	NA	NA	NA

19. POWER *(See Remarks)

a. MEAN (U) 5 W - 50 W

b. PEP (U) 79 W

8. EMISSION DESIGNATOR (U) 25K0F1E

12. EMISSION BANDWIDTH (U) ☐ Calculated ☑ Measured

a. -3 dB	b. -20 dB	c. -40 dB	d. -60 dB	e. OC-BW
NAvail	25 kHz	NAvail	NAvail	NAvail

13. MAXIMUM BIT RATE (U) 16 kbps

14. MODULATION TECHNIQUES AND CODING (U) Frequency Modulation - Hopping

15. MAXIMUM MODULATION FREQUENCY (U) 6.5 kHz

17. DEVIATION RATIO (U) 1

18. PULSE CHARACTERISTICS

a. RATE (U)	b. WIDTH (U)	c. RISE TIME (U)	d. FALL TIME (U)	e. COMP RATIO (U)
NA	NA	NA	NA	NA

19. POWER

a. MEAN (U) 5 W - 50 W

b. PEP (U) 79 W

TRANSMITTER EQUIPMENT CHARACTERISTICS

8. EMISSION DESIGNATOR (U) 25K0F3E

12. EMISSION BANDWIDTH (U) ☐ Calculated ☑ Measured

a. -3 dB	b. -20 dB	c. -40 dB	d. -60 dB	e. OC-BW
NAvail	25 kHz	NAvail	NAvail	NAvail

13. MAXIMUM BIT RATE (U) 16 kbps

14. MODULATION TECHNIQUES AND CODING (U) Amplitude modulation

15. MAXIMUM MODULATION FREQUENCY (U) NA

17. DEVIATION RATIO (U) 1

18. PULSE CHARACTERISTICS

a. RATE (U)	b. WIDTH (U)	c. RISE TIME (U)	d. FALL TIME (U)	e. COMP RATIO (U)
NA	NA	NA	NA	NA

19. POWER

a. MEAN (U) 5 W - 50 W

b. PEP (U) 79 W

9. FREQUENCY TOLERANCE (U) 2 ppm

10. FILTER EMPLOYED

(U) ☑ a. YES ☐ b. NO *(See Remarks)

11. SPREAD SPECTRUM

(U) ☑ a. YES ☐ b. NO

16. PRE-EMPHASIS

(U) ☐ a. YES ☑ b. NO

20. OUTPUT DEVICE

(U) Solid-State

22. SPURIOUS LEVEL

(U) -80 dB

21. HARMONIC LEVEL

a. 2nd (U) -67 dB

b. 3rd (U) -67 dB

c. OTHER (U) -80 dB

23. FCC TYPE ACCEPTANCE NO.

(U) NA

24. REMARKS

(U) Item 10:
Built in agile proximity filter for cosite operation

(U) Item 19 Designator 25K0F1D:
Emission Bandwidth calculations based on TRC-9310AP spec of at least 67dB below carrier for harmonic H2 (2x88MHz) (IE, -67dB per octave above and below 88MHz). TRC-9310AP is compliant with MIL-STD-461E, notice RE103.

Item 14 Modulation Techniques: 300 hops per second, hopset programmable from 1-2320 channels.

Item 15 Maximum Modulation Frequency: 6 KHz in frequency hopping mode, 6.5 KHz in fixed frequency mode.

Item 17 Deviation ratio: (0.5 x 20 KHz BW in item 12a)/(8KHz data SQ wave in item 15) = 1.25 deviation ratio.

Item 19 PEP power: calculation based on TRC-9310AP spec of +2dB upper tolerance on nominal power.

Item 22 Spurious Level: based on TRC-9310AP spec of at least 67dB below carrier for harmonic H3 (3x88MHz) and at least 80 dB below carrier for harmonics greater than or equal to H4 (4x88MHz). Off-harmonic levels unknown.

RECEIVER EQUIPMENT CHARACTERISTICS

1. NOMENCLATURE, MANUFACTURER'S MODEL NO.
(U) TRC-9310AP

2. MANUFACTURER'S NAME
(U) Thales

3. RECEIVER INSTALLATION (U)
Patriot Shelters (ECS, CRG) and Launchers (LS)

4. RECEIVER TYPE
(U) Superheterodyne

5. TUNING RANGE (U)
30 MHz - 87.975 MHz

6. METHOD OF TUNING
(U) Crystal and PLL Synthesizer

7. RF CHANNELING CAPABILITY
(U) 30 MHz, 25 KHz increments, 2320 channels

8. EMISSION DESIGNATORS (U)
25K0F1D 25K0F1E
25K0F3E

9. FREQUENCY TOLERANCE
(U) 2 ppm

10. IF SELECTIVITY

	1st (U)	2nd (U)	3rd (U)
a. -3 dB	52 kHz	52 kHz	NA
b. -20 dB	160 kHz	175 kHz	NA
c. -60 dB	400 kHz	700 kHz	NA

11. RF SELECTIVITY
☐ Calculated ☑ Measured

a. -3 dB (U) 50 kHz
b. -20 dB (U) 2 MHz
c. -60 dB (U) 8 MHz
d. Preselection Type (U) Not Available

12. IF FREQUENCY
a. 1st (U) 124.8 MHz
b. 2nd (U) 384 kHz
c. 3rd (U) NA

13. MAXIMUM POST DETECTION FREQUENCY (U)
16 kHz

14. MINIMUM POST DETECTION FREQUENCY (U)
NA

15. OSCILLATOR TUNED

	1st (U)	2nd (U)	3rd (U)
a. ABOVE TUNED FREQUENCY			NA
b. BELOW TUNED FREQUENCY		X	NA
c. EITHER ABOVE OR BELOW THE FREQUENCY	X		NA

16. MAXIMUM BIT RATE (U) 16 kbps

17. SENSITIVITY
a. SENSITIVITY (U) -113 dBm
b. CRITERIA (U) BER <5*10^-2 at 16KBps
c. NOISE FIG (U) 20 dB
d. NOISE TEMP (U) NA

18. DE-EMPHASIS (U)
☐ a. YES ☑ b. NO

19. IMAGE REJECTION (U) 80 dB

20. SPURIOUS REJECTION (U) NA

21. REMARKS
(U) Receiver Remarks:
Maximum Post Detection Frequency: 3 KHz in analog mode, 16 KHz in frequency hopping mode.

ANTENNA EQUIPMENT CHARACTERISTICS

1. (U) ☐ **a. TRANSMITTING** ☐ **b. RECEIVING** ☑ **c. TRANSMITTING AND RECEIVING**

2. NOMENCLATURE, MANUFACTURER'S MODEL NO.
(U) ANT 223 S

3. MANUFACTURER'S NAME
(U) Thales

5. TYPE
(U) Broadband Whip

4. FREQUENCY RANGE (U)
30 MHz - 88 MHz

6. POLARIZATION (U)
Vertical

8. GAIN *(See Remarks)
a. MAIN BEAM (U) -2 dBi
b. 1st MAJOR SIDE LOBE
(1) 1st Side Lobe: (U) NA
(2) Angular Position: (U) NA

9. BEAMWIDTH
a. HORIZONTAL: (U) 360 degrees
b. VERTICAL: (U) 120 degrees

7. SCAN CHARACTERISTICS
a. TYPE (U) NA
b. VERTICAL SCAN (U) Fixed (No Scan)
(1) Max Elev (U) NA
(2) Min Elev (U) NA
(3) Scan Rate (U) NA
c. HORIZONTAL SCAN (U) Fixed (No Scan)
(1) Sector Scanned (U) NA
(2) Scan Rate (U) NA
d. SECTOR BLANKING (U) ☐ **(1) YES** ☑ **(2) NO**

10. REMARKS
(U) Item 8:
Gain -4 dBi from 50 MHz to 75 MHz, decreasing to -6 dBi at 30 MHz and -3 dBi at 88 MHz.

NTIA GENERAL INFORMATION

1. APPLICATION TITLE (U)
Thales TRC-9310AP VHF Frequency Hopping Transceiver

2. SYSTEM NOMENCLATURE (U)
PATRIOT Launcher Data Link Communications

3. STAGE OF ALLOCATION (U) ☐ a. STAGE 1 CONCEPTUAL ☐ b. STAGE 2 EXPERIMENTAL ☑ c. STAGE 3 DEVELOPMENTAL ☐ d. STAGE 4 OPERATIONAL

4. FREQUENCY REQUIREMENTS

a. FREQUENCY(IES) (U)	b. EMISSION DESIGNATORS (U)
30 MHz - 87.975 MHz	25K0F1D (Hopping) 25K0F1E (Hopping) 25K0F3E

5. PURPOSE OF SYSTEM, OPERATIONAL AND SYSTEM CONCEPTS (U)
TRANSMISSION AND RECEPTION OF ENCRYPTED DATA MESSAGES BETWEEN SHELTER AND LAUNCHERS IN A PATRIOT FIRE UNIT VIA LOS FREQUENCY-HOPPING VHF PROPAGATION.

(WARTIME USE) (U) ☑ a. YES ☐ b. NO

6. INFORMATION TRANSFER REQUIREMENTS (U) HALF-DUPLEX TRANSFER 2048-BIT MESSAGE AT 16,000 BPS IN BOTH DIRECTIONS EVERY 1.6 SECONDS.

7. ESTIMATED INITIAL COST OF THE SYSTEM (U) System development cost is TBD.

8. TARGET DATE FOR (U)

a. APPLICATION APPROVAL	b. SYSTEM ACTIVATION	c. SYSTEM TERMINATION
01 Mar 2011	01 Jun 2011	01 May 2012

9. SYSTEM RELATIONSHIP AND ESSENTIALITY (U) THE THALES TRC-9310AP RADIO IS PLANNED FOR INSTALLATION IN PROTOTYPE UAE PATRIOT SHELTER / LAUNCHER DATA LINKS AT WSMR FOR SYSTEM VERIFICATION OF LINK PERFORMANCE VIA FREQUENCY-HOPPING VHF PROPAGATION UNDER DIFFERENT FIELD CONDITIONS. THE TRC-9310AP IS THE RADIO SELECTED BY THE UAE CUSTOMER FOR THIS APPLICATION.

10.REPLACEMENT INFORMATION (U) SINCGARS MODEL AN/VRC-90A USED IN THE US IS BEING REPLACED BY THE TRC-9310AP FOR UAE PER CUSTOMER DIRECTION. FREQUENCY ALLOCATIONS FOR AN/VRC-90A AND TRC-9310AP ARE THE SAME.

11.RELATED ANALYSIS AND /OR TEST DATA (U) TRC-9310AP EMC TEST/ANALYSIS REPORTS NOT AVAILABLE. THALES EMC SPECS SHOW COMPLIANCE WITH MIL-STD-461D, NOTICES CE102, RE101, RE102, CS101, CS114, CS115, RS101, RS103 & RS105.

12.NUMBER OF MOBILE UNITS (U) 3

13. GEOGRAPHICAL AREA FOR

a. STAGE 2 (U) NA

b. STAGE 3 (U) White Sands Test Center NM, Aberdeen Proving Grounds/Aberdeen Test Center MD, Eglin AFB FL, Santa Rosa Island FL, Patuxent River Naval Base MD, Pelham NH, Andover MA.

c. STAGE 4 (U) UAE

14. LINE DIAGRAM

15. SPACE SYSTEMS

16. TYPE OF SERVICE(S) FOR STAGE 4 *(See Remarks)

17. STATION CLASS(ES) FOR STAGE 4

18. REMARKS (U) Item 16:
No specific service (EW)