| APPLICATION FOR EQUIPMENT FREQUENCY ALLOCATION | CLASSIFICATION<br>UNCLASSIFIED | DATE<br>9/1/13 | FORM APPROVED<br>OMB No. 0704-0188<br>Page 1 of 6 Pages |
|---|---|---|---|

## DOD GENERAL INFORMATION

| TO | FROM |
|---|---|
| USMP (for testing from August through October 2013) | Dmitri Nguyen, US Army TARDEC<br>6501 E. Eleven Mile, building 200C<br>RDTA-RS/M.S. 264<br>Warren, MI 48397-5000 |

**1. APPLICATION TITLE**
Rajant LX4 radio – 1445 MHz Transceiver

**2. SYSTEM NOMENCLATURE**
Rajant LX4 radio– 1445 MHz Transceiver

**3. STAGE OF ALLOCATION** *(X one)*
☐ a. STAGE 1 CONCEPTUAL ☐ b. STAGE 2 EXPERIMENTAL ☐ c. STAGE 3 DEVELOPMENTAL ☒ d. STAGE 4 OPERATIONAL

**4. FREQUENCY REQUIREMENTS**
a. FREQUENCY(IES) 1445 MHz
b. EMISSION DESIGNATOR(S) 22M0G1DAW (non-hopping)

**5. TARGET STARTING DATE FOR SUBSEQUENT STAGES**

| a. STAGE 2 | b. STAGE 3 | c. STAGE 4 |
|---|---|---|
| NA | NA | September through October 2013 |

**6. EXTENT OF USE**
Intermittent – 12 hours

**7. GEOGRAPHICAL AREA FOR**
a. STAGE 2 NA
b. STAGE 3 NA
c. STAGE 4 US&P

**8. NUMBER OF UNITS**

| a. STAGE 2 | b. STAGE 3 | c. STAGE 4 |
|---|---|---|
| NA | NA | 2 |

**9. NUMBER OF UNITS OPERATING SIMULTANEOUSLY IN THE SAME ENVIRONMENT** 30

**10 OTHER J/F 12 APPLICATION NUMBER(S) TO BE** None
☐ a. SUPERSEDED J/F 12/
☐ b. RELATED J/F 12/

**11. IS THERE ANY OPERATIONAL REQUIREMENT AS DESCRIBED IN THE INSTRUCTIONS FOR PARAGRAPH 11?**
☐ a. YES ☒ b. NO ☐ c. NAvail

**12. NAMES AND TELEPHONE NUMBERS**

| a. PROGRAM MANAGER | (1) COMMERCIAL | (2) AUTOVON |
|---|---|---|
| Robert Kania | 410-278-9424 | |
| **b. PROJECT ENGINEER** | **(1) COMMERCIAL** | **(2) AUTOVON** |
| Dmitri Nguyen | **586-202-5490** | |

**13. REMARKS**

| DOWNGRADING INSTRUCTIONS | CLASSIFICATION | |
|---|---|---|
| | UNCLASSIFIED | |

DD Form 1494, AUG 96

## TRANSMITTER EQUIPMENT CHARACTERISTICS

| | |
|---|---|
| **1. NOMENCLATURE, MANUFACTURER'S MODEL NO.**<br>Rajant LX4 radio – 1445 MHz Transceiver | **2. MANUFACTURER'S NAME**<br>Rajant Corporation |
| **2. TRANSMITTER INSTALLATION**<br>Polaris Prototype All Terrain Vehicle | **4. TRANSMITTER TYPE**<br>Homodyne (zero-IF) 802.11 wireless LAN. |
| **5. TUNING RANGE**<br>1445 MHz | **6. METHOD OF TUNING**<br>Frequency synthesizer. |
| **7. RF CHANNELING CAPABILITY**<br>One channel at 1445 MHz. | **8. EMISSION DESIGNATOR(S)**<br>22M0D1DAW (non-hopping) |
| **9. FREQUENCY TOLERANCE**<br>+/-20 ppm | |
| **10. FILTER EMPLOYED** (X one)<br>[ ] a. YES [ ] b. NO | |
| **11. SPREAD SPECTRUM** (X one)<br>[ ] a. YES [ ] b. NO | **12. EMISSION BANDWIDTH** (X and complete as applicable)<br>[ ] CALCULATED [ ] MEASURED |
| **13. MAXIMUM BIT RATE**<br>54 Mbps | a. -3 dB 16.8 MHz<br>b. -20 dB 19.7 MHz |
| **14. MODULATION TECHNIQUES AND CODING**<br>See remarks. | c. -40 dB 45.0 MHz<br>d. -60 dB 68.0 MHz<br>e. OC-BW 22 MHz |
| | **15. MAXIMUM MODULATION FREQUENCY**<br>NA. |
| **16. PRE-EMPHASIS** (X one)<br>[ ] a. YES b. NO | **17. DEVIATION RATIO**<br>NA. |
| | **18. PULSE CHARACTERISTICS** |
| **19. POWER** | a. RATE NA.<br>b. WIDTH NA.<br>c. RISE TIME NA.<br>d. FALL TIME NA.<br>e. COMP RATIO NA. |
| a. MEAN 27 dBm ± 1 dB<br>b. PEP NA. | |
| **20. OUTPUT DEVICE**<br>GaAs HBT Linear Power Amplifier. | **21. HARMONIC LEVEL** |
| **22. SPURIOUS LEVEL**<br>-30 dBc | a. 2ND -65 dBc<br>b. 3RD -65 dBc |
| **23. FCC TYPE ACCEPTANCE NO.**<br>NA. | c. OTHER -66 dBc (4th) |

**24. REMARKS**

Item 4: IEEE 802.11g standard compliant.
Item 8: 1.4 GHz, 802.11g, 22M0D1DAW (non-hopping): 6 Mbps, 12 Mbps, 24 Mbps, 36 Mbps, 48 Mbps and 54 Mbps.
Item 10: Bandpass filter with 2.5 dB insertion loss and a nominal 24 dB of attenuation 37 MHz removed from the tuned frequency.
Item 12, e: As per 802.11a/b/g specifications.
Item 14: 1.4 GHz, 802.11g, 22M0D1DAW (non-hopping): OFDM @ 6 Mbps, 12 Mbps, 24 Mbps, 36 Mbps, 48 Mbps and 54 Mbps.
Item 15: Applies to FM and PM equipment only.
Item 16: This item is applicable only to analog FM systems. The Rajant system is not an analog FM system.
Item 17: Applies to FM and PM equipment only.
Item 18: Not pulse-modulated transmitter. Does not apply.
Item 19: AM modulated emissions. PEP does not apply.

## RECEIVER EQUIPMENT CHARACTERISTICS

| | |
|---|---|
| **1. NOMENCLATURE, MANUFACTURER'S MODEL NO.** Rajant LX4 radio – 1445 MHz Transceiver | **2. MANUFACTURER'S NAME** Rajant Corporation |
| **2. RECEIVER INSTALLATION** Polaris Prototype All Terrain Vehicle | **4. RECEIVER TYPE** Homodyne (zero-IF) 802.11 wireless LAN. |
| **5. TUNING RANGE** 1445 MHz | **6. METHOD OF TUNING** Frequency synthesizer. |
| **7. RF CHANNELING CAPABILITY** One channel at 1445 MHz. | **8. EMISSION DESIGNATOR(S)** 22M0D1DAW (non-hopping) |
| **9. FREQUENCY TOLERANCE** +/-20 ppm | |

| **10. IF SELECTIVITY** | **1ST** | **2ND** | **3RD** |
|---|---|---|---|
| a. -3 dB | NA. | NA. | NA. |
| b. -20 dB | NA. | NA. | NA. |
| c. -60 dB | NA. | NA. | NA. |

**11. RF SELECTIVITY** (X and complete as applicable)

☐ CALCULATED ☐ MEASURED

a. -3 dB 28 MHz
b. -20 dB 90 MHz
c. -60 dB 180 MHz
d. PRESELECTION TYPE: Hardware filter.

**12. IF FREQUENCY**

a. 1ST NA.
b. 2ND NA.
c. 3RD NA.

**13. MAXIMUM POST DETECTION FREQUENCY**: 11 MHz

**14. MINIMUM POST DETECTION FREQUENCY**: NA.

| **15. OSCILLATOR TUNED** | **1ST** | **2ND** | **3RD** |
|---|---|---|---|
| a. ABOVE TUNED FREQUENCY | | | |
| b. BELOW TUNED FREQUENCY | | | |
| c. EITHER ABOVE OR BELOW TUNED FREQUENCY | | | |

**16. MAXIMUM BIT RATE**: 54 Mbps

**17. SENSITIVITY**

| | | |
|---|---|---|
| a. SENSITIVITY | -93 dBm +/- 1 dB | dBm |
| b. CRITERIA | 10^-6 bit error rate | |
| c. NOISE FIG | Less than 3 dB | dB |
| d. NOISE TEMP | NA. | Kelvin |

**18. DE-EMPHASIS** (X one)

☐ a. YES ☐ b. NO

**19. IMAGE REJECTION**: NA.

**20. SPURIOUS REJECTION**: NA.

**21. REMARKS**

Item 4: IEEE 802.11g standard compliant.
Item 6: 2.4 GHz channels are software selectable from 2412 MHz to 2462 MHz in 5 MHz increments.
Item 10: Homodyne radio.
Item 12: Homodyne radio.
Item 13: As per 802.11a/b/g specifications.
Item 14: According to the DD form 1494 Preparation Guide document, this field applies to multichannel FM receivers only. This is not a multichannel FM receiver.
Item 15: NA. Homodyne radio.
Item 17, d: Terrestrial system, therefore noise temp does not apply.
Item 19: According to the DD form 1494 Preparation Guide document, this field applies to superheterodyne receivers only. This is a homodyne, and not a superheterodyne, receiver.
Item 20: Homodyne radio.

## ANTENNA EQUIPMENT CHARACTERISTICS

1. [ ] a. TRANSMITTING [ ] b. RECEIVING [X] c. TRANSMITTING AND RECEIVING

| | |
|---|---|
| 2. NOMENCLATURE, MANUFACTURER'S MODEL NO.<br>Tactical Mesh Antenna TMA-14-2VT | 3. MANUFACTURER'S NAME<br>Luxul |
| 4. FREQUENCY RANGE<br>1400 - 1500 MHz | 5. TYPE<br>Low Profile Durable Omnidirectional Antenna |
| 6. POLARIZATION<br>Linear-Vertical | 7. SCAN CHARACTERISTICS<br>a. TYPE Fixed |
| 8. GAIN | b. VERTICAL SCAN |
| a. MAIN BEAM<br>2dBi | (1) MAX ELEV<br>Not Applicable |
| b. 1ST MAJOR SIDE LOBE<br>No Significant Side Lobe | (2) MIN ELEV<br>Not Applicable |
| | (3) SCAN RATE<br>Not Applicable |
| 9. BEAMWIDTH | c. HORIZONTAL SCAN |
| a. HORIZONTAL<br>360 Degrees | (1) SECTOR SCANNED<br>Not Applicable |
| b. VERTICAL<br>70 Degrees | (2) SCAN RATE<br>Not Applicable |
| | d. SECTOR BLANKING *(X one)*<br>[ ] (1) YES [X] (2) NO |

10. REMARKS

DD FORM 1494, AUG 96

| APPLICATION FOR SPECTRUM REVIEW | CLASSIFICATION: UNCLASSIFIED | PAGE<br>Page 5 of 6 Pages |
|---|---|---|

## NTIA GENERAL INFORMATION

**1. APPLICATION TITLE**
Rajant LX4 radio – 1445 MHz Transceiver

**2. SYSTEM NOMENCLATURE**
Rajant LX4 radio – 1445 MHz Transceiver

**3. STAGE OF ALLOCATION** *(X one)*

☐ a. STAGE 1 CONCEPTUAL ☐ b. STAGE 2 EXPERIMENTAL ☐ c. STAGE 3 DEVELOPMENTAL ☒ d. STAGE 4 OPERATIONAL

**4. FREQUENCY REQUIREMENTS**

a. **FREQUENCY(IES)** 1445 MHz

b. **EMISSION DESIGNATOR(S)** 22M0G1DAW (non-hopping)

**5. PURPOSE OF SYSTEM, OPERATIONAL AND SYSTEM CONCEPTS** **(WARTIME USE)** *(X one)* ☐ a. YES ☒ b. NO

**6. INFORMATION TRANSFER REQUIREMENTS**
NA

**7. ESTIMATED INITIAL COST OF THE SYSTEM**
NAvail

**8. TARGET DATE FOR**

| a. APPLICATION APPROVAL | b. SYSTEM ACTIVATION | c. SYSTEM TERMINATION |
|---|---|---|
| NAvail | NAvail | NAvail |

**9. SYSTEM RELATIONSHIP AND ESSENTIALITY**
System is used to transmit telemetry data between platforms

**10. REPLACEMENT INFORMATION**
NA

**11. RELATED ANALYSIS AND/OR TEST DATA**
NA

**12. NUMBER OF MOBILE UNITS**
NA

**13. GEOGRAPHICAL AREA FOR**

a. **STAGE 2**

b. **STAGE 3**

c. **STAGE 4 US&P**

| 14. LINE DIAGRAM | 15. SPACE SYSTEMS |
|---|---|
| See page(s) see attached | See page(s) NAvail |
| **16. TYPE OF SERVICE(S) FOR STAGE 4** | **17. STATION CLASS(ES) FOR STAGE 4** |
| NAvail | NAvail |

**18. REMARKS**

| DOWNGRADING INSTRUCTIONS | CLASSIFICATION | |
|---|---|---|
| N/A | UNCLASSIFIED | |

| APPLICATION FOR FOREIGN SPECTRUM SUPPORT | CLASSIFICATION | PAGE |
|---|---|---|
| | Unclassified | Page 6 of 6 |

**FOREIGN COORDINATION GENERAL INFORMATION**

**1. APPLICATION TITLE**
Rajant LX4 radio – 1445 MHz Transceiver

**2. SYSTEM NOMENCLATURE**
Same

**3. STAGE OF ALLOCATION** *(X one)*

| | a. STAGE 1 - CONCEPTUAL | | b. STAGE 2 - EXPERIMENTAL | | c. STAGE 3 - DEVELOPMENTAL | X | d. STAGE 4 - OPERATIONAL |
|---|---|---|---|---|---|---|---|

**4. FREQUENCY REQUIREMENTS**

| | |
|---|---|
| a. FREQUENCY(IES) | 1445 MHz |
| b. EMISSION DESIGNATOR(S) | 22M0G1DAW (non-hopping) |

**5. PROPOSED OPERATING LOCATIONS OUTSIDE US&P**
none

**6. PURPOSE OF SYSTEM, OPERATIONAL AND SYSTEM CONCEPTS**
Not applicable

**7. INFORMATION TRANSFER REQUIREMENTS**
Not applicable

**8. NUMBER OF UNITS OPERATING SIMULTANEOUSLY IN THE SAME ENVIRONMENT**
Not applicable

**9. REPLACEMENT INFORMATION**
Not applicable

| 10. LINE DIAGRAM *(See Page(s))* | 11. SPACE SYSTEMS *(See Page(s))* |
|---|---|
| | |

**12. PROJECTED OPERATIONAL DEPLOYMENT DATE**

**13. REMARKS**

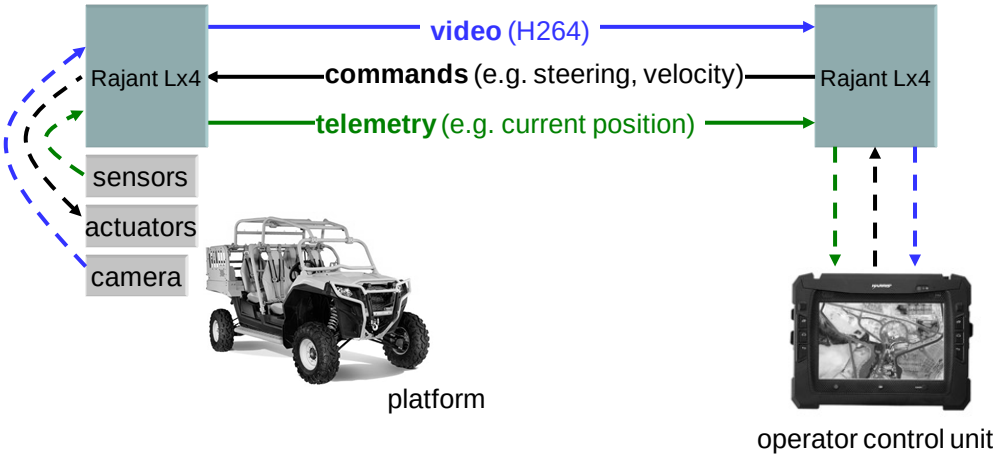
| DOWNGRADING INSTRUCTIONS | CLASSIFICATION | |
|---|---|---|
| | | |

DD FORM 1494, AUG 96

Reset

**Line Diagram**

- **Rajant Breadcrumb LX4** radio using 902 to 928 MHz, 2.402to 2.472 GHz, and 5.735 to 5.835GHz
- Etheros Chip Set uses OFDM waveform
- Radio automatically selects radio channel with best received signal strength




- Point to Point connection between operator and platform
- Operator Control Unit sends commands and receives sensor data and video from the vehicle
- Platform's CPU collects sensor data and video and forwards them to OCE