

CLASSIFICATION		PAGE	
TRANSMITTER EQUIPMENT CHARACTERISTICS			
1. NOMENCLATURE, MANUFACTURER'S MODEL NO. Wave Relay 10W S-band Radio Module (RF-2150)		2. MANUFACTURER'S NAME Persistent Systems, LLC	
3. TRANSMITTER INSTALLATION N/A		4. TRANSMITTER TYPE OFDM Data Communications	
5. TUNING RANGE 2.212-2.472 GHz		6. METHOD OF TUNING Programmable Frequency Synthesizer	
7. RF CHANNELING CAPABILITY:		8. EMISSION DESIGNATOR(S)	
a. Lowest channel/frequency 2.212 GHz		See Attachment 1	
b. Tuning increments 5 MHz			
c. Number of channels 51 Channels			
d. Number of frequencies required for operation 1			
e. Minimum Frequency Separation N/A			
9. FREQUENCY TOLERANCE +/-4 PPM		12. EMISSION BANDWIDTH (x and complete as applicable)	
10. FILTER EMPLOYED (X one) ☒ a. Yes ☐ b. No		☐ CALCULATED ☒ MEASURED	
11. SPREAD SPECTRUM (X one) ☐ a. Yes ☒ b. No		a. -3 dB See Attachment 1	
		b. -20 dB	
		c. -40 dB	
		d. -60 dB	
		e. OC-BW	
13. MAXIMUM BIT RATE 234 Mbps (after FEC coding)		15. MODULATION FREQUENCY ☒ a. Maximum ☐ b. Minimum	
14. MODULATION TECHNIQUES AND CODING See Attachment 1		16. PRE-EMPHASIS (X one) ☐ a. Yes ☒ b. No	
17. DEVIATION RATIO N/A		18. PULSE CHARACTERISTICS	
19. POWER (X one) ☒ a. MEAN ☐ b. PEP		a. RATE N/A	
See Remarks		b. WIDTH N/A	
		c. RISE TIME N/A	
		d. FALL TIME N/A	
		e. COMP RATIO N/A	
20. OUTPUT DEVICE GaN Transistor		21. HARMONIC LEVEL	
22. SPURIOUS LEVEL -78 dBc @ 936.5 MHz		a. 2ND -82 dBc at antenna connector	
23. FCC TYPE ACCEPTANCE NO. N/A		b. 3RD -56 dBc at antenna connector	
		c. OTHER -74 dBc at antenna connector (4th Harmonic)	
24. NAVSTAR GPS BAND MEASUREMENT			
a. GPS WIDEBAND EMISSION LEVEL (1164-1240 MHz): dBw/MHz N/A			
b. GPS WIDEBAND EMISSION LEVEL (1559-1610 MHz): dBw/MHz N/A			
c. GPS NARROWBAND EMISSION LEVEL (1164-1240 MHz): dBw N/A			
d. GPS NARROWBAND EMISSION LEVEL (1559-1610 MHz): dBw N/A			
e. PULSE SYSTEMS N/A			
25. REMARKS Item 5: User selectable center frequencies in 5 MHz increments Item 10: Low-Pass filter with 0.8 dB insertion loss Item 19: User selectable power output from 16.5dBm (3-chain aggregate 135mW) to 35dBm (3-chain aggregate 9.5W). 9.5W is the expected mean power when the radio is operating in the 2.212 GHz to 2.397 GHz frequency range. As per FCC transmitter power limitations, the allowable mean power is 1W when the radio operates above 2.4 GHz. Items 8, 12, 14, & 15: Please refer to Attachment 1 in the Attachment tab. Item 21c: The 4th harmonic is the strongest powered harmonic above the 3rd (-69 dBc at antenna connector)			

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INSTRUCTIONS FOR COMPLETING DD FORM 1494
"APPLICATION FOR EQUIPMENT FREQUENCY ALLOCATION"
TRANSMITTER EQUIPMENT CHARACTERISTICS PAGE

ITEM 1 - Nomenclature, Manufacturer's Model No. Enter the Government assigned alphanumeric equipment designation. If above is not available, enter the manufacturer's model number, e.g., MIT 502, and complete Item 2. If above is not available, enter a short descriptive title, e.g., ATS-6 telemetry transmitter.

ITEM 2 - Manufacturer's Name. Enter the manufacturer's name if available. If a manufacturer's model number is listed in Item 1, this item must be completed.

ITEM 3 - Transmitter Installation. List specific type(s) of vehicle(s), ship(s), plane(s) or building(s), etc., where the transmitter(s) will be installed.

ITEM 4 - Transmitter Type. Enter the generic class of the transmitter, e.g., Frequency Scan, Scan While Track Radar, Monopulse Tracker, AM or FM Communications.

ITEM 5 - Tuning Range. Enter the frequency range through which the transmitter is capable of being tuned, e.g., 225-400 MHz. For equipment designed to operate only at a single frequency, enter this frequency. Indicate units, e.g., kHz, MHz or GHz.

ITEM 6 - Method of Tuning. Enter the method of tuning, e.g., crystal, synthesizer or cavity. If the equipment is not readily tunable in the field, indicate in Item 25, "Remarks," the complexity of tuning. Include complexity factors such as skill levels involved, major assemblies involved, time required, and location (factory or depot) where equipment is to be tuned.

ITEM 7 - RF Channeling Capability.

- a. Lowest channel/frequency: Proposed Definition - The lowest tuned frequency of the transmitter frequency band(s) at which the transmitter is capable of operating.
- b. Tuning increments: Proposed Definition - The frequency separation between tuned frequencies for equipment with uniformly-spaced step-tuned capability.
- c. Number of channels: Proposed Definition - For uniformly spaced channels, enter the center frequency of the first channel and channel spacing.
- d. Number of frequencies required for operation: Proposed Definition - Enter the number of frequencies required for nominal operation.
- e. Minimum Frequency Separation: Proposed Definition - The required frequency separation between the different radio sets operated at one transmitter or receiver location

ITEM 8 - Emission Designator(s). Enter the emission designator(s) including the necessary bandwidth for each designator as described in Chapter 9 of the NTIA Manual, e.g., 16K0F3E. For systems with a frequency hopping mode as well as a non-hopping mode enter the emission designators for each mode. Identify each mode as hopping or non-hopping.

ITEM 9 - Frequency Tolerance. Enter the frequency tolerance, i.e., the maximum departure of a transmitter from its assigned frequency after normal warm-up time has been allowed. Indicate the units in parts per million (ppm) for all emission types except single sideband which shall be indicated in Hertz (Hz).

ITEM 10 - Filter Employed. Mark the appropriate block. Provide the characteristics of any filter used in Item 24, "Remarks."

ITEM 11 - Spread Spectrum. Mark the appropriate block. If "Yes," see instructions for Item 14.

ITEM 12 - Emission Bandwidth. Enter the emission bandwidths for which the transmitter is designed at the -3, -20, and -60 dB levels and the occupied bandwidth. The bandwidth at -40 dB shall also be entered for pulse radar transmitters. The emission bandwidth is defined as that appearing at the antenna terminals and includes any significant attenuation contributed by filtering in the output circuit or transmission lines. Values of emission bandwidth specified should be indicated as calculated or measured by marking the appropriate block. Indicate units used, e.g., Hz, kHz or MHz. Note that the Occupied Bandwidth (Item 12.e.) is defined as the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5% of the

total mean power radiated.

ITEM 13 - Maximum Bit Rate. Enter the maximum information bit rate for digital equipment, in bits per second. If spread spectrum is used, enter the bit rate after encoding.

ITEM 14 - Modulation Techniques and Coding. Describe in detail the modulation and/or coding techniques employed. For complex modulation schemes such as direct sequence spread spectrum, frequency hopping, frequency agile, etc., enter full details in Item 25, "Remarks."

ITEM 15 - Modulation Frequency. - a. Maximum - For frequency or phase modulated transmitter enter the maximum modulation or baseband frequency. This frequency is assumed to be the frequency at -3 dB point on the high frequency side of the modulator response curve. Indicate the units, e.g., Hz, kHz or MHz. b. Minimum - Enter lowest frequency in the baseband modulating signal when analog modulation is employed.

ITEM 16 - Pre-emphasis. For frequency or phase modulated transmitters mark the appropriate block to indicate whether pre-emphasis is available.

ITEM 17 - Deviation Ratio. For frequency or phase modulated transmitter enter the deviation ratio computed with the formula

$$\text{Deviation Ratio} = \frac{\text{Maximum Frequency Deviation}}{\text{Maximum Modulation Frequency}}$$

ITEM 18 - Pulse Characteristics. For pulse modulated transmitters:

- a. Enter the pulse repetition rate in pulses per second (pps).
- b. Enter the pulse width at the half voltage levels in microseconds (usec).
- c. Enter the pulse rise time in microseconds (usec). This is the time duration for the leading edge of the voltage pulse to rise from 10% to 90% of its peak amplitude.
- d. Enter the pulse fall time in microseconds (usec). This is the time duration for the trailing edge of the voltage pulse to fall from 90% to 10% of its peak amplitude.
- e. Enter the maximum pulse compression ratio, if applicable.

ITEM 19 - Power. Enter the mean power delivered to the antenna terminals for all AM and FM emissions, or the peak envelope power (PEP) for all other classes of emissions. If there are any unique situations such as interrupted CW, provide details in Item 24, "Remarks." Indicate the units, e.g., W or kW.

ITEM 20 - Output Device. Enter a description of the device used in the transmitter output stage, e.g., ceramic diode, reflex klystron, transistor or TWT.

ITEM 21 - Harmonic Level. Enter the harmonic level in dB relative to the fundamental of the 2nd and 3rd harmonics. Enter in Item c. the relative level in dB of the highest powered harmonic above the 3rd.

ITEM 22 - Spurious Level. Enter the maximum value of spurious emission in dB relative to the fundamental which occurs outside the -60 dB point on the transmitter fundamental emission spectrum (Item 12) and does not occur on a harmonic of the fundamental frequency.

ITEM 23 - FCC Type Acceptance No. Enter the FCC type acceptance number if applicable

ITEM 24 - NAVSTAR GPS Band Measurement. Federal agencies requesting Spectrum Certification for systems operating in the 390-413 MHz, and 960-1710 MHz frequency bands must provide measurements of the emission levels generated in the frequency bands used by the Navstar Global Positioning System. Provide measurements in wideband and narrowband

- a. GPS WIDEBAND EMISSION LEVEL (1164-1240 MHz): dBw/MHz
- b. GPS WIDEBAND EMISSION LEVEL (1559-1610 MHz): dBw/MHz
- c. GPS NARROWBAND EMISSION LEVEL (1164-1240 MHz): dBw
- d. GPS NARROWBAND EMISSION LEVEL (1559-1610 MHz): dBw
- e. For Pulse Systems, provide measurements of the temporal characteristics of the emissions in the 1164.45-1188.45MHz, 1215.6-1239.6MHz and 1563.42-1587.42MHz band

ITEM 25 - Remarks. Use this item to amplify or clarify any of the information provided above.

CLASSIFICATION				PAGE
RECEIVER EQUIPMENT CHARACTERISTICS				
1. NOMENCLATURE, MANUFACTURER'S MODEL NO. Wave Relay 10W S-band Radio Module (RF-2150)			2. MANUFACTURER'S NAME Persistent Systems, LLC	
3. RECEIVER INSTALLATION N/A			4. RECEIVER TYPE Homodyne	
5. TUNING RANGE 2.212-2.472 GHz			6. METHOD OF TUNING Programmable Frequency Synthesizer	
7. RF CHANNELING CAPABILITY:			8. EMISSION DESIGNATOR(S)	
a. Lowest channel/frequency 2.212 GHz			See Attachment 2	
b. Tuning increments 5 MHz				
c. Number of channels 51 Channels				
d. Number of frequencies required for operation 1				
e. Minimum Frequency Separation N/A				
9. FREQUENCY TOLERANCE +/-4 PPM				
10. IF SELECTIVITY	1ST	2ND	3RD	11. RF SELECTIVITY (X and complete as applicable)
a. -3 dB	N/A			☐ CALCULATED ☒ MEASURED
b. -20 dB	N/A			a. -3 dB 513 MHz
c. -60 dB	N/A			b. -20 dB 1376 MHz
				c. -60 dB N/A - See remarks
12. IF FREQUENCY				d. PRESELECTION TYPE Bandpass filter
a. 1ST N/A				13. MAXIMUM POST DETECTION FREQUENCY See Attachment 2
b. 2ND N/A				14. MINIMUM POST DETECTION FREQUENCY N/A
c. 3RD N/A				
15. OSCILLATOR TUNED	1ST	2ND	3RD	16. MAXIMUM BIT RATE 234 Mbps (after FEC coding)
a. ABOVE TUNED FREQUENCY	N/A			17. SENSITIVITY
b. BELOW TUNED FREQUENCY	N/A			a. SENSITIVITY See Attachment 2 dBm
c. EITHER ABOVE OR BELOW TUNED FREQUENCY	N/A			b. CRITERIA 10% PER
18. DE-EMPHASIS (X one)				c. NOISE FIG 5 dB
☐ a. Yes ☒ b. No				d. NOISE TEMP N/A Kelvin
19. IMAGE REJECTION N/A				20. SPURIOUS REJECTION N/A
21. ADJACENT CHANNEL SELECTIVITY (dB) 21 dB		22. INTERMODULATION REJECTION LEVEL (dB) 47 dB		23. CONDUCTED UNDESIRE EMISSIONS (dBm) N/A
24. REMARKS Items 8, 13, and 17a: Please refer to Attachment 2 in the Attachment tab. Item 11: The bandpass filter utilized in the RF-2150 design has an ultimate rejection of -45 dB with a bandwidth of 4039 MHz. As such, the -60dB block in Item 11 was marked as "N/A".				
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INSTRUCTIONS FOR COMPLETING DD FORM 1494
"APPLICATION FOR EQUIPMENT FREQUENCY ALLOCATION"
RECEIVER EQUIPMENT CHARACTERISTICS PAGE

ITEM 1 - Nomenclature, Manufacturer's Model No. Enter the Government assigned alphanumeric equipment designation. If above is not available, enter the manufacturer's model number, e.g., MIT 502, and complete Item 2. If above is not available, enter a short descriptive title, e.g., GPS Receiver, Director Station RX.

ITEM 2 - Manufacturer's Name. Enter the manufacturer's name if available. If a manufacturer's model number is listed in Item 1, this item must be completed.

ITEM 3 - Receiver Installation. List specific type(s) of vehicle(s), ship(s), plane(s) or building(s), etc., where the receiver(s) will be installed.

ITEM 4 - Receiver Type. Enter the generic class, e.g., Dual Conversion Superheterodyne or Homodyne.

ITEM 5 - Tuning Range. Enter the frequency range through which the receiver is capable of being tuned, e.g., 225-400 MHz. For equipment designed to operate only at a single frequency, enter this frequency. Indicate units, e.g., kHz, MHz or GHz.

ITEM 6 - Method of Tuning. Enter the method of tuning, e.g., crystal, synthesizer or cavity. If the equipment is not readily tunable in the field, indicate in Item 23, "Remarks," the complexity of tuning. Include complexity factors such as skill levels involved, major assemblies involved, time required, and location (factory or depot) where equipment is to be tuned.

ITEM 7 - RF Channeling Capability.

- a. Lowest channel/frequency: Proposed Definition - The lowest tuned frequency of the transmitter frequency band(s) at which the transmitter is capable of operating.
- b. Tuning increments: Proposed Definition - The frequency separation between tuned frequencies for equipment with uniformly-spaced step-tuned capability.
- c. Number of channels: Proposed Definition - For uniformly spaced channels, enter the center frequency of the first channel and channel spacing.
- d. Number of frequencies required for operation: Proposed Definition - Enter the number of frequencies required for nominal operation.
- e. Minimum Frequency Separation: Proposed Definition - The required frequency separation between the different radio sets operated at one transmitter or receiver location

ITEM 8 - Emission Designator(s). Enter the emission designator(s) including the necessary bandwidth(s) for each designator, e.g., 16K0F3E. For systems with a frequency hopping mode as well as a non-hopping mode enter the emission designators for each mode.

ITEM 9 - Frequency Tolerance. Enter the frequency tolerance, i.e., the maximum departure of a receiver from its assigned frequency after normal warm-up time has been allowed. Indicate the units in parts per million (ppm) for all emission types except single sideband which shall be indicated in Hertz (Hz).

ITEM 10 - IF Selectivity. Enter the bandwidth for each IF stage at the -3, -20 and -60 dB levels. Indicate units, e.g., kHz or MHz.

ITEM 11 - RF Selectivity. Enter the bandwidth at the -3, -20 and -60 dB levels. The RF bandwidth includes any significant attenuation contributed by filtering in the input circuit or transmission line. Values of RF bandwidths specified should be indicated as calculated or measured by marking the appropriate block. Indicate units, e.g., kHz or MHz. Enter

the preselection type, e.g., tunable cavity.

ITEM 12 - IF Frequency. Enter the tuned frequency of the first, second and third IF stages. Indicate units, e.g., kHz or MHz.

ITEM 13 - Maximum Post Detection Frequency. Enter the maximum post detection frequency. This is the nominal frequency at the -3 dB point on the high frequency side of the receiver base band. Indicate units, e.g., kHz or MHz.

ITEM 14 - Minimum Post Detection Frequency. For multichannel FM systems enter the minimum post detection frequency. This is the nominal frequency at the -3 dB point on the low frequency side of the receiver base band. Indicate units, e.g., kHz or MHz.

ITEM 15 - Oscillator Tuned. Mark the appropriate block to indicate the location of the 1st, 2nd and 3rd oscillator frequencies with respect to the associated mixer input signal.

ITEM 16 - Maximum Bit Rate. Where applicable, enter the maximum bit rate (bps) that can be used. If spread spectrum is used, enter the bit rate after encoding. Describe any error detecting/correcting codes in Item 23, "Remarks."

ITEM 17 - Sensitivity.

- a. Enter the sensitivity in dBm.
- b. Specify criteria used, e.g., 12 dB SINAD (Signal to Interference plus Noise and Distortion).
- c. If the receiver is used with terrestrial systems, enter the receiver noise figure in dB.
- d. If the receiver is used with space or satellite earth stations, enter the receiver noise temperature in Kelvin.

ITEM 18 - De-emphasis. For frequency or phase modulated receivers mark the appropriate block to indicate whether de-emphasis is available.

ITEM 19 - Image Rejection. Enter the image rejection in dB. Image rejection is the ratio of the image frequency signal level required to produce a specified output, to the desired signal level required to produce the same output.

ITEM 20 - Spurious Rejection. Enter the spurious rejection in dB. Enter the single level of spurious rejection that the receiver meets or exceeds at all frequencies outside the -60 dB IF bandwidth. Spurious rejection is the ratio of a particular out-of-band frequency signal level required to produce a specified output, to the desired signal level required to produce the same output.

ITEM 21 - Adjacent Channel Selectivity. A ratio in (dB) that compares signal strength received against a similar signal on another frequency.

ITEM 22 - Intermodulation Rejection Level. A measure of RF input threshold before intermodulation products occurs (expressed in dB).

ITEM 23 - Conducted Undesired Emissions. Those undesired signals generated in the receiver and leaving the receiver by way of the receiving transmission line. Only required when employing wideband Fixed, Land, Mobile, or portable transmitters in the Fixed or Mobile service between 29.7 and 50, 162 and 174, or 406.1 and 420 MHz (expressed in dBm).

ITEM 24 - Remarks. Use this item to amplify or clarify any of the information provided above

ATTACHMENT 1

Transmitter Characteristic Tables

Item 8. Emission Designators

Waveform Type	Modulation	Coding	Emission Designator at Channel Width			
			5 MHz	10 MHz	20 MHz	40 MHz
OFDM	BPSK	1/2-rate Convolutional	4M06D1D	8M91D1D	17M8D1D	N/A
OFDM	BPSK	3/4-rate Convolutional	4M06D1D	8M91D1D	17M8D1D	N/A
OFDM	QPSK	1/2-rate Convolutional	4M06D1D	8M91D1D	17M8D1D	N/A
OFDM	QPSK	3/4-rate Convolutional	4M06D1D	8M91D1D	17M8D1D	N/A
OFDM	16-QAM	1/2-rate Convolutional	4M06D1D	8M91D1D	17M8D1D	N/A
OFDM	16-QAM	3/4-rate Convolutional	4M06D1D	8M91D1D	17M8D1D	N/A
OFDM	64-QAM	2/3-rate Convolutional	4M06D1D	8M91D1D	17M8D1D	N/A
OFDM	64-QAM	3/4-rate Convolutional	4M06D1D	8M91D1D	17M8D1D	N/A
OFDM	64-QAM	5/6-rate Convolutional	4M06D1D	8M91D1D	17M8D1D	N/A

Table 1

Item 12. EMISSION BANDWIDTH (Measured in MHz) – RF-2150

Waveform Type	OFDM				DSSS			
Channel Width	5MHz	10MHz	20MHz	40MHz	5MHz	10MHz	20MHz	40MHz
-3 dB	4.43	8.81	17.61	N/A	N/A	N/A	N/A	N/A
-20 dB	5.12	9.5	19.95	N/A	N/A	N/A	N/A	N/A
-40 dB	14.22	25.81	51.88	N/A	N/A	N/A	N/A	N/A
-60 dB	35.63	63.1	133.6	N/A	N/A	N/A	N/A	N/A
OC-BW	5.0	9.3	19.1	N/A	N/A	N/A	N/A	N/A

Table 2

Item 14: MODULATION TECHNIQUES AND CODING

Protocol	Waveform Type	Modulation	Coding	Spatial Streams	Effective Data Rate (Mbps) at Channel Width			
					5 MHz	10 MHz	20 MHz	40 MHz
802.11g	OFDM	BPSK	1/2-rate Convolutional	N/A	1.50	3.0	6.0	N/A
802.11g	OFDM	BPSK	3/4-rate Convolutional	N/A	2.25	4.5	9.0	N/A
802.11g	OFDM	QPSK	1/2-rate Convolutional	N/A	3.00	6.0	12.0	N/A
802.11g	OFDM	QPSK	3/4-rate Convolutional	N/A	4.50	9.0	18.0	N/A
802.11g	OFDM	16-QAM	1/2-rate Convolutional	N/A	6.00	12.0	24.0	N/A
802.11g	OFDM	16-QAM	3/4-rate Convolutional	N/A	9.00	18.0	36.0	N/A
802.11g	OFDM	64-QAM	2/3-rate Convolutional	N/A	12.00	24.0	48.0	N/A
802.11g	OFDM	64-QAM	3/4-rate Convolutional	N/A	13.50	27.0	54.0	N/A
802.11n	OFDM	BPSK	1/2-rate Convolutional	1	1.63	3.25	6.5	N/A
802.11n	OFDM	QPSK	1/2-rate Convolutional	1	3.25	6.5	13.0	N/A
802.11n	OFDM	QPSK	3/4-rate Convolutional	1	4.88	9.75	19.5	N/A
802.11n	OFDM	16-QAM	1/2-rate Convolutional	1	6.5	13	26.0	N/A
802.11n	OFDM	16-QAM	3/4-rate Convolutional	1	9.75	19.5	39.0	N/A
802.11n	OFDM	64-QAM	2/3-rate Convolutional	1	13	26	52.0	N/A
802.11n	OFDM	64-QAM	3/4-rate Convolutional	1	14.63	29.25	58.5	N/A
802.11n	OFDM	64-QAM	5/6-rate Convolutional	1	16.25	32.5	65.0	N/A
802.11n	OFDM	BPSK	1/2-rate Convolutional	2	3.25	6.5	13	N/A
802.11n	OFDM	QPSK	1/2-rate Convolutional	2	6.5	13	26	N/A
802.11n	OFDM	QPSK	3/4-rate Convolutional	2	9.75	19.5	39	N/A
802.11n	OFDM	16-QAM	1/2-rate Convolutional	2	13	26	52	N/A
802.11n	OFDM	16-QAM	3/4-rate Convolutional	2	19.5	39	78	N/A
802.11n	OFDM	64-QAM	2/3-rate Convolutional	2	26	52	104	N/A
802.11n	OFDM	64-QAM	3/4-rate Convolutional	2	29.25	58.5	117	N/A
802.11n	OFDM	64-QAM	5/6-rate Convolutional	2	32.5	65	130	N/A
802.11n	OFDM	BPSK	1/2-rate Convolutional	3	4.88	9.75	19.5	N/A
802.11n	OFDM	QPSK	1/2-rate Convolutional	3	9.75	19.5	39	N/A
802.11n	OFDM	QPSK	3/4-rate Convolutional	3	14.63	29.25	58.5	N/A
802.11n	OFDM	16-QAM	1/2-rate Convolutional	3	19.5	39	78	N/A
802.11n	OFDM	16-QAM	3/4-rate Convolutional	3	29.25	58.5	117	N/A
802.11n	OFDM	64-QAM	2/3-rate Convolutional	3	39.75	79.5	156	N/A
802.11n	OFDM	64-QAM	3/4-rate Convolutional	3	43.88	87.75	175.5	N/A
802.11n	OFDM	64-QAM	5/6-rate Convolutional	3	48.75	97.5	195	N/A

Table 3

Item 14. OFDM Characteristics

Protocol	Channel Width (MHz)	Modulation	Coding	Spatial Streams	Emission Designator	Effective Data Rate (Mbps)	Transmission Bit Rate (Mbps)
802.11g	5	BPSK	1/2-rate Convolutional	N/A	4M06D1D	1.50	3.0
802.11g	5	BPSK	3/4-rate Convolutional	N/A	4M06D1D	2.25	3.0
802.11g	5	QPSK	1/2-rate Convolutional	N/A	4M06D1D	3.00	6.0
802.11g	5	QPSK	3/4-rate Convolutional	N/A	4M06D1D	4.50	6.0
802.11g	5	16-QAM	1/2-rate Convolutional	N/A	4M06D1D	6.00	12.0
802.11g	5	16-QAM	3/4-rate Convolutional	N/A	4M06D1D	9.00	12.0
802.11g	5	64-QAM	2/3-rate Convolutional	N/A	4M06D1D	12.00	18.0
802.11g	5	64-QAM	3/4-rate Convolutional	N/A	4M06D1D	13.50	18.0
802.11n	5	BPSK	1/2-rate Convolutional	1	4M06D1D	1.63	3.26
802.11n	5	QPSK	1/2-rate Convolutional	1	4M06D1D	3.25	6.5
802.11n	5	QPSK	3/4-rate Convolutional	1	4M06D1D	4.875	6.5
802.11n	5	16-QAM	1/2-rate Convolutional	1	4M06D1D	6.5	13
802.11n	5	16-QAM	3/4-rate Convolutional	1	4M06D1D	9.75	13
802.11n	5	64-QAM	2/3-rate Convolutional	1	4M06D1D	13	19.5
802.11n	5	64-QAM	3/4-rate Convolutional	1	4M06D1D	14.63	19.5
802.11n	5	64-QAM	5/6-rate Convolutional	1	4M06D1D	16.25	19.5
802.11n	5	BPSK	1/2-rate Convolutional	2	4M06D1D	3.25	6.5
802.11n	5	QPSK	1/2-rate Convolutional	2	4M06D1D	6.5	13
802.11n	5	QPSK	3/4-rate Convolutional	2	4M06D1D	9.75	13
802.11n	5	16-QAM	1/2-rate Convolutional	2	4M06D1D	13	26
802.11n	5	16-QAM	3/4-rate Convolutional	2	4M06D1D	19.5	26
802.11n	5	64-QAM	2/3-rate Convolutional	2	4M06D1D	26	39
802.11n	5	64-QAM	3/4-rate Convolutional	2	4M06D1D	29.25	39
802.11n	5	64-QAM	5/6-rate Convolutional	2	4M06D1D	32.5	39
802.11n	5	BPSK	1/2-rate Convolutional	3	4M06D1D	4.875	9.75
802.11n	5	QPSK	1/2-rate Convolutional	3	4M06D1D	9.75	19.5
802.11n	5	QPSK	3/4-rate Convolutional	3	4M06D1D	14.63	19.5
802.11n	5	16-QAM	1/2-rate Convolutional	3	4M06D1D	19.5	39
802.11n	5	16-QAM	3/4-rate Convolutional	3	4M06D1D	29.25	39
802.11n	5	64-QAM	2/3-rate Convolutional	3	4M06D1D	39	58.5
802.11n	5	64-QAM	3/4-rate Convolutional	3	4M06D1D	43.875	58.5
802.11n	5	64-QAM	5/6-rate Convolutional	3	4M06D1D	48.75	58.5
802.11g	10	BPSK	1/2-rate Convolutional	N/A	8M91D1D	3.0	6.0
802.11g	10	BPSK	3/4-rate Convolutional	N/A	8M91D1D	4.5	6.0
802.11g	10	QPSK	1/2-rate Convolutional	N/A	8M91D1D	6.0	12.0
802.11g	10	QPSK	3/4-rate Convolutional	N/A	8M91D1D	9.0	12.0
802.11g	10	16-QAM	1/2-rate Convolutional	N/A	8M91D1D	12.0	24.0
802.11g	10	16-QAM	3/4-rate Convolutional	N/A	8M91D1D	18.0	24.0
802.11g	10	64-QAM	2/3-rate Convolutional	N/A	8M91D1D	24.0	36.0
802.11g	10	64-QAM	3/4-rate Convolutional	N/A	8M91D1D	27.0	36.0
802.11n	10	BPSK	1/2-rate Convolutional	1	8M91D1D	3.25	6.5
802.11n	10	QPSK	1/2-rate Convolutional	1	8M91D1D	6.5	13
802.11n	10	QPSK	3/4-rate Convolutional	1	8M91D1D	9.75	13
802.11n	10	16-QAM	1/2-rate Convolutional	1	8M91D1D	13	26
802.11n	10	16-QAM	3/4-rate Convolutional	1	8M91D1D	19.5	26
802.11n	10	64-QAM	2/3-rate Convolutional	1	8M91D1D	26	39
802.11n	10	64-QAM	3/4-rate Convolutional	1	8M91D1D	29.25	39
802.11n	10	64-QAM	5/6-rate Convolutional	1	8M91D1D	32.5	39
802.11n	10	BPSK	1/2-rate Convolutional	2	8M91D1D	6.5	13
802.11n	10	QPSK	1/2-rate Convolutional	2	8M91D1D	13	26
802.11n	10	QPSK	3/4-rate Convolutional	2	8M91D1D	19.5	26
802.11n	10	16-QAM	1/2-rate Convolutional	2	8M91D1D	26	52

Protocol	Channel Width (MHz)	Modulation	Coding	Spatial Streams	Emission Designator	Effective Data Rate (Mbps)	Transmission Bit Rate (Mbps)
802.11n	10	16-QAM	3/4-rate Convolutional	2	8M91D1D	39	52
802.11n	10	64-QAM	2/3-rate Convolutional	2	8M91D1D	52	78
802.11n	10	64-QAM	3/4-rate Convolutional	2	8M91D1D	58.5	78
802.11n	10	64-QAM	5/6-rate Convolutional	2	8M91D1D	65	78
802.11n	10	BPSK	1/2-rate Convolutional	3	8M91D1D	9.75	19.5
802.11n	10	QPSK	1/2-rate Convolutional	3	8M91D1D	19.5	39
802.11n	10	QPSK	3/4-rate Convolutional	3	8M91D1D	29.25	39
802.11n	10	16-QAM	1/2-rate Convolutional	3	8M91D1D	39	78
802.11n	10	16-QAM	3/4-rate Convolutional	3	8M91D1D	58.5	78
802.11n	10	64-QAM	2/3-rate Convolutional	3	8M91D1D	78	117
802.11n	10	64-QAM	3/4-rate Convolutional	3	8M91D1D	87.75	117
802.11n	10	64-QAM	5/6-rate Convolutional	3	8M91D1D	97.5	117
802.11g	20	BPSK	1/2-rate Convolutional	N/A	17M8D1D	6.0	12.0
802.11g	20	BPSK	3/4-rate Convolutional	N/A	17M8D1D	9.0	12.0
802.11g	20	QPSK	1/2-rate Convolutional	N/A	17M8D1D	12.0	24.0
802.11g	20	QPSK	3/4-rate Convolutional	N/A	17M8D1D	18.0	24.0
802.11g	20	16-QAM	1/2-rate Convolutional	N/A	17M8D1D	24.0	48.0
802.11g	20	16-QAM	3/4-rate Convolutional	N/A	17M8D1D	36.0	48.0
802.11g	20	64-QAM	2/3-rate Convolutional	N/A	17M8D1D	48.0	72.0
802.11g	20	64-QAM	3/4-rate Convolutional	N/A	17M8D1D	54.0	72.0
802.11n	20	BPSK	1/2-rate Convolutional	1	17M8D1D	6.5	13
802.11n	20	QPSK	1/2-rate Convolutional	1	17M8D1D	13	26
802.11n	20	QPSK	3/4-rate Convolutional	1	17M8D1D	19.5	26
802.11n	20	16-QAM	1/2-rate Convolutional	1	17M8D1D	26.0	52
802.11n	20	16-QAM	3/4-rate Convolutional	1	17M8D1D	39.0	52
802.11n	20	64-QAM	2/3-rate Convolutional	1	17M8D1D	52.0	78
802.11n	20	64-QAM	3/4-rate Convolutional	1	17M8D1D	58.5	78
802.11n	20	64-QAM	5/6-rate Convolutional	1	17M8D1D	65.0	78
802.11n	20	BPSK	1/2-rate Convolutional	2	17M8D1D	13	26
802.11n	20	QPSK	1/2-rate Convolutional	2	17M8D1D	26	52
802.11n	20	QPSK	3/4-rate Convolutional	2	17M8D1D	39	52
802.11n	20	16-QAM	1/2-rate Convolutional	2	17M8D1D	52	104
802.11n	20	16-QAM	3/4-rate Convolutional	2	17M8D1D	78	104
802.11n	20	64-QAM	2/3-rate Convolutional	2	17M8D1D	104	156
802.11n	20	64-QAM	3/4-rate Convolutional	2	17M8D1D	117	156
802.11n	20	64-QAM	5/6-rate Convolutional	2	17M8D1D	130	156
802.11n	20	BPSK	1/2-rate Convolutional	3	17M8D1D	19.5	39
802.11n	20	QPSK	1/2-rate Convolutional	3	17M8D1D	39	78
802.11n	20	QPSK	3/4-rate Convolutional	3	17M8D1D	58.5	78
802.11n	20	16-QAM	1/2-rate Convolutional	3	17M8D1D	78	156
802.11n	20	16-QAM	3/4-rate Convolutional	3	17M8D1D	117	156
802.11n	20	64-QAM	2/3-rate Convolutional	3	17M8D1D	156	234
802.11n	20	64-QAM	3/4-rate Convolutional	3	17M8D1D	175.5	234
802.11n	20	64-QAM	5/6-rate Convolutional	3	17M8D1D	195	234

Table 4

Item 15: Modulation Frequency (Measured in MHz)

Waveform Type	OFDM				DSSS			
Channel Width	5MHz	10MHz	20MHz	40MHz	5MHz	10MHz	20MHz	40MHz
Frequency	2.3875	4.775	9.55	N/A	N/A	N/A	N/A	N/A

Table 5

ATTACHMENT 2

Receiver Characteristic Tables

Item 8. Emission Designators

Waveform Type	Modulation	Coding	Emission Designator at Channel Width			
			5 MHz	10 MHz	20 MHz	40 MHz
OFDM	BPSK	1/2-rate Convolutional	4M06D1D	8M91D1D	17M8D1D	N/A
OFDM	BPSK	3/4-rate Convolutional	4M06D1D	8M91D1D	17M8D1D	N/A
OFDM	QPSK	1/2-rate Convolutional	4M06D1D	8M91D1D	17M8D1D	N/A
OFDM	QPSK	3/4-rate Convolutional	4M06D1D	8M91D1D	17M8D1D	N/A
OFDM	16-QAM	1/2-rate Convolutional	4M06D1D	8M91D1D	17M8D1D	N/A
OFDM	16-QAM	3/4-rate Convolutional	4M06D1D	8M91D1D	17M8D1D	N/A
OFDM	64-QAM	2/3-rate Convolutional	4M06D1D	8M91D1D	17M8D1D	N/A
OFDM	64-QAM	3/4-rate Convolutional	4M06D1D	8M91D1D	17M8D1D	N/A
OFDM	64-QAM	5/6-rate Convolutional	4M06D1D	8M91D1D	17M8D1D	N/A

Table 6

Item 13: Maximum Post Detection Frequency (Measured in MHz)

Waveform Type	OFDM				DSSS			
Channel Width	5MHz	10MHz	20MHz	40MHz	5MHz	10MHz	20MHz	40MHz
Frequency	2.3875	4.775	9.55	N/A	N/A	N/A	N/A	N/A

Table 7

Item 17a. Sensitivity

Waveform Type	Chanel Width			
	5 MHz	10 MHz	20 MHz	40 MHz
OFDM	-98 dBm	-95 dBm	-92 dBm	N/A

Table 8