SECURITY SUMMARY & SPECIAL HANDLING REQUIREMENTS

The Application Title is : TrellisWare Shadow Radios (TW-900/TW-950)

The System Name is : TrellisWare Shadow Radios (TW-900/TW-950)

The overall classification of this application is : **UNCLASSIFIED**

Refer to your Security Manual for further guidance.

The Application Level Special Handling is : A

Approved for public release; distribution is unlimited (DoD Directive 5230.24)

DOWNGRADING INSTRUCTIONS

Special Handling Instruction : A

CLASSIFICATION

UNCLASSIFIED

APPLICATION FOR EQUIPMENT FREQUENCY ALLOCATION	CLASSIFICATION UNCLASSIFIED	DATE 4/25/2018	PAGE 2

DOD GENERAL INFORMATION

TO (U) Army Spectrum Management Office (ASMO)

6916 Cooper Avenue, Fort Meade, MD
20755-9701

FROM (U) PdM Waveforms
SFAE-CCC-TRW
6560 Surveillance Loop, Bldg 6007
Aberdeen Proving Ground, Maryland
21005

1. APPLICATION TITLE (U) TrellisWare Shadow Radios (TW-900/TW-950)

2. SYSTEM NOMENCLATURE (U) TrellisWare Shadow Radios (TW-900/TW-950)

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)

b. EMISSION DESIGNATORS

5. TARGET STARTING DATE FOR SUBSEQUENT STAGES

a. STAGE 2	b. STAGE 3	c. STAGE 4	(U) 6/29/2018

6. EXTENT OF USE (U) Intermittent use of mesh network capabilities for demonstration and specific (See Data Overflow Page)

7. GEOGRAPHICAL AREA FOR

a. STAGE 2

b. STAGE 3

c. STAGE 4 (U) US&P - Polygon

8. NUMBER OF UNITS

a. STAGE 2	b. STAGE 3	c. STAGE 4	(U) 250

9. NUMBER OF UNITS OPERATING SIMULTANEOUSLY IN THE SAME ENVIRONMENT (U) 250

10. OTHER J/F 12 APPLICATION ID(S) TO BE
☐ **a. SUPERSEDED**
☐ **b. RELATED**

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 (See Data Overflow Page)

(U) Sayeed Hasan, Ph. D.
Chief Engineer

13. REMARKS (U)

(U) See TrellisWare document titled "TSM Network Scalability Test Report" from 8/28/2017 for example of capability and scalability.

(U) Item 4a. Radios support the following frequency ranges: 225-450 MHz, 690-970 MHz, 1250-2620 MHz.

DOWNGRADING INSTRUCTIONS

Special Handling Instruction : A

CLASSIFICATION
UNCLASSIFIED

DOD DATA OVERFLOW PAGE

6. EXTENT OF USE

Cont. (U) fic exercise.

12. NAMES AND TELEPHONE NUMBERS

Cont. (U)

PdM Waveforms, PM Tactical Radios, PEO C3T
Desk: 443-395-2626
Mobile: 443-252-1865

13. REMARKS

(U) Item 4b. Radios support the following emission designators: 1M20G1D, 3M60G1D, 10M0G1D, 20M0G1D, 40M0G2D.

DOWNGRADING INSTRUCTIONS

Special Handling Instruction : A

TRANSMITTER EQUIPMENT CHARACTERISTICS

1. NOMENCLATURE, MANUFACTURER'S MODEL NO.
(U) Shadow, (U) TW-900/TW-950 Shadow

2. MANUFACTURER'S NAME (See Data Overflow Page)
(U) TrellisWare Technologies, Inc.,

3. TRANSMITTER INSTALLATION
(U) Portable, handheld

4. TRANSMITTER TYPE
(U) Phase Modulation Communications

5. TUNING RANGE (See Data Overflow Page)
(U) 1250.600 - 2619.400 MHz (U) 225.6000 - 449.4000 MHz

6. METHOD OF TUNING
(U) Synthesizer

7. RF CHANNELING CAPABILITY (See Data Overflow Page)
(U) 5.0000 kHz Increments (U) 5.0000 kHz Increments

8. EMISSION DESIGNATORS
(U) 10M0G1D (See Data Overflow Page)

9. FREQUENCY TOLERANCE
(U) 0.5 ppm

10. FILTER EMPLOYED
(U) Tunable BPF + Harmonic LPF

11. SPREAD SPECTRUM
☐ a. YES ☒ b. NO

12. EMISSION BANDWIDTH
☐ CALCULATED ☒ MEASURED

a. -3 dB	(U) 7400 kHz	(U) 6800 kHz
b. -20 dB	(U) 10400 kHz	(U) 10400 kHz
c. -40 dB	(U) 16400 kHz	(U) 15600 kHz
d. -60 dB	(U) 25200 kHz	(U) 24000 kHz
e. OC-BW	(U) 10000 kHz	(U) 10000 kHz

13. MAXIMUM BIT RATE
(U) 40000000 bps

14. MODULATION TECHNIQUES AND CODING
(U) Digital

15. MAXIMUM MODULATION FREQUENCY
(U) 2620000 kHz (U) 450000 kHz

16. PRE-EMPHASIS
☐ a. YES ☐ b. NO

17. DEVIATION RATIO

18. PULSE CHARACTERISTICS

19. POWER

a. MEAN

b. PEP (U) 0.125 W - (U) 2.00 W

c. CARRIER

a. RATE

b. WIDTH

c. RISE TIME

d. FALL TIME

e. COMP RATIO

20. OUTPUT DEVICE
(U) Integrated Circuit

21. HARMONIC LEVEL

a.	(U) -53.0 dB
b.	(U) -53.0 dB
c.	(U) -60.0 dB

22. SPURIOUS LEVEL
(U) -60.0 dB

23. FCC TYPE ACCEPTANCE NO.
(U) N/A

24. REMARKS (U)

(U) Item 8. Radio has five operating bandwidth modes: 1.2 MHz, 3.6 MHz, 10 MHz, 20 MHz, and 40 MHz. All bandwidth modes utilize CPM modulation. The 10 MHz and 20 MHz modes each utilize two different CPM modulations for different types of traffic. The 40 MHz mode utilizes two adjacent 20 MHz channels to increase network capacity, but is only transmitting in one of the two 20 MHz channels at any given moment.

(U) Item 12. Measured data is provided for every combination of frequency band and emmision designator. The measured data shows the widest possible spectrum utilization for each emmision designator.

TRANSMITTER DATA OVERFLOW PAGE

2. MANUFACTURER'S NAME

(U)
16516 Via Esprillo, Ste 300
San Diego, CA 92127

5. TUNING RANGE

(U) 690.6000 MHz - (U) 969.4000 MHz

7. RF CHANNELING CAPABILITY

(U) 5.0000 kHz Increments

8. EMISSION DESIGNATORS

(U) 1M20G1D	(U) 20M0G1D	(U) 3M60G1D
(U) 40M0G2D		

12. EMISSION BANDWIDTH

-3.00 dB (U) 6000 kHz	-3.00 dB (U) 580 kHz	-3.00 dB (U) 156 kHz
-20.0 dB (U) 10400 kHz	-20.0 dB (U) 1420 kHz	-20.0 dB (U) 1360 kHz
-40.0 dB (U) 15600 kHz	-40.0 dB (U) 2200 kHz	-40.0 dB (U) 2200 kHz
-60.0 dB (U) 24000 kHz	-60.0 dB (U) 4000 kHz	-60.0 dB (U) 3200 kHz
Measured	Measured	Measured
OC-BW (U) 10000 kHz	OC-BW (U) 1200.0 kHz	OC-BW (U) 1200.0 kHz
-3.00 dB (U) 600 kHz	-3.00 dB (U) 18400 kHz	-3.00 dB (U) 18400 kHz
-20.0 dB (U) 1440 kHz	-20.0 dB (U) 24000 kHz	-20.0 dB (U) 24000 kHz
-40.0 dB (U) 2200 kHz	-40.0 dB (U) 38000 kHz	-40.0 dB (U) 38000 kHz
-60.0 dB (U) 3800 kHz	-60.0 dB (U) 76000 kHz	-60.0 dB (U) 76000 kHz
Measured	Measured	Measured
OC-BW (U) 1200.0 kHz	OC-BW (U) 20000 kHz	OC-BW (U) 20000 kHz
-3.00 dB (U) 18200 kHz	-3.00 dB (U) 1660 kHz	-3.00 dB (U) 620 kHz
-20.0 dB (U) 24000 kHz	-20.0 dB (U) 4200 kHz	-20.0 dB (U) 3800 kHz
-40.0 dB (U) 40000 kHz	-40.0 dB (U) 6200 kHz	-40.0 dB (U) 5400 kHz
-60.0 dB (U) 74000 kHz	-60.0 dB (U) 10400 kHz	-60.0 dB (U) 9400 kHz
Measured	Measured	Measured
OC-BW (U) 20000 kHz	OC-BW (U) 3600.0 kHz	OC-BW (U) 3600.0 kHz
-3.00 dB (U) 2200 kHz	-3.00 dB (U) 38000 kHz	-3.00 dB (U) 38000 kHz
-20.0 dB (U) 4200 kHz	-20.0 dB (U) 40000 kHz	-20.0 dB (U) 40000 kHz
-40.0 dB (U) 7000 kHz	-40.0 dB (U) 56000 kHz	-40.0 dB (U) 54000 kHz
-60.0 dB (U) 11000 kHz	-60.0 dB (U) 82000 kHz	-60.0 dB (U) 84000 kHz
Measured	Measured	Measured
OC-BW (U) 3600.0 kHz	OC-BW (U) 40000 kHz	OC-BW (U) 20000 kHz

15. MAXIMUM MODULATION FREQUENCY

(U) 970000 kHz	(U) 2620000 kHz	(U) 450000 kHz
(U) 970000 kHz	(U) 2620000 kHz	(U) 450000 kHz
(U) 970000 kHz	(U) 2620000 kHz	(U) 450000 kHz
(U) 970000 kHz	(U) 2620000 kHz	(U) 970000 kHz

24. REMARKS

(U) Item 16. N/A

(U) Item 17. N/A

TRANSMITTER DATA OVERFLOW PAGE

24. REMARKS (continued)

(U) Item 18. N/A

(U) Item 19. Radio has ALC with following selectable power levels: 0.100W, 0.250W, 0.5W, 1.0W, and 2.0W. Modulation is constant envelope. Transmitter is burst based, so transmit duty cycle (and mean transmit power) is dependent on requested data traffic.

(U) Item 20. Output device is an integrated circuit power amplifier.

(U) Item 21. Measured data.

RECEIVER EQUIPMENT CHARACTERISTICS

1. NOMENCLATURE, MANUFACTURER'S MODEL NO.
(U) Shadow, (U) TW-900/TW-950 Shadow

2. MANUFACTURER'S NAME (See Data Overflow Page)
(U) TrellisWare Technologies, Inc.,

3. RECEIVER INSTALLATION

4. RECEIVER TYPE
(U) Phase Modulation Communications

5. TUNING RANGE (See Data Overflow Page)
(U) 225.6000 - 449.4000 MHz (U) 690.6000 - 969.4000 MHz

6. METHOD OF TUNING
(U) Synthesizer

7. RF CHANNELING CAPABILITY (See Data Overflow Page)
(U) 5.0000 kHz Increments (U) 5.0000 kHz Increments

8. EMISSION DESIGNATORS (See Data Overflow Page)
(U) 10M0G1D

9. FREQUENCY TOLERANCE
(U) 0.5 ppm

10. IF SELECTIVITY	1st	2nd	3rd
a. -3 dB			
b. -20 dB			
c. -60 dB			

11. RF SELECTIVITY (See Data Overflow Page)
☐ CALCULATED ☒ MEASURED

a. -3 dB	(U) 19400 kHz
b. -20 dB	(U) 22000 kHz
c. -60 dB	(U) 50000 kHz

d. Preselection Type
(U) Digitally Tunable

12. IF FREQUENCY
a. 1st
b. 2nd
c. 3rd

13. MAXIMUM POST DETECTION FREQUENCY

14. MINIMUM POST DETECTION FREQUENCY

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

16. MAXIMUM BIT RATE
(U) 40000000 bps

17. SENSITIVITY (See Data Overflow Page)

a. SENSITIVITY	(U) -102 dBm
b. CRITERIA	(U) 0.01 (U) Other
c. NOISE FIG	(U) 8.00 dB
d. NOISE TEMP	(U) 1540 K

18. DE-EMPHASIS
☐ a. YES ☐ b. NO

19. IMAGE REJECTION

20. SPURIOUS REJECTION
(U) 80.0 dB

21. REMARKS (U)

(U) Item 10. N/A - Homodyne receiver.

(U) Item 11. 20 MHz data is measured. 1.2MHz, 3.6MHz, 10MHz data is calculated.

(U) Item 12. N/A - Homodyne receiver.

(U) Item 13. N/A - CPM Modulation.

(U) Item 14. N/A - CPM Modulation.

RECEIVER DATA OVERFLOW PAGE

2. MANUFACTURER'S NAME
(U)
16516 Via Esprillo, Ste 300
San Diego, CA 92127

5. TUNING RANGE
(U) 1250.600 MHz - (U) 2619.400 MHz

7. RF CHANNELING CAPABILITY
(U) 5.0000 kHz Increments

8. EMISSION DESIGNATORS
(U) 1M20G1D
(U) 20M0G1D
(U) 3M60G1D
(U) 40M0G2D

11. RF SELECTIVITY

3.00 dB(U) 8000 kHz 20.0 dB(U) 10500 kHz 60.0 dB(U) 34000 kHz Measured	3.00 dB(U) 3000 kHz 20.0 dB(U) 4600 kHz 60.0 dB(U) 14000 kHz Measured	3.00 dB(U) 1000 kHz 20.0 dB(U) 1200 kHz 60.0 dB(U) 3500 kHz Measured
3.00 dB(U) 19400 kHz 20.0 dB(U) 22000 kHz 60.0 dB(U) 50000 kHz Measured	3.00 dB(U) 8000 kHz 20.0 dB(U) 10500 kHz 60.0 dB(U) 34000 kHz Measured	3.00 dB(U) 3000 kHz 20.0 dB(U) 4600 kHz 60.0 dB(U) 14000 kHz Measured
3.00 dB(U) 1000 kHz 20.0 dB(U) 1200 kHz 60.0 dB(U) 3500 kHz Measured	3.00 dB(U) 19400 kHz 20.0 dB(U) 22000 kHz 60.0 dB(U) 50000 kHz Measured	3.00 dB(U) 8000 kHz 20.0 dB(U) 10500 kHz 60.0 dB(U) 34000 kHz Measured
3.00 dB(U) 3000 kHz 20.0 dB(U) 4600 kHz 60.0 dB(U) 14000 kHz Measured	3.00 dB(U) 1000 kHz 20.0 dB(U) 1200 kHz 60.0 dB(U) 3500 kHz Measured	

17. SENSITIVITY

a. SENSITIVITY (U) -102 dBm
b. CRITERIA (U) 0.01 (U) Other
c. NOISE FIGURE (U) 8.00 dB
d. NOISE TEMPERATURE (U) 1540 K

a. SENSITIVITY (U) -102 dBm
b. CRITERIA (U) 0.01 (U) Other
c. NOISE FIGURE (U) 8.00 dB
d. NOISE TEMPERATURE (U) 1540 K

a. SENSITIVITY (U) -102 dBm
b. CRITERIA (U) 0.01 (U) Other
c. NOISE FIGURE (U) 8.00 dB
d. NOISE TEMPERATURE (U) 1540 K

a. SENSITIVITY (U) -102 dBm
b. CRITERIA (U) 0.01 (U) Other
c. NOISE FIGURE (U) 8.00 dB
d. NOISE TEMPERATURE (U) 1540 K

RECEIVER DATA OVERFLOW PAGE

17. SENSITIVITY (continued)

a. SENSITIVITY (U) -102 dBm
b. CRITERIA (U) 0.01 (U) Other
c. NOISE FIGURE (U) 8.00 dB
d. NOISE TEMPERATURE (U) 1540 K

a. SENSITIVITY (U) -102 dBm
b. CRITERIA (U) 0.01 (U) Other
c. NOISE FIGURE (U) 8.00 dB
d. NOISE TEMPERATURE (U) 1540 K

a. SENSITIVITY (U) -102 dBm
b. CRITERIA (U) 0.01 (U) Other
c. NOISE FIGURE (U) 8.00 dB
d. NOISE TEMPERATURE (U) 1540 K

a. SENSITIVITY (U) -102 dBm
b. CRITERIA (U) 0.01 (U) Other
c. NOISE FIGURE (U) 8.00 dB
d. NOISE TEMPERATURE (U) 1540 K

a. SENSITIVITY (U) -102 dBm
b. CRITERIA (U) 0.01 (U) Other
c. NOISE FIGURE (U) 8.00 dB
d. NOISE TEMPERATURE (U) 1540 K

a. SENSITIVITY (U) -102 dBm
b. CRITERIA (U) 0.01 (U) Other
c. NOISE FIGURE (U) 8.00 dB
d. NOISE TEMPERATURE (U) 1540 K

a. SENSITIVITY (U) -102 dBm
b. CRITERIA (U) 0.01 (U) Other
c. NOISE FIGURE (U) 8.00 dB
d. NOISE TEMPERATURE (U) 1540 K

a. SENSITIVITY (U) -102 dBm
b. CRITERIA (U) 0.01 (U) Other
c. NOISE FIGURE (U) 8.00 dB
d. NOISE TEMPERATURE (U) 1540 K

a. SENSITIVITY (U) -102 dBm
b. CRITERIA (U) 0.01 (U) Other
c. NOISE FIGURE (U) 8.00 dB
d. NOISE TEMPERATURE (U) 1540 K

21. REMARKS

(U) Item 15. N/A - Homodyne receiver.

(U) Item 17b. Packet Error Rate.

(U) Item 18. N/A - Homodyne receiver.

RECEIVER DATA OVERFLOW PAGE

21. REMARKS (continued)

(U) Item 19. N/A - Homodyne receiver.

(U) Item 20. N/A - Homodyne receiver.

ANTENNA EQUIPMENT CHARACTERISTICS

1. ☐ **a. TRANSMITTING** ☐ **b. RECEIVING** ☐ **c. TRANSMITTING AND RECEIVING**

2. NOMENCLATURE, MANUFACTURER'S MODEL NO.
(U) TW-1161

3. MANUFACTURER'S NAME (See Data Overflow Page)
(U) TrellisWare Technologies, Inc.,

4. FREQUENCY RANGE
(U) 675.0000 - 2600.000 MHz

5. TYPE (U) Halfwave Dipole

6. POLARIZATION
(U) Vertical

7. SCAN CHARACTERISTICS

a. TYPE

b. VERTICAL SCAN

(1) Max Elev

(2) Min Elev

(3) Scan Rate

c. HORIZONTAL SCAN

(1) Sector Scanned

(2) Scan Rate

8. GAIN

a. MAIN BEAM
(U) 1.00 dBi

b. 1st MAJOR SIDE LOBE
Horz. (U) 1 dB Actual Vert. (U) 1 dB Actual

9. BEAMWIDTH

a. HORIZONTAL
(U) 360 degrees

b. VERTICAL
(U) 80.0 degrees

d. SECTOR BLANKING ☐ (1) YES ☐ (2) NO

10. REMARKS (U)

(U) Item 1. Antenna is both transmit and receive.

(U) Item 7. N/A - Antenna is not scanning.

(U) Item 8b. N/A - Antenna does not have sidelobes.

(U) Item 9b. 70-90 degrees depending on frequency.

ANTENNA DATA OVERFLOW PAGE

3. MANUFACTURER'S NAME

(U)

16516 Via Esprillo, Ste 300
San Diego, CA 92127

ANTENNA EQUIPMENT CHARACTERISTICS

1. ☐ **a. TRANSMITTING** ☐ **b. RECEIVING** ☐ **c. TRANSMITTING AND RECEIVING**

2. NOMENCLATURE, MANUFACTURER'S MODEL NO.
(U) TW-1160

3. MANUFACTURER'S NAME (See Data Overflow Page)
(U) TrellisWare Technologies, Inc.,

4. FREQUENCY RANGE
(U) 675.0000 - 2600.000 MHz

5. TYPE (U) Halfwave Dipole

6. POLARIZATION
(U) Vertical

7. SCAN CHARACTERISTICS

a. TYPE

b. VERTICAL SCAN

(1) Max Elev

(2) Min Elev

(3) Scan Rate

c. HORIZONTAL SCAN

(1) Sector Scanned

(2) Scan Rate

8. GAIN

a. MAIN BEAM
(U) 1.00 dBi

b. 1st MAJOR SIDE LOBE
Horz. (U) 1 dB Actual Vert. (U) 1 dB Actual

9. BEAMWIDTH

a. HORIZONTAL
(U) 360 degrees

b. VERTICAL
(U) 80.0 degrees

d. SECTOR BLANKING ☐ (1) YES ☐ (2) NO

10. REMARKS (U)

(U) Item 1. Antenna is both transmit and receive.

(U) Item 7. N/A - Antenna is not scanning.

(U) Item 8b. N/A - Antenna does not have sidelobes.

(U) Item 9b. 70-90 degrees depending on frequency.

ANTENNA DATA OVERFLOW PAGE

3. MANUFACTURER'S NAME

(U)

16516 Via Esprillo, Ste 300
San Diego, CA 92127

ANTENNA EQUIPMENT CHARACTERISTICS

1. ☐ **a. TRANSMITTING** ☐ **b. RECEIVING** ☐ **c. TRANSMITTING AND RECEIVING**

2. NOMENCLATURE, MANUFACTURER'S MODEL NO.
(U) TW-1155

3. MANUFACTURER'S NAME (See Data Overflow Page)
(U) TrellisWare Technologies, Inc.,

4. FREQUENCY RANGE
(U) 700.0000 - 970.0000 MHz

5. TYPE (U) Halfwave Dipole

6. POLARIZATION
(U) Vertical

7. SCAN CHARACTERISTICS

a. TYPE

b. VERTICAL SCAN

(1) Max Elev

(2) Min Elev

(3) Scan Rate

8. GAIN

a. MAIN BEAM
(U) 2.00 dBi

b. 1st MAJOR SIDE LOBE
Horz. (U) 2 dB Actual Vert. (U) 2 dB Actual

c. HORIZONTAL SCAN

(1) Sector Scanned

(2) Scan Rate

9. BEAMWIDTH

a. HORIZONTAL
(U) 360 degrees

b. VERTICAL
(U) 80.0 degrees

d. SECTOR BLANKING ☐ (1) YES ☐ (2) NO

10. REMARKS (U)

(U) Item 1. Antenna is both transmit and receive.

(U) Item 7. N/A - Antenna is not scanning.

(U) Item 8b. N/A - Antenna does not have sidelobes.

ANTENNA DATA OVERFLOW PAGE

3. MANUFACTURER'S NAME

(U)

16516 Via Esprillo, Ste 300
San Diego, CA 92127

ANTENNA EQUIPMENT CHARACTERISTICS

1. ☐ **a. TRANSMITTING** ☐ **b. RECEIVING** ☐ **c. TRANSMITTING AND RECEIVING**

2. NOMENCLATURE, MANUFACTURER'S MODEL NO.
(U) TW-1150

3. MANUFACTURER'S NAME (See Data Overflow Page)
(U) TrellisWare Technologies, Inc.,

4. FREQUENCY RANGE
(U) 225.0000 - 470.0000 MHz

5. TYPE (U) Halfwave Whip

6. POLARIZATION
(U) Vertical

7. SCAN CHARACTERISTICS

a. TYPE

b. VERTICAL SCAN

(1) Max Elev

(2) Min Elev

(3) Scan Rate

8. GAIN

a. MAIN BEAM
(U) 0.000 dBi

b. 1st MAJOR SIDE LOBE
Horz. (U) 0 dB Actual Vert. (U) 0 dB Actual

c. HORIZONTAL SCAN

(1) Sector Scanned

(2) Scan Rate

9. BEAMWIDTH

a. HORIZONTAL
(U) 360 degrees

d. SECTOR BLANKING ☐ (1) YES ☐ (2) NO

b. VERTICAL
(U) 80.0 degrees

10. REMARKS (U)

(U) Item 1. Antenna is both transmit and receive.

(U) Item 7. N/A - Antenna is not scanning.

(U) Item 8b. N/A - Antenna does not have sidelobes.

ANTENNA DATA OVERFLOW PAGE

3. MANUFACTURER'S NAME

(U)

16516 Via Esprillo, Ste 300
San Diego, CA 92127

NTIA GENERAL INFORMATION

1. APPLICATION TITLE (U) TrellisWare Shadow Radios (TW-900/TW-950)

2. SYSTEM NOMENCLATURE (U) TrellisWare Shadow Radios (TW-900/TW-950)

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)
b. EMISSION DESIGNATORS

5. PURPOSE OF SYSTEM, OPERATIONAL AND SYSTEM CONCEPTS **(WARTIME USE)** (U) ☒ **a. YES** ☐ **b. NO**
(U) Provide for the mobile mesh networking dissemination of voice, video and data traffic in tactical environments.

6. INFORMATION TRANSFER REQUIREMENTS
(U) Ability to transmit voice, streaming video and IP data over multiple hops.

7. ESTIMATED INITIAL COST OF THE SYSTEM

8. TARGET DATE FOR

a. APPLICATION APPROVAL	b. SYSTEM ACTIVATION	c. SYSTEM TERMINATION
(U) 6/29/2018	(U) 6/29/2018	

9. SYSTEM RELATIONSHIP AND ESSENTIALITY (See Data Overflow Page)
(U) Tactical and assault operations in harsh RF environments that can include caves/tunnels, ships, and dense urban centers. The TSM Shadow system is designed to maintain robust connectivity

10. REPLACEMENT INFORMATION
(U) NA

11. RELATED ANALYSIS AND/OR TEST DATA

12. NUMBER OF UNITS (U) 250

13. GEOGRAPHICAL AREA FOR

a. STAGE 2

b. STAGE 3

c. STAGE 4 (U) US&P - Polygon

14. LINE DIAGRAM See Attached

15. SPACE SYSTEMS

16. TYPES OF SERVICE(S) FOR STAGE 4
Land Mobile

17. STATION CLASS(ES) FOR STAGE 4
ML

18. REMARKS

DOWNGRADING INSTRUCTIONS

Special Handling Instruction : A

CLASSIFICATION
UNCLASSIFIED

NTIA DATA OVERFLOW PAGE

9. SYSTEM RELATIONSHIP AND ESSENTIALITY

Cont. (U) across all of the aforementioned RF environments providing multi-channel voice, streaming video and IP data through a mobile mesh network that requires no fixed infrastructure.

DOWNGRADING INSTRUCTIONS

Special Handling Instruction : A

Table of Contents For

(U) TrellisWare Shadow Radios (TW-900/TW-950)

ALSO:

Line Diagram: TrellisWare Shadow Radios (TW-900/TW-950)