

Attachment 001

# LIGHT ARMORED VEHICLE COMMAND & CONTROL (LAV-C2)

*Router/Switch Performance Specification*

17 January 2014

**DISTRIBUTION STATEMENT C: DISTRIBUTION AUTHORIZED TO U.S GOVERNMENT AGENCIES AND THEIR CONTRACTORS (FOR ADMINISTRATIVE OR OPERATION USE) AS OF THE APPROVAL DATE OF THIS DRAWING. OTHER REQUESTS SHALL BE REFERRED TO USATACOM, PROGRAM MANAGER'S OFFICE LIGHT ARMORED VEHICLE, SFAE-CSS-LAV-M, 6501 ELEVEN MILE ROAD, WARREN, MI 48397-5000.**

**THIS INFORMATION IS SUBJECT TO US EXPORT LAWS. THIS DOCUMENT, WHICH INCLUDES ANY ATTACHMENTS AND EXHIBITS HERETO, CONTAINS INFORMATION SUBJECT TO INTERNATIONAL TRAFFIC IN ARMS REGULATIONS (ITAR) OR EXPORT ADMINISTRATION REGULATIONS (EAR), WHICH MAY NOT BE EXPORTED, RE-EXPORTED, RELEASED, OR DISCLOSED TO A FOREIGN PERSON INSIDE OR OUTSIDE THE US WITHOUT FIRST OBTAINING APPROPRIATE EXPORT AUTHORIZATION. VIOLATIONS OF THESE EXPORT REGULATIONS ARE SUBJECT TO SEVERE CRIMINAL AND CIVIL PENALTIES.**

Attachment 001

## 1.0 SCOPE

### 1.1 Specification Scope

This document establishes the requirements for the router/switch necessary for integration into the LAV-C2 vehicle. The router shall be a sealed box with slide rails and conform to a 482.6 mm (19" standard rack mount) footprint not to exceed two rack units (2 RU) in height to ensure a proper fit into the communications rack.

## 2.0 DOCUMENTS

### 2.1 Applicable Documents

The referenced documents at the current revision level (unless otherwise indicated) including Change Notices; apply as defined within this specification.

#### List of Standards

- **MIL-STD-461F:** *Requirements For The Control Of Electromagnetic Interference Characteristics Of subsystems And Equipment*
- **MIL-STD-188-124:** *Grounding, Bonding And Shielding For Common Long Haul/Tactical Communication Systems Including Ground Based Communications-Electronics Facilities And Equipments*
- **MIL-STD-130:** *Identification Marking Of U.S. Military Property*
- **MIL-STD-1275:** *Characteristics Of 28 Volt DC Electrical Systems In Military Vehicles*
- **MIL-STD-810:** *Environmental Engineering Considerations And Laboratory Tests*

#### Handbooks

**MIL-HDBK-454:** *General Guidelines For Electronic Equipment*

#### Federal Standards

- N/A

#### Other Government Documents

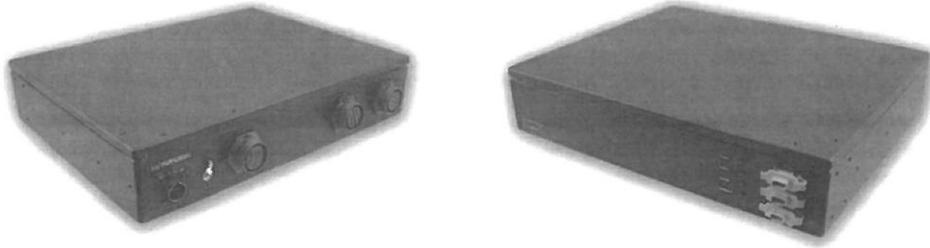
- N/A

## 3.0 REQUIREMENTS

### 3.1 Mechanical Requirements

#### 3.1.1 Outline and Dimensions

### **3.1.1.1 Router**



### **3.1.2 Finish**

The part finish shall protect the device and meet all requirements after exposure to any environments required herein.

### **3.1.3 Marking**

Devices shall be marked with part number 01365-03002A1353-1 IAW MIL-STD-130. Devices shall be serialized IAW MIL-STD-130.

## **3.2 Performance Requirements**

### **3.2.1 Console/Aux Ports**

The console/aux ports shall be located in the front of the unit. The ports shall consist of a single DB-9 and a single RJ-45 port in support of this functionality. The ports are to be covered, capped, and tethered IAW specified environmental requirements.

### **3.2.2 Ethernet Ports**

All Ethernet Ports shall be located in the rear of the enclosure (not to include ports in 3.2.1). The connector type shall be a D38999/24WH35SN bundle. There shall be three (3) D38999/24WH35SN bundles to support all Ethernet Ports (not to include ports in 3.2.1). Unless otherwise specified, the ports shall be evenly distributed among the three D38999/24WH35SN's to the largest extent possible.

### **3.2.3 Cisco Equipment**

The router/switch unit shall be managed via a Cisco operating system.

### **3.2.4 Router DRAM**

The Router DRAM shall be the maximum available dictated by the components selected for integration meeting specification requirements.

### **3.2.5 Router Flash**

The Router Flash shall be the maximum available dictated by the components selected for integration meeting specification requirements.

### **3.2.6 Router Port Density**

Router Port Density shall be 4 Fast Ethernet ports.

### **3.2.7 Switch Port Density**

Switch Port Density shall be twenty-four (24) Fast Ethernet ports and two (2) Gigabit Ethernet ports.

### **3.2.8 Switch DRAM**

The Switch DRAM shall be the maximum available dictated by the components selected for integration meeting specification requirements.

### **3.2.9 Indicator Lights**

The unit shall have lights on the front of the unit that indicate power (green) and indicate activity (amber).

## **3.3 Electrical Requirements**

### **3.3.1 Power Consumption**

Power consumption shall not exceed 100W.

### **3.3.2 Power Input**

The power input shall function between 18 and 32Vdc IAW MIL-STD-1275.

### **3.3.3 Power Interface**

The power interface shall conform to the MIL-DTL-38999 standard.

### **3.3.4 Electromagnetic Interference (EMI)**

All EMI characteristics shall be IAW the following sections of MIL-STD-461F

**3.3.4.1** CE102 - *Conducted Emissions, 10 kHz to 10 MHz, Power Leads*

**3.3.4.2** CS101 - *Conducted Susceptibility, 30 Hz to 150 kHz, Power Leads*

**3.3.4.3** CS114 - *Conducted Susceptibility, 10 kHz to 200 MHz, Bulk Injection*

**3.3.4.4** CS115 - *Conducted Susceptibility, Impulse*

**3.3.4.5** CS116 - *Conducted Susceptibility, 10 kHz to 100 MHz, Sinusoidal Transients*

**3.3.4.6** RE101 - *Radiated Emissions, 30 Hz to 100 kHz, Magnetic Field*

**3.3.4.7** RE102 - *Radiated Emissions, 10 kHz to 18 GHz, Electric Field*

**3.3.4.8** RS103 - *Radiated Susceptibility, 10 kHz to 40 GHz, Electric field*

### **3.3.5 Grounding, Bonding, Shielding**

All Grounding, Bonding, and Shielding shall be IAW MIL-STD-188-124

### **3.3.6 General Guidelines for Electronic Equipment**

All Electronic Equipment shall be IAW the following sections of MIL-HDBK-454

- 3.3.6.1 Guideline 1 - *Safety Design Criteria*
- 3.3.6.2 Guideline 4 - *Fungus Inert Materials*
- 3.3.6.3 Guideline 5 - *Soldering*
- 3.3.6.4 Guideline 9 - *Workmanship*
- 3.3.6.5 Guideline 10 - *Electrical Connectors*
- 3.3.6.6 Guideline 11 - *Insulating Materials, Electrical*
- 3.3.6.7 Guideline 12 - *Fastener Hardware*
- 3.3.6.8 Guideline 15 - *Metals, Corrosion Resistance*
- 3.3.6.9 Guideline 19 - *Terminations*
- 3.3.6.10 Guideline 20 - *Wire, Hookup, Internal*
- 3.3.6.11 Guideline 28 - *Controls*
- 3.3.6.12 Guideline 33 - *Resistors*
- 3.3.6.13 Guideline 35 - *Reliability*
- 3.3.6.14 Guideline 39 - *Fuses and Fuse Holders*
- 3.3.6.15 Guideline 50 - *Indicator Lights*
- 3.3.6.16 Guideline 54 - *Maintainability*
- 3.3.6.17 Guideline 55 - *Enclosures*
- 3.3.6.18 Guideline 58 - *Switches*
- 3.3.6.19 Guideline 61 - *Electromagnetic Interference Control*
- 3.3.6.20 Guideline 67 - *Marking*
- 3.3.6.21 Guideline 69 - *Internal Wiring Practices*

**3.3.6.22** Guideline 70 - *Electrical Filters*

**3.3.6.23** Guideline 74 - *Grounding, Bonding and Shielding*

### **3.4 Environmental Requirements**

The unit shall be capable of meeting all electrical requirements following exposure to any or all of the environments specified in the following paragraphs.

#### **3.4.1 Temperature Range**

Storage: -51°C to +71°C (-60°F to +160°F)

Operating: -32°C to +52°C (-25°F to +125°F)

#### **3.4.2 High Temperature**

The unit shall be IAW MIL-STD-810, Section 501.5 Hot Climatic Category, Procedure I Storage and Procedure II Operation.

#### **3.4.3 Low Temperature**

The unit shall be IAW MIL-STD-810, Section 502.5 Procedure I Storage and Procedure II Operation.

#### **3.4.4 Temperature Shock**

The unit shall be IAW MIL-STD-810, Section 503.5, 0°F to +70°F for duration of 10 minutes and +120°F to +70°F for a duration of 10 minutes, Procedure IB.

#### **3.4.5 Low Pressure**

The unit shall be IAW MIL-STD-810, Section 500.5, Procedure I Storage/Air Transport and Procedure III Rapid Decompression.

#### **3.4.6 Rain**

The unit shall be IAW MIL-STD-810, Section 506.5, Procedure II Water Tightness.

#### **3.4.7 Humidity**

The unit shall be IAW MIL-STD-810, Section 507.5, with a minimum time of 10 days, Cycle B1, Procedure I.

#### **3.4.8 Fungus**

The unit shall be IAW MIL-STD-810, Section 508.6, US (2.2.2), time of 28 to 84 days.

#### **3.4.9 Salt Fog**

The unit shall be IAW MIL-STD-810, Section 509.5, 4 days duration.

#### **3.4.10 Sand and Dust**

The unit shall be IAW MIL-STD-810, Section 510.5, Procedure I Blowing Dust, 13 hours using <105µm particle size.

#### **3.4.11 Vibration**

The unit shall be IAW MIL-STD-810, Section 514.6, Procedure 1 General Vibration, Wheeled Vehicle.

#### **3.4.12 Acoustic Noise**

The unit shall be IAW MIL-STD-810, Section 515.6, Procedure I Diffuse Field Acoustic Noise and Procedure III Cavity Resonance Acoustic Noise.

#### **3.4.13 Shock**

The unit shall be IAW MIL-STD-810, Section 516.6, Procedure I Functional Shock, Procedure II Materiel To Be Packaged, Procedure III Fragility, Procedure IV Transit Drop, Procedure V Crash Hazard, and Procedure VI Bench Handling.

### **4.0 QUALITY ASSURANCE PROVISIONS**

#### **4.1 Quality Assurance Program**

The Contractor shall implement and maintain a Quality System compliant to ISO 9001:2008 or equivalent. The Contractor shall document the Quality Assurance System in a Quality Assurance Manual, which shall be capable of satisfying the above requirements and be made available for review at Government's request.

The Contractor shall explicitly identify by paragraph, any exceptions taken to the Quality Program requirements. The Contractor shall be prepared to justify these exceptions and all exceptions shall be subject to Government approval.

Key Characteristics shall be a major part of this Program. Key Characteristics for a part, subassembly, or system are those selected geometrical, material properties, functional and/or cosmetic features, which are measurable, whose variation control is necessary in meeting Government requirements and enhancing Government satisfaction.

Documented procedures shall be in place and implemented for the following activities as a minimum:

- CONTROL OF DOCUMENTS
- CONTROL OF RECORDS
- INTERNAL AUDITS
- CONTROL OF NONCONFORMANCES
- CORRECTIVE ACTION
- PREVENTIVE ACTION

#### **4.2 Corrective Action System**

The Contractor shall document and implement a corrective action system for process and product non-conformance. The system shall be closed-loop, ensuring that problems are reported, recorded, tracked, and resolved in a timely manner. An analysis shall be performed to detect trends in the non-conformances identified. Corrective actions shall be evaluated to

determine if problems have been resolved, adverse trends have been reversed, and changes have been implemented without introducing additional problems.

#### **4.3 Manufacturing Controls Workmanship**

The Contractor shall maintain Workmanship Standards and work instructions in accordance with ISO 9001:2008 or equivalent as a minimum, workmanship shall be performed in accordance with MIL-HDBK-454, ANSI J-STD-001 and SAE-AS50881.

#### **4.4 Corrosion Control**

The Contractor shall apply corrosion prevention and control programs that assure the use of best practices for controlling and preventing corrosion in the product during its specified service life. This program activity shall be made available for review by the Government upon request.

#### **4.5 Nonconforming Material**

The Contractor shall define control of Non-Conforming Material in accordance with ISO 9001:2008. No Material Review Board (MRB) authority is granted and authority cannot be flowed to sub-tier Contractors. Requests for authorization of use-as-is or to perform repairs shall be requested through the appropriate contract-to-contract representatives. Disposition time by the Government will vary with the severity of the non-conformance and the required analysis.

#### **4.6 Design and Development**

Design and development shall be planned and controlled. Stages/phases of design and development (sequence, mandatory steps, and configuration control), reviews, verifications, and validation activities, along with the responsibilities and authorities of those involved shall be identified.

Design inputs shall be defined, recorded, and maintained including: Functional and Performance requirements, statutory/regulatory requirements, necessary information from prior designs, or other essential requirements. Inputs shall be reviewed for adequacy.

Design outputs shall be documented and provide: traceability to input requirements; information for purchasing, production, and servicing; contain or reference acceptance criteria; define characteristics essential for safe and proper use; identify key characteristics. Output documents shall be approved prior to release. Data pertinent to the product shall be defined to allow product to be identified, manufactured, inspected, used, and maintained.

Verifications that outputs meet inputs shall be performed. Records of the review and necessary action shall be maintained.

Validation that the product is capable of intended use shall be conducted prior to delivery or implementation. Record of validation and necessary actions shall be maintained. This validation follows successful verification activity and is performed on the final product under defined operating conditions (e.g. Environmental/Qualification Test, Operation/Technical Evaluation Test).

Documented evidence shall be in place for completion of verification and validation (e.g.

reports, calculations, test results). Design and Development Verification and Validation testing shall be planned, controlled, reviewed and documented. Documents shall include:

- Plans/specification which identify product, resources, objectives, conditions, parameter, and acceptance requirements
- Procedures which identify methods used and records
- Test configuration, how tests are observed, and are acceptance criteria met.

Design changes shall be identified and recorded. This includes evaluation of effect on constituent parts and delivered product. Changes shall be reviewed, verified, validated, and approved prior to implementation. Records of changes and necessary actions shall be maintained. Change processes shall include regulatory agencies/Government approval where required.

#### **4.7 Product Verification and Acceptance**

During product sell-off, the Contractor shall provide the Government with technical insight to ascertain that:

- Drawings and specifications are completed, and the product matches the documentation
- In-process and final workmanship inspections have been completed and the product complies with designated requirements and workmanship standards
- The Contractor shall have a process that is compatible with The Department Of Defense Product Quality Report Program for handling user complaints with fielded products.

#### **4.8 Measuring, Test Equipment and Tooling**

The Contractor's Calibration Control System shall comply with ISO 10012 and/or ANSI/NCSL Z540. The Contractor's Quality Assurance organization shall be responsible for ensuring that control of all test equipment hardware and software is maintained. Procedures shall define the requirements for build, verification, certification and use of Special Test Equipment.

#### **4.9 Acceptance Testing**

Acceptance testing shall be performed on each piece of equipment, prior to delivery, to Government approved acceptance test procedures.

#### **4.10 Inspection and Test Records**

The Contractor shall retain copies of all inspection and test records for a period of at least 3 years after the date of final delivery. A documented procedure shall be in place for control of records.

### **5.0 APPROVED SOURCE(S) OF SUPPLY**

Only the item described in this document, when procured from the Contractor(s) listed herein, is approved by the Government for use in the application(s) specified herein. A substitute item shall not be used without prior approval by the Government.

Identification of the approved source(s) of supply herein is not to be construed as a guarantee of present or continued availability as a source for the item described in the document.

### 5.1 Approved Source(s) of Supply and Part Number Cross Reference

**Table 1. Part Number/Contractor Identification**

| <b>Part Number</b>   | <b>Contractor Part Number</b> | <b>Contractor Name</b> | <b>CAGE Code</b> | <b>Address</b>  |
|----------------------|-------------------------------|------------------------|------------------|---|
| 3200 Series Router   | C230ENC-K9                    | Cisco Systems, Inc.    | 0GX96            | 170 West Tasman Drive,<br>San Jose, CA 95134-<br>1706 |
| 2955 Catalyst Switch | WS2955T-12                    | Cisco Systems, Inc.    | 0GX96            | 170 West Tasman Drive,<br>San Jose, CA 95134-<br>1706 |