Parvus DuraMAR 5915 (“0X”Series)

Rugged Cisco 5915 Mobile IP Router Subsystem, Standalone

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Key Features

- Rugged Cisco 5915-based Mobile IP Router
- 5x Ports (2x Routed, 3x Switched)
- Cisco Enterprise IOS Management/Security Software with Data, Video, Voice Services
- Size, Weight & Power (SWaP) Optimized:
- < 5 lbs Weight, 112 inch³ Size, < 15 Watts Power
- Vehicle and Aircraft Compatible Power Supply (per MIL-STD-704F & MIL-STD-1275D)
- Environmental Qual Tested to MIL-STD-810G, including Extreme Shock & Vibe for Jet, Helo, Tracked Vehicles
- MIL-STD-461F EMI/EMC Qual Tested for Conducted & Radiated Emissions/ Suspectiblity
- Rugged Aluminum Chassis w/ MIL-DTL-38999 Circular Connectors
- IP67 Ingress Protected (Dust/Water Proof)
- Data Zeroization to Erase Sensitive Data

Application

- In-Vehicle / Aircraft IP Network Routing / Switching
- Network-Centric Operations / Situational Awareness
- Extreme Environments (Cold / Hot Temperatures, Humidity, Rain, Dust, Shock, Vibration)
- Transparent Mobile Data, Voice and Video In-Vehicle Communications and On-Demand Network Connectivity
- Fixed / Rotary Wing (Un)manned Air Vehicles
- Tactical Ground Vehicles / Maritime Platforms
- C4ISR Technology Refresh / LRU Upgrades

Overview

The Parvus® DuraMAR® 5915 is a rugged Commercial-Off the Shelf (COTS) Cisco IOS-managed secure mobile network router integrating Cisco’s 5915 Embedded Services Router (ESR) card in an ultra-rugged chassis optimized for harsh military and civil vehicle / aircraft installations. The “0X” model series (MAR-5915-0X) is a standalone variant with a total of five (5) Ethernet ports. An ideal solution for IP networking technology refresh and situational awareness applications deployed at the tactical network edge, the DuraMAR 5915 enables prime defense contractors and civil agencies to deploy data, video, and voice services virtually anywhere LAN/WAN connectivity may be required, especially in mobile, airborne, ground, manned or unmanned vehicle and sensor applications.

The MAR-5915-0X series provides a robust network routing architecture with the performance, security, Quality of Service (QoS), high availability, and manageability that customers expect from Cisco IOS-based technologies. The familiar Cisco IOS software interface minimizes training requirements and provides extensive support for IPv4/IPv6 routing protocols, IP multicasting, Radio Aware Routing (RAR), Dynamic Link Exchange Protocol (DLEP), remote VoIP, Firewall/IPS/IDS, Mobile Ad Hoc Networking (MANET) and Mobile IP routing for connectivity in Comms on the Move (COTM) applications. An onboard AES hardware encryption engine offloads encryption processing from the router to provide highly secure yet scalable data, video, and voice services.

Optimized for Size, Weight and Power (SWaP) sensitivity as well as mechanical robustness under extreme environmental conditions, the DuraMAR 5915 0X series is qualified for extreme MIL-STD-810G and MIL-STD-461F environmental and EMI compliance (thermal, shock, vibration, humidity, altitude, conducted and radiated emissions & susceptibility). Leveraging stackable PC104 subassemblies and a modular enclosure design, the unit is completely sealed against dust and water ingress (IP67), requires no active cooling, provides interfaces over MIL-DTL-38999 connectors, and features a military-grade power supply for aircraft (MIL-STD-704F) and ground (MIL-STD-1275D) vehicle voltage inputs, spikes, and transient levels, as well as MIL-STD-461F EMI/EMC filtering.

For applications requiring Cisco IOS managed switching, see DuraMAR 5915 “2X Series” datasheet for MAR-5915-2X variant which integrates a Cisco ESS 2020 switch. For low-power, carrier-grade GbE switching, see DuraMAR 5915 “3X Series” datasheet for MAR-5915-3X variant which integrates a Vitesse-based GbE Switch. For a standalone Cisco 5915 ESR-based system with RJ-45 / M12 connectors (5x total 10/100 ports), see DuraMAR 31-5915 datasheet.

Features

Cisco Technology:

- Cisco IOS-Managed Embedded Services Router (ESR) in Ultra-Rugged Enclosure
- Cisco 5915 Advanced Enterprise IOS for Robust Information Assurance, Dynamic Layer 3 IPv4 / IPv6 Routing, QoS Management, Mobile Ad Hoc Networking, Remote Call Manager, Radio Aware Routing (RAR)
- Integrated Services Router (ISR) Features Support Concurrent Data, Video, and Voice Services, Firewall, Hardware Accelerated AES Encryption/NSA Suite B in IOS
- Modular, Open Architecture Rugged COTS PC104 Hardware Design
- Ethernet Ports: 5x Ports (2x 10/100 Routed, 3x 10/100 Switched)
- Cisco 5915 ESR is FIPS 140-2 Level 1 Approved, Common Criteria Validated, and DoD APL Listed; DuraMAR 5915 Router is US DoD UC APL Approved

Ruggedization:

- Fully Qualified to MIL-810G Shock, Vibration, Thermal, Altitude, Humidity
- -40 to +71C Fanless Extended Temp Operation with No Moving Parts
- Corrosion-Resistant, Aluminum Chassis IP67 Sealed Against Water, Dust
- Circular MIL-DTL-38999 Connectors for Reliable Network Connections
- Filtered, Transient and EMI-Protected MIL-STD-1275/704 Compliant Power Supply for Aircraft and Ground Vehicle Use
- Qual Tested for MIL-461F Conducted/Radiated Emissions & Susceptibility

cisco Technology

- Data Zeroization Support to Erase Sensitive Information
- Conformal Coating for Humidity/Tin-Whisker Mitigation
- Flexible / Robust Mounting – Base Flange Mount or Side Boss Mount
- Export Jurisdiction: ITAR-Free, U.S. Commerce EAR Controlled

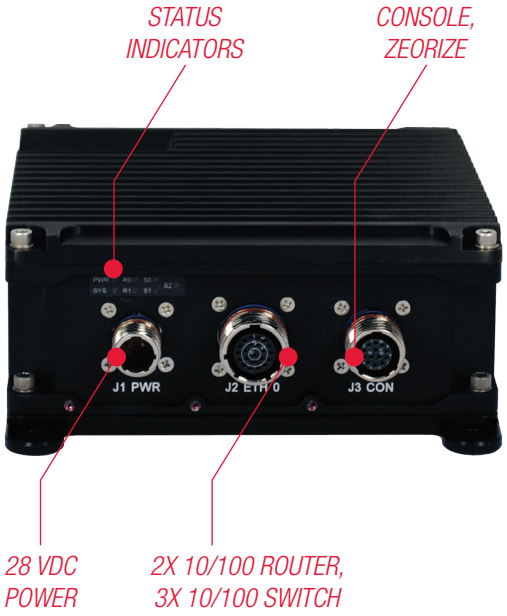
Applications:

- Civil and Military Tactical In-Vehicle LAN Switching / WAN Routing - 24V / 28V Ground Vehicle / Aircraft / Maritime Platforms with Size, Weight & Power (SWaP) Constraints
- Extending Cisco Systems Enterprise Networking Infrastructure Beyond the Reach of Traditional Fixed-Networks into Mobile and Embedded Networking Applications
- Mobile Ad Hoc Networking (MANET) - On-Demand Network Connectivity in Mobile Deployments When Connected to UHF, VHF, Wi-Fi and Tactical Radio Platforms
- Aggregation of Peripheral Devices (Cameras, Sensors, Computers) from Outdoor and Embedded IP Network Infrastructure into a Manageable, Highly Secure IP Network
- C4ISR Situational Awareness / Technology Refresh / Line Replaceable Units (LRUs)

Specifications Summary

Applications

- Technology Migration Path for Legacy Cisco 3200 (3230 / 3250 / 3270)-based Routers, including DuraMAR 1000, DuraMAR 3230
- Managed Layer 3 IP Network Routing and Layer 2 Local Area Network (LAN) Ethernet Switching in Harsh Temperature and Vibration Environments for IP-Enabled Equipment (i.e. On-board Computers, Cameras, Sensors, Radios, Satcom Modems, Monitoring Devices, and Command-and-Control Gear)
- Size, Weight & Power (SWaP) Constrained Mobile, Tactical, Airborne, and Vehicle Networking Applications Upgrading Situational Awareness and/or Network Centric Capabilities at Network Edge in Demanding Embedded Networking Environments (e.g. Defense, Homeland Security, Energy, Industrial, Oil & Gas Platforms, Underground Mining Equipment, Offshoring Drilling Rigs, Shipping Vessels, Electric Utility Substations, Railway Train Rolling Stock, Fleet Transportation, Outdoor Embedded Networks, etc)
- Remote IP Telephony on Vehicles or Outdoor Locations using Cisco Unified Communications Manager Express (CME)
- Mobile Ad Hoc Networking (MANET) - On-Demand Network Connectivity in Mobile Deployments When Connected to UHF, VHF, Wi-Fi and Tactical Radio Platforms



Ports

MAR-5915-0X Series (Cisco 5915 Router only):

- 2x 10/100Mbps Fast Ethernet WAN Router Ports, IEEE 802.3 Compliant
- 3x 10/100Mbps Fast Ethernet Switched LAN Ports, IEEE 802.3u Compliant
- 1x Console Ports, RS-232
- Power Input & Data Zeroize

MAR-5915-0X Standalone Cisco-based Router Subsystem

Cisco Technology

Cisco 5915 Embedded Services Router (ESR), Rugged PC104 Card

- Cisco 5915 Enterprise IOS Base / Advanced Services Image, incl. Option. Communications Manager Express (CME) License
- Support for IPv6 Routing, VoIP / CME, VPN / Firewall / IPS, Mobile IP, IPSec Exclusive to Advanced IOS only(see Cisco 5915 datasheet / Cisco Feature Navigator for complete software feature comparison)
- Routing Performance: ~170Kpps (Performance Varies Based on Security/Voice/Data Services Enabled)
- Ethernet Ports: 2x 10/100 Routed, 3x 10/100 Switched

Side View

Specifications Summary

Routing / Bridging

- IPv4 and IPv6 Routing (IPv6 Features Available in Advanced Enterprise IOS Image only)
- Routing Protocols: Routing Information Protocol (RIP) v1/v2; Open Shortest Path First (OSPF); Enhanced Interior Gateway Routing Protocol (EIGRP)-IP, Border Gateway Protocol (BGP), Cisco Discovery Protocol, IP Policy Routing, IP Multicast Protocol Independent Multicast (PIM) v1/v2, Internet Group Management Protocol (IGMP) v1/v2, IP Multicast Load Splitting, Cisco Group Management Protocol (GMP), Telnet, Dial-On-Demand Routing (DDR), UDP Telnet
- Encapsulations: PPP over Ethernet (PPPoE) Client and Server for Fast Ethernet, 802.1q VLAN trunking support, Generic Routing Encapsulation (GRE)
- VLAN: Virtual Local Area Network Logical Segmentation of Network for Optimal use of Bandwidth

Mobility

Supported in Advanced Enterprise IOS Only:

- Radio Aware Routing (RAR): Optimize IP Routing Over Fixed/Temporary Radio Networks, Factor Radio Link Metrics into Route Calculations, and Immediately Recognize/Adapt to Changes in Network Neighbour Status via Dynamic Link Exchange Protocol (DLEP), Router Radio Control Protocol (R2CP), RFC 5578
- Mobile Ad-Hoc Networks (MANET): OSPFv3/EIGRP Enhancements for Mobile Temporary Networks via (PPPoE Extensions)
- Mobile IP Routing: Home Agent and Mobile Router Redundancy, Mobile Router Preferred Interfaces, Mobile Router Reverse Tunnelling, Mobile Router Asymmetric Links, Mobile Router Static and Dynamic Networks, Static Co-Located Care-of Address, AAA Server, Cisco Mobile NAT Traversal over Mobile IP

Side Boss Mounts Enable Optional Vertical Orientation Mounting (if turned on side)

Rear View

Management & Monitoring

- Base/Advanced Enterprise Cisco IOS Software with Command Line Interface (CLI)
- Configuration Management via Serial Console or Ethernet Port Through Terminal Emulation Application
- SNMPv2/v3, Telnet, RADIUS, TACACS+, Cisco Service Assurance Agent, Syslog, Response Time Reporter, NTP Client, TFTP Client and Server, DHCP Client and Server, DHCP Relay, HSRP
- Network Address Translation; Address Conservation; DHCP Client Address Negotiation, Easy IP Phase I

Security

- Authentication: Route, PAP, CHAP, MS-CHAP Local Password, IP Access Lists, Time-Based ACLs
- Generic Routing Encapsulation; Fast Switching, Cisco Express Forwarding, Process Switching, STAC/RTP Compression
- Advanced Enterprise IOS Only: Stateful Inspection Firewall; Intrusion Detection System ; Easy VPN for Client/Server/Remote; MPLS VPN; Hardware Accelerated Crypto: IPSec, 3DES, AES, IKE Protocols; Port-To-Application Mapping; Tunnel Endpoint Discovery; Secure Shell (SSH) Protocol Client and Server

Information Assurance / Certs

- DuraMAR 5915 with Cisco IOS Rel. 15.2GC TN 1429401is listed on the US Department of Defense DISA UC APL (Unified Capabilities Approved Product List) as a Customer Edge Router (CER)
- Cisco 5915 ESR Card is Federal Information Processing Standard (FIPS) 140-2 Level 1 Approved, Common Criteria Evaluation and Validation Scheme (CCEVS) EAL2 Product Validated and DISA APL Approval
- NSA Suite-B support in Cisco IOS Software cryptography, including Suite-B-GCM-128, Suite-BGCM-256, Suite-B-GMAC-128, and Suite-B-GMAC-256 as described in RFC-4869 (Supported in Advanced Enterprise IOS Only)
- Data Zeroization Support (Initiated by Offboard Signal Trigger) – Advanced IOS only

Quality of Service

- Quality of Service (QoS) Classification / Prioritization of Data, Guaranteeing Determinism for Mission-Critical Data: Generic Traffic Shaping, Class-Based Ethernet Matching, Mobile Access Routing (802.1p Class of Service), Committed Access Rate, Flow-Based WRED, Low-Latency/Priority/Weighted Fair Queuing, Dial Backup, Dialer Profiles, Dialer Idle Timeout, Dial on Demand, Class-Based Weighted Fair Queuing, Traffic Policing RSVP; 802.1Q VLAN) Trunking and Encapsulation Support

Voice Services

- Supported in Advanced Enterprise IOS Only with Add-on License: Cisco Unified Communications Manager Express for Remote IP Telephony/Command & Control Comms, 5 / 25 / 50 -User License Support, Capable of Supporting up to 48 Phones

Power

- 28V Nominal Power Input Voltage (18-33 VDC Continuous)
- Power Consumption: <15 W Max
- MIL-STD-704F & MIL-STD-1275D Compliant: Steady State Voltage, Ripple, Surges, Spikes
- Galvanic Isolation: 1500 V
- Grounding Lug for Connection to System Chassis Ground

Physical

- Dimensions (estimated): 2.66” H x 6.75” D x 6.25” W (~6.76 cm H x ~17.15 cm D x ~15.88 cm W); Excluding Connectors/ Mounts
- Weight (estimated): 4.0 lbs. (~1.8 kg)
- Installation: Base Flange Mount or Side Boss Mount (90° Rotated Orientation)
- Connectors: MIL-DTL-38999 Series III
- Cooling: Passive Natural Convection. No Moving Parts
- Ingress Protection: Dust and Water Proof (Similar to IP67)
- Enclosure/Finish: Corrosion Resistant, Aluminium Alloy w/ Black Anodize Finish per MIL-A-8625

Specifications Summary

Environmental

Qualification Tested / Certified to MIL-STD-810G:

- Operating Temperature: -40° to +71°C / -40° to +160°F (MIL-810G, Methods 501,502)
- Storage Temperature: -40° to +85°C / -40° to 185°F (MIL-810G, Methods 501,502)
- Operating Shock: 40g, 11ms, 3 pos/neg per axis, 18 terminal peak sawtooth pulses (MIL-810G, Meth 516)
- Crash Hazard Shock: 75g, 11ms, 2 pos/neg per axis, 12 terminal peak sawtooth pulses (MIL-810G, Meth 516)
- Random Vibration: 10Hz to 2000Hz, 3 Axes, 1 Hour/Axis (MIL-STD-810G, Method 514)
- Humidity: Up to 95% RH @ 40C, Non-Condensing (Conformal Coated PWBs - Qual by Analysis)
- Water Immersion: 1 Meter, 30 Minutes (MIL-STD-810G, Method 512)
- Blowing Sand and Dust per MIL-STD-810G, Method 501.5 (Sealed Enclosure; Qual by analysis)
- Operational Altitude: Up to 15,000 feet (4,572 meters) - MIL-STD-810G, Method 500
- Storage Altitude: Up to 40,000 feet (12,192 meters) - MIL-STD-810G, Method 500

EMI / EMC Isolation

Qualification Tested / Certified to MIL-STD-461F:

- Conducted Emissions:
  CE102, Power Leads, 10 KHz to 10MHz, basic curve
- Conducted Susceptibility:
  CS101, Power Leads, 30 Hz to 150 KHz, Curve 2 (28V and Below);
  CS114, Bulk Cable Injection, 10k Hz to 200M Hz;
  CS115, Bulk Cable Injection, Impulse Rate 30 Hz
  CS116, Damped Sinusoidal Transients, Cables and Power Leads, 10k Hz to 100M Hz
- Radiated Emissions:
  RE102, Electric Field, 10 KHz to 18 GHz, Figure RE102-3
- Radiated Susceptibility:
  RS103, Electric Field, 2MHz to 18 GHz, Aircraft External, 200 Volts per Meter

Status Isolation

- LED Indicators for PWR and LNK

Reliability

- Designed & Manufactured using AS9100 Aerospace Grade / ISO 9001:2000 Certified Quality Program
- No Moving Parts; Passive Cooling; Conformal Coated Boards for Humidity and Tin Whisker Mitigation
- Workmanship: Assembled to IPC-A-610 Class III Workmanship
- No Moving Parts. No Active Cooling Required
- Mean Time Between Failure (MTBF) Calculated per MIL-HDBK-217F:
  Ground Benign, +25°C: 966,053 hours (110 years)
  Ground Mobile, +25°C: 109,379 hours (12.5 years)
  Airborne Inhabit, +25°C: 28,907 hours (3.3 years)
  Airborne Rotary, +25°C: 23,278 hours (2.7 years)

Export Jurisdiction

- NON-ITAR: U.S. Commerce Export Administration Regulations (EAR) Controlled

Starter Cable Set

- CBL-5915-01: Optional Starter Breakout Cable Set Mates with MIL-DTL-38999 Connectors for Ethernet, Console, and Power Signals, Transitioning to Traditional RJ-45/DB-9/Power (for Lab or Bench Testing Purposes)
- Enclosure/Finish: Corrosion Resistant, Aluminium Alloy w/ Black Anodize Finish per MIL-A-8625

Warranty

- Standard 90-Day Return to Depot Warranty
- Extended, Multi-Year Service Agreements Available which Bundle Cisco SmartNET (Access to IOS Software Updates)

Specifications Summary

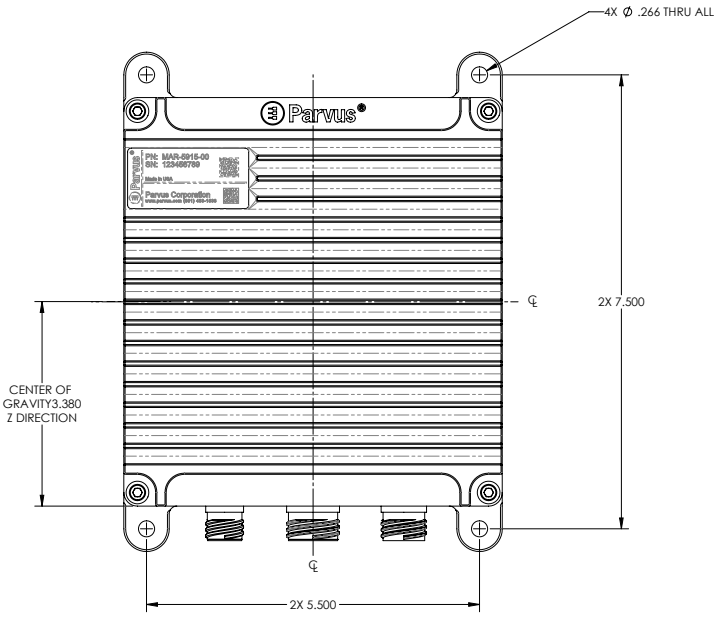
Ordering Codes

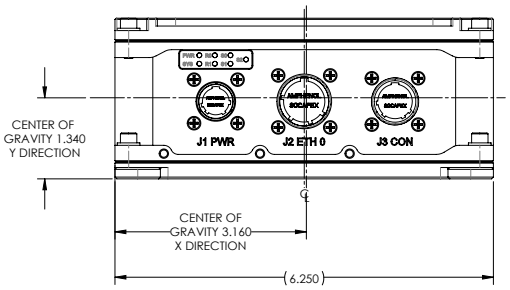
- MAR-5915-00, DuraMAR 5915 Mobile Router (2x FE Routed, 3x FE Switched), Base Enterprise IOS
- MAR-5915-01, DuraMAR 5915 Mobile Router (2x FE Routed, 3x FE Switched), Adv. Enterprise IOS
- MAR-5915-02, DuraMAR 5915 Mobile Router (2x FE Routed, 3x FE Switched), Adv. Enterprise IOS, CME-5 Users
- MAR-5915-03, DuraMAR 5915 Mobile Router (2x FE Routed, 3x FE Switched), Adv. Enterprise IOS, CME-25 Users
- MAR-5915-04, DuraMAR 5915 Mobile Router (2x FE Routed, 3x FE Switched), Adv. Enterprise IOS, CME-50 Users
- CBL-5915-00, Breakout Cable Set for MAR-5915-00/-01/-02/-03/-04 (Mating MIL-38999 to RJ-45, DB-9, Power)
  Note: “CME” is Cisco Communications Manager Express (CME) License for 5/25/50 Users (for Remote VoIP Call Manager Services)
- For Standalone 5915 Router Subsystem with Rugged RJ-45 / M12 Connectors, see DuraMAR 31-5915
- For applications requiring Cisco IOS managed switching, see DuraMAR 5915 “2X Series” datasheet for MAR-5915-2X variant (which integrates a Cisco ESS 2020 Switch) or for a Standalone Cisco Switch Subsystem, the DuraNET 30-2020.
- For C5915 ESR-based Router Integrated with Vitesse GbE-based Switch (total of 23 Ports), See DuraNET 5915 “3X” (MAR-5915-3X)
- For Standalone 20-Port Vitesse-based GbE Switch Subsystem (without 5915 Router), see DuraNET 20-10
- For C5815 ESR-based Router with Rugged RJ-45 / M12 Connectors, see DuraMAR 31-5915 product.

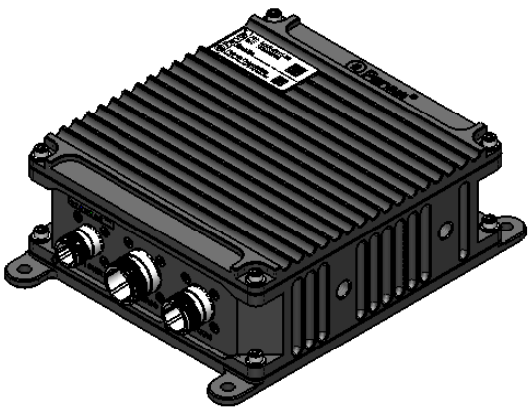
Special Order Options

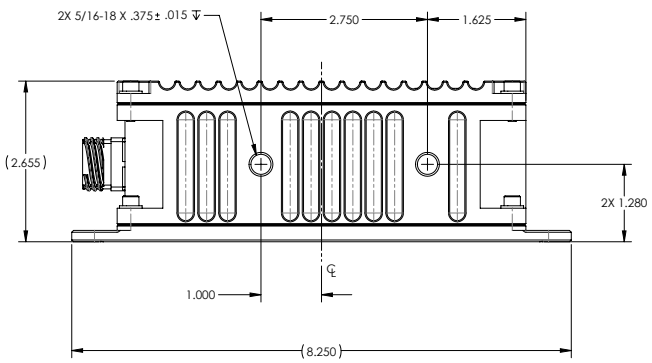
- “DuraWORX” Combination Router + Mission Computer Subsystem
- MIL-DTL-38999 Connector Caps, Mechanical Changes, Custom Metal Finishes
- Program-Specific Delta Qual (Additional MIL-Certifications / Environmental Testing)

Specifications Summary









Parvus DuraMAR 5915 (“1X”Series)

Rugged Cisco 5915 Mobile IP Router Subsystem w/ Integrated Marvell Gigabit Ethernet Switch

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Key Features

- Rugged Cisco 5915-based Mobile Router w/Integrated Marvell GbE Switch
- 19x Ports (2x Routed, 17x Switched)
- Cisco Enterprise IOS Router Management / Security Software w/Data, Video, Voice Services
- Parvus COM-1268 Management for Switch
- Size, Weight & Power (SWaP) Optimized
- Environmental Qual Tested to MIL-STD-810G, including Extreme Shock & Vibe for Jet, Helo, Tracked Vehicles
- MIL-STD-461F EMI/EMC Qual Tested for Conducted & Radiated Emissions/ Suspectiblity
- Rugged Aluminum IP67 (Dust/Water Proof) Chassis w/ MIL-DTL-38999 Circular Connectors
- Vehicle and Aircraft Compatible Power Supply (per MIL-STD-704F & MIL-STD-1275D)
- Data Zeroization to Erase Sensitive Data

Application

- In-Vehicle / Aircraft IP Network Routing / Switching
- Network-Centric Operations / Situational Awareness
- Extreme Environments (Cold / Hot Temperatures, Humidity, Rain, Dust, Shock, Vibration)
- Transparent Mobile Data, Voice and Video In-Vehicle Communications and On-Demand Network Connectivity
- Fixed / Rotary Wing (Un)manned Air Vehicles
- Tactical Ground Vehicles / Maritime Platforms
- C4ISR Technology Refresh / LRU Upgrades

Overview

The Parvus® DuraMAR® 5915 is a rugged Commercial-Off the Shelf (COTS) Cisco IOS-managed secure mobile network router integrating Cisco’s 5915 Embedded Services Router (ESR) card in an ultra-rugged chassis optimized for harsh military and civil vehicle / aircraft installations. The “1X” model series (MAR-5915-1X) couples the 5915 ESR with a lightly-managed Marvell-based Layer 2 Gigabit Ethernet switch for a total of 19 Ethernet ports. An ideal solution for IP networking technology refresh and situational awareness applications deployed at the tactical network edge, the DuraMAR 5915 enables prime defense contractors and civil agencies to deploy data, video, and voice services virtually anywhere LAN/WAN connectivity may be required, especially in mobile, airborne, ground, manned or unmanned vehicle and sensor applications.

The MAR-5915-1X series provides a robust network routing and switching architecture with the performance, security, Quality of Service (QoS), high availability, and manageability that customers expect from Cisco IOS and Marvel -based technologies. The familiar Cisco IOS software interface minimizes training requirements and provides extensive support for IPv4/IPv6 networking protocols, IP multicasting, Radio Aware Routing (RAR), DLEP, encryption (AES/IPSec/NSA Suite B/VPN), remote VoIP, Firewall/IPS/IDS, and Mobile Ad Hoc Networking (MANET) for connectivity in Comms on the Move (COTM) applications. The Parvus COM-1268 switching software supports QoS/CoS traffic prioritization, VLAN trunking, and RSTP redundancy.

Optimized for Size, Weight and Power (SWaP) sensitivity as well as mechanical robustness, the DuraMAR 5915 1X series is qualified for extreme MIL-STD-810G and MIL-STD-461F environmental and EMI compliance (thermal, shock, vibration, humidity, altitude, conducted and radiated emissions & susceptibility). Leveraging stackable PC104 subassemblies and a modular enclosure design, the unit is completely sealed against dust and water ingress (IP67), requires no active cooling, provides interfaces over MIL-DTL-38999 connectors, and features a military-grade power supply for aircraft (MIL-STD-704F) and ground (MIL-STD-1275D) vehicle voltage inputs, spikes, and transient levels, as well as MIL-STD-461F EMI/EMC filtering.

For applications requiring Cisco IOS managed switching, see DuraMAR 5915 “2X Series” datasheet for MAR-5915-2X variant which integrates a Cisco ESS 2020 switch. For higher GbE port-count and carrier-grade management, see DuraMAR 5915 “3X Series” datasheet for MAR-5915-3X variant which integrates a Vitesse-based GbE Switch. For a standalone Cisco 5915 ESR-based system (5x total 10/100 ports), see DuraMAR 5915 “0X Series” or DuraMAR 31-5915.

Features

Cisco Technology:

- Cisco IOS-Managed Embedded Services Router (ESR) and Marvell-based Lightly Managed Gigabit Ethernet Switch Combination: Cisco 5915 ESR (as used in DuraMAR 5915 0X router) + Parvus COM-1268 Switches (as used in DuraNET 1268 switch)
- Cisco 5915 Advanced Enterprise IOS for Robust Information Assurance, Dynamic Layer 3 IPv4 / IPv6 Routing, QoS Management, Mobile Ad Hoc Networking, Remote Call Manager, Radio Aware Routing (RAR); Lightly-Managed Parvus 1268 Switch Software
- Integrated Services Router (ISR) Features Support Concurrent Data, Video, and Voice Services, Firewall, Hardware Accelerated AES Encryption/NSA Suite B in IOS
- Modular, Open Architecture Rugged COTS PC104 Hardware Design
- High Port Count: 19x Ports (2x 10/100 Router, 2x 10/100 Switch, 15x GbE Switch)
- Cisco 5915 ESR is FIPS 140-2 Level 1 Approved, Common Criteria Validated, and DoD APL Listed; Standalone DuraMAR 5915 Router is US DoD UC APL Approved

Ruggedization:

- Fully Qualified to MIL-810G Shock, Vibration, Thermal, Altitude, Humidity
- -40 to +71C Fanless Extended Temp Operation with No Moving Parts
- Corrosion-Resistant, Aluminum Chassis IP67 Sealed Against Water, Dust
- Circular MIL-DTL-38999 Connectors for Reliable Network Connections
- Filtered, Transient and EMI-Protected MIL-STD-1275/704 Compliant Power Supply for Aircraft and Ground Vehicle Use
- Qual Tested for MIL-461F Conducted/Radiated Emissions & Susceptibility
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- Conformal Coating for Humidity/Tin-Whisker Mitigation

- Flexible / Robust Mounting – Base Flange Mount or Side Boss Mount
- Export Jurisdiction: ITAR-Free, U.S. Commerce EAR Controlled

Applications:

- Civil and Military Tactical In-Vehicle LAN Switching / WAN Routing - 24V / 28V Ground Vehicle / Aircraft / Maritime Platforms with Size, Weight & Power (SWaP) Constraints
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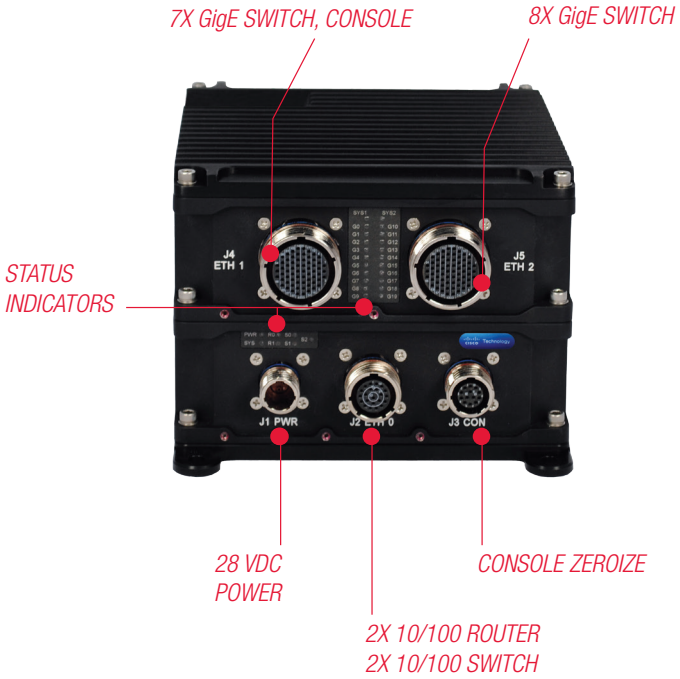
- C4ISR Situational Awareness / Technology Refresh / Line Replaceable Units (LRUs)



cisco Technology

Specifications Summary

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- Technology Migration Path for Legacy Cisco 3200 (3230 / 3250 / 3270)-based Router and Cisco Catalyst 2955-Based Networking Subsystems, including DuraMAR 1000, DuraMAR 3230, and DuraNET 2955
- Managed Layer 3 IP Network Routing and Layer 2 Local Area Network (LAN) Ethernet Switching in Harsh Temperature and Vibration Environments for IP-Enabled Equipment (i.e. On-board Computers, Cameras, Sensors, Radios, Satcom Modems, Monitoring Devices, and Command-and-Control Gear)
- Size, Weight & Power (SWaP) Constrained Mobile, Tactical, Airborne, and Vehicle Networking Applications Upgrading Situational Awareness and/or Network Centric Capabilities at Network Edge in Demanding Embedded Networking Environments (e.g. Defense, Homeland Security, Energy, Industrial, Oil & Gas Platforms, Underground Mining Equipment, Offshoring Drilling Rigs, Shipping Vessels, Electric Utility Substations, Railway Train Rolling Stock, Fleet Transportation, Outdoor Embedded Networks, etc)
- Remote IP Telephony on Vehicles or Outdoor Locations using Cisco Unified Communications Manager Express (CME)
- Mobile Ad Hoc Networking (MANET) - On-Demand Network Connectivity in Mobile Deployments When Connected to UHF, VHF, Wi-Fi and Tactical Radio Platforms

Ports

MAR-5915-1X Series (Cisco 5915 Router + Parvus COM-1268 Switches):

- 2x 10/100Mbps Fast Ethernet WAN Router Ports, IEEE 802.3 Compliant (from 5915 ESR)
- 2x 10/100Mbps Fast Ethernet Switched LAN Ports, IEEE 802.3u Compliant (from 5915 ESR)
- 15x 10/100/1000Mbps GbE Ethernet Switched LAN Ports, IEEE 802.3ab Compliant (from 2x COM-1268 Switches)
- 2x Console Ports, RS-232 (1x for 5915 Router, 1x for COM-1268 Switch)
- Power Input & Data Zeroize

Cisco Technology

Cisco 5915 Embedded Services Router (ESR), Rugged PC104 Card

- Cisco 5915 Enterprise IOS Base / Advanced Services Image, incl. Option. Communications Manager Express (CME) License
- Support for IPv6 Routing, VoIP / CME, VPN / Firewall / IPS, Mobile IP, IPSec Exclusive to Advanced IOS only (see Cisco 5915 datasheet / Cisco Feature Navigator for complete software feature comparison)
- Routing Performance: ~170Kpps (Performance Varies Based on Security/Voice/Data Services Enabled)
- Ethernet Ports: 2x 10/100 Routed, 2x 10/100 Switched (+1 Additional Switched 10/100 Port Connected to COM-1268 Switch)

MAR-5915-1X Cisco Router + Mavell GbE Switch Combo

Side View

Side Boss Mounts Enable Optional Vertical Orientation Mounting (if turned on side)

Specifications Summary

Cisco Router (5915 ESR)

ROUTING / BRIDGING:

- IPv4 and IPv6 Routing (IPv6 Features Available in Advanced Enterprise IOS Image only)
- Routing Protocols: Routing Information Protocol (RIP) v1/v2; Open Shortest Path First (OSPF); Enhanced Interior Gateway Routing Protocol (EIGRP)-IP, Border Gateway Protocol (BGP), Cisco Discovery Protocol, IP Policy Routing, IP Multicast Protocol Independent Multicast (PIM) v1/v2, Internet Group Management Protocol (IGMP) v1/v2, IP Multicast Load Splitting, Cisco Group Management Protocol (GMP), Telnet, Dial-On-Demand Routing (DDR), UDP Telnet
- Encapsulations: PPP over Ethernet (PPPoE) Client and Server for Fast Ethernet, 802.1q VLAN trunking support, Generic Routing Encapsulation (GRE)
- VLAN: Virtual Local Area Network Logical Segmentation of Network for Optimal use of Bandwidth

MOBILITY: (Advanced Enterprise IOS Only)

- Radio Aware Routing (RAR): Optimize IP Routing Over Fixed/Temporary Radio Networks, Factor Radio Link Metrics into Route Calculations, and Immediately Recognize/Adapt to Changes in Network Neighbour Status via Dynamic Link Exchange Protocol (DLEP), Router Radio Control Protocol (R2CP), RFC 5578
- Mobile Ad-Hoc Networks (MANET): OSPFv3/EIGRP Enhancements for Mobile Temporary Networks via (PPPoE Extensions)
- Mobile IP Routing: Home Agent and Mobile Router Redundancy, Mobile Router Preferred Interfaces, Mobile Router Reverse Tunnelling, Mobile Router Asymmetric Links, Mobile Router Static and Dynamic Networks, Static Co-Located Care-of Address, AAA Server, Cisco Mobile NAT Traversal over Mobile IP

MANAGEMENT & MONITORING:

- Base/Advanced Enterprise Cisco IOS Software with Command Line Interface (CLI)
- Configuration Management via Serial Console or Ethernet Port Through Terminal Emulation Application
- SNMPv2/v3, Telnet, RADIUS, TACACS+, Cisco Service Assurance Agent, Syslog, Response Time Reporter, NTP Client, TFTP Client and Server, DHCP Client and Server, DHCP Relay, HSRP
- Network Address Translation; Address Conservation; DHCP Client Address Negotiation, Easy IP Phase I

SECURITY:

- Authentication: Route, PAP, CHAP, MS-CHAP Local Password, IP Access Lists, Time-Based ACLs
- Generic Routing Encapsulation; Fast Switching, Cisco Express Forwarding, Process Switching, STAC/RTP Compression
- Advanced Enterprise IOS Only: Stateful Inspection Firewall; Intrusion Detection System ; Easy VPN for Client/Server/Remote; MPLS VPN; Hardware Accelerated Crypto: IPSec, 3DES, AES, IKE Protocols; Port-To-Application Mapping; Tunnel Endpoint Discovery; Secure Shell (SSH) Protocol Client and Server

INFORMATION ASSURANCE:

- Cisco 5915 ESR Card is Federal Information Processing Standard (FIPS) 140-2 Level 1 Approved, Common Criteria Evaluation and Validation Scheme (CCEVS) EAL2 Product Validated and DISA UC APL Approval
- Standalone DuraMAR 5915 with Cisco IOS Rel. 15.2GC TN 1429401 is listed on the US Department of Defense DISA UC APL (Unified Capabilities Approved Product List) as a Customer Edge Router (CER)
- NSA Suite-B support in Cisco 5915 IOS Software cryptography, including Suite-B-GCM-128, Suite-BGCM-256, Suite-B-GMAC-128, and Suite-B-GMAC-256 as described in RFC-4869
- Hardware Encryption Supporting IP Security (IPsec), Secure Sockets Layer with transparent LAN services (SSL/TLS), Secure Real-time Transport Protocol (SRTP), Triple Digital Encryption Standard (3DES), Advanced Encryption Standard (AES), Internet Key Exchange (IKE) Protocols (Supported in Advanced Enterprise IOS Only)
- Data Zeroization Support (Initiated by Offboard Signal Trigger) – Advanced IOS only

QUALITY OF SERVICE:

- Quality of Service (QoS) Classification / Prioritization of Data, Guaranteeing Determinism for Mission-Critical Data: Generic Traffic Shaping, Class-Based Ethernet Matching, Mobile Access Routing (802.1p Class of Service), Committed Access Rate, Flow-Based WRED, Low-Latency/Priority/Weighted Fair Queuing, Dial Backup, Dialer Profiles, Dialer Idle Timeout, Dial on Demand, Class-Based Weighted Fair Queuing, Traffic Policing RSVP; 802.1Q VLAN) Trunking and Encapsulation Support

VOICE SERVICES:

- Cisco Unified Communications Manager Express for Remote IP Telephony/Command & Control Comms, 5 / 25 / 50 -User License Support (5915 Advanced IOS Add-On Option), Capable of Supporting up to 48 Phones

Specifications Summary

Gigabit Switch (COM-1268)

Parvus COM-1268 GbE Switch PC104+ Cards (Similar as Integrated into DuraNET 1268 GbE Standalone Switch System)

- Architecture: Marvell 88E6185 Ethernet Switch Packet Processor w/Embedded Microprocessor and Parvus COM-1268 Light Management Software Application, OSI Data Layer 2+, High-Speed Four Traffic Class QoS Switch Fabric, 8K MAC Address Look-Up Engine w/Integrated 1MB Frame Buffer Memory, Back-Pressure and Pause Frame-Based Flow Control
- Ethernet Ports: 15x GbE Switched Ports (+ Addt’l Switched GbE Ports Internally Connected between 5915 ESR and COM-1268 Cards)
- Port Features: Full/Half Duplex, Auto-MDI/MDIX, Auto-Negotiation, Auto-Detect; Speed Auto-Sensing, Auto-Crossover, Port Mirroring, Port Monitoring
- Quality of Service (QoS) 802.1p Class of Service (CoS)/Quality of Service (Qos) Traffic Prioritization; Packets Switched into Four Traffic Class Queues; Priority Determined by Port, 802.1p Tagged Frames, IPv4 TOS/Diff-Serv, IPv6 TC
- VLAN: Port-Based and 802.1Q Tagged Virtual Local Area Networks (VLAN), Up to 4096 VLAN IDs • IEEE-802.1 D/w/s (Spanning Tree, Rapid Spanning Tree, Multiple Spanning Tree Protocol)
- Management: Command Line Interface (CLI) over RS-232 Console; Link Speed, Duplex Mode, Flow Control on Per-Port Basis; Port Monitoring, Port Mirroring\
- Declassification: Data Zeroization Support to Erase Non-Volatile Flash Memory

Power

- 28V Nominal Power Input Voltage (18-33 VDC Continuous)
- Power Consumption: <50 W Max
- MIL-STD-704F & MIL-STD-1275D Compliant: Steady State Voltage, Ripple, Surges, Spikes
- Galvanic Isolation: 1500 V
- Grounding Lug for Connection to System Chassis Ground

Environmental

Qualification Tested / Certified to MIL-STD-810G:

- Operating Temperature: -40° to +71°C / -40° to +160°F (MIL-810G, Methods 501,502)
- Storage Temperature: -40° to +85°C / -40° to 185°F (MIL-810G, Methods 501,502)
- Operating Shock: 40g, 11ms, 3 pos/neg per axis, 18 terminal peak sawtooth pulses (MIL-810G, Meth 516)
- Crash Hazard Shock: 75g, 11ms, 2 pos/neg per axis, 12 terminal peak sawtooth pulses (MIL-810G, Meth 516)
- Random Vibration: 10Hz to 2000Hz, 3 Axes, 1 Hour/Axis (MIL-STD-810G, Method 514)
- Humidity: Up to 95% RH @ 40C, Non-Condensing (Conformal Coated PWBs - Qual by Analysis)
- Water Immersion: 1 Meter, 30 Minutes (MIL-STD-810G, Method 512)
- Blowing Sand and Dust per MIL-STD-810G, Method 501.5 (Sealed Enclosure; Qual by analysis)
- Operational Altitude: Up to 15,000 feet (4,572 meters) - MIL-STD-810G, Method 500
- Storage Altitude: Up to 40,000 feet (12,192 meters) - MIL-STD-810G, Method 500

EMI / EMC Isolation

Qualification Tested / Certified to MIL-STD-461F:

- Conducted Emissions, CE102, Power Leads, 10 KHz to 10MHz, basic curve
- Conducted Susceptibility, CS101, Power Leads, 30 Hz to 150 KHz, Curve 2 (28V and Below)
- Radiated Emissions, RE102, Electric Field, 10 KHz to 18 GHz, Figure RE102-3
- Radiated Susceptibility, RS103, Electric Field, 2MHz to 18 GHz, Aircraft External, 200 Volts per Meter

Physical

- Dimensions (estimated): 4.66” H x 6.75” D x 6.25” W (~11.84 cm H x ~17.15 cm D x ~15.88 cm W), Excluding Connectors/ Mounts
- Weight: Approx. 7.39 lbs (~3.35 kg)
- Installation: Base Flange Mount or Side Boss Mount (90° Rotated Orientation)
- Connectors: MIL-DTL-38999 Series III
- Cooling: Passive Natural Convection. No Moving Parts
- Ingress Protection: Dust and Water Proof (Similar to IP67)
- Enclosure/Finish: Corrosion Resistant, Aluminium Alloy w/ Black Anodize Finish per MIL-A-8625

Specifications Summary

Status Indication

- LED Indicators for PWR and LNK of 5915 ESR Router Ports and Switch Ports

Reliability

- Designed & Manufactured using AS9100 Aerospace Grade / ISO 9001:2000 Certified Quality Program
- No Moving Parts; Passive Cooling; Conformal Coated Boards for Humidity and Tin Whisker Mitigation
- Workmanship: Assembled to IPC-A-610 Class III Workmanship
- No Moving Parts. No Active Cooling Required
- Mean Time Between Failure (MBTF) Calculated per MIL-HDBK-217F:
  Ground Benign, +25°C: 657,557 hours (75.1 years)
  Ground Mobile, +25°C: 68,536 hours (7.8 years)
  Airborne Inhabit, +25°C: 14,906 hours (1.70 years)
  Airborne Rotary, +25°C: 12,096 hours (1.38 years)

Export Jurisdiction

- NON-ITAR: U.S. Commerce Export Administration Regulations (EAR) Controlled

Starter Cable Set

- CBL-5915-01: Optional Starter Breakout Cable Set Mates with MIL-DTL-38999 Connectors for Ethernet, Console, and Power Signals, Transitioning to Traditional RJ-45/DB-9/Power (for Lab or Bench Testing Purposes)

Warranty

- Standard 90-Day Return to Depot Warranty
- Extended, Multi-Year Service Agreements Available which Bundle Cisco SmartNET (Access to IOS Software Updates)

Ordering Codes

- MAR-5915-10: DuraMAR 5915 Mobile Router/GigE Switch (2x FE Routed, 2x FE Switched, 15x GigE Switched), BaseIOS
- MAR-5915-11: DuraMAR 5915 Mobile Router/GigE Switch (2x FE Routed, 2x FE Switched, 15x GigE Switched), AdvIOS
- MAR-5915-12: DuraMAR 5915 Mobile Router/GigE Switch (2x FE Routed, 2x FE Switched, 15x GigE Switched), AdvIOS, CME-5
- MAR-5915-13: DuraMAR 5915 Mobile Router/GigE Switch (2x FE Routed, 2x FE Switched, 15x GigE Switched), AdvIOS, CME-25
- MAR-5915-14: DuraMAR 5915 Mobile Router/GigE Switch (2x FE Routed, 2x FE Switched, 15x GigE Switched), AdvIOS, CME-50

Note: “CME” is Cisco Communications Manager Express (CME) License for 5/25/50 Users (for Remote VoIP Call Manager Services)

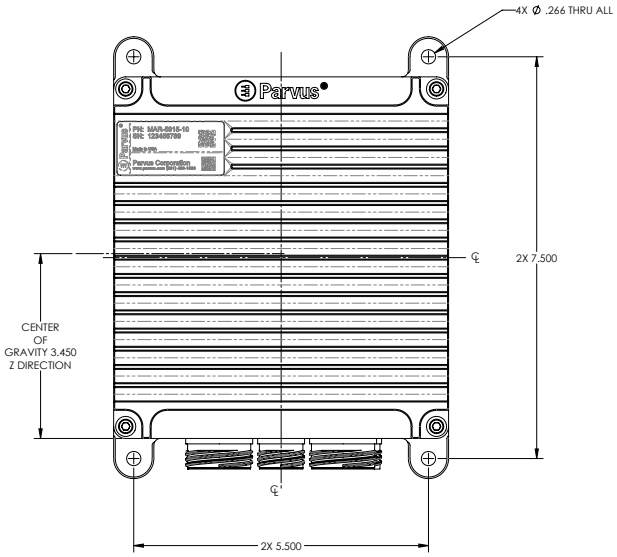
CBL-5915-01- Breakout Cable Set for MAR-5915-10/-11/-12/-13/-14 (Mating MIL-38999 to RJ-45, DB-9, Power)

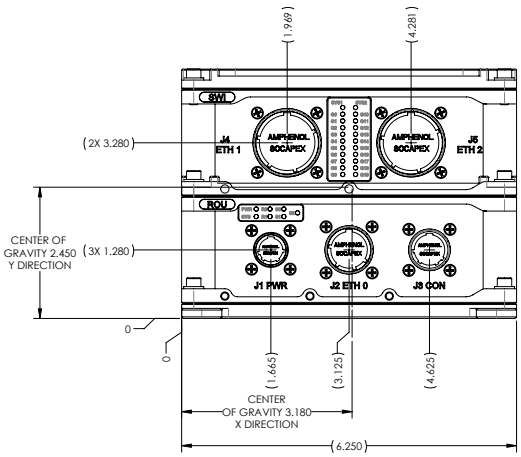
- For Standalone 5915 Router Subsystem (without COM-1268 GbE Switch), see DuraMAR 5915 0X (MAR-5915-0X) or DuraMAR 31-5915
- For Standalone 10-Port COM-1268-based GbE Switch Subsystem (without 5915 Router), see DuraNET 1268
- For Standalone 20-Port SWI-22-10-based GbE Switch Subsystem (without 5915 Router), see DuraNET 20-10
- For applications requiring Cisco IOS managed switching, see DuraMAR 5915 “2X Series” datasheet for MAR-5915-2X variant (which integrates a Cisco ESS 2020 Switch) or for a Standalone Cisco Switch Subsystem, the DuraNET 30-2020.
- For C5915 ESR-based Router Integrated with Vitesse GbE-based Switch (total of 23 Ports), See DuraNET 5915 3X (MAR-5915-3X)

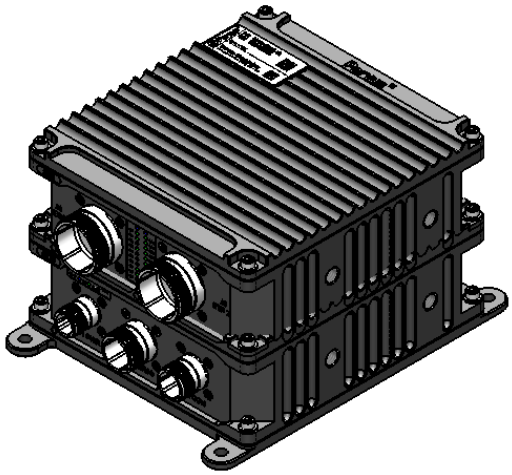
Special Order Options

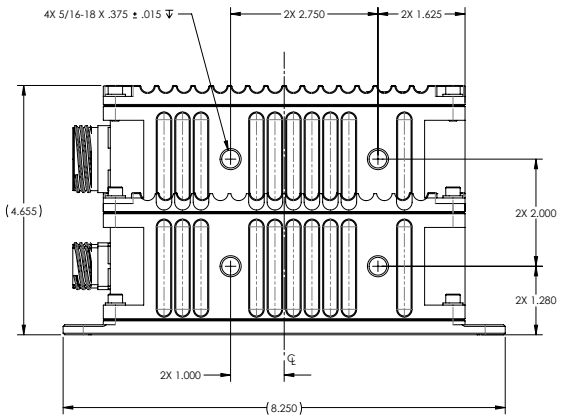
- “DuraWORX” Combination Router + Mission Computer Subsystem
- MIL-DTL-38999 Connector Caps, Mechanical Changes, Custom Metal Finishes
- Program-Specific Delta Qual (Additional MIL-Certifications / Environmental Testing)

Specifications Summary









Parvus DuraMAR 5915 (“2X”Series)

Rugged Cisco 5915 Mobile IP Router Subsystem
with Integrated Cisco ESS 2020 Ethernet Switch

CURTISSWRIGHTDS.COM

Key Features

- Rugged Cisco 5915-based mobile IP router with integrated Cisco ESS 2020 Ethernet switch
- 23 x ports (2 x router, 21 x switch)
- Cisco IOS router + switch management/ security software with data, video, voice services
- Qual tested to MIL-STD-810G, MIL-STD-461F, DO-160 (severe environmental and EMI conditions)
- Size, weight and power (SWaP) optimized
- Rugged aluminum IP67 (dust/water proof)
- Chassis with MIL-DTL-38999 circular connectors
- Vehicle and aircraft compatible power supply (per MIL-STD-704F and MIL-STD-1275D)
- Data zeroization to erase sensitive data

Applications

- In-vehicle/aircraft IP network routing/ switching
- Network-centric operations/situational awareness
- Extreme environments (cold/hot temperatures, humidity, rain, dust, shock, vibration)
- Transparent mobile data, voice and video in-vehicle communications and on-demand network connectivity
- Fixed/rotary wing (un)manned air vehicles
- Tactical ground vehicles/maritime platforms
- C4ISR technology refresh/LRU upgrades

Overview

The Parvus® DuraMAR® 5915 is a rugged Commercial Off the Shelf (COTS) Cisco IOS-managed secure mobile network router integrating Cisco’s 5915 Embedded Services Router (ESR) card in an ultra-rugged chassis optimized for harsh military and civil vehicle/aircraft installations. The “2X” model series (MAR-5915-2X) integrates an expanded port-count, all Cisco IOS managed routing and switching architecture with an integrated Cisco ESS 2020 Ethernet switch (as integrated in the standalone DuraNET® 30-2020 switch) for a total of 23 Ethernet ports. An ideal solution for IP networking technology refresh and situational awareness applications deployed at the tactical network edge, the DuraMAR 5915 enables prime defense contractors and civil agencies to deploy Cisco Mobile Ready Net capabilities, including data, video, and voice services virtually anywhere LAN or WAN connectivity may be required, especially in mobile, airborne, ground, manned or unmanned vehicle and sensor applications.

The MAR-5915-2X series provides an all-Cisco network routing and switching architecture with enterprise features, performance, security, Quality of Service (QoS), high availability, and manageability that customers expect from Cisco IOS-based technology. The familiar Cisco IOS software interface minimizes training requirements and provides extensive support for Layer 2/3 IPv4 and IPv6 networking protocols, IP multicasting, Radio Aware Routing (RAR), Dynamic Link Exchange Protocol (DLEP), encrypted data (AES/IPSec/NSA Suite B/VPN), remote VoIP, Firewall/IPS/IDS, and Mobile Ad Hoc Networking (MANET) for connectivity in Comms on the Move (COTM) applications.

Optimized for SWaP sensitivity as well as mechanical robustness, the DuraMAR 5915 2X Series is qualified to meet extreme MIL-STD-810G, MIL-STD-461F, and DO-160G conditions for environmental and EMI compliance (thermal, shock, vibration, humidity, altitude, conducted and radiated emissions and susceptibility). Leveraging stackable PC/104 subassemblies and a modular enclosure design, the unit is completely sealed against dust and water ingress (IP67), requires no active cooling, provides interfaces over proven MIL-DTL-38999 connectors, and features a military-grade power supply supporting aircraft (MIL-STD-704F/DO-160G) and ground/marine vehicle (MIL-STD-1275D) voltage inputs, spikes, and transient levels, as well as MIL-STD-461F/DO-160G EMI/EMC filtering.

For applications requiring higher LAN bandwidth, see DuraMAR 5915 “3X Series” product sheet for MAR-5915-3X variant which integrates a Vitesse-based GbE Switch. For a standalone Cisco 5915 ESR-based system (5x total 10/100 ports), see DuraMAR 5915 “0X Series” or DuraMAR 31-5915 product sheets.

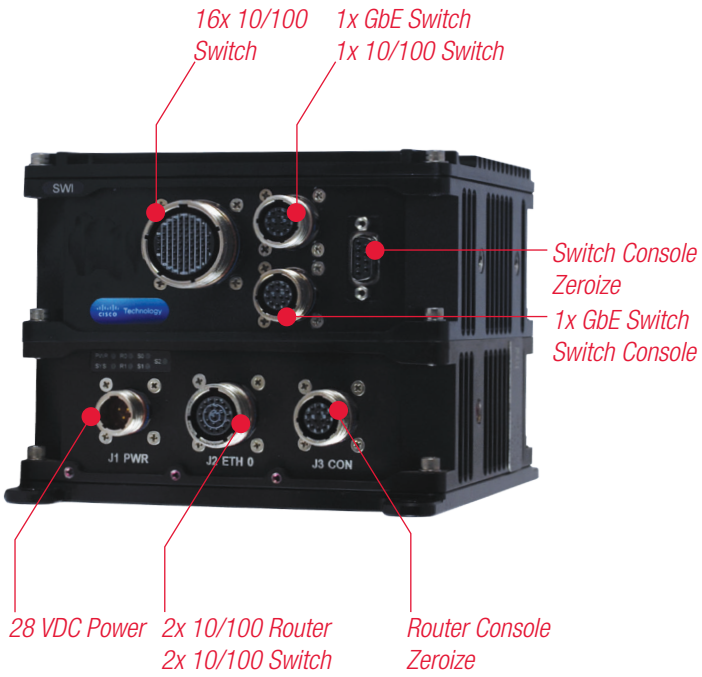


Figure 1: Ethernet ports, serial, zeroize, and power brought out on DTL-38999 connectors

Features

Cisco technology

- Cisco IOS-managed Embedded Services router (ESR) and switch combination: Cisco 5915 ESR (as in MAR-5915-0X) + Cisco ESS 2020 Switch (as in DuraNET 30-2020)
- Cisco 5915 Advanced Enterprise IOS and ESS 2020 LAN base IOS for robust information assurance, dynamic Layer 3 IPv4/IPv6 routing, QoS management, MANET, remote call manager, radio aware routing (RAR)
- Integrated services router (ISR) features support concurrent data, video, and voice services, firewall, hardware accelerated AES encryption/NSA Suite B in IOS
- Modular, open architecture rugged COTS PC/104 hardware design
- High port count: 23 x ports (2 x 10/100 router, 2 x GbE switch, 19 x 10/100 switch)
- Cisco 5915 ESR is FIPS 140-2 Level 1 approved and Common Criteria Evaluation and Validation Scheme (CCEVS) validated; Cisco 5915, Cisco ESS 2020, Parvus DuraMAR 5915 Router and Parvus DuraNET 30-2020 Switch are listed on US DoD APL

Ruggedization

- Qual tested to meet extreme MIL-STD-810G, DO-160 environmental compliance for shock, vibration, thermal, altitude, humidity
- -40 to +71°C fanless extended temp operation with no moving parts
- Corrosion-resistant, aluminum chassis IP67 sealed against water, dust
- Circular MIL-DTL-38999 connectors for reliable network connections
- Filtered, transient and EMI-protected MIL-STD-1275/704/DO-160 compliant power supply for aircraft and ground vehicle use
- Validated to meet MIL-461 and DO-160 conducted/radiated emissions and susceptibility
- Data zeroization support to erase sensitive information
- Conformal coating for humidity/tin-whisker mitigation
- Flexible/robust mounting – base flange mount or side boss mount
- Export jurisdiction: ITAR-free, U.S. Commerce EAR controlled

Figure 2: Front view

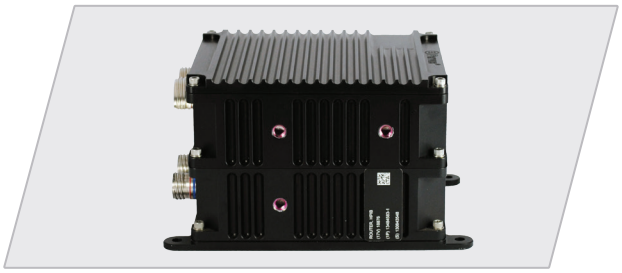


Figure 3: Side view (note mounting features on side and bottom)

Target Applications

- Civil and military tactical in-vehicle LAN switching/WAN routing - 24V/28V ground vehicle/aircraft/maritime platforms with SWaP constraints
- Extending Cisco systems enterprise networking infrastructure beyond the reach of traditional fixed-networks into mobile and embedded networking applications
- MANET - on-demand network connectivity in mobile deployments when connected to UHF, VHF, Wi-Fi and tactical radio platforms
- Aggregation of peripheral devices (cameras, sensors, computers) from outdoor and embedded IP network infrastructure into a manageable, highly secure IP network
- C4ISR situational awareness/technology refresh/LRUs
- Technology migration path for legacy Cisco 3200 (3230/3250/3270)-based router and Cisco catalyst 2955-based networking subsystems, including DuraMAR 1000, DuraMAR 3230, and DuraNET 2955
- Cisco IOS-managed Layer 3 IP network routing and Layer 2 LAN Ethernet switching in harsh temperature and vibration environments for IP-enabled equipment (i.e. on-board computers, cameras, sensors, radios, SatCom modems, monitoring devices, and command-and-control gear)
- SWaP-constrained mobile, tactical, airborne, and vehicle networking applications upgrading situational awareness and/or network centric capabilities at network edge in demanding embedded networking environments (e.g. defense, homeland security, energy, industrial, oil and gas platforms, underground mining equipment, offshoring drilling rigs, shipping vessels, electric utility substations, railway train rolling stock, fleet transportation, outdoor embedded networks, etc)
- Remote IP telephony on vehicles or outdoor locations using Cisco unified Communications Manager Express (CME)

Cisco IOS Technology

Router

Cisco 5915 Embedded Services Router (ESR), rugged PC/104 card

- Cisco 5915 Enterprise IOS base/advanced services image, including option, CME license
- Support for IPv6 routing, VoIP/CME, VPN/firewall/IPS, mobile IP, IPSec exclusive to advanced IOS only (see Cisco 5915 datasheet/Cisco feature navigator for complete software feature comparison)

Switch

Cisco ESS 2020 Embedded Services Switch, rugged PC/104 base + expansion card

- Non-blocking OSI data Layer 2 Ethernet switch with Cisco IOS LAN base software image (includes support for advanced security, IPv6 management, QoS, static IPv4 Layer 3 routing) (see Cisco ESS 2020 datasheet/Cisco feature navigator for complete list of supported software features)

Ports

MAR-5915-2X Series (Cisco 5915 Router + Cisco ESS 2020 Switch)

- 2 x 10/100 Mbps fast Ethernet WAN router ports, IEEE 802.3 compliant (from 5915 ESR)
- 2 x 10/100 Mbps fast Ethernet switched LAN ports, IEEE 802.3u compliant (from 5915 ESR)
- 17 x 10/100 Mbps fast Ethernet switched LAN ports, IEEE 802.3u compliant (from ESS 2020 switch)
- 2 x 10/100/1000 Mbps GbE switched LAN ports, IEEE 802.3ab compliant (from ESS 2020 switch)
- 2 x console ports, RS-232 (1 x for router on DTL-38999, 1 x for switch – via DB-9 or DTL-38999 interface)
- Additional 2 x Ethernet ports connected internally: 1 x 10/100 switched port of 5915 ESR connected to 1 x 10/100 switched port of ESS 2020 switch (this connection can optionally be disabled for standalone router/switch functions and total of 24 external Ethernet ports through internal DIP switch setting change; additional 5915 10/100 LAN port is already pinned out to external DTL-38999 connector)

Performance

Router

- Routing throughput: ~170Kpps (performance varies based on security/voice/data services enabled)
- Ethernet ports: 2 x 10/100 routed, 2 x 10/100 switched (+1 additional switched 10/100 port connected to ESS 2020)

Switch

- Forwarding rate: 5.5 Mpps with 64-bytes packets; forwarding bandwidth: 3.7 Gbps; egress buffer: 2 MB
- Unicast MAC addresses: 8000; IGMP multicast groups: 255; max VLANs: 255
- Ethernet ports: 2 x GbE and 17 x 10/100 switched ports (+1 x additional switched 10/100 port connected to 5915 ESR)

Cisco Switch (ESS 2020)

- L2 switching: IEEE 802.3/u/ab (Ethernet, fast Ethernet, gigabit Ethernet), IEEE 802.3ad Link Aggregation (LACP), Resilient Ethernet Protocol (REP), IEEE 802.1D/w/s (STP, RSTP, MSTP), IEEE 802.1p Layer 2 COS prioritization; IEEE 802.1q VLAN; IEEE 802.1AB Link Layer Discovery Protocol (LLDP, VLAN Trunking Protocol v2 (VTPv2), Network Time Protocol (NTP), UDLD, flex links, VLAN Trunking Protocol v3 (VTPv3), EtherChannel, Voice VLAN
- Multicast: IGMPv1, v2, v3 snooping, IGMP querier
- Management: web device manager, SmartPort, MIB, SNMP, syslog, RMON, DHCP server, remote switched port analyzer (RSPAN), voice VLAN (VVID), L2 IPv6 host, L2 HTTP over IPv6, SNMP over IPv6, customized TCAM/SDM size
- Security: unicast MAC filtering, SCP, SSH, SNMPv3, TACACS+, RADIUS server/client, MAC address notification, BPDU Gguard, SPAN session, 802.1x Multi-Domain Authentication (MDA), 802.1x guest VLAN, storm control, port-security, DHCP snooping, IP source guard, dynamic Arp inspection, guest VLAN, MAC authentication bypass, trust boundary
- QoS: ingress policing, rate-limit, egress queueing/shaping, AutoQoS
- L3 routing: IPv4 static routing

Cisco Router (5915 ESR)

Routing/Bridging

- IPv4 and IPv6 routing (IPv6 features available in Advanced Enterprise IOS image only)
- Routing protocols: Routing Information Protocol (RIP) v1/v2; Open Shortest Path First (OSPF); Enhanced Interior Gateway Routing Protocol (EIGRP)-IP, Border Gateway Protocol (BGP), Cisco Discovery Protocol, IP policy routing, IP Multicast Protocol Independent Multicast (PIM) v1/v2, Internet Group Management Protocol (IGMP) v1/v2, IP multicast load splitting, Cisco Group Management Protocol (GMP), Telnet, Dial-On-Demand routing (DDR), UDP Telnet
- Encapsulations: PPP over Ethernet (PPPoE) client and server for fast Ethernet, 802.1q VLAN trunking support, Generic Routing Encapsulation (GRE)
- VLAN: Virtual LAN logical segmentation of network for optimal use of bandwidth

Mobility (Advanced Enterprise IOS only)

- Radio Aware Routing (RAR): optimize IP routing over fixed/temporary radio networks, factor radio link metrics into route calculations, and immediately recognize/adapt to changes in network neighbor status via Dynamic Link Exchange Protocol (DLEP), Router Radio Control Protocol (R2CP), RFC 5578
- MANET: OSPFv3/EIGRP enhancements for mobile temporary networks via (PPPoE extensions)
- Mobile IP routing: home agent and mobile router redundancy, mobile router preferred interfaces, mobile router reverse tunnelling, mobile router asymmetric links, mobile router static and dynamic networks, static co-located care-of address, AAA server, Cisco Mobile NAT traversal over mobile IP

Management and Monitoring

- Base/advanced enterprise Cisco IOS software with Command Line Interface (CLI)
- Configuration management via serial console or Ethernet port through terminal emulation application
- SNMPv2/v3, Telnet, RADIUS, TACACS+, Cisco Service Assurance Agent, Syslog, response time reporter, NTP client, TFTP client and server, DHCP client and server, DHCP relay, HSRP
- Network address translation; address conservation; DHCP client address negotiation, easy IP Phase I

Security

- Authentication: route, PAP, CHAP, MS-CHAP local password, IP access lists, time-based ACLs
- Generic routing encapsulation; fast switching, Cisco Express Forwarding, process switching, STAC/RTP compression
- Advanced Enterprise IOS only: stateful inspection firewall; intrusion detection system; easy VPN for client/server/remote; MPLS VPN; hardware accelerated crypto: IPSec, 3DES, AES, IKE protocols; port-to-application mapping; tunnel endpoint discovery; Secure Shell (SSH) protocol client and server

Quality of Service

- Quality of Service (QoS) classification/prioritization of data, guaranteeing determinism for mission-critical data: generic traffic shaping, class-based Ethernet matching, mobile access routing (802.1p Class of Service), committed access rate, flow-based WRED, low-latency/priority/weighted fair queuing, dial backup, dialer profiles, dialer idle time-out, dial on Demand, Class-Based Weighted Fair Queuing, Traffic policing RSVP; 802.1Q VLAN) trunking and encapsulation support

Voice Services

- Cisco Unified Communications Manager Express for remote IP telephony/command and control comms, 5/25/50 - user license support (5915 Advanced IOS add-on option), capable of supporting up to 48 phones

Information Assurance

- DuraMAR 5915 with Cisco IOS Rel. 15.2GC TN 1429401 is listed on the US Department of Defense DISA UC APL (Unified Capabilities Approved Product List) as a Customer Edge Router (CER); DuraNET 30-2020 with Rel. IOS 15.2E TN 1429402 is listed on the US Department of Defense DISA UC APL as an Access Internet Protocol (IP) Switch
- Cisco 5915 ESR card is Federal Information Processing Standard (FIPS) 140-2 Level 1 approved, Common Criteria Evaluation and Validation Scheme (CCEVS) EAL2 product validated, and DISA UCAPL approval; Cisco ESS 2020 Switch is US UCAPL approved
- NSA Suite-B support in Cisco 5915 IOS Software cryptography, including Suite-B-GCM-128, Suite-BGCM-256, Suite-B-GMAC-128, and Suite-B-GMAC-256 as described in RFC-4869
- Hardware Encryption Supporting IP Security (IPsec), Secure Sockets Layer with transparent LAN services (SSL/TLS), Secure Real-time Transport Protocol (SRTP), Triple Digital Encryption Standard (3DES), Advanced Encryption Standard (AES), Internet Key Exchange (IKE) protocols (supported in Advanced Enterprise IOS only)
- Data zeroization support (initiated by offboard signal trigger) – Advanced IOS only

Power

- 28V nominal power input voltage (12-36 VDC continuous)
- MIL-STD-704F 28 VDC compliant for aircraft electrical operation: over/under voltages, spikes, and surges for normal, transfer, abnormal, emergency, starting, and power failure
- MIL-STD-1275D 28 VDC compliant for ground vehicle operation: steady state DC voltage variations, no fault/single fault conditions, ripple voltage susceptibility on input power leads, imported voltage spikes, over-voltage and under-voltage surges, starting disturbances, electrostatic discharge (ESD) immunity
- RTCA/DO-160 compliant for aircraft operation (Sections 16-18, 25): power input, voltage spikes, audio frequency conducted susceptibility-power inputs, electrostatic discharge
- < 30W maximum power consumption
- Grounding lug for connection to system chassis ground

Environmental

Validated to meet MIL-STD-810G and RTCA/DO-160G:

- Operating temperature: -40 to +71°C (-40 to +160ºF) ambient (per MIL-STD-810G Methods 501.5 and 502.5) and -40 to +70°C (per DO-160G, Section 4 Category A2 and D2 and Section 4.5.5, Category V/Table 4-1)
- Storage temperature: -40 to +85ºC (-40 to +185ºF) (per MIL-STD-810G Method 502.5 and Method 501.5) and -55 to +85ºC (per DO-160G, Section 4, Category A2)
- Humidity (operating/transport): up to 95% RH @ 40ºC, non-condensing (per MIL-STD-810G, Method 507.5, Procedure II; DO-160G, Section 6, Category B, Section 6.3.2)
- Operating shock: 40g, 11ms, 3 pos/neg per axis, 18 terminal peak shock pulses per MIL-STD-810G Method 516.6, Procedure I; 6g, 11ms, terminal peak shock pulses per DO-160G, Section 7, Class A)
- Crash hazard shock: 75g, 11ms, 12 terminal peak shock pulses, 2 pos/neg per axis (per MIL-STD-810G Method 516.6, Procedure V)
- Random vibration: 3 axes, 1 hour/axis (per MIL-STD-810G, Method 514, per Procedures I and II and DO-160G Section 8, Category S, Curve B3 per combined jet-helo-tracked vehicle profile)
- Ingress (dust/sand): no ingress (designed for compliance to IP67, MIL-STD-810G Method 510.5, Procedure I and II, DO-160G, Section 12, Category S)
- Water immersion: no leakage per 1 meter submersion, 30 minutes (similar to IP67 and MIL-STD-810G, Method 512.5, Procedure I (1 meter, 30 minutes))
- Operating altitude: up to +50,000 ft (15,240 meters) (per DO-160G, Section 4, Category D2, Section 4.6.1) and +30,000 ft (9,144 meters) (per MIL-STD-810G, Method 500.5, Procedures I-II)
- Storage altitude: up to 60,000 ft (18,288 meters) (per MIL-STD-810G, Method 500.5, Procedures I-II)

EMI/EMC Isolation

Validated to meet MIL-STD-461G and RTCA/DO-160G:

- Conducted emissions: MIL-STD-461F, CE102, power leads, 10 KHz to 10MHz, basic curve, Figure CE102-1; DO-160G Sec. 21; conducted RF emissions, 150 kHz to 152 MHz, Category L; Figures 21-1, 21-2
- Conducted susceptibility: MIL-STD-461F, CS101, power leads, 30 Hz to 50 KHz, Curve 2, Figure CS101-1 (28V and below) DO-160G Sec. 20; conducted susceptibility, 10 kHz to 400 MHz, Category M; Figure 20-6
- Radiated emissions: MIL-STD-461F, RE102, electric field, 10 KHz to 18 GHz, fixed wing internal < 25 meters, Figure RE102-3; DO-160G Sec. 21; radiated RF emissions, 100 MHz to 6 GHz, Category L; Figure 21-7
- Radiated susceptibility: RS-103, electric field, 2 MHz to 18 GHz, 200V/m, Table VII, RS103 limits; DO-160G Sec. 20; radiated susceptibility, 100 MHz to 8 GHz, Category R; Figure 20-10

Physical Specifications

- Dimensions (H x D x W, excluding connectors/mounts) (estimated):
  - 5.00” x 6.75” x 6.25” (~12.7 x ~17.15 x ~15.88cm)
- Weight (approx): < 9 lbs. (< 4.08 kg)
- Installation: base flange mount or side boss mount (90° rotated orientation)
- Connectors: MIL-DTL-38999 Series III
- Cooling: passive natural convection, no moving parts
- Ingress protection: dust and water proof (similar to IP67)
- Enclosure/finish: corrosion resistant, aluminium alloy with black anodize finish per MIL-A-8625

Other Specifications

Status indication

- LED indicators for PWR and LNK of 5915 ESR router ports

Reliability

- Designed and manufactured using AS9100 Aerospace Grade/ISO 9001:2000 certified quality program
- No moving parts; passive cooling; conformal coated boards for humidity and tin whisker mitigation
- No moving parts, no active cooling required

Mean Time Between Failure (MTBF) calculated per MIL-HDBK-217F: TBD - ROM estimate:

- Ground benign, +25°C: 657,557 hours (75.1 years)
- Ground mobile, +25°C: 68,536 hours (7.8 years)
- Airborne inhabit, +25°C: 14,906 hours (1.70 years
- Airborne rotary, +25°C: 12,096 hours (1.38 years)

Export

- ITAR-Free: U.S. Commerce Export Administration Regulations (EAR) controlled

Warranty

- Standard 90-day return to depot warranty
- Extended, multi-year service agreements available which bundle Cisco SmartNET (access to IOS software updates)

Ordering Information

Ordering codes

- MAR-5915-20: DuraMAR 5915 Router with ESS 2020 Switch (MAR-5915-00 + DUNET-30-2020-01), 2020 LAN BaseIOS, 5915 BaseIOS
- MAR-5915-21: DuraMAR 5915 Router with ESS 2020 Switch (MAR-5915-01 + DUNET-30-2020-01), 2020 LAN BaseIOS, 5915 AdvIOS
- MAR-5915-22: DuraMAR 5915 Router with ESS 2020 Switch (MAR-5915-02 + DUNET-30-2020-01), 2020 LAN BaseIOS, 5915 AdvIOS CME5
- MAR-5915-23: DuraMAR 5915 Router with ESS 2020 Switch (MAR-5915-03 + DUNET-30-2020-01), 2020 LAN BaseIOS, 5915 AdvIOS CME25
- MAR-5915-24: DuraMAR 5915 Router with ESS 2020 Switch (MAR-5915-04 + DUNET-30-2020-01), 2020 LAN BaseIOS, 5915 AdvIOS CME50
- CBL-MAR-5915-20: breakout cable set for MAR-5915-2X (mating MIL-38999 to RJ-45, DB-9, power)

Note: “CME” is Cisco Communications Manager Express (CME) license for 5/25/50 users (for remote VoIP call manager services)

Special order options

- MIL-DTL-38999 connector caps, mechanical changes, custom metal finishes
- Program-specific delta qual (additional MIL-certifications/ environmental testing)

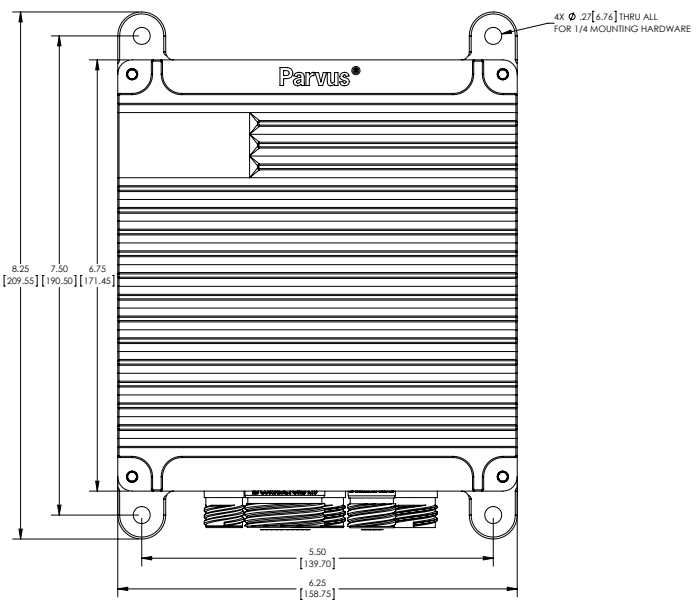
Starter cable set

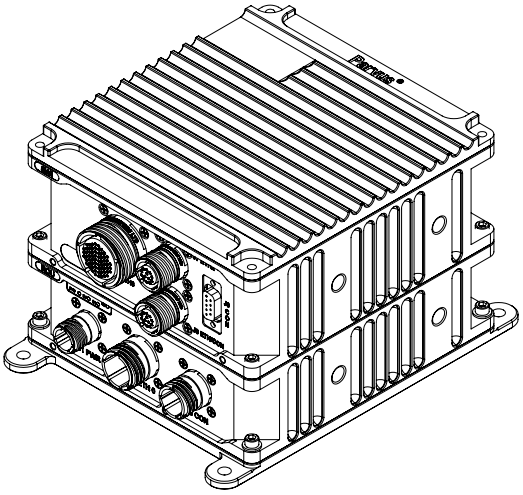
- CBL-MAR-5915-20: optional starter breakout cable set mates with MIL-DTL-38999 connectors for Ethernet, console, and power signals, transitioning to traditional RJ-45/DB-9/ power (for lab or bench testing purposes)

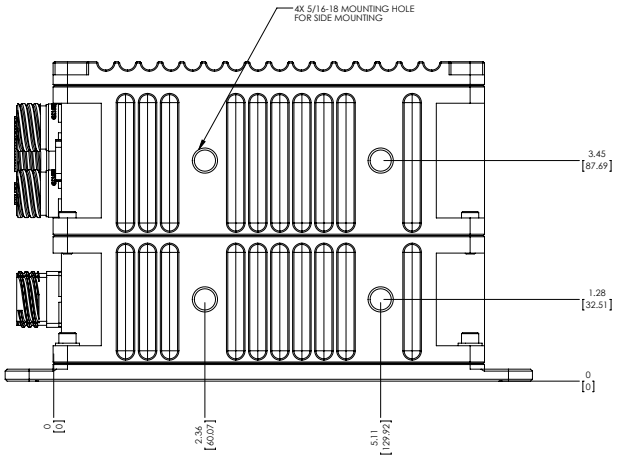
Related Products

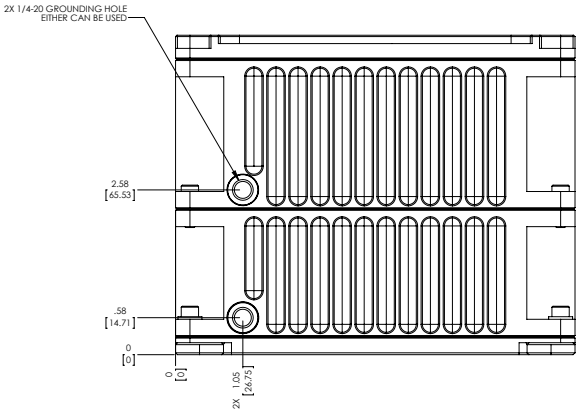
- For standalone C5915 router subsystem (without ESS 2020 Switch), see DuraMAR 5915 0X (MAR-5915-0X) or DuraMAR 31-5915
- For standalone ESS 2020 switch subsystem (without 5915 Router), see DuraNET 30-2020
- For C5915 ESR-based router integrated with Vitesse GbE-based switch (total of 23 ports), see DuraNET 5915 3X (MAR-5915-3X)
- For combined Intel Core i7-based mission processor with DuraMAR 5915 router, see DuraWORX 80-41 product

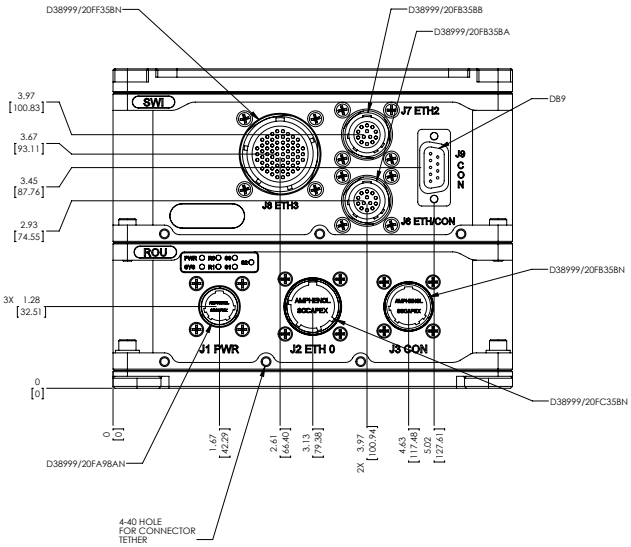
Line Drawings











Parvus DuraMAR 5915 (“3X”Series)

Rugged Cisco 5915 Mobile IP Router Subsystem with Integrated Vitesse Gigabit Ethernet Switch

CURTISSWRIGHTDS.COM

Key Features

- Rugged Cisco 5915-based mobile IP router with integrated Vitesse Gigabit Ethernet switch
- 23 x ports (2 x routed, 21 x switched)
- Cisco IOS router and security software with data, video, voice services
- Vitesse CE services management for switch
- Qual tested to MIL-810G, MIL-461F, DO-160 (severe environmental and EMI conditions)
- Size, weight and power (SWaP) optimized
- Rugged aluminum IP67 (dust/water proof) chassis with MIL-DTL-38999 circular connectors
- Vehicle and aircraft compatible power supply (per MIL-STD-704F and MIL-STD-1275D)
- Data zeroization to erase sensitive data

Applications

- In-vehicle/aircraft IP network routing/ switching
- Network-centric operations/situational awareness
- Extreme environments (cold/hot temperatures, humidity, rain, dust, shock, vibration)
- Transparent mobile data, voice and video in-vehicle communications and on-demand network connectivity
- Fixed/rotary wing (un)manned air vehicles
- Tactical ground vehicles/maritime platforms
- C4ISR technology refresh/LRU upgrades

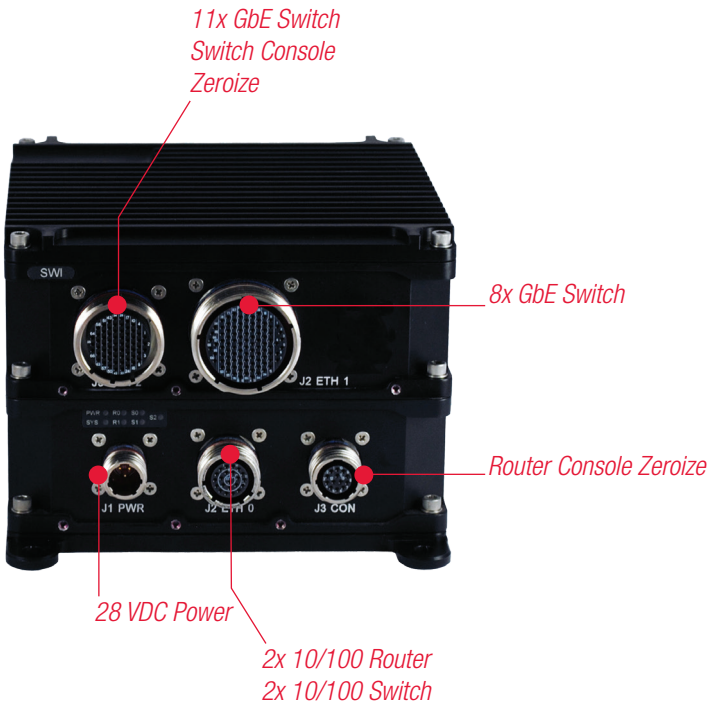
Overview

The Parvus® DuraMAR® 5915 is a rugged Commercial Off the Shelf (COTS) Cisco IOS-managed secure mobile network router integrating Cisco’s 5915 Embedded Services Router (ESR) card in an ultra-rugged chassis optimized for harsh military and civil vehicle/aircraft installations. The “3X” model series (MAR-5915-3X) couples the 5915 ESR with a high bandwidth Layer 2 Vitesse Gigabit Ethernet switch for a total of 23 Ethernet ports. An ideal solution for IP networking technology refresh and situational awareness applications deployed at the tactical network edge, the DuraMAR 5915 enables prime defense contractors and civil agencies to deploy data, video, and voice services virtually anywhere LAN/WAN connectivity may be required, especially in mobile, airborne, ground, manned or unmanned vehicle and sensor applications.

The MAR-5915-3X series provides a robust network routing and switching architecture with the performance, security, Quality of Service (QoS), high availability, and manageability that customers expect from Cisco IOS and Vitesse-based technologies. The familiar Cisco IOS software interface minimizes training requirements and provides extensive support for Layer 2/3 IPv4 and IPv6 networking protocols, IP multicasting, Radio Aware Routing (RAR), Dynamic Link Exchange Protocol (DLEP), encrypted data (AES/IPSec/NSA Suite B/VPN), remote VoIP, Firewall/IPS/IDS, and Mobile Ad Hoc Networking (MANET) for connectivity in Comms on the Move (COTM) applications. Vitesse CE services software adds Layer 2 GbE switching features, including SNMP management, precision timing (IEEE-1588v2), secure authentication (802.1X, ACLs, Web/CLI), redundancy (RSTP/MSTP), link aggregation, and Built in Test (BIT).

Optimized for SWaP sensitivity as well as mechanical robustness, the DuraMAR 5915 3X Series is qualified to meet extreme MIL-STD-810G, MIL-STD-461F, and DO-160G conditions for environmental and EMI compliance (thermal, shock, vibration, humidity, altitude, conducted and radiated emissions & susceptibility). Leveraging stackable PC/104 subassemblies and a modular enclosure design, the unit is completely sealed against dust and water ingress (IP67), requires no active cooling, provides interfaces over proven MIL-DTL-38999 connectors, and features a military-grade power supply supporting aircraft (MIL-STD-704F/DO-160G) and ground/marine vehicle (MIL-STD-1275D) voltage inputs, spikes, and transient levels, as well as MIL-STD-461F/DO-160G EMI/EMC filtering.

For applications requiring Cisco IOS managed switching, see DuraMAR 5915 “2X Series” product sheet for MAR-5915-2X variant which integrates a Cisco ESS 2020 Switch. For a standalone Cisco 5915 ESR-based system (5x total 10/100 ports), see DuraMAR 5915 “0X Series” or DuraMAR 31-5915 product sheets.



Features

Cisco technology

- Cisco IOS-managed Embedded Services router (ESR) and Vitesse CE services Gigabit Ethernet switch combination: Cisco 5915 ESR (as used in DuraMAR 5915 0X router) + Parvus SWI-22-10 switch (as used in DuraNET 20-10 switch)
- Cisco 5915 Advanced Enterprise IOS for robust information assurance, dynamic Layer 3 IPv4/IPv6 routing, QoS management, MANET, remote call manager, radio aware routing (RAR); Vitesse Carrier Ethernet (CE) services software
- Integrated services router (ISR) features support concurrent data, video, and voice services, firewall, gardware accelerated AES encryption/NSA Suite B in IOS
- Modular, open architecture rugged COTS PC/104 hardware design
- High port count: 23 x ports (2 x 10/100 router, 2 x 10/100 switch, 19 x GbE switch)
- Cisco 5915 ESR is FIPS 140-2 Level 1 approved, Common Criteria Validated, and DoD APL listed; standalone DuraMAR 5915 Router is US DoD UC APL approved

Ruggedization

- Qual tested to meet extreme MIL-STD-810G, DO-160 environmental compliance for shock, vibration, thermal, altitude, humidity
- -40 to +71°C fanless extended temp operation with no moving parts
- Corrosion-resistant, aluminum chassis IP67 sealed against water, dust
- Circular MIL-DTL-38999 connectors for reliable network connections
- Filtered, transient and EMI-protected MIL-STD-1275/704/DO-160 compliant power supply for aircraft and ground vehicle use
- Validated to meet MIL-461 and DO-160 conducted/radiated emissions and susceptibility
- Data zeroization support to erase sensitive information
- Conformal coating for humidity/tin-whisker mitigation
- Flexible/robust mounting – base flange mount or side boss mount
- Export jurisdiction: ITAR-free, U.S. Commerce EAR controlled

Network ports are interfaced over MIL-DTL-38999 connectors

Side Boss Mounts Enable Optional Vertical Orientation Mounting (if turned on side)

Target Applications

- Civil and military tactical in-vehicle LAN switching/WAN routing - 24V/28V ground vehicle/aircraft/maritime platforms with SWaP constraints
- Extending Cisco systems enterprise networking infrastructure beyond the reach of traditional fixed-networks into mobile and embedded networking applications
- MANET - on-demand network connectivity in mobile deployments when connected to UHF, VHF, Wi-Fi and tactical radio platforms
- Aggregation of peripheral devices (cameras, sensors, computers) from outdoor and embedded IP network infrastructure into a manageable, highly secure IP network
- C4ISR situational awareness/technology refresh/LRUs
- Technology migration path for legacy Cisco 3200 (3230/3250/3270)-based router and Cisco catalyst 2955-based networking subsystems, including DuraMAR 1000, DuraMAR 3230, and DuraNET 2955
- Managed Layer 3 IP network routing and Layer 2 LAN Ethernet switching in harsh temperature and vibration environments for IP-enabled equipment (i.e. on-board computers, cameras, sensors, radios, SatCom modems, monitoring devices, and command-and-control gear)
- SWaP-constrained mobile, tactical, airborne, and vehicle networking applications upgrading situational awareness and/or network centric capabilities at network edge in demanding embedded networking environments (e.g. defense, homeland security, energy, industrial, oil and gas platforms, underground mining equipment, offshoring drilling rigs, shipping vessels, electric utility substations, railway train rolling stock, fleet transportation, outdoor embedded networks, etc)
- Remote IP telephony on vehicles or outdoor locations using Cisco unified Communications Manager Express (CME)

Cisco IOS Router

Router

Cisco 5915 Embedded Services Router (ESR), rugged PC/104 card

- Cisco 5915 Enterprise IOS base/advanced services image, including option, CME license
- Support for IPv6 routing, VoIP/CME, VPN/firewall/IPS, mobile IP, IPSec exclusive to advanced IOS only (see Cisco 5915 datasheet/Cisco feature navigator for complete software feature comparison)

Router performance

- Routing throughput: ~170Kpps (performance varies based on security/voice/data services enabled)
- Ethernet ports: 2 x 10/100 routed, 2 x 10/100 switched (+1 additional switched 10/100 port connected to SWI-22-10 GbE Switch)

Carrier-Grade Gigabit Switch

SWI-22-10 Card/DuraNET 20-10 System

Parvus SWI-22-10 20-port GbE Switch PCI/104-Express™ Card (as integrated in DuraNET 20-10 GbE standalone switch system)

- Architecture: Vitesse carrier-grade Ethernet switch packet processor with Embedded MIPS CPU with DDR-2 memory and Vitesse CE services carrier Ethernet application running on eCos operating system for optimal performance and RedBoot Bootloader for reliability
- Ethernet ports: 19 x GbE switched ports (+1 x additional switched GbE port internally connected to 5915 ESR)
- Port control: port-speed, duplex mode, flow control, port frame size (jumbo frames), port state, port status (link monitoring), port statistics (MIB counters)

- Quality of Service (QoS) traffic prioritization and queuing: 8 priorities, 8 CoS queues per port, strict or deficit-weighted RR scheduling, shaping/policing per queue and per port, storm control
- VLAN: 8K MAC addresses, 4K VLANs, 802.1Q static VLAN, protocol-based VLAN, MRP, MVRP, MVR, IEEE-80210ad provider bridge, link aggregation (IEEE-802.3ad)
- IEEE-802.1 D/w/s (spanning tree, rapid spanning tree, multiple spanning tree protocol)
- L2 IEEE-1588v2 Precision Timing Protocol (PTP)
- Layer 3 routing: Layer 3 IPv4/IPv6 unicast static routing support for IP routing to attached WAN/radio ports
- Management: in-band Ethernet management using web GUI or Simple Network Management Protocol (SNMP), or Command Line Interface (CLI) over RS-232 console for Telnet/SSH/Terminal; HTTP/HTTPS web server, SNMP v1/v2/v3 client, DHCP client, IEEE 802.1X authentication, system Syslog, SSHv2, IPv6 management, IGMP/MLD/DHCP snooping, access control lists, port mirroring, BPDU guard, RMON, Cisco Discovery Filtering, IEEE-802.10AB LLDP
- Self-diagnostics: Built-in Test (BIT) functionality to detect system faults
- Security: Network Access Server (NAS) IEEE-802.1X, RADIUS Accounting, MAC Address limit, TACACS, Web&CLI Authentication, ACLs, IP Source Guard
- Declassification: Data Zeroization Support to Erase Non-Volatile Flash Memory and Restore Board to Factory Default Configuration

Ports

MAR-5915-3X Series (Cisco 5915 Router + Parvus SWI-22-10 Switch)

- 2 x 10/100 Mbps fast Ethernet WAN router ports, IEEE 802.3 compliant (from 5915 ESR)
- 2 x 10/100 Mbps fast Ethernet switched LAN ports, IEEE 802.3u compliant (from 5915 ESR)
- 19 x 10/100/1000 Mbps GbE Ethernet switched LAN ports, IEEE 802.3ab compliant (from SWI-22-10 switch)
- 2 x console ports, RS-232 (1 x for router, 1 x for switch)
- Power input and data zeroize
- Additional 2 x Ethernet ports connected internally: 1 x 10/100 switched port of 5915 ESR connected to 1x GbE switch port of SWI-22-10 (also pinned out to external DTL-38999 connectors; can optionally be de-coupled for standalone router/switch functions and total of 25 external Ethernet ports by changing internal DIP switch setting)

Cisco Router (5915 ESR)

Routing/Bridging

- IPv4 and IPv6 routing (IPv6 features available in Advanced Enterprise IOS image only)
- Routing protocols: Routing Information Protocol (RIP) v1/v2; Open Shortest Path First (OSPF); Enhanced Interior Gateway Routing Protocol (EIGRP)-IP, Border Gateway Protocol (BGP), Cisco Discovery Protocol, IP policy routing, IP Multicast Protocol Independent Multicast (PIM) v1/v2, Internet Group Management Protocol (IGMP) v1/v2, IP multicast load splitting, Cisco Group Management Protocol (GMP), Telnet, Dial-On-Demand routing (DDR), UDP Telnet
- Encapsulations: PPP over Ethernet (PPPoE) client and server for fast Ethernet, 802.1q VLAN trunking support, Generic Routing Encapsulation (GRE)
- VLAN: Virtual LAN logical segmentation of network for optimal use of bandwidth

Mobility (Advanced Enterprise IOS only)

- Radio Aware Routing (RAR): optimize IP routing over fixed/temporary radio networks, factor radio link metrics into route calculations, and immediately recognize/adapt to changes in network neighbor status via Dynamic Link Exchange Protocol (DLEP), Router Radio Control Protocol (R2CP), RFC 5578
- MANET: OSPFv3/EIGRP enhancements for mobile temporary networks via (PPPoE extensions)
- Mobile IP routing: home agent and mobile router redundancy, mobile router preferred interfaces, mobile router reverse tunnelling, mobile router asymmetric links, mobile router static and dynamic networks, static co-located care-of address, AAA server, Cisco Mobile NAT traversal over mobile IP

Management and Monitoring

- Base/advanced enterprise Cisco IOS software with Command Line Interface (CLI)
- Configuration management via serial console or Ethernet port through terminal emulation application
- SNMPv2/v3, Telnet, RADIUS, TACACS+, Cisco Service Assurance Agent, Syslog, response time reporter, NTP client, TFTP client and server, DHCP client and server, DHCP relay, HSRP
- Network address translation; address conservation; DHCP client address negotiation, easy IP Phase I

Security

- Authentication: route, PAP, CHAP, MS-CHAP local password, IP access lists, time-based ACLs
- Generic routing encapsulation; fast switching, Cisco Express Forwarding, process switching, STAC/RTP compression
- Advanced Enterprise IOS only: stateful inspection firewall; intrusion detection system; easy VPN for client/server/remote; MPLS VPN; hardware accelerated crypto: IPSec, 3DES, AES, IKE protocols; port-to-application mapping; tunnel endpoint discovery; Secure Shell (SSH) protocol client and server

Quality of Service

- Quality of Service (QoS) classification/prioritization of data, guaranteeing determinism for mission-critical data: generic traffic shaping, class-based Ethernet matching, mobile access routing (802.1p Class of Service), committed access rate, flow-based WRED, low-latency/priority/weighted fair queuing, dial backup, dialer profiles, dialer idle time-out, dial on Demand, Class-Based Weighted Fair Queuing, Traffic policing RSVP; 802.1Q VLAN) trunking and encapsulation support

Voice Services

- Cisco Unified Communications Manager Express for remote IP telephony/command and control comms, 5/25/50 - user license support (5915 Advanced IOS add-on option), capable of supporting up to 48 phones

Information Assurance

- Cisco 5915 ESR card is Federal Information Processing Standard (FIPS) 140-2 Level 1 approved, Common Criteria Evaluation and Validation Scheme (CCEVS) EAL2 product validated, and DISA UCAPL approval
- Standalone DuraMAR 5915 Router with Cisco IOS Rel. 15.2GC TN 1429401 is listed on the US Department of Defense DISA UC APL (Unified Capabilities Approved Product List) as a Customer Edge Router (CER)
- NSA Suite-B support in Cisco 5915 IOS Software cryptography, including Suite-B-GCM-128, Suite-BGCM-256, Suite-B-GMAC-128, and Suite-B-GMAC-256 as described in RFC-4869– Advanced IOS only
- Hardware Encryption Supporting IP Security (IPsec), Secure Sockets Layer with transparent LAN services (SSL/TLS), Secure Real-time Transport Protocol (SRTP), Triple Digital Encryption Standard (3DES), Advanced Encryption Standard (AES), Internet Key Exchange (IKE) protocols supported in Advanced Enterprise IOS only)
- Data zeroization support (initiated by offboard signal trigger) – Advanced IOS only

Power

- 28V nominal power input voltage (12-36 VDC continuous)
- MIL-STD-704F 28 VDC compliant for aircraft electrical operation: over/under voltages, spikes, and surges for normal, transfer, abnormal, emergency, starting, and power failure
- MIL-STD-1275D 28 VDC compliant for ground vehicle operation: steady state DC voltage variations, no fault/single fault conditions, ripple voltage susceptibility on input power leads, imported voltage spikes, over-voltage and under-voltage surges, starting disturbances, electrostatic discharge (ESD) immunity
- RTCA/DO-160 compliant for aircraft operation (Sections 16-18, 25): power input, voltage spikes, audio frequency conducted susceptibility-power inputs, electrostatic discharge
- < 35W maximum power consumption
- Grounding lug for connection to system chassis ground

Environmental

Validated to meet MIL-STD-810G and RTCA/DO-160G:

- Operating temperature: -40 to +71°C (-40 to +160ºF) ambient (per MIL-STD-810G Methods 501.5 and 502.5) and -40 to +70°C (per DO-160G, Section 4 Category A2 and D2 and Section 4.5.5, Category V/Table 4-1)
- Storage temperature: -40 to +85ºC (-40 to +185ºF) (per MIL-STD-810G Method 502.5 and Method 501.5) and -55 to +85ºC (per DO-160G, Section 4, Category A2)
- Humidity (operating/transport): up to 95% RH @ 40ºC, non-condensing (per MIL-STD-810G, Method 507.5, Procedure II; DO-160G, Section 6, Category B, Section 6.3.2)
- Operating shock: 40g, 11ms, 3 pos/neg per axis, 18 terminal peak shock pulses per MIL-STD-810G Method 516.6, Procedure I; 6g, 11ms, terminal peak shock pulses per DO-160G, Section 7, Class A)
- Crash hazard shock: 75g, 11ms, 12 terminal peak shock pulses, 2 pos/neg per axis (per MIL-STD-810G Method 516.6, Procedure V)
- Random vibration: 3 axes, 1 hour/axis (per MIL-STD-810G, Method 514, per Procedures I and II and DO-160G Section 8, Category S, Curve B3 per combined jet-helo-tracked vehicle profile)
- Ingress (dust/sand): no ingress (designed for compliance to IP67, MIL-STD-810G Method 510.5, Procedure I and II, DO-160G, Section 12, Category S)
- Water immersion: no leakage per 1 meter submersion, 30 minutes (similar to IP67 and MIL-STD-810G, Method 512.5, Procedure I (1 meter, 30 minutes))
- Operating altitude: up to +50,000 ft (15,240 meters) (per DO-160G, Section 4, Category D2, Section 4.6.1) and +30,000 ft (9,144 meters) (per MIL-STD-810G, Method 500.5, Procedures I-II)
- Storage altitude: up to 60,000 ft (18,288 meters) (per MIL-STD-810G, Method 500.5, Procedures I-II)

EMI/EMC Isolation

Validated to meet MIL-STD-461F and RTCA/DO-160G:

- Conducted emissions, MIL-STD-461F, CE102, power leads, 10 KHz to 10 MHz, basic curve, Figure CE102-1; DO-160G Sec. 21; conducted RF emissions, 150 kHz to 152 MHz, Category L; Figures 21-1, 21-2
- Conducted susceptibility, MIL-STD-461F, CS101, power leads, 30 Hz to 50 KHz, Curve 2, Figure CS101-1 (28V and below); DO-160G Sec. 20; conducted susceptibility, 10 kHz to 400 MHz, Category M; Figure 20-6
- Radiated emissions, MIL-STD-461F, RE102, electric field, 10 KHz to 18 GHz, fixed wing internal < 25 meters, Figure RE102-3; DO-160G Sec. 21; radiated RF emissions, 100 MHz to 6 GHz, Category L; Figure 21-7
- Radiated susceptibility, RS-103, electric field, 2 MHz to 18 GHz, 200V/m, Table VII, RS-103 limits; DO-160G Sec. 20; radiated susceptibility, 100 MHz to 8 GHz, Category R; Figure 20-10

Physical Specifications

- Dimensions (H x D x W, excluding connectors/mounts) (estimated):
  - 4.75” x 6.75” x 6.25” (~12.06 x ~17.15 x ~15.88cm)
- Weight (estimated): < 8.0 lbs. (< 3.62 kg)
- Installation: base flange mount or side boss mount (90° rotated orientation)
- Connectors: MIL-DTL-38999 Series III
- Cooling: passive natural convection, no moving parts
- Ingress protection: dust and water proof (similar to IP67)
- Enclosure/finish: corrosion resistant, aluminium alloy with black anodize finish per MIL-A-8625

Other Specifications

Status indication

- LED indicators for PWR and LNK of 5915 ESR router ports

Reliability

- Designed and manufactured using AS9100 Aerospace Grade/ISO 9001:2000 certified quality program
- No moving parts; passive cooling; conformal coated boards for humidity and tin whisker mitigation
- Workmanship: assembled to IPC-A-610 Class III workmanship
- No moving parts, no active cooling required

Mean Time Between Failure (MTBF) calculated per MIL-HDBK-217F: TBD - ROM estimate:

- Ground benign, +25°C: 657,557 hours (75.1 years)
- Ground mobile, +25°C: 68,536 hours (7.8 years)
- Airborne inhabit, +25°C: 14,906 hours (1.70 years
- Airborne rotary, +25°C: 12,096 hours (1.38 years)

Export

- ITAR-Free: U.S. Commerce Export Administration Regulations (EAR) controlled

Warranty

- Standard 90-day return to depot warranty
- Extended, multi-year service agreements available which bundle Cisco SmartNET (access to IOS software updates)

Ordering Information

Ordering codes

- MAR-5915-30: DuraMAR 5915 Router with DuraNET 20-10 GigE Switch (MAR-5915-00 + DUNET-20-10-01), 5915 BaseIOS
- MAR-5915-31: DuraMAR 5915 Router with DuraNET 20-10 GigE Switch (MAR-5915-01 + DUNET-20-10-01), 5915 AdvIOS
- MAR-5915-32: DuraMAR 5915 Router with DuraNET 20-10 GigE Switch (MAR-5915-02 + DUNET-20-10-01), 5915 AdvIOS CME5
- MAR-5915-33: DuraMAR 5915 Router with DuraNET 20-10 GigE Switch (MAR-5915-03 + DUNET-20-10-01), 5915 AdvIOS CME25
- MAR-5915-34: DuraMAR 5915 Router with DuraNET 20-10 GigE Switch (MAR-5915-04 + DUNET-20-10-01), 5915 AdvIOS CME50
- CBL-MAR-5915-30: breakout cable set for MAR-5915-2X (mating MIL-38999 to RJ-45, DB-9, power)

Note: “CME” is Cisco Communications Manager Express (CME) license for 5/25/50 users (for remote VoIP call manager services)

Special order options

- “DuraWORX” combination Router + Mission Computer Subsystem
- MIL-DTL-38999 connector caps, mechanical changes, custom metal finishes
- Program-specific delta qual (additional MIL-certifications/ environmental testing)

Starter cable set

- CBL-MAR-5915-30: optional starter breakout cable set mates with MIL-DTL-38999 connectors for Ethernet, console, and power signals, transitioning to traditional RJ-45/DB-9/power (for lab or bench testing purposes)

Related Products

- For standalone 5915 Router subsystem (without SWI-22-10 GbE Switch), see DuraMAR 5915 0X (MAR-5915-0X) or DuraMAR 31-5915
- For standalone SWI-22-10 GbE Switch subsystem (without 5915 Router), see DuraNET 20-10
- For applications requiring Cisco IOS managed switching, see DuraMAR 5915 “2X Series” product sheet for MAR-5915-2X variant (which integrates a Cisco ESS 2020 Switch) or for a standalone Cisco Switch subsystem, the DuraNET 30-2020

Line Drawings