

# 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
- 5 x ports (2 x routed, 3 x switched)
- Cisco Enterprise IOS management/security software with data, video, voice services
- SWaP optimized:
  - + Small size: 112 inch<sup>3</sup> (1835 cm<sup>3</sup>)
  - + Lightweight: 4.0 lbs. (1.8 kgs)
  - + Low-power: < 15 watts
- Vehicle and aircraft compatible power supply (per MIL-STD-704F & MIL-STD-1275D)
- Environmental qual tested to MIL-STD-810G, including extreme shock and vibration for jet, helo, tracked vehicles
- MIL-STD-461F EMI/EMC qual tested for conducted and radiated emissions/susceptibility
- Rugged aluminum chassis with MIL-DTL-38999 circular connectors
- IP67 ingress protected (dust/water proof)
- 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 “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 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 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” product sheet for MAR-5915-2X variant which integrates a Cisco ESS 2020 switch. For low-power, carrier-grade GbE switching, 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 with RJ-45/M12 connectors (5x total 10/100 ports), see DuraMAR 31-5915 product sheet.

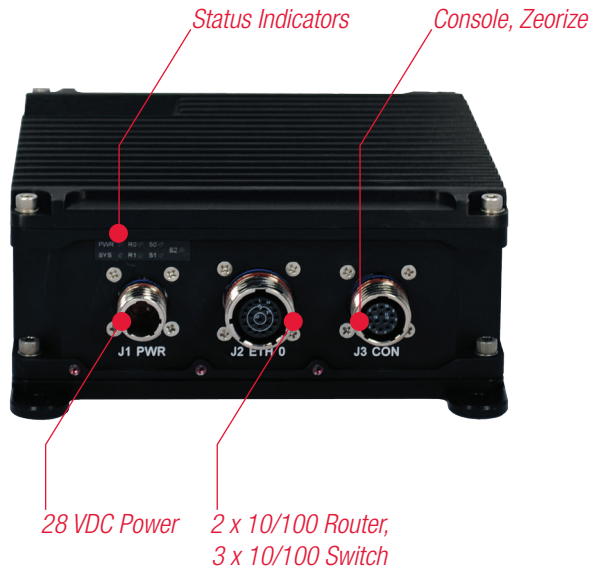


Figure 1: Ethernet ports, serial, zeroize, and power brought out on DTL-38999 connectors

## 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, 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
- Ethernet ports: 5 x ports (2 x 10/100 routed, 3 x 10/100 switched)
- Cisco 5915 ESR is FIPS 140-2 Level 1 approved, Common Criteria Evaluation and Validation Scheme (CCEVS) 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 +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
- Qual tested for MIL-461F 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, including DuraMAR 1000, DuraMAR 3230
- 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)

## Ports

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

- 2 x 10/100 Mbps fast Ethernet WAN router ports, IEEE 802.3 compliant
- 3 x 10/100 Mbps fast Ethernet switched LAN ports, IEEE 802.3u compliant
- 1 x console ports, RS-232
- Power input and data zeroize

### 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)
- Routing performance: ~170Kpps (performance varies based on security/voice/data services enabled)
- Ethernet ports: 2 x 10/100 routed, 3 x 10/100 switched



Figure 4: Shown mounted on side



Figure 5: Rear view

## 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)
- 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
- 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 (supported in Advanced Enterprise IOS only)
- Data zeroization support (initiated by offboard signal trigger) - Advanced IOS only

## Power

- 28V nominal power input voltage (18-33 VDC continuous)
- Power consumption: <15 watt max
- MIL-STD-704F and MIL-STD-1275D compliant: steady state voltage, ripple, surges, spikes
- Galvanic isolation: 1500V
- Grounding lug for connection to system chassis ground

## Physical Specifications

- Dimensions (H x D x W, excluding connectors/mounts) (estimated):  
+ 2.66" x 6.75" x 6.25" (~6.76 x ~17.15 x ~15.88cm)
- Weight (approx): 4.0 lbs. (~1.8 kgs)
- 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

## 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: 10 Hz to 2000 Hz, 3 axes, 1 hour/axis (MIL-STD-810G, Method 514)
- Humidity: up to 95% RH @ 40°C, 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 10 MHz, basic curve
- Conducted susceptibility: CS101, power leads, 30 Hz to 150 KHz, Curve 2 (28V and below); CS114, bulk cable injection, 10 KHz to 200 MHz; CS115, bulk cable injection, impulse rate 30 Hz CS116, damped sinusoidal transients, cables and power leads, 10 KHz to 100 MHz
- Radiated emissions: RE102, electric field, 10 KHz to 18 GHz, Figure RE102-3
- Radiated susceptibility: RS103, electric field, 2 MHz to 18 GHz, aircraft external, 200 volts per meter



## Other Specifications

### Status indication

- LED Indicators for PWR and LNK

### 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:

- Ground benign, +25°C: 966,053 hours (110 years)
- Ground nobile, +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

- 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-5915-00: DuraMAR 5915 Mobile Router (2 x FE routed, 3 x FE switched), Base Enterprise IOS
- MAR-5915-01: DuraMAR 5915 Mobile Router (2 x FE routed, 3 x FE switched), Adv. Enterprise IOS
- MAR-5915-02: DuraMAR 5915 Mobile Router (2 x FE routed, 3 x FE switched), Adv. Enterprise IOS, CME-5 users
- MAR-5915-03: DuraMAR 5915 Mobile Router (2 x FE routed, 3 x FE switched), Adv. Enterprise IOS, CME-25 users
- MAR-5915-04: DuraMAR 5915 Mobile Router (2 x FE routed, 3 x 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)

### 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-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 with black anodize finish per MIL-A-8625

## Related Products

- 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” 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
- 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 C5915 ESR-based router with rugged RJ-45/M12 connectors, see DuraMAR 31-5915 product
- For combined Intel Core i7-based mission processor with DuraMAR 5915 router, see DuraWORX 80-41 product

## Line Drawings

