



Locomotive Ethernet Switch

By focusing on the unique needs of each customer, Central Railway Manufacturing has worked with leaders in the freight transportation industry to turn their networking and sensor-based analytics requirements into a reality.

Locomotive Ethernet Switch

Central Railway Manufacturing's equipment portfolio includes the ESW, the Ethernet Switch. The ESW is a fully featured managed Layer 2 Ethernet switch for any locomotive LDARS or on-board business network application. In addition, the CRM ESW supports a wide range of optional features including a standalone acoustic fuel sensor interface and user-definable analog and digital inputs to enable custom analytics. These features are available in a compact wall-mount or LSI-rack 2U enclosure.

Insight into ESW technology...

The ESW employs a versatile communications architecture that incorporates two fully featured and manageable Ethernet switches with advanced QOS, VLAN, and port isolation features. In its simplest port expansion application, the ESW functions as a basic 10-port switch where any port can be used to expand to all others utilizing the AAR 8-pin M12 standard connector. However, the ESW is structured with network versatility, PoE, and sensor bridging applications in mind:

- 8 x 10/100/1000 Ethernet
- 2 x 10/100 Legacy Ethernet
- 1 x RS-422/485 Synchronous/Asynchronous
- 1 x RS-422 PWM Input
- 4 x 150V/4-20mA Isolated Analog Inputs
- 6 x 74V Digital Isolated Inputs
- 15V @ 200mA isolated power output
- 2 x Power Over Ethernet PSE Class 0



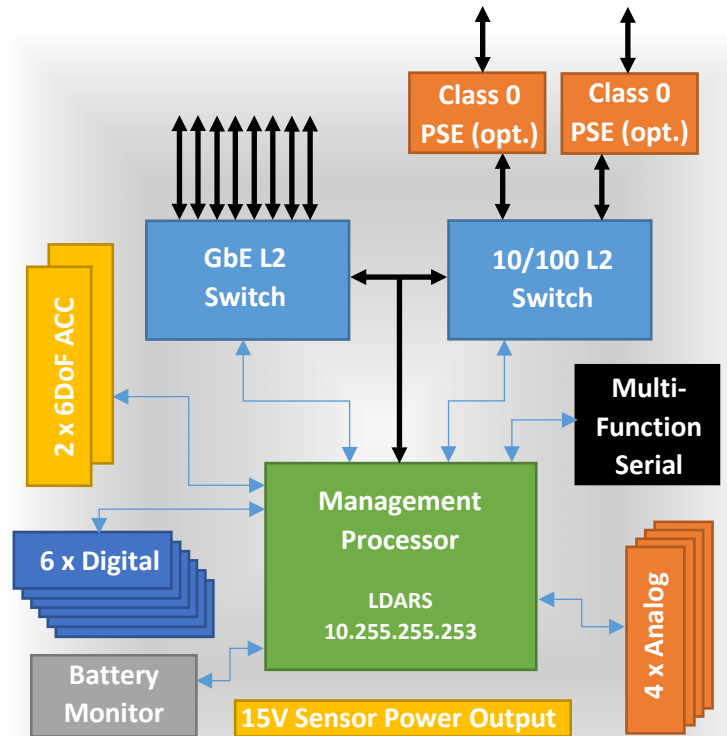
Your network at your fingertips...

As a simple managed Ethernet Switch, the CRM ESW resides at LDARS 10.255.255.253 where the ESW can be configured and where the customer can query the ESW for port connectivity metrics for example.

The ESW is part of the CRM Enabling Technologies suite of products whose focus is to allow customers to leverage their own networks and data mining infrastructure to connect to on-board sensors. The ESW is designed as a cost-competitive and space-sensitive approach to address the increasingly common issue of adding sensors to locomotives and bridging the sensor data to the on-board network.

The ESW conveniently normalizes digital, analog, and serial/sensor telemetry to the Ethernet network, where sensor data can be readily consumed by predictive maintenance algorithms, for example. The ESW supports license-free Class C broadcast of all raw sensor telemetry, and also supports AAR ITCSM.

ESW Detailed Characteristics	
Power:	74V nominal, AAR 5-Pin Connector 6W Typical, 9W peak 20V Brownout, 40V to 110V operating
Ethernet:	8 x 10/100/1000 AAR M12 8-pin 2 x 10/100 AAR M12 8-pin -VLAN, QOS, Port Iso/Fwd Optional: 2 x 13W Class 0 PoE PSE
Connectivity:	4 x Isolated Analog Inputs 6 x Isolated Digital Inputs Multifunction Serial -RS-232/422/485 -Synchronous/Asynchronous -Programmable Termination -HDLC/SDLC with CRC RS-422 PWM Input
Telemetry:	Precision Locomotive Battery Voltage Monitor 2 x 6D Accelerometers
Outputs:	15VDC Sensor Supply Output, 200mA 2 x Class 0 Power over Ethernet Power Sourcing, 13W each
Environment:	-40°C to +70°C Operating 0% to 95% RH Non-condensing AAR-S9401 Cab Mount Mechanical Shock and Vibration, RF Emissions & Immunity



One-Stop Locomotive Analytics

The CRM ESW supports a completely self-contained and standalone acoustic fuel sensor interface for precision fuel management applications, including the power interface. The software configurable inputs can be configured for a wide range of custom user alerts and statistics, such as:

- Engine Run and Duty Cycle
- Hard Hit (accelerometer-based),
- Fueling Events
- Engine Temperature
- Battery Voltage/Health (i.e. cranking voltage)
- etc.

Combined with other customer-specified sensors, the ESW can be configured to be an extremely powerful yet compact standalone analytics platform, especially for legacy fleets. Combined with the CRM Locomotive Network Interface (LNI), a compact edge-processing platform enabled with GPS, WiFi and cellular, the ESW can be part of a flexible and low-cost analytics and asset monitoring solution.