



S5066 WB-ARQ

S4691 MARLIN



### RC10 Product Overview

The RC10 ARQ Server and IP Controller is a purpose-built platform for Automatic Repeat reQuest (ARQ) communications functions based on STANAG 5066 and STANAG 4538, as well as a Mobile Ad-Hoc Relay Line of Sight Networking (MARLIN) function based on STANAG 4691. The RC10 is a companion product to the RM10 Wideband SDM & ALE. The unit has a bit-exact synchronous DCE interface supporting all the STANAG 4691 Annex B and MIL-STD-188-110C Appendix D rates up to 96 kbps for UHF and 120 kbps for WBHF.

The RC10, when configured as a STANAG 4691 node provides a MARLIN implementation based on the STANAG 4691 Annex A standard. The MARLIN standard describes the system concept and set of protocols that provide Internet Protocol (IP) data transfer in multiple-node, multiple-hop dynamic networks employing a line of sight (LOS) radio bearers.

The RC10's STANAG 4691 Node Controller provides a number of services such as automatic network discovery, collision avoidance, error-free data delivery using the embedded ARQ protocol, multi-hop MANET operation, slot merging for adaptive data rate control.

A synchronous balanced DTE port is built into the RC10 unit to interface with a bulk encryption unit. The RC10 can be configured to work with different crypto sync times in order to support a wide range of NATO & Pfp cryptos. The RC10 is highly parameterized to be able to work over a variety of bearers.

### STANAG 4691 MARLIN Node Controller

The RC10 S4691 MARLIN Node Controller is situated in between the V/UHF radio and an IP Router, with optional link encryption between the controller and the modem. For this reason, it is able to make use of legacy V/UHF radios to transport IP data.

Due to the shared radio channel, the network controller implements coordinated channel medium access to avoid collisions. It uses a synchronous Time Division Multiple Access (TDMA) known as Distributed Slot Reservation Media Access (DSRMA) to create and manage ad-hoc networks and facilitate transmission between participating nodes. IP data relaying is also employed to extend the network to BLOS.

The RC10 has been designed to be self-organizing with respect to topology changes – such as nodes entering and exiting the network and position change relative to other nodes. The RC10 Node Controller supports up to 16 UHF LOS nodes and a maximum of 5 hops per subnet. Potentially up to 100 nm in coverage could be achieved.

Because the MARLIN TDMA scheme requires precise timing in order to coordinate transmissions on the shared channel, each node must have access to a high precision source of time information. The RC10 gets accurate UTC time from either an external GPS device or an external NTP Server. A time accuracy of  $\pm 10$  ppm of UTC is achieved.

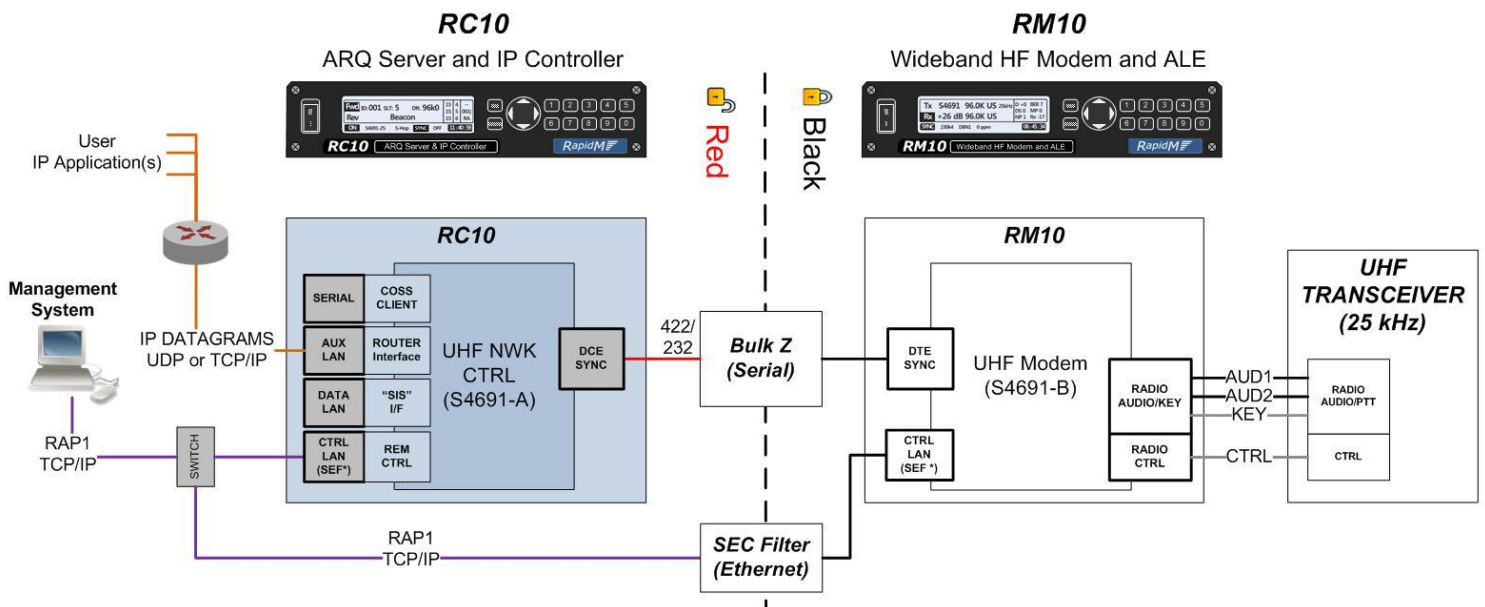


Figure 1: RC10 Typical Use-Case - UHF MARLIN Node

STANAG 4691 ANNEX A "MARLIN" NETWORK CONTROLLER	
<b>OPERATIONAL MODES</b>	<ul style="list-style-type: none"> <li>Single-Hop: Point-to-Point Packet Delivery (no relay)</li> <li>Multi-Hop: Packet Delivery via MANET relaying</li> </ul>
<b>FEATURES</b>	<ul style="list-style-type: none"> <li>Collision avoidance and recovery: The RC10 coordinates transmissions on the shared channel using a synchronous Time-Division Media Access (TDMA) scheme.</li> <li>ARQ Data Transfer for error-free data delivery</li> <li>Router Interface: The RC10 STANAG 4691 controller supports either TCP or UDP Data over IP.</li> <li>Data Priority: The RC10's Link Layer Controller (LLC) handles packet segmentation, reassembly, and duplicate detection. Data compression and decompression based on the standard based on zlib (RFC 1950). Each unit data has a priority value. Higher precedence data is sent first.</li> <li>Automatic and distributed neighbour discovery and network organization. The MANET Relay Controller (RC) monitors the LOS network topology to identify network members as well as the shortest paths to desired destinations.</li> <li>Distributed coordination of transmission to avoid collisions on a shared channel.</li> <li>Slot merging for Dynamic bandwidth allocation in response to asymmetrical user data load requirements.</li> <li>Collision avoidance and recovery: The RC10 provides a listen-before-transmit function. If the LBT is not successful, a random back-off scheme is employed before attempting another join request transmission since a collision may have occurred with the first request.</li> </ul>

GENERAL CHARACTERISTICS				
<b>SIZE, WEIGHT &amp; COLOR</b>	Width: 212.2 mm Depth: 225.6 mm	Height: 41.1 mm (excl. front panel) Height: 44.1 mm (incl. front panel)	Weight: 2.2 kg	Color: Black Grey (RAL 7021), Saddlewood Powder (VX 7517)
<b>ENVIRONMENTAL SPECIFICATIONS</b>	Climatic	<ul style="list-style-type: none"> <li>Storage/Operation: -30 °C to +70 °C (MIL-STD-810F)</li> <li>Humidity: 90% non-condensing at 30 °C (MIL-STD-810F)</li> </ul>		
	Mechanical	<ul style="list-style-type: none"> <li>Vibration: Surface Ship, Marine Vehicles, Aircraft, Min. Integrity (MIL-STD-810F)</li> <li>Shock: 40 G, 11 ms (MIL-STD-810F)</li> </ul>		
	EMC	<ul style="list-style-type: none"> <li>MIL-STD-461E (RE101, RE102, CE102, CS101, CS114, RS101, RS103)</li> </ul>		
	Safety/CE Marking	<ul style="list-style-type: none"> <li>CE Marking - Directives 2006/95/EC as amended</li> <li>SANS 60950-1:2010 / IEC 60950-1:2012</li> </ul>	<ul style="list-style-type: none"> <li>LVD - Low Voltage Directive 2014/35/UE</li> <li>EMC - Electromagnetic Compatibility Directive 2014/30/UE</li> <li>EDD – Eco-Design Directive 2009/125/EC</li> </ul>	
	MTBF	<ul style="list-style-type: none"> <li>&gt; 40,000 hours</li> </ul>		
<b>INSTALLATION</b>	Compact design: The unit occupies a width less than ½ of an 1U 19" rack slot, <i>RapidM</i> 19" rack-mountable tray available.			
<b>PRESETS</b>	Factory and Custom Presets			

INTERFACES	
<b>DCE (DATA) PORT (DB25M)</b>	RS-422 balanced, RS-423, RS-232 unbal., MIL-STD-188-114 (interoperable), EIA 530A compliant. Half & Full Duplex operation, Sync, Std. and High-speed Async modes. Connects to COMSEC.
<b>ETHERNET DATA PORT (RJ45)</b>	IP Packet Data: 10/100 Base T (IEEE 802.3U compatible), embedded TCP/IP Stack Protocol: RAW SIS IP packet data. Connects to application PCs / servers / laptops.
<b>ETHERNET AUX LAN (RJ45)</b>	IP Packet Data: 10/100 Base T (IEEE 802.3U compatible), embedded TCP/IP Stack Protocol: TCP/IP, connects to application Router (Enclave or Federating Router)
<b>REMOTE CONTROL/ GPS PORT (DE9M)</b>	Remote Control Pins: RS-485 Multi-drop, RS-422 balanced or RS-232 Protocol: Control Protocol (RAP1 + RIPC, ASCII S5066 Annex E). Connects to <i>RM8 SDM</i> External GPS Control Pins: RS-232 (nominally input). Data Rate: 300 to 19200 bps. PPS line: RS 232/422 (NMEA) or TTL. Time reference, [position function]. Connects to external GPS.
<b>GPS ANTENNA (MCX)</b>	Optional Built-in GPS receiver: Time reference for time-based functions, [position function].
<b>SERIAL DATA (2) &amp; AUDIO PORTS (2) (DB25M)</b>	Asynchronous Data (2 ports): RS-232, up to 115200 bps, 1/2 stop bits, 5/6/7/8 bit data Support for: ITA-2, ITA-5 for ACP-127 support. Connects to ACP 127 terminal. Input Audio: 600 ohm balanced, -20 to +10 dBm without adjustment or MIC input Output Audio: Balanced, -40 to +10 dBm adjustable into 600 ohm load. Connects to intercom or hand / headset.
<b>ETHERNET CTRL PORT (RJ45)</b>	Remote Control: 10/100 Base T (IEEE 802.3U compatible), embedded TCP/IP Stack Protocol: Control Protocol (RAP1 + RIPC). Connects to external management / control system.
<b>USER INTERFACE FOR UNIT CONTROL</b>	Local control via 32x202 pixel graphical LCD display and 16-key keypad. 3 bi-colour LED indicators Alphanumeric and digit keypad for fast data entry, 4-way navigation button.
<b>POWER SUPPLY</b>	Wide-range supply input: 90-264 VAC, 40-440 Hz, 2A & 100-370 VAC. Makes the unit suitable for use on military base stations, vessels and aircraft.

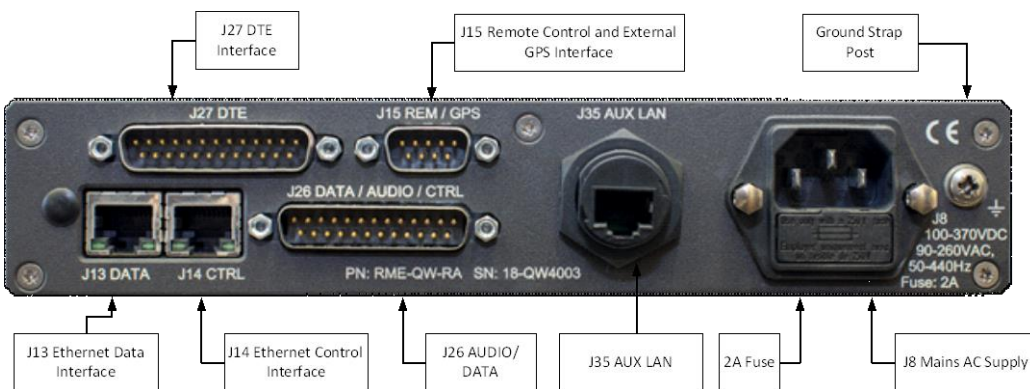
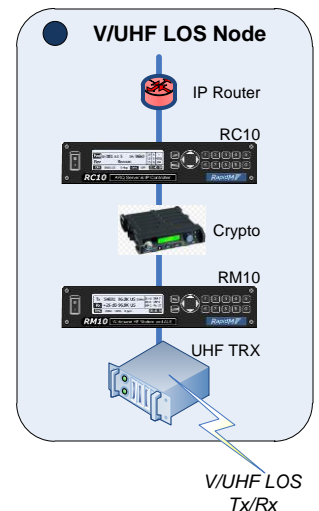


Figure 2: RC10 Rear Panel Layout

RC10 ARQ SERVER & IP CONTROLLER ORDERING INFORMATION	STOCK NUMBER	DESCRIPTION
RC10 UHF S4691-A MARLIN CONTROLLER	RME-C0-RA-CUV06	SDC: RC10 CU (4691-A Controller) V06

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