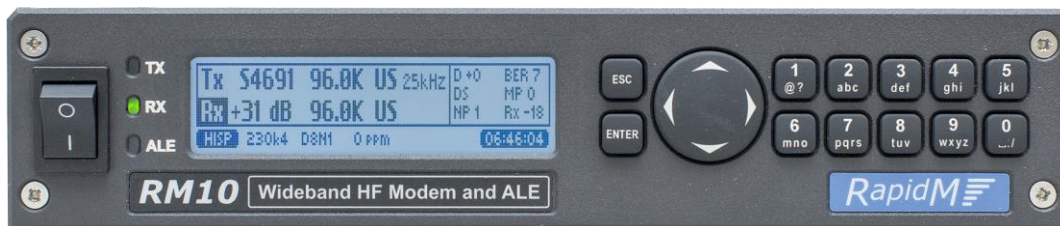




WBHF 24 kHz ALE 4G, 3G & 2G V/UHF 20/25 kHz



RM10 Product Overview

The *RM10* Wideband Software Defined Modem (SDM) provides a purpose-built standalone hardware platform for strategic and maritime WBHF Beyond Line-of-Sight (BLOS) and V/UHF Line-of-Sight (LOS) radio communications.

The *RM10* data modem waveforms address the need for higher throughput needed for high-capacity HF & V/UHF data communication over wideband radio channels.

The UHF data modems are specified in STANAG 4691 Annex B, providing a suite of LOS data modem waveforms occupying a radio bandwidth of 20 or 25 kHz and a maximum user data rate of 76.8 or 96 kbps. The STANAG 4691 waveform is used in a TDMA systems, together with the MARLIN Network Controller as specified in STANAG 4691 Annex A. The MARLIN Network Controller is provided in the *RC10*, and implements an *ad hoc routing and relaying protocol* for Extended Line-Of-Sight (ELOS) (via a 2 or 3 hop MANET) over UHF communications channels.

A *RapidM* proprietary VHF waveform offers user data rates up to 128 kbps in a 24 kHz bandwidth.

V/UHF Data Modem

The *RM10* offers standards-based UHF data modems as specified in the NATO STANAG 4691 Annex B, providing user data rates between 12k8 bps and 96 kbps in a 25 kHz bandwidth. These waveforms have been extended to also support legacy V/UHF radios that only provide a 20 kHz audio interface. The system is used for both broadcast and Automatic Repeat reQuest (ARQ) TDMA-based operation.

The S4691-B is an AUTOBAUD (self-identifying) waveform family. Four block interleavings lengths of 20 ms, 80 ms, 320 ms and 1.28 s are provided. The FEC is based on a full-tail-biting constraint length 9 convolutional code.

S4691-B, DATA RATES [BPS]							
BW	Mod	64-QAM	32-QAM	16-QAM	16-QAM	8-PSK	Q-PSK
25 kHz		96 000	80 000	64 000	48 000	32 000	16 000
20 kHz*		76 800	64 000	51 200	38 400	25 600	12 800

* Extension of standard implementation.

The *RM10*'s low data rates (non-QAM) are suitable for use with a non-linear power amplifier (PA). Higher rates require a linear PA or can work with wideband FM or AM radios. The Ultra Short interleaver is intended for IP traffic and Medium is for video streaming; Long is for high-capacity data traffic at low vehicle speeds (slow fading channels).

Integration with the RC10 MARLIN Node Controller

A typical UHF LOS node consists of a *RC10* STANAG 4691 MARLIN Node Controller and a *RM10* V/UHF Data Modem, with optional link encryption between the controller and the modem. The modem audio output is connected to a radio (half or full duplex) forming a single frequency network. Normally an IP router is connected to the node controller, enabling local area networks (LANs) to be interconnected via the *RC10* Node Controller.

Single nodes, typically deployed on ships, may connect to the network given that they utilize the same operation frequency, parameter set and encryption.

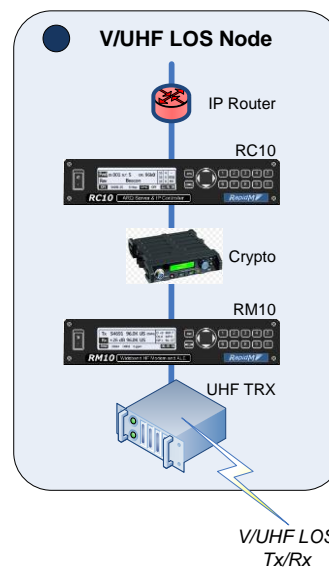
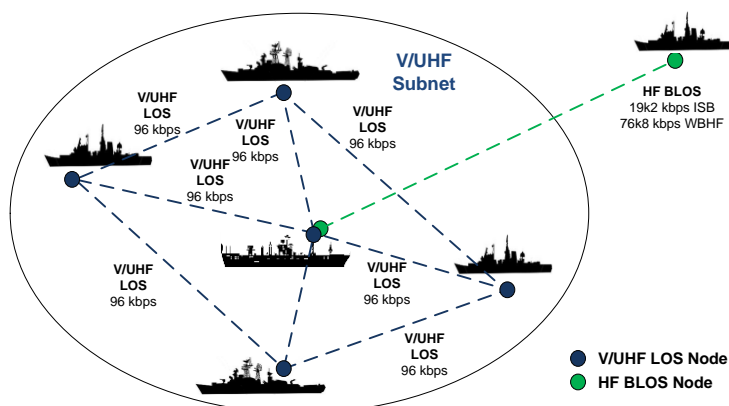


Figure 1: V/UHF LOS & HF BLOS Network (top). V/UHF Node (bottom)

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

INTERFACES	
DTE (DATA) PORT (DB25F)	RS-422 balanced, RS-423, RS-232 unbalanced., MIL-STD-188-114 (interoperable), EIA 530A compliant Half & Full Duplex operation, Synchronous, Standard and High-speed Async modes
REMOTE CONTROL/ GPS PORT (DE9M)	Remote Control Pins: RS-422 balanced or RS-232 Protocol: Control Protocol (RAP1 + RIPC, ASCII S5066 Annex E) External GPS Control Pins: RS-232 (nominally input) Data Rate: 300 to 19200 bps, 1/2 stop bits, 7/8 bit data. PPS line: RS 232/422 (NMEA) or TTL
GPS	Built-in GPS receiver: Time reference for 2G ALE Linking protection (AL-2).
ETHERNET CTRL PORT (RJ45)	Remote Control: 10/100 Base T (IEEE 802.3U compatible), embedded TCP/IP Stack Protocol: Control Protocol (RAP1 + RIPC)
ETHERNET DATA PORT (RJ45)	IP Packet Data: 10/100 Base T (IEEE 802.3U compatible), embedded TCP/IP Stack Protocol: Raw IP packet data, requires 3G ALE
ETHERNET AUX LAN PORT (RJ45)	IP Packet Data: 10/100 Base T (IEEE 802.3U compatible), embedded TCP/IP Stack Reserved for Radio over IP (RoIP)
USER INTERFACE	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
RADIO CONTROL & AUDIO PORTS (DB25M)	Radio Control Pins (2 channels): RS-232, up to 115200 bps, 1/2 stop bits, 7/8 bit data Supports for various radio control protocols are built-in.
	Input Audio (2 channels): 600 Ohm balanced, -20 to +10 dBm without adjustment Output Audio (2 channels): Balanced, -40 to +10 dBm adjustable into 600 ohm load Keyline: Non-polarized contact closure (<45 V, 200 mA). PTT Sense Input: Pull to ground to indicate external PTT.
	Aux Audio Pins: Connection of microphone for ALE voice calling Input Audio: 600 ohm balanced, -20 to +10 dBm without adjustment or MIC input (selectable) Output Audio: Balanced, -40 to +10 dBm adjustable into 600 ohm load
SUPPLY	AC Supply: 90-264 VAC, 40-440 Hz, 2A; 100-370 VDC

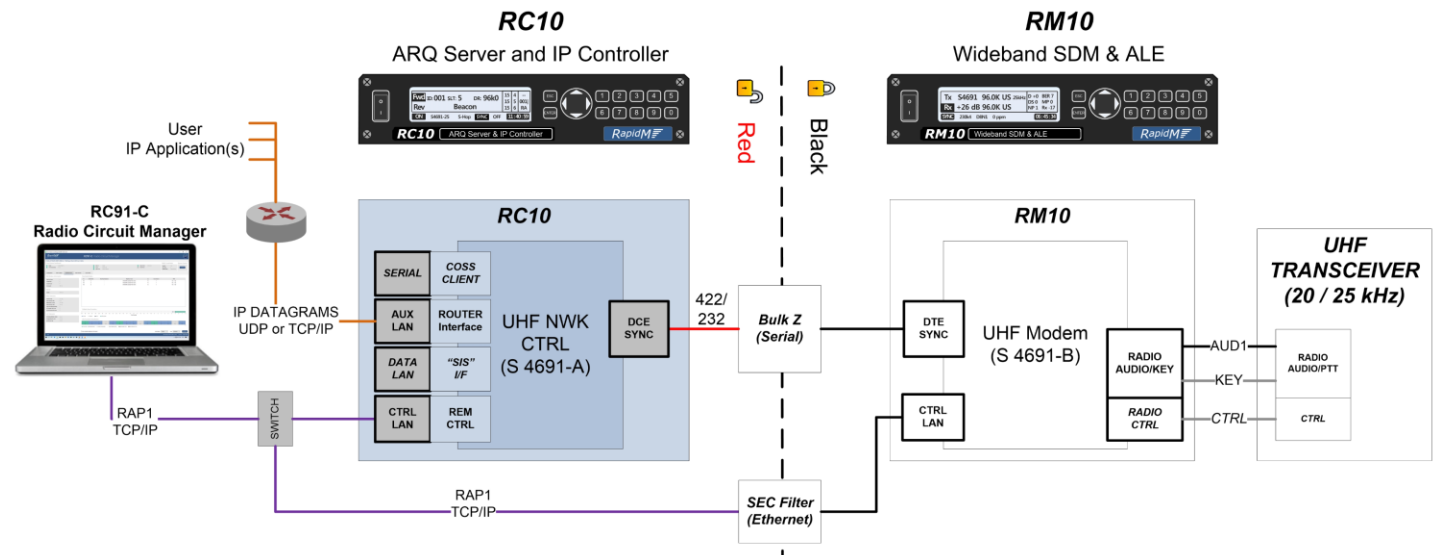


Figure 2: RM10, RC10 & RC91-C Complete Radio Circuits Architecture

RM10 UHF MODEM ORDERING INFORMATION		STOCK NUMBER	DESCRIPTION
UHF	RM10 Wideband SDM - UHF Modem (STANAG 4691-B)	RME-M0-RA-U4V06	SDM: RM10 U4 (UHF 4691-B, 25/20 kHz) V06
OTHER RM10 VARIANTS (DATASHEETS AVAILABLE)		STOCK NUMBER	DESCRIPTION
VHF	RM10 Wideband SDM - VHF Modem RM V6	RME-M0-RA-V6V06	SDM: RM10 V6 (V/UHF 25kHz 128kbps) V06
HF	RM10 Wideband SDM - WBHF Modem (MS-188-110C)	RME-M0-RA-W1V06	SDM: RM10 W1 (110ABC 24kHz 120kbps) V06

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