SWave

VQ1
NODE SECURE WIDEBAND
QUAD CHANNEL RADIO

LEONARDO

The **SWave** Vehicular Quad-channel Type1 (VQ1) radio is an enhanced architecture SDR radio node conceived for mobile military applications where high communications performance, multi-band operation, channel modularity and scalable configurations are essential.

SWave VQ1 can be deployed at any command echelon in a tactical land system, from stationary/mobile command posts down to forward armored AIFV's Combat and Combat Support vehicles. It is a definitive enabler for joint operations of multinational armed forces. Efficient cooperation of coalition forces is enhanced through toplevel flexibility in terms of waveforms, supporting any kind of communication services in the digitized battlefield.

Support for coalition-level owned waveforms such as ESSOR High-Data-Rate (HDR) or S-HCDR in addition to SINCGARS WF and manifold NATO STANAG/MIL-STD ones, makes of the VQ1 the perfect radio to carry out interoperable multinational/coalition missions.

KEY FEATURES

- 2Mhz to 2Ghz (HF/VHF/UHF) 4 channel architecture
- All channels are fully reconfigurable by Software Waveforms
- Simultaneous use (up to 4) of wideband/narrowband data/ IP, CNR-like voice, video communications
- High-Performant Scalable and Modular Architecture
- Seamless interoperability with legacy radios
- Embedded long-haul use in each of the 4 channels

- 125W ancillary Couplifier for HF Band
- Customizable COMSEC security and EPM/ECCM support
- Support for modern networking Mobile Ad-Hoc MANET WFs
- Support for EPM/ECCM WFs
- HF Suite WFs
- Dynamic Gateway Mode
- SCA/ESSOR Architecture compliant.

SWave VQ1 four, fully integrated, transceivers can operate four simultaneous communications in the 2MHz to 2000MHz frequency range in any possible mix being the ultimate constraints dictated by the waveforms' spectrum occupancy and co-located scenarios. This enables optimization of the number of physical radio transceivers onboard the vehicles within a battle group, with considerable savings in all SWaP related aspects.

SWave VQ1 supports the following budget in term of transmitted power dependant by the frequency range

- Up to an output RF power of 50W in V/U 30-512MHz without need of external additional ancillary HPA
- In high UHF range 512MHz to 2000MHz, by external HPA, up to 20W
- In HF range 2MHz to 30 MHz, by external Couplifier,up to 125W.

SWave VQ1 is also suitable for installation in surface vessels, in naval communication domain, and for fixed/ infrastructural use. Compliant with the US JTNC (former JTRS) Software Communications Architecture (SCA) and the extensions of EU ESSOR Consortium, the unit supports wideband IP data or voice, secure CNR voice, video services thus providing interoperability with fielded radios and new C4ISR systems.

The embedded NETSEC module supports COMSEC and TRANSEC mode used in legacy radios; legacy encryption modes supported are: KY-57/VINSON, ANDVT/KYV-5, KG-84C and keyfill modes of DS-101 and DS-102. AES 256 Crypto Engine is also supported with appropriate keys management facilities.

The unit supports the more advanced state-of-the-art Mobile Ad-hoc Network (MANET) waveforms as ESSOR HDR, S-HCDR and SelfNET® family, composed by by EPM/ ECCM EASY II, NarrowBand Adaptive Waveform (NBAW), Soldier Broadband WF (SBW) and the emerging NATO Narrow-band.

The STANAG/MIL-STD Waveform set, as V/UHF VuLOS, Sincgars, STANAG 4246 (HQI/II), and TACSAT DAMA, integrate the supported WF portfolio in favour of an improved experience of the interoperability with the fielded legacy radios. National specific communication custom needs may be successfully hosted by the SCA/ ESSOR architecture as new waveforms thanks to high-computing capabilities of the VQ1 radio transceiver architecture.

Beyond-line-of-sight communications are supported with the external HF Power Amplifier (125W) and antenna coupler functions integrated into the Couplifier® ancillary unit and with a set of deployable HF waveforms inclusive of STANAG 4203 and 3G ALE.

VQ1 takes advantage of the dedicated NMS-2K management suite SW tool, for exploiting its flexible configuration capabilities and versatility to support every fielded scenario
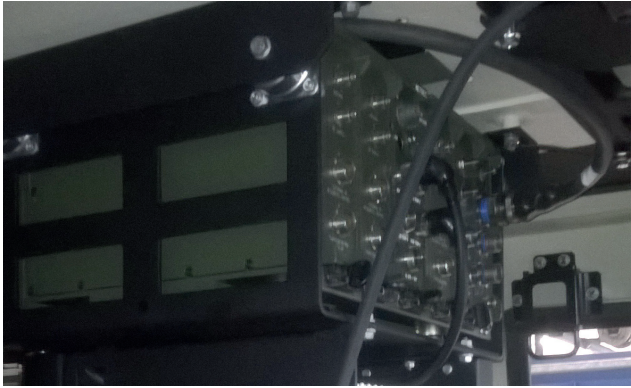
NMS-2K encompasses Services Planning System, to design and configure SDR radio networks, Tactical Network Monitoring and Element Manager Systems, to keep each radio network and its perfomances under control. Key Management System and SDR Filler complete the management toolset. As such, VQ1 may be remotely operated with any kind of terminal via Web interface tool or via SNMP.

CONFIGURATION OPTIONS

SWave VQ1 is highly configurable:

· Mission-based hardware may be provisioned at depot level, dependant by mission planning by choosing the convenient number of needed transceiver units/enabling modems and embedded or external HPAs/Couplifiers

· At WF level, by loading appropriate WFs into each reconfigurable general-purpose SDR transceivers.

An example of considerable configuration is shown below.

· CH1 run BLOS HF suite WF

· CH2 and CH 3 – can run any V/UHF networking MANET Wideband/Narrowband WFs or Ground/G-A-G legacy WFs

· CH4 run TACSAT DAMA WF.

In coherence with antenna system cabling, any channel can be loaded with any of the WFs supported portfolio.

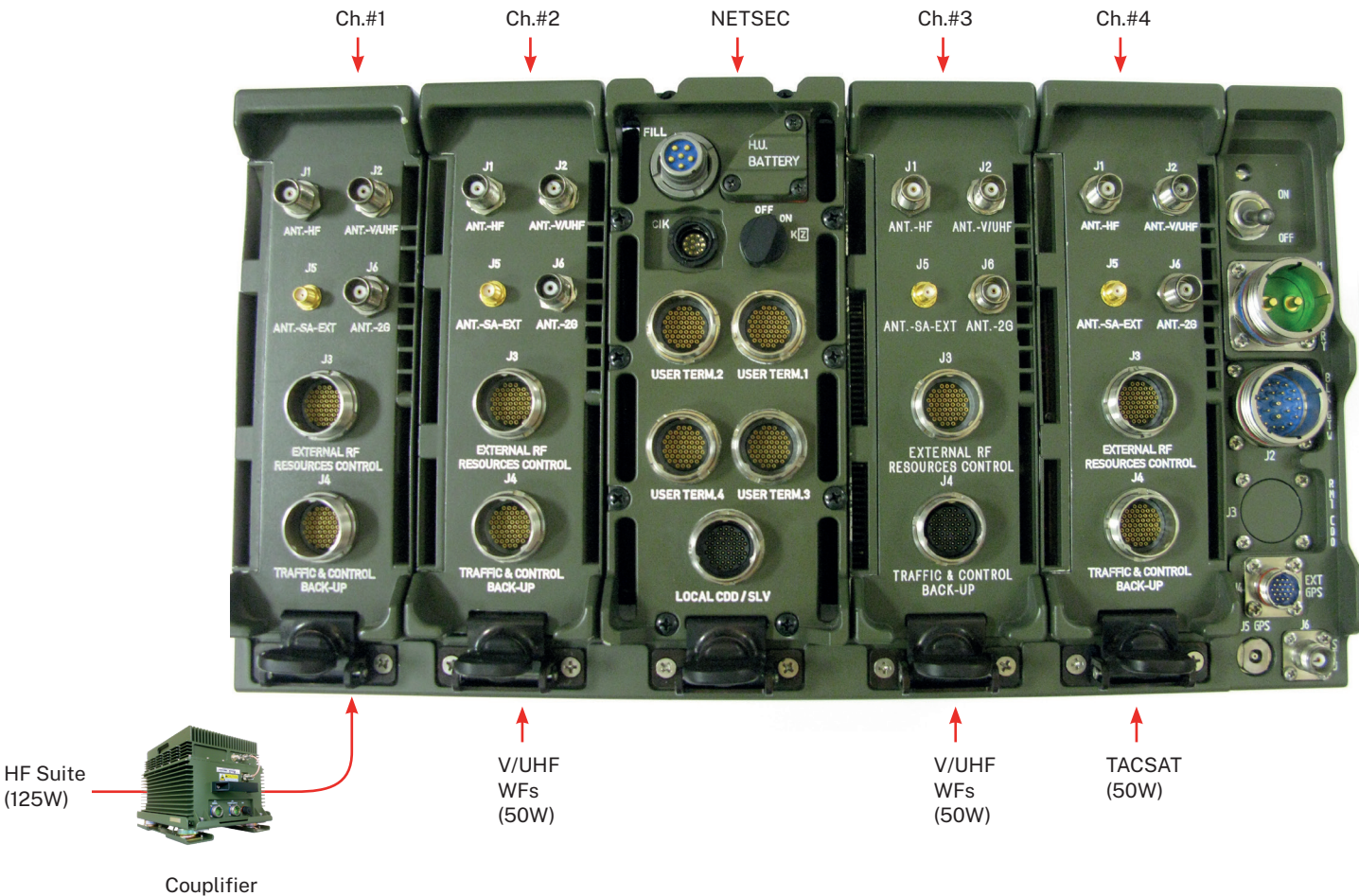**SWave** VQ1 embeds a GPS receiver and may also be connected to an external SAASM GPS.

SWave VQ1 is supplied with User Manuals and SW administration and configuration tools. Other Optional ancillaries/accessories are: a shock mounting base, whips (both VHF, UHF) antenna, wideband antenna, TACSAT antenna and dual-channel stacked UHF antenna.

TECHNICAL DESCRIPTION

GENERAL
- Channels — Four independent, half-duplex or simplex
- Frequency range — 2MHz to 2000MHz
- Channel spacing — HF: n x 3Khz (n=1..8)
  VHF/UHF: NB 8.33kHz, 12.5kHz, 25kHz, up to 100KHz
  WB: up to 5Mhz SATCOM: 5kHz, 25kHz
  High-UHF: Up to 5MHz
- Data rate — Up to 1Mbps (max 5Mbit WF dependent)
- Three RF ports for each channel (HF/V-UHF/High-UHF)
- SDR core software — JTNC SCA 2.2.2
  ESSOR Architecture
- Dynamic gateway mode — Cross-banding/Native IP
  Protocol Stack and routing between channels

PHYSICAL (PER CHANNEL)
- Power output — 125W for HF port with external Couplifier
  50W for 30: 512MHz V/UHF
  20W for High/UHF with ext. High/UHF HPA
- Noise figure (V/U ports) ≤9dB, ≤5dB (243-270MHz TACSAT mode)
- IF rejection (V/U ports) Better than-80dBc @ 10% Fc
- Sensitivity (V/U ports) <-115dBm (NarrowbandFM@10dB SINAD)

Security
- Modes — Four independent secure Embedded COMSEC & TRANSEC capabilities
- Encryption — Customisable COMSEC security
- Cryptographic keys loading By means of Keyfill device into a Removable CIK
- Over-The-Air-Rekeying/Deletion Supported
- Zeroization — Yes

MECHANICAL
- Sizes (W x D x H) — 404mm x 231mm x 382mm
- Weight — ≤45kg (with shock mounting base)

Power supply
- Voltage — 19VDC to 34VDC according to MIL-STD-1275
- Power consumption — 700W (Typical-four channels 50W)

INTERFACE (PER CHANNEL)
- RF antenna ports
- HF (2MHz to 30MHz) N Connector 50 Ohm
- V/UHF (30MHz to 512MHz) N Connector 50 Ohm
- High UHF (512MHz to 2000MHz) N Connector 50 Ohm
- Audio interfaces — Analogue audio ports with dual PTT
- Data interfaces — Data port with a serial (RS-232/RS-422) and Ethernet
- Audio aux — Analogue audio ports with dual PTT
- Expansion port — Control lines for HPA.accessory

INTERFACE (COMMON)
- GPS antenna — SMA Connector, 50 Ohm
- External SAASM GPS port
- Fill/CIK port
- Control interfaces — Ethernet

ENVIRONMENT
- Shock and vibration According to MIL-STD-810F for tracked vehicles, wheeled vehicles
- Immersion — 1m
- EMI/EMC — MIL-STD-461E
- Operating temperature-40°C to +55°C

INSTALLATION
- Wheeled or tracked combat and combat support vehicles tactical logistics platforms ships

SUPPORTED WAVEFORMS
- HF suite — STANAG 4203, STANAG 4285, MIL-STD-188-110B, MIL-STD-188-141B, STANAG 4538, STANAG 5066
- NB — VuLOS V/UHF AM/FM (STANAG 4204/4205)
- Datalink IP — MIL-STD-188-220C
- EPM/ECCM — SINCGARS, HQ I/II (STANAG 4246), SelfNET® EASY II
- TACSAT — SAMA/DAMA (MIL-STD-188-181A, MIL-STD 188-182A,MILSTD-188-183, MIL-STD-188-184)
- WB MANET — ESSOR HDR, S-HCDR, SelfNET® Networking SBW(Soldier Broadband Waveform)
- NB MANET — SelfNET® Narrow Band Adaptive WF (NBAW), NATO Narrow Band WF (NBWF)

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