MESIT

GROUP OMNIPOL

DICOM®RF40 radio system

WF40 Wideband MANET Waveform

WF40 is a MANET-type waveform (Mobile Ad-hoc Network), which is a communication network consisting of mobile nodes with an automatic ability to self-organize into a network with a dynamically changing topology. The user is not required to pre-configure any communication topology or to specify any central or rebroadcasting nodes. The network function does not depend on any external synchronization source (GNSS receiver), but, if available, it can use this information for increased robustness and speed, especially at the entry of nodes into the network (connection of split networks).

The WF40 is capable of operating over the entire range of operating frequencies, i.e. from 30 MHz to 512 MHz. It uses a 250 kHz radio channel providing sufficient capacity to ensure network management and transmission of voice and data services in C4 networks and, with respect to its economically-chosen channel width, it provides the user with a wide space in the radio frequency spectrum to implement a large number of parallel networks on the battlefield.

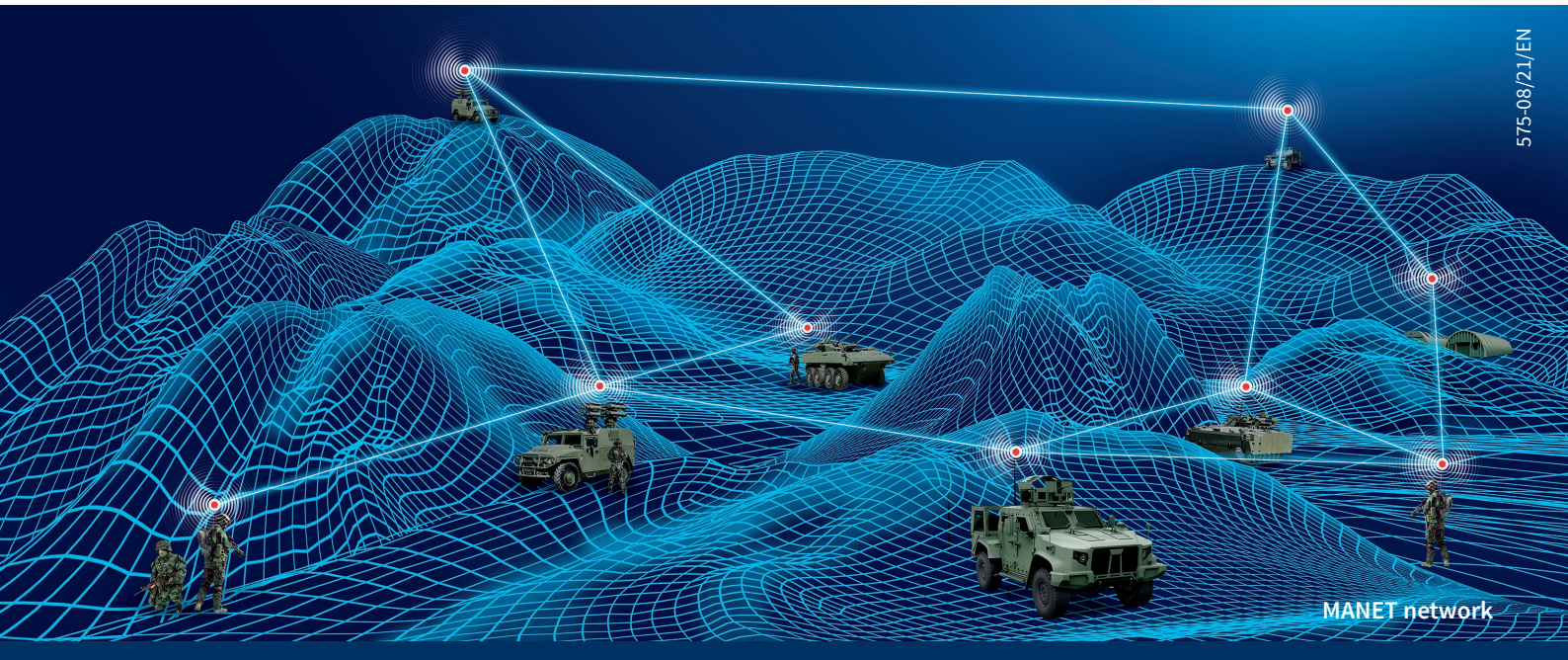
One of the very important features of MANET-type networks is the multi-hop automatic rebroadcasting ability (hop = section with direct radio visibility), i.e. rebroadcasting using other nodes towards target nodes without direct radio visibility with the source node. This significantly increases the resulting real ranges. The WF40 waveform has an automatic rebroadcasting capability for voice (automatic rebroadcasting depth up to 5 hops) as well as data (unlimited hops). With a suitable node topology, vehicular radios can then be connected over tens to hundreds of kilometres!

In one channel with a maximum of 20 participants, voice, PLI (Position Location Information) and data services are transmitted simultaneously in an encrypted manner. Communication security (COMSEC) is implemented on the basis of the AES-256 block cipher. In a WF40 network, two independent half-duplex voice channels are transmitted (dual-PTT), their levels and priorities in the network may be freely configured (broadcast and private circuit, main and sub-network, etc.). Voice transmission utilizes a MELP-type voice encoder with a bit rate of 2.4 kbit/s, which guarantees top quality and high voice intelligibility.

To ensure coverage of larger networks with a higher number of participants, it is possible to easily link individual WF40 networks by interconnecting two radios with one Ethernet cable or use the so called Soldier Mode, which enables coverage of the communication needs of an entire platoon (e.g. 10 nodes platoon + 3 teams of 7 combatants) with one communication network.

The shared transmission capacity usable for user data transmission is 270 kbit/s. The resulting network throughput is then heavily dependent on the number of nodes and current topology. Additionally, the network supports an adaptive data rate selection mechanism with three rates that are automatically selected according to the current connection quality and maintain data connectivity even at the radio range limit. Data transmission is IP-based and supports UDP as well as TCP/IP transmissions. The data network can be configured as Level 3 with routing in each radio node. The network can also transmit high-compression low-resolution video streams (typically at 128 kbit/s).

Radios in the MANET network transmit service packets that carry information about the current network status and topology. These service transmissions also include information about the geographic locations of individual radios (from internal GNSS receivers), which are aggregated in individual nodes and can be sent as an IP packet to a connected data terminal with BMS for visualisation on maps. The advantage is that this functionality does not require any additional load of the network with information and thus does not reduce user data transmission capacity, as it is part of the service overhead of the waveform.



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