dPMR - Digital Mobile Radio
Advanced Protocols

dPMR Overview

The standard decoding software W-CODE includes a new digital mode, dPMR, designed for private land mobile services. In the ever ongoing effort to squeeze more capacity out of a finite resource, the electro-magnetic spectrum, a new digital standard, digital Private Mobile Radio (dPMR) is emerging.

Whereas the older analogue PMR (Private Mobile Radio) requires 25 kHz channels or for newer systems 12.5 kHz, dPMR offers two discrete frequency channels within 12.5 kHz (FDMA -- Frequency Division Multiple Access). dPMR offers both voice and data communications.

dPMR Architecture

dPMR is an open ETSI standard published in TS 102 490 (license-free) and TS 102 658 (licensed). TS 102 490 covers license-free hand portable equipment operating in peer-to-peer mode. The radios should have an integral antenna and are limited in their output power. The standard is also known as dPMR446. Equipment complying with TS 102 658 uses the same air interface technology as dPMR446 without the limitations of its license-free counterpart.

It supports different levels of functionality as listed below:
♦ Mode 1: Peer-to-peer direct mode (communication without infrastructure)
♦ Mode 2: Centralized repeater network
♦ Mode 3: Managed centralized repeater network (trunking)

dPMR uses 4FSK modulation at a rate of 2400 symbols/second where the dibits mapped to +1050 Hz, +350 Hz, -350 Hz and -1050 Hz deviations of the carrier in relation to the center frequency.
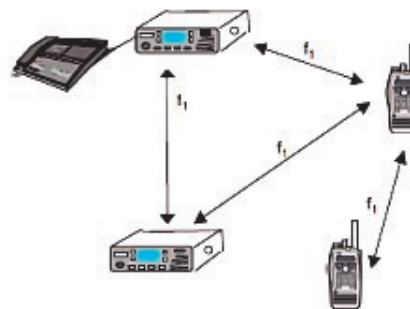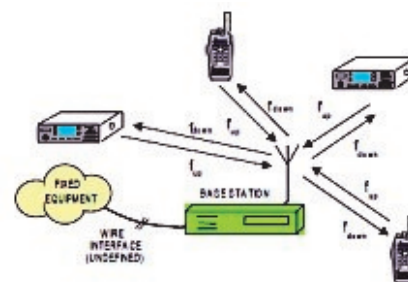

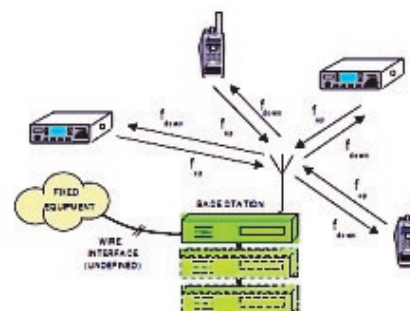
Fig. 1 dPMR Mode 1

Fig. 2 dPMR Mode 2

Fig. 3 dPMR Mode 3

dPMR Protocol stack

The dPMR protocol stack is shown in fig.4. The air interface physical layer is responsible for
- modulation and demodulation
- transmitter and receiver switching
- HF characteristics
- bits and symbol definition
- frequency and symbol synchronization
- burst building

The data link layer main functions are
- channel coding (FEC, CRC) acknowledgement mechanisms
- interleaving
- media access control

- link addressing
- interfacing of voice
- data bearer services

The third layer is the call control layer in the control plane which provides
- base station activation and deactivation
- call setup, maintenance and tear-down
- destination addressing
- built-in services (pre-emption, emergency signaling, etc.)
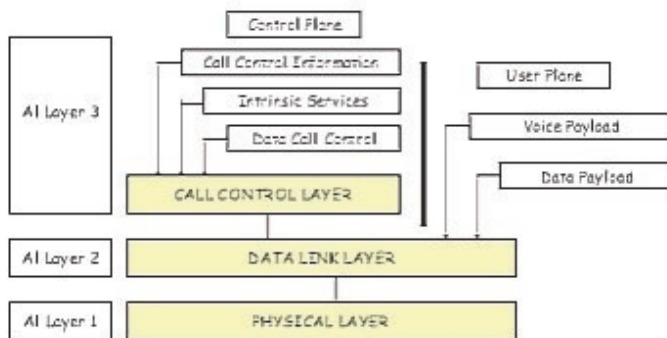- data call control
- announcement signaling

Fig. 4 dPMR Protocol stack

dPMR Frame structure

According to TS 102 658 a dPMR traffic channel contains four different frame types: Payload, Message, End and Packet Data Header frames, see fig.5.
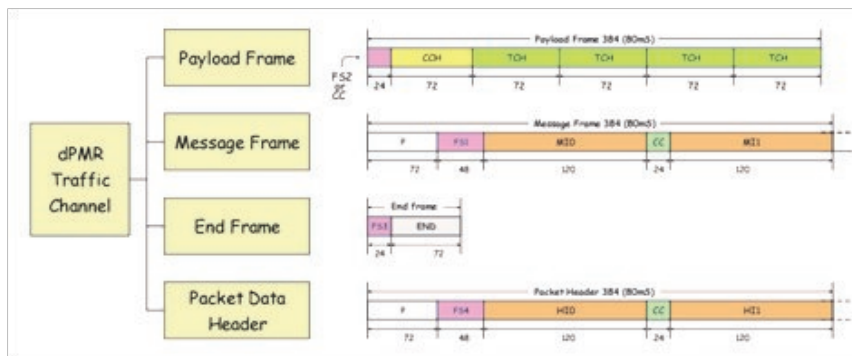

Fig. 5 dPMR Frame Structures

Transmissions start with a Communication_Start Header frame followed by an integral number of super frames each containing four payload-data or voice frames. The super frames (fig.6) also contain sufficient information for late entry. A series of super frames is terminated by an End Frame as shown in fig. 6. Fig. 7 Shows Voice or Data Payload continuous transmission and Fig. 8 the dPMR call protocol.
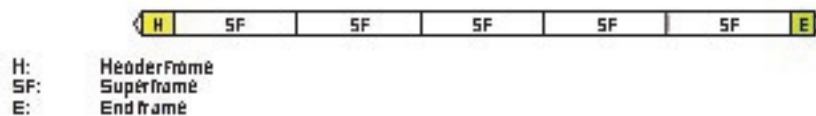

Fig. 6 Super frame Structure

H: Header Frame
SF: Super frame
E: End frame

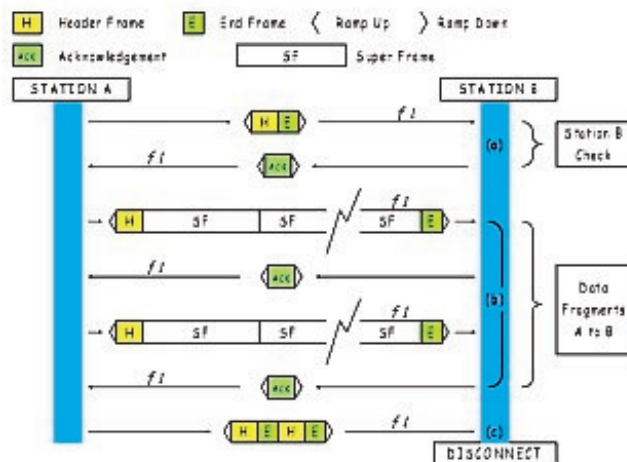*Fig. 7 Voice or Data Payload continuous transmission*

Fig. 8 dPMR call protocol

The communication mode field in the header frames or CCH (Control Channel) defines the type of payload data as shown in table on right side. For data communication type 3 (packet data) a different frame format is employed.

Voice communications (no user data in SLD field)
Voice + slow data (user data in SLD field)
Data communication type 1 (Payload is user data without FEC)
Data communication type 2 (Payload is user data with FEC)
Data communication type 3 (Packer data, ARQ method)
Voice and attached data (Type 2)

The dPMR devices are divided into two groups according their functionality: Initial Mode devices support the services in Table 2. They can only make a group call and have simplified 8-bit addresses called the Common ID (group ID). The common ID can be considered similar to the CTCSS/DTCS signaling used in analogue private mobile radio. The second group of devices (Configured Mode) offer advanced functionality including individual calls and use 24 bit addresses.

Bearer services	Tele-services	Supplementary services
Voice		Late Entry
		All Call
	Group Call	PTT Call
		Slow user data
		Talking Party Identification
Type 2 data	IP over dPMR	-
		Status Message
	Group Short Data Message	Precoded Message
		Free Text Message
		Short file transfer
Type 1 data	IP over dPMR	-
		Status Message
	Group Short Data Message	Precoded Message
		Free Text Message
		Short file transfer

Table 2

The current version of the W-CODE dPMR software supports Modes 1 and 2 as well as the li-cense-free dPMR446 mode. The voice calls, called party checks (ringer) and the status messages are decoded. Data Calls are not implemented in the current ver-sion. Below is a screenshot of a dPMR session.
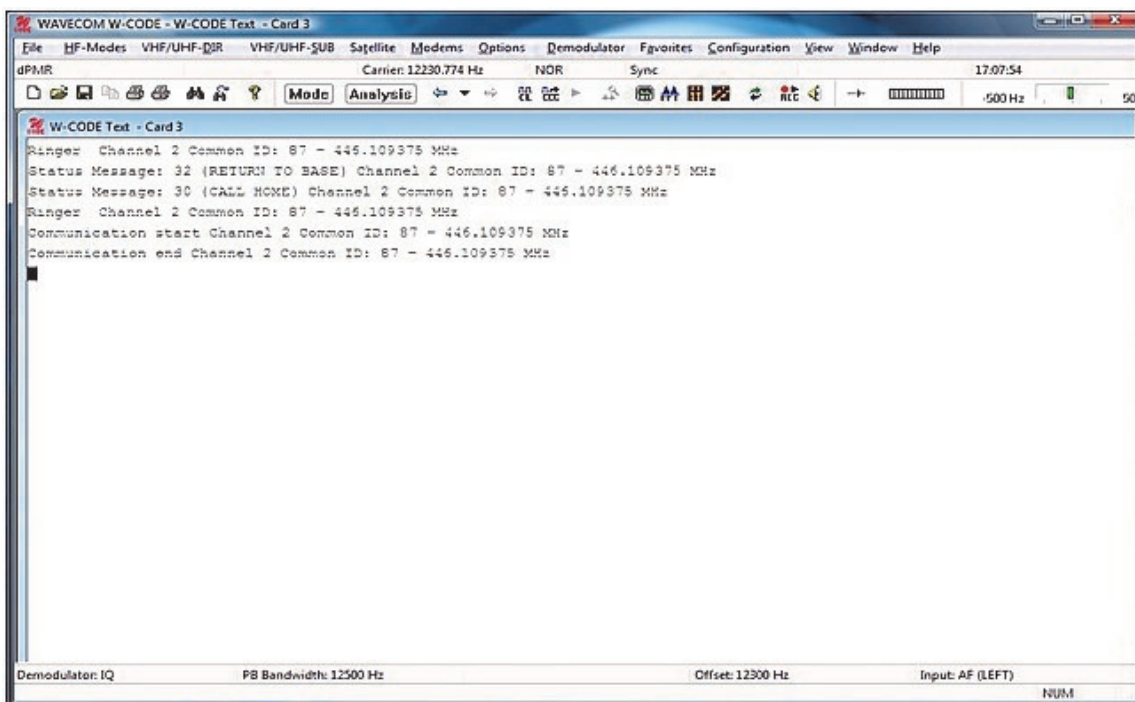
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Since more than thirty years Wavecom Elektronik AG has developed, manufactured and distributed high quality devices and software for the decoding and retrieval of information from wireless data communication in all frequency bands. The nature of the data communication may be arbitrary, but commonly contains text, images and voice. The company is internationally established within this industry and maintains a longstanding, world-wide network of distributors and business partners.

Product Information

Products	http://www.wavecom.ch/product-summary.php
Datasheets	http://www.wavecom.ch/brochures.php
Specifications	http://www.wavecom.ch/product-specifications.php
Documentation	http://www.wavecom.ch/manuals.php
Online help	http://www.wavecom.ch/content/ext/DecoderOnlineHelp/default.htm
Software warranty	One year free releases and bug fixes, update by DVD
Hardware warranty	Two years hardware warranty
Prices	http://www.wavecom.ch/contact-us.php

System Requirements

	Minimum	Recommended
CPU	Core i5 or Core i7 2.8 GHz	Core i7-6700 3.4 GHz
Memory	4 - 8 GB RAM	16 - 32 GB RAM
OS	Windows 7	Windows 10 32-bit or 64-bit

Distributors and Regional Contacts

You will find a list of distributors and regional contacts at http://www.wavecom.ch/distributors.php

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