Wireless M-Bus for 169 MHz, updates in EN13757-4

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Introduction

The Wireless M-Bus standard (actually a European *Norm*, EN 13757-4) is a wireless communication protocol that was developed for the reading of electricity, gas-, water-, heat-meters and heat allocators. It has gradually been extended as new frequency bands and technologies have become available. The mode N ("Narrowband") was added when the 169 MHz band was opened for license free use for utility meter reading. This was added in the 2013 revision of the standard.

A new major addition and revision of the EN 13757-4 standard related to mode N was done in the 2019 release. This Application Note gives an overview of the M-Bus standard documents and summarizes the main changes in this new release of part -4.

Radiocrafts is taking active part in the standardization work at CEN, contributing with technical expertise in the working groups writing the standard documents based on extensive experience in radio communication, and being a leading supplier of Wireless M-Bus modules.

Using a ready-made RF module such as those offered by Radiocrafts, ensures standard compliance, and a much lower R&D cost and shorter time to market when developing new products required to meet the standard. The modules are also tested for CE compliance further simplifying the end-product qualification.

The M-Bus standard overview

Wireless M-Bus has its root in the wired M-Bus user group that was very active in the 90's. Initially they created the wired M-Bus standard for meter reading. Later that standard became part of the European standard EN1434 for reading heat energy meters.

The M-Bus specification was later enhanced, and *Wireless* M-Bus was introduced. This standardization work was transferred to CEN, technical committee TC294, that created the new European standard EN 13757 "Communication system for meters and remote reading of meters". This standard currently (as of June 2020) consists of:

- EN13757-1:2014 Data exchange
- EN13757-2:2018 Wired M-Bus communication
- EN13757-3:2018 Application protocols
- EN13757-4:2019 Wireless M-Bus communication
- EN13757-5:2015 Wireless M-bus relaying
- EN13757-6:2015 Local Bus
- EN13757-7:2018 Transport and security services

As seen, the part -4 introduced wireless meter reading that will be discussed in this document. Wireless M-Bus is a radio and data link specification. The transport, security and application layers for M-Bus are specified in EN 13757-3 and EN13757-7.

To get all the details, you need to buy the standard documents. It is widely available online from the national standardization organizations.

Wireless M-Bus mode N

Wireless M-Bus mode N was added in the 2013 edition of the standard. Mode N offer a narrowband radio solution at 169 MHz. A low data rate (2.4 kbps) in a narrow radio channel (12.5 kHz) make it possible to get very good sensitivity in the radio receiver. Up to 500 mW radiation power is allowed in this frequency

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band, further contributing to the achievable range. And finally, the rather low radio frequency compared to the other modes (433 and 868 MHz) gives better penetration into buildings, basements, and pits. This make the mode N the best solution to communicate with utility meters that are very often installed in these “hard to reach” places.

The original standard specified
- 6 channels of 12.5 kHz (2.4 or 4.8 kbps)
- 3 channels of 25 kHz (reserved)
- 1 channel of 50 kHz (19.2 kbps)

in the 169.400 to 169.475 MHz band.

The new edition of the standard has added more channels and data rates, as discussed below.

The Wireless M-Bus mode N has also been the basis for the Wize protocol, specified by the Wize Alliance. Some changes and additions in the Wize protocol specification has also been reflected in the new edition of the standard.

The new EN13757-4:2019

Since 2013 some new frequency bands have been opened for license free use, close to the original band at 169.4 MHz. These bands are now used to increase the number of available radio channels, increasing the capacity. Note however, the limited duty-cycle allowed in these new bands.

Sub-band A: 169.400 – 169.475 MHz (the original band, max 500 mW)
Sub-band B: 169.475 – 169.4875 MHz (max 10 mW, 0.1% duty cycle)
Sub-band C: 169.4875 – 169.5875 MHz (max 10 mW, 0.001% duty cycle)
Sub-band D: 169.5875 – 169.8125 MHz (max 10 mW, 0.1% duty cycle)

A new data rate of 6.4 kbps using 4-GFSK modulation is added to be used in sub-bands A, C and D within 12.5 kHz channels. This will increase the spectrum efficiency in terms of bit/s per Hz of bandwidth. The higher data rate also shorten the transmission which helps reduce the power consumption.

The 25 kHz channels that were reserved are no longer used. But four new 50 kHz channels are added in the new sub-band D to provide the highest data rate of 19.2 kbps.

To keep the current consumption of the device as low as possible, Wireless M-Bus make two-way communication possible by having a short listening window just after the meter transmission. The time between transmission and this listening window is called the *response delay*. A new response delay of 5 seconds has now been added, in addition to the “fast” and “slow” originally defined. The fast was 100 ms, and the slow was 1.1 or 2.1 seconds depending on the data rate used. However, as even 2 seconds could be a challenge for preparing a message to be sent from the gateway to the meter, especially in the case where one gateway serves thousands of meters, the timing was increased to 5 seconds. This is the “extended” response delay, also being the default if no Extended Link Layer (ELL) is used. Otherwise the ELL will specify which response delay to use.

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Wireless M-Bus modules

Radiocrafts offer a range of products that are compliant with the Wireless M-Bus standard mode N, and now being updated to meet the new EN 13757-4:2019. This includes:

RC1701HP-MBUS4
RC1701HP-MSM

Also the Wize module based on Wireless M-Bus mode N are available with the features of the new standard:

RC1701HP-WIZE

All modules are supported by Development Kits for easy test, evaluation, prototyping and application development. More information, Data Sheets and User Manuals are available on www.radiocrafts.com

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Document Revision History

Document Revision	Changes
1.0	First release

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