**IEEE P802.19**

**Wireless Coexistence**

|  |  |  |
| --- | --- | --- |
| Project | IEEE P802.19 Wireless Coexistence WG | |
| Title | **Proposed Draft Text on ETIS TS 103 357 Section** | |
| Date Submitted | September 19, 2025 | |
| Source | Joerg Robert (FAU Erlangen-Nuernberg/Fraunhofer IIS) | E-mail: joerg.robert@ieee.org |
| Re: |  | |
| Abstract | This submission presents proposed text for P802.19.3a. | |
| Purpose | To review and discuss TOC items in preparing the Draft. | |
| Notice | This document has been prepared to assist the IEEE P802.19. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve(s) the right to add, amend or withdraw material contained herein. | |
| Release | The contributor acknowledges and accepts that this contribution becomes the property of IEEE and may be made publicly available by IEEE P802.19. | |

***TG3a editor: Please change the text in the complete document as follows:***

4.7 ETSI TS 103 357

This subclause overviews sub-1 GHz frequency band technologies described in the ETSI Technical Specification TS 103 357 [B8], which defines the radio interface for three different Low Throughput Networks (LTN): clause 5 defines the “Lfour family,” clause 6 the “Telegram splitting ultra narrow band (TS-UNB) family,” and clause 7 the “Dynamic Downlink Ultra Narrow Band (DD-UNB) family.” These three radio interfaces are three different systems that address different LPWAN scenarios and are summarized in 4.7.1 to 4.7.3.

4.7.1 Lfour family

The Lfour family only offers uplink communication and no downlink is defined. The uplink uses chirp modulated BPSK or BPSK and the occupied bandwidth ranges between 50 kHz and 160 kHz. The maximum coupling loss (MCL), that is the maximum attenuation between transmitter and receiver, is between 150 dB and 155 dB. The reception network consists of base stations in a star or extended star topology. Lfour may use auxiliary time synchronization methods like the Global Positioning System (GPS) for reduced base station complexity.

The forward error correction employs a rate 1/4 low density parity check (LDPC) code, which is identical to the IEEE 802.15.4 LECIM FSK Split Mode LDPC code. Additionally, packets may be transmitted multiple times with the possibility to coherently add the multiple transmissions in the receiver.

4.7.2 Telegram splitting ultra narrow band (TS-UNB) family

The TS-UNB family offers bidirectional and unidirectional communication. The modulation uses minimum shift keying (MSK) with a symbol rate of 2.3 kS/s. For improved robustness, TS-UNB uses frequency hopping, resulting in a typical effective bandwidth of 100 kHz (standard mode) or 725 kHz (wide mode). The MCL is between 153 dB and 164 dB on the uplink and 161 dB on the downlink. TS-UNB supports a star or extended star network topology.

The forward error correction is similar to the encoding of IEEE Std 802.15.4 LECIM FSK Split Mode. It uses a rate 1/3 convolutional code and spreads the encoded data on several radio bursts, which are then transmitted on different frequencies. This offers the benefit that the data of multiple radio bursts may be lost without significantly degrading the decoding performance.

In ETSI Technical Specification TS 103 357-2 [Reference TS 103 357-2 V2.1.1], the functionality of the TS-UNB family has been further extended. The specification introduces additional operational modes that support higher bit rates and reduced transmission latencies.

4.7.3 Dynamic Downlink Ultra Narrow Band (DD-UNB) family

The DD-UNB family only supports bidirectional communication, that is all endpoints have to support bidirectional communication. The modulation uses binary FSK with a symbol rate of 500 S/s with a Bose–Chaudhuri–Hocquenghem (BCH) forward error correction. Frequency hopping is used to improve the robustness. The specification does not define the MCL, but according to the data rate it will be in the order of 150 dB. The DD-UNB family supports a star or extended star topology. Furthermore, orphan endpoints can be connected using a relay link through another endpoint to improve coverage.

***TG3a editor: Please add the following reference to the bibliography:***

[TS 103 357-2 V2.1.1] ETSI TS 103 357-2 (2024), Short Range Devices; Low Throughput Networks (LTN); Protocols for radio interface A; Part 2: TS-UNB protocol