REGIONAL PARAMETERS

V1.2

Version	Modifications	Date
1.0	Initial version (included in LAN Protocol Specification v1.0)	22/09/2017
1.1	Separate document for regional parameters	28/08/2018
1,2	Addition of LD1200 & LD2400 modulations	03/06/2025

Summary

This document outlines the regional parameters of the physical layer of the Wize LAN protocol (i.e. those related to the frequency band). The LAN network designates the medium range radio network between the devices and the gateways.

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Contributors

See document [R1]

1 Introduction

This document describes the Wize LAN Regional Parameters. For each region and frequency scheme in which Wize is used, this document provides characteristics description and specification of the physical layers, including frequency channels, physical link parameters, data encoding & preambles and specific parameters.

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2 Reference documents

2.1 Applicable standards

See document [R1]

2.2 Main specifications

Reference	Document	Version
R[1]	WIZE - 01 LAN Protocol	V1.5
R[2]	WIZE - 03 Common Application Layers	V1.3

3 Wize regional parameters list

The following regional parameters have been defined for use of Wize, provided with their common reference name:

Common reference name	Region(s) of use	Frequency bands and key characteristics
EU169	Europe	169MHz ISM band with modulations as defined by EN13757-4

(others bands are under investigation and would be added on request, please contact the Wize alliance)

4 EU169 regional parameters

These regional parameters are used by Wize for the LAN interface in Europe is the 169 MHz band. It is a license-free ISM band at the European level, usable with duty cycles up to 10% for tracking and remote device reading applications as per recommendation REC/ERC/70-03 (annex 2)..

4.1 Physical layers

While using EU169 regional parameters, three different physical layers are supported on the LAN interface:

Physical layer	Description	Specification
PHY-WM2400	Physical layer using mode EN13757-4 N2 at 2400bps	see 4.3.2
PHY-WM4800	Physical layer using mode EN13757-4 N2 at 4800bps	see 4.3.3
PHY-WM6400	High speed specific physical layer for very densely populated zones, using mode EN13757-4, N2 at 6400bps	see 4.3.4
PHY-LD1200	High performance physical layer for ultra deep indoor devices, using LDPC encoding and a 1200bps effective bit rate	see 4.5
PHY-LD2400	High performance physical layer for deep indoor devices, using LDPC encoding and a 2400bps effective bit rate	see 4.6

Table 1 : Physical layers

4.2 Frequency channels

As per standard EN13757-4 (mode N2), this frequency band is divided into 6 channels, each 12.5 KHz wide.

In compliance with EN13757-4 and in order to optimise engineering and network capacity, the Wize LAN protocol allows the free use of one or more of the various physical layers in each frequency channel. Similarly, for two-way exchanges (N2 mode, COMMAND/RESPONSE flows), the modulation used in the downlink direction by Wize protocol may be different from that used in the uplink direction

	Central frequency (MHz)	Channel spacing (KHz)	Flow (kbps) and modulation	Central frequency tolerance	Max Tx Power	Duty cycle
	169.406250 169.418750 169.431250	12.5	Any	1.5	500 mW	10%

	169.456250
	169.468750

Figure 1 : Physical layer/channel allocations

The equipment hardware (device and LAN modem) must at least be compatible with the use of:

- the three physical modulations PHY_WM2400, PHY_WM4800 and PHY_WM6400 in the uplink direction;
- the two physical modulations PHY_WM2400 and PHY_WM4800 in the downlink direction

This applies to each of the 6 channels.

In addition, the support of the two high performance physical modulations PHY_LD1200 and PHY_LD2400 could optionally be supported by devices and gateways.
i
Note: as per regulations, this frequency band must be used according to a cyclical transmission ratio of 10% (duty cycle): all equipment transmitting on this band can transmit at most 6 minutes every hour. In reality, this only affects the download of software by the gateways, as this limit must be taken into account by the Head-End system for scheduling purposes.

4.3 Detailed specification of the physical layers

4.3.1 Specification of the frequency channels

Communications via the LAN interface take place on six separate frequency channels. Each physical layer can use each of these channels for a specific communication.

The frequency band used is the harmonised band 169.4 MHz to 169.475 MHz. Each of the 6 N_i channels ($1 \leq i \leq 6$) has a width of 12.5KHz and a central frequency equal to:

$$F_i = 169.39375 + i*0.0125 \text{ MHz}$$

Each of the six channels is identified by the following frequency channel number:

Frequency channel number	Central frequency
100	169.406250 MHz
110	169.418750 MHz
120	169.431250 MHz
130	169.443750 MHz
140	169.456250 MHz
150	169.468750 MHz

Table 2 : Channel frequencies

Note: The other frequency channel number values are reserved for future extensions.

Central frequency accuracy must be guaranteed by design for the gateway + device assembly according to the specified tolerance of +/-1.5KHz required for the WM-4800 mode, which is the most restrictive (see 4.24.2), i.e. +/-8.8ppm.

To reduce the cost of the devices, the readjustment of the central frequency via a downlink command is possible in order to compensate oscillator long-term drifts (quartz ageing) and to allevіate long-term stability requirements for central frequency.

4.3.2 PHY-WM2400 physical layer

The PHY-WM2400 physical layer is strictly identical to the physical layer specified in standard EN13757-4 (EN13757-4) for modes N2 at 2400bps rate, with the adaptation below:

- **DISPENSATION** with respect to standard EN13757-4: the frequency deviation tolerance is +/-0.2% (static) instead of the +/-10% specified in EN13757-4, and the GFSK modulation must be of the continuous phase type as proposed optionaly by EN13757-4, so as to optimise the receiver's achievable performances (modulation index exactly 2.0).

The main characteristics of this modulation are thus as follows:

Parameter	Min	Nominal	Max	Comments
Channel width		12.5KHz		
Central frequency	Cf. paragraph 4.3			Channels 100 to 150
Central freq tolerance	-2KHz		+2KHz	
Modulation		GFSK		Continuous phase
Deviation	-0.2% (*)	+/-2.4KHz	+0.2% (*)	-2.4KHz=0, +2.4KHz=1
Modulation index		2.0		
Filtering index		0.5BT		
Bit rate	-100ppm	2400bps	+100ppm	
Binary encoding		NRZ		MSBs first

Table 3 : Characteristics of the PHY-WM2400 layer

( ) The tolerances indicated are tolerances on static deviations, i.e. for set binary levels, and thus do not affect hardware cost as all current integrated transceivers have numerical modulators. On transitions between two logical states, a difference of 10% maximum with the theoretical GFSK deviation is tolerated.*

As per standard EN13757-4, the physical frame in mode PHY-WM2400 thus consists of a preamble of 16 bits and a synchronisation sequence of 16 bits, followed by an L2 level frame of variable length. The frame format chosen for the LAN protocol is the format B of standard EN13757-4 (only one CRC per frame). The frame header format is thus as follows:

Preamble 16 bits 0101010101010101	Sync word 16 bits 11110110 01110010	L2 Frame

Figure 2 : Format of PHY-WM2400 frames

4.3.3 PHY-WM4800 physical layer

The PHY-WM4800 physical layer is strictly identical to the physical layer specified in standard EN13757-4 for mode N2 and rate of 4800bps, with the specific adaptation below:

- **DISPENSATION** with respect to standard EN13757-4: the frequency deviation tolerance is +/-0.2% (static) instead of the +/-10% as specified in EN13757-4, and the GFSK modulation must be of the continuous phase type as proposed optionaly by EN13757-4,, so as to optimise the receiver's achievable performances (modulation index exactly 1.0). (*)

Commenté [EF1]: Is it a mistake in our spec? Where does the +/-10% comme from?

Commenté [EF2R1]: Same comment in following §

The main characteristics of this modulation are thus as follows:

Parameter	Min	Nominal	Max	Comments
Channel width		12.5KHz		
Central frequency	Cf. paragraph 4.3			Channels 100 to 150
Central freq tolerance	-1.5KHz		+1.5KHz	
Modulation		GFSK		Continuous phase
Deviation	-0.2% (*)	+/-2.4KHz	+0.2% (*)	-2.4KHz=0, +2.4KHz=1
Modulation index		1.0		
Filtering index		0.5BT		
Bit rate	-100ppm	4800bps	+100ppm	
Binary encoding		NRZ		MSBs first

Table 4 : Characteristics of the PHY-WM4800 layer

( ) The tolerances indicated are tolerances on static deviations, i.e. for set binary levels, and thus do not affect hardware cost as all current integrated transceivers have numerical modulators. On transitions between two logical states, a difference of 10% maximum with the theoretical GFSK deviation is tolerated.*

The format of the physical frame in PHY-WM4800 mode is strictly identical to that used for mode PHY_WM2400:

Figure 3 : Format of the PHY-WM4800 frame

4.3.4 PHY-WM6400 physical layer

The PHY-WM6400 physical layer is used to increase channel capacity.It is strictly identical to the physical layer specified in standard EN13757-4 for mode N2 and rate of 6400bps, with the specific adaptation below:

- **DISPENSATION** with respect to standard EN13757-4: the frequency deviation tolerance is +/-0.2% (static) instead of the +/-10% as specified in EN13757-4, and the 4 GFSK modulation must be of the continuous phase type as proposed optionaly by EN13757-4,, so as to optimise the receiver's achievable performances (modulation index exactly 1.0). (*)

Commenté [3]: Table 5 say +/-1% !!

The main characteristics for this physical mode are as follows:

Parameter	Min	Nominal	Max	Comments
Channel width		12.5KHz		
Central frequency	Cf. paragraph 4.3			Channels 100 to 150
Central freq tolerance	-1.5KHz		+1.5KHz	
Modulation		4GFSK		Continuous phase
eviation	1% (*)	-3.2KHz -1.066KHz +1.066KHz +3.2KHz	+1% (*)	-3.2KHz=01 (code A) -1.066KHz=00 (code B) +1.066KHz=10 (code C) +3.2KHz=11 (code D)

Modulation index		1		
Filtering index		0.5BT		
Bit rate	-100ppm	6400bps	+100ppm	
Binary encoding		NRZ		MSBs first

Table 5 : Characteristics of the PHY-WM6400 layer

(*) The tolerances indicated are tolerances on static deviations, i.e. for set binary levels. On transitions between two statuses, a difference of 10% maximum with the theoretical GFSK deviation is tolerated

Commenté [4]: 4GFSK ? No?

The physical frame in PHY-WM6400 mode consists of a preamble of 16 symbols and a synchronisation sequence of 16 symbols, followed by an L2 level frame of variable length:

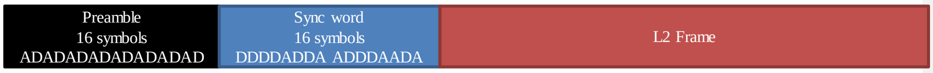

Figure 4: Format of PHY-HWM6400 frames

4.4 L1/L2 parameters for WM2400, WM4800 & WM6400

4.4.1 Physical link parameters

The physical link parameters for EU169 are specified in European norm EN13757-4 section 10.2, which is the reference. For easy reference, here is an extract from this standard (please refer to the official standard for consistency) :

Characteristic	Data rate	Symbol	min.	typ.	max.	Unit	Note
GFSK, deviation (mod. index 2,0)	2,4 kbps		±1,68	±2,4	±3,12	kHz	70–130 % of nominal deviation
GFSK, deviation (mod. index 1,0)	4,8 kbps		±1,68	±2,4	±3,12	kHz	70–130 % of nominal deviation
4GFSK, deviation (mod. index 1,0)	6,4 kbps		±2,24	−3,2, −1,06, +1,06, +3,2	±4,16	kHz	70–130 % of nominal deviation
GFSK/4GFSK relative bandwidth	All	BT		0,5			
Bit/symbol rate tolerance	All				±100	ppm	
Preamble length	All	PL	16		16	bits or symbols	
Synchronization length	All	SL	16		16	bits or symbols	
Postamble (trailer) length	All			0		bits or symbols	
Default response delay	All	t_{RO}	4 997,5	5 000	5 002,5	ms	
Fast response delay (O-2-M)	All	t_{RO}	99,5	100	100,5	ms	
Slow response delay (O-2-M)	4,8 kbps 6,4 kbps 19,2 kbps	t_{RO_slow}	1 099,5 1 099,5 1 099,5	1 100 1 100 1 100	1 100,5 1 100,5 1 100,5	ms	
Slow response delay (O-2-M)	2,4 kbps	t_{RO_slow}	2 099,5	2 100	2 100,5	ms	
Extended response delay (O-2-M)	All	t_{RO_slow}	4 997,5	5 000	5 002,5	ms	
FAC transmission delay		t_{TxD}	N × 1 000 −0,5	N × 1 000	N × 1 000 +0,5	ms	*N* = 5,7 or 13
FAC time out	All	t_{TO}	25		30	s	

Table 6 : EN13757 Mode N, Modulation and timing

4.4.2 Data encoding & preamble

The data encoding and preamble specifications for EU169 standard modulations (WM2400, WM4800 and WM6400) are specified in European norm EN13757-4 section 10.2, which is the reference. For easy reference, here is an extract from this standard (please refer to the official standard for consistency) :

4.4.2.1 Encoding

Data transmitted using GFSK modulation shall be NRZ encoded, with the low frequency corresponding to a binary “0”.

Data transmitted using 4GFSK modulation shall be NRZ encoded, with the lowest frequency corresponding to binary “01” (symbol A), the second frequency corresponding to binary “00” (B), the third frequency corresponding to binary “10” (C) and the highest frequency corresponding to binary “11” (D).

Each data byte shall be transmitted with the most significant bit first.

4.4.2.2 Preamble and synchronization pattern

All transmissions using GFSK shall, where n = 8, be preceded by either;

- n × (01) 11110110 10001101 (frame format A) or,
- n × (01) 11110110 01110010, (frame format B).

All transmissions using 4GFSK shall, where n = 8, be preceded by either;

- n × (AD) DDDDADDA DAAADDAD (frame format A) or,
- n × (AD) DDDDADDA ADDDAADA (frame format B).

NOTE: The first pattern is equivalent to, the bit pattern n × (0111) 1111111101111101 1101010111110111 and the second pattern is equivalent to the bit pattern n × (0111) 1111111101111101 0111111101011101.

All chips of each frame, including pre- and postamble, shall form an uninterrupted sequence.

The decoder may optionally detect that the receiver has captured another transmission, by detecting a new preamble and synchronization pattern in conjunction with an abrupt increase in the received signal strength. In that case, the receiver shall stop the analysis of the current frame and start detecting a new frame. This “capture detect” feature increases the communication capacity of the system in presence of many devices.

4.5 PHY-LD1200 physical layer

In order to allow the development of best-in-class products, the LD1200 physical layer uses a different modulation than the historical EN13757-4 versions. This modulation is specified as follows :

Parameter	Min	Nominal	Max	Comments
Channel width		12.5KHz		
Central frequency	Cf. paragraph 4.3			Channels 100 to 150
Central freq tolerance	-1.5KHz		+1.5KHz	
Modulation		GMSK		Continuous phase
Deviation	-1% (*)	+/-600Hz	+1% (*)	
Modulation index		0,5		Exactly 0.5
Filtering index		0.5BT		
Bit rate		2400bps		Exactly 2 x deviation 2400bps raw PHY rate, giving 1200bps actual data rate plus overhead)
Binary encoding		Differential		MSBs first

Table 7 : LD1200 modulation parameters

Commenté [EF5]: (*) is missing, is 1% the good value or 0.2%?

4.6 PHY-LD2400 physical layer

In order to allow the development of best-in-class products, the LD2400 physical layer uses a different modulation than the historical EN13757-4 versions. This modulation is specified as follows :

Parameter	Min	Nominal	Max	Comments
Channel width		12.5KHz		
Central frequency	Cf. paragraph 4.3			Channels 100 to 150
Central freq tolerance	-1.5KHz		+1.5KHz	
Modulation		GMSK		Continuous phase
Deviation	-1% (*)	+/-1200Hz	+1% (*)	
Modulation index		0,5		Exactly 0.5
Filtering index		0.5BT		
Bit rate		4800bps		Exactly 2 x deviation 4800bps raw PHY rate, giving 2400bps actual data rate plus overhead)
Binary encoding		Differential		MSBs first

Table 8 : LD2400 modulation parameters

4.7 LD1200 & LD2400 frame encoding

In order to allow the development of best-in-class products, the frame encoding for the LD1200 and LD2400 modulations are different from the historical EN13757-4 versions. They are specified here under.

Nota : In order to ease the implementation of the LD1200 & LD2400 frame encoding, a reference C encoding library, LDlib.c, is supplied by the Alliance to Alliance members. This source code should be considered as a golden reference implementation. See document R[1] on Intellectual property rules and library download.

The overall frame encoding for the LD1200 and LD2400 formats is a 7 step process as follows:

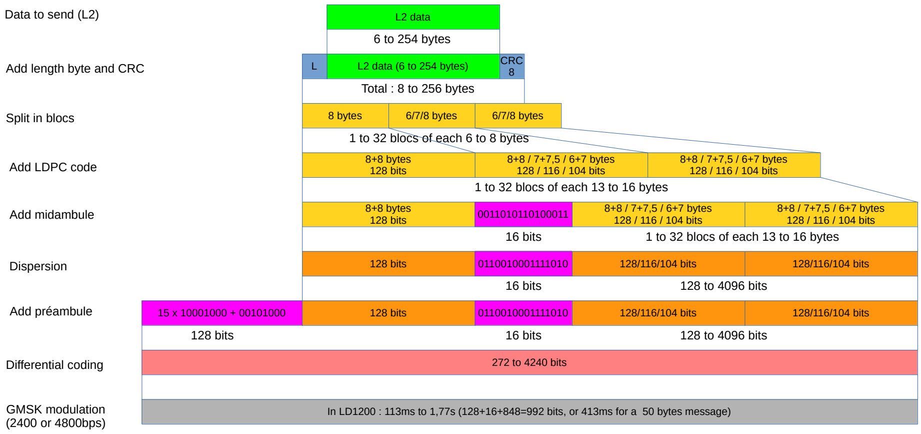

Figure 5 : LD mode encapsulation

The process starts with a L2 frame of 6 to 254 bytes.

Step 1 : Encapsulation

- A PHY-layer length byte is added at the start of the frame (in addition to the higher layer length byte).
- A PHY-layer CRC byte is added at the end of the frame (in addition to the higher layer error detection). This CRC is calculated using the polynomial $x^8+x^7+x^2+x+1$.

Step 2 : Bloc splitting

The resulting 8 to 256 bytes frame is then spited into 1 to 32 blocks of 6 to 8 bytes each. The first block is always 8 bytes, the following are 6, 7 or 8 bytes each. The block splitting rule depending on the input frame length is the following :

Octets										8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Symboles										128	232	232	232	232	232	232	244	256	336	336	336	336	348	360	372	384	440	440	452	464	476	488	500
Bloc # 1										8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Bloc # 2											1	2	3	4	5	6	7	8	5	5	6	6	7	7	8	8	6	6	7	7	7	8	8
Bloc # 3																			4	5	5	6	6	7	7	8	6	6	6	7	7	7	8
Bloc # 4																											5	6	6	6	7	7	7
Bloc # 5																																	
Bloc # 6																																	
Bloc # 7																																	
Bloc # 8																																	

Octets	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64
Symboles	512	556	568	580	592	604	616	628	640	684	696	708	720	732	744	756	768	812	824	836	848	860	872	884	896	940	952	964	976	988	1000	1012	1024
Bloc # 1	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Bloc # 2	8	7	7	7	7	8	8	8	8	7	7	7	8	8	8	8	8	7	7	8	8	8	8	8	8	7	8	8	8	8	8	8	8
Bloc # 3	8	6	7	7	7	7	8	8	8	7	7	7	7	8	8	8	8	7	7	7	8	8	8	8	8	7	7	8	8	8	8	8	8
Bloc # 4	8	6	6	7	7	7	7	8	8	7	7	7	7	7	8	8	8	7	7	7	7	8	8	8	8	7	7	7	8	8	8	8	8
Bloc # 5		6	6	6	7	7	7	7	8	6	7	7	7	7	7	8	8	7	7	7	7	7	8	8	8	7	7	7	7	8	8	8	8
Bloc # 6										6	6	7	7	7	7	7	8	7	7	7	7	7	7	8	8	7	7	7	7	7	8	8	8
Bloc # 7																		6	7	7	7	7	7	7	8	7	7	7	7	7	7	8	8
Bloc # 8																										7	7	7	7	7	7	7	8

Table 9 : LD bloc splitting

If needed, the actual data frame is end-padded by 0x00 bytes to complete the last block if its length is less than 6 bytes.

Step 3 : LDPC coding

Each data block is then encoded using a low-density parity-check code (LDPC), depending on the block length :
- For 8 bytes blocks, a (128, 64) code is used meaning that 8 LDPC bytes are added after the 8 data bytes
- For 7 bytes blocks, a (116, 56) code is used meaning that 7,5 LDPC bytes are added after the 7 data bytes (the last 8 bits are set to 0 and last 4 LDPC bits are not transmitted)
- For 6 bytes blocks, a (104, 48) code is used meaning that 7 LDPC bytes are added after the 6 data bytes (the last 16 bits are set to 0 and last 8 LDPC bits are not transmitted)

The LDPC coding is based on the following constants :

K_{0} = C23CB311712CBD07, K_{1} = 84796623E2587A0F, K_{2} = 08F3CC46C4B1F41E, K_{3} = 11E6988D8963E83D
K_{4} = 23CC311B12C7D07B, K_{5} = 47986236258EA0F7, K_{6} = 8F30C46C4B1C41EF, K_{7} = 1E6188D9963883DE
K_{8} = 3CC211B32C7107BD, K_{9} = 7984236658E20F7A, K_{10} = F30846CCB1C41EF4, K_{11} = E6118D9863893DE8
K_{12} = CC231B31C7127BD0, K_{13} = 984736628E25F7A0, K_{14} = 308F6CC41C4BEF41, K_{15} = 611ED9883896DE83
K_{16} = 2E9BEC1EC284706F, K_{17} = 5D36D83D8509E0DE, K_{18} = BA6CB07B0A13C1BD, K_{19} = 74D960F71426837B
K_{20} = E9B2C1EE284C06F7, K_{21} = D36583DD50980DEE, K_{22} = A6CB07BBA1301BDC, K_{23} = 4D970F76426137B8
K_{24} = 9B2E1EEC84C26F70, K_{25} = 365D3DD80985DEE0, K_{26} = 6CBA7BB0130ABDC1, K_{27} = D974F76026147B83
K_{28} = B2E9EEC14C28F706, K_{29} = 65D3DD839850EE0D, K_{30} = CBA6BB0730A1DC1B, K_{31} = 974D760F6142B837
K_{32} = 857262A3E7D0EF87, K_{33} = 0AE5C546CFA1DF0F, K_{34} = 15CA8A8D9F43BE1F, K_{35} = 2B94151B3E877C3F
K_{36} = 57282A367D0EF87E, K_{37} = AE50546CFA1CF0FD, K_{38} = 5CA1A8D8F439E1FB, K_{39} = B94251B1E873C3F7
K_{40} = 7285A362D0E787EF, K_{41} = E50A46C5A1CF0FDF, K_{42} = CA158D8A439F1FBE, K_{43} = 942B1B15873E3F7C
K_{44} = 2857362A0E7D7EF8, K_{45} = 50AE6C541CFAFDF0, K_{46} = A15CD8A839F4FBE1, K_{47} = 42B9B15173E8F7C3
K_{48} = DAA64ED59472F9F8, K_{49} = B54D9DAA28E5F3F1, K_{50} = 6A9B3B5551CAE7E3, K_{51} = D53676AAA394CFC7
K_{52} = AA6DED5447299F8F, K_{53} = 54DBDAA98E523F1F, K_{54} = A9B6B5531CA57E3E, K_{55} = 536D6AA7394AFC7C
K_{56} = A6DAD54E7294F8F9, K_{57} = 4DB5AA9DE528F1F3, K_{58} = 9B6A553BCA51E3E7, K_{59} = 36D5AA7694A3C7CF
K_{60} = 6DAA54ED29478F9F, K_{61} = DB54A9DA528E1F3F, K_{62} = B6A953B5A51C3E7E, K_{63} = 6D53A76A4A397CFC

Table 10 : LDPC codes

Step 4 : Midamble

A specific 16-bit midamble is added just after the first LDPC-encoded bloc (or at the end of the frame if it has only one block). This midamble is the following bit pattern : 0110010001111010.

Nota : this midamble is used to improve frequency offset correction in particular for very low signal levels, improving the sensitivity at 10% PER up to 0.8dB

Step 5 : Dispersion

The resulting frame, including midamble and data blocks plus their LDPC codes, is then processed through a dispersion algorithm is ordered to provide a mean 50% density of 0 and 1's.

Step 6 : Preamble

A 128-bit preamble is added at the beginning of the frame. This preamble consists of 16 repetitions of the bit pattern 10001000 ($88), with the last 4 bits reversed (10000111), acting as a start of frame delimiter. This dispersion is calculated as a XOR of the input data with the following 4095-bit pseudo periodic sequence :

$\{d_0 d_1 d_2 \ldots d_{11}\} = \{101110010101\}$
$d_k = d_{k-6} \oplus d_{k-8} \oplus d_{k-11} \oplus d_{k-12}$ for $k>12$

Step 7 : Differential coding

The resulting data frame is then transmitted using the LD1200 or LD2400 physical layer modulation as specified above (GMSK, respectively 2400sps or 4800sps giving actual data rates of 1200bps or 2400bps plus overhead).

4.8 DATA LAN parameter dictionary

4.8.1 LAN Parameters

The parameters ID from $08 to $10 included are reserved for PHY layer managements and are then dependant of the regional parameter set. For EU169 regional parameters, the respective coding of PHY layer parameters are the following :

Id	Parameter name	Description	Size (bytes)	Mode	L/R	Coding	Default value
Specified in Common Application Layers & Specific Application Layers index document ([R2])						Specific to EU169 regionalparameters	
08	**RF_UPLINK_CHANNEL**	Frequency channel to be used for all uplink message transmissions	1	R/W	L/R	100, 110, 120, 130, 140, 150. Other : reserved	Cf. WIZE Alliance for allocation (channel 120 preferred as the downlink channel only)
09	**RF_DOWNLINK_CHANNEL**	Frequency channel to be used for all message receptions (except firmware download)	1	R/W	L/R	100, 110, 120, 130, 140, 150. Other : reserved	120
0A	**RF_UPLINK_MOD**	Modulation to be used for all uplink message transmissions	1	R/W	L/R	00 : WM-2400 01 : WM-4800 02 : WM-6400 03 : reserved 04: LD1200 05 : LD-2400 Other : reserved	0
0B	**RF_DOWNLINK_MOD**	Modulation to be used for all message receptions (except firmware download)	1	R/W	L/R	00 : WM-2400 01 : WM-4800 02 : WM-6400 Other : reserved	0
10	**TX_POWER**	Transceiver nominal transmission power	1	R/W	L/R	00 : PMax 01 : PMax-6dB 02 : PMax-12dB Other : reserved	0

Table 11 : PHY parameters dependant on the regional parameters set

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