Bellman & Symfon AB

Document title				Document no.	Revision
Visit 433 Radio description and calculation for Canada				**Visit433_001DSP**	**002**
Issued by	Date	Approved by:	Date:	Info class:	
Stefan Lundgren	2006-06-28		-	**Strictly confidential**	

File name: g:\alla\avd800\re810_utveckling\05_bv433\visit433_north america\visit433_001dsp002_visit433 description and caluclation for canada.doc

REVISION	DATE	PARAGRAPHS CHANGED	SIGN.
001A	2006-06-16	Initial version	Slu
002	2006-06-28	Calculation changed to worst case	Slu

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1 Visit 433 Radio interface

1.1 General

The wireless communication shall use the 433 MHz SRD radio spectrum according to CEPT ERC recommendation 70-03E.

1.2 Frequency band

Carrier frequency shall be 433.92 MHz ($\pm$ 200 kHz).

1.3 Modulation

Baud rate is approximately 333.34 bit/s.

On-Off Keying shall be used for modulation, where carrier present = "1", no carrier = "0".

1.4 Frame format

Data is transferred in a frame-format beginning with a back-off time of 12 bits, a reference bit (1/3 bit length) and 12 information bits.

The information bits represents 8 address-bits and 4 data bits, where the address corresponds to the selected channel and the 4 data bits holds information about that kind of alarm event that has occurred.

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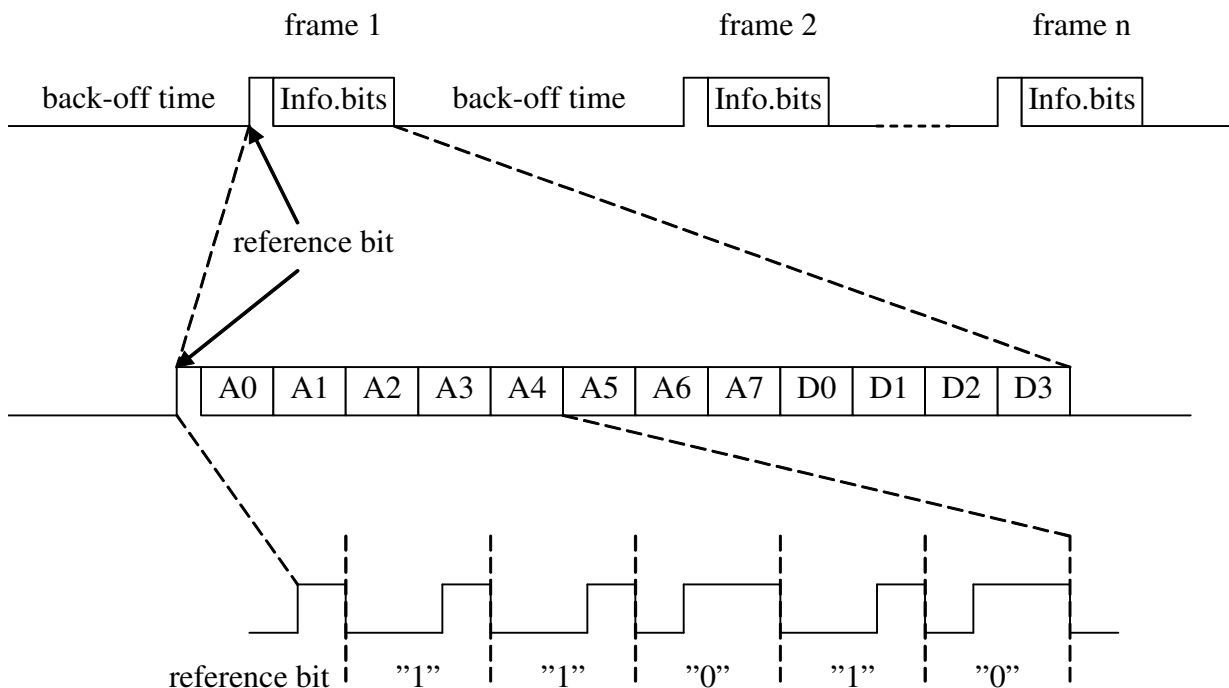

Figure 1: Visit frame format

The information bits are encoded using two different pulse-widths for representation of "1" and "0". The reference bit must be used as a timing reference, in order to decide the logical level of the received bits. The length of the reference bit is measured and a constant is added to achieve a threshold time. A measured pulse of the information bits that is longer than the threshold is considered a logical "0" and a shorter pulse is considered logical "1".

An alarm event will repeat transmit frames for a minimum of 1.3 s. The back-off time between frames should be at least the pilot time, which is 36 ms (12 bits).

The receiver expects no transmission for approximately 4-6ms (depending on product) before the reference bit is measured. At least 3 identical frames must be received before an alarm event is triggered in the receiver.

1.5 Output power calculation

According to RSS-210e table 4 the upper allowed limit to transmit is 10972uV/m measured with an average method meter. Since Visit433 System is using On-Off keying modulation technique it is not possible to use the average method directly. Therefore, according to NEMKO, the radio power level is measured with peak measurement method and then calculated with the formula: 20*log(on time in 100ms/100ms). The Visit433 system message is designed with a back-off time, radio message, back-off time, radio message for about 1.3 seconds. The bit time is 3ms.

1. Message 1:

    a. Reference bit: 1/3 bit time   1/3*3=   1ms

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    b. 12 bits with max on time of 2/3 bit time   2/3*12*3= 24ms

Total on 1:   25ms

2. Message 2: Length 100ms-37ms(message 1)-36ms(back-off time)=27ms

25ms*27/37   18.24ms

Total on 2:   18.24ms

Total on time/100ms 43.24ms

Peak value: 20*log(43.24ms/100ms)= -7.28db higher than 10972uV/m which gives 25367uV/m at 3m.