Project: IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs)

Submission Title: [Preamble, SFD design and Korea Bands for IEEE802.15.4k DSSS PHY]
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Re: []
Abstract: [A PHY Proposal for Low Energy Critical Infrastructure Networks Applications]

Purpose: [To be considered in IEEE 802.15.4k]

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Outline

- Korean Bands
- Preamble and SFD Design
- OVSF Code Generator

Korean 900Mhz Band

- Korean Band: 917.1 Mhz -923.5MHz

According to, W=(1+β) x Rc , where β=1 ,and with SF: 32(15dB) -16384(42dB)

CS (KHz)	Channelization Formula	No. of Possible Channels	Chip Rate (KHz)	Possible Data Rate (bps)
200	917.1+(n-1)*0.2	32	100	6.1 - 3125
400	917.1+(n-1)*0.4	16	200	12.2 - 6250
600	917.5+(n-1)*0.6	10	300	18.3 - 9375
800	917.1+(n-1)*0.8	8	400	24.4 - 12500
1000	917.5+(n-1)*1.0	6	500	30.5 - 15625
2000	917.5+(n-1)*2.0	3	1000	61.0 - 31250

CS- Chanel spacing

Korean 900Mhz Band

- To be included in TG4k draft

PHY (MHz)	Frequency Band (MHz)	Region/Availability	Chip rate (kchip/s)	Modulation
917	917.1-923.5	South Korea	100	BPSK/O-QPSK
			200	BPSK/O-QPSK
			500	BPSK/O-QPSK
			1000	BPSK/O-QPSK

Korean 900Mhz Band

- The channel numbering and spacing for the 917 MHz South Korea band (917.1 – 923.5 MHz) is as follows:
- For 32 channels,

$$917.1+(n-1)\times 0.2MHz$$ where, n=1,2,3…..,32

- For 16 channels,

$$917.1+(n-1)\times 0.4MHz$$ where, n=1,2,3…..,16

- For 6 channels,

$$917.1+(n-1)\times 1.0MHz$$ where, n=1,2,3…..,6

- For 3 channels,

$$917.1+(n-1)\times 2.0MHz$$ where, n=1,2,3

Preamble and SFD Design

- A 32 bits preamble is shown below,

P=[1010 1010 1010 1010 1010 1010 1010 1011]

- A 8 bits SFD is as follows,

SFD=[1010 1011]

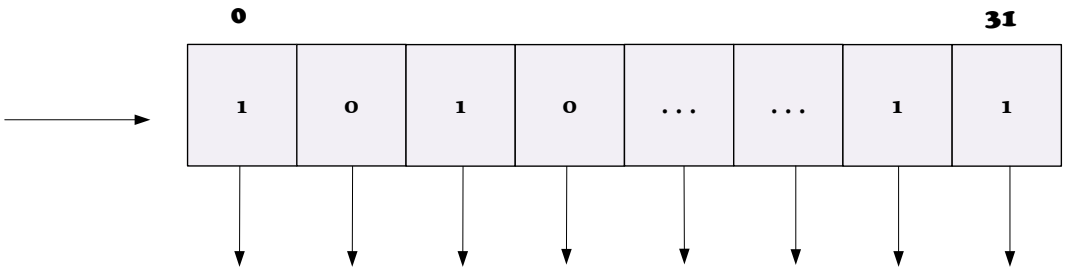
The End

Thank You

Supplements

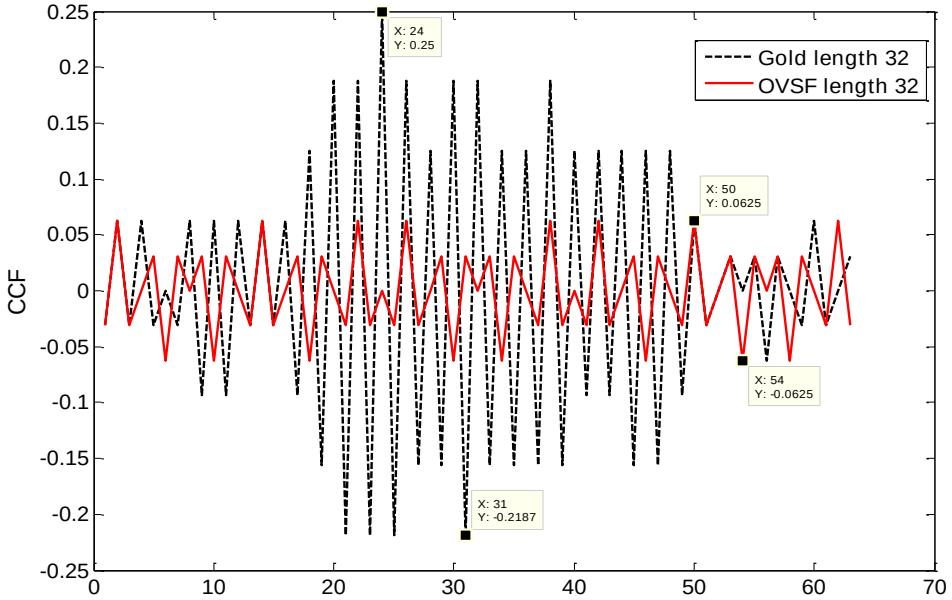
The Cross Correlation of Preamble

- CCF properties of a given fixed Code with Gold code and OVSF code
- The given a fixed ID code with length 32 is as follows,



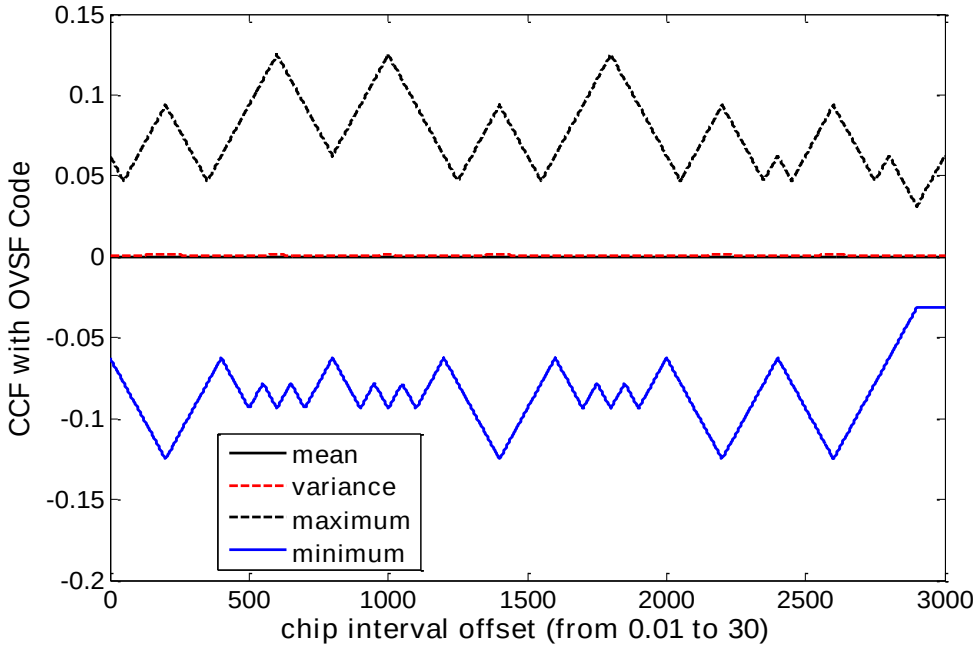
CCF under Perfect Synchronization

- The CCF properties of the fixed ID code with Gold code and OVSF code under perfect synchronization are shown



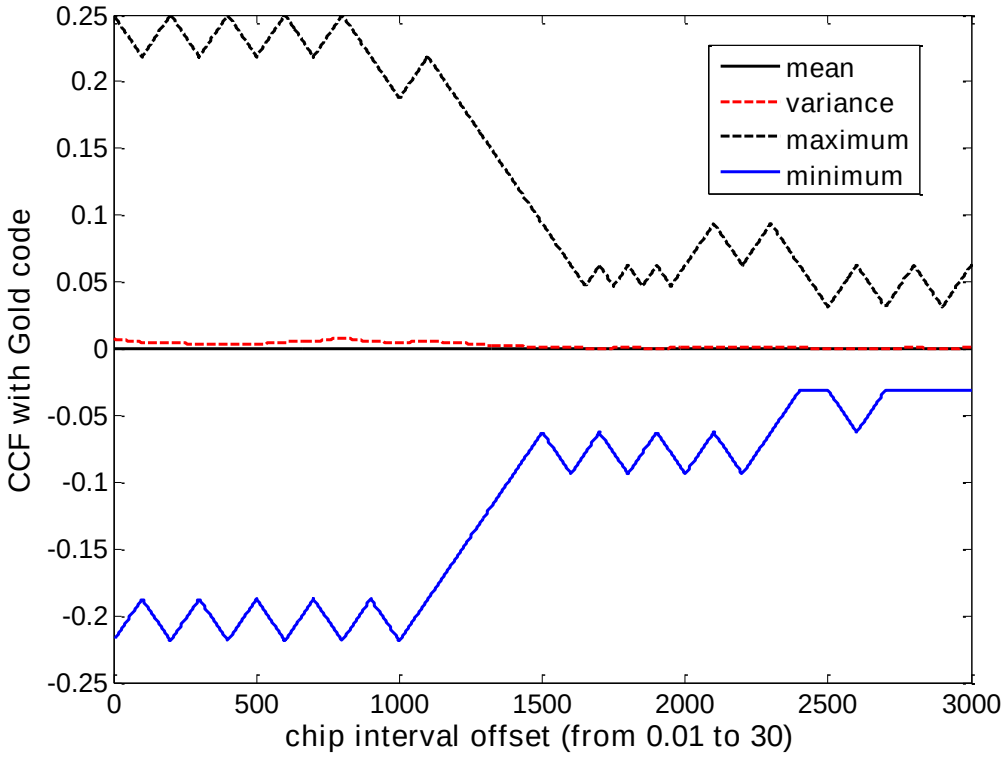
CCF under Imperfect Synchronization

- The CCF properties of the fixed ID code with OVSF code under imperfect synchronization is shown,



CCF under Imperfect Synchronization

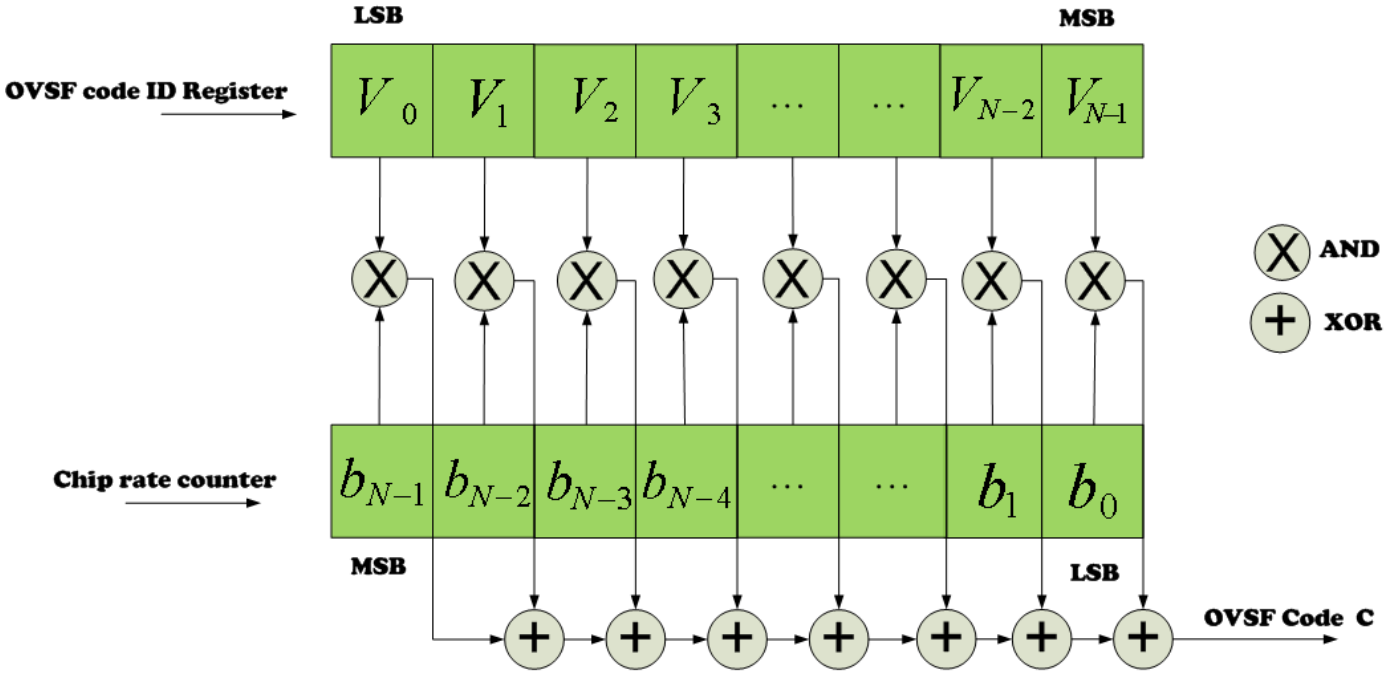
- The CCF properties of the fixed ID code with OVSF code and Gold code under imperfect synchronization are shown,



- It is seen that the cross correlation values of the fixed ID code with the OVSF code are smaller than that of the fixed ID code with the Gold code in perfect synchronization conditions.
- We can also conclude the cross correlation values of the fixed ID code with the Gold code and OVSF code are stable in imperfect synchronization conditions.

OVSF Code generator

The logic level architecture of an OVSF code generator is shown in following figure:



There are two inputs for OVSF code generator :

- an OVSF code ID Register
- a chip rate counter

OVSF Code generator

The least significant bit (LSB) of the counter enables the most significant bit (MSB) of OVSF code ID register to be included in the XOR operation.

The MSB of the counter controls the LSB of OVSF code ID register.

Finally, the generated OVSF code with various SF is along the OVSF code tree shown as