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

Submission Title: [Continuous Spectrum (CS) UWB signal]

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Abstract: [Continuous Spectrum (CS) UWB signal is presented.]

Purpose: [To forward the discussion within 15.4a group]

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Soft-Spectrum Adaptation UWB waveforms

➢ Design a proper pulse waveform with high frequency efficiency corresponding to any frequency mask.

➢ Adjust transmitted signal's spectra in flexible so as to minimize interference with coexisting systems.
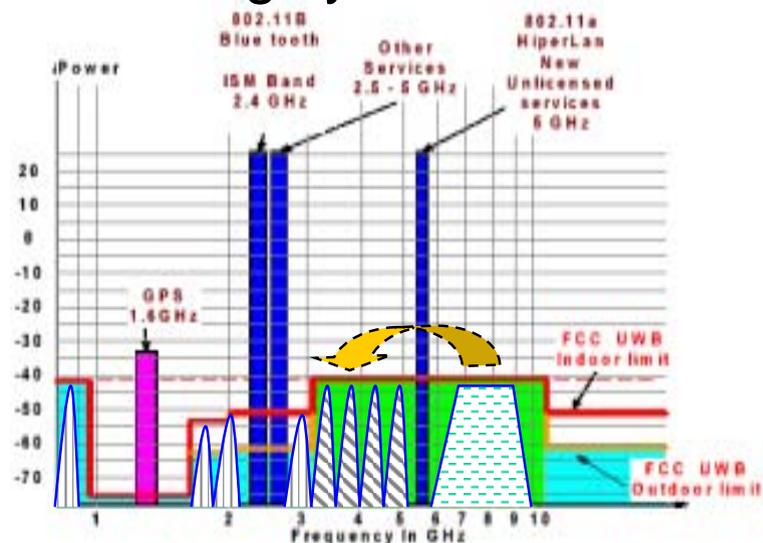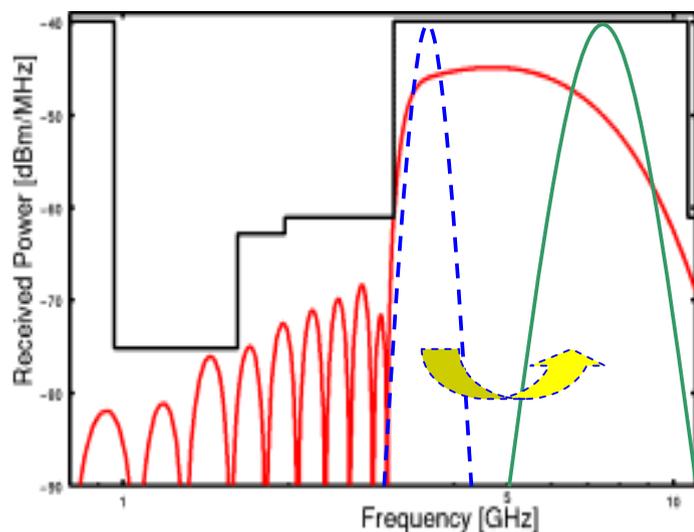

Soft-Spectrum Adaptation (SSA)

Continuous spectrum (CS) UWB signal

e.g.,

group delay

1nsec/1GHz

frequency

Gaussian
BW = 500MHz

| Pulse shaping |

LO

CS FILTER

GA

~2nsec

B_{10dB}=500MHz

~2.5nsec

B_{10dB}=500MHz
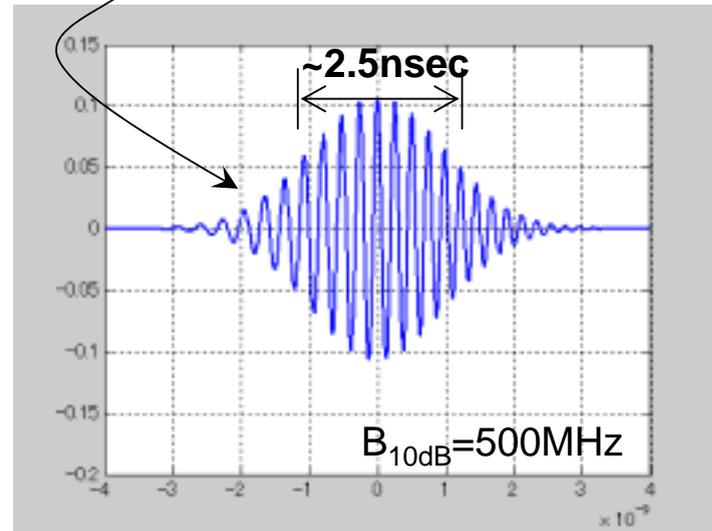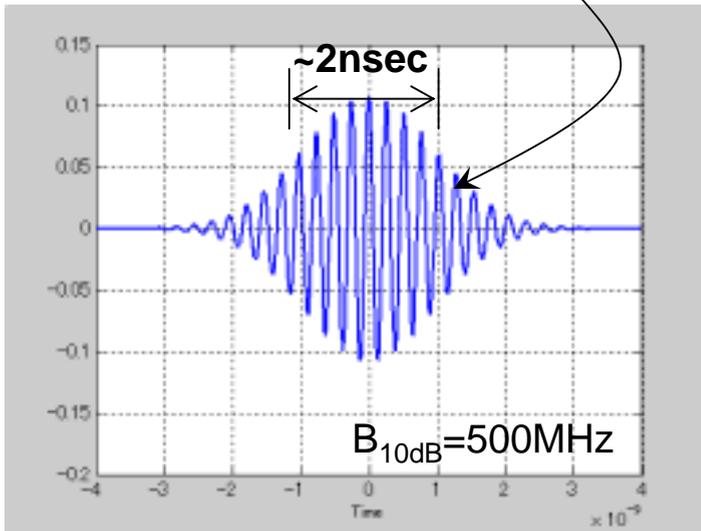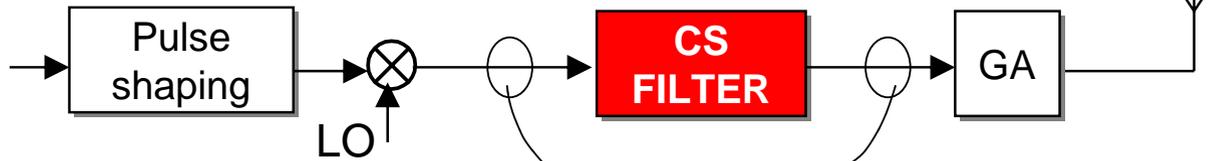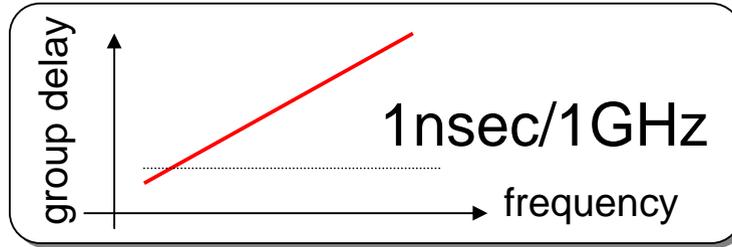
What is the difference between input signal and output signal ?

Only the time-frequency distribution of signal energy is different

Gaussian waveform

time

input

frequency

CS FILTER

CS waveform

time

output

frequency

Ordinary chirp

~2nsec

~2.5nsec

>10nsec

CS: Continuous Spectrum

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Inverse CS filter

e.g.,

Pre-Select Filter

LNA

INVERSE CS FILTER

detection

CS waveform

~2nsec

B_{10dB}=500MHz
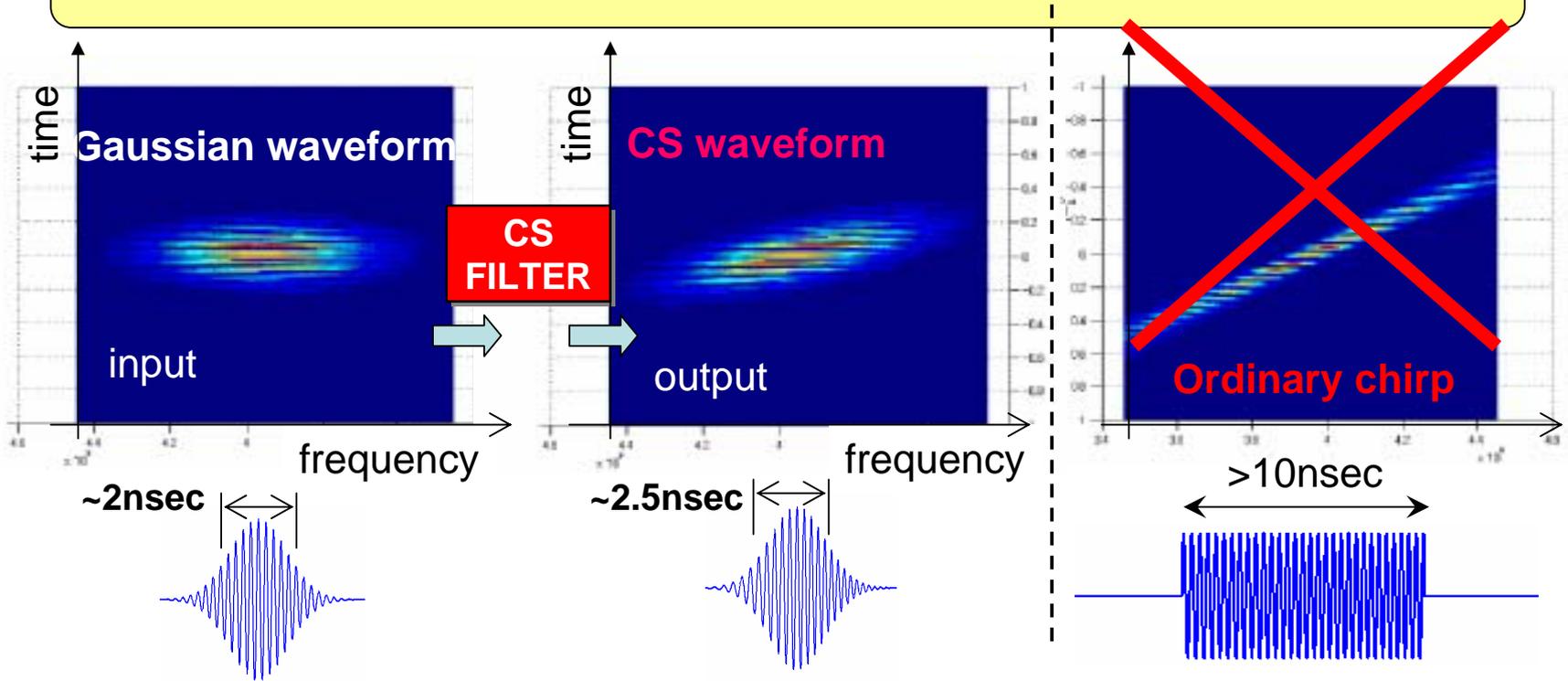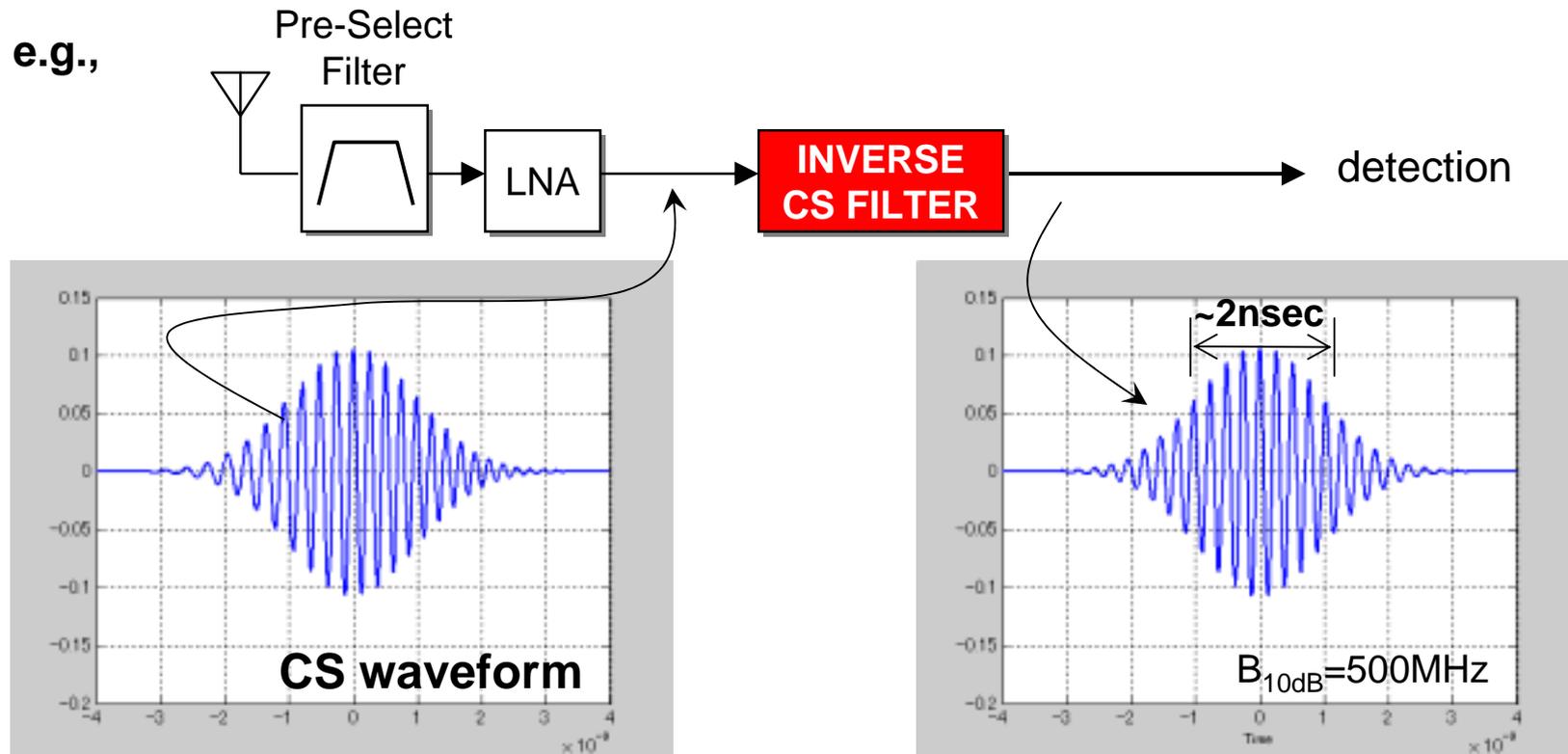
CS waveform is inversed to the input signal before the CS filter at TX

Simulation Results

- **SOP performance** (The allowable minimum distance for PER=10^{-2})

1. DS-UWB (Gaussian, coherent detection, d_ref=15m)

	Co-channel (CM1)	Co-channel (CM5)	Adjacent Ch. (2SOPs, CM1)	Adjacent Ch. (2SOPs, CM5)
d_int [m]	8.3	9.0	12.4	9.8

2. CS-UWB (coherent detection, d_ref=15m)

	Co-channel (CM1)	Co-channel (CM5)	Adjacent Ch. (2SOPs, CM1)	Adjacent Ch. (2SOPs, CM5)
d_int [m]	**7.4**	**8.4**	**7.9**	**5.5**

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Concluding remarks

- Continuous Spectrum UWB
  - CS UWB signal is generated by a CS filter
  - **The difference between input and output signal of CS filter is only the time-frequency distribution of signal energy.**
  - **The time-frequency distribution of CS signal is different from that of ordinary chirp signals.**

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