IEEE 802.16m Sounding Channel Design Proposal

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Venue:

TGm – Call for comments on 16m DL-MIMO rapporteur group draft : C80216m-08_657r2.pdf

Abstract:

Proposal for 16m sounding channel

Purpose:

Adoption of proposed text/content for 802.16m System Description Document

Sounding Channel Design

❑ Sounding symbol (current WiMAX)

  ▪ Cell-edge users have noisy sounding

❑ Sounding channel distributed over an UL subframe

  ▪ Sounding channel spans over 1 subframe (6 symbols)

  ▪ Same overhead as sounding symbol in WiMAX

  ▪ Cell-edge users can use 6x power compared to sounding symbol

  ▪ Better inter-cell interference control (by cell-specific permutation)

Example Design

UL Sounding CH

DL$_7$	DL$_8$	DL$_9$	DL$_{10}$	DL$_{11}$	UL$_1$	UL$_2$	UL$_3$

UL$_3$ pilots ■

UL$_3$ data □

Cell-specific sounding pattern

BS1

UL$_1$, UL$_2$, UL$_4$ (Edge users)

can use ~6x power for sounding
(compared to sounding symbol)

□ UL$_1$ sounding

□ UL$_2$ sounding

□ UL$_4$ sounding

BS2

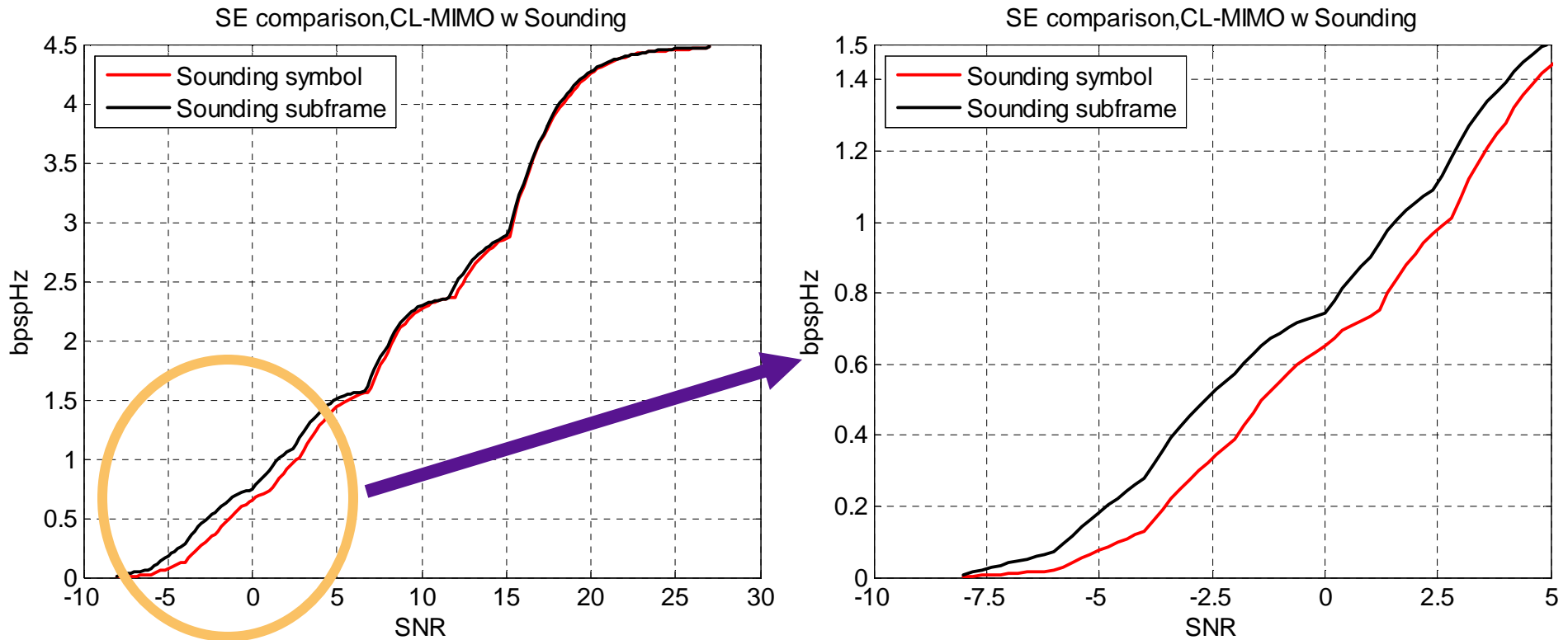| DL$_{12}$	DL$_{13}$	DL$_{14}$	DL$_{15}$	DL$_{16}$	UL$_4$	UL$_5$	UL$_6$
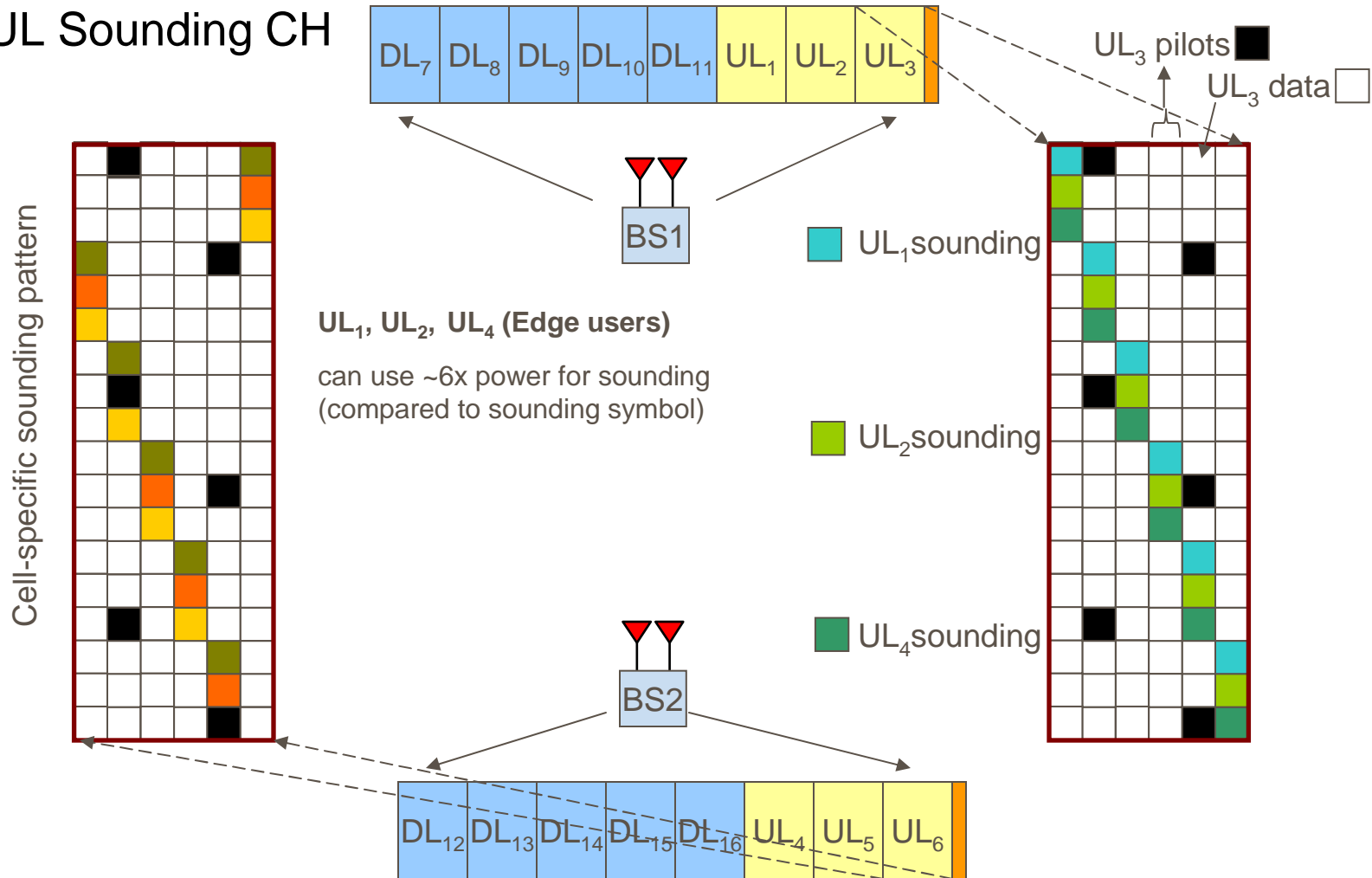
Sounding Channel Performance

- SE for 4x2

- 2 ~ 3 dB gain on DL beamforming for cell edge users

Link Simulation Parameters 1

Parameter	Value
NFFT	1024
Carrier frequency	2.6 GHz
# Tx antennas x #Rx antennas	4 x 2
Antenna spacing	4 λ for Tx, 0.5 λ for Rx
MCS	1/2 QPSK, 3/4 QPSK, 1/2 16QAM, 1/2 64QAM
Channel model	SCM Urban Macro 15^0
Mobile speed	3kmph
UL sounding delay	5ms (last sounding symbol to beamforming delay)
DL Pilots	Dedicated, 2.5dB boosted
Sounding Symbol parameters	4.9dB per-subcarrier UL/DL SNR difference for a sounding band, 1Tx Antenna Sounded, Linear CE at BS, Rank-1 transmit weights are equal gain
Sounding Channel (subframe)	6.2dB – (7.8dB due to 6x power)=-1.6dB per-subcarrier UL/DL SNR difference for sounding channel, 1Tx antenna Sounded, Linear CE at BS, Rank-1 transmit weights are equal gain
Receiver	MRC for Rank-1, LMMSE for Rank-2
DL channel estimator	2D-MMSE based on 18x6 tile
Packet size	288/432/480 bits
DL- Allocation	Localized allocation, 18x6 tile randomly distributed in frequency

Link Simulation Parameters 2

- ❑   Pilot - 5.56% -1 stream
- ❑   Pilot - 11.11% - 2 streams
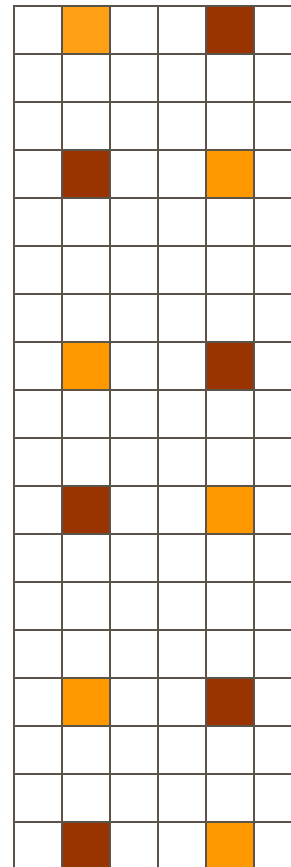
Sounding Channel Proposal

❏ Sounding signal in 16m may be transmitted through a sounding channel that spans multiple OFDM symbols