

Considerations on HE-SIG-A/B

Date: 2015-07-15

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Abstract

- This submission shows the following considerations on HE-SIG-A and HE-SIG-B for DL-OFDMA:
- #1 Possible contents for HE-SIG-B
- #2 HE-SIG-B configurations
- #3 Possible decoding optimization

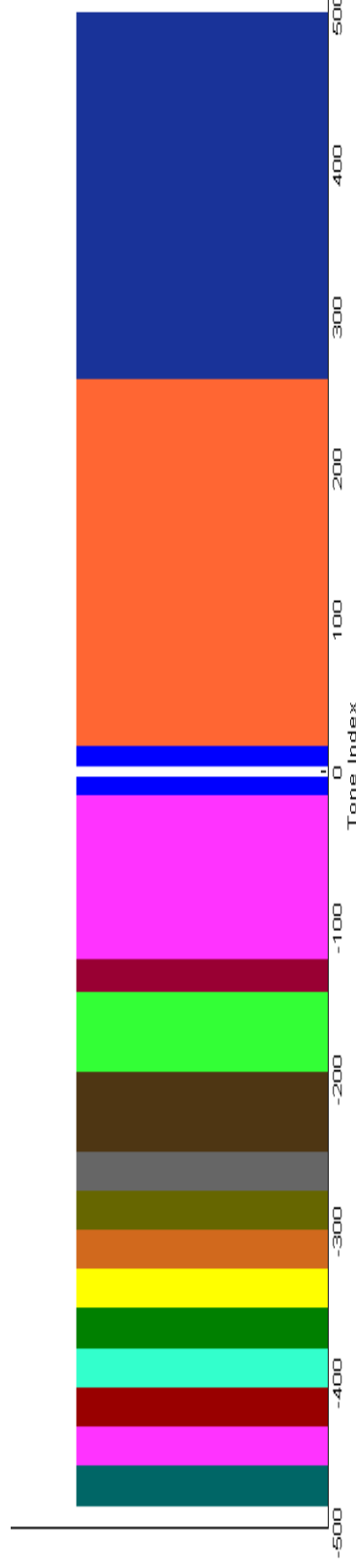
Consideration #1:

MCS per OFDMA Resource Unit

We agreed some patterns for OFDMA building blocks at May 2015 meeting. [2]
It is preferable for each resource unit to use different MCS for better efficiency.
Combination of resource units also should be identified for each transmission.

e.g. Combination of resource units

16 OFDMA assignments in 80MHz BSS (ref: slide 30 of 15/330r5)

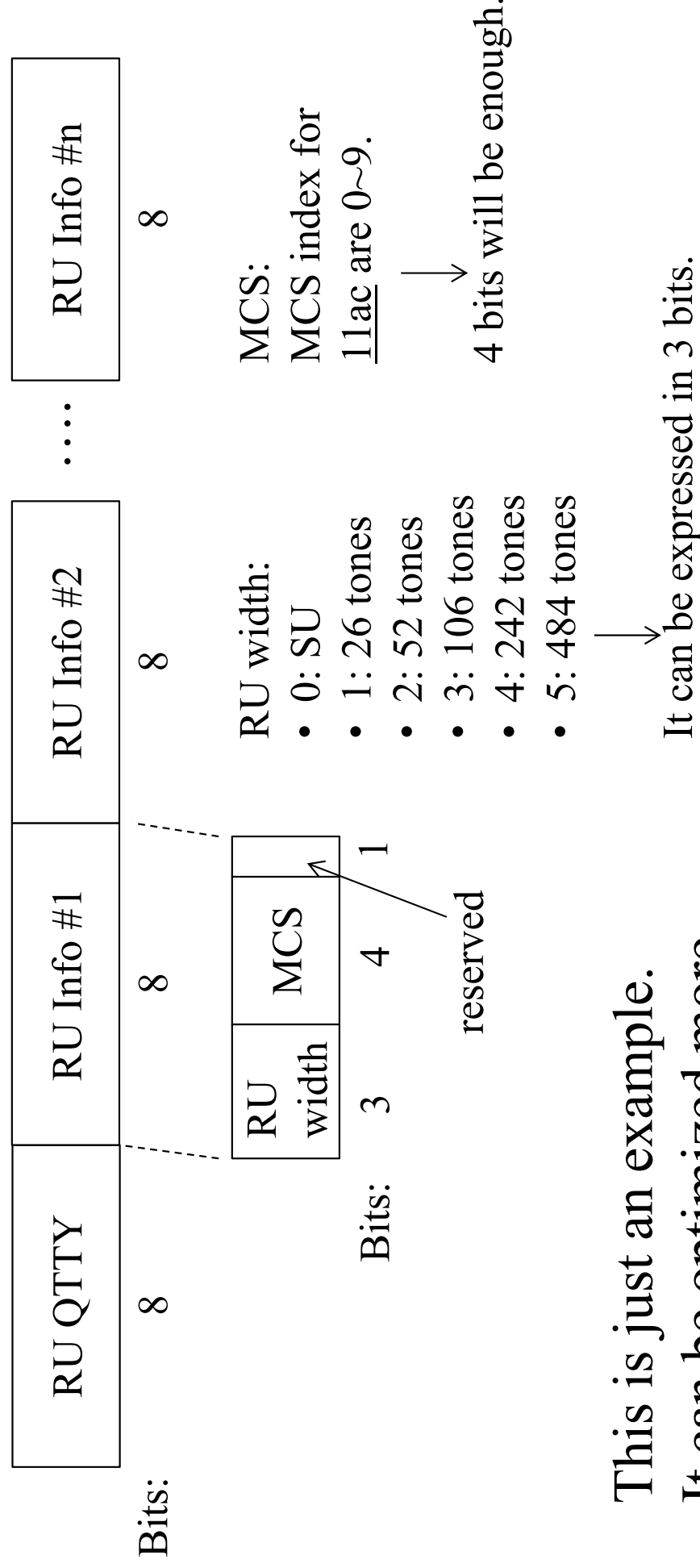


Proposal #1:

Resource unit assignment and MCS for respective resource unit will be contents in HE-SIG-B.

Consideration #1: e.g. Expression of HE-SIG-B

RU = Resource Unit

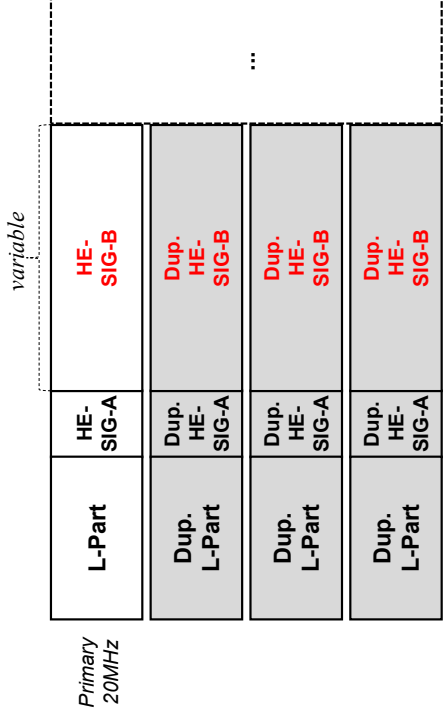


This is just an example.
It can be optimized more.

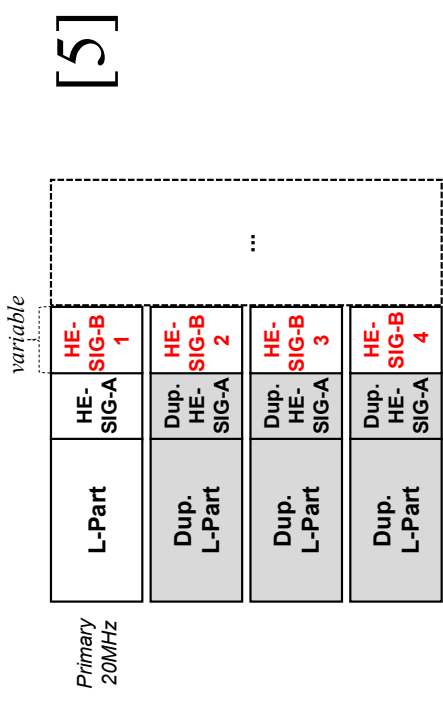
Consideration #2:

Possible Configurations of HE-SIG-B [3][4]

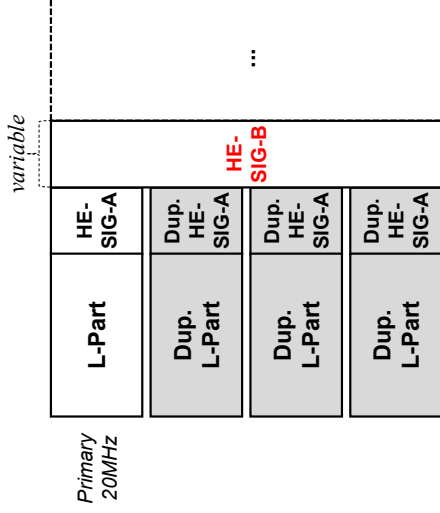
- Option-A. Duplicated HE-SIG-B per 20MHz



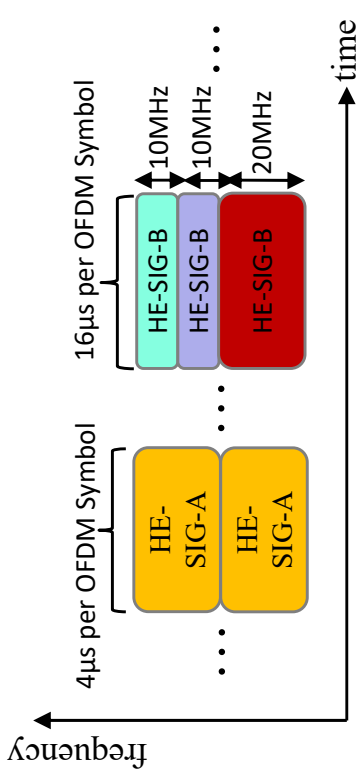
- Option-B. Non-duplicated HE-SIG-B per 20MHz



- Option-C. Entire-channel HE-SIG-B



- Option-D. HE-SIG-B per resource unit



HE-SIG-A needs to have segment information of resource units. → It's not feasible.

That big information will not fit in HE-SIG-A.

Consideration #2: Required OFDM Symbols

BW	Max. QTTY of RU	Max. size of HE-SIG-B (required bits)	Required OFDM symbols for HE-SIG-B (64FFT) *		
			A	B	C
20M	9	80	4	4	4
40M	18	152	7	4	4
80M	37	304	13	4 *	4
160M	74	600	25	4 *	4

Note-1) HE-SIG-B structure on Slide-4 is assumed.

Note-2) 48 available subcarriers and coding rate = 1/2 are assumed per 20MHz.

* It's subject how to express the resource units across two 20MHz. (next slide)

Option-A isn't efficient. It may not be practical.

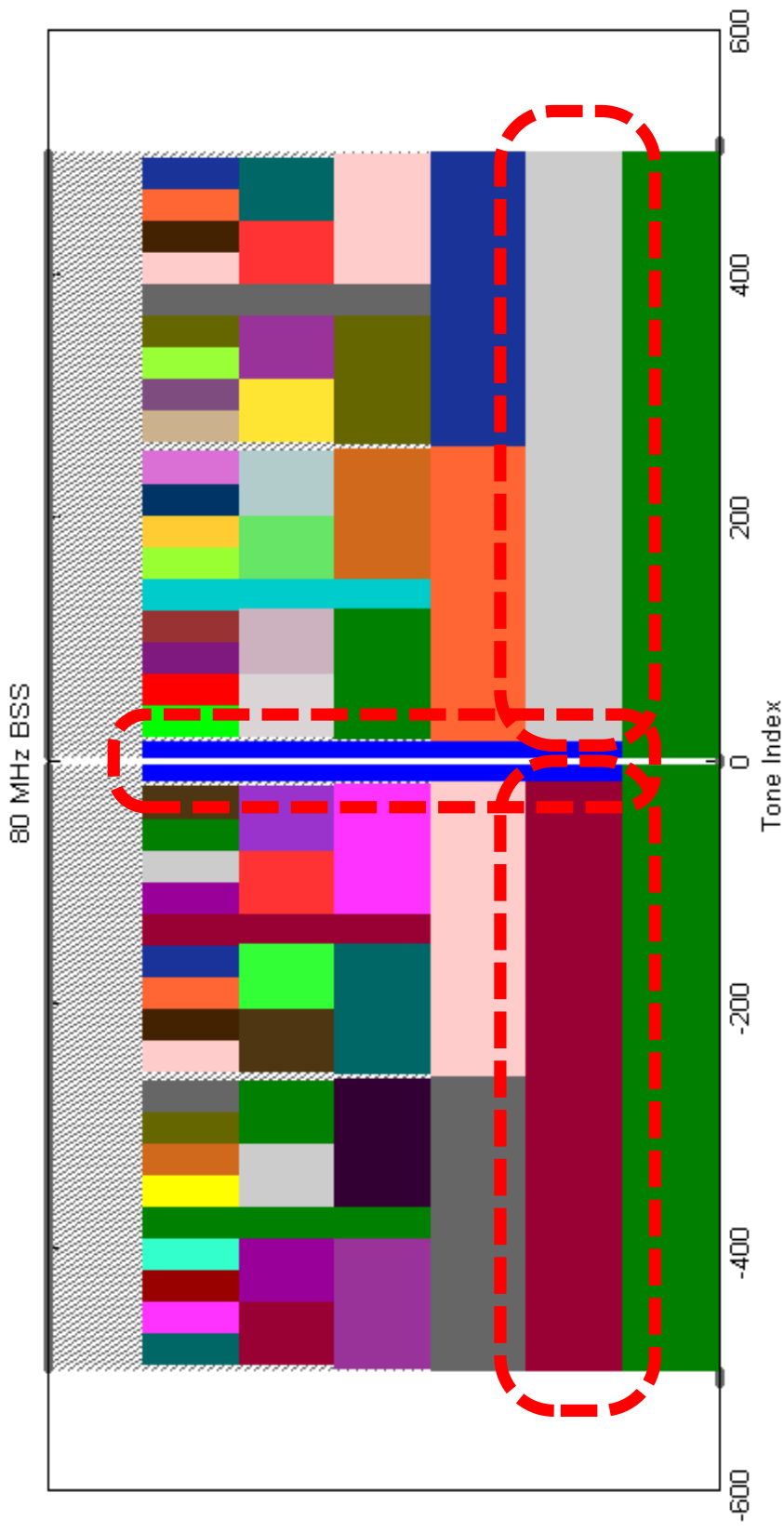
Proposal #2:

HE-SIG-B should not be duplicated in every 20MHz as Option-A.

Consideration #2: An Issue on Option-B

Some resource units are across two 20MHz sub-bands.

→ How can we express these resource units in Option-B case??

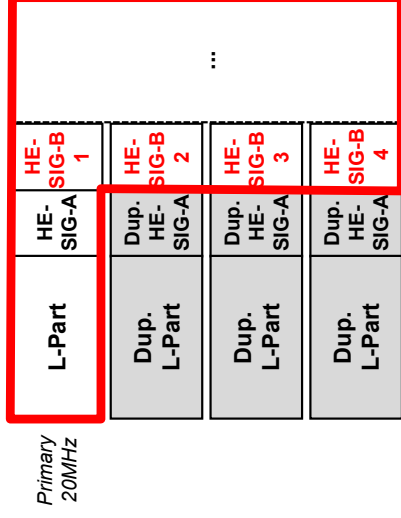


Consideration #3: Decoding Issue for DL-OFDMA??

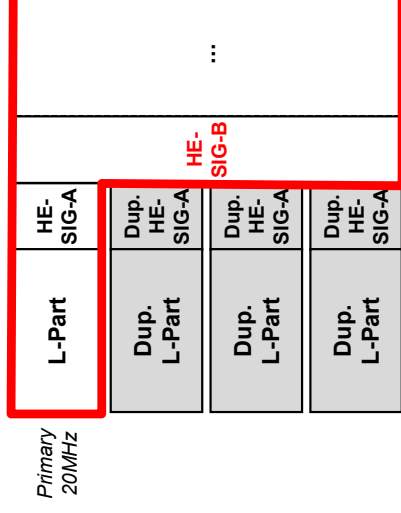
- Definitive destination address will be acquired from decoded MAC frame.
→ A receiving STA has to decode all resource units to pick up a desired MAC frame.

: Minimum required portion for decoding

Option-B.



Option-C.



It may be complicated for a receiving STA to decode the entire DL-OFDMA frame of multi-resource units with various MCSs and resource segmentations.

Consideration #3: Possible Optimization for Decoding Schemes

- When HE-SIG-A has an indication for sub-band selection, a receiving STA may be able to limit decoding portion just for a specific 20MHz.
- That indication will be with Multi-Access (MA) group ID. (Need further studies)

 : Minimum required portion for decoding

Figures below are examples that are indicated in HE-SIG-A as 2nd 20M to be decoded.

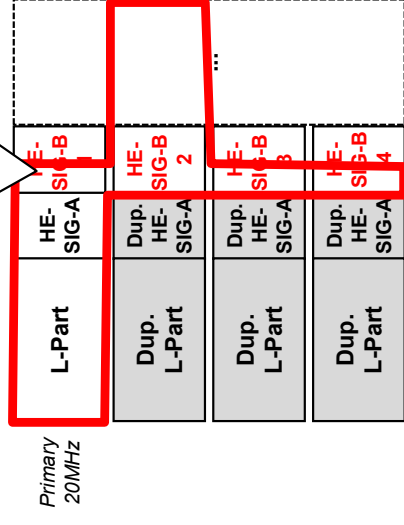
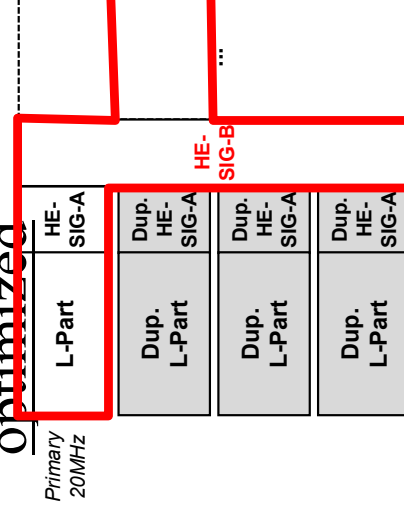
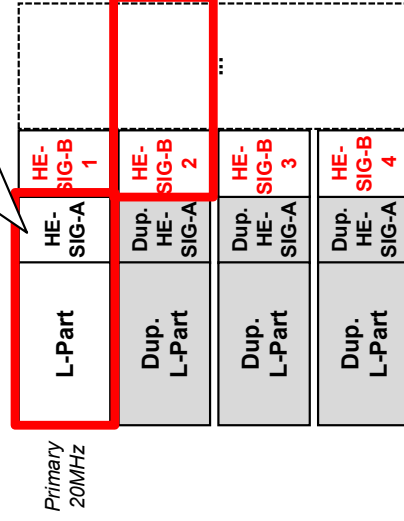
Option-B.

Option-C.

Not well-

Doc. 15/821r0

Indication for sub-band selection



This optimization may reduce required processing power to decode DL-OFDMA frame on a receiving STA.

Consideration #3: Issues

- MA Group Indication:
 - How to make up the group for each sub-band?
- Resource units across two 20MHz sub-bands:
 - The same issue as Slide-7
- Channel estimation
 - Maybe HE-LTF/STF will help it.
- Others?

Conclusion

- **Some contents of HE-SIG-B are proposed for DL-OFDMA PPDU.**
 - Resource unit assignment (e.g. RU QTTY,RU width)
 - MCS per RU
- **HE-SIG-B should not be duplicated on every 20MHz sub-band for better efficiency.**
- **Sub-band selection measure was proposed as a potential optimization.**

It may possibly reduce required processing power to decode DL-OFDMA PPDU on a receiving STA.

Straw Poll #1

- **Do you agree to add the following text into 11ax SFD?**

3.2.3 HE-SIG-B

HE-SIG-B includes resource unit assignment and MCS per resource unit for DL-OFDMA PPDU.

Y/N/A =

Straw Poll 2

- **Do you agree to add the following text into 11ax SFD?**

3.2 HE preamble

3.2.1 General

Sub-band selection measure is provided in HE-SIG-A or HE-SIG-B for DL-OFDMA PPDU reception.

Note: It is necessary to study appropriate position of that information.

Y/N/A =

References

- [1] doc. 11-15/132r5, “Specification Framework for TGax”
- [2] doc. 11-15/330r5, “OFDMA Numerology and Structure”
- [3] doc. 11-15/621r2, “Design Principles for HE Preamble”
- [4] doc. 11-15/557r0, “Preamble Structure in 802.11ax”
- [5] doc. 11-15/821r0, “HE-SIG-B Structure”