Sampling Rate Change for OFDM mode

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To present XXXX

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Sampling Rate Change for OFDM mode

Tal Kaitz

Alvarion
Background

• In D2 Draft Sampling Rate (Fs) To Bandwidth (BW) can take two values:
• Fs/BW=8/7
  – Used for 2K OFDMA as well as 256 OFDM in the license exempt band.
• Fs/BW=7/6
  – 256 OFDM in license bands.
Proposed Change

• Use same same value.
• Harmonized standard
• Other technical benefits
• Worth the capacity loss of only 2%.
Orthogonality

- With 8/7 the channel spacing is always an integer number of subcarriers.
  - Ch spacing = \( \frac{7}{8} \times F_s \) / \( \frac{F_s}{256} \) = 224 subc.

- With 7/6 it is not
  - Ch spacing = \( \frac{6}{7} \times F_s \) / \( \frac{F_s}{256} \) = 219.48 subc.

- Reduces Adjacent Channel Interference
ACI and Orthogonality.
ACI and Orthogonality.

- After Filtering and sampling
ACI and Orthogonality.

- If interferer is not in same subcarrier grid:
- Interferer effectively convolved with Sinc function
- Out of band interference leaks in => Increase ACI
Sampling rates

- For many regulatory bands, the 7/6 parameter results in strange sampling rates.
- For instance, in ETSI bands
  - Channel raster is 1.75MHz*n
  - Fs @ 7/6 is 2.04166667MHz*n.
  - Fs @ 8/7 is 2MHz*n.
- Digital sampling rate converters can be employed
  - Increased complexity
Conclusions

• Changing to Fs/BW=8/7 enables:
  – Harmonization throughout the OFDM/A modes
  – Orthogonality between channels.
  – No strange sampling rates, No sampling rate converters
  – Only 2% loss.