

# 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 ( $F_s$ ) To Bandwidth (BW) can take two values:
- $F_s/BW=8/7$ 
  - Used for 2K OFDMA as well as 256 OFDM in the license exempt band.
- $F_s/BW=7/6$ 
  - 256 OFDM in license bands.

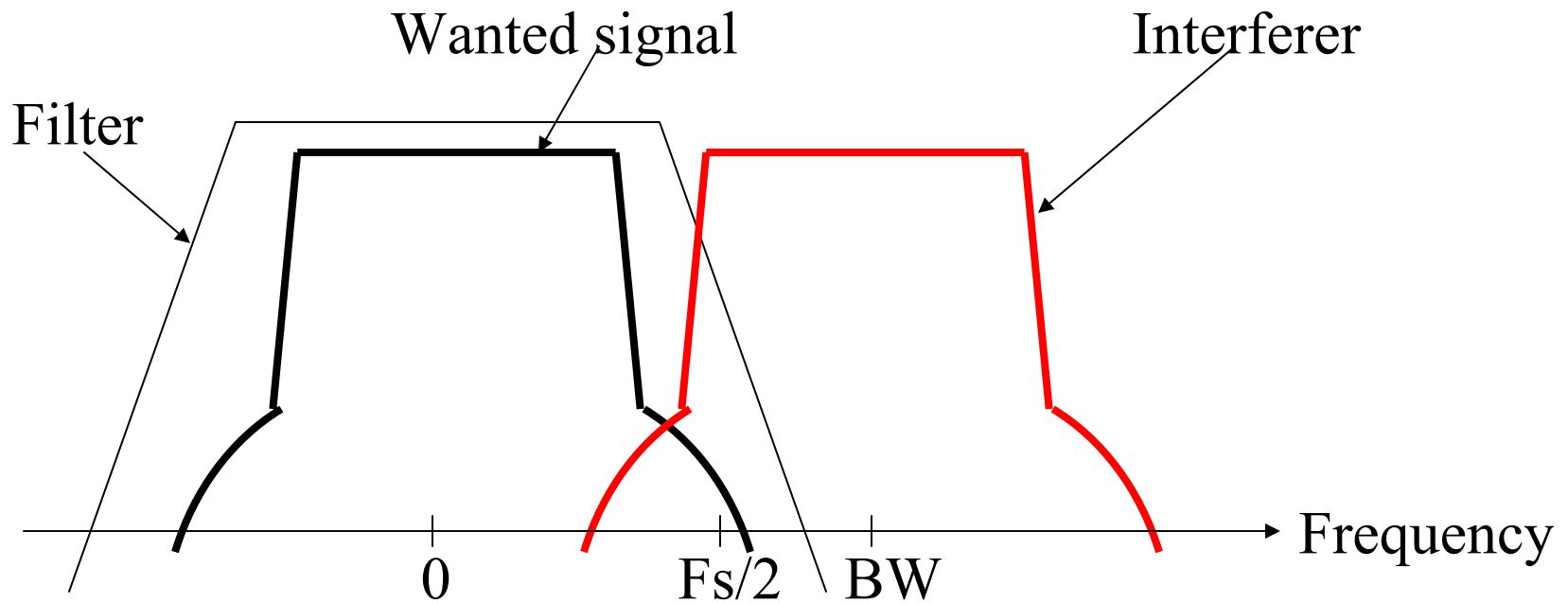
# Proposed Change

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

# Orthogonality

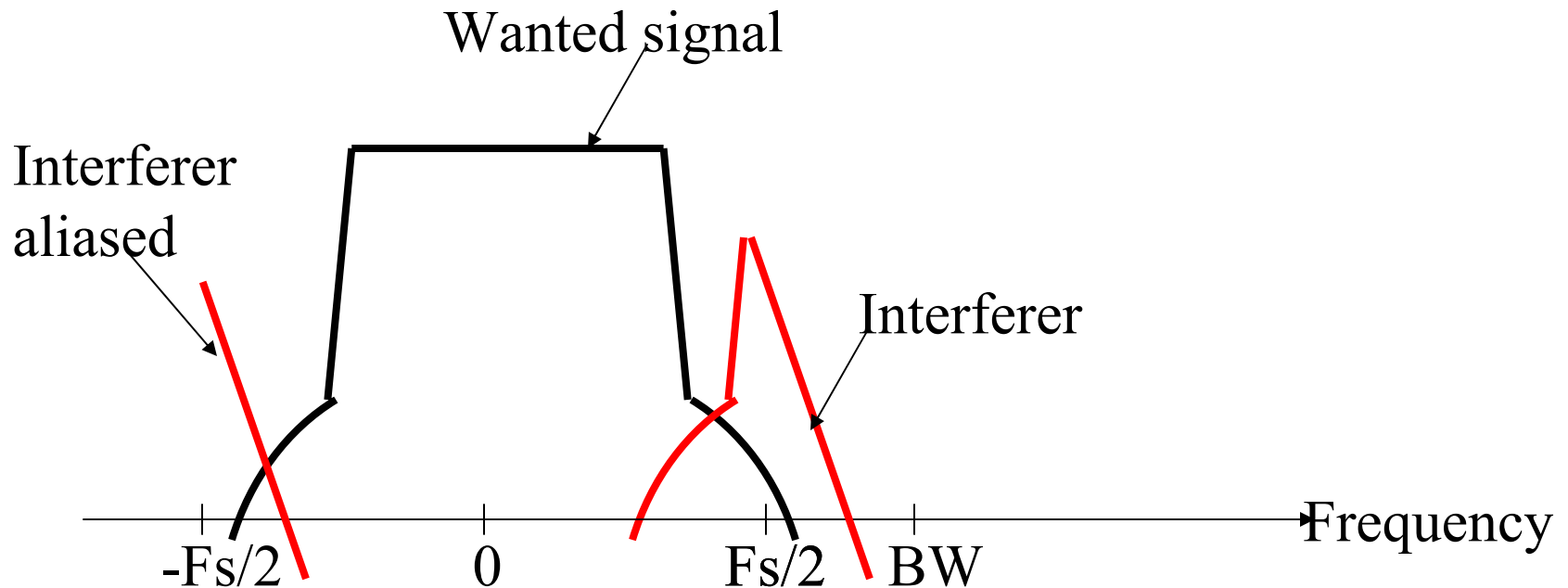
- With  $8/7$  the channel spacing is always an integer number of subcarriers.
  - Ch spacing =  $(7/8 * F_s) / (F_s/256) = 224$  subc.
- With  $7/6$  it is not
  - Ch spacing =  $(6/7 * F_s) / (F_s/256) = 219.48$  subc.
- Reduces Adjacent Channel Interference

# ACI and Orthogonality.



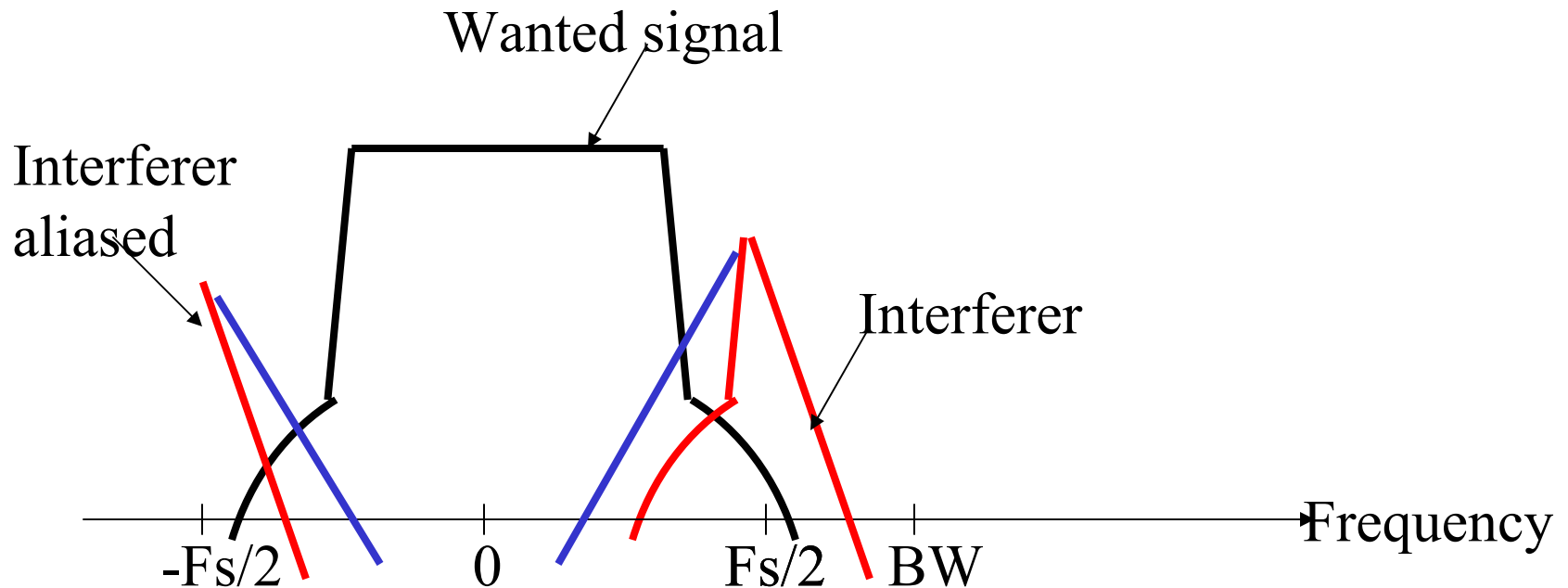
# ACI and Orthogonality.

- 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  $1.75\text{MHz} \cdot n$
  - $F_s @ 7/6$  is  $2.04166667\text{MHz} \cdot n$ .
  - $F_s @ 8/7$  is  $2\text{MHz} \cdot n$ .
- Digital sampling rate converters can be employed
  - Increased complexity

# Conclusions

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