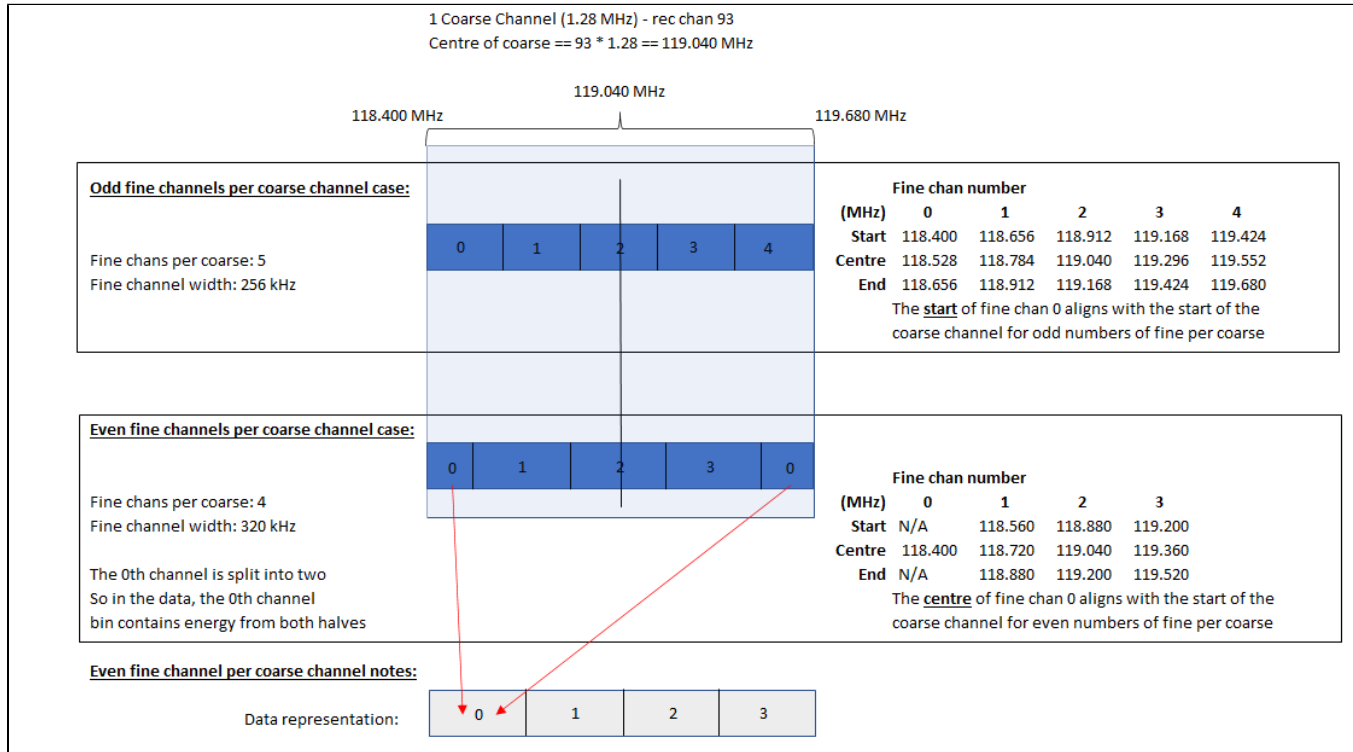


MWA Fine Channel Centre Frequencies

Whether it is Legacy MWA or MWAX, the channels are centre symmetric, meaning-

The centre frequency of the centre fine channel of a coarse channel equals the centre frequency of the coarse channel (except for two [Exceptions](#))



Even Fine Channel per Coarse Channel Notes

In the "even fine channel per coarse channel" case, for the ease of processing the data, the 0th fine channel is included. This fine channel combines two non-contiguous fine channel halves from each end of the coarse channel, so a single start and end frequency are not meaningful. However we still assign this channel a centre frequency (equal to the start of the coarse channel), so that all fine channels are equally spaced within the coarse channel.

Exceptions

- Legacy MWA Correlator with 20 kHz fine channel width: In this case the fine channel frequencies are offset by +5 kHz
- Legacy MWA Correlator with 40 kHz fine channel width: In this case the fine channel frequencies are offset by +15 kHz

These exceptions result in the fine channel frequencies of 20kHz and 40kHz Legacy MWA data NOT being the same as 20kHz and 40kHz MWAX data.

Averaging

Here is a more detailed picture of which ultrafine channels go into which averaged channel. In this example there are 12 channels being averaged by different fscrunch factors. The averaging behavior depends on whether the fscrunch number and the number of averaged channels are odd or even.

This example illustrates why the center frequency of an averaged MWAX channel can be different from that of an averaged channel from the legacy correlator.

It's also worth noting that MWAX observations with an odd number of averaged channels contain some power from ultrafine channel zero in the last channel of each coarse band. This is shown in the third MWAX example.

The tick marks indicate the center frequencies of each ultrafine channel, with the center frequency of the center coarse fine channel shown in bold.

Channels that include power from ultrafine channel zero (the channel which contains power from the high and low edges of the coarse channel) are highlighted in gray.

