Receiver Bandwidth

What is Receiver Bandwidth?

Receiver bandwidth, often shortened to just 'bandwidth' and not to be confused with transmit bandwidth, is a selectable parameter that controls the range of frequencies to be sampled for an MR image. Bandwidth is inseparable from two other parameters: Field of View (FOV) and Frequency Matrix. Indirectly, the bandwidth has implications in a number of things: chemical shift artifact, image contrast, geometric distortion, echo spacing, TR, TE, SAR, susceptibility artifact, motion artifact, sampling rate, and frequency encoding gradient amplitude. This complex list of effects can make bandwidth difficult to understand in isolation, especially as this parameter is interacted with differently across different vendors. What is important to consider when scanning is how altering bandwidth from it's initial setting will affect the image. Generally speaking, the bandwidth should be initially set as high as possible while maintaining adequate SNR. Below are a few vendor specific guidelines for how to use bandwidth:

GE

- Bandwidth is reported as frequencies across the entire image, disregarding FOV and Frequency Matrix
- When reducing FOV, reduce bandwidth; when increasing FOV, increase bandwidth. This helps keep the chemical shift artifact constant.
- Small FOV (13cm) bandwidth: 15-20 kHz
- Large FOV (24+cm) bandwidth: 31+ kHz
- For FSE: keep Min TE around 8-12ms

Siemens

- Bandwidth is reported as Hz/Pixel; hold the mouse over the drop down menu to see the # of pixels chemical shift
- Fat and water are ~220 Hz apart at 1.5T; try to keep the Hz/Pixel near 220, or # of pixel chemical shift close to 1-1.3
- Keep in mind how large the pixels are when adjusting FOV and Matrix, as the Hz/pixel will stay constant. Big pixels = larger artifacts

Bandwidth in Practice