sides, radiused to match the throat entry angle like an oblate spheroid or quadratic horn. The mouth is radiused too, to eliminate any sharp edges. This reduces the severity of internal reflections. The top and bottom are curved with a nearly tractrix profile. This provides a 90° pattern with constant directivity in the horizontal plane and uniformly collapsing directivity in the vertical. The vertical beamwidth is approximately 50° from the crossover point up to about 5kHz, and above that it drops to about 40°. The collapse of vertical directivity is gentle and slow, not something I would call beaming.

I like this pattern the most for home hifi, because it is a useful shape for room coverage and reduction of reflections. It is also a good match at the crossover point, where vertical nulls are usually set at the edge of the pattern, around 40-50°. The 90° constant directivity horizontal coverage is perfectly suited for room coverage, especially when the speakers are setup like shown in the following link.
Imaging, placement and orientationThere are other horns that would probably work well in this application too. The quadratic throat horn or oblate or prolate spheroidal horns both act similarly, provided they are designed with an axisymmetrical pattern approximately 90°x40° or 90°x50°. In the case of the quadratic throat, this is done with a rectangular mouth but on the OS/PS horns it is done with an elliptical shape. Either way, as long as constant directivity and the requisite 90°x40° to 90°x50° pattern is achieved, I expect it would work very well in this application, with perhaps some minor crossover changes.

The reason I prefer the asymmetrical flare is the intended coverage area is wider than it is tall. For room coverage, you need a fairly wide spread, although you do want to keep it within the walls. That makes the 90° angle the obvious choice, in my opinion. The desired vertical angle is much smaller, because most listening rooms have eight foot ceilings. Reflections from the ceiling are usually the most offensive, so a limited vertical angle is best.
Matching directivity in the vertical and the horizontal planes
Baffle spacing, phase angles and time alignment, revisitedAnother thing is horns that are wider than tall lose pattern control in the vertical dimension first. This means at low frequencies, the pattern will be wider than at high frequencies, even if made to have constant directivity in the vertical plane. There is no way around this, because the mouth dimension sets the low frequency limit of pattern control. In a sense, all horns exhibit "collapsing directivity" as they enter their passbands, because this is where they begin to have pattern control. However, when a horn is mounted above another sound source, then the two develop nulls above and below the forward axis. With careful placement and crossover design, these nulls can be set just outside the horn's pattern at HF. This tends to punctuate the edges of the pattern at LF, where the horn might otherwise begin to lose control because of mouth dimensions.

The speaker should make a nice clean forward lobe, free of any response abberations. It should have uniform spectral balance and constant directivity. So making sure the vertical nulls are outside the forward lobe is important. It is also best if the energy is limited outside the lobe, with the "ideal" speaker delivering no sound outside its pattern. Of course, there is always some energy outside the pattern because the edges aren't brick walls. But the less energy outside the pattern, the better. Energy outside the pattern is not useful, and only serves to create unwanted reflections. It usually lacks spectral balance and almost never has uniform directivity. The better a loudspeaker can perform in these areas related to directivity sets the uniformity of the reverberent field.

between the midwoofer and tweeter, and also to match the amplitude response and provide

matches directivity and amplitude, for proper summing on-axis and off-axis through a wide 90°x40° arc. If you were to plug the values into a canned crossover program, you would get weird results that seemed to indicate the HP was 1.6kHz and LF was 1.3kHz, or thereabouts. I generally call it a 1.6kHz crossover, but there's more to it than a single number can tell you. The important thing is what happens in the acoustic realm, which includes electrical, mechanical and acoustic transformations. The bottom line is how the speaker performs as a whole, as they say, the proof is in the pudding.