



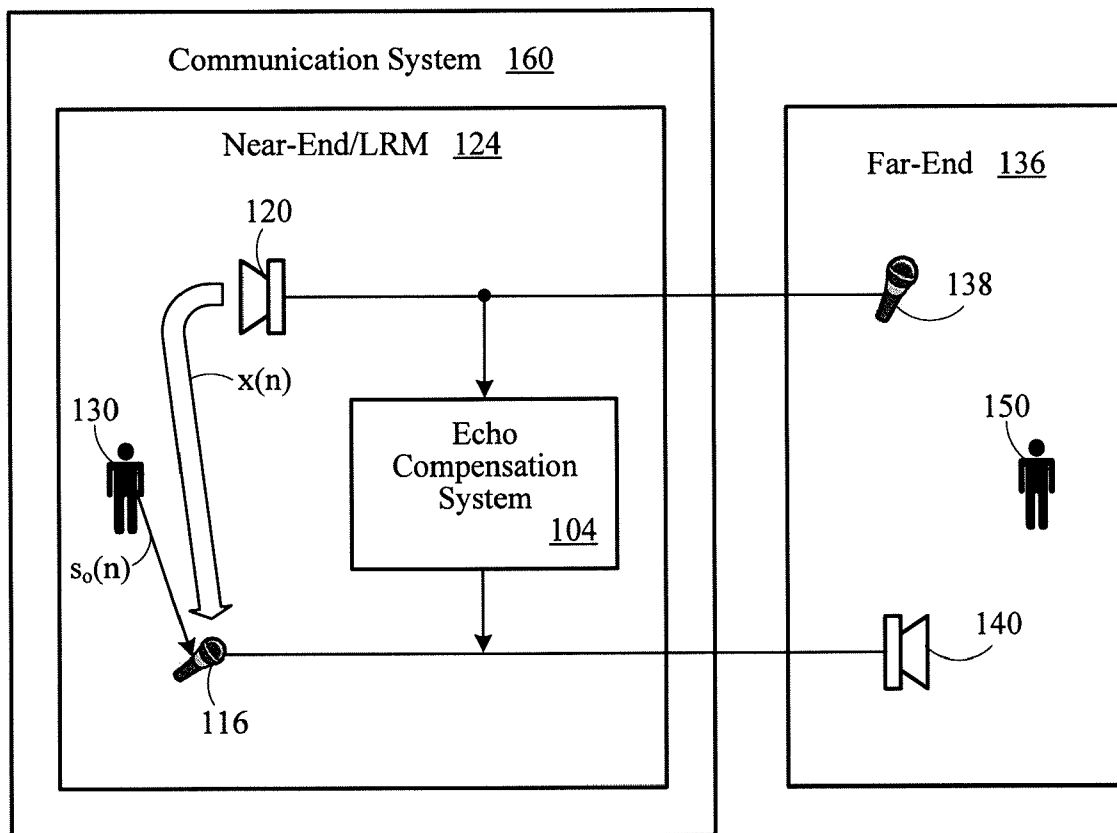
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Buck et al.(10) **Pub. No.: US 2008/0144848 A1**(43) **Pub. Date: Jun. 19, 2008**(54) **LOW COMPLEXITY ECHO COMPENSATION
SYSTEM****Publication Classification**(51) **Int. Cl.**
H04B 3/20 (2006.01)(52) **U.S. Cl.** **381/66**(57) **ABSTRACT**(76) Inventors: **Markus Buck**, Biberach (DE); **Tim Haulick**, Blaubeuren (DE); **Martin Rossler**, Ulm (DE); **Gerhard Uwe Schmidt**, Ulm (DE); **Walter Schnug**, Memmingen (DE)Correspondence Address:
BRINKS HOFER GILSON & LIONE
P.O. BOX 10395
CHICAGO, IL 60610

An echo reduction system includes a signal analysis filter that converts an input into sub-band signals. A signal down-sampling circuit down-samples the sub-band signals at a first down-sampling rate. An echo analysis filter converts a loudspeaker signal into echo sub-band signal that are further processed by an echo down-sampling circuit. The circuit down-samples the echo sub-band signals at a second down-sampling rate to generate down-sampled echo sub-band signals. An echo compensation filter folds the down-sampled echo sub-band signals with an estimated impulse response of a loudspeaker-room-input system. A second echo down-sampling circuit down-samples the folded down-sampled echo sub-band signals at a third down-sampling rate to generate estimated echo sub-band signals. The first down-sampling rate is equal to the product of the second and third down-sampling rates.

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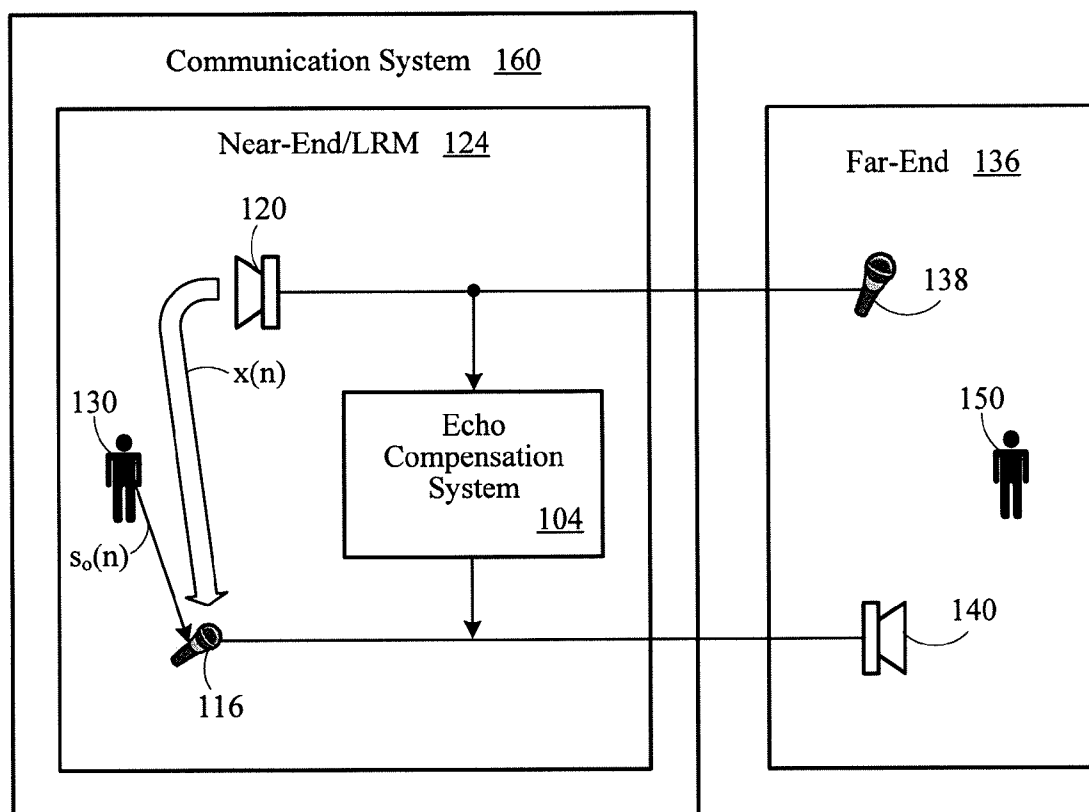


Figure 1

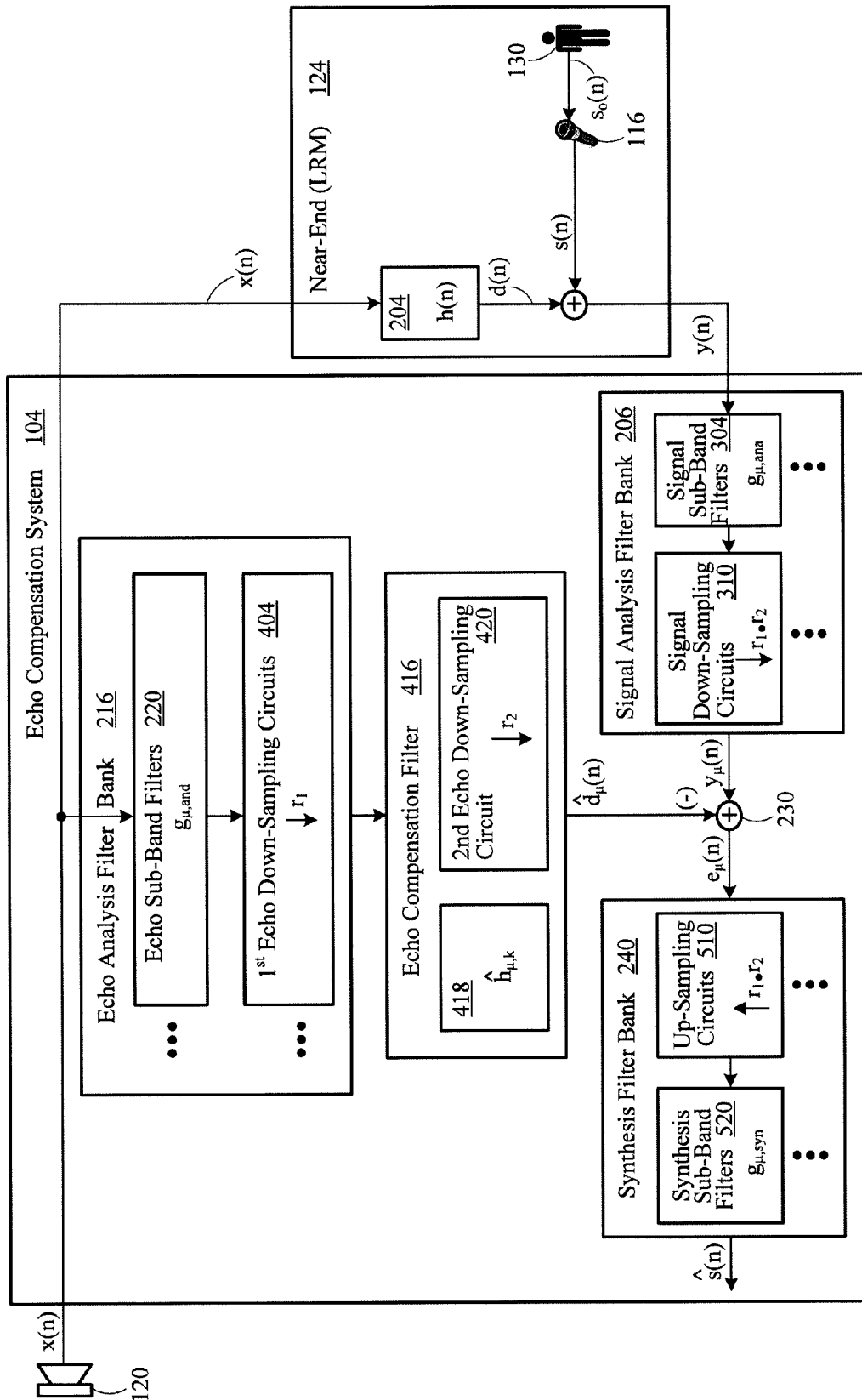


Figure 2

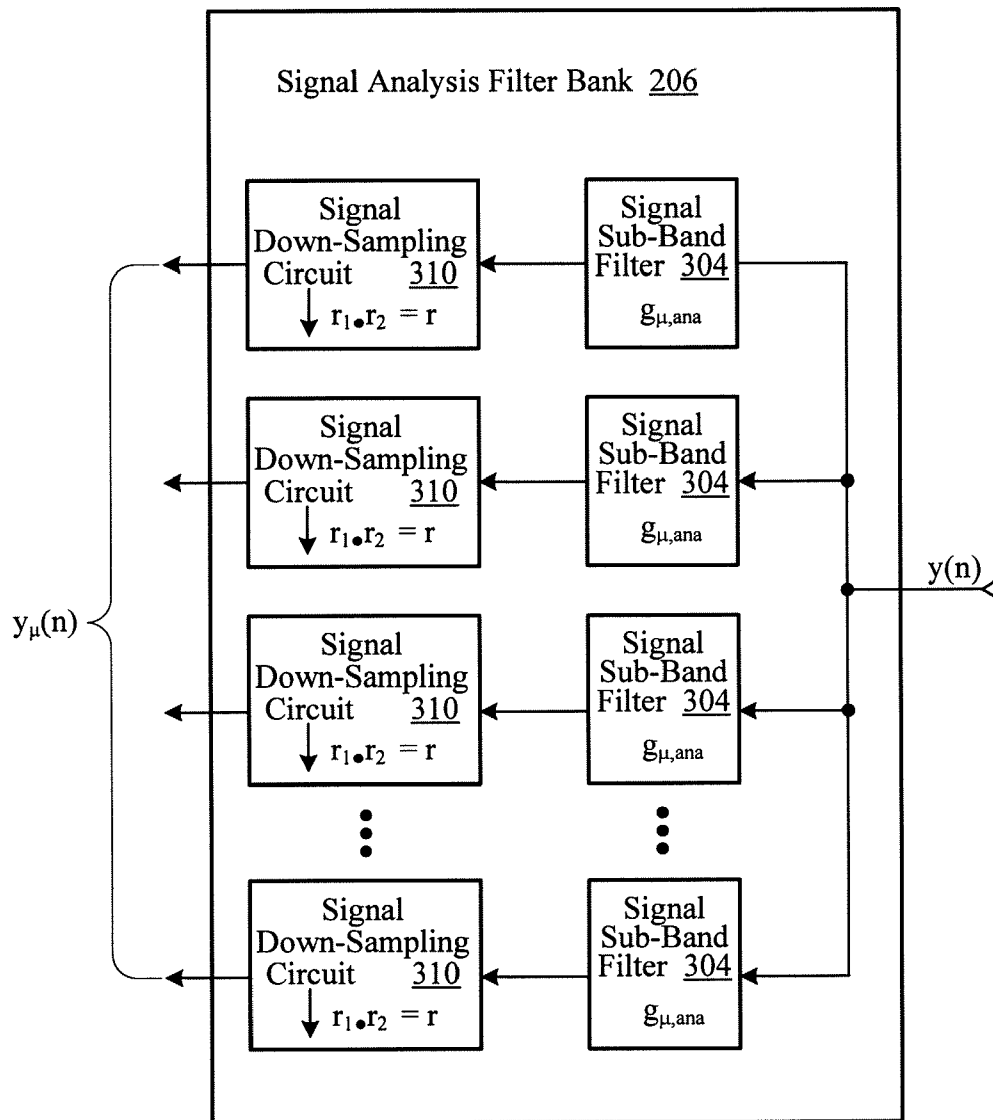


Figure 3

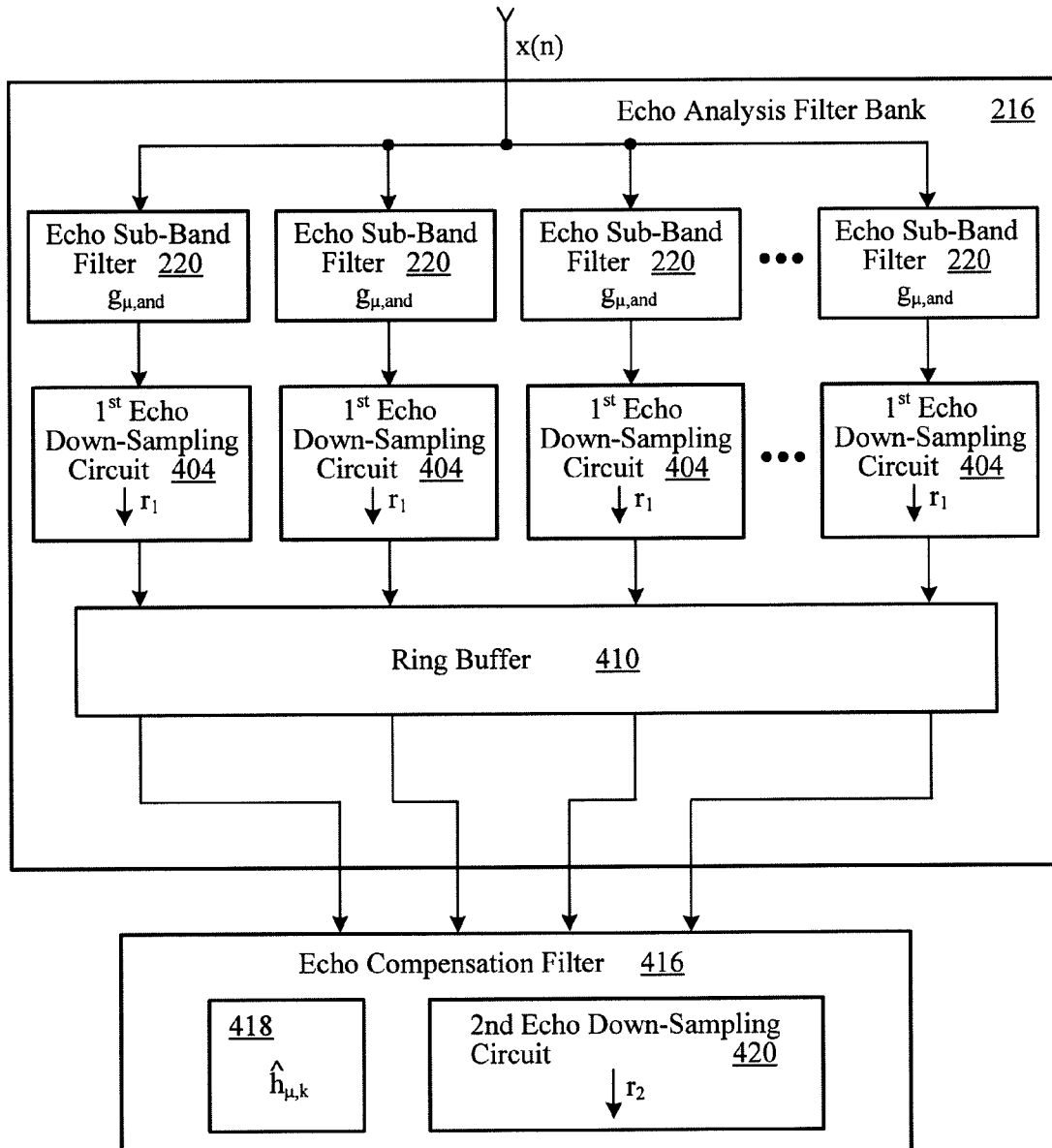


Figure 4

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