

## Simulation of Non-linear Echo Characteristics of Terminals

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Delay and echo disturbances are likely the most dominant quality degradation factors in modern telecommunication scenarios. The use of echo compensation in terminals like mobile devices and IAD (Integrated Access Devices) with wireless phones (DECT terminals) is mandatory today in order to provide high speech quality. Miniaturization and the use of low priced components often introduce non-linearities which cannot be appropriately handled by echo cancellation, neither in terminals nor in IAD's. Consequently an appropriate simulation of such echo components is necessary in order to provide realistic testing capabilities for echo cancellers to verify performance in such scenarios. Different sources of non-linearities such as loudspeaker distortions, housing vibrations and of course the linear part modeled by impulse responses in terminals are discussed in this contribution. A simulation model is derived and fed with objective measurement data from existing terminals to cover the most important sources of non-linearities.