RESIDUAL SIGNALS MODELING FOR LAYERED IMAGE/VIDEO SOFTCAST WITH HYBRID DIGITAL-ANALOG TRANSMISSION

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Abstract

This paper proposes a layered SoftCast scheme to integrate the high efficiency part of the digital transmission and analog-like transmission.

This paper studies the relationship between the residual spectrum and the base layer bit rate.

This paper presents a bit rate selection scheme based on the rate-residual model to achieve optimal overall performance.

Overview of Layered SoftCast

For the digital transmission, enough energy are allocated to fight the noise. The overall distortion of reconstruction is equal to the distortion produced in analog transmission.

For the analog-like transmission, the scaling factors are determined by a power-distortion optimization (PDO) procedure. The overall performance with PDO is

\[
D_s = \frac{1}{2} \left( \sum_{\omega} \sqrt{v(E(\omega))} \right)^2
\]

A. Rate-Residual Modeling

A. To achieve the best performance, a optimal base layer bit rate should be chosen by:

\[
R = \arg \min_{R \in W} D_{\text{total}} \quad \text{s.t. } P \leq P_{\text{total}}
\]

The total expected distortion can be described as

\[
D_{\text{total}}(R) = \sum_{\omega} \sigma(E(\omega)) \left( \frac{\sigma(E(\omega))}{P_{\text{total}}} \right)^2 (\sum_{\omega} \sigma(E(\omega)) \sigma(E(\omega))^2)^2
\]

Results

References

