



<sup>1</sup> *Speech intelligibility is often impaired by background noise and reverberation, e.g. in the case of railroad station announcements or in cell phones. The software solution AdaptDRC analyzes and optimizes speech intelligibility on the receiver side in real time. Picture MEV Verlag*

## ADAPT DRC

### Real-time optimization of speech intelligibility

The speech reproduction of communication systems is often subject to superimposed reverberation and background noise. With AdaptDRC, the Fraunhofer IDMT offers a patented software solution which automatically improves speech intelligibility in real time, even in hearing situations with unknown, variable noise. By taking into account the latest findings from hearing research, AdaptDRC achieves a high level of hearing comfort even for narrow-band signals and people suffering from hearing loss.

#### Near-end listening enhancement – signal adaptation for interfering noise on receiver side

The acoustic situation on the receiver side is detected by means of a microphone – e.g. on the rear side of cell phones – and the intelligibility of the speech signal in the current hearing situation is analyzed. On the basis of this analysis, model-based signal processing methods optimize speech intelligibility in real time.

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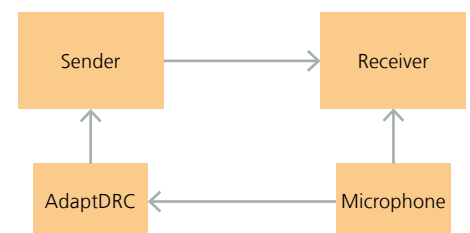
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#### Application areas

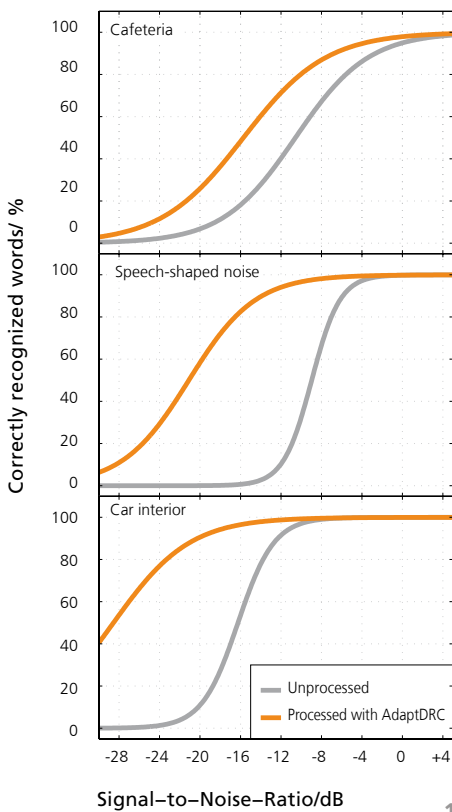
- Public Address Systems
- Mobile phones
- Headphones and headsets
- Conference Systems
- In-Car Communication
- Inflight-Entertainment
- Tour Guide Systems
- Hearing aids



<sup>2</sup> *The current acoustic situation on the receiver side serves as the basis for AdaptDRC signal processing. Picture Fraunhofer IDMT*



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1 Scientific evaluation studies with test persons with normal and impaired hearing show that AdaptDRC makes it possible to achieve a significant improvement in speech intelligibility in different acoustic scenarios – e.g. in a cafeteria, in a hubbub of voices or inside cars. Picture Fraunhofer IDMT

### Publications

H. Schepker et al. (2013), Proc. Interspeech 2013, Lyon, France, pp 3577 – 3581.

H. Schepker et al. (2015), Speech-in-noise enhancement using amplification and dynamic range compression controlled by the speech intelligibility index, Journal of the Acoustical Society of America, 138, pp. 2692-2706.

## Hearingmodel-based signal processing

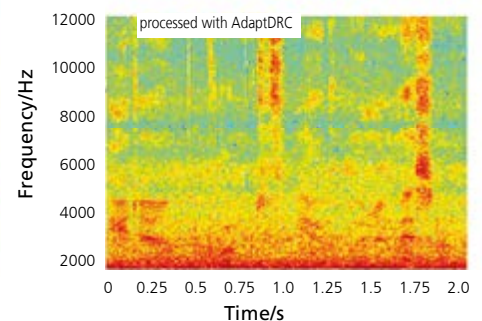
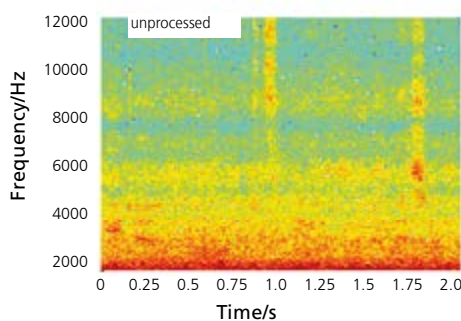
AdaptDRC uses human hearing perception models to evaluate and improve the intelligibility of a speech signal. The algorithm continuously analyzes the current intelligibility based on the speech intelligibility index SII. Signal processing is activated when intelligibility decreases, e.g. due to an increase in interfering noise. Individual frequency bands are selectively boosted and the dynamic range of the signal compressed at the same time. This makes it possible to improve speech intelligibility by 30-80 percent without increasing the volume. Scientific studies with test persons with both normal and impaired hearing have shown that persons with hearing loss also benefit from the algorithm and are able to understand speech signals more easily and with less listening effort. The fact that the signal is processed only if speech intelligibility is impaired contribu-

2 Depending on the background noise, AdaptDRC can improve speech intelligibility by 30-80 percent. Picture MEV-Verlag

tes to hearing comfort and naturally sounding speech reproduction.

## Application-specific adaptation

AdaptDRC makes it possible to improve speech intelligibility in different technical systems – from conventional telephone transmission through to full bandwidths in high-quality multimedia applications. Due to the dynamic signal compression used, speech intelligibility can be improved even in difficult acoustic environments. The algorithm is available as a platform-independent C implementation and can be adapted to application-specific scenarios and technical conditions.



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3 Time-frequency characteristic of a disturbed speech signal: unprocessed on the left and processed with AdaptDRC on the right. Picture Fraunhofer IDMT