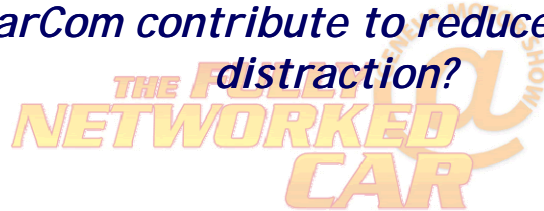


*Drivers Distraction -  
To what Extent can the Work of ITU  
FG CarCom contribute to reduced drivers  
distraction?*



**H. W. Gierlich**  
HEAD acoustics GmbH  
Chair of ITU-T Focus Group CarCom

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**Drivers Distraction – An Analysis\***

- **Physical/manual distraction**
  - Manual operation of devices
- **Visual distraction**
  - Watching information other than road
- **Auditory distraction**
  - Focusing on auditory events not related to the driving task
- **Cognitive distraction**
  - Occupied by non driving related tasks

\* See also NHTSA

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## Technology Based Distraction in Cars

- o Car entertainment systems
- o Navigation systems
- o Phones for speech communication
- o Car information systems
- o Text messaging systems
- o „Texting while driving“
- o :

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## To be avoided

- o In general all activities distracting from the driving task, esp.:
  - Visual cues which require different focus than road
  - Non intuitive manual operation of the car
  - Loading the human auditory system by distracting cues
  - Unnatural and low quality dialogs and communications

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=> Auditory Channel and Speech "available"

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## Speech Based Services in Cars

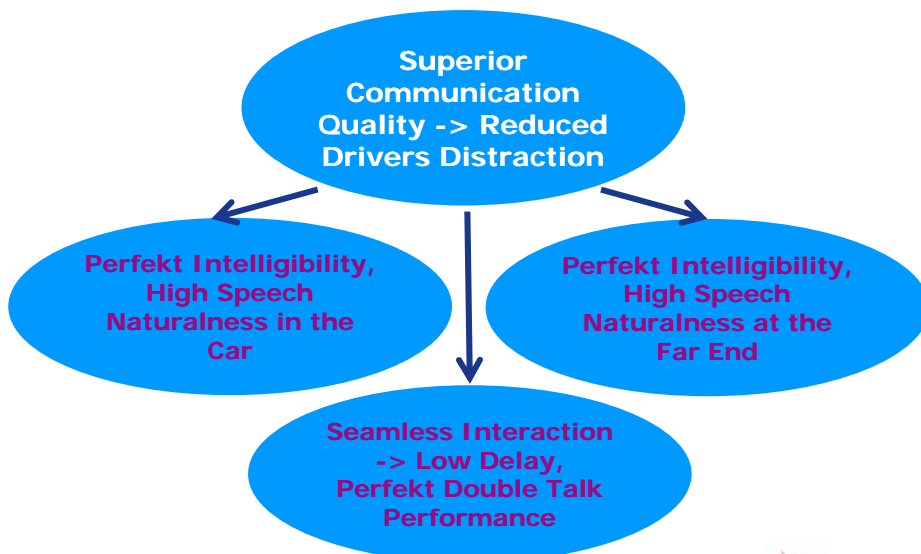
- o Speech prompts
- o Speech dialog systems
- o Speech communication services

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o The main speech applications:


- Speech recognition systems
- Speech dialog systems
- Text to speech systems
- Speech enhancement for communication systems
- Hands-free communication
- Enhanced in-car communication systems between passengers



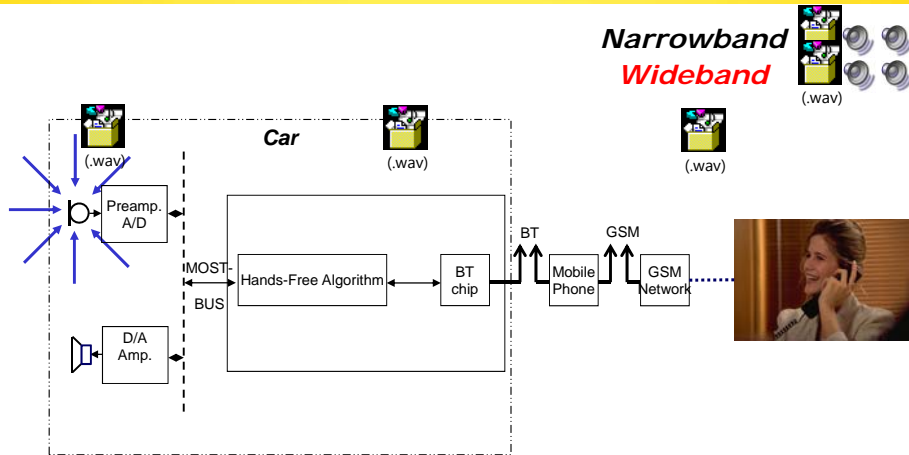
### o Why hands-free in cars?

- Reduce physical distraction (dialing, holding the phone...)
- Reduce visual distraction (watching display, keyboard ...)



- o Wideband services in mobile networks available soon  
->
- o Enabling wideband telephony (100 Hz- 8 kHz) in cars
  - Fullband 
  - Narrow band (car) 
  - Wideband (car) 
- o **Efficient use of the high quality audio systems in cars:**
  - Getting superior sound quality
  - Increasing speech intelligibility
  - Increasing naturalness of a conversation
  - Reduce drivers distraction due to poor speech sound quality

## Superior Sound Quality & Intelligibility for the Far End <sup>11</sup>



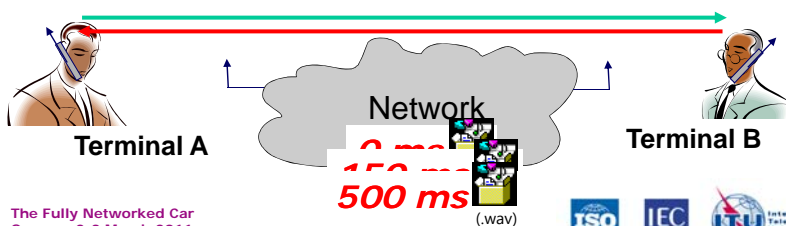
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## Influence of Delay on Drivers Distraction <sup>12</sup>

- o Best case car to car:  
*~200 ms*
- o Worst case car to car (including network delay):  
*>>400 ms*

**For superior conversational quality: delay < ~150 ms**  
*(from the users perspective)*



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## Consequences of Poor Quality Hands-Free Implementation

- Reduced speech quality - near end and far end
- Poor sound quality
- Corrupted speech due to low quality noise cancelling and low quality echo cancellation
- Insufficient conversational performance due to high transmission delay
- Poor double talk performance

->

High cognitive distraction due to poor technical performance

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## ITU-T Standards Contributing to Reduced Drivers Distraction

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### *ITU-T standards for Hands-Free Communication:*

- *ITU-T P. 1100 for narrowband hands-free*
- *ITU-T P. 1110 for wideband hands-free*

### *ITU-T standards work in FG CarCOM:*

- *New work on subsystem requirements for Hands-Free Systems in Cars*

### *ITU-T standards for Dialog Systems:*

- *P.851: Subj. evaluation of dialog systems*
- *Suppl. 24 to P. Rec.: Parameters describing the interaction with spoken dialog systems*

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- o *Speech technologies may help to reduce drivers distraction if properly implemented*
- o *ITU is an excellent forum for speech related technologies and their standardization*
- o *FG CarCOM is actively working on advanced standards for hands-free implementations and subsystems, more:*

<http://www.itu.int/ITU-T/focusgroups/carcom/>

- o *A new ITU Focus group on Drivers Distraction is starting soon!*

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- o Providing expertise for testing and optimization of all speech technologies used in cars
- o Providing test systems for speech applications to the car industry, suppliers, algorithm developers and chipset manufacturers
- o Supporting standardization since 20 years based on the expertise and basic research at HEAD acoustics

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