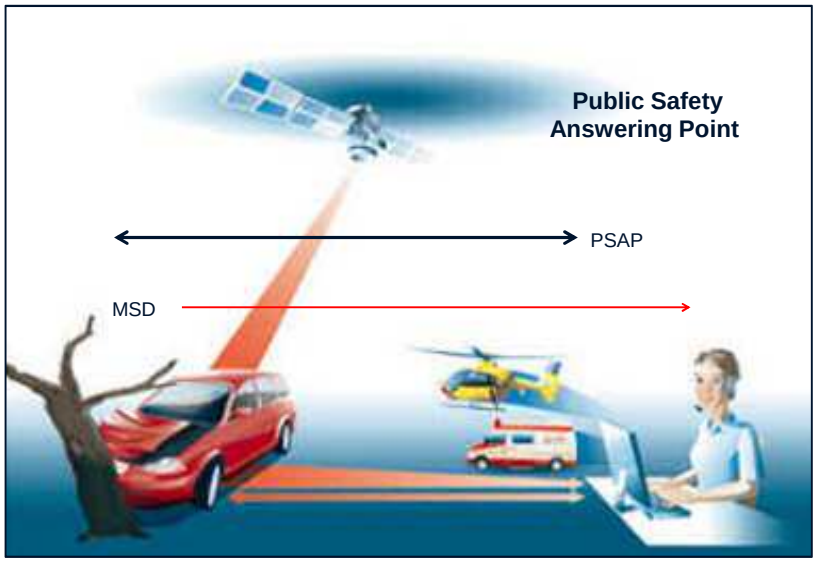
The new ITU-T Work on

"Speech communication requirements for emergency calls originating from vehicles "

H. W. Gierlich
Managing Director Telecom
HEAD acoustics
Rapporteur Q.4 ITU-T SG12

A Typical Emergency Call



Source: ADAC

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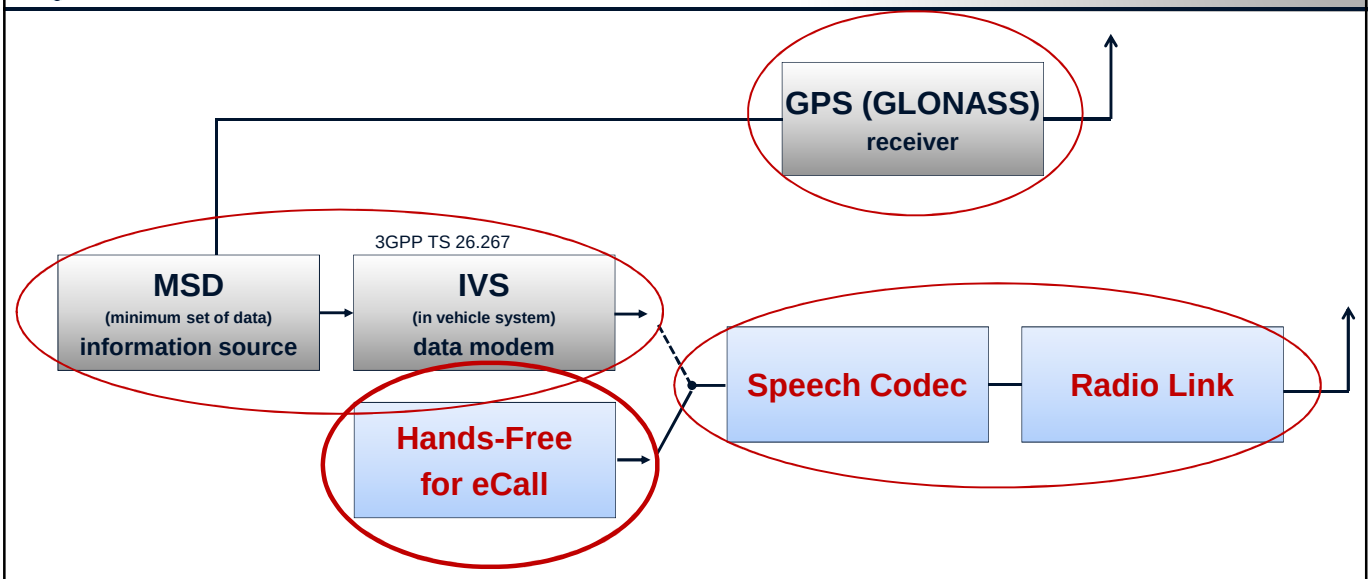
A Typical Emergency Call System Architecture in a Car



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Standards for Voice Quality in Car Hands-Free

VDA Specification for car hands-free systems
since 2001 – targeted to narrow-band integrated car hands-free

ITU-T P.1100: Narrowband hands-free communication in motor vehicles
since 2008

ITU-T
in motor vehicles
since 2010 – targeted to integrated, after-market car hands-free & headsets

Basis of ERA-GLONASS Standards

ITU-T P.emergency: Speech communication requirements for emergency calls originating from vehicles
work ongoing since 09/2014 – targeted to car emergency call systems

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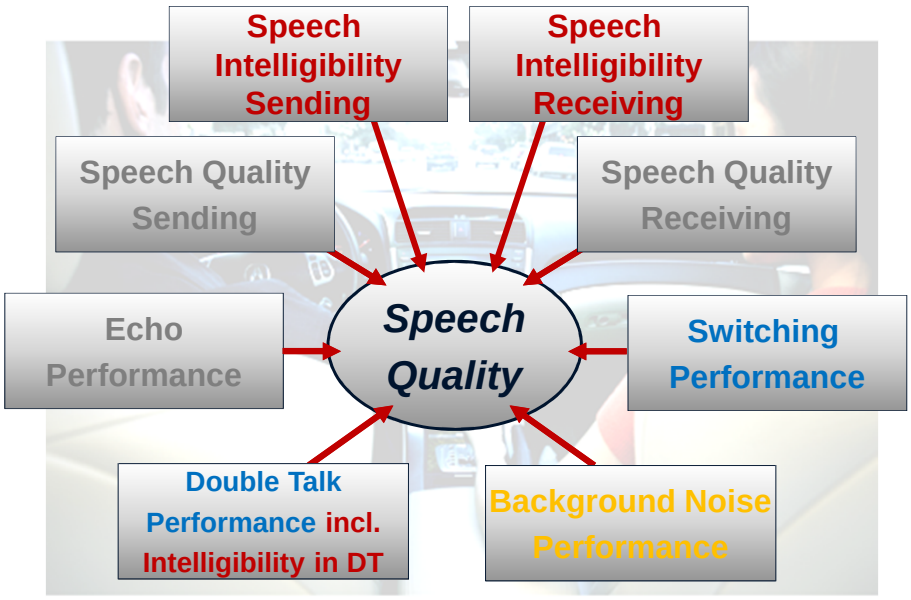
What is Different, what is Missing for Emergency Call Systems

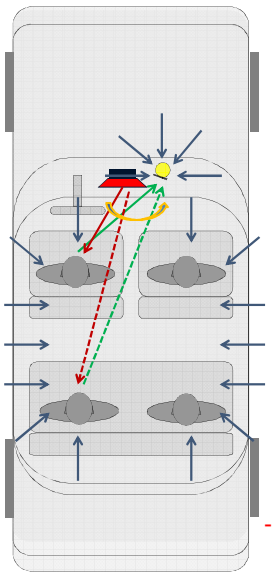


The Acoustical Situation in a Car

Receiving – speech reception by the passengers

Coupling between loudspeaker and microphone

Background Noise – in addition to speech in receive



Sending – speech pickup by the microphone

Background Noise – pickup by the microphone

Main differences compared to car hands-free:
- **Car is crashed**
- **System must work from all locations in the car**

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System Constraints for eCall Systems

- Costs – eCall systems should be produced at minimum costs
- Reliability – eCall systems should be mostly independent of the car systems, crash-proof
- Component limitations
  - Potential “one box” design with small loudspeaker
  - No advanced microphone technology due to cost and space requirements
- Limitations in system placement
- Need to be integrated into the car design during the design phase
- General acoustical difficulties in a car cabin

The Different Parameters Influencing the Quality of eCall Seech Services

Parameter in present standards	Relevance to eCall speech services
Delay	Probably less important
Frequency Response	Should be targeted to intelligibility
Loudness Ratings	Important basic parameter
Distortions	Probably less important
System noise	Less important if below certain limits
Out of Band signals	Less important if below certain limits
Terminal Coupling Loss	Probably less stringent requirement sufficient
Background noise performance	Important information in the background noise should be preserved
Echo performance	Probably less stringent requirements needed
Double talk performance	Important due to less disciplined conversation
Switching performance	Important due to less disciplined conversation
Comfort noise insertion	Less relevant
Speech Intelligibility	**Most important, new tests required**

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The ITU-T SG 12 Approach

Major considerations for P.emergency in ITU-T

- **The recommendation will deal only and exclusively with emergency call systems.**
- **The main focus of this recommendation is on speech intelligibility as well as on conversational aspects of speech quality such as double talk capability.**
- **Silent call scenarios are considered to be very important and need to be integrated in P.emergency.**
- **P.emergency will not consider post-crash scenarios, at least not in the first versions**
- **ITU-T SG12 recognizes the urgent need for such a Recommendation and the goal is to finalize a first version already by May 2015.**
- **Start with narrowband.**

The Main Parameters Considered in P.emergency

Parameter in and their purpose

Delay	***Ensure delay is below limits of relevant mobile stds.***
Frequency Response	***Target to intelligibility rather than quality***
Loudness Ratings	***Considers the different passenger locations in cars***
System noise (idle channel)	***Keep from existing standards***
Terminal Coupling Loss & additional echo performance tests	***Important to ensure proper communication from the car to PSAP, less demanding requirements than HFT***
Switching performance	***Important to ensure complete transmission of words from the passengers to the PSAP side***
Double talk performance	***Important parameter in conversation due to less disciplined behavior of injured passengers***
Background noise performance	***Taking into account the transmission of noise in silent calls (no passenger speaking)***
Speech intelligibility in the presence of background noise	***Focusing on intelligibility rather than on quality, ensuring a high intelligibility with background noise***

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Challenges in Testing and Requirements for eCall Speech Services

- Speech Intelligibility
  - In sending no objective methodology available
  - In receiving the application of existing methods is studied (not likely to be included I the first version)
- “Work-arounds”
  - Adaptation of frequency response characteristics
  - Additional loudness requirements for different positions in the car
- New focus in background noise situations:
  - High intelligibility with background noise
  - Preserve “naturalness” & “recognizability” of the background noise
- Preserve double talk capability as much as possible with special focus on intelligibility during double talk

Considerations for Speech Intelligibility Testing in eCall Systems

- **Speech Intelligibility in receiving**
  - More “classical” situation – similar to speech intelligibility in rooms
  - Potential application of existing methods such as
    - **SII (speech intelligibility index),**
    - **STIPA (speech transmission index for public address systems)**
    - **RASTI (rapid speech transmission index)**
- **Speech Intelligibility in sending**
  - No well performing objective test method available
  - Performance evaluation potentially possible using “second order” parameters such as
    - **Optimized frequency response characteristics,**
    - **Evaluation of switching and double talk performance with focus on speech intelligibility**
    - **Consideration of eCall relevant noise types**

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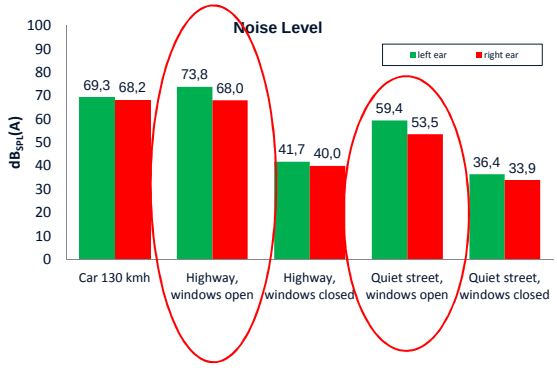
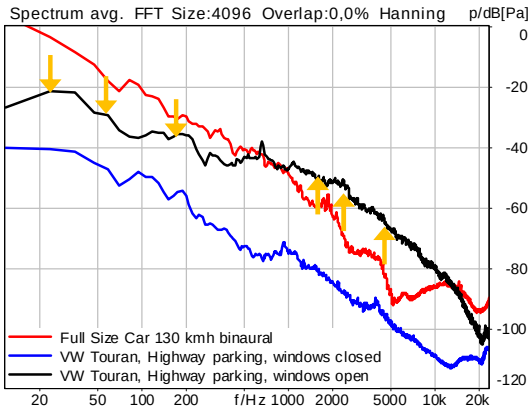
Background Noises in eCall Senarios

- Simulation of a crashed vehicle by testing with the background noise rcorded with open windows





Timeline P.emergency

- FNC 2014 conclusion: develop a **standard specifically targeted to emergency call systems** — March 2014
- **Proposal of an new Recommendation P.emergency** — April 2014
- Decision on **start of work** in ITU-T SG12 – Q.4 — Sept. 2014
- **First Draft** (based on ITU-T standards P.1100 and P.1110)
- Invitation of **experts/stakeholders** for a Rapporteur Meeting hosted by HEAD acoustics — Dec. 2014
- Define most relevant parameters and test procedures — Ongoing
- Validate new requirements
- **Final draft** (first version)
- Proposed date for consent — May 2015

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Dr.-Ing. H. W. Gierlich

info@head-acoustics.de
www.head-acoustics.de
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