

# MULTI-TALK

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Multi-Talk aims to give a group of users the ability to communicate in a many-to-many, push-to-talk fashion. The problem formulation is motivated by application use cases found on construction sites as well as in large sports events such as Formula 1 or Show jumping. The main project goal is to evaluate the communication requirements of audio broadcasting in a mobile ad hoc network and suggest techniques to increase the voice quality and the broadcast range.

## 1. Background and Motivation

Multi-Talk aims to give a group of users the ability to communicate in a many-to-many, push-to-talk fashion. Multiple simultaneous duplex links should be established between a maximum of six users. In addition, numerous simplex users listen to the ongoing dialog and may choose to become active (duplex), thereby forcing the oldest of the currently active users to be removed from its duplex link in a FIFO like fashion. Multi-Talk is motivated by application use cases found on construction sites as well as in sports events such as Formula 1 or Show jumping.

## 2. Problem formulation

To minimize development cost, Multi-Talk should be implemented using components-off-the-self (COTS), e.g., WLAN cards in a mobile ad hoc network. Broadcasting voice in a mobile ad hoc network implies very specific communication requirements. The voice application itself implies relatively error tolerant, soft real-time constraints, but also high throughput and good broadcast range. The use of COTS implies that information is available on a bit level only and thus no soft information can be used. The mobile ad hoc network implies wireless communication links that are error-prone, time-varying and sensitive to interference from collocated systems.

The main goal of Multi-Talk is to evaluate the communication requirements of audio broadcasting in a mobile ad hoc network based on COTS and suggest techniques to increase the voice quality and the broadcast range.

## 3. Approach

The use case and thereby the performance measures and requirements are to be developed in close collaboration with customers of Free2move.

The obtainable performance using COTS, e.g., standard WLAN cards and potentially also IEEE 802.11s, is to be evaluated initially. This will give an indication of the available voice quality and the necessary hardware constraints.

A survey on research results relating to soft real-time audio communications in mobile ad hoc networks is to be conducted. Further, research results on joint channel and voice coding for hard decision transceivers is to be studied.

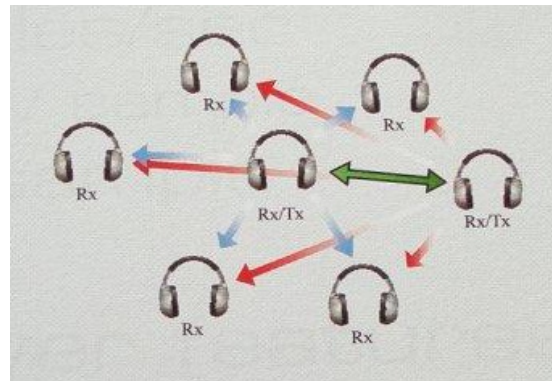


Figure 1. Two nodes are active (duplex) and broadcast voice in a mobile ad hoc network. Remaining nodes listen (simplex) to the ongoing dialog.

Next, the project should suggest suitable adjustments and additions to improve system performance, i.e., suggest efficient source and channel coding techniques suitable for the particular conditions that apply.

If the problem formulations within the project give rise to research problems suitable for a PhD student project, such a project should be formulated.

## PARTNERS AND STATUS

**Industrial partner:** Free2move AB.

**Project funding:** CERES profile funding from the Knowledge Foundation and the industrial partners.

**Duration:** July 2009 – July 2010.

**Project leader:** Dr. Elisabeth Uhlemann

**Ph D student:** Katrin Bilstrup

## RELATED PUBLICATIONS

E. Uhlemann, L. K. Rasmussen and P.-A. Wiberg, "Wireless real-time communication using deadline dependent coding," in *ARTES - A Network for Real-Time Research and Graduate Education in Sweden*, edited by H. Hansson, Uppsala University, Sweden, 2006, ISBN: 91-506-1859-8, pp. 397-415.

E. Uhlemann and L.K. Rasmussen, "Incremental redundancy deadline dependent coding for efficient wireless real-time communications," *Proc. IEEE International Conference on Emerging Technologies & Factory Automation*, Catania, Italy, Sep. 2005, pp. 417-424.