Implementation of a Car2Car communication system on different platforms using Wifi Direct as communication protocol

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Inhaltsverzeichnis

Shortcuts

V2V Vehicle to Vehicle

Kapitel 1

Introduction

Since V2V is a trendsetting and complex topic you can't find much literature. Only a few internet sources currently offer relevant information.
The aim of this work is to provide a basic understanding of the principles of V2V and to implement three prototypes for Windows Phone and Android based mobile phones and a rasberry pi.

Kapitel 2

Car2Car

Car 2 Car Communication (C2C-Communication) or Car 2 X Communication describes the communication between vehicles and other infrastructure. The goal is to improve the safety on the streets and to inform road user about upcoming problems on the road immediately including different car manufactureres and roadside units. Furthermore the Car 2 Car Communication technology should be a basis for decentralized active safety applications and therefore reduce accidents and their severity. Besides active safety functions, it includes active traffic management applications and helps to improve traffic flow.

2.1 Actors

One Actor of the System is the driver, which receives road information and warning messages or route recommendations.
Another Actor is the road operator, which receives road information from cars or other infrastructure and therefore will improve the control of the traffic in a more efficient way.
The last important actors are hotspot and internet providers, who can install their communication systems for example at gas stations.

Kapitel 3

Wifi Direct

Kapitel 4

Prototypes

4.1 Android

Since Android 4.0, devices with appropriate hardware are allowed to connect directly to each other over WI-FI P2P without an access point between them. Android P2P framework complies with the WI-FI Alliances' WI-FI Direct certification program. With the usage of this API you are able to discover and connect to other devices when they support WI-FI P2P. According to documentations the advantage of WI-FI P2P beside Bluetooth or similar connection types is a fast connection across distances much longer than others. This allows applications a fast exchange of data between multiple users, which could be useful for applications such as multiplayer games, photosharing applications and in general, all applications which are relying on a fast connection between a long distance.

4.2 Rasberry Pi

4.3 Windows Phone

Microsoft included Wifi Direct in his new Windows Phone 8.1 SDK, but actually there is no good documentation or sample which describes the usage of Wifi Direct in a Windows Phone app.
The other option would be to use there own namespace which connects two phones directly to each other, but this requires Bluetooth and WIFI and the same app on both devices. Since this is not compatible with any other devices than Windows Phones this is not good solution. Furthermore are the devices limited to the Bluetooth range which is in fact not very long.

Kapitel 5

Evaluation

Kapitel 6

Conclusion and Outlook

Listings

Abbildungsverzeichnis

Quellenverzeichnis