

fm RDS / TMC

Bastian Bloessl
<bloessl@ccs-labs.org>

About Me

- PhD Student @ University of Paderborn
- Distributed Embedded Systems Group
- Work on several OOT Modules
 - WiFi, ZigBee, RDS, WeatherSonde

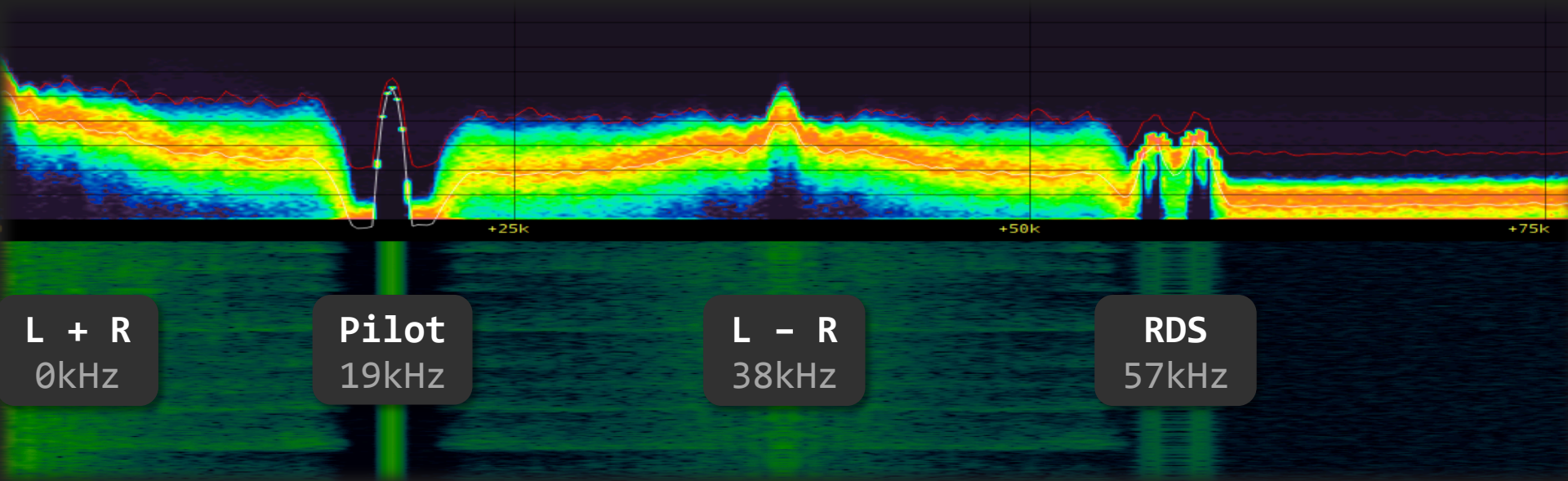
DF1BBL



Radio Data System



Radio Data System

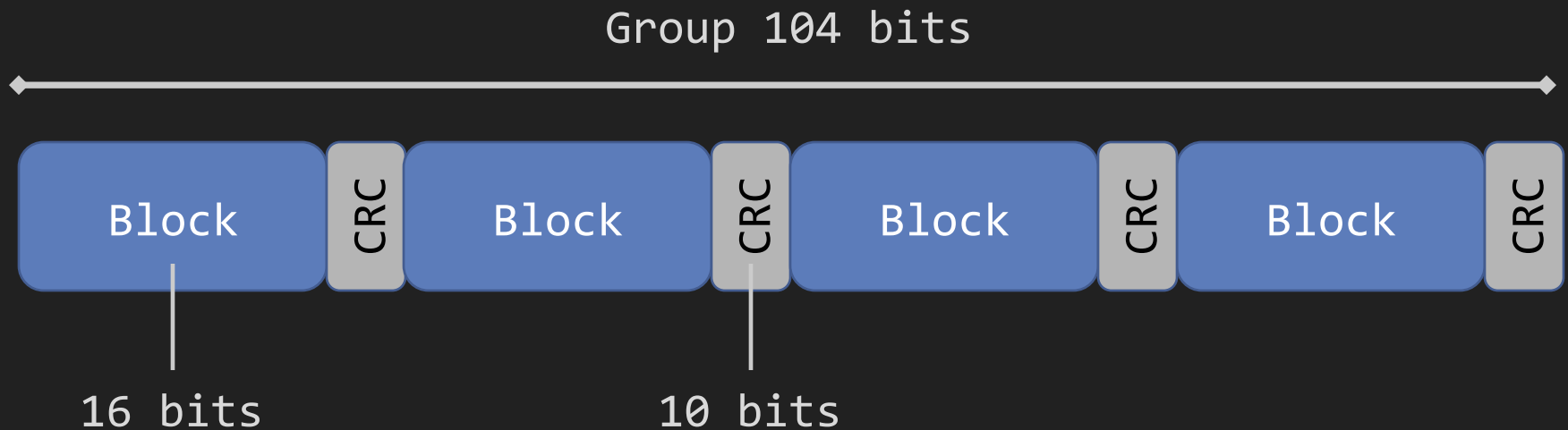


Radio Data System

- Released 1984
 - Last update 2014
- Digital subchannel on FM broadcasts
 - Station name
 - Alternate frequencies
 - Time
 - Traffic program / traffic announcement

Encoding

- Manchester encoded
- 1187.5 bit/s



Why RDS?

- Simple protocol
- Cheap hardware
 - RTL-SDR + 2EUR antenna
- Ubiquitous
- Extension of FM receiver



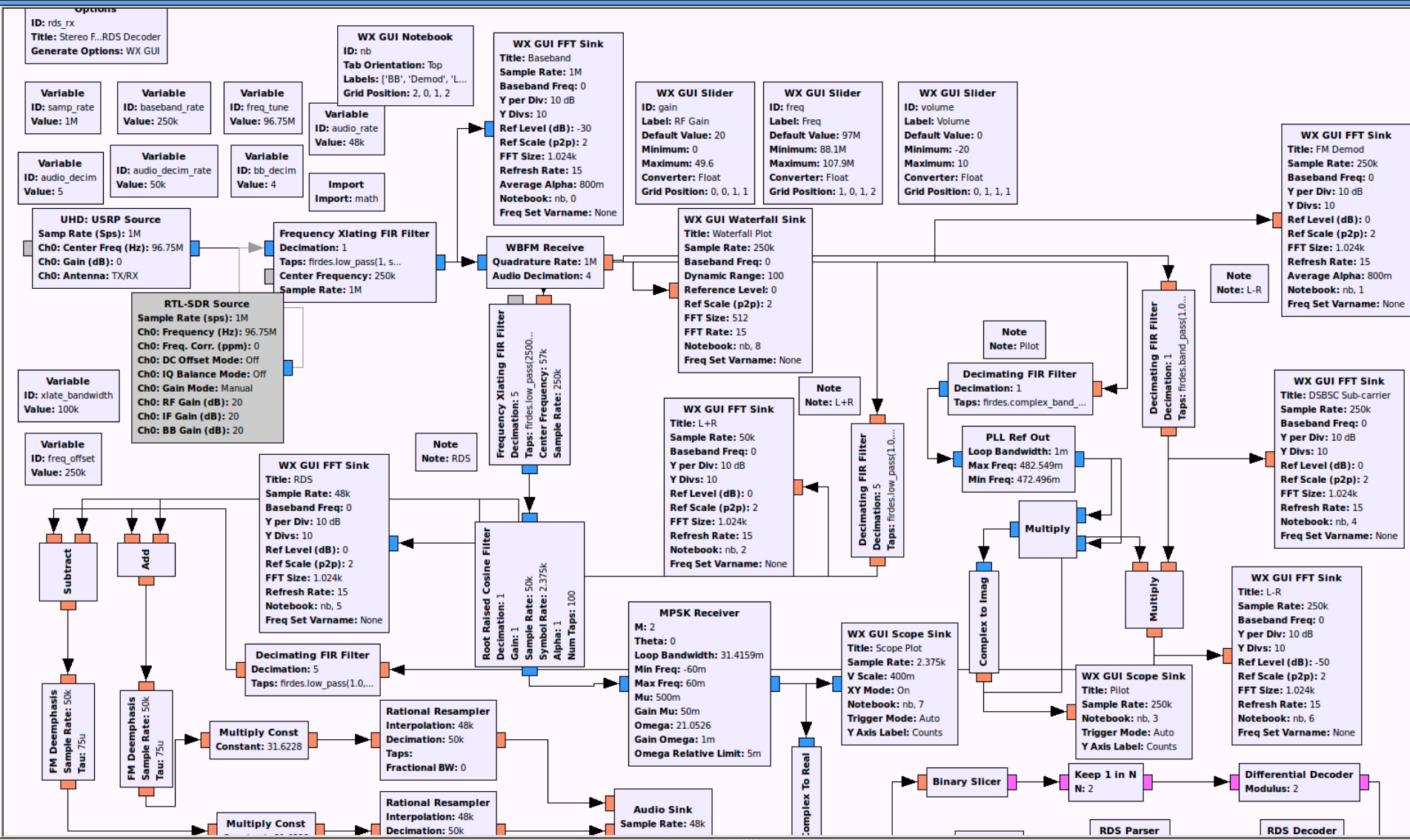
R·D·S

GR-RDS



- Open Source
- Easy to install
- Tested with RTL-SDR, USRPs, HackRF
- Receive and transmit side
- <http://www.github.com/bastibl/gr-rds/>

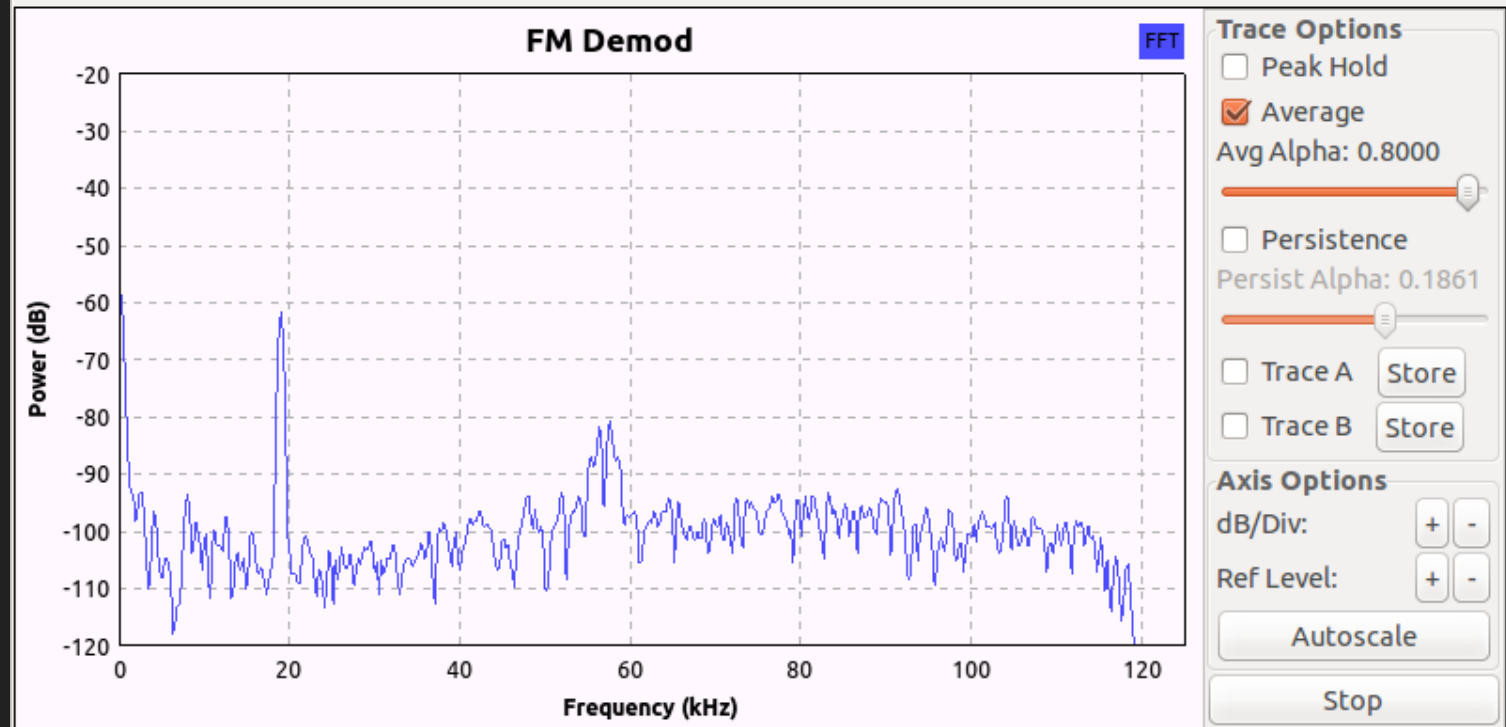
GR-RDS



RF Gain: 44 Volume: 0

Freq: 97M

BB Demod L+R Pilot DSBSC RDS L-R RDS constellation Waterfall



Frequency **97.00** Station Name **WDR 3** Program Type **Other Music** PI **D393**

TP TA Music Stereo AH CMP stPTY

Clock Time **25.01.2015, 16:04 (+1.0h)**

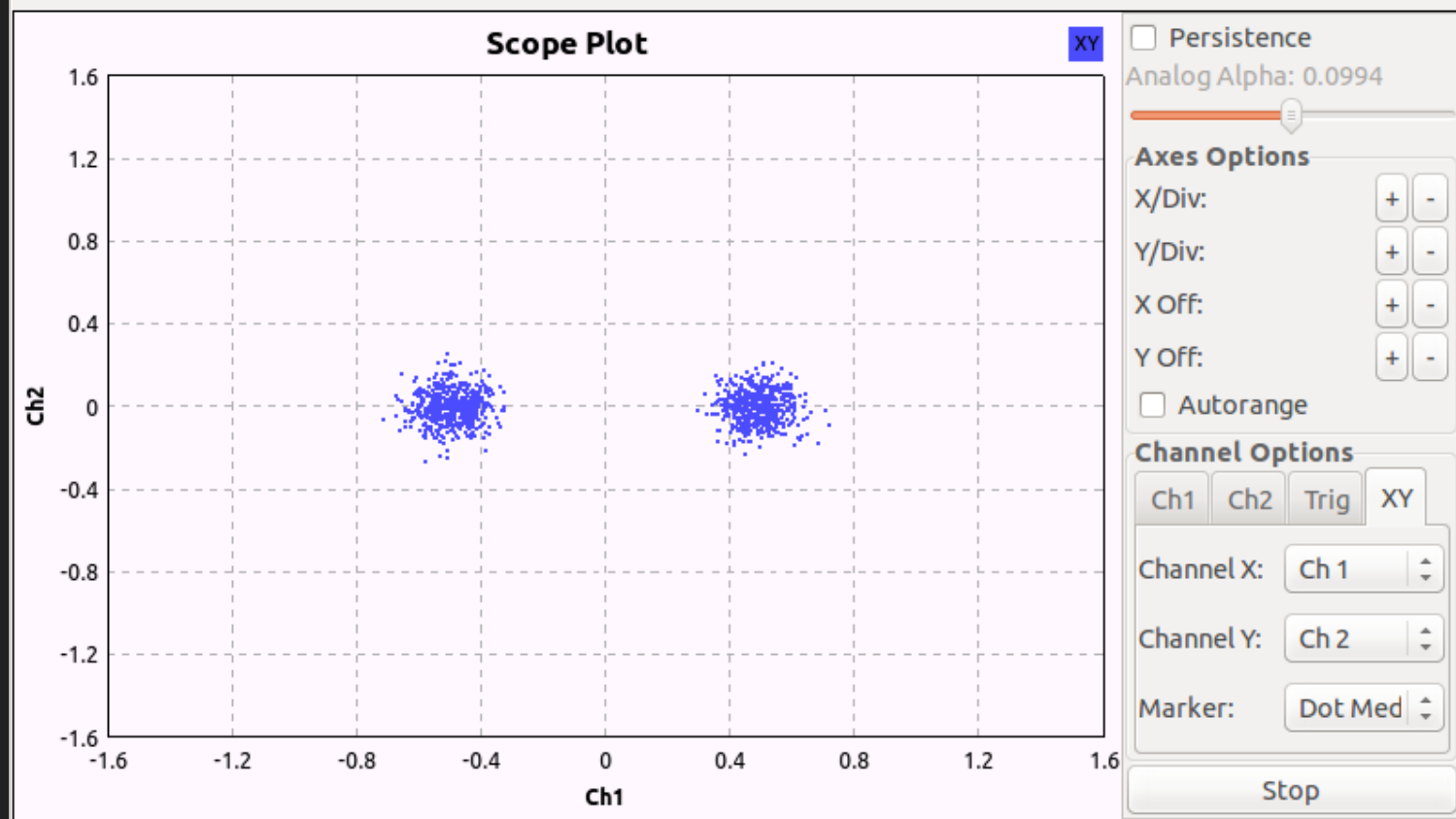
Alt. Frequencies **92.70MHz, 97.00MHz**

Radio Text **WDR 3 Musikkulturen Mit Thomas Daun Mazurka-Fieber beim TFF J...**

RF Gain: 44 Volume: 0

Freq: 97M

BB Demod L+R Pilot DSBSC RDS L-R RDS constellation Waterfall



Frequency **97.00** Station Name **WDR 3** Program Type **Other Music** PI **D393**
TP TA Music Stereo AH CMP stPTY
Clock Time **25.01.2015, 16:04 (+1.0h)** Alt. Frequencies **91.70MHz**
Radio Text **WDR 3 Musikkultufon: 0221 56789 333 (kostenpflichtig)**

TMC

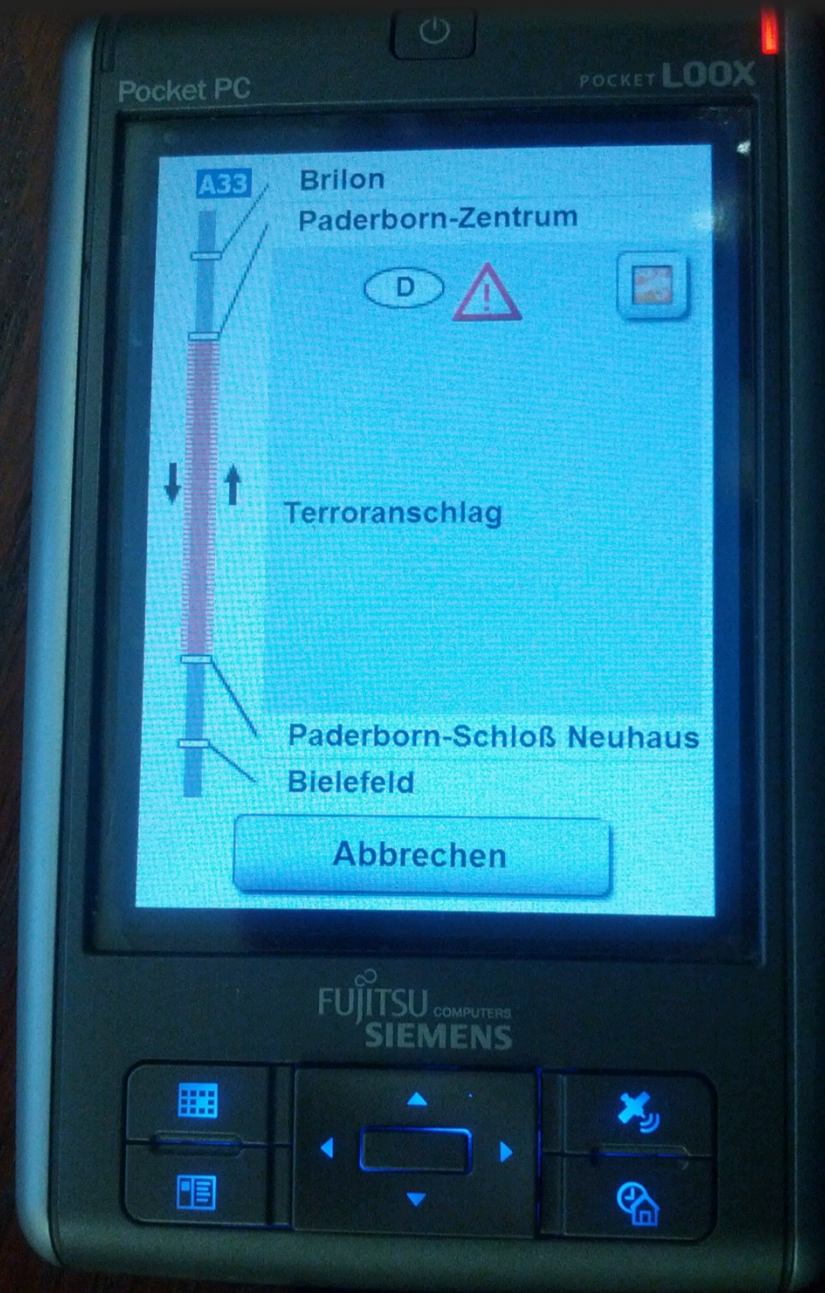
- Traffic Message Channel
 - RDS group type for traffic information



TMC Encoding

- National location table
 - #266 Berlin, #11023 Paderborn Center
 - 61456 locations for Germany
- Alert-C for event types
 - #1340 swarm of insects
 - #2022 public transport strike
 - #1456 bull fight





Canard? Hacked?

Navigation system
reports terrorist
attack in Bavaria

Bild ≡ MENU

FALSCHMELDUNG? GEHACKT?

Navi meldet Terroranschlag in Bayern



Disclaimer

- Please be careful with
 - What you send
 - On which frequency you send it
 - How much power you use
- You never know
 - Who receives it
 - If it triggers automated actions



Conclusion

- Try it
- Improve it
- Build some stuff with it

