Cellular Network Data Logging Platform

Design and development of a system to measure the cellular network coverage

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Introduction: Currently, people in Switzerland are served by several cellular network providers. However, only three of them – namely Swisscom, Sunrise and Salt – maintain own infrastructure such as base transceiver stations (BTS). As a result, they are also the only ones who have the ability to directly influence the cellular network coverage in Switzerland and therefore have a significant impact on when and where we can get in touch with whom virtually.

The wireless research vehicle, a car equipped with different measurement systems, is used by the Institute for Communication Systems (ICOM) to perform measurements on various wireless network systems such as DAB or Polycom, but not yet on mobile radio standards.

Objective: In order to add these measurement capabilities to the Wireless Reasearch Vehicle, the goal of this thesis was to develop a stand-alone data logging platform, which is capable of measuring different parameters of cellular networks autonomously. The system is based on three Telit cellular modules, which can be, concerning future purposes, interchanged easily. To assign the measured cellular data to a geographical location, a GNSS receiver from u-blox is used. The collected data itself is stored on an SD card, which is used to transfer the recordings to an external computer for evaluation. A LCD display and buttons provide the possibility to control and configure the most important parameters on the fly.

Since the interior of the wireless research vehicle can reach high temperatures on hot summer days when parked, and also low temperatures in winter, the system must be temperature resistant and start working within the shortest time.

Result: The result is a temperature resistant hardware based on Telit's LE910C1-EU module as its centerpiece to measure 2G to 4G cellular networks. With just a few hand movements, the modules can be interchanged to add for example 5G measuring capabilities with the FN980 module.
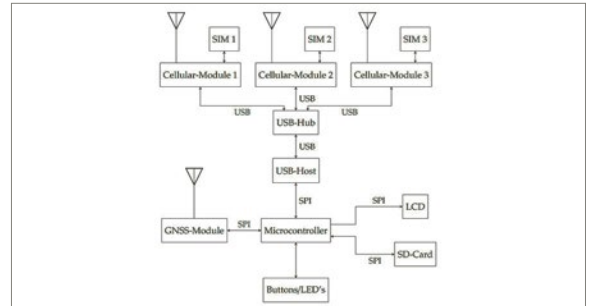
The hardware of the system carefully packed into the 3D-printed housing – here without the top cover
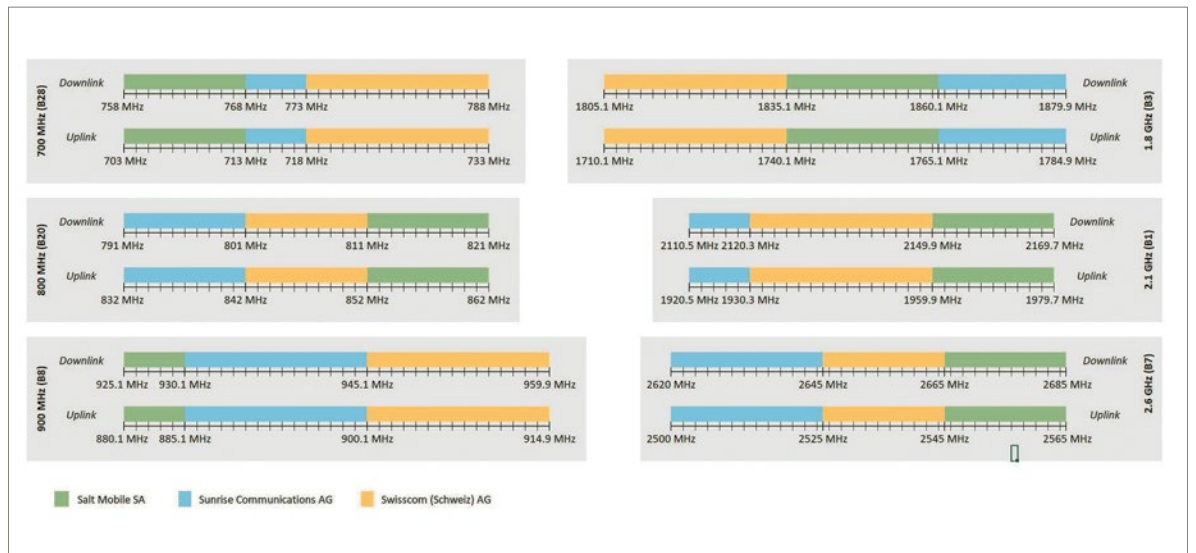Own presentment

All the dependencies of the main hardware parts
Own presentment

All of the six mobile frequency bands supported by the LE910C1-EU and used in Switzerland
Own presentment, based on data from efis.cept.org

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