

Research project: **Opportunistic Hiking**

Keywords: opportunistic networks, device-to-device communication, mobility modelling

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**Background:** In opportunistic networks, there is no fixed infrastructure (e.g., a cellular network) and devices simply exchange messages over a short radio channel when they happen to meet. For example, mobile phones in a rural area with no mobile network coverage could communicate with each other and eventually relay messages to desired destinations. This routing mode is known as *store-carry-forward*.

In Iceland, we have many areas with limited or non-existing network coverage, hosting a “more or less continuous” flow of people visiting natural sightseeing hotspots. The most recent example is the Fagradalsfjall volcano which was initially without cellular coverage.

Let us consider a scenario where a large number of mobile phones, each of them equipped with ample amounts of storage, visit such a location on a daily basis. It is clear that these devices can carry huge volumes of data to and from the given area. Moreover, the same devices can be used as a distributed storage for important data related to the given area (e.g., safety regulations and weather forecasts).

### Project description:

In principle, it seems plausible to use opportunistic communication in the aforementioned settings. The goal in this project is to develop efficient routing mechanisms that adapt to this kind of setting. To this end, we must first understand the mobility patterns, develop a model that captures the essential characteristics of “touristic mobility in nature hotspots”. The next step is to develop efficient opportunistic routing principles that carry the data to and from the given area(s). Relevant performance metrics include bandwidth (e.g., GB/min) and the mean one-way delay (e.g. how fast an urgent message sent from Internet can reach a person located in the isolated area).

The third step is to integrate the so-called floating content concept for storing and sharing information relevant to the given area. Such information can be touristic (e.g., photos and greetings) as well as official guidelines and safety rules.

**Results:** The results of this work will be three-folded:

1. Mobility models with parameters matching some real life scenarios for which data is available. (e.g., GPS trace files).
2. Performance evaluation of the opportunistic communication in the example scenario by means of simulations and analysis (if possible).
3. Developing a complete concept for the above system including the floating content concept.  
Note that this type of system could be an optional part of Rakning C-19 app.

### Expected skills:

- Programming skills and ambition for elegant code
- Basic understanding of the probability theory and wireless networks
- Analytic

