



Measuring Mobile Broadband Networks in Europe

Özgü Alay
ozgu@simula.no
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- Underpins a lot of vital operations of the modern society
- The popularity of mobile devices combined with high-capacity 3G and 4G mobile networks, has radically changed the way most people access and use the Internet.



Objective data on the performance and stability of MBB (user's perspective)?

MONROE: a unique platform for measurements and experiments in operational MBB networks

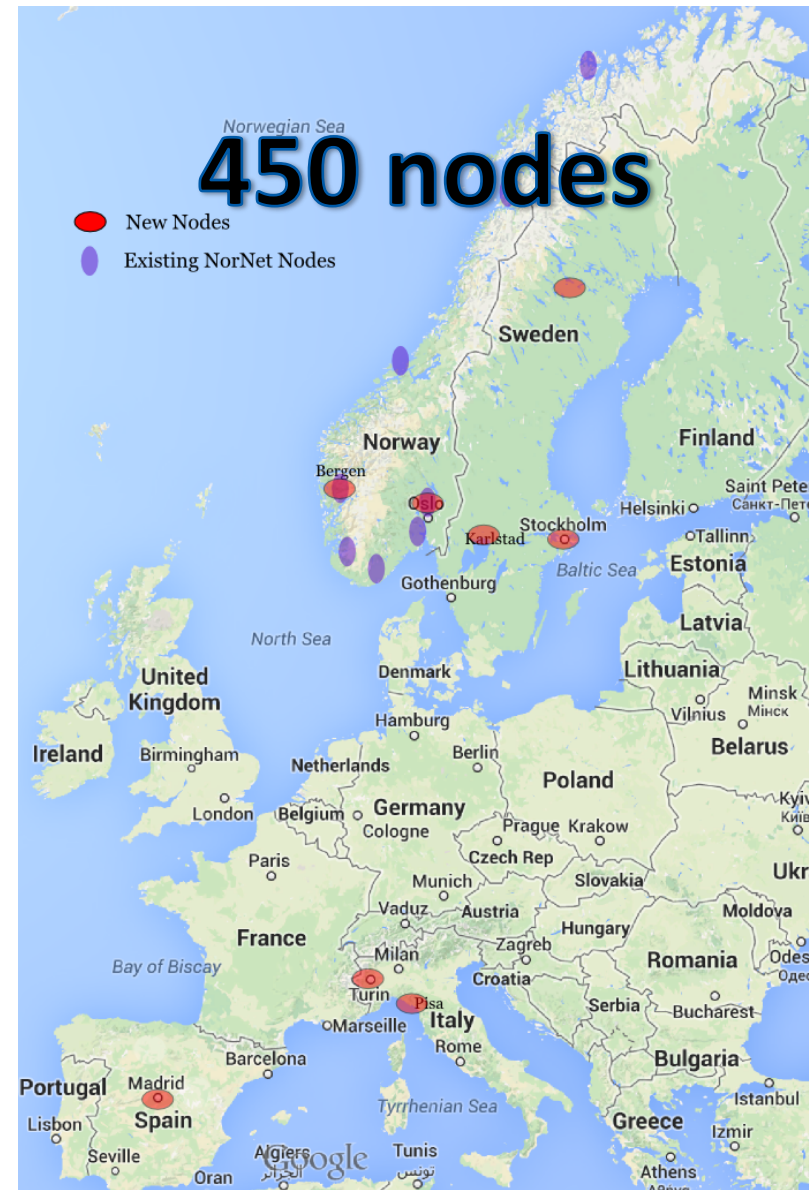
- Design, build and operate an **open, European-scale, and flexible** platform with multi-homing capabilities to run experiments on operational 3G/4G Mobile Broadband networks
- Use the platform for:
 - identification of key MBB performance parameters, thus enabling **accurate, realistic, persistent** and **meaningful** monitoring and performance assessment
 - **Moody's of MBB Networks**: price, bandwidth and applications
 - examination and evaluation of **innovative protocols and services** for MBB networks

Who can benefit from MONROE?

- **Operators:** Discover configuration/operational problems using the information on performance from the users' perspective
- **Regulators and society at large:** Assess the stability and performance of MBB networks to guide regulations and spur competition
- **Organizations and businesses:** (Transport/logistic companies and emergency services) Assess the quality of their services that depend heavily on mobile networks in their operations
- **Users/consumers:** Make informed choices on which network provider to choose
- **Researchers, innovators and experimenters:** Evaluate the performance of novel applications or protocols in a real operational setting

MONROE

- Build on the existing NorNet Edge infrastructure, consisting of 200 dedicated operational nodes spread across Norway
- Extend the Coverage to 4 European Countries (Norway, Sweden, Spain, Italy)
 - Comparison of different configurations, regulations, frequencies and operator strategies in and among different countries



MONROE

- Nodes on buses, trains and trucks
 - Impact of mobility
 - Rural vs City
- 3 MBB operators and WiFi
 - Experimenting on different access technologies
 - Explore new ways of combining them to increase performance and robustness
 - New opportunities, i.e., 4G/WIFI handover



Capabilities and Functionalities

- Linux based measurement boxes that supports:
 - Performance evaluation of different applications (HTTP, VoIP, video streaming, video conferencing, etc...)
 - Kernel modifications
 - Simultaneous access to multiple providers
 - Performance evaluation of novel protocols and services (MPTCP, D2D, etc...)
- Provides an user access and experiment scheduling interface through FED4FIRE
- Compatible to mPlane

MONROE

- Started March 1st 2015
- 8 Partners: Simula (Coordinator), IMDEA (Spain), Karlstad University (Sweden), Polytechnic Torino (Italy), Nextworks (Italy), Telenor (Norway), Celerway (Norway), NET1 (Sweden)
- Budget 6.5M € (Open calls to support external user's experiments (3.3M €))
- First Open Call will be announced Early 2016
 - Up to 150k € support
 - Experiments
 - Extensions to the testbed