



Ericsson Weather Data

Microwave Induced Rain Monitoring



ERICSSON

In
partnership
with

SMHI

What is EWD?



EWD is measuring rainfall in real time utilizing signal disturbances in microwave links used as backhaul in cellular networks

Rain is affecting microwave signals and these disturbances are filtered and analyzed in near real time, to calculate rainfall along the link path as well as to extrapolate rainfall between links.

Resolution

Compared to existing radar solutions, microwave based measurements result in higher spatial and temporal resolution.

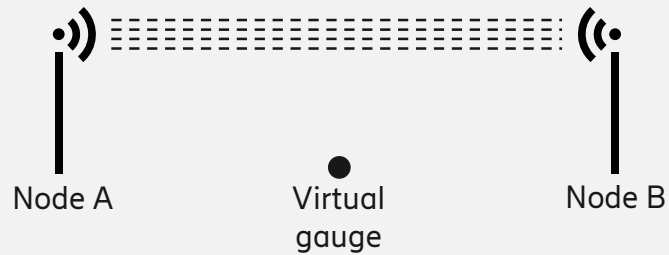
CAPEX

Utilizing existing hardware in commercial cellular networks providing a cost efficient solution for detailed rainfall measurements.

Use Cases

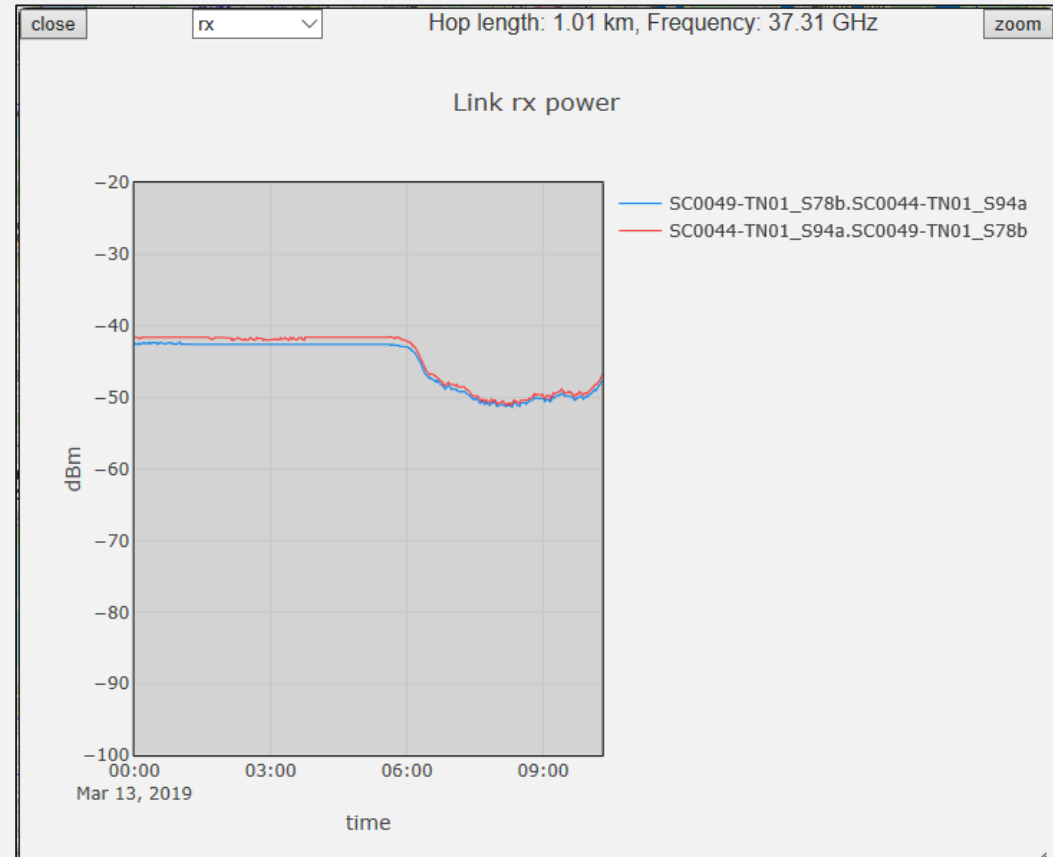
Detailed rainfall and flood predictions for climate mitigation efforts; cities, agriculture, tourism, insurance, weather agencies and water utilities

The concept



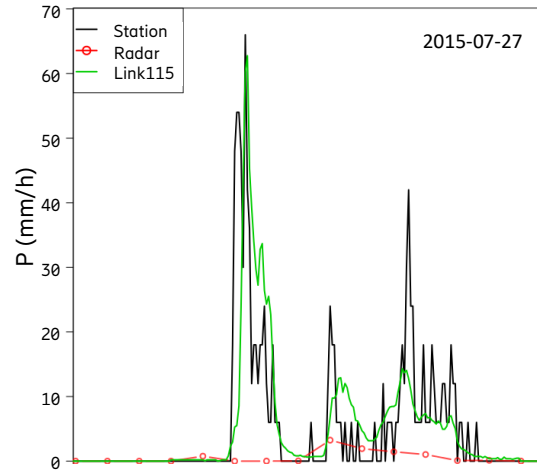
How does it work?

- Tx from node A and Rx from node B is measured.
- Rainfade gives an attenuation of the power.
- Utilized to calculate rainfall across the link path.
- Algorithm calculates rainfall and creates a virtual gauge at the middle of the link.



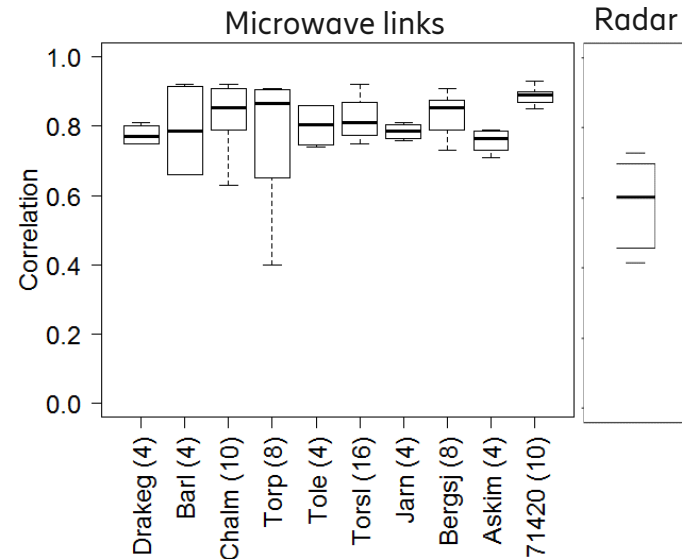
Resolution & correlation

Example data from Gothenburg, Sweden

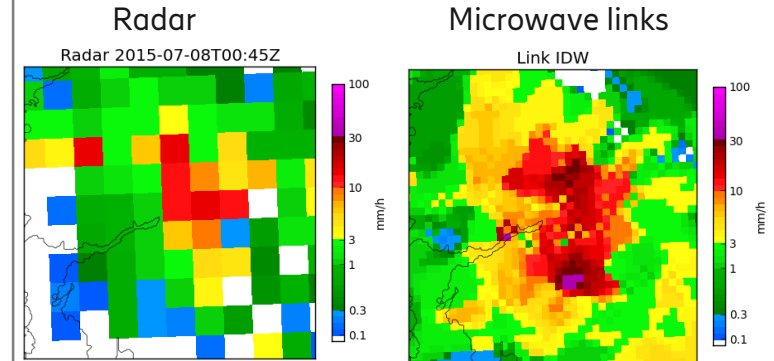


4 Hour Storm event (red dots = 15' radar intervals)

- Mobile network provide better ability to capture **peak intensities** compared with radar
- Better also at capturing **quick rainfall events**
- Bias of 30% compared to radar at 20%, rain gauge at 10%



| Correlation | Min | Mean | Max |
|-----------------|-----|------|------|
| Microwave links | 0,4 | 0,82 | 0,93 |
| Radar | 0,4 | 0,57 | 0,73 |
| Nearby gauges | - | 0,8 | - |



Dense MW Networks enable high resolution rain measurements

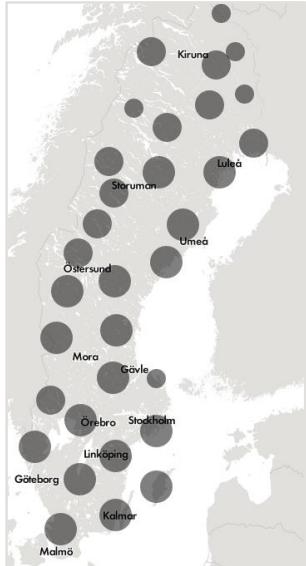
| | Radar | Microwave links |
|---------------------|-------------------|-----------------|
| Temporal resolution | 15 min | 10s - 1 min |
| Spatial resolution | 4 km ² | 100-1 000 m |
| Vertical sampling | 1.2 km | 25 m |

The business case



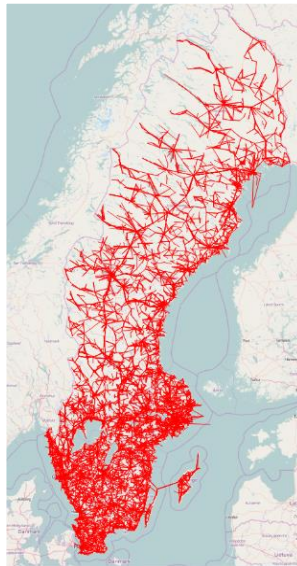
Price comparison, Sweden

Radar & Gauge System



- 12 radar dishes & 600 rain gauges
- 50 MUSD CAPEX
- 8 MUSD OPEX/YR
- 10yr NPV system spend: 120 MUSD**

MW systems



- 20,000 MW Hops
- 3 Major Operators
- No CAPEX charged
- 0,8 MUSD OPEX/YR
- 10yr NPV system spend: 12 MUSD**

Use cases for EWD

- Historical data
- Real time data
- Near-term forecasting

Agriculture



- Optimize time point of crop cultivation
- Micro-insurance for farmers
- Preventive actions, cattle & crop protection
- Irrigation, fertilization etc. decisions

Public stakeholders



- Risk mapping & vulnerability assessment
- City planning
- Real-time alerts & emergency warning
- Predictions for early warning systems

Water services



- Sewage planning & design
- Real time monitoring
- HydroElectric price prediction
- Improved hydrological modelling

Transportation



- Road and transit planning
- Flood & landslide warnings
- Traffic routing, emergency vehicle routing, traffic flow management

Insurance



- Validate claims
- Optimize policy pricing
- Risk assessment, weather index & 3rd party models
- Real time warning to insurers
- Business continuity services



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