



**Digl-TIGO meeting
TIGO, Dar es Salaam, 18Feb2018**

Digital Inclusion in Rural Tanzania

Digl.BasicInternet.no

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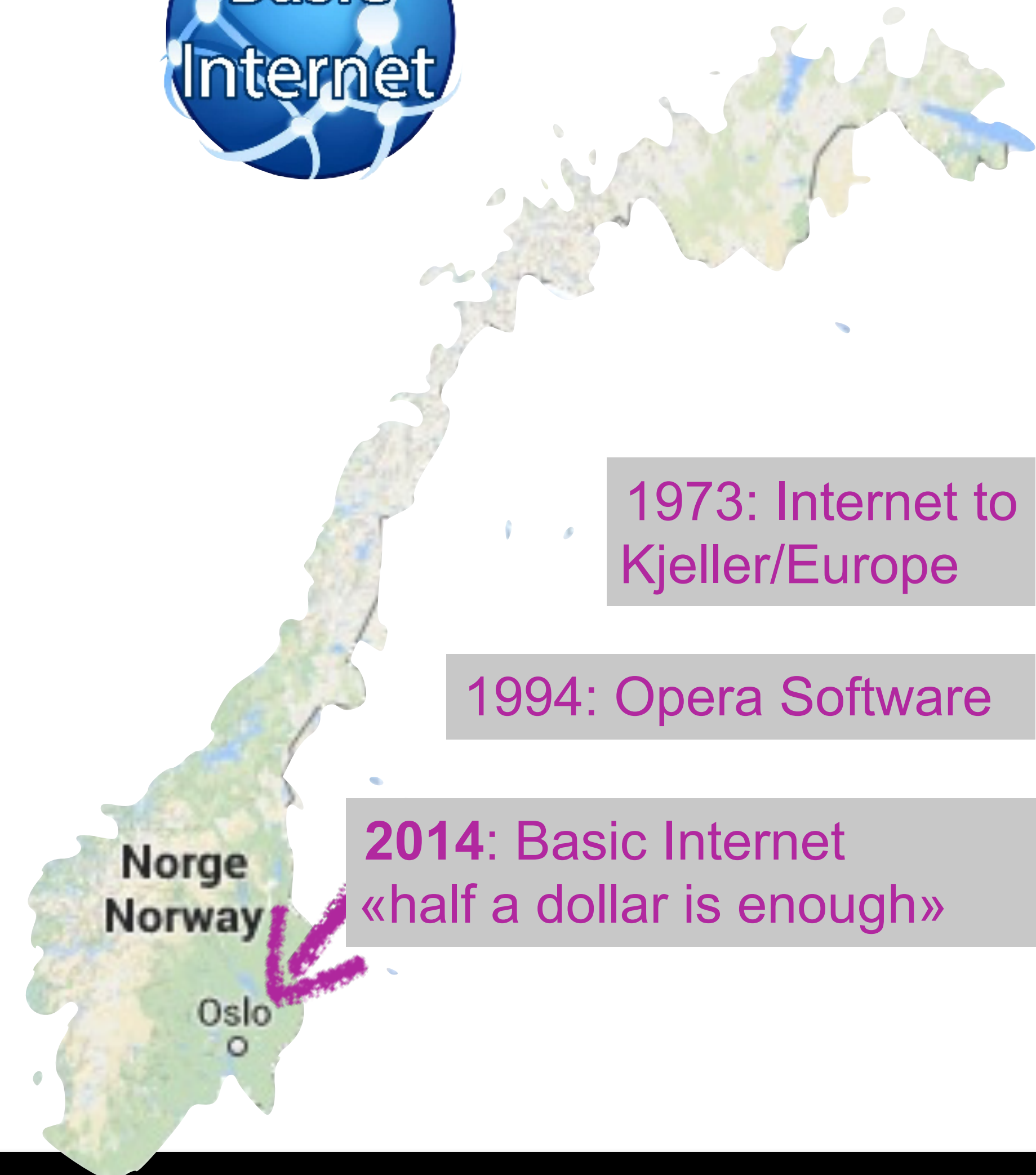
Goals of the meeting

- Contribute with your expertise on Digital Rural Inclusion
- Goal of the Meeting: “Digital Inclusion in Rural Tanzania”
 - ➔ Mobile Broadband uptake in rural areas
 - ➔ Digital Health, Literacy and decent work
- Scaling up from pilot activity “free access to non-profit content”
 - ➔ From pilot phase with 3 to 10 villages
 - ➔ How can we contribute to the success of UCSAF?
 - ➔ Common initiative “Connecting Rural Tanzania”

Executive Summary



- **Information** is the **basis** for **education**, **health** and entrepreneurship
- **Digitalisation** is the engine of **economic growth** and wellbeing of people
- **InfoInternet** is access to text and pictures
 - Develops the market, **complementary** to market actors
 - Roll-out through local partners
 - **Sustainable business**, free information & paid amusement
- Sustainable development requires **digital inclusion**, which necessitates Internet for all
- Impact lives of billions of people in the world
- **Now:**
 - Operations in DRC Congo
 - Pilot for digital Tanzania
 - Pilot for "off-grid" satellite GSM with Basic Internet
 - Outlining **the pilot project** for India



Main objectives - “Internet light for all”

2017



- Free access to information
 - for everyone
 - for all times (sustainable business model)
 - KPI evaluation
- Pilot in Tanzania
 - Health information
 - 2 health spot (Phase A)
 - 10 health spot (Phase B)
- Pilot in DRC
 - Extend GSM with InfoInternet
 - 2 + 6 off-grid villages (A + B)
- Sustainability and Impact

A screenshot of the website for the "Non-discriminating Access for Digital Inclusion" (DigI) project. The website has a navigation menu with links for Home, Overview, Tanzania, DRC, Basic Internet, Connect the Unconnected, and About us. The main banner features the title "Non-discriminating Access for Digital Inclusion" and three images showing people using mobile devices. Below the banner is a paragraph describing the project as a three-year initiative from 2017 to 2020, aimed at establishing pilots for InfoInternet access in DRC Congo and Tanzania. On the right side, there is an "About us" section listing the "DigI members": Josef Noll, Andrea Winkler, Ingeborg K Haavardsson, Christine Holst, Elibariki Mwakapeje, Helena Ngowi, Bernard Ngowi, Erwan Le Quentrec, Finn Helge Tolpinrud, Maurice Isabwe, and Peter Cardellichio.

Home Overview Tanzania DRC Basic Internet Connect the Unconnected About us

Non-discriminating Access for Digital Inclusion

The **Non-discriminating access for Digital Inclusion (DigI)** project is a three year project, running from 2017 - 2020 with the main objective to establish pilots for the **InfoInternet** access in **DRC Congo** and **Tanzania**. The project was founded by the Research Council of Norway as part of the **Visjon2030** portfolje^[1]. R&I work related to the pilots will prove business profitability for commercial establishment of the **InfoInternet** as an independent and self-sustainable ICT and communication infrastructure for digital inclusion. Internet access is a universal issue and of major concern to many policy makers and governments. Free access to information presents the basis for a scalable solution of digital access for everyone in the society.

About us

DigI members

- Josef Noll
- Andrea Winkler
- Ingeborg K Haavardsson
- Christine Holst
- Elibariki Mwakapeje
- Helena Ngowi
- Bernard Ngowi
- Erwan Le Quentrec
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<http://DigI.BasicInternet.no>



Focus in DRC



- Addressing Internet as enabler for Digital Society
 - existing mobile (GSM only) network
 - existing entry through ongoing collaborations
- Potential services:
 - voucher-sales for digital services,
 - electrical lights,
 - programs and mentoring for education and health
- Sustainability
 - operated by commercial actor
 - service continuity (free InfoInternet)
 - only 2-2,5% of bandwidth needed

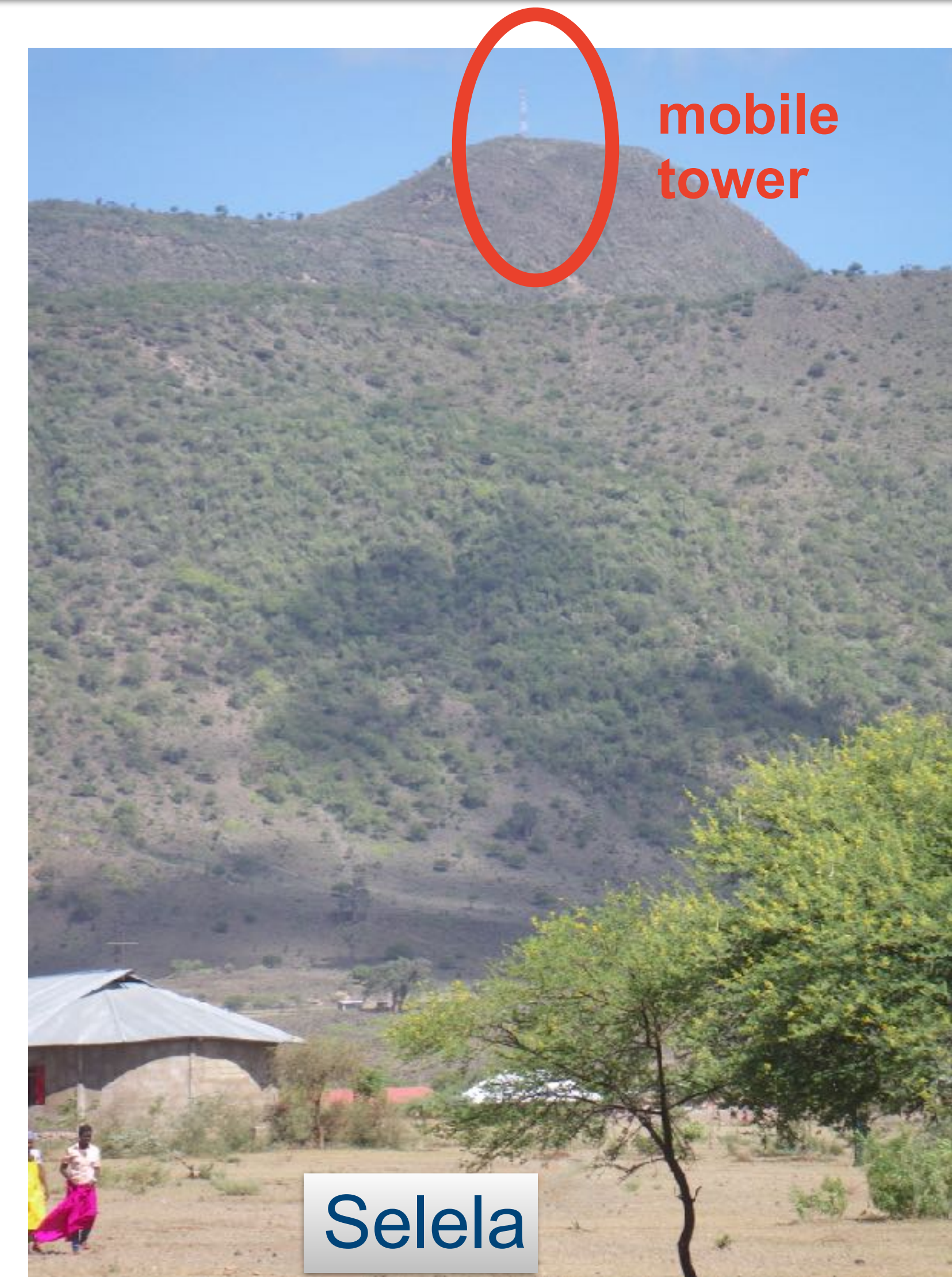


Status Connectivity Tanzania, 12Feb2018



http://its-wiki.no/wiki/Digl:Roundtable_Digital_Health_for_Tanzania

- Universal Communications Service Access Fund (UCSAF)
 - bring mobile coverage to Tanzania (TZ).
 - mobile coverage 90% of the population (2G).
 - enabled connectivity to 500 wards, over 2000 villages have 2G
 - ▶ covering 4 million people in rural Tanzania, over 300 schools
 - ▶ total of 150.000 km², added 16% of the country.
- **Goal:** Reach 98% of the population
 - increase of 8% is difficult to reach due to the spread population.
 - High operational costs for the 2G network
 - ▶ maintenance of the remote sites, security and power supply.
 - Internet and mobile broadband (3G and 4G networks),
 - ▶ the majority of wards have 3G in the centre
 - ▶ 4G is sparsely deployed, concentrating on cities.





Government building, Selela



local guest house, Selela



Government building, Izazi



tower (3G), Migoli

Migration path: 3G/4G upgrade of base stations



- From 2G to 4G (5G)
 - tower upgrade
 - customer base & devices
 - future technology: 4G/LTE
 - coverage: 4G >150 km vs 3G ~ 10-15 km
- Using 450 MHz LTE
 - “nationwide coverage”
 - termination for hot-spots
- 4G hot-spot termination
 - Jio (India): INR 999 (USD ~13) hot-spot
 - INR 150 (USD ~2.2) for 1 GB/day



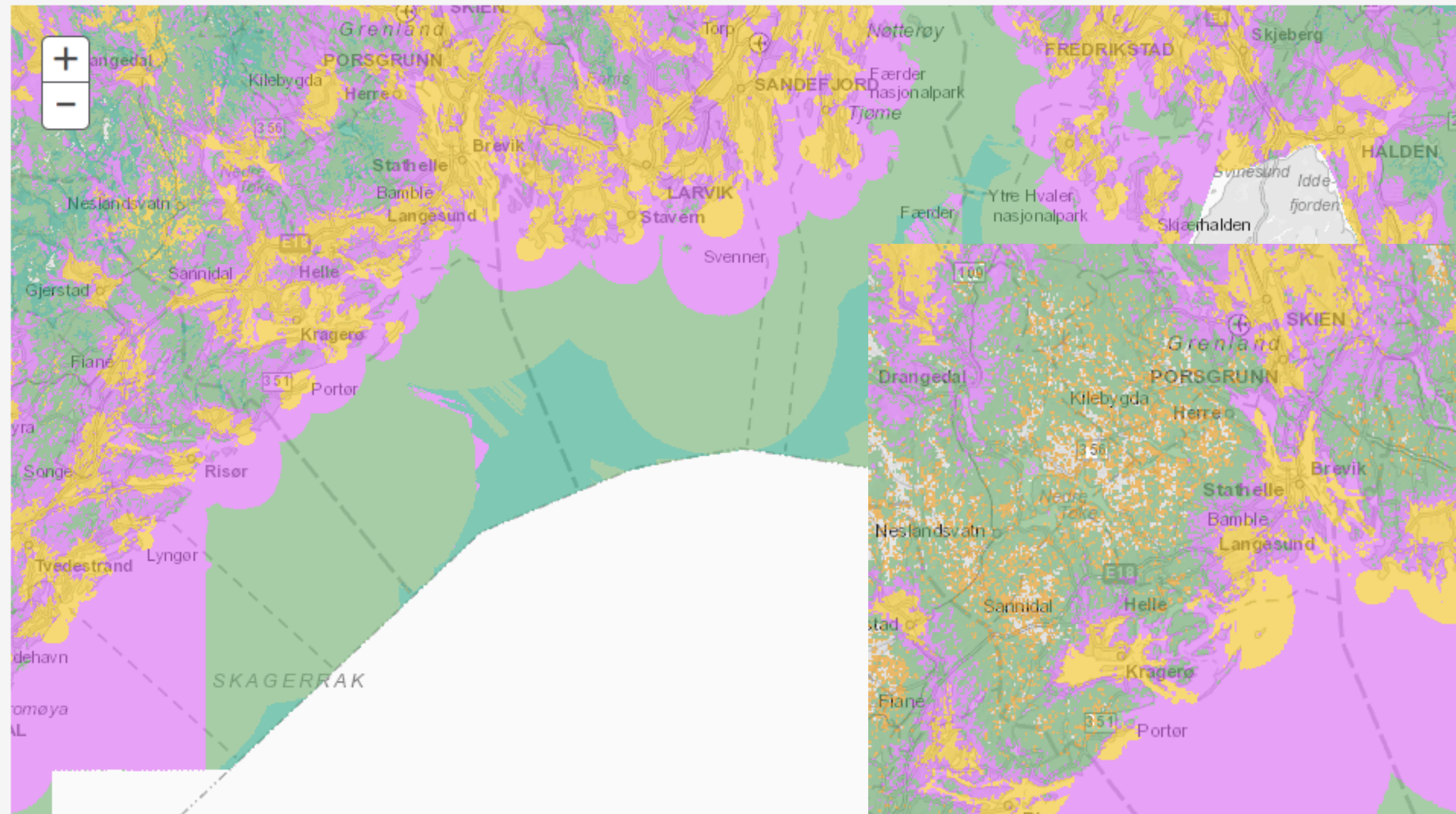
tower (3G), Migoli



ICE 450 MHz coverage Norway

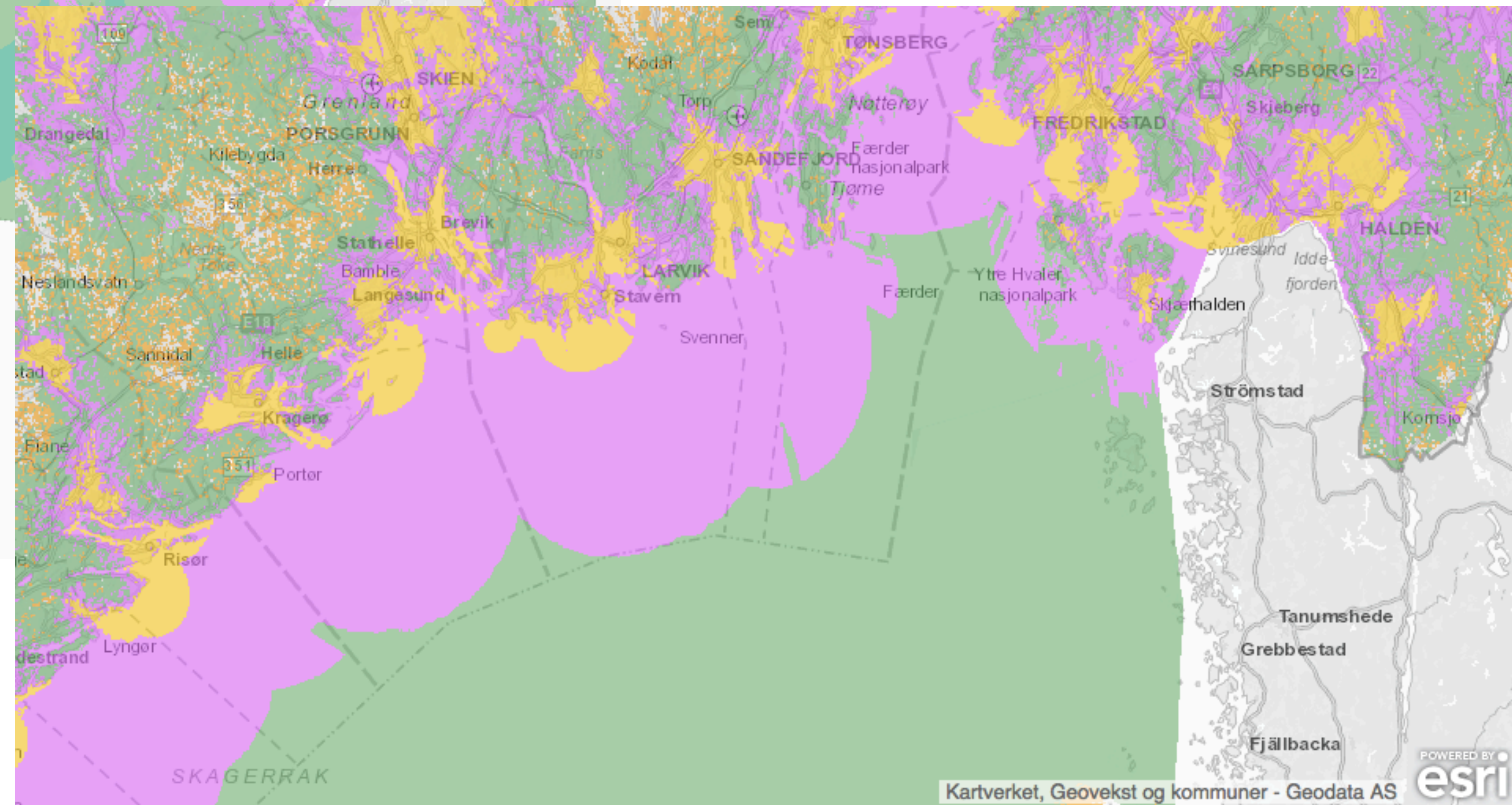
<https://www.ice.no/dekning/>

Tegnforklaring:
■ Meget god dekning
■ God dekning
■ Basisdekning
■ Utendørs antenne

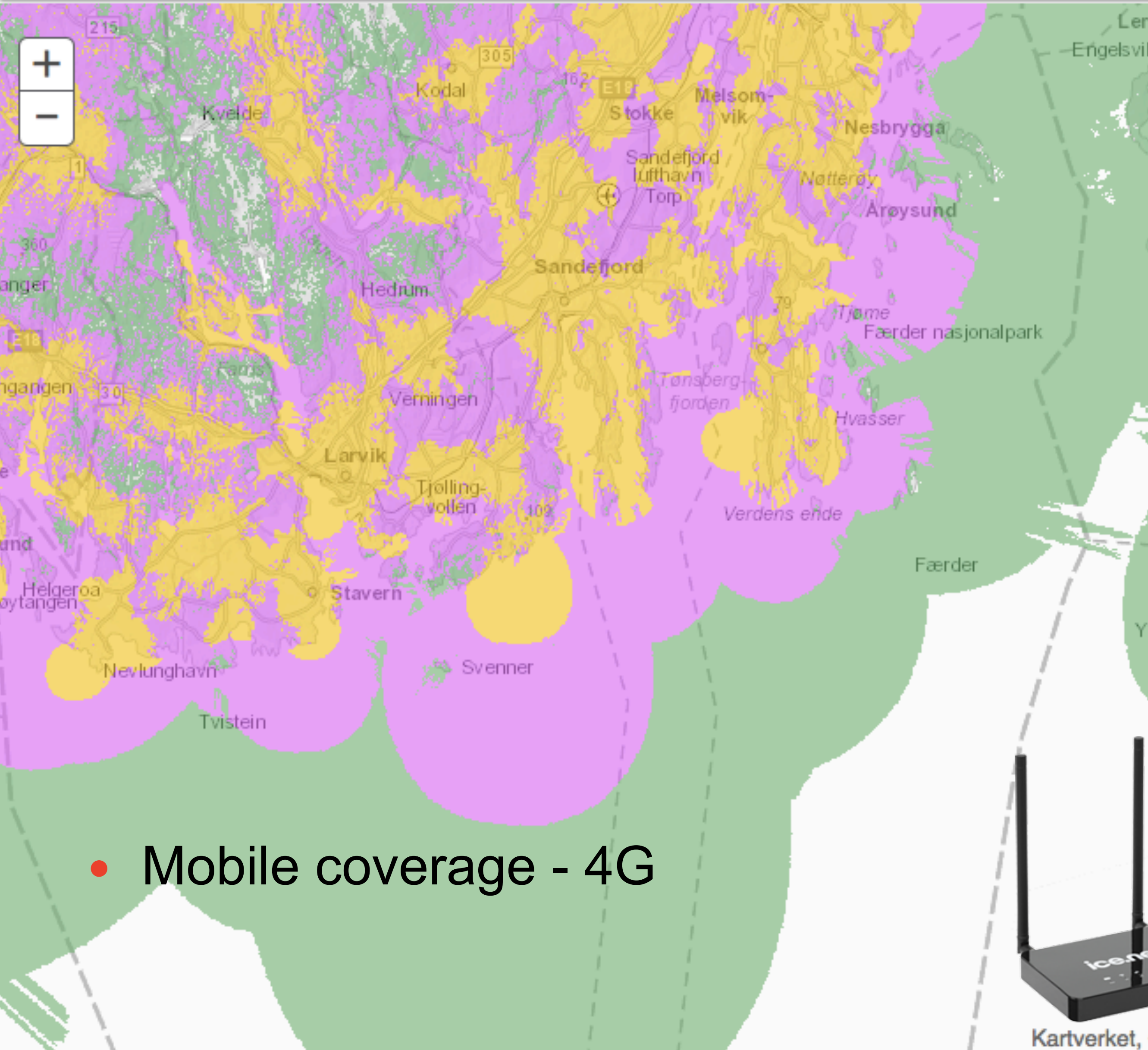


• Router & external antenna

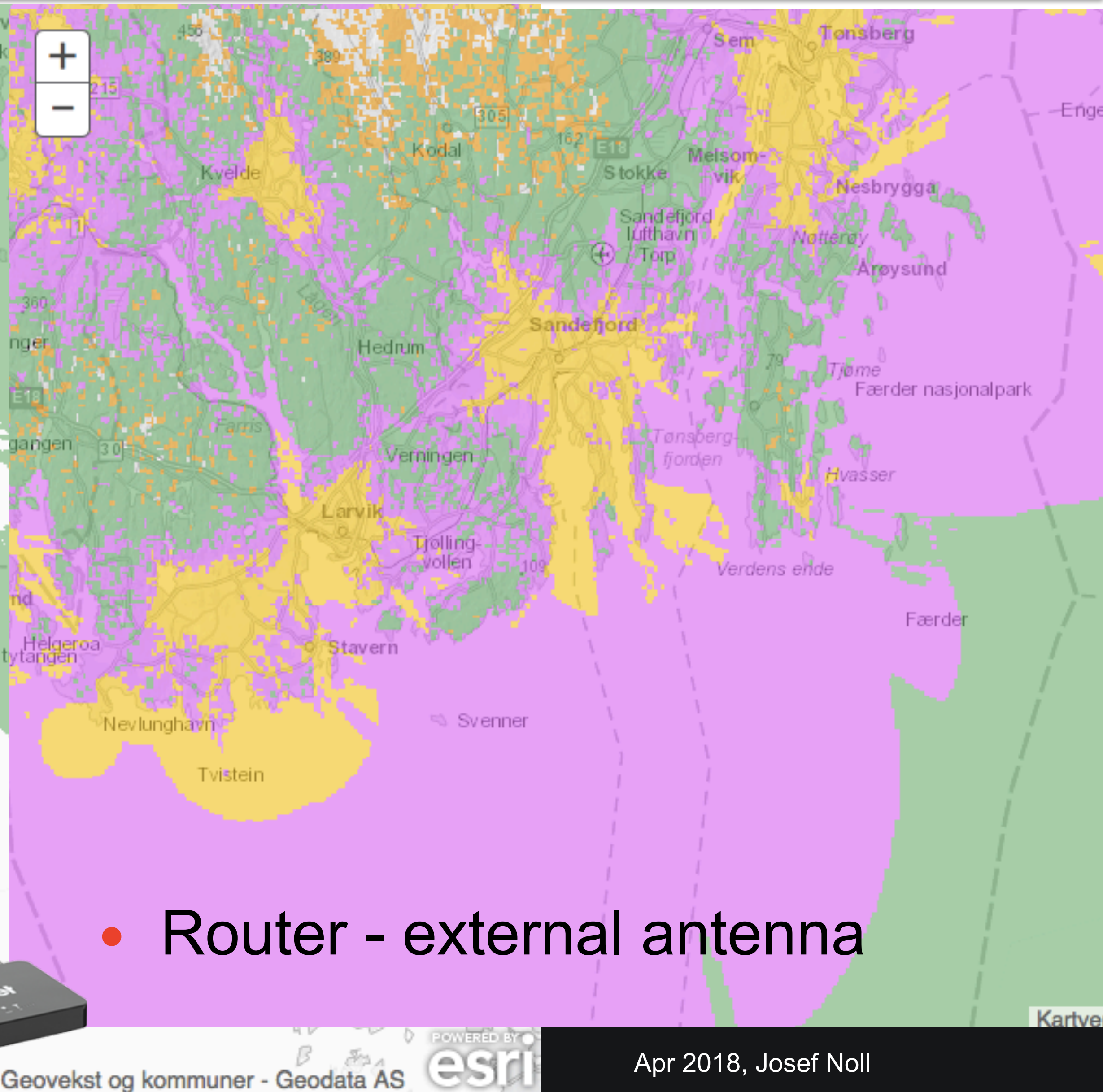
• Mobile coverage



Detailed comparison left: Mobile - right: Router (external antenna)



• Mobile coverage - 4G



• Router - external antenna



Migration path: 2G and IP link



- 2G and IP links
 - Amotel & Telecomshop Belgium for coverage and Internet



GSM + Wifi
→ 200W
→ MicroBTS

[source: Amotel]



Feasibility to Tanzania?

- We need more long-term investments
 - build infrastructure
 - enable digital services
- Long-term revenue

The example from India

- 1 GB per day for € ~2.1 per month
- free voice, Zero-rated cloud content
- Schools, railway stations, ...
- *“Revenue is not an issue. Services will come”*



[source: Jio Press Release, Jan 2018, India]

| | |
|--|---|
| <p>JioFi 4G Data + Voice Device</p> <p>Festive Offer.</p>  <p>₹ 999</p> | <p>JioFi</p> <p>Attractive Offer*</p>  <p>₹ 1,999</p> |
|--|---|

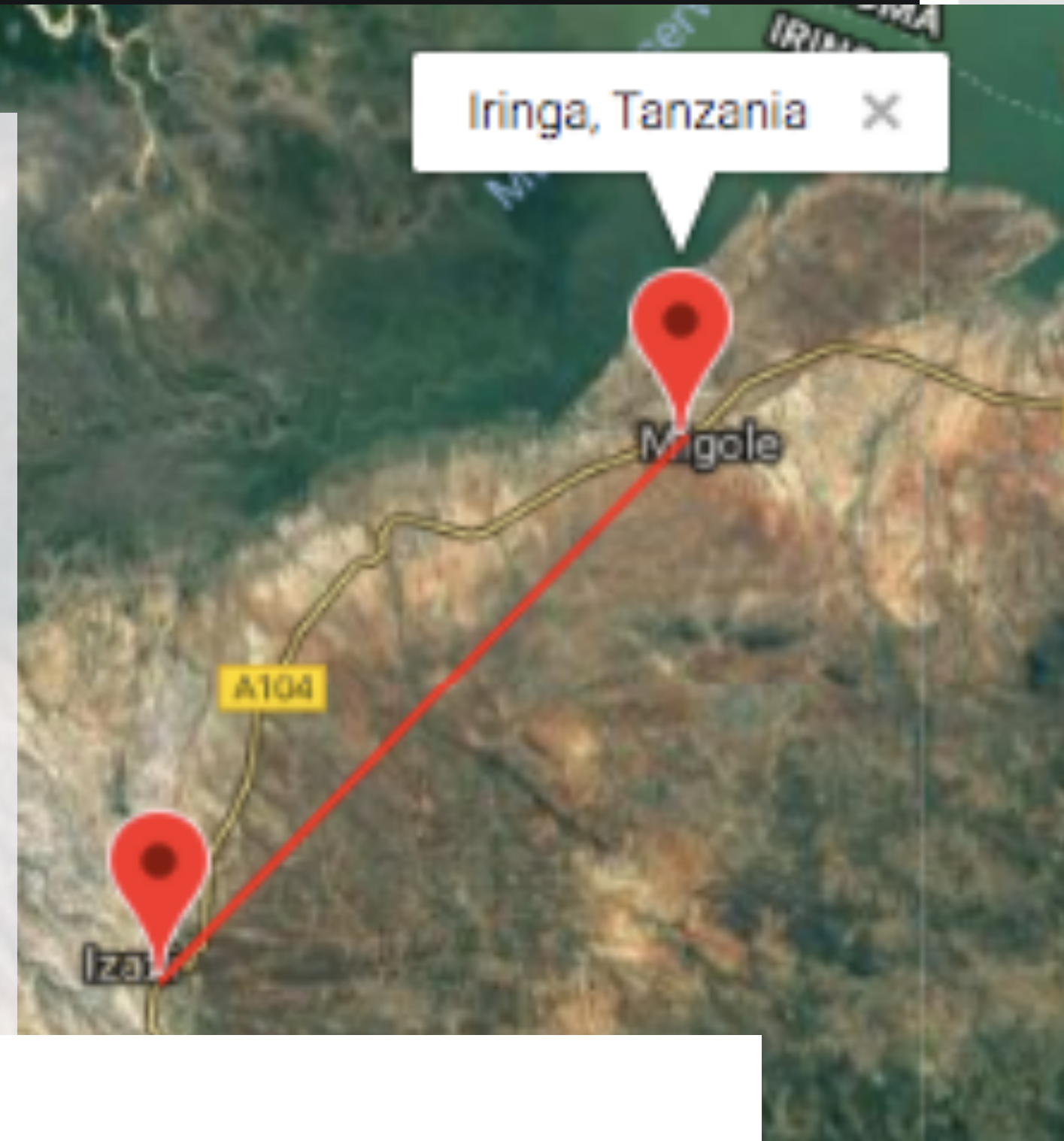
999 INR ~ 15 US\$

The adoption rate of 4G phones saw a four-fold increase last year because of the disruption in the telecom market as well as the dip in the cost of internet. Its reach has penetrated every corner of India, including the remote corners of the country. While Reliance Jio, Micromax etc. work on developing 4G feature phones, smartphones still remain the future.

<https://www.techradar.com/news/cheapest-4g-phones-in-india>

Connectivity of Izazi

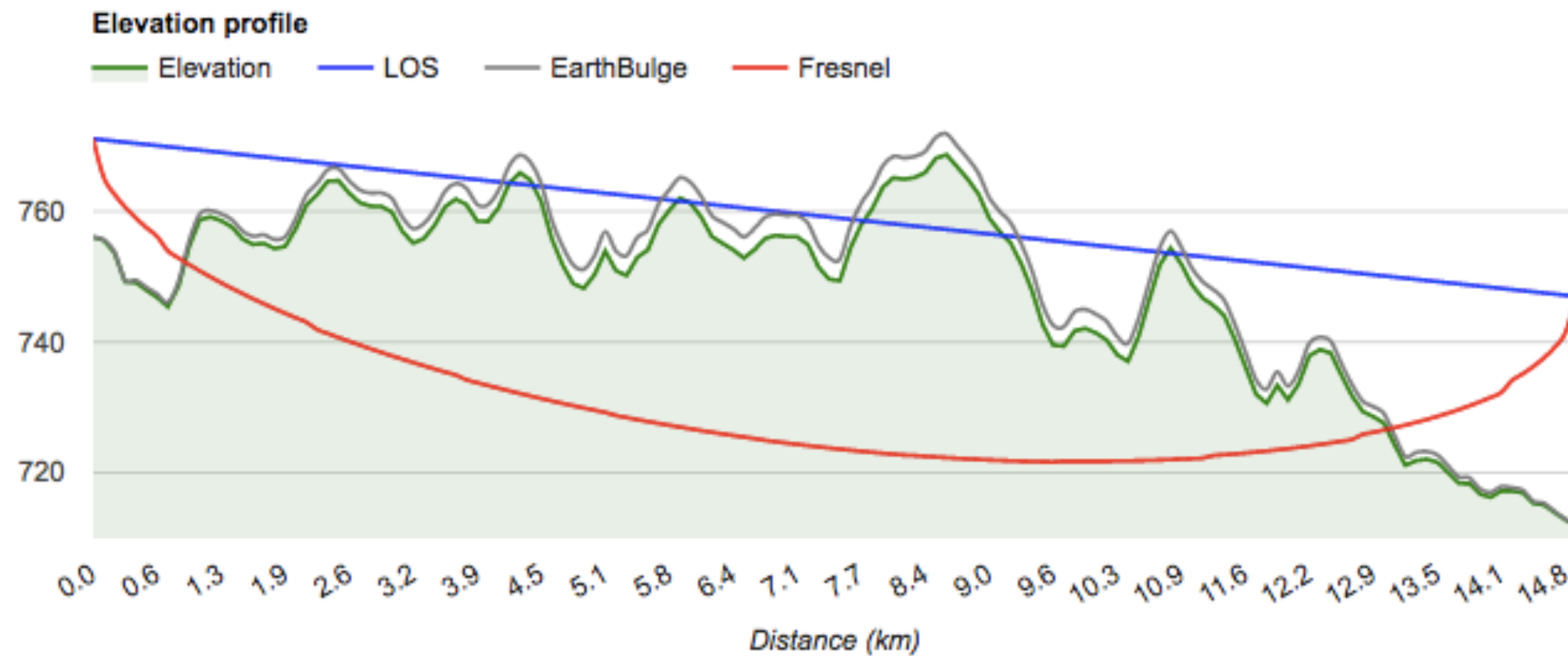
- Migoli: has 3G tower in the village, Latitude: -7.145672 | Longitude: 35.819636, Altitude: 717 meters
- Izazi: 2G connection from Migoli tower (no 3G), Latitude: -7.23764 | Longitude: 35.720995, Altitude: 753 meters



RF Haversine - Radio Link Budget & Path Profile for iOS

| Link Summary | | |
|----------------------|-----------------|------------------|
| | Izazi, Tanzania | Iringa, Tanzania |
| Latitude | -7.240309 | -7.143805 |
| Longitude | 35.722758 | 35.816187 |
| Elevation (ASL) | 755.94 m | 711.91 m |
| Azimut | 44° | 224° |
| Distance | 14.90 km | |
| H antenna | 15 m | 35 m |
| Antenna Gain | 18 dBi | 18 dBi |
| Tx Power | 26 dBm | 26 dBm |
| Frequency | 900 MHz | |
| Receiver Sensitivity | -85.5 dBm | |

| Radio Link Performance | | |
|------------------------|------------|------------|
| EIRP dB | 44 dB | 44 dB |
| EIRP W | 25.12 W | 25.12 W |
| Free Space Loss | 115.00 dB | |
| Vapour Attenuation | 0.00 dB | |
| O2 Attenuation | 0.07 dB | |
| Receive Level | -54.07 dBm | -54.07 dBm |



Clearance/Obs: -49.40 m - at distance: 8.6 Km - fresnel radius: 34.81 m
 Clearance/Obs: -48.79 m - at distance: 8.5 Km - fresnel radius: 34.88 m

| Rain Region / Fade MArgin / Availability | |
|--|-----------------|
| Fade Margins (FM) | 31.4 dB |
| Rain Region / Climate | Good (C=0.25) ? |
| Availability (worst conditions) | 100 % |
| Downtime (worst conditions) | 0 min/year |

Discussion points from UCSAF

- 450 MHz with Wifi equipment: no take up (Smart-Benson online)
- Operator infrastructure
 - passive repeaters (not easy for network management)
 - solar-driven repeaters (?)
 - currently: RAN sharing
 - 3 of 7, 3G in place
 - upgrade 2G-3G(4G)
- IP link to wifi spots
 - School, Health spots
- Customer
 - charging
 - devices (tablets)
 - literacy, local content (Swahili)
 - affordability (don't know the costs)
 - free access to information
- low uptake, ~40 MB/month
- Airtel (experiences from India not applicable)
- Izazi - phase 3

Digital Rural Tanzania

Discussion of a **holistic approach** for rural development

Communication

Internet to the villages

Energy

International co-operation

Common initiatives

Digital Inclusion

Health Information

Education

Village information