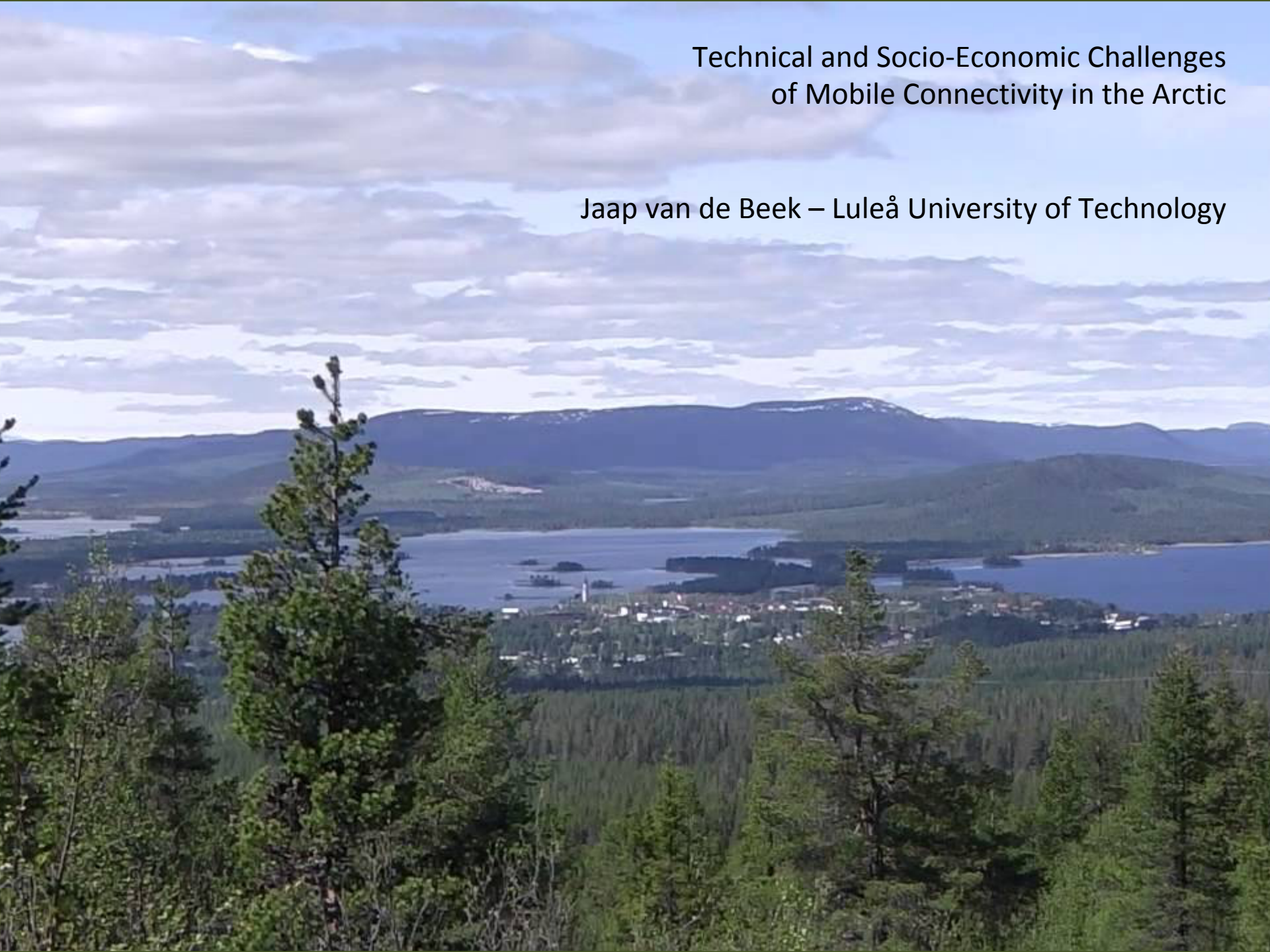


Technical and Socio-Economic Challenges of Mobile Connectivity in the Arctic

Jaap van de Beek – Luleå University of Technology





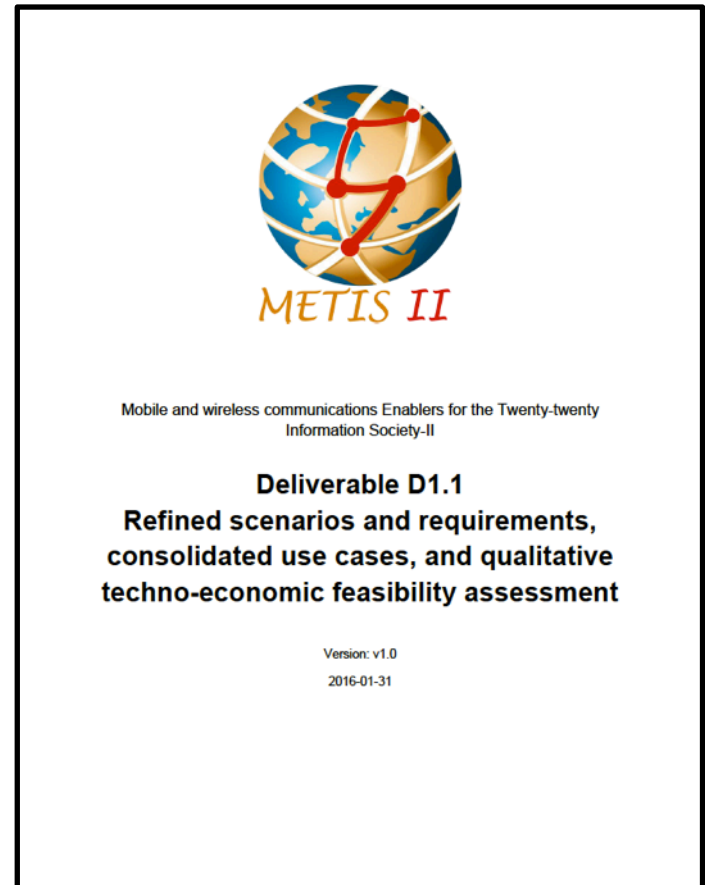
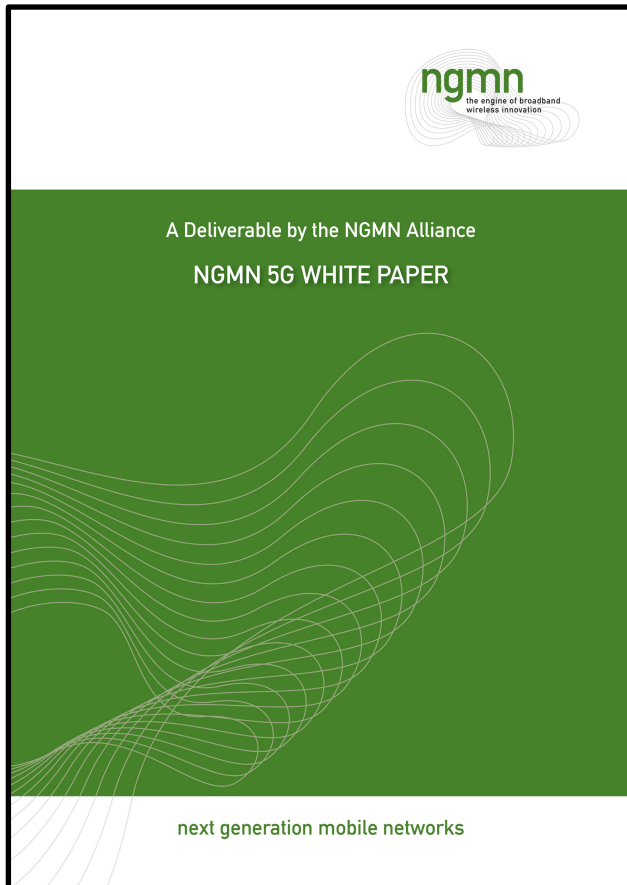
“A problem larger than
not having good connectivity
is
decision-makers claiming you have”



LULEÅ
UNIVERSITY
OF TECHNOLOGY

Is **5G** the answer?

“Coverage everywhere”



plans back in 2014-2015: 25 Mbit/s. **Everywhere, really?**

3GPP's 5G standard release December 2017

An *urban* standard!

3GPP TS 38.211 V15.0.0 (2017-12)

Technical Specification

**3rd Generation Partnership Project;
Technical Specification Group Radio Access Network;
NR;
Physical channels and modulation
(Release 15)**



meanwhile

phase 1: 2009-2015

parts of fixed network is
decommissioned.
replaced with mobile solutions

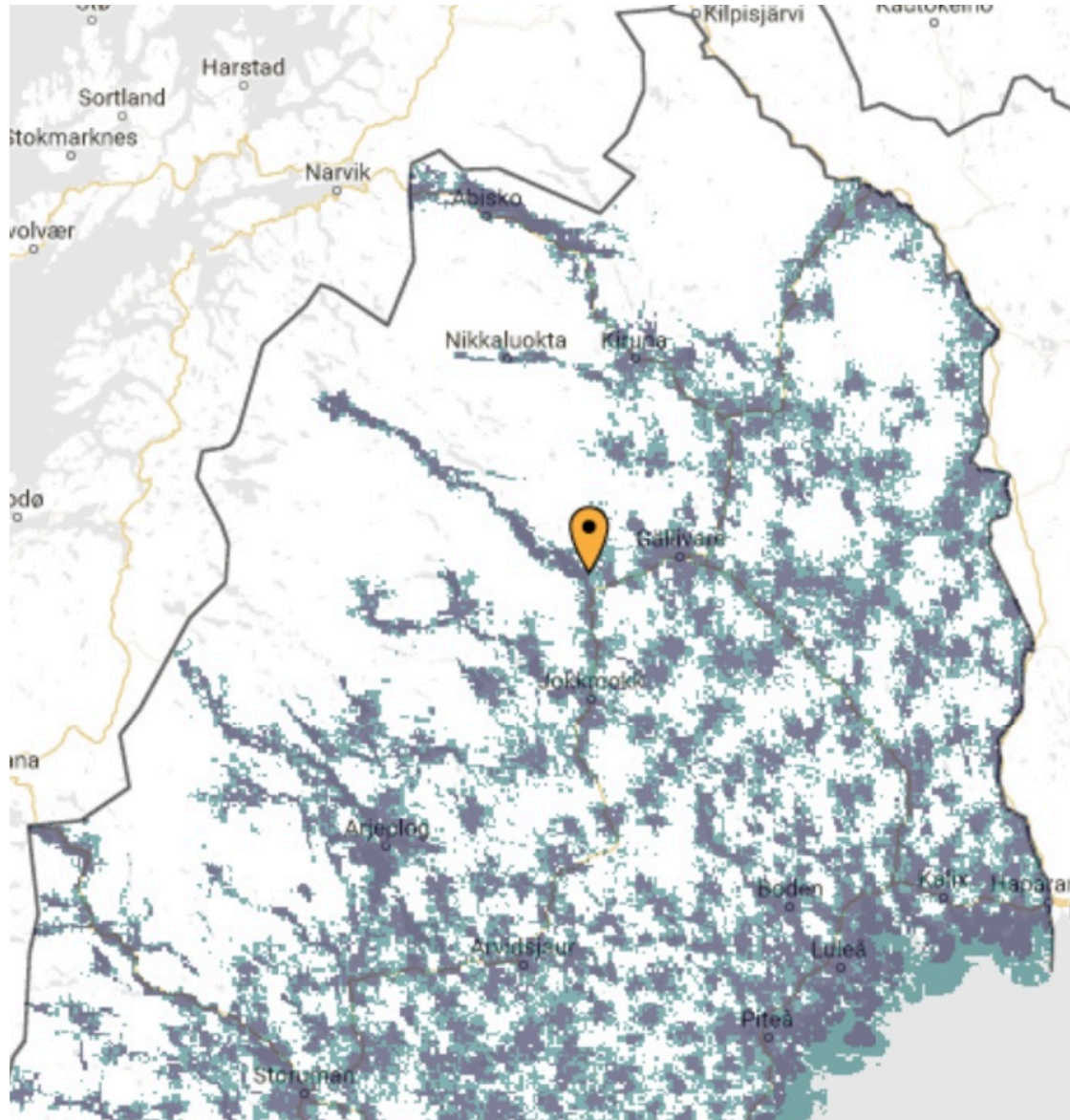
phase 2: since 2016:

rural ADSL-network
replaced with mobile broadband



<http://www.pts.se/teknikskiftet>

mobile broadband access



**Coverage quality
most people are used to**

3G, 4G: >2Mbit/s



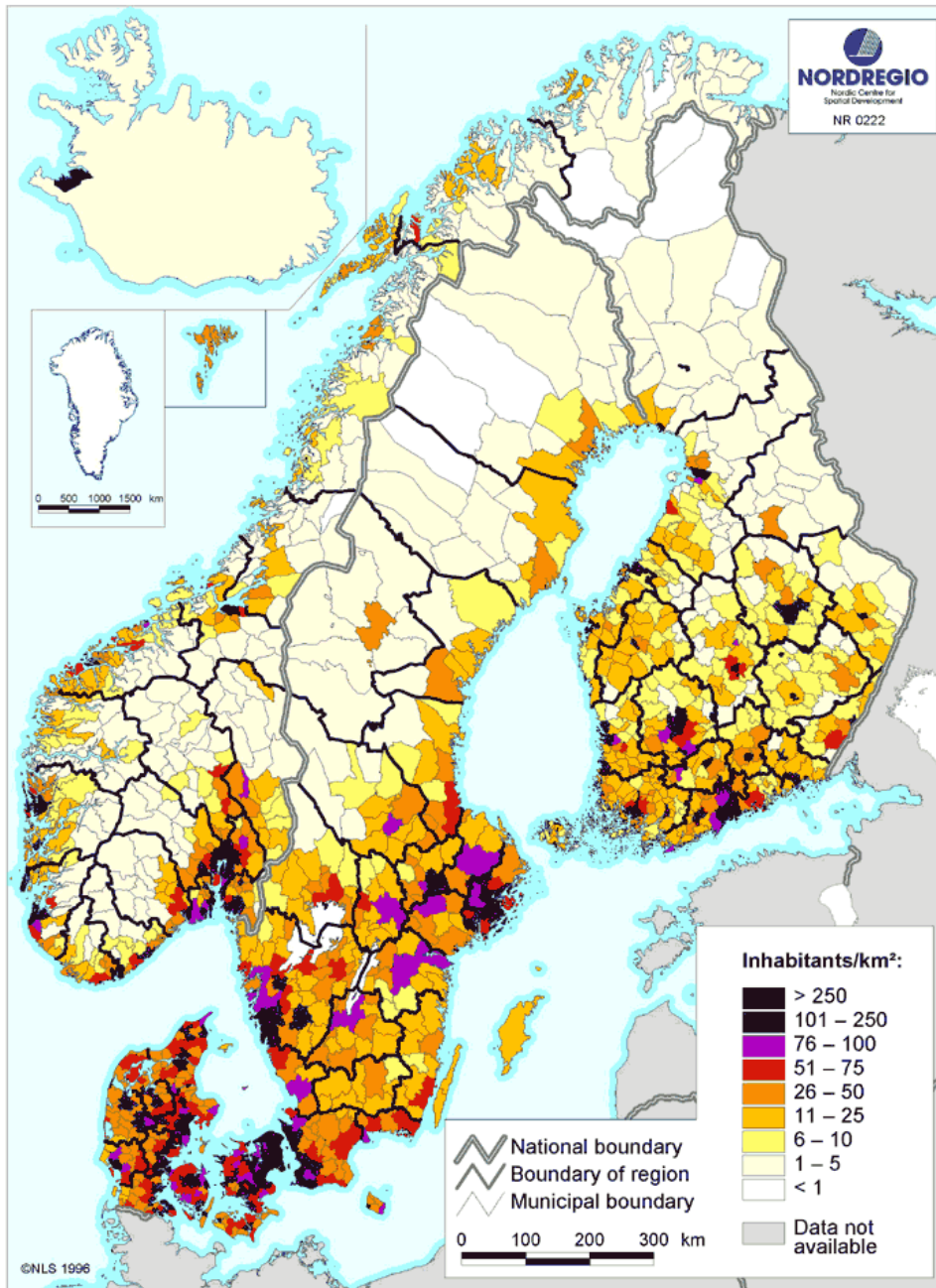
rural potential revenue:

\$ 262 /square mile /year *

urban potential revenue:

\$248,000 /square mile /year *

* A.-M. Kovacs, "Regulation in Financial Translation: Will the Incentive Auction Increase Mobile-Broadband Competition in Rural America?", May 2014



So, for 30 years,

mobile networks have
been built *outwards*

networks

- are denser
- use higher spectrum
- use less power

So, large land areas will never be reached by the market



and ambitious targets

European commission - goals:



2020

50% EU citizens have access to at least 100 Mbit/s

100% EU citizens have access to at least 30 Mbit/s

Swedish government – ‘Bredbandsstrategi’, dec 2016:



2025

98% access to at least 1 Gbit/s

2% = 90000 households

99.9% access to at least 100 Mbit/s

0.1% = 4500 households

100% access to at least 30 Mbit/s

and: mobile coverage wherever people reside and move

(Norrbotten: 115000 households)

Google




<http://www.google.com/loon>



Jay Parikh says: "We've done the cost analysis"



- 
- A tall, dark metal telecommunications tower with multiple antenna arrays at the top stands prominently in a field of bright yellow wildflowers. The field is in the foreground, and the tower is positioned slightly to the left of the center. In the background, there are green trees, a small building with a brown roof, and a chain-link fence. The sky is a clear blue with some light, wispy clouds.
- do we believe this cost argument?
 - what do the traditional actors say?
 - who will cover the rural?
 - and how?

What needs
to be done

new thinking for terrestrial networks:

- building networks “inwards”**
- rural hotspot & rural backhaul**
- five ways to think new**



1. business models

“We do not sell seats to tourists,
-
we sell tourists to their destinations”



2. network operation

have stakeholders themselves operate networks

- agriculture
- communities – public sector
- tourism
- industries
- blue-light services
- e-health

preferably in cooperation!

micro-operators

lower the thresholds !

3. spectrum and roaming

current licensing-regime damaging for the rural

easy-to-acquire spectrum for (local) operators

not a threat to today's operators!

“real” operators roam into these networks

4. reuse TV-infrastructure

umbrella cells
for mobile coverage
and hot-spot backhaul



5. exploit 5G technological advances

- new antenna technology:
 - pencil-sharp beamforming for ultra-large cells
- integration with satellite backhauling
 - recent study item in 3GPP
- energy-autonomous base- and relay stations
- new edge-computing and edge-cloud

ngmn - next generation mobile networks

[ABOUT US](#) [5G WHITE PAPER](#) [WORK PROGRAMME](#) [NEWS](#) [EVENTS](#) [PUBLICATIONS](#)

NGMN NEWS AND PRESS RELEASES

NGMN Alliance launches new projects to boost 5G success

→ 2018-06-19 | → Press Release

Updates on first 5G deployment experiences, further technology development and new business models to be shared at the NGMN Industry Conference in Vancouver, November 6-8, 2018

Frankfurt, GERMANY, June 19, 2018 – Next Generation Mobile Networks (NGMN) has confirmed the launch of four new key projects to support the development and deployment of 5G networks.

The projects – “**Spectrum and deployment efficiencies**”, “**Ultra Reliable Low Latency Communication (URLLC) requirements for vertical industries**”, “**RAN convergence**” and “**Extreme long-range communications for deep rural coverage**” - have been highlighted as crucial development areas to further optimise and guide the telecoms industry towards the successful deployment of 5G beyond 2018.

Chairman of the NGMN Alliance Board Johan Wibergh said: “We’re delighted to be leading the

Arctic Mobile Communications Architectures



RURAL ICT TESTBED

#FULLCOVERAGE

realizing new rural hotspots



#FULLTÄCKNING





netmore



VISITA



LANTBRUKARNAS
RIKSFÖRBUND



LUNDS UNIVERSITET

www.fulltackning.se

#FULLTÄCKNING

in summary

- 5G is not going to help, unless...
- technology is not the bottle-neck
- deploy “inwards” – the rural hotspot !
- tailored rural network, spectrum,
and operator solutions
- awareness campaign

Technical and Socio-Economic Challenges of Mobile Connectivity in the Arctic

Jaap van de Beek – Luleå University of Technology

