

# What are the requirements for technology evolution



Wireless media distribution beyond 2020

May 06, 2015, Helmut Schink

## Requirements for Media Distribution: food for thought

Let us consider all relevant stakeholders and the drivers

Stakeholders Drivers	PSM	Private Media	Regulators	Network Operators	Consumers /Participants	Device vendors	Chip vendors
DRM							
Reach (Service)							
Interactivity							
Flexibility							
Global scale							
Spectrum Efficiency							
Control							
Coverage							
Low cost							

## LTE Broadcast (=eMBMS) opening the door

### Broadcast

#### High Density Areas

- E.g. stadium and concert hall scenarios
- Using existing spectrum
- Short-term, deployment starting currently
- Several trials

#### Real Time Experience

- Edge video orchestration with eMBMS distribution
- „eMBMS in a box“ hosted in RACS, easy and fast introduction in local scenarios
- MEC based demo system available
- Entertainment and Disaster relief

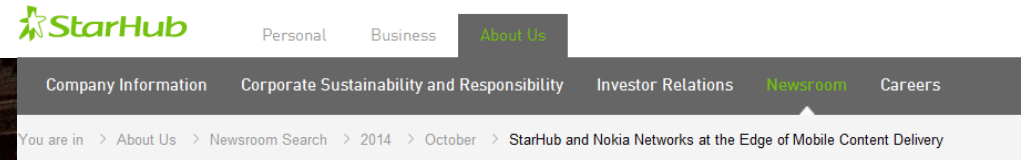
#### Large Areas Broadcast

- Using separate Spectrum: UHF other available higher frequencies
- Complement or replacement of current DTT technologies
- Improved spectrum efficiency due to LTLP architecture (e.g. 100 MHz for 25HD channels)
- Disruptive – longer term

### Interactivity from the beginning

- Games
- User participation in Shows
- Second screen, chatting, social media
- Background information
- File repair
- Unicast for niche channels
- Unicast for coverage gaps
- Upload traffic information
- User behaviour tracking

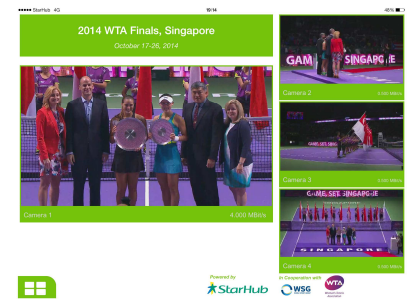
### Unicast



## StarHub and Nokia Networks at the Edge of Mobile Content Delivery

This new multimedia experience has become reality following StarHub's trial implementation of Nokia's Liquid Applications solution at its 4G mobile base stations within the Indoor Stadium at Singapore Sports Hub, bringing 'live' sports action closer to spectators.

For the trial conducted on 21 October 2014, four 'live' video feeds of the Rising Stars Finals played at the BNP Paribas WTA Finals Singapore presented by SC Global were delivered concurrently to spectators on mobile devices, giving them different perspectives of the action played out in the court. Spectators were able to zoom in on the action by selecting any preferred camera angle at any time.



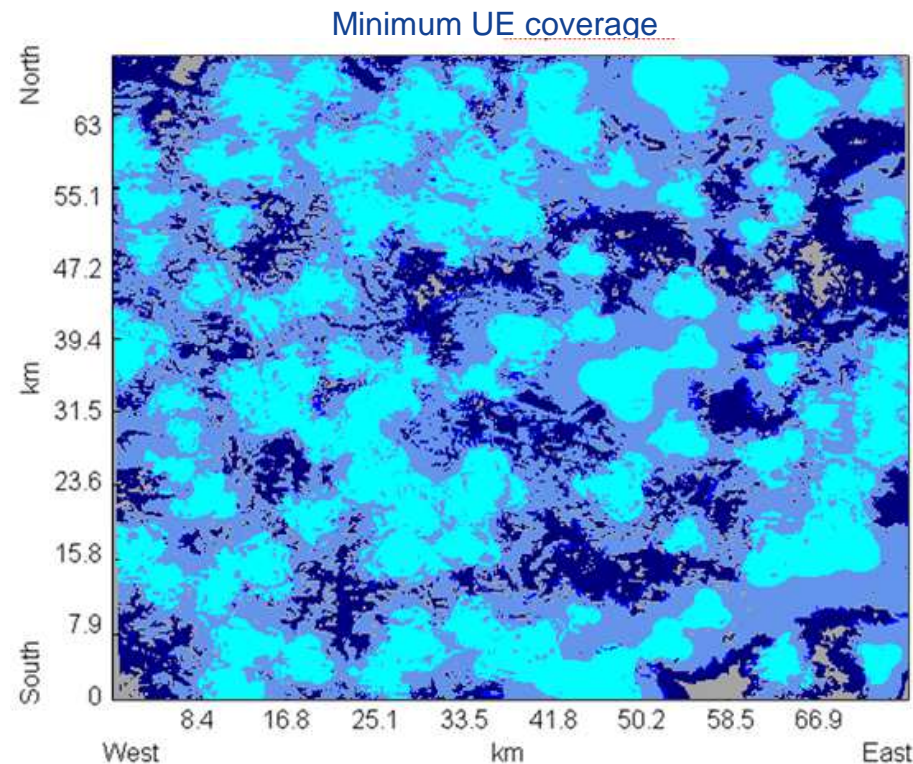
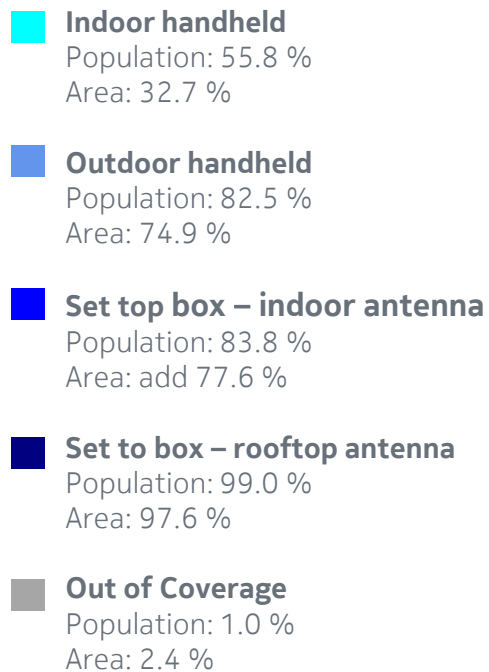
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<http://www.starhub.com/about-us/newsroom/2014/october/starhub-and-nokia-networks-at-the-edge-of-mobile-content-deliver.html>

**NOKIA**

# Single Frequency Networks (SFN) with high coverage of large areas are possible

## System simulation results



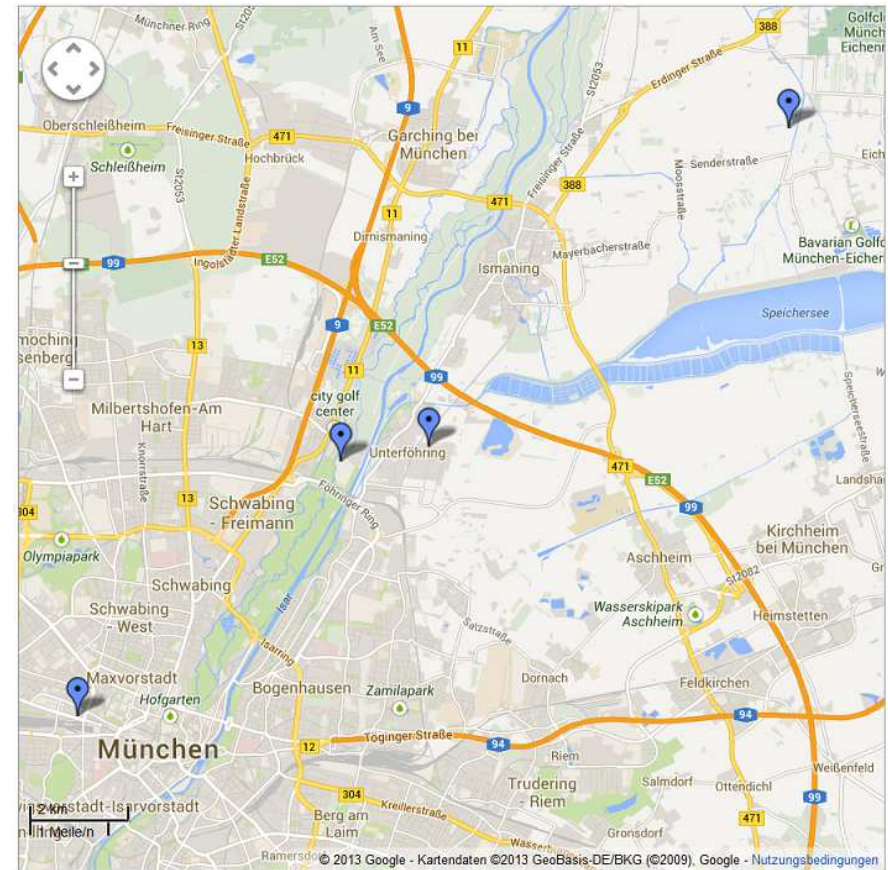
Tight synchronization  
of neighbor cells

Increased interference  
robustness

Improved border  
coverage due to lower  
TX powers and small  
cell sizes

## IMB5: eMBMS Test Network Munich

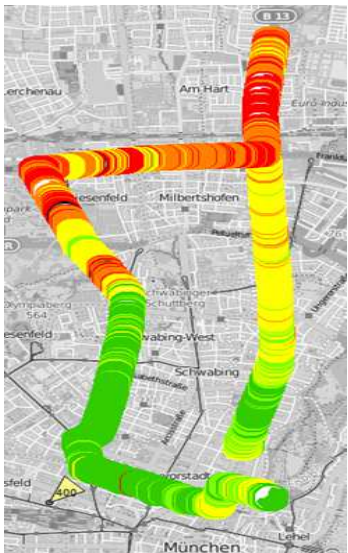
- Topology
  - Testbed is deployed in an area of ~400 km<sup>2</sup>
  - 4 sites of Bayerischer Rundfunk (BR)
    - Funkhaus (93m), Freimann (107m),
    - Unterföhring, (25m), Ismaning (214m)
  - Inter-site distances
    - FH-UF: 9,1km; FH-FM: 7,4 km; FH-IM: 18,9 km
    - FM-UF: 1,8 km; FM-IM: 11,5 km; UF-IM:9,9 km
- Operational parameters
  - Commercial Nokia LTE radio equipment with special software load
  - Single frequency network (MBSFN)
  - 761-771 MHz (downlink), 706-716 MHz (uplink)
  - 40 Watt per RF module



## eMBMS RS SINR compared to single cell RS SINR

- SINR (eMBMS) measurement
- This measurement is performed only on the eMBMS reference signals in the MBMS subframes

### Funkhaus



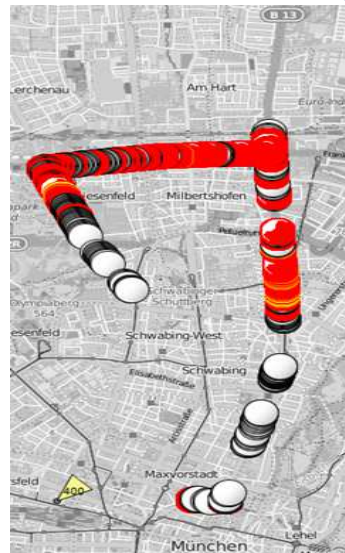
### PCI 400

### Freimann



### PCI 200

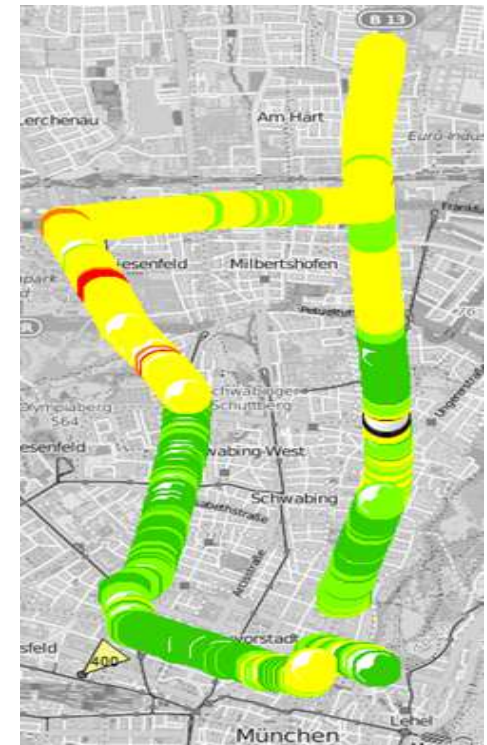
### Unterföhring



### PCI 300

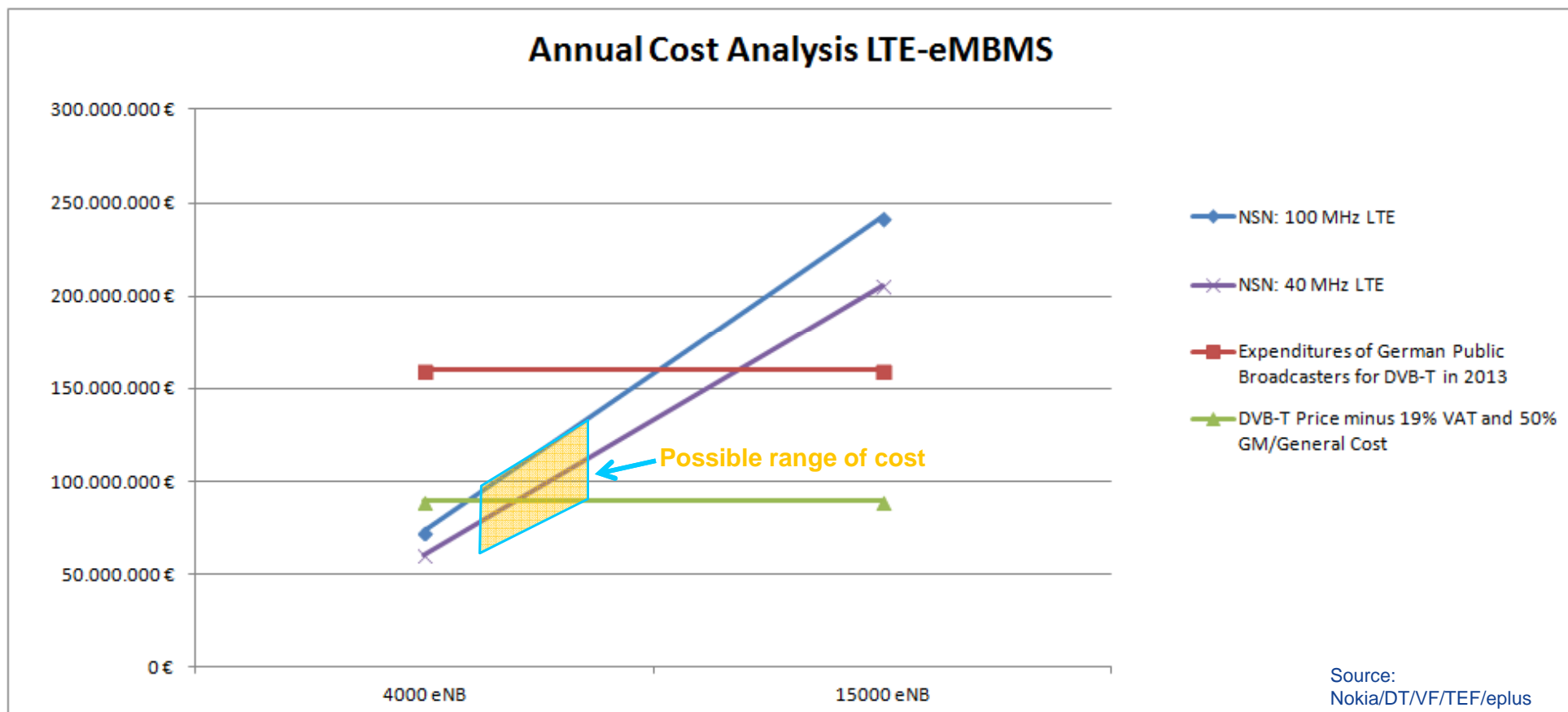
Unit: dB  
 [20.00; 40.00]  
 [15.00; 20.00]  
 [5.00; 15.00]  
 [0.00; 5.00]  
 [-10.00; 0.00]  
 all others

### MBSFN area



## Comparison between LTE Broadcast and DVB-T in Germany

LTE and DVB-T Cost are in the same Ballpark



Source:  
Nokia/DT/VF/TEF/eplus

## Can we merge LTE into DVB-T 2?

The main promise:  
broadcasters (PSBs) can maintain the infrastructure / vertical integration

Great: then it sounds like **LTE**, but....

The devil is in the details:

- HTHP approach leads to low frequency re-use and border problems
- Higher power consumption due to topology
- HTPT: long cyclic prefix -> low speed limit
- No standard, no chip, no terminal
- And: no uplink, no interactivity
- Permanent double transmission of content?
- Increased complexity challenge for LTE

Can this be fixed ?

## Can we extend LTE to cover PSM needs

The main promise: broadcasters (PSMs) can focus on content

Great:

- LTE allows flexibility/scalability from existing sites
- LTE is globally accepted, standardized and deployed
- LTE reaches billions of mobile devices
- Interactivity is at its heart

The devil is in the details:

- PSBs would become PSMs: a perception game
- Loss of control of resources generates fear of dependency and loss on QoS ensurance
- Coverage in rural areas may be more expensive

Let us fix these problems

## Required extension to LTE eMBMS Rel. 12

Agree on most relevant use cases and scenarios

Extend LTE standards to improve Coverage / Cost position for rural areas:  
CP beyond 16/33 $\mu$ s -> approx. 100 $\mu$ s??  
Develop dedicated carrier approach, up to 100% for eMBMS

Enable Supplemental downlink for flexible introduction

Agree on operational models that give content providers trust:  
Transparency / Control  
Reliability / QoS  
Choice / Interoperability

## Requirements for Media Distribution: how do solutions fit

We should go for a broad solution for entire ecosystem

Stakeholders	PSM	Private Media	Regulators	Network Operators	Consumers /Participants	Device vendors	Chip vendors
Drivers							
DRM							
Reach (Service)							
Interactivity							
Flexibility							
Global scale							
Spectrum Efficiency							
Control							
Coverage							
Low cost							

LTE LTLP and its extension best positioned to cover requirements of entire ecosystem

Current PSM's priorities can possibly be covered by DVB-T HTHP extensions (HTHP)