

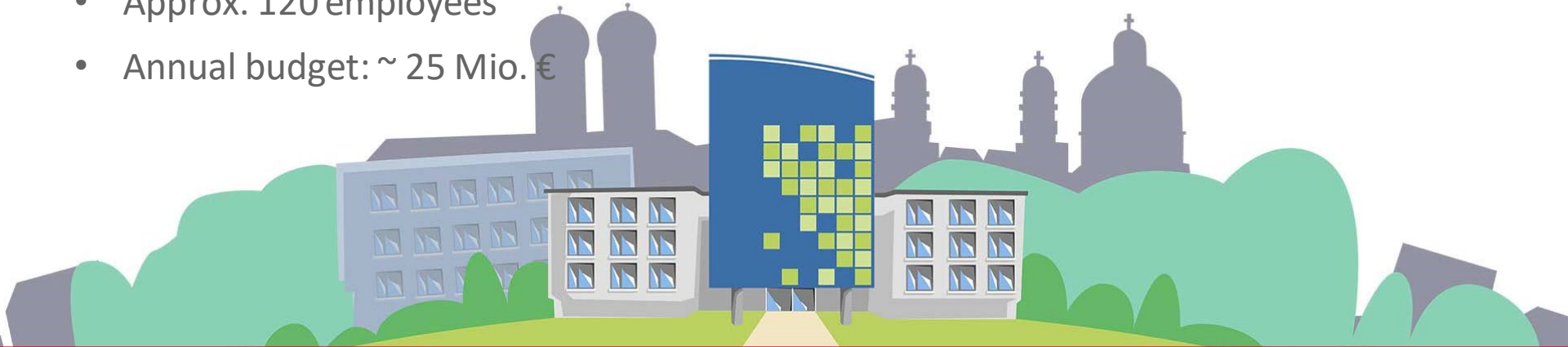


5G Broadcast trial using FeMBMS

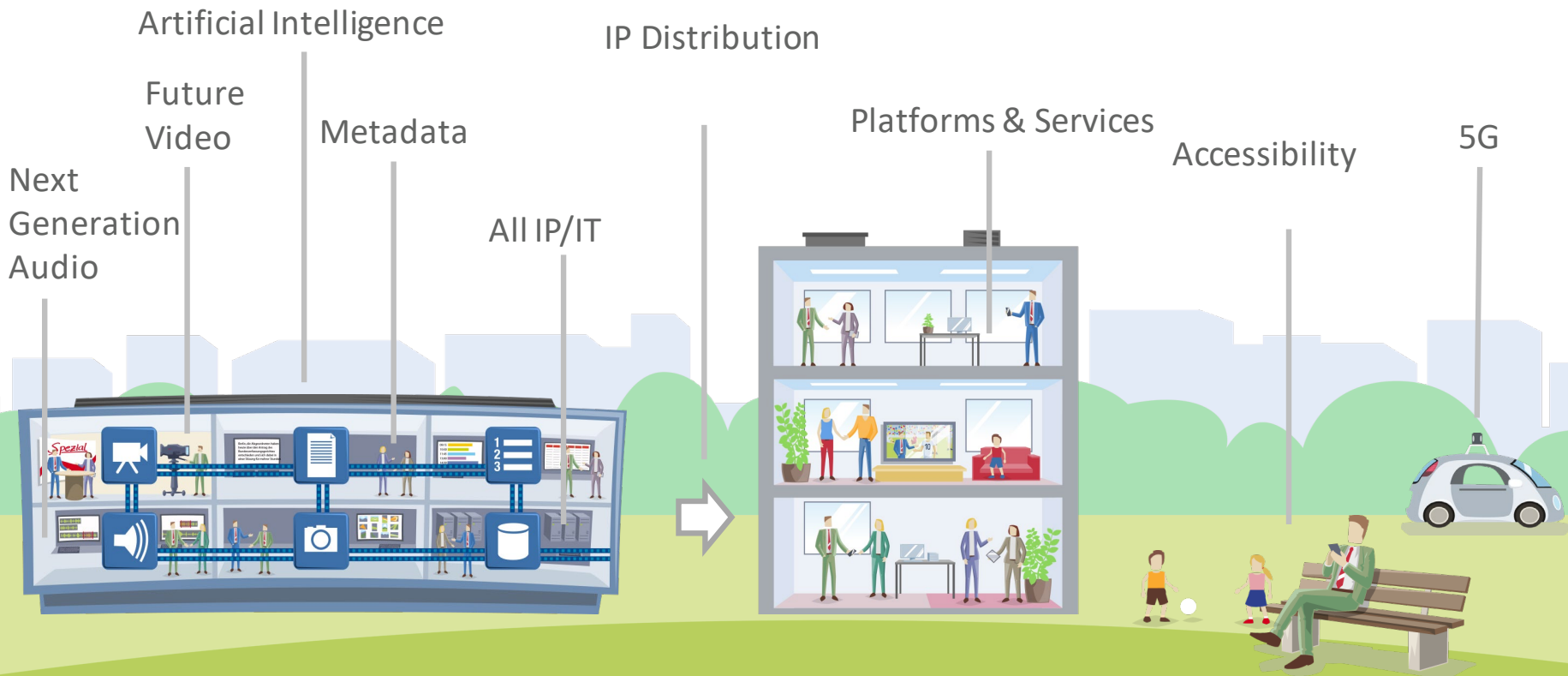
Aneta Baier, IRT

IRT: Brief overview

- Research and competence centre of the public broadcasting corporations in Germany (ARD, ZDF, Deutschlandradio), Austria (ORF) and Switzerland (SRG/SSR)
- Location: Munich, Germany (BR TV production facility Freimann)
- Non-profit limited liability company with 14 associates
- Founded in 1956
- Approx. 120 employees
- Annual budget: ~ 25 Mio. €

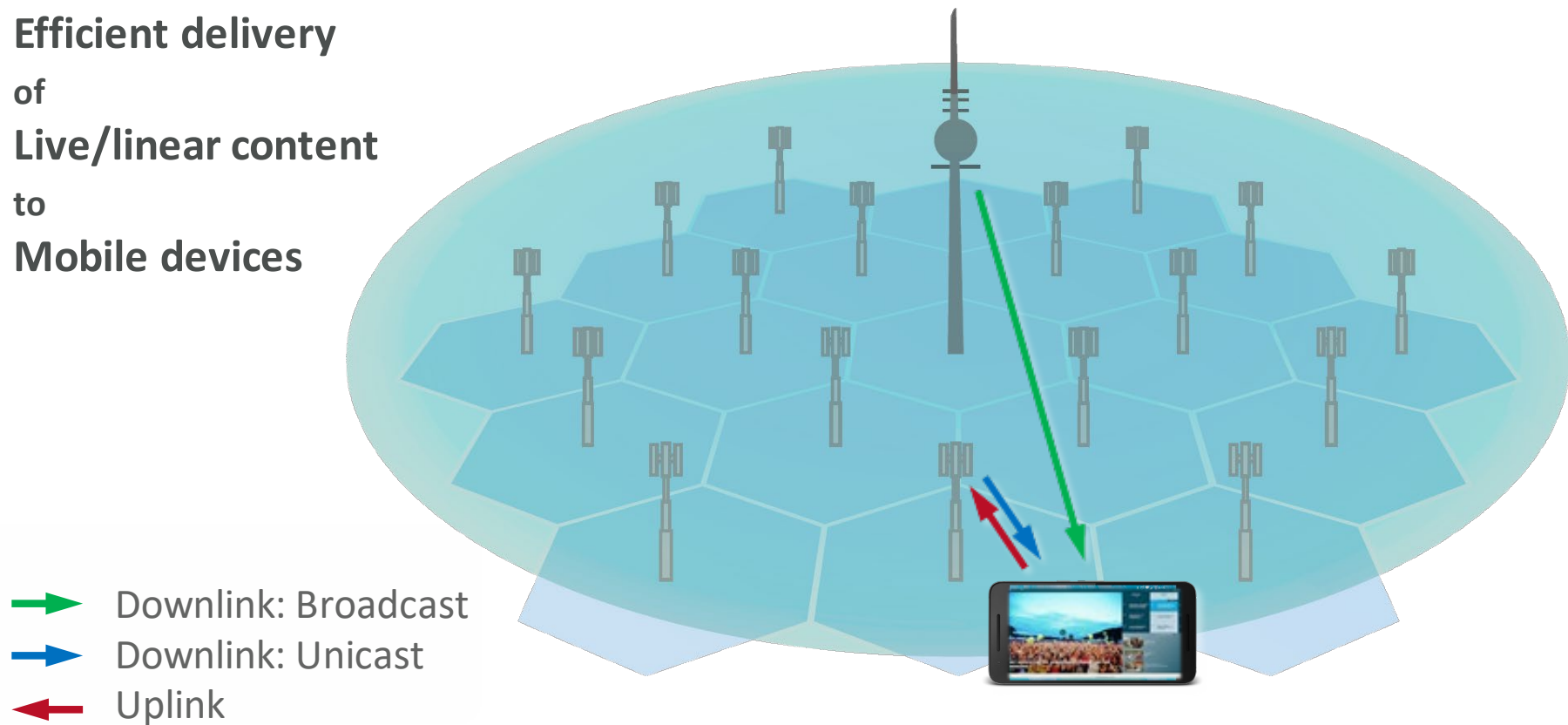


IRT: Our topic areas



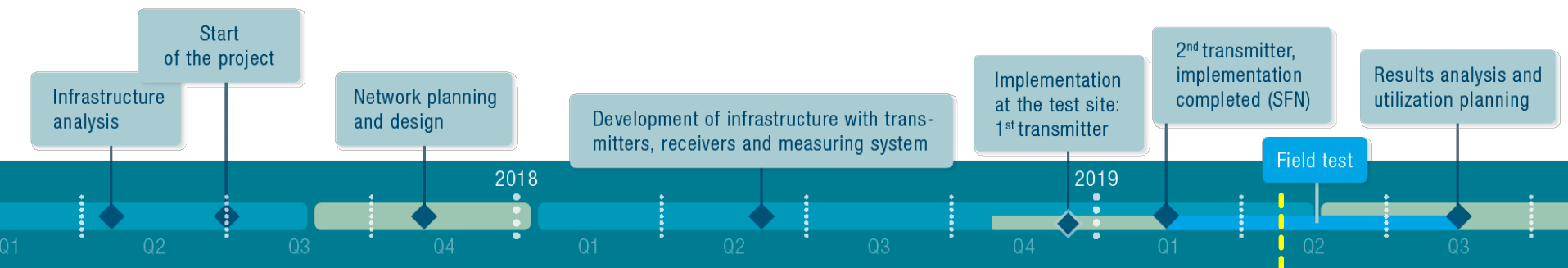
Next generation of broadcast distribution

Efficient delivery
of
Live/linear content
to
Mobile devices



Introduction

- Research and implementation of the FeMBMS specification for the large-scale transmission of media content in broadcast mode based on mobile technology
- Co-funded by the Bavarian Research Foundation
- Duration 28 months (1 July 2017 to 31 October 2019)



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FeMBMS: Further evolved Multimedia Broadcast Multicast Service

Broadcast in 3GPP World since 2005

→ *Perspective of a mobile network operator*

- MBMS in 3GPP Release 6 (UMTS, 3G)
- eMBMS in 3GPP Release 9 (LTE, 4G)

FeMBMS was finalized in 3GPP Release 14 in summer of 2017

→ *Consideration of media broadcasters' perspective*

- Support of larger inter-site distance (cyclic prefix 200 μ s)
- Dedicated MBMS transmission (100% broadcast transmission)

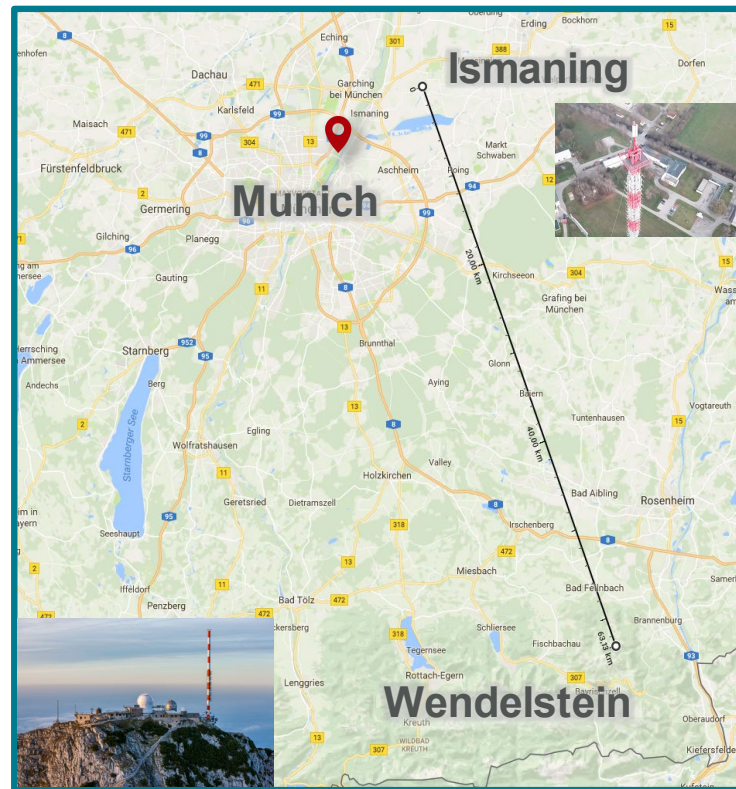


LTE radio frame = 10 ms

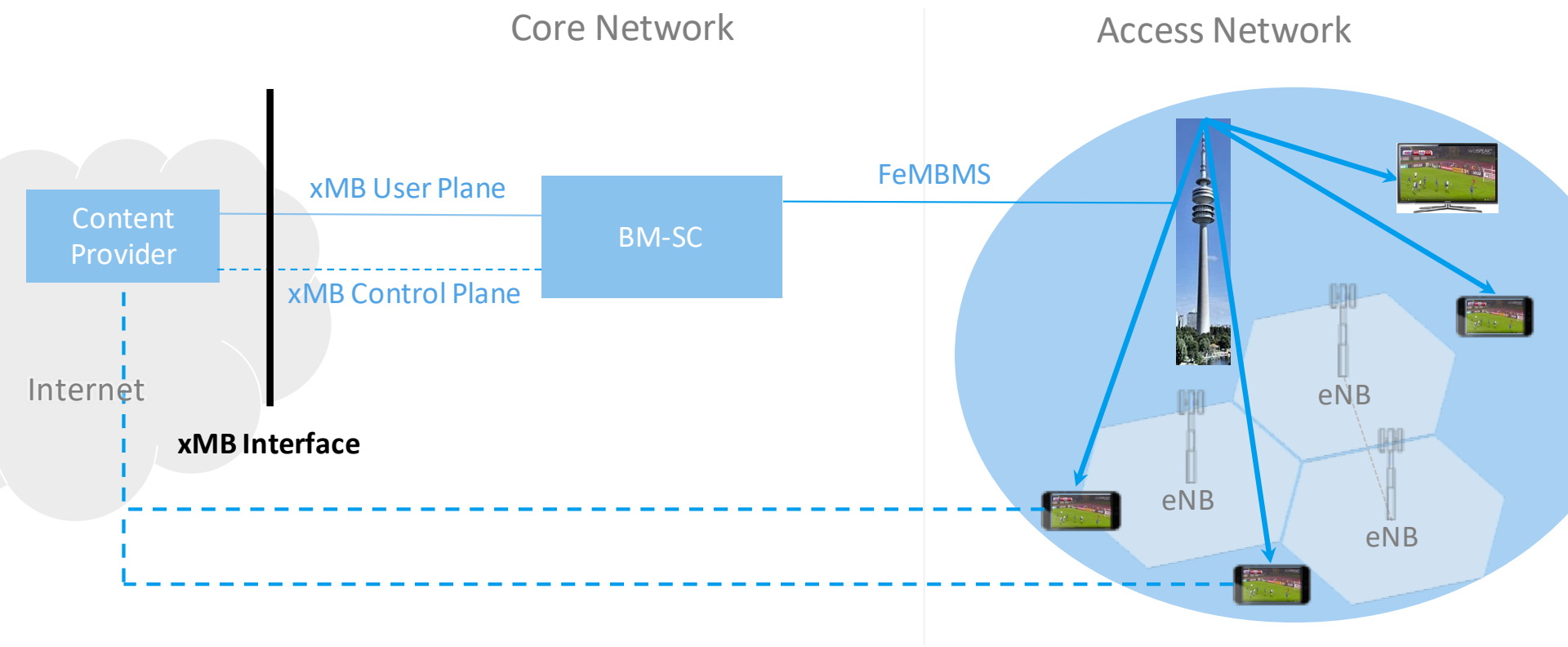
- Receive-only mode

Test field in the Bavarian Alpine region

- Large-scale broadcast network based on FeMBMS/LTE Rel. 14
- Single frequency network with two transmitters (distance 63 km):
 - Wendelstein (since December 2018)
 - Ismaning (since March 2019)
- Power 100 kW ERP, channel 56
- Bandwidth 5 MHz, MCS 9, QPSK
- Video signal:
 - TV content: BR Fernsehen
 - Data rate: 3192 kbit/s
 - H.265, HD



Rohde & Schwarz: Simplified architecture for TV services

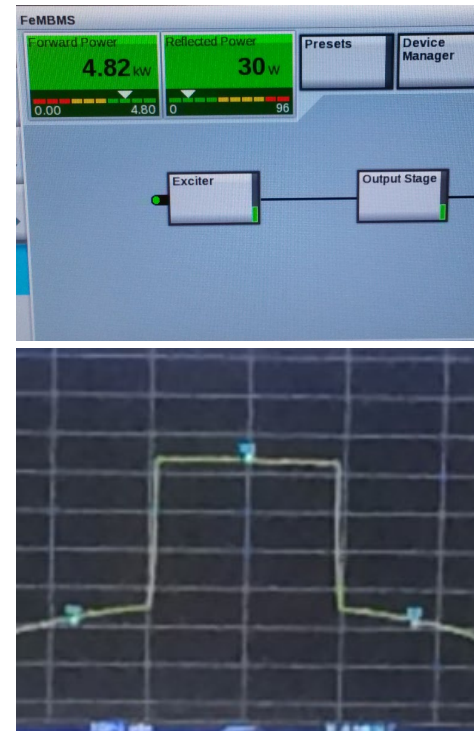


HPHT LTE Broadcast – 5G Today makes it real!

World's first HPHT FeMBMS transmitter on-air located at Wendelstein



Source: Rohde & Schwarz



Kathrein: Transmit antenna



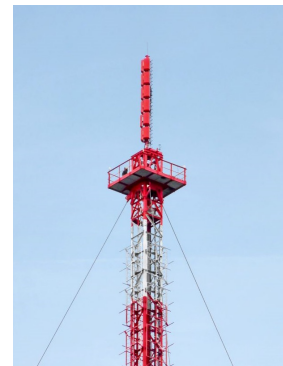
Wendelstein: Site height: 1838 m a.s.l, ant. height 53 m

- Vertically polarized



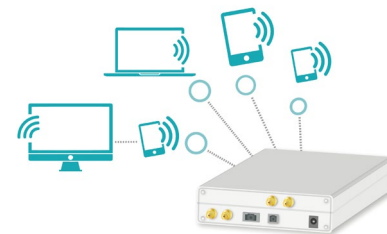
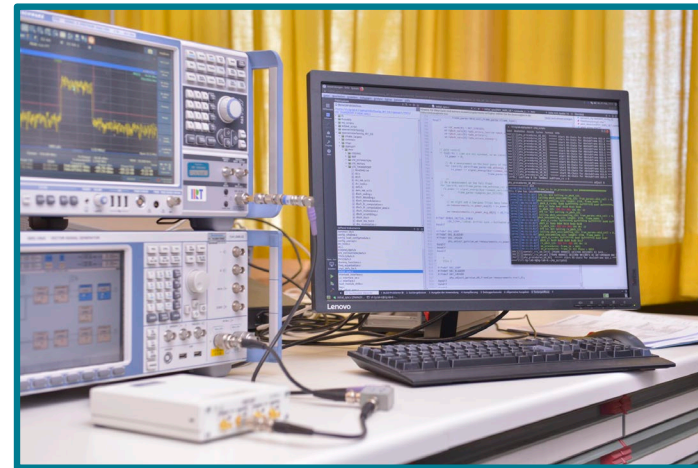
Ismaning: Site height 483 m a.s.l, ant. height 215 m

- Polarisation switchable, H / V / RHC for Tx
- Circular polarization provides steady signal practically independent of the Rx device position



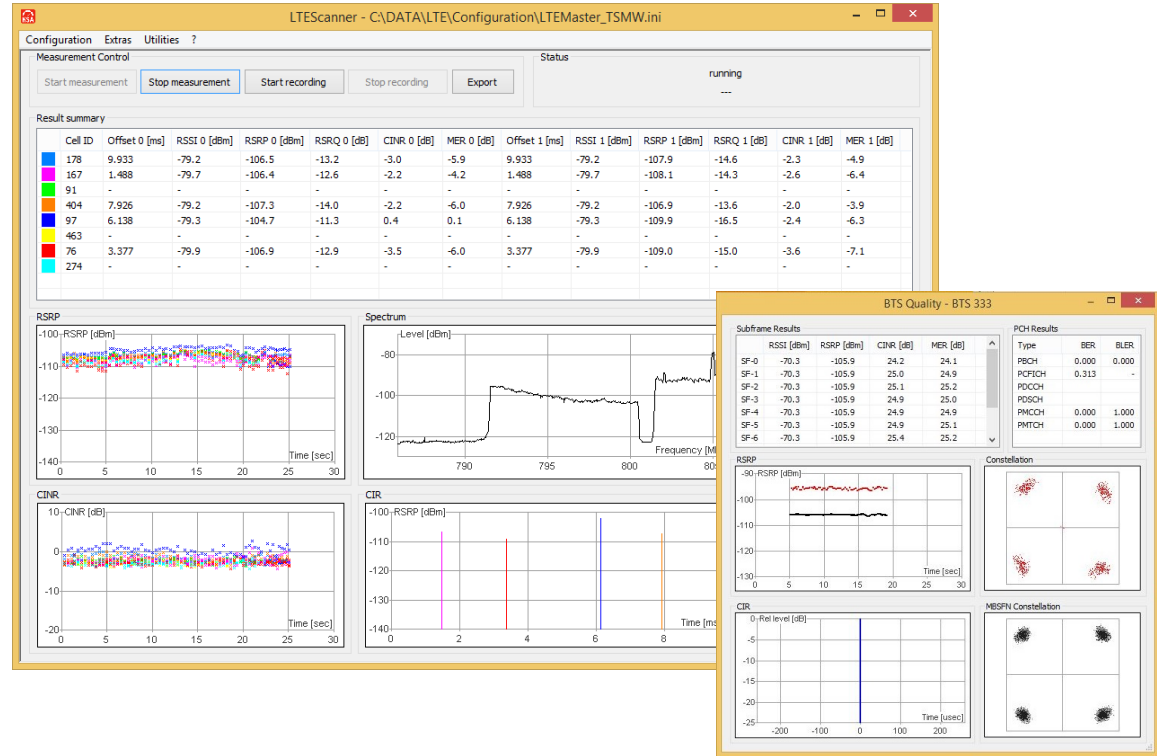
IRT: Prototypical implementation of FeMBMS receiver

- Software Defined Radio (SDR) device USRP 29xx
- Software platform: Open Air Interface (OAI)
Open source implementation of core network (EPC), access network and user equipment (EUTRAN) of 3GPP cellular networks
- IRT is a member of the OAI Software Alliance
- Implementation of FeMBMS required modifications in some elements of OAI
- Next step: optimisation and field tests



KATHREIN Signal Analyzer LTE Scanner FeMBMS

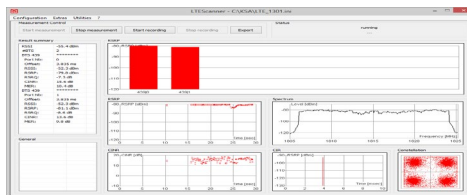
- SDR (Software Defined Radio) concept
- Software created by Enkom (Kathrein Group)
- Independent of chipsets or existing decoders
- Signal strength and quality-of-service measurement
- Mobile, portable or stationary measurement



Field measurements starting Juni 2019

➤ Measuring tool:

KSA – LTE Scanner FeMBMS



➤ Polarisation

horizontal, vertical, circular

➤ Reception mode

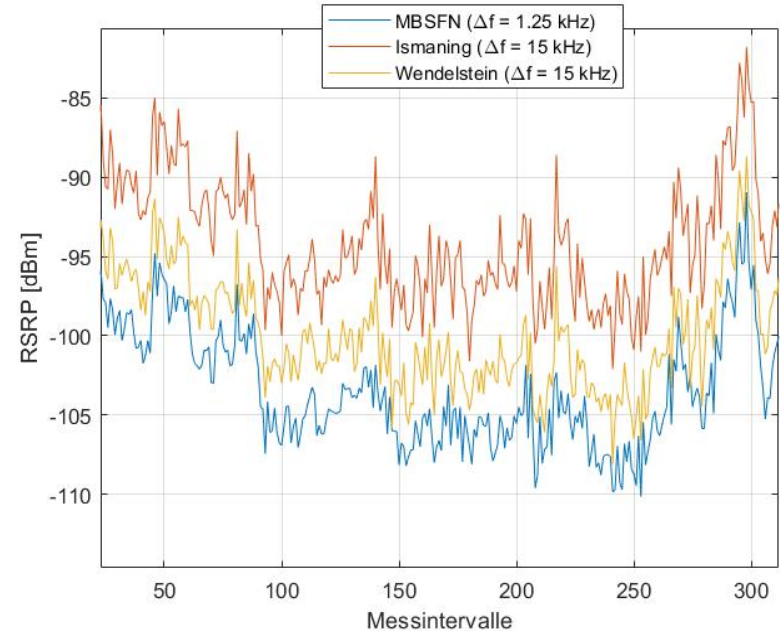
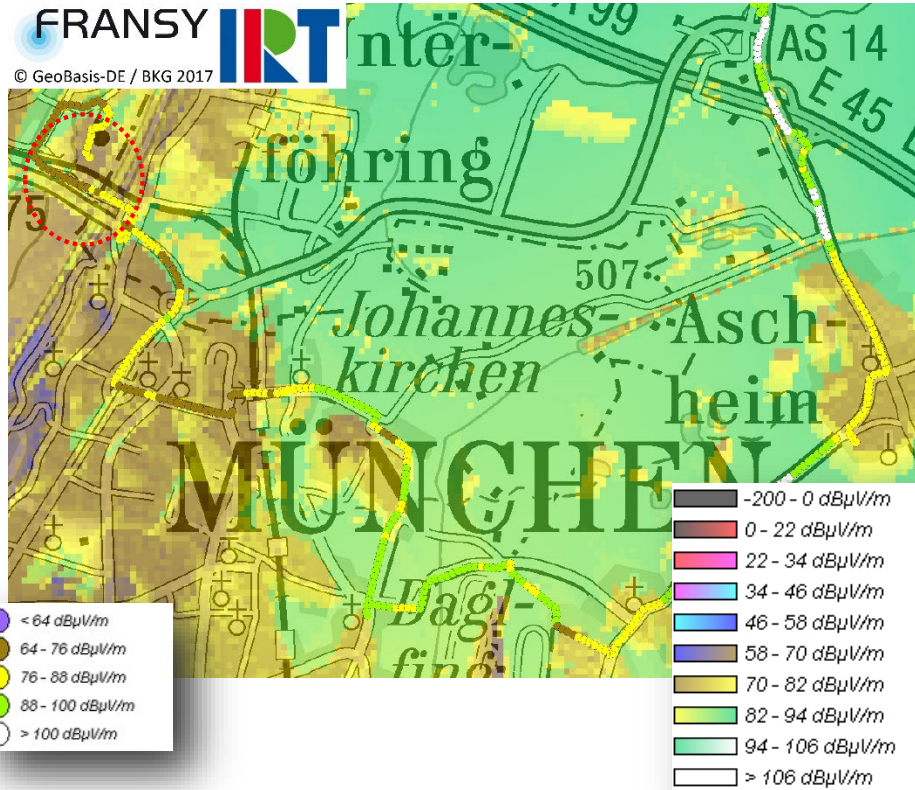
stationary, portable and mobile

➤ Network modes

MFN and SFN



First field measurements



measured RSRP values for CAS and MBSFN signals

5G Today: Summary



Bayerische
Forschungsförderung

- A forward-looking project with a multitude of interesting tasks
 - Implementation of FeMBMS specification
 - Broadcast network based on FeMBMS in the Bavarian Alpine Region
 - Field measurements: Evaluation of the technology as a broadcast network
- Opportunities through the project 5G-Today:
 - Contribution to the 3GPP standardization
 - Media use on smartphones and tablets - linear and non-linear
 - Technical requirements for future attractive business models for mobile and broadcasting



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Thank you for your attention!

Experts in audio-visual media

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