On the Future DVB Terrestrial

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Our Mission: To Create And To Promote Video Standards
What We Have Achieved

- SD (MPEG-2, 1993)
- HD (H.264, 2003)
- UHD (HEVC, 2013)

- DVB S
- DVB C
- DVB T
- DVB GEM
- DVB S2
- DVB C2
- DVB T2
- DVB S2X

- DVB UHD1-P1
- DVB UHD1-P2
- HFR
- Colour
- HDR
- Audio
- UHD IP
DVB-T/T2 Worldwide Success
DTT Transition Scenarios

- Analog TV
  - T2+HEVC
  - T2+H.264
  - T+H.264
  - T+MPEG2
- Transition has already happened or is confirmed
- Potential transition in the future
Performance comparison DVB-T2 vs. DVB-T

AWGN - Additional White Gaussian Noise
Net Capacity in Stationary channel
(C/N @ QEF : BER=10^{-11} - DVB-T2 : Red / DVB-T : Blue)

6dB power saving
Performance comparison ATSC 3.0 / DVB-T2

Source: Frank Herrmann, Panasonic
Performance comparison ATSC 3.0 / DVB-T2

Source: Frank Herrmann, Panasonic
As compared to DVB-T2 the spectral performance improvement for a single channel is not even 1 dB.

For low SNR, which is the relevant region for mobile, there is basically no difference at all.

Conclusion: For the time being there are no technologies available to significantly improve the spectral performance of a single channel.
WiB: A new DTT network architecture

Basic principles of WiB (1)

- **Wideband**
  - Wideband transmission as a single WiB signal
  - Covering potentially the whole 224 MHz UHF band (28 UHF channels)

- **Reuse-1**
  - Adjacent TXs use the same frequencies
  - Very challenging interference situation
    - e.g. C/I = 0 dB

- **Robust transmission mode required**
  - e.g. QPSK, req. C/N close to 0 dB

- **Interference Cancellation**
  - Removes unwanted interference

- **Reduced Capex and Opex**
- **Increased capacity**
- **Evaluation in DVB Study Mission Group**

Source: Eric Stare (Teracom)
New UHD Phase 2 Features Also for DTT

- High Dynamic Range
  - HLG and HDR10
- Wider color
- Higher Frame Rates
- Next Generation Audio
  - MPEG-H
  - Dolby AC-4
Interactivity: HbbTV in all Networks

- In operation
- Technically proven
Large Variety of HbbTV TV-Apps

- EPG
- Children / Youth
- Catchup / VoD
- Timeshift / replay
- Games
- Voting
- Targeted advertisement
- Shopping / „sales through“
- Second screen
- Social networks
- Live TV streams
HbbTV deployment worldwide

- Regular operation in 25 countries, more are preparing launch
- > 200 applications deployed
- > 40 Mio devices
- Used by millions of TV viewers every day
- > 80% of all Smart TVs sold have HbbTV
- Market penetration continuously growing

Status: July 2016
Solution for Wifi Distribution of Broadcast Content in the Home

- SatIP supports wifi distribution for C/S/T and IPTV
- SatIP/DVB liaison agreement

Standard for Live Broadcast TV via IP
The Future will Continue

- SD
- HD
- UHD
- VR?

- MPEG-2 1993
- H.264 2003
- HEVC 2013
- H.266 2020?

- DVB S
- DVB C
- DVB T
- DVB S2
- DVB C2
- DVB T2
- DVB GEM

- DVB UHD-1
- DVB UHD-1 Phase2
- DVB WiB

- HFR
- Colour
- HDR
- Audio
- UHD IP

- 1990
- '95
- 2000
- '05
- 2010
- '15
- 2020
- 2025

- '93
- '98
- '03
- '08
- '13
- '18
- '23

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Conclusion

- For DTT we cannot expect spectrum efficiency improvements for single channel transmission. However overall network optimisation is possible.
- The current UHD Phase 2 specification defines a new level of user experience.
- IP and hybrid delivery and applications will be DVB's strategic focus.
- For interactivity and hybrid applications HbbTV is our partner.
- Broadcast is and will be an important factor.
- DVB is committed to provide the necessary specification for the success of broadcast.
DVB-T2: A European Success Story

Dominant platform
118 million households rely on DTT

Linear TV is alive
3 hours of watching per day

DTT is growing
80% growth in 5 years

Minutes per day

<table>
<thead>
<tr>
<th></th>
<th>Linear TV</th>
<th>Non Linear TV</th>
</tr>
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<tbody>
<tr>
<td>Public Service Media</td>
<td>250</td>
<td>50</td>
</tr>
<tr>
<td>Commercial</td>
<td>100</td>
<td>150</td>
</tr>
</tbody>
</table>

2008 2013

0 100 200 300 400 500 600 700

Public Service Media
Commercial
GDP per capita is similar to Malaysia (10840 Eur vs 8488 Eur in Turkey)
66% of TV revenues are subscription
Strong uptake of DTT
Mobile services offered on DVB-T
28 FTA + 11 pay + 2 regional
Germany has started T2 with HEVC
1080p50 will deliver best quality
Portable reception
40 Free to air as well as pay TV services
Basic STBs below 40 Euros