



DIGITAL radio mondiale

The **FUTURE** of global radio

“Flexible and Complete Digital Radio for Europe”

DRM European Workshop

In conjunction with the DRM General Assembly

6th - 7th April 2016 - Erlangen, Germany



DRM+ Multi-Channel Transmission

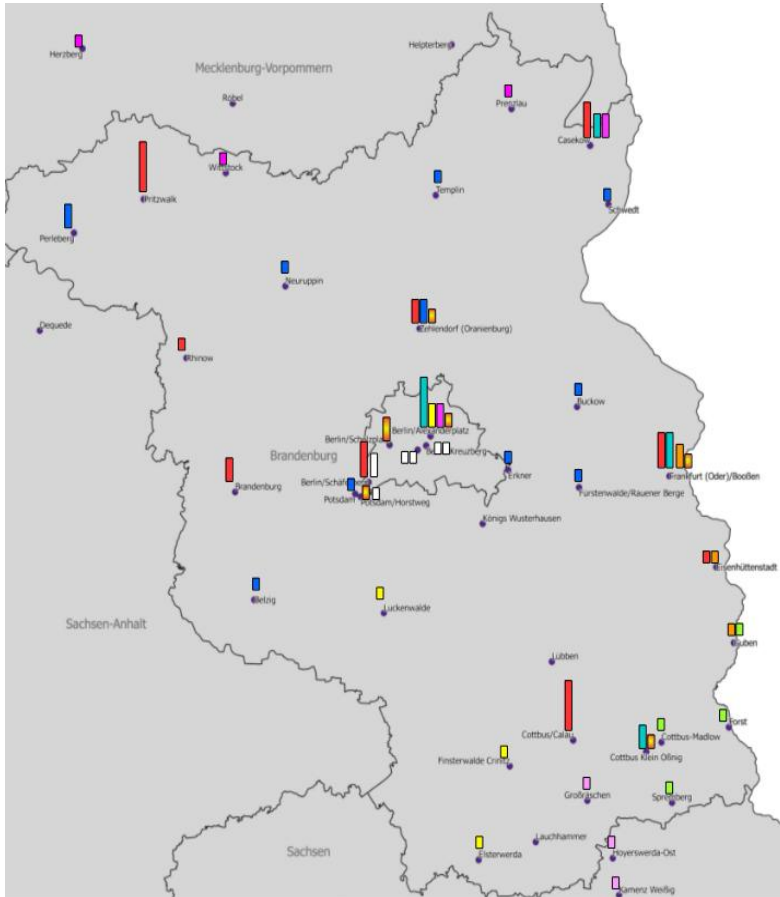
- cost and spectrum efficient broadcast networks -

[Mobile Broadcast Consult](#)

Dr.-Ing. Manfred Kühn

E-Mail: mbc.kuehn@t-online.de

► Commercial FM Programmes in Berlin and Brandenburg



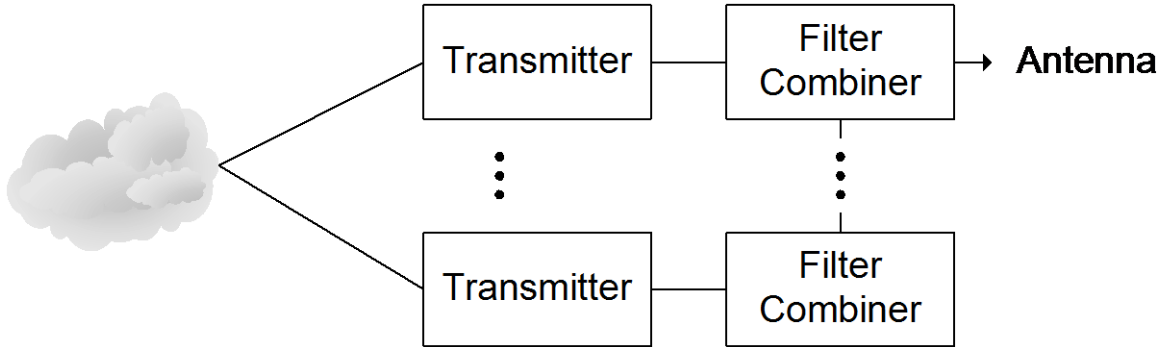



Requirements for digital broadcast

- Each programme requires its own transmission conditions:
 - covered area,
 - TX location,
 - transmitting power,
 - kind of reception (PO, PI, Mob),
 - single transmitter or SFN
 - a.s.o ...
- Local programme insertion (“local windows“).
- Low distribution costs

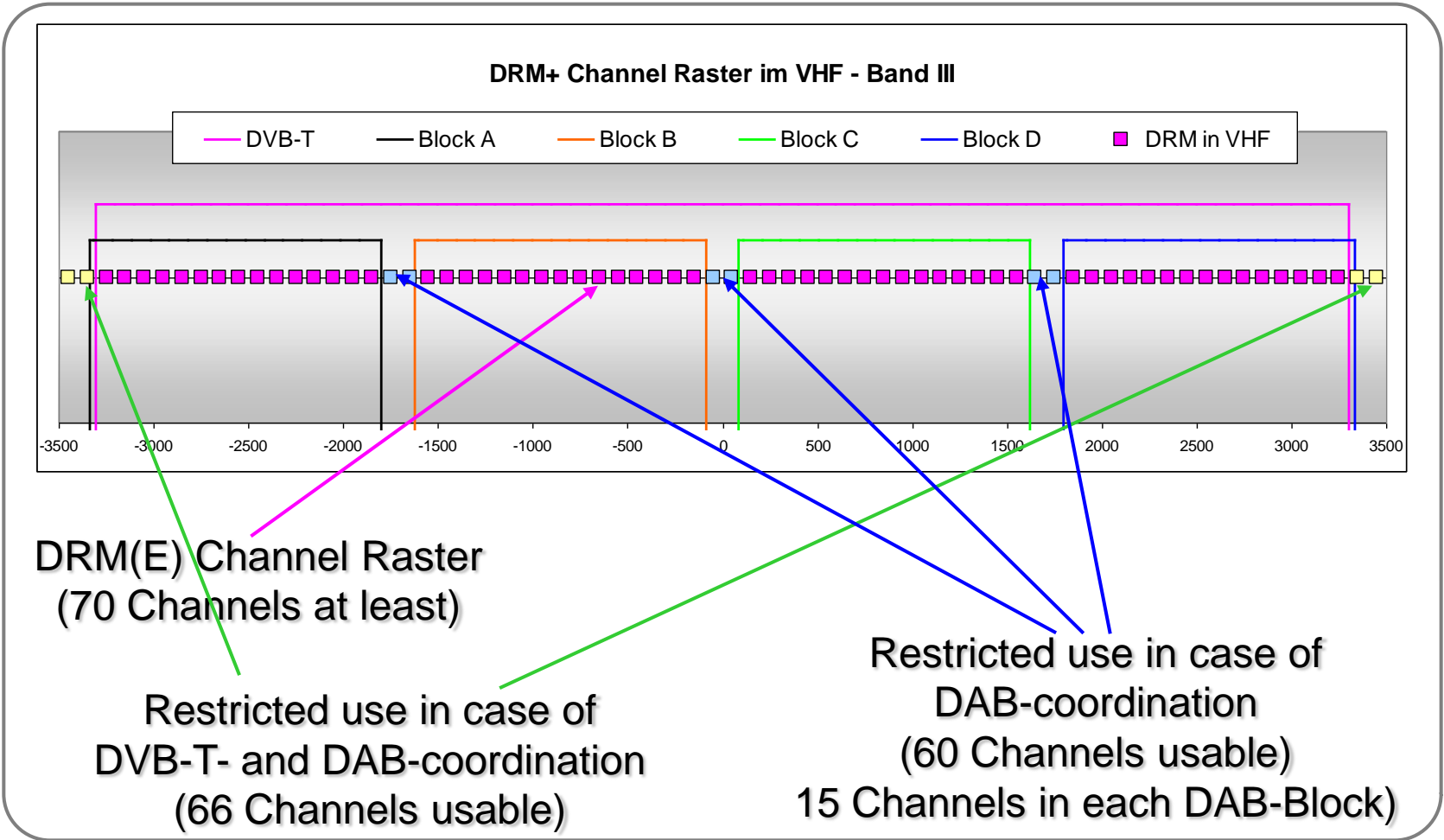
Note: A high power DAB transmitter interferes most of the area.

► Transmitter Stations at Cities and Dens Populated Areas (i.e. FM)

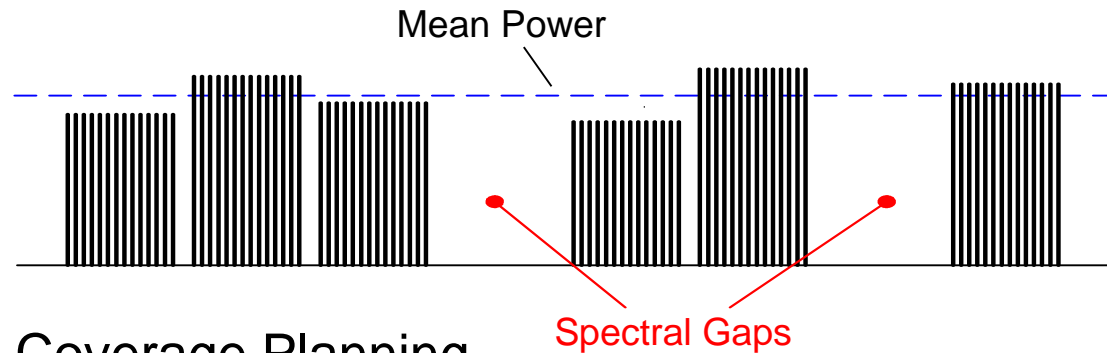


A big effort is necessary for FM transmitter stations

► **DRM+ Channel Raster (ITU-R BS.1660-5)**



► Multi Channel Spectrum (MCS) 1

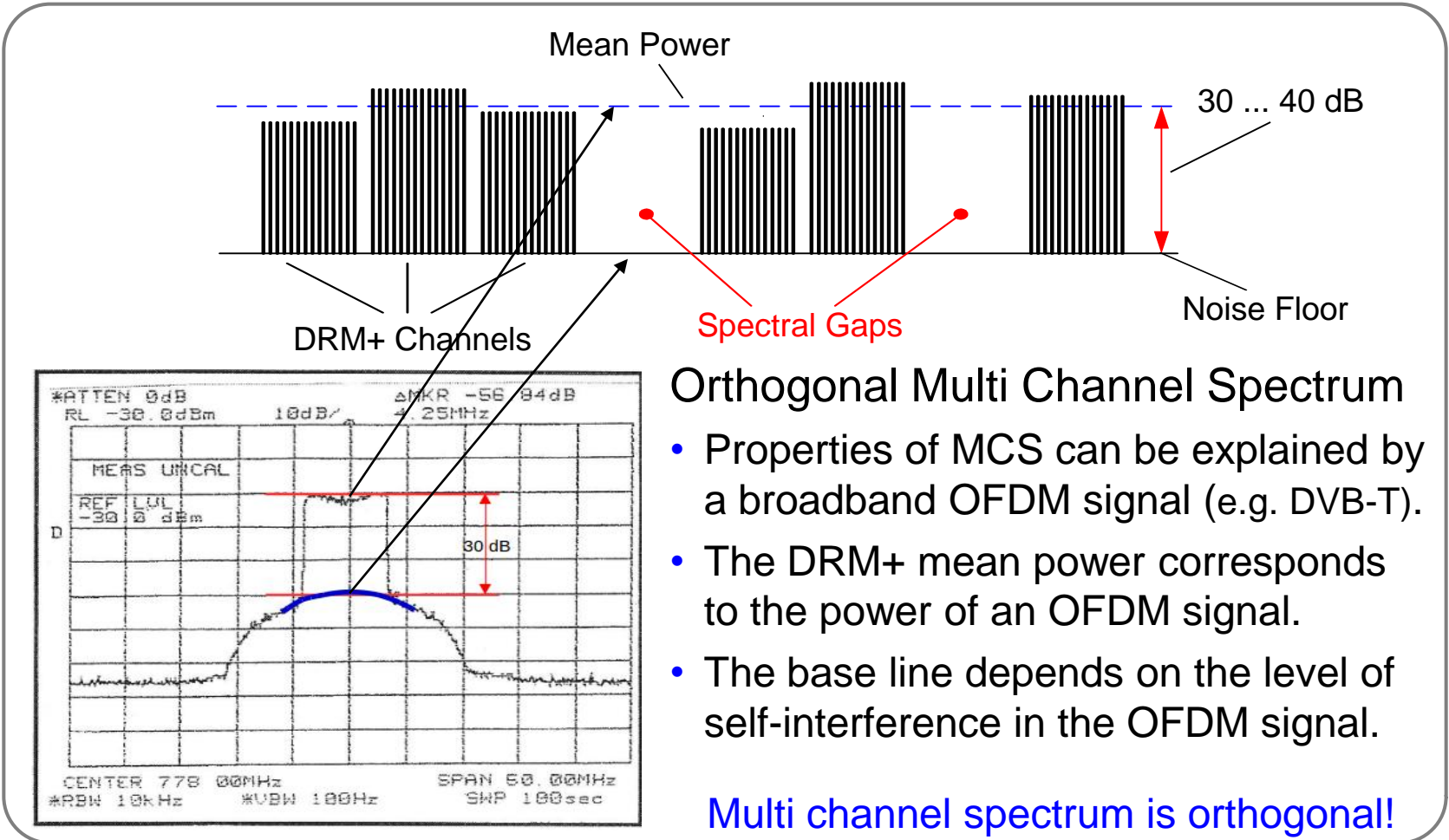


DRM+ Coverage Planning

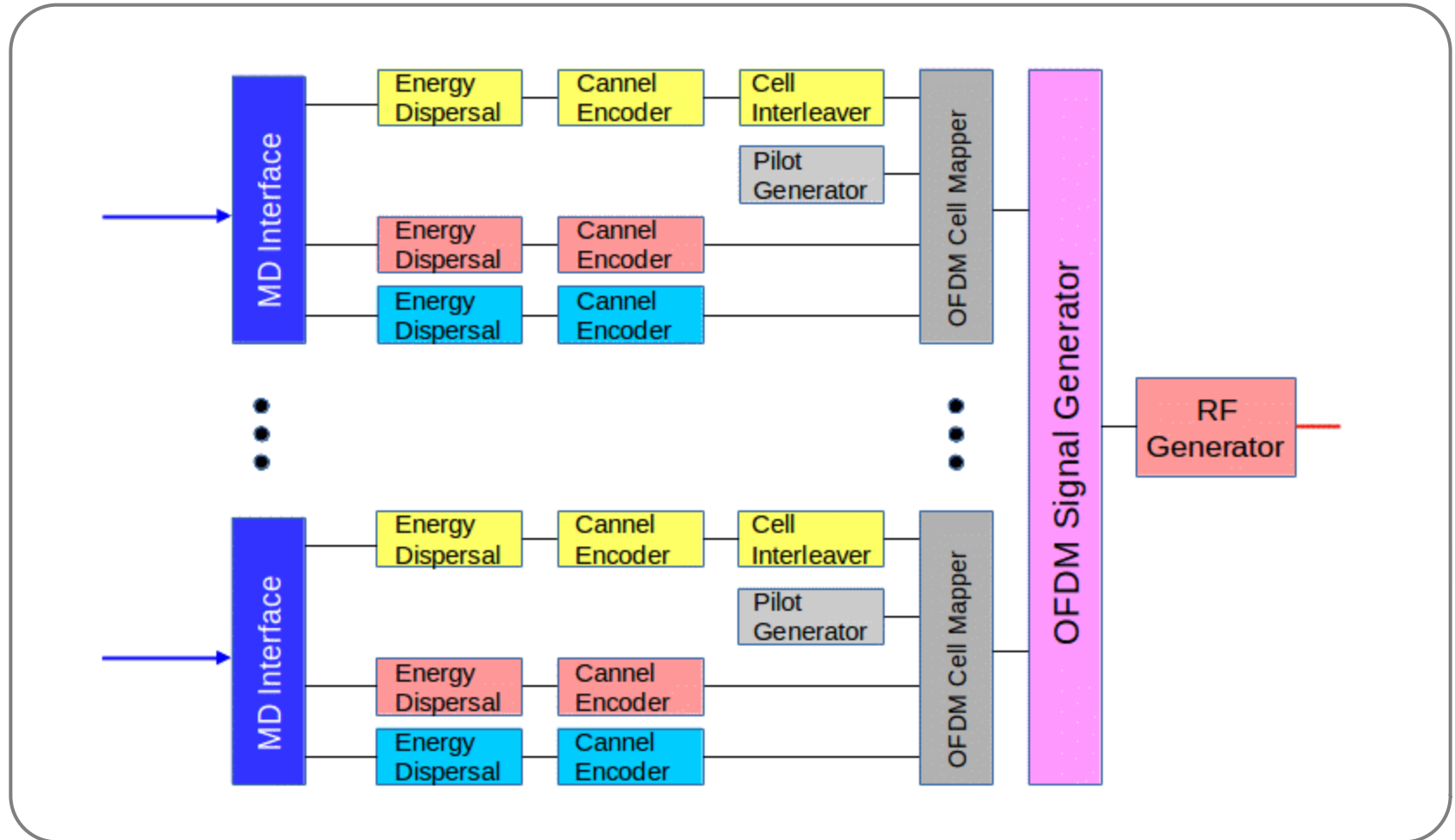
- Every broadcaster get his own DRM+ channel .
- Each DRM+ channel is adjusted to the transmission parameters required by the broadcaster.
- Adjacent channels might be used if protection level is sufficient.
- Spectral gaps are there instead of unused DRM+ channel.
- Up to 15 DRM+ channels might be placed in a DAB Block.

Multi channel spectrum can be generated by common FFT!

► Multi Channel Spectrum (MCS) 2

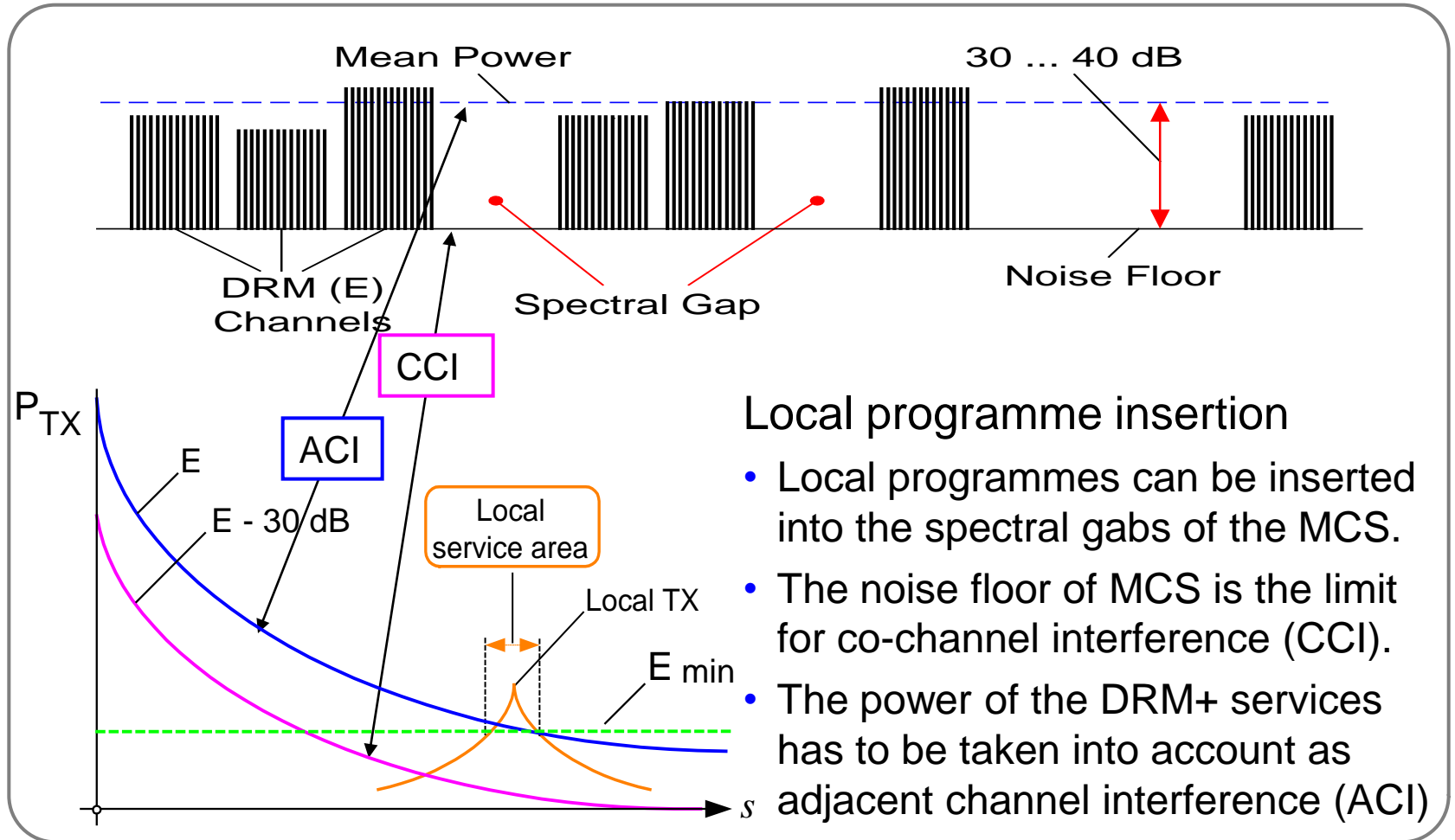


► DRM+ Multi Channel Transmitter (MCT)



► Local Programme Insertion

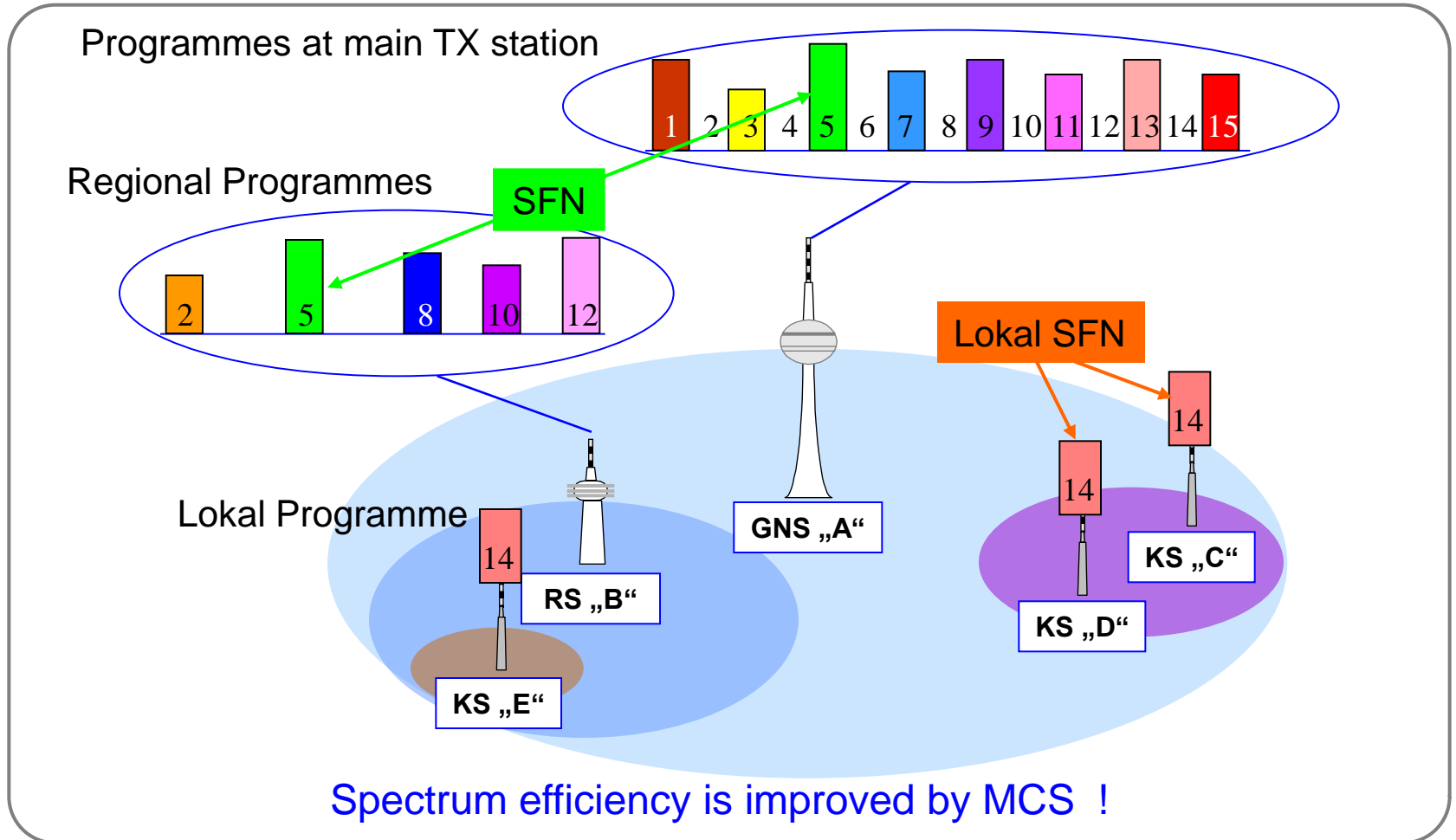
CCI



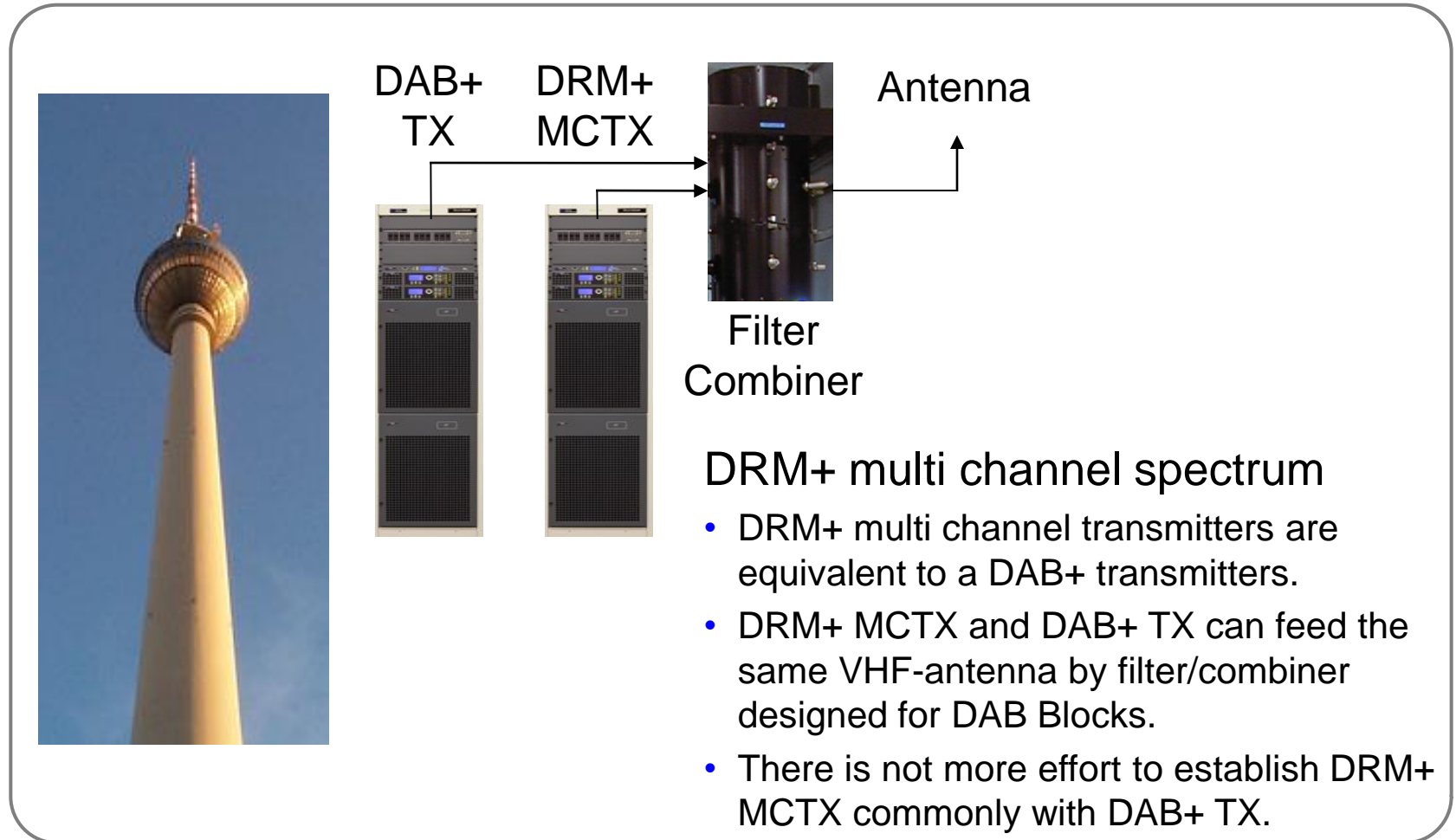
Local programme insertion

- Local programmes can be inserted into the spectral gaps of the MCS.
- The noise floor of MCS is the limit for co-channel interference (CCI).
- The power of the DRM+ services has to be taken into account as adjacent channel interference (ACI)

► *Application example*



► Effort at the Transmitter Station



► *Benefit of DRM+ Multi-Channel Transmission*

Conclusion:

- DRM+ networks can be performed as single transmitter (MFN) or single frequency networks (SFN).
- Several DRM+ channels can be merged as „orthogonal multi channel signal“ to achieve better cost and spectrum efficiency.
- Individual transmission parameters like modulation, transmitting power a.s.o. can be used even in the case of DRM multi channel transmission.
- Spectral gabs in a multi channel signal can be used for lokal services.

Neither DAB nor DVB-T is flexible enough to meet the requirements of commercial broadcasters !

What we urgently need are DRM+/DAB+ multi-norm receivers !



Thank you for your attention !

Mobile Broadcast Consult

Dr.-Ing. Manfred Kühn

Scientific Technical Consultancy

Dresdener Strasse 25B
D-15566 Schöneiche

Phone: +49 (0)30 64 387 341

Moblie: +49 (0)151 149 18181

E-Mail: mbc.kuehn@t-online.de