DAB+ Network Deployment Plans in Hungary

Approaches to the Digitisation of Audio Broadcasting in V4 Countries
February 18-19, 2015
Banská Bystrica

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Antenna Hungária

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Geneva Plan (RRC-06)

- Only allotments are defined for T-DAB service in Band III
- 3 national multiplexes are possibly on the upper VHF channels CH10, CH11, CH12
- Analogue services are protected until 2015-06-17

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Geneva Plan (RRC-06)

- An allotment determines:
  - Territory (boundary)
  - Frequency (bandwidth)
  - Reference planning configuration (reception mode: portable indoor)
  - Reference network (used to determine whether or not, the planned transmitter or SFN causes less interfering field strength than the allotment)

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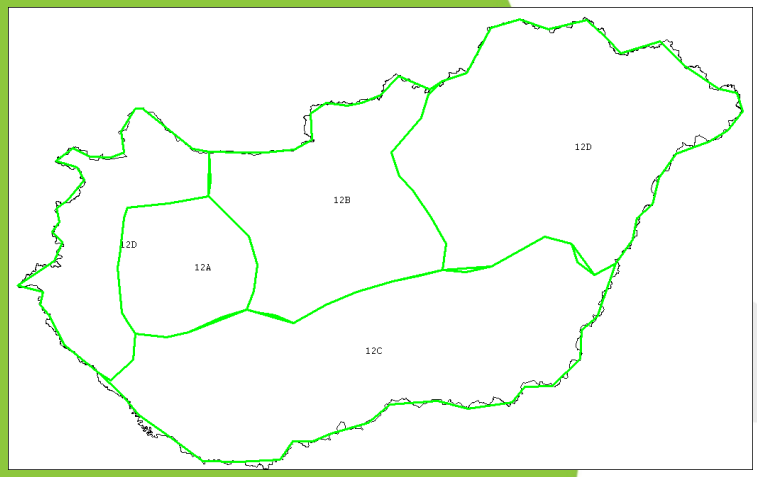
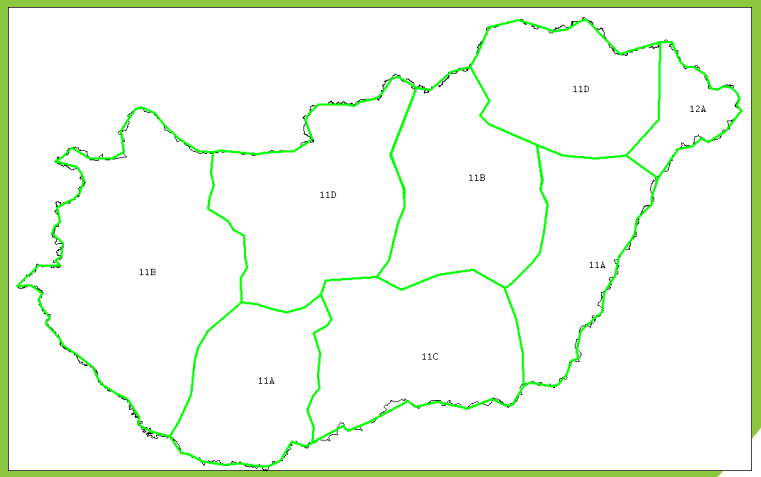
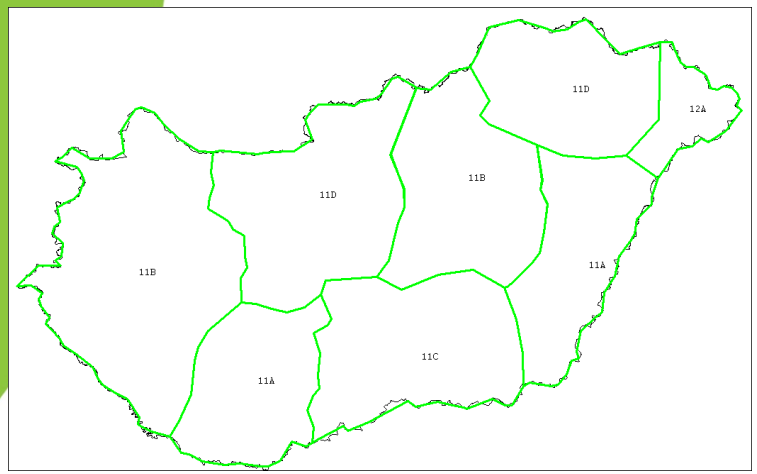
Geneva Plan (RRC-06)

- The SFN allotments for three multiplexes







2008: Digital Radio Tender

- 1 national multiplex (ch12, vertical pol.)
- Portable indoor reception
- 94% population coverage
- Hungarian and foreign analogue services are protected, therefore not enough frequencies are available, temporary solutions are necessary, and the network deployment depends on ASO

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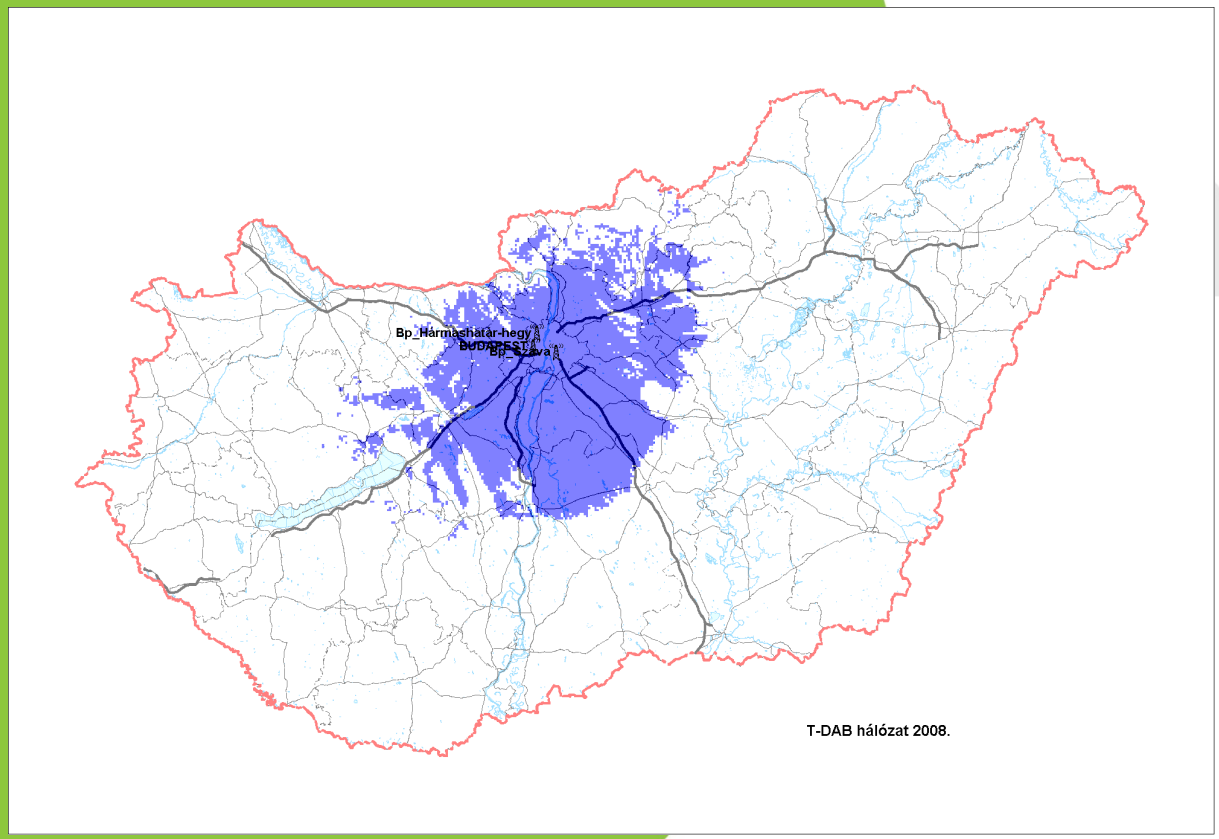
2008: Digital Radio Tender

- 2008: 3 transmitters, 31% coverage



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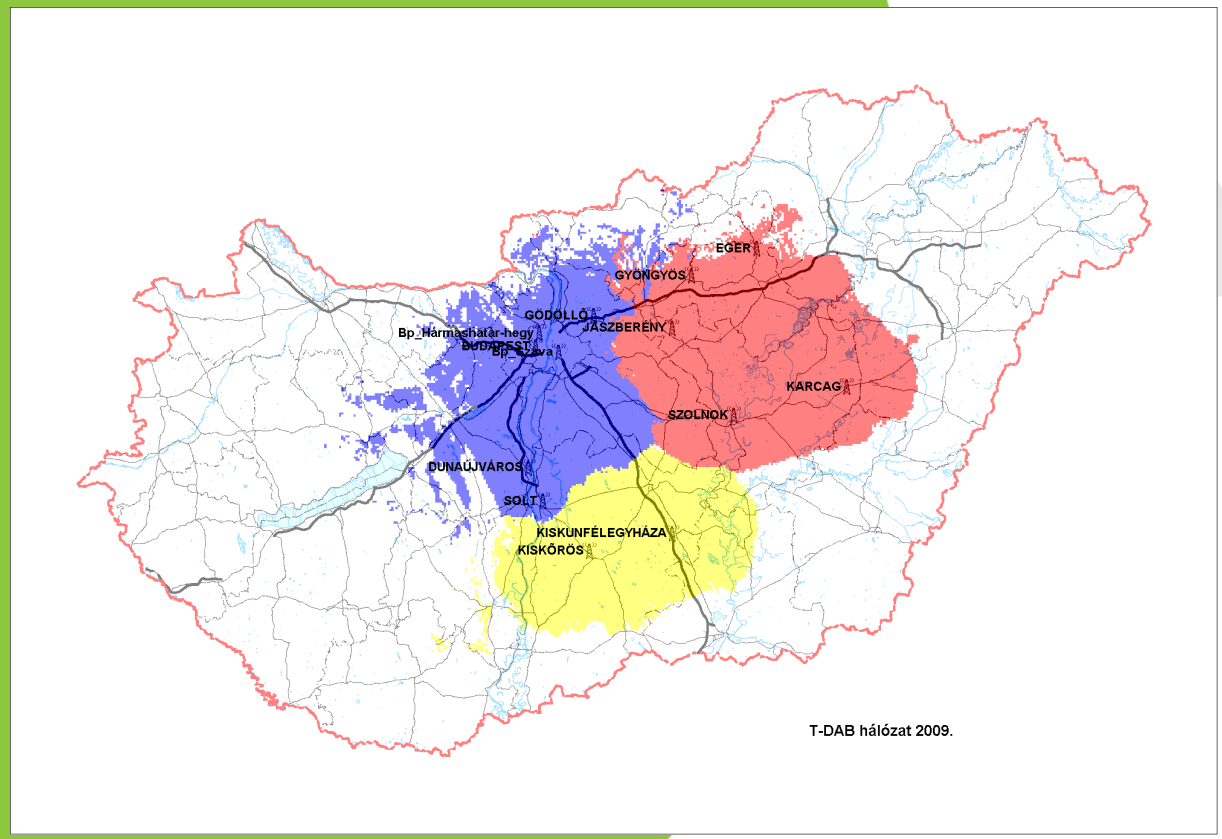
2008: Digital Radio Tender

- 2009: 13 transmitters, 44% coverage



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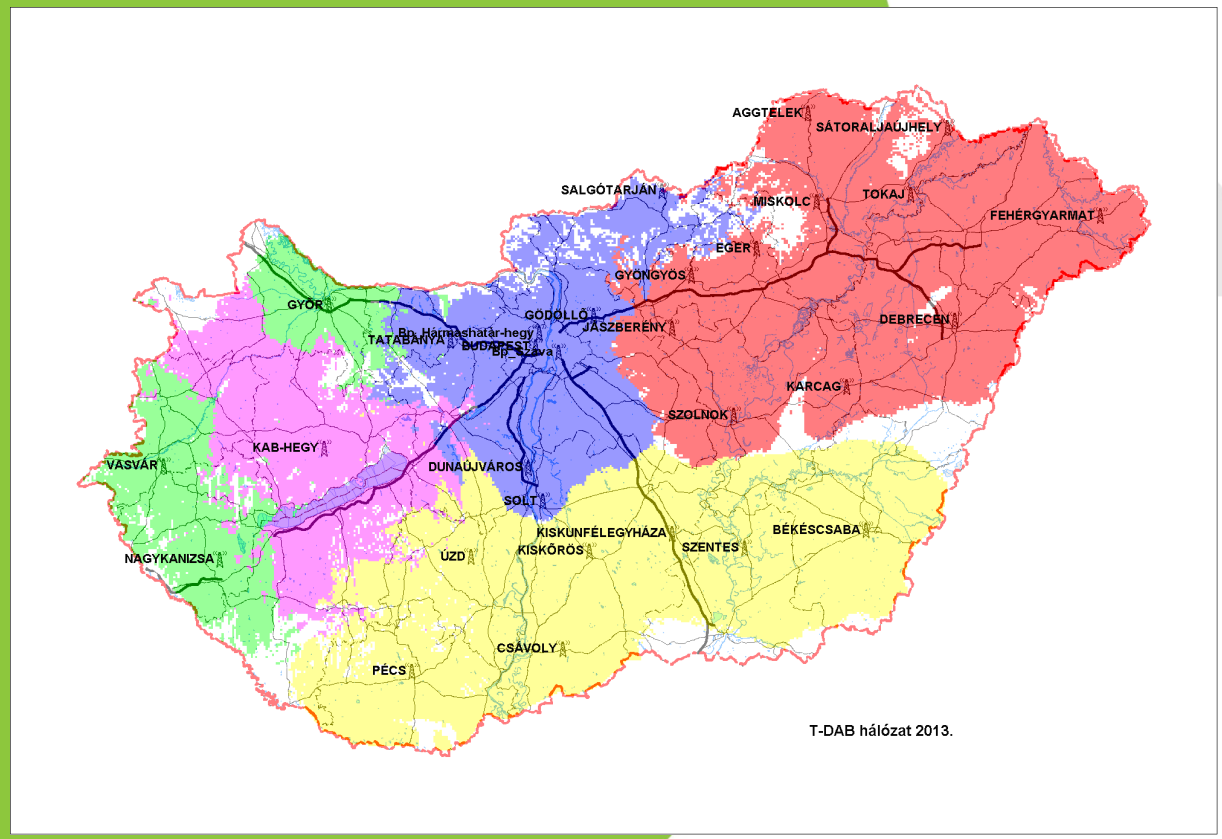
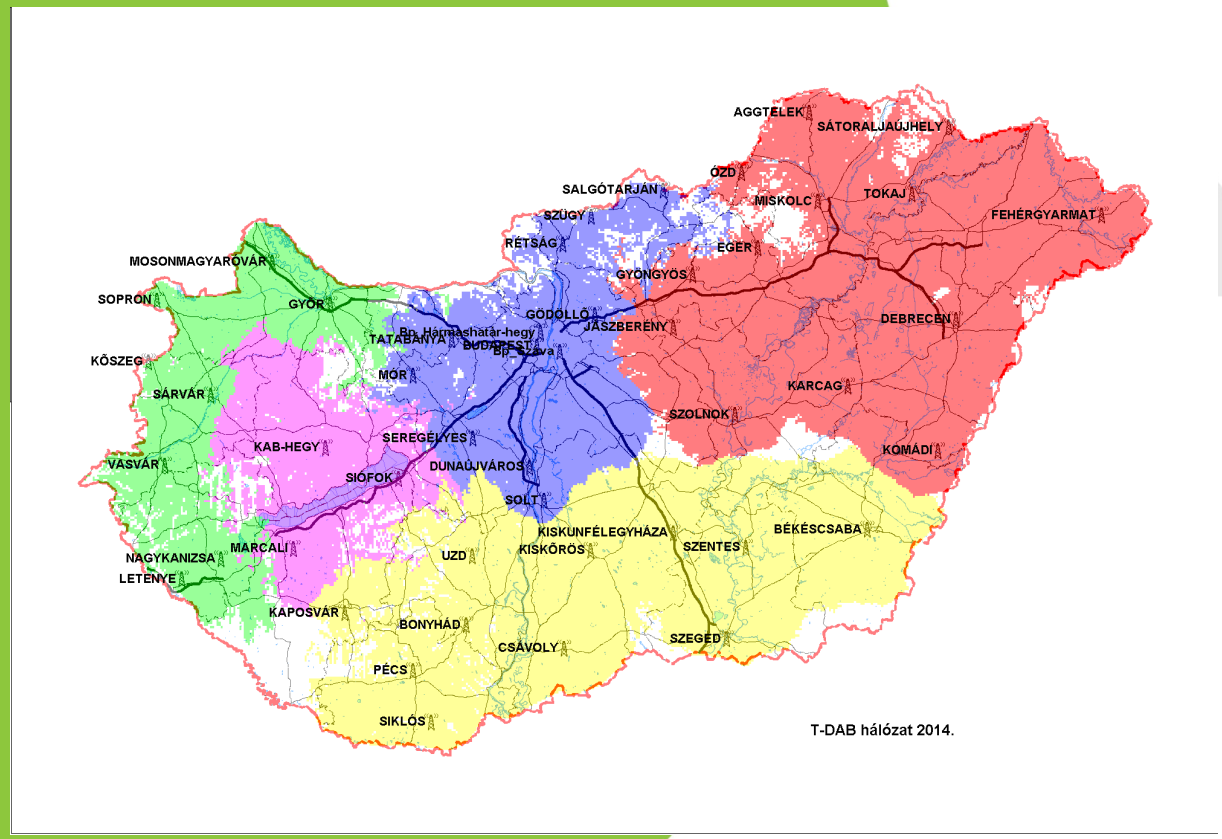
2008: Digital Radio Tender

- 2013: 30 transmitters, 93% coverage



2008: Digital Radio Tender

- 2014: 47 transmitters, 94% coverage



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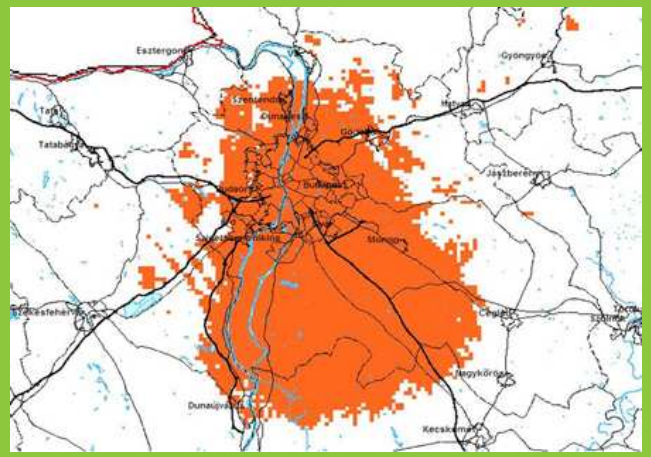
Digital Radio Service in 2008

- 2008: Transmission starts on 3 stations in Budapest on a temporary frequency with temporary antennas and power



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Digital Radio Service in 2008

- ASO date in Hungary was planned as end of 2012 but it was postponed and finally happened in 2013
- ASO in neighboring countries is postponed even more
- Content suppliers were reluctant towards DAB+
- Network deployment was suspended by waiting for promising signs

<antenna_hungária>

Situation in 2014/ early 2015

- Content providers show increasing interest
- From last summer all main stakeholders are owned by the state
- ASO is done in Hungary, ASO in Europe should take place till 2015-06-17 or at least analogue services cannot be protected any longer
- Geneva Plan frequencies will be available
- Hungarian Authority (NMHH) achieved some promising results in international frequency coordination, and they continue to work on it further

Situation in 2014

- New frequencies, new possible radiation patterns
- SFN and indoor reception experiences show that more transmitting sites are needed

Complete network re-design was necessary

Planning parameters

- „Portable reception is defined as: (RPC-05)
- – class B (ground floor, indoor), which means reception where a portable receiver with an attached or built-in antenna is used indoors at no less than 1.5 m above floor level in rooms with the following characteristics:
- a) on the ground floor
- b) with a window in an external wall

Planning parameters

- It is assumed that:
- – optimal receiving conditions will be found by moving the antenna up to 0.5 m in any direction
- – the portable receiver is not moving during reception and large objects near the receiver are also not moving
- – extreme cases, such as reception in completely shielded rooms, are disregarded”

Planning parameters

- Planning criteria
  - minimum median field strengths
  - maximum allowed interference towards other services
- Based on
  - C/N values
  - Receiver noise figure
  - Antenna gain
  - Height loss (field strength is calculated to 10m above ground instead of 1.5m)
  - Building entry loss (statistical)
  - Percentage time (received field strength is a time-dependent variable)
  - Location correction factors (receiving location is a variable inside a small area)
  - Frequency dependency
  - Protection ratios

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Planning parameters

- Minimum median field strength @10m @200MHz for portable indoor reception is: 66dBµV/m
- In highly built-in urban areas: 73dBµV/m (EBU TECH 3317)
- Other reception modes (such as mobile) have lower values

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Difficulties

- In comparison to UHF band DVB-T: higher necessary field strength, lower permitted radiated power → High number of sites is necessary
- Usually there are only small available spaces on towers or
  the only available space on wide diameter section of the tower → Special antenna solutions
- Still ongoing frequency coordination

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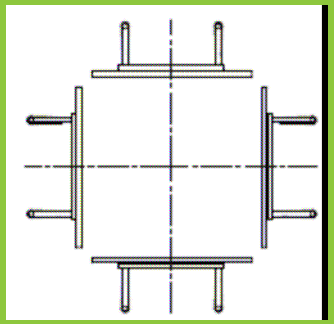
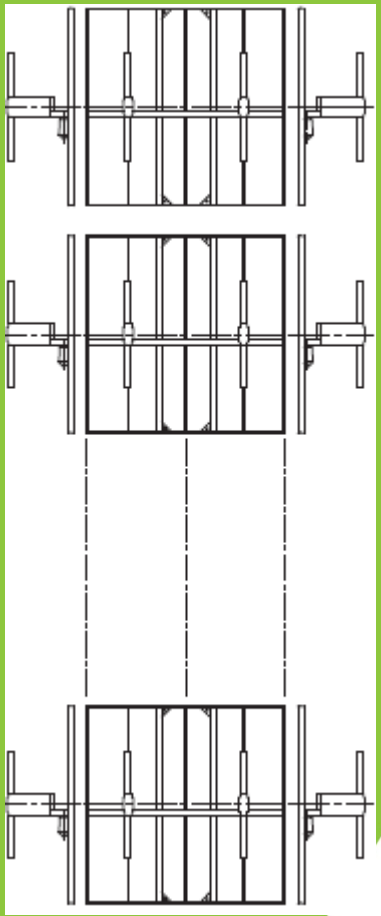
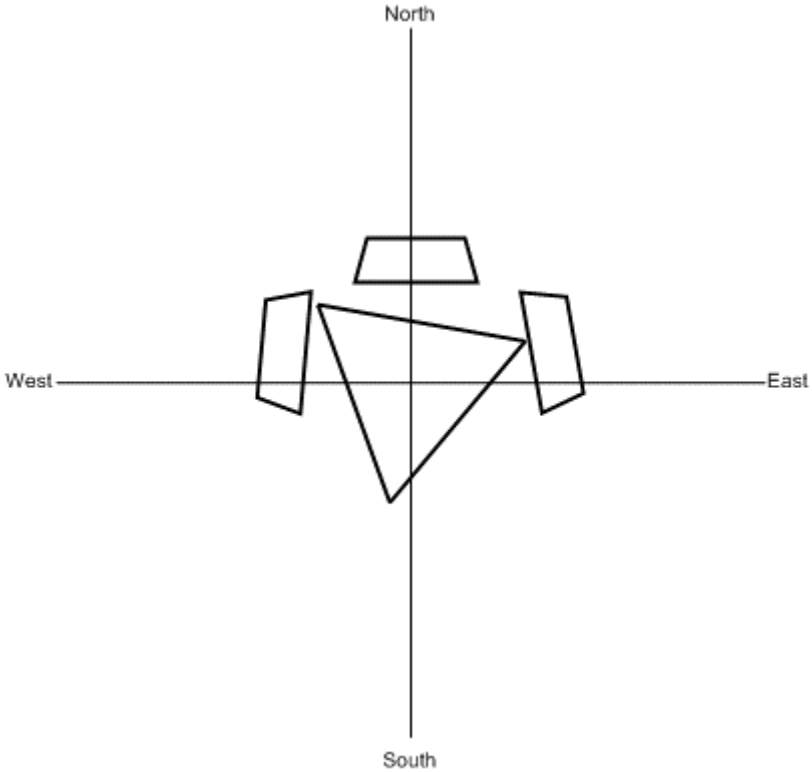
Typical antennas

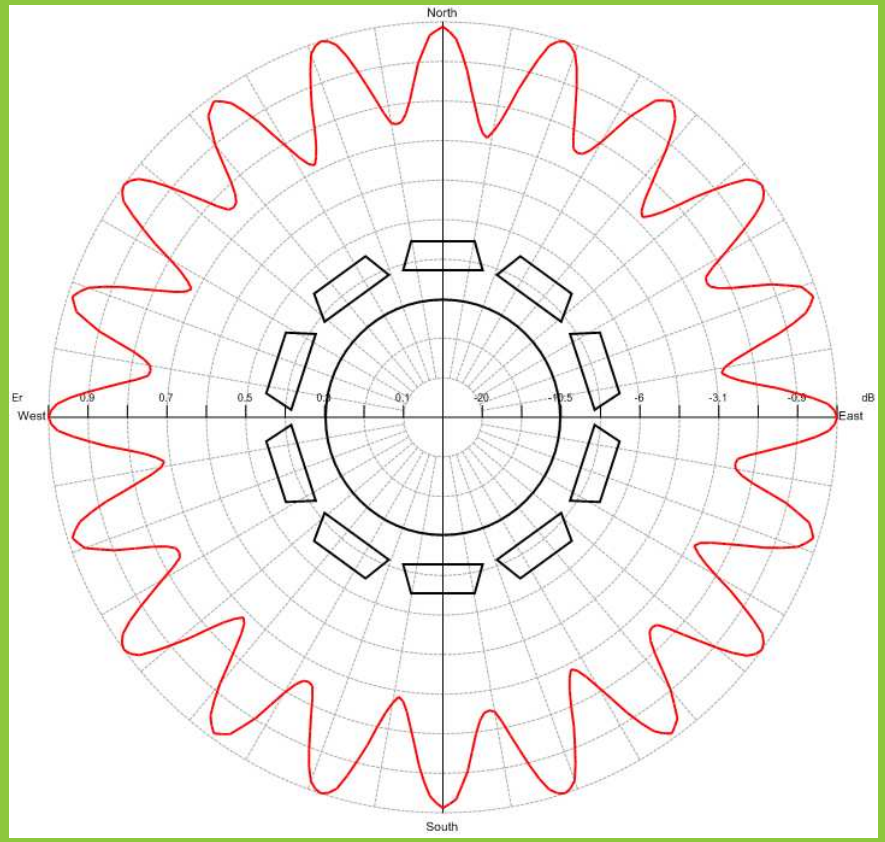
Antenna systems

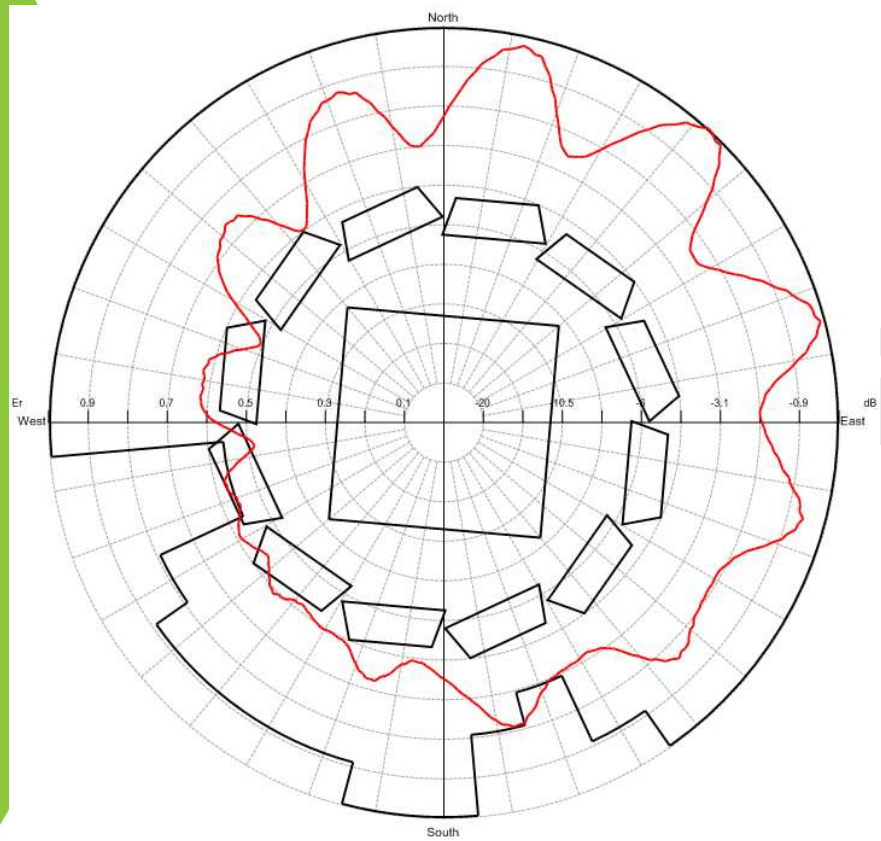






Antenna systems





Planned network

- 74 sites, >94% coverage (portable indoor reception mode)
- ERPmax: from 100W to 10kW
- Transmitter power: 150/300W, 750/1300W, 2.6/3.9/5kW
- Antenna systems: from 1 dipole to 8x4 panel antenna systems

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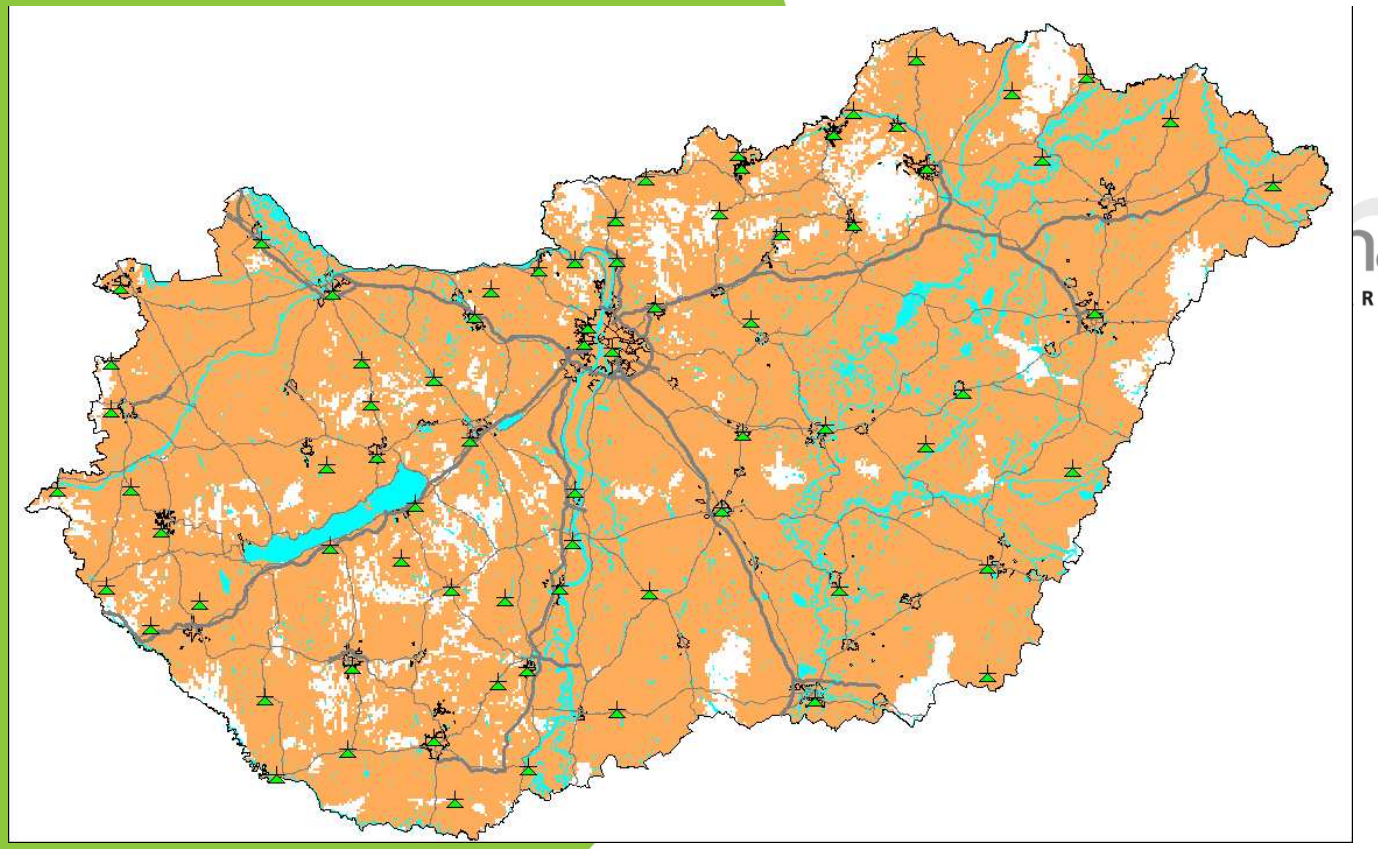
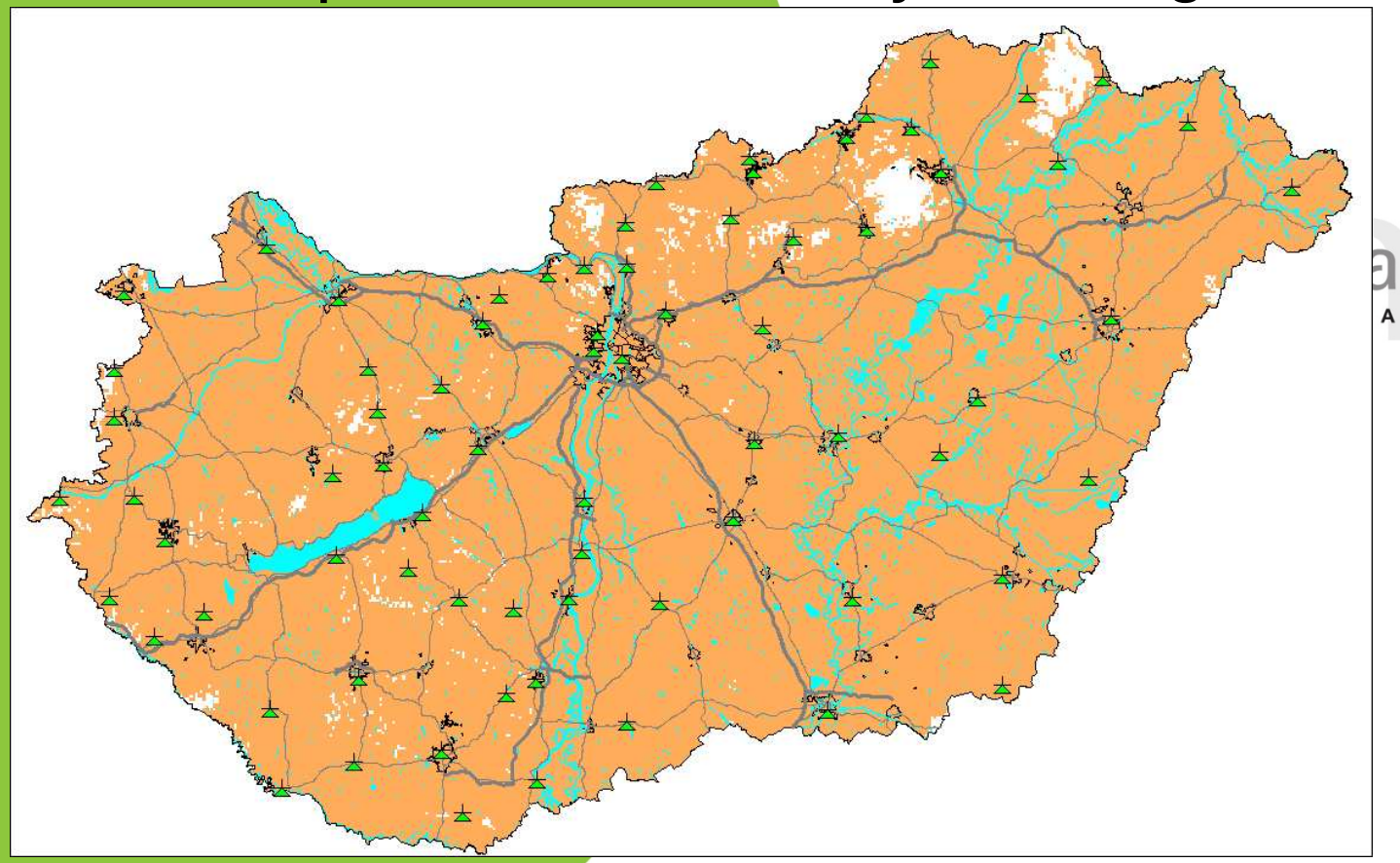
Planned network

- Portable indoor reception: 94% population coverage



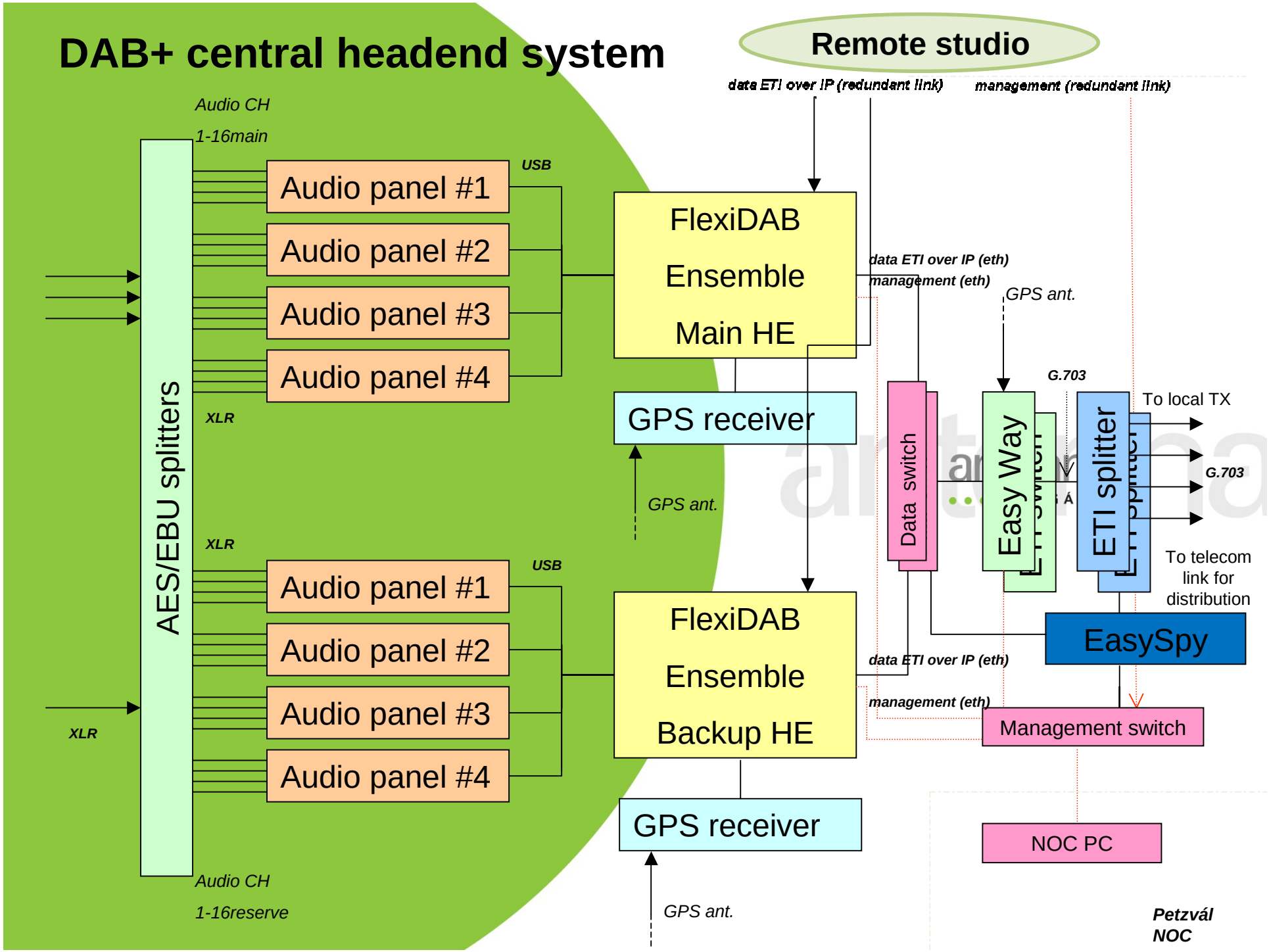
Planned network

- Mobile reception: 97% territory coverage

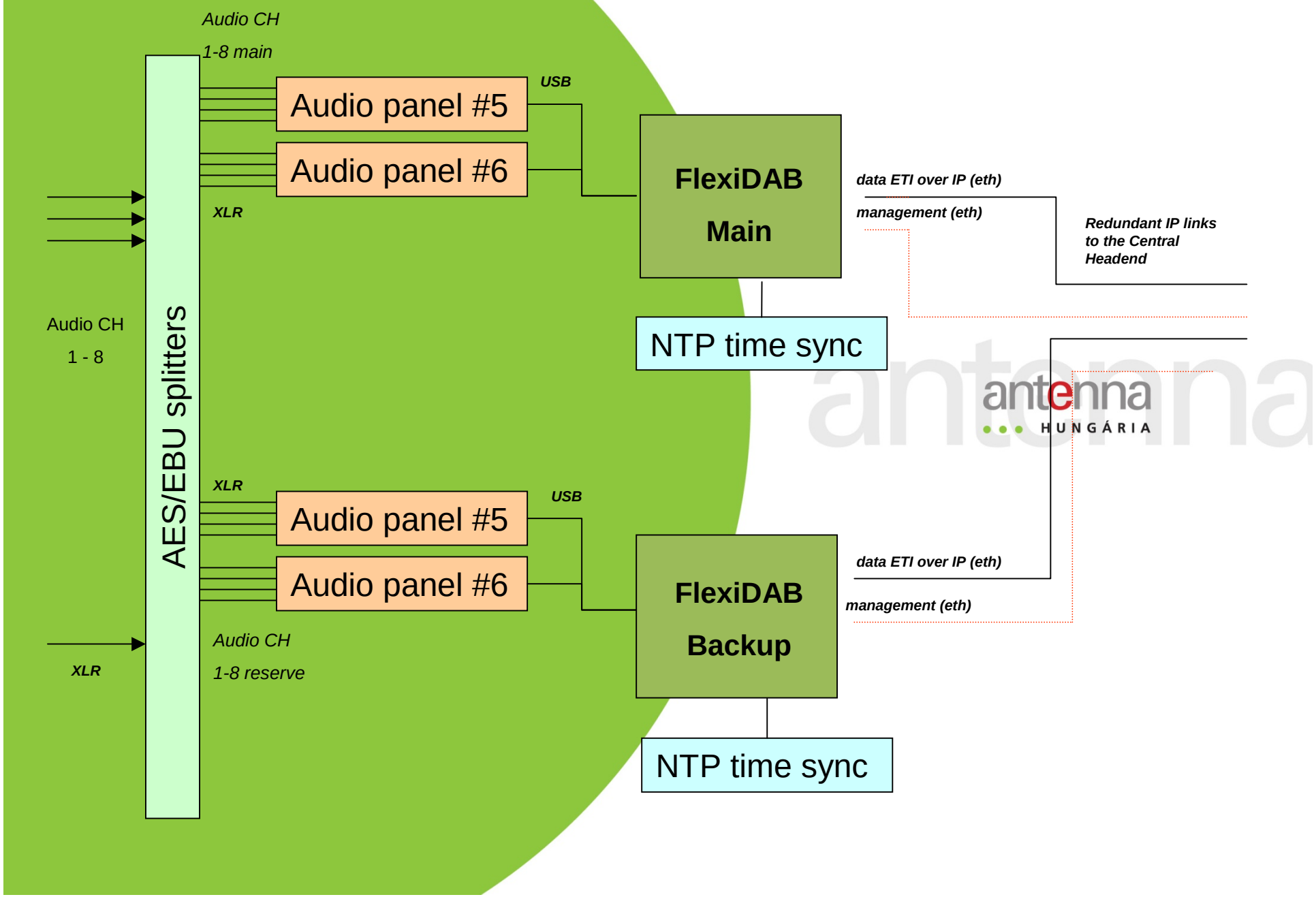


Offered services

- PAD: Programme Associated Data
  - DLS: Dynamic Label Segment
  - SLS: SLide Show
- NPAD: Non Programme Associated Data
  - EPG: Electronic Programme Guide
  - TPEG: Transport Protocol Experts Group

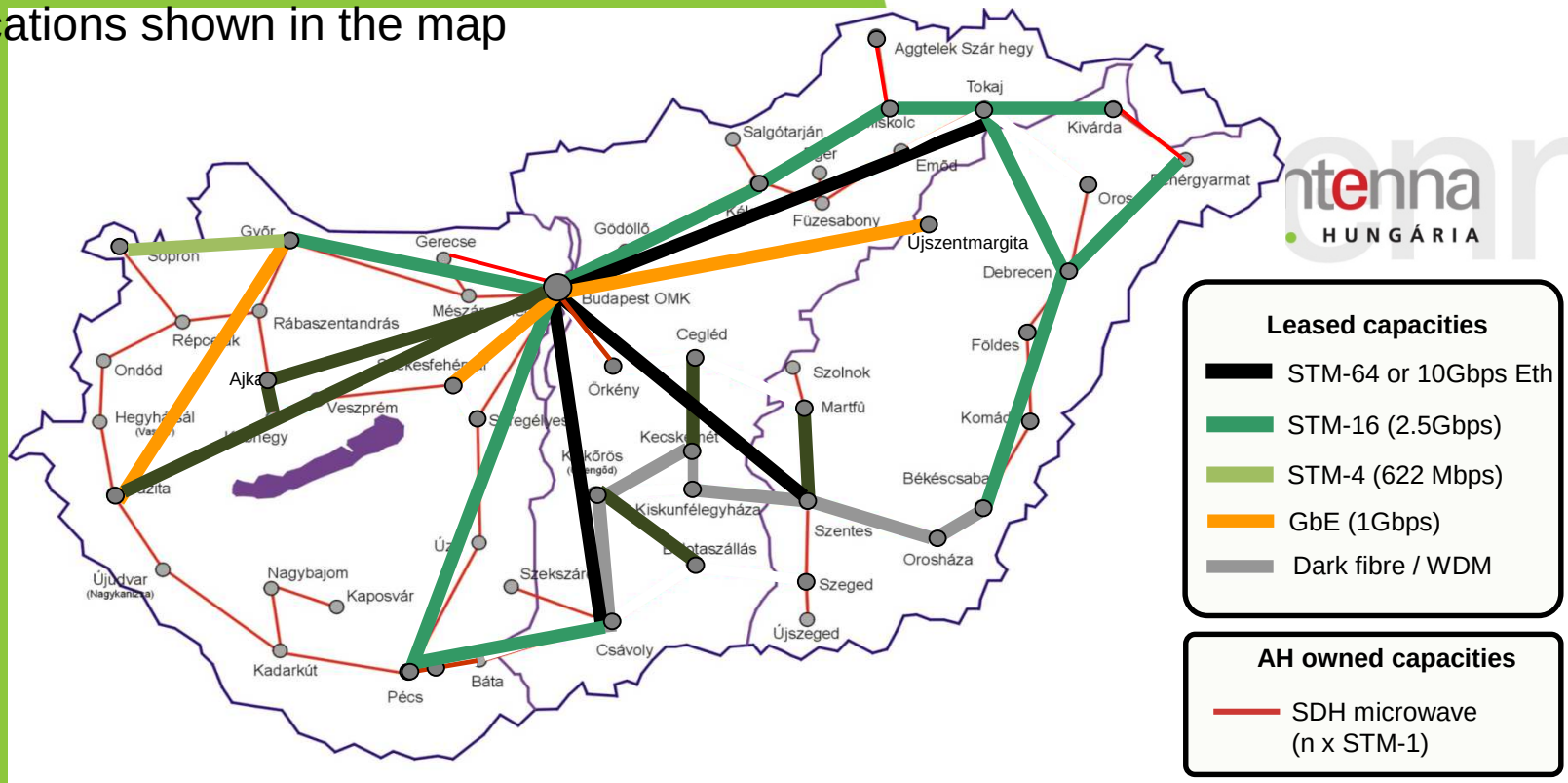

DAB+ central headend system
Remote studio
data ETI over IP (redundant link)
management (redundant link)
Audio CH
1-16main
AES/EBU splitters
Audio panel #1
Audio panel #2
Audio panel #3
Audio panel #4
USB
XLR
FlexiDAB
Ensemble
Main HE
GPS receiver
GPS ant.
data ETI over IP (eth)
management (eth)
G.703
Data switch
Easy Way
ETI splitter
To local TX
G.703
To telecom
link for
distribution
EasySpy
Management switch
NOC PC
Audio panel #1
Audio panel #2
Audio panel #3
Audio panel #4
USB
XLR
FlexiDAB
Ensemble
Backup HE
data ETI over IP (eth)
management (eth)
GPS receiver
GPS ant.
Audio CH
1-16reserve
Petzvál
NOC

Remote studio - Headend

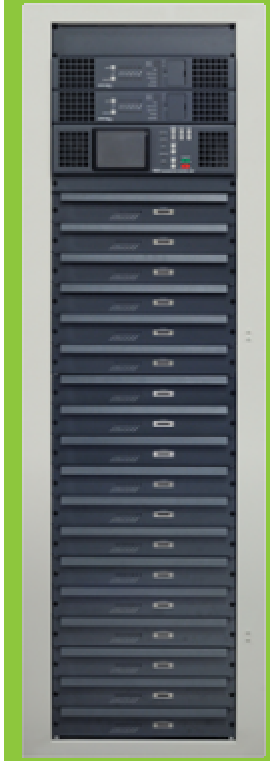


Signal distribution

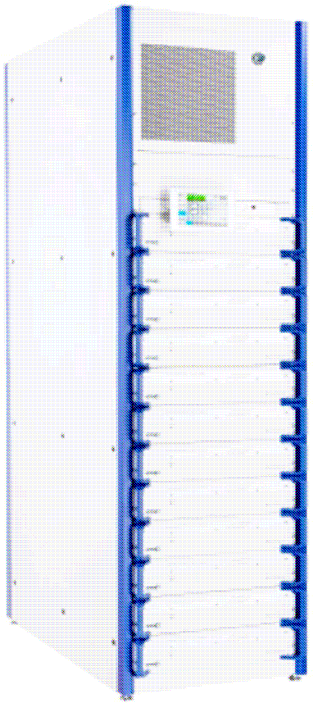
- Mixed topology of microwave-SDH, dark fibre-WDM and leased line NG-SDH and Gigabit Ethernet sections
- Different PoPs – with IP/MPLS/Metro, SDH or both
- Antenna Hungária owns the network devices at the locations shown in the map



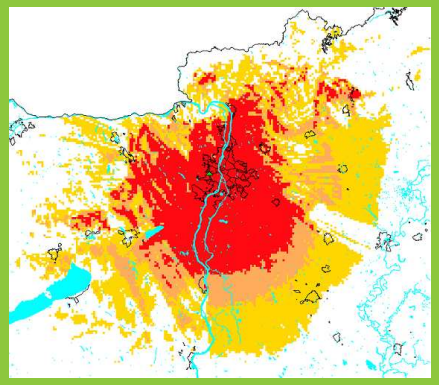
Transmitters



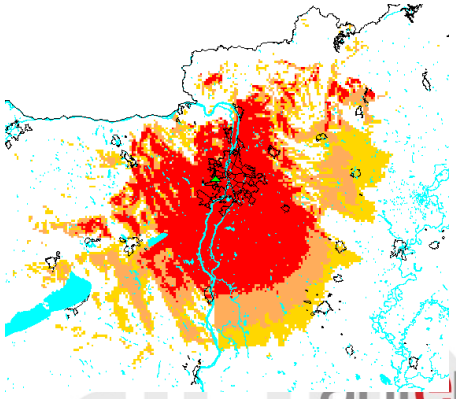
- Air cooled TX up to 1 kW, Liquid cooled above
- Different redundancy method depending on the covered population of the site:
  1+1, Dual Drive or Single Drive
- High efficiency by using Doherty technology
- Small footprint, Multi TX technology
- EDI Ethernet input



FM vs DAB+
Very simple comparism



FM 10 kW ERP
1.4 kW TX output power



DAB+ 10 kW ERP
1.7 kW TX output power

- More or less the same coverage (high gain 8 bays antennasystem in both cases

FM vs DAB+
Very simple comparism

- FM TX efficiency cca. 70%, DAB+ TX efficiency is cca. 35-40%
- 1,4 kW FM output power → 2 kW power consumption for 1 radio channel
- 1,7 kW FM output power → 4,8 kW power consumption for 10-12 radio channel
- 4-5 times less energy per radio channel

Energy saving → Cost saving

Energy saving → Saving the environment

Thank you for your attention!

February 18-19, 2015
Banská Bystrica

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