

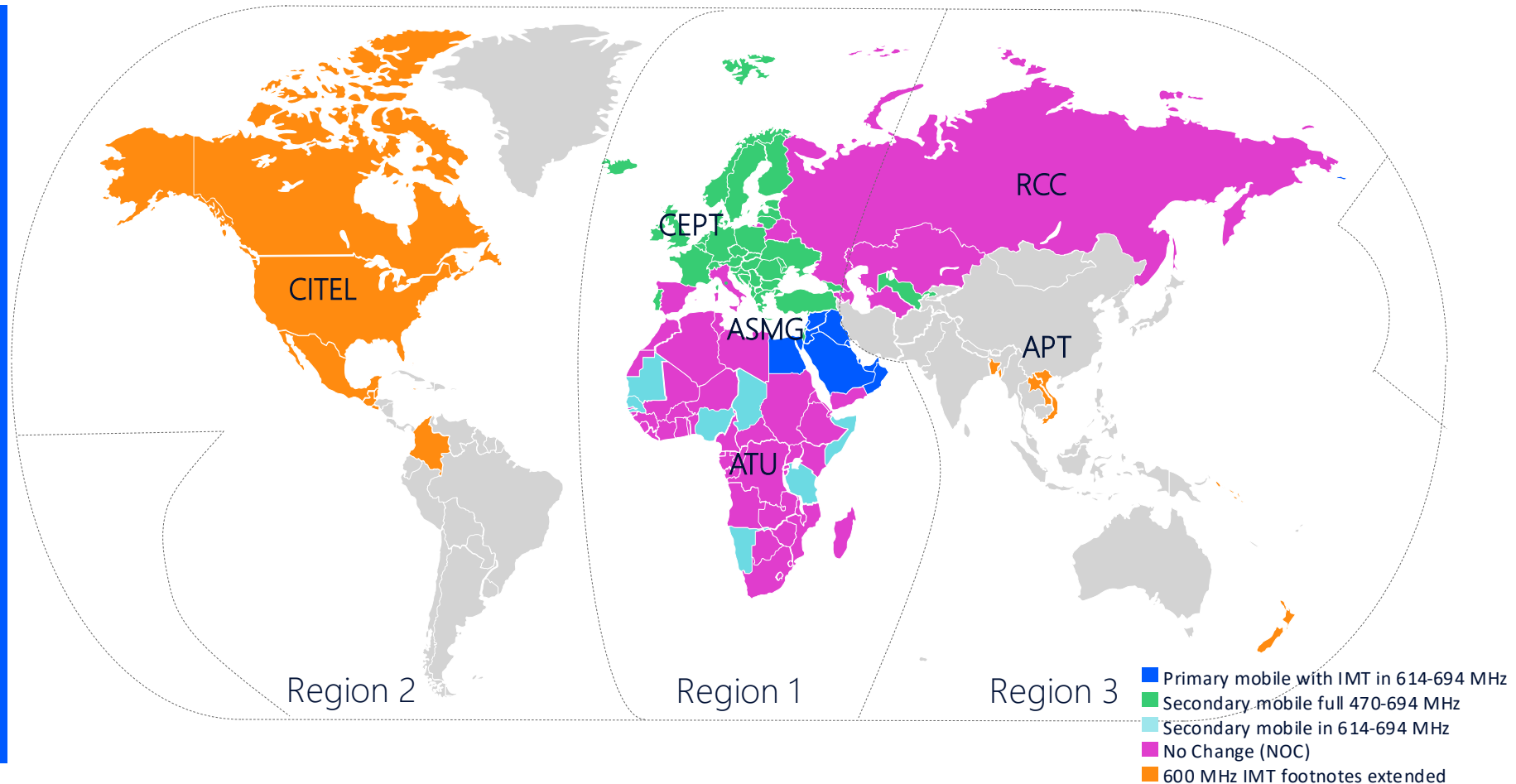
# Sharing in 470-694 MHz

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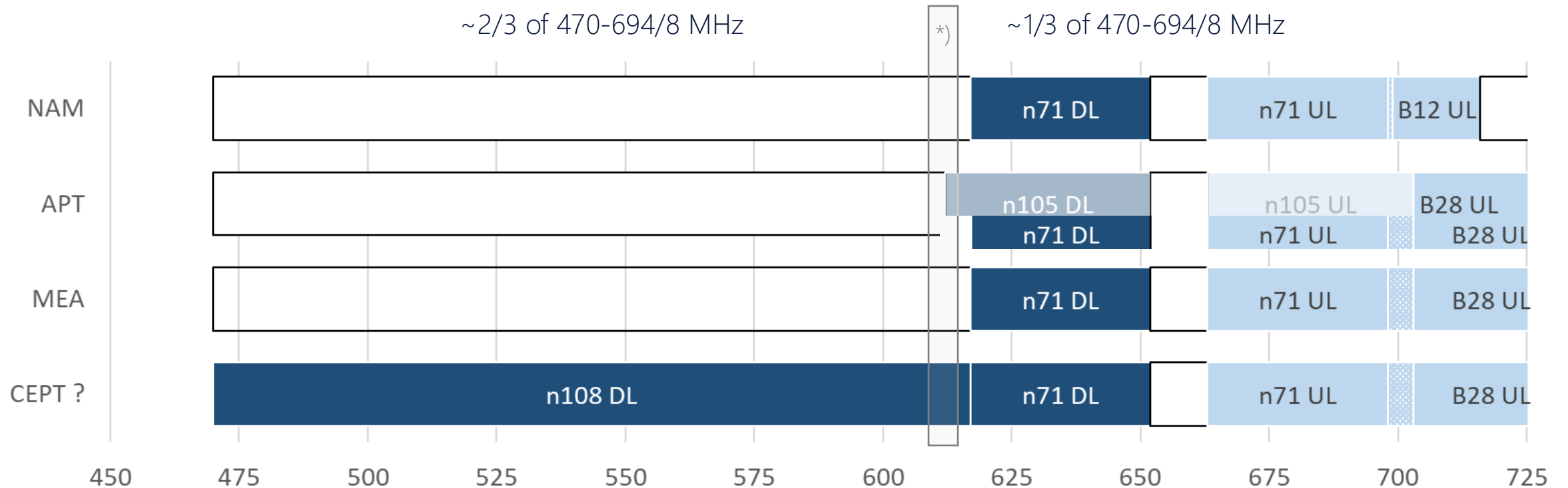
# WRC-23 momentum on the low UHF band (470-694 MHz)

## Sharing required for additional mobile use sub 700 MHz

- **Primary** (with conditions) in 600 MHz for Gulf countries (e.g., UAE, KSA, Qatar)
- **Secondary** for the full band for (most of) the European countries, with review in 2031
- **Secondary** for some African countries in the 600 MHz band
- Extended **IMT footnotes** in 600 MHz band in ITU Regions 2&3



# 3GPP bands addressing 470-69x MHz opportunities



- 600 MHz FDD opportunities in various regions, considering broadcast use in neighboring countries, (n71: DL 617-652MHz, UL 663-698 MHz; n105: DL 612-652MHz, UL 663-703 MHz)
- DL opportunities including 5G Broadcast and mobile DL in co-existence with broadcast in neighboring countries or even within the same country, considering potential future 600 MHz FDD, possibly evolving in CEPT, applicable globally (n108: DL 470-698 MHz)

# Sharing in 470-694 MHz is possible

## Earlier Nokia engagements in coexisting UHF use in Germany and Finland

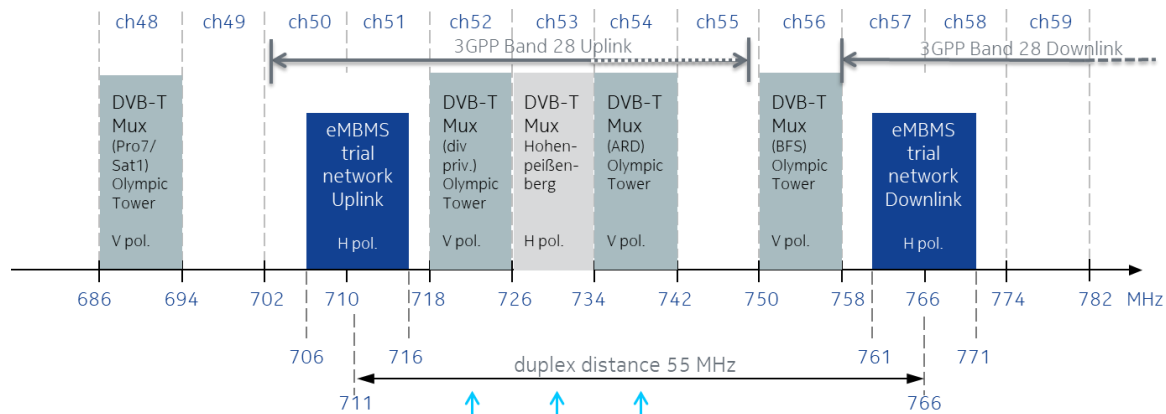
### eMBMS FDD Rel 12 field trials Munich

Partners e.g. IRT, BR, Rohde & Schwarz, Fraunhofer IIS, ...

Demonstrating capabilities and limitations of Rel 12 eMBMS for broadcast in terms of ISD, capacity (max 60% of DL) etc.

Also demonstrating mobile network operation options in broadcast spectrum, coexisting with broadcast

Building on Bd 28 commercial equipment while the 700 MHz band was still in active broadcast use



<https://gsacom.com/paper/lte-for-wide-area-broadcast-nokia-white-paper/>

### 700 MHz SDL field trials Helsinki

Partners e.g. Elisa, YLE, Qualcomm, Nokia ...

Demonstrating the possibility to enhance mobile network performance with SDL in broadcast spectrum

Building on Bd 28 commercial equipment while the 700 MHz band was still in active broadcast use (CA Bd 7 + Bd 28)



<https://yle.fi/aihe/artikkeli/2016/09/02/yle-qualcomm-and-nokia-announce-worlds-first-demonstration-lte-supplemental>

# Sharing of 600 MHz FDD with Digital Terrestrial TV

Key issue is protecting highly sensitive mobile UL from DTT high-power high tower transmitters

Within a country of interest, the full downlink and uplink range 617-698 MHz requires clearing from DTT

Along borders, ideally also any neighboring countries would clear the full downlink and uplink range from DTT. This is often not achievable and bi- or multilateral agreements (e.g. GE06) grant countries rights to operate high-power high-tower DTT on certain channels.

Still, individual countries can manage 600 MHz mobile deployments under certain conditions:

- Mobile downlink interference into a neighboring country is moderate and can be controlled by e.g. antenna directions and TX power settings
- DTT interference into mobile DL is only close to borders and typically limited as UEs are on street level (unlike DTT antennas on roof tops)
- DTT interference into mobile UL (BS receiver) is severe, but typically interference comes from few DTT transmitters. Neighbors may be willing to negotiate replanning these to lower frequencies. Further, network planning and features in the mobile deployment can mitigate interference.
- A TMG study <sup>\*)</sup> outlines options and there is experience e.g. in Finland co-existing with Russian DTT

# Sharing of mobile with incumbents in 470-694 MHz

## Existing toolbox could cover new scenarios when introducing mobile

### Mobile UL sharing with DTT

- Large separation distances required, but replanning few DTT transmitters and or measures on mobile network planning or even feature level can help mitigate issues
  - > can be considered in cross border coordination

### Mobile DL sharing with DTT

- Moderate separation distance required, adjacent channel cross border can be handled e.g. within GE06
  - > can be considered even within the same country subject to e.g. DTT reception rooftop vs. portable indoor

### Mobile UL and DL sharing with PMSE

- Smaller separation distances than DTT due to lower power levels allow for geographical sharing within the same country, e.g. urban areas with more channels available to PMSE than in rural areas,
  - LSA-like sharing mechanisms to clear spectrum for exceptional events (e.g. large festivals in a rural area)

### Mobile UL and DL sharing with Radio Astronomy as well as Wind Profile Radars

- Exclusion zones for mobile in selected channels to protect such services would be smaller than for DTT due to lower power levels

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