

EBU **TECHNICAL**



## Could broadcasting services liberate harmonised spectrum in the UHF band?

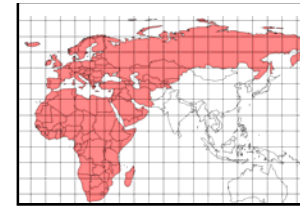
EBU Seminar on Spectrum Policy

3 June 2008

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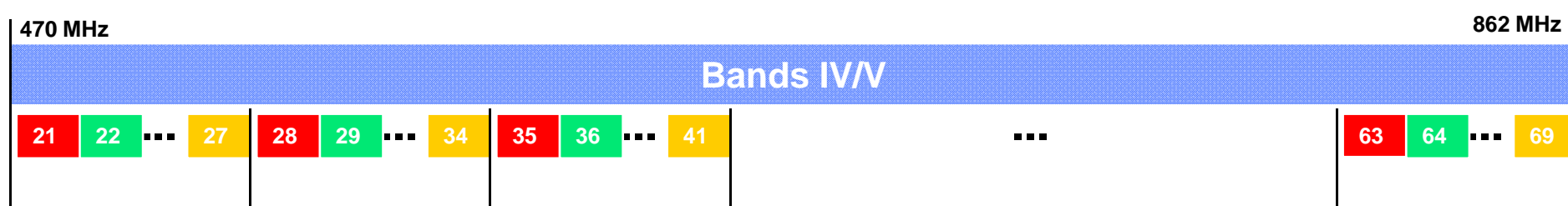
# The GE06 Plan - Bands IV/V



- WHAT IS THE GE06 Plan? Regional Agreement for digital terrestrial broadcasting services in Band III (174-230 MHz) and Bands IV/V (470 – 862 MHz)
- FOR WHICH PLANNING AREA? 118 countries
- HOW MUCH SPECTRUM IS AVAILABLE IN BANDS IV/V?

392 MHz

49 Frequency Channels of 8 MHz each (Ch 21 to Ch 69)



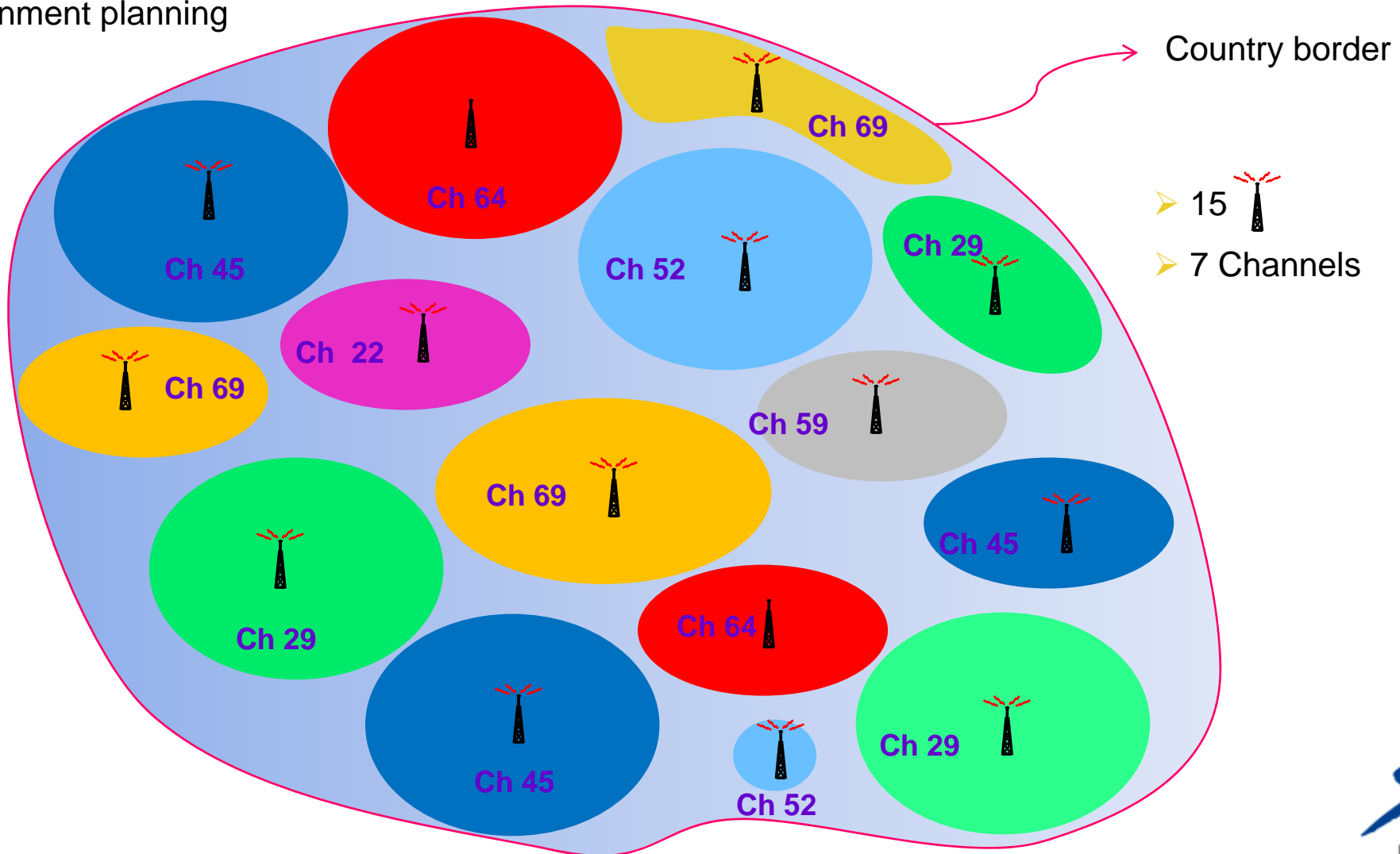
- More than 30 000 DVB-T frequencies assigned in Bands IV/V in CEPT countries
- Most European countries got **7-8 DVB-T layers** in Bands IV/V
- What is a 'layer'?

**A layer represents a set of channels which can be used to provide one full, or partial, nationwide coverage**



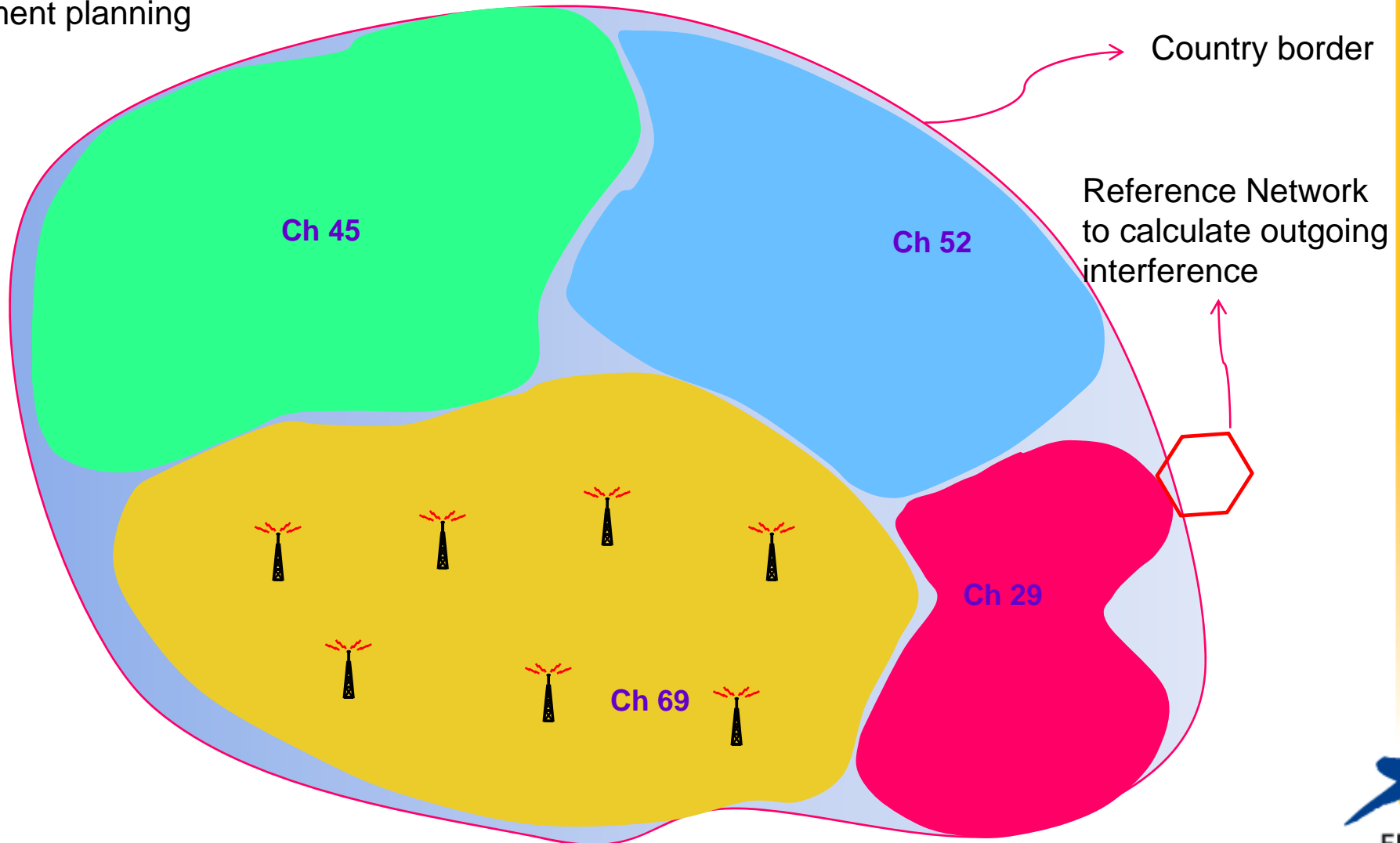
# An MFN layer – Multiple Frequency Network

Assignment planning



# An SFN layer – Single Frequency Layer

Allotment planning



# A frequency Plan has to compromise

## Flexibility

DVB-T Standard allows for different

- Modulation schemes – multiplex capacity
- Different reception modes
- SFN planning

Allotment planning

GE06 is a flexible plan

## Network Efficiency - network cost

The use of high power transmitters maximises the coverage and decreases number of transmitters needed

## Spectrum use Efficiency

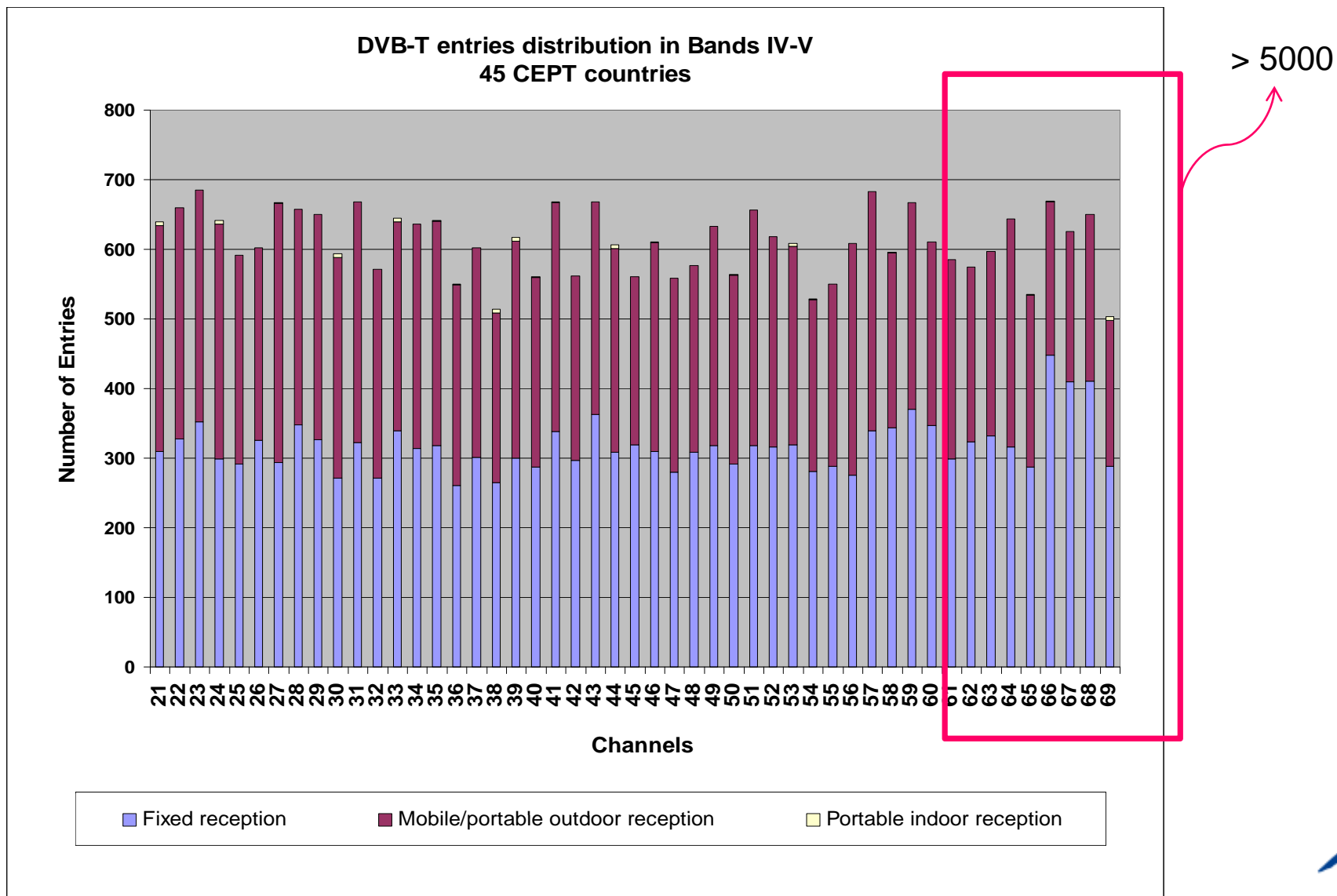
GE06 has allocated 7-8 DVB-T layers (Analogue TV Plan ST61 allocated 3-4 layers per country)

GE06 is an efficient plan

**GE06 is an interference limited Plan**



# Distribution of DVB-T entries in GE06

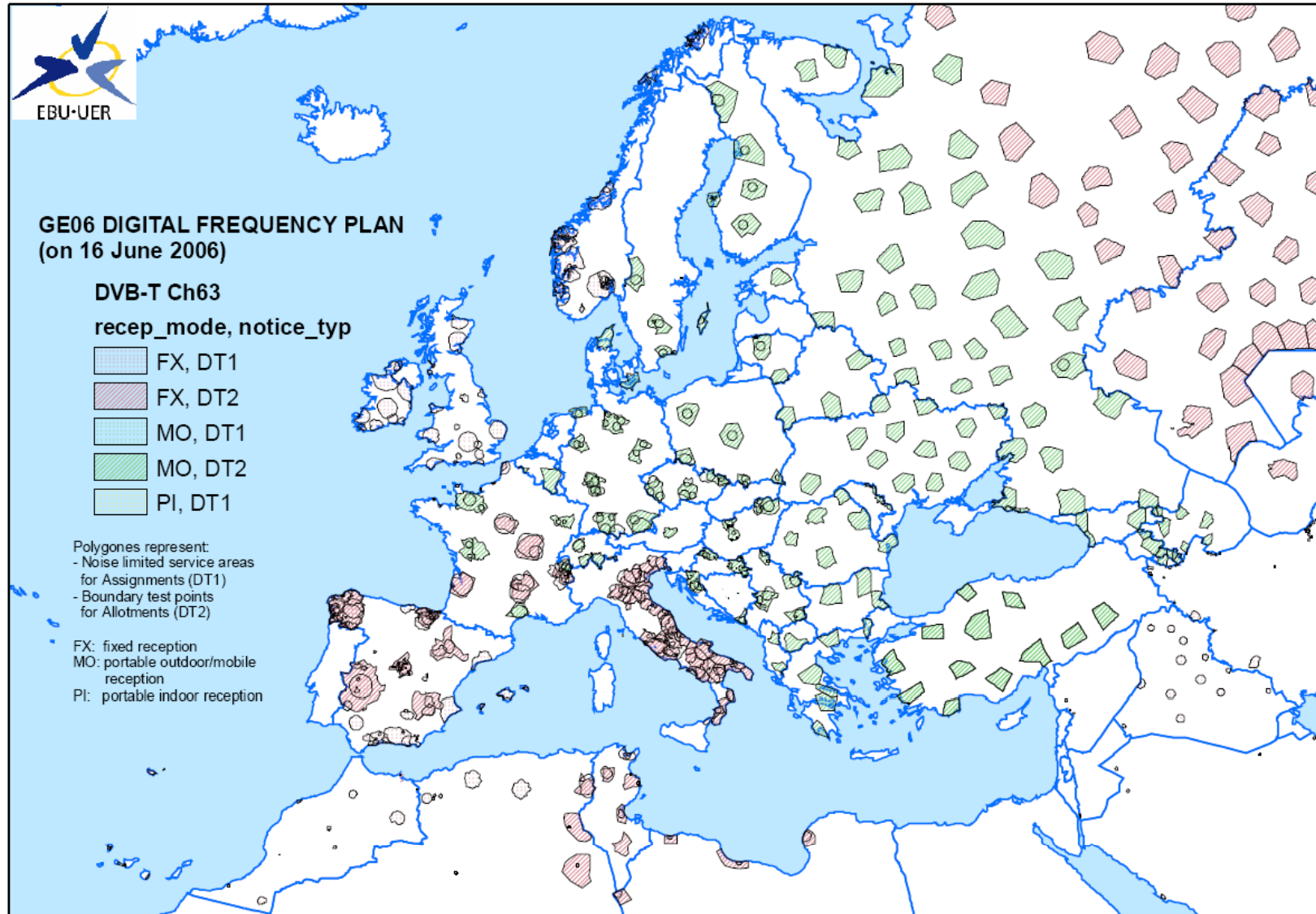


# Use of Channels 61 to 69 in some European countries

	N° of DVB-T entries	% over country total
Sweden	57	6 %
UK	125	7 %
Switzerland	40	11 %
Portugal	48	11.5 %
France	212	12 %
Greece	41	12 %
Malta	7	12 %
Italy	452	13 %
Poland	90	15 %
Cyprus	5	15 %
Germany	257	16 %
Netherlands	51	18 %
Austria	52	19 %
Denmark	25	20 %
Belgium	12	20 %
Spain	999	44 %

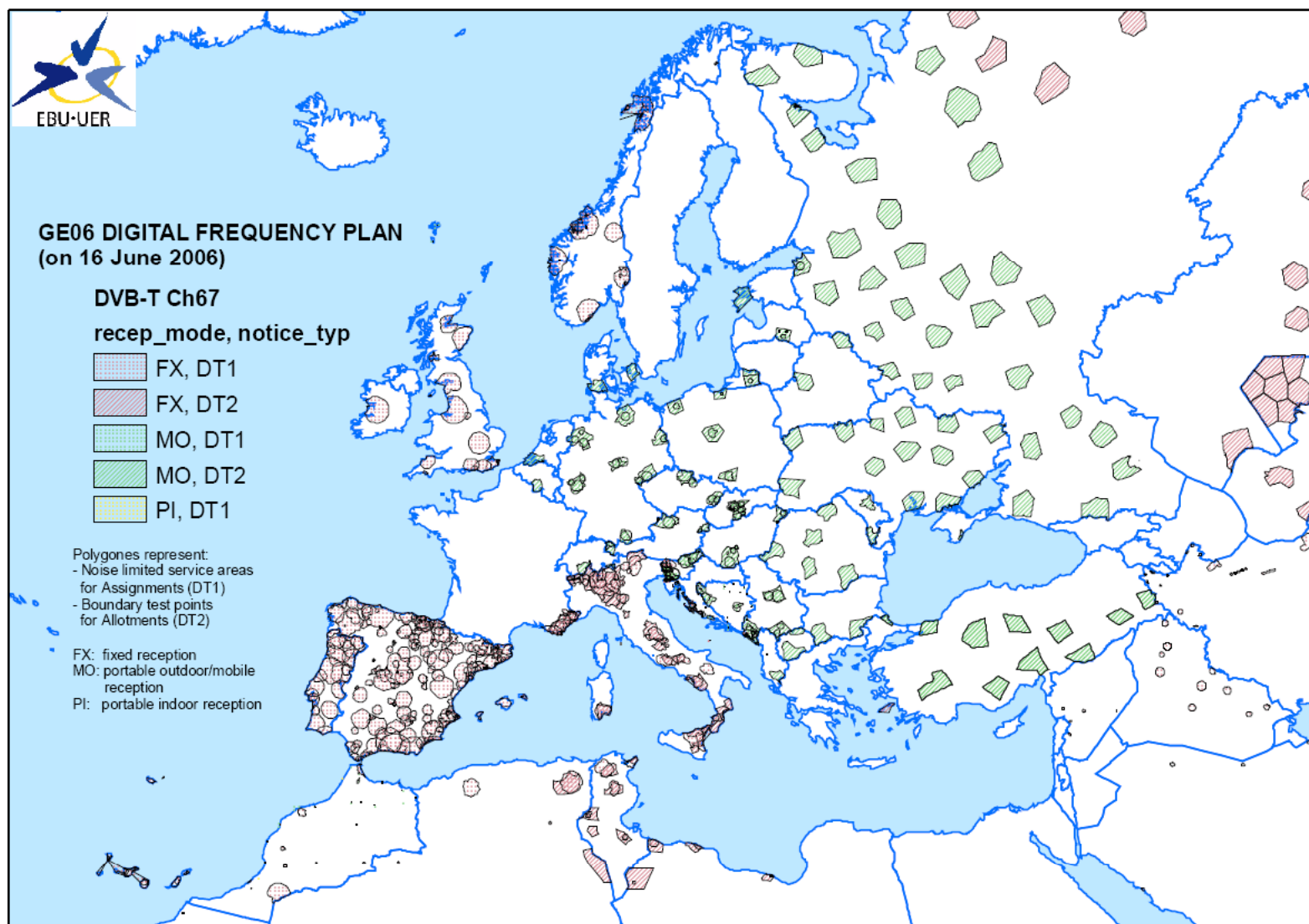


# Channel 63 planning for DVB-T

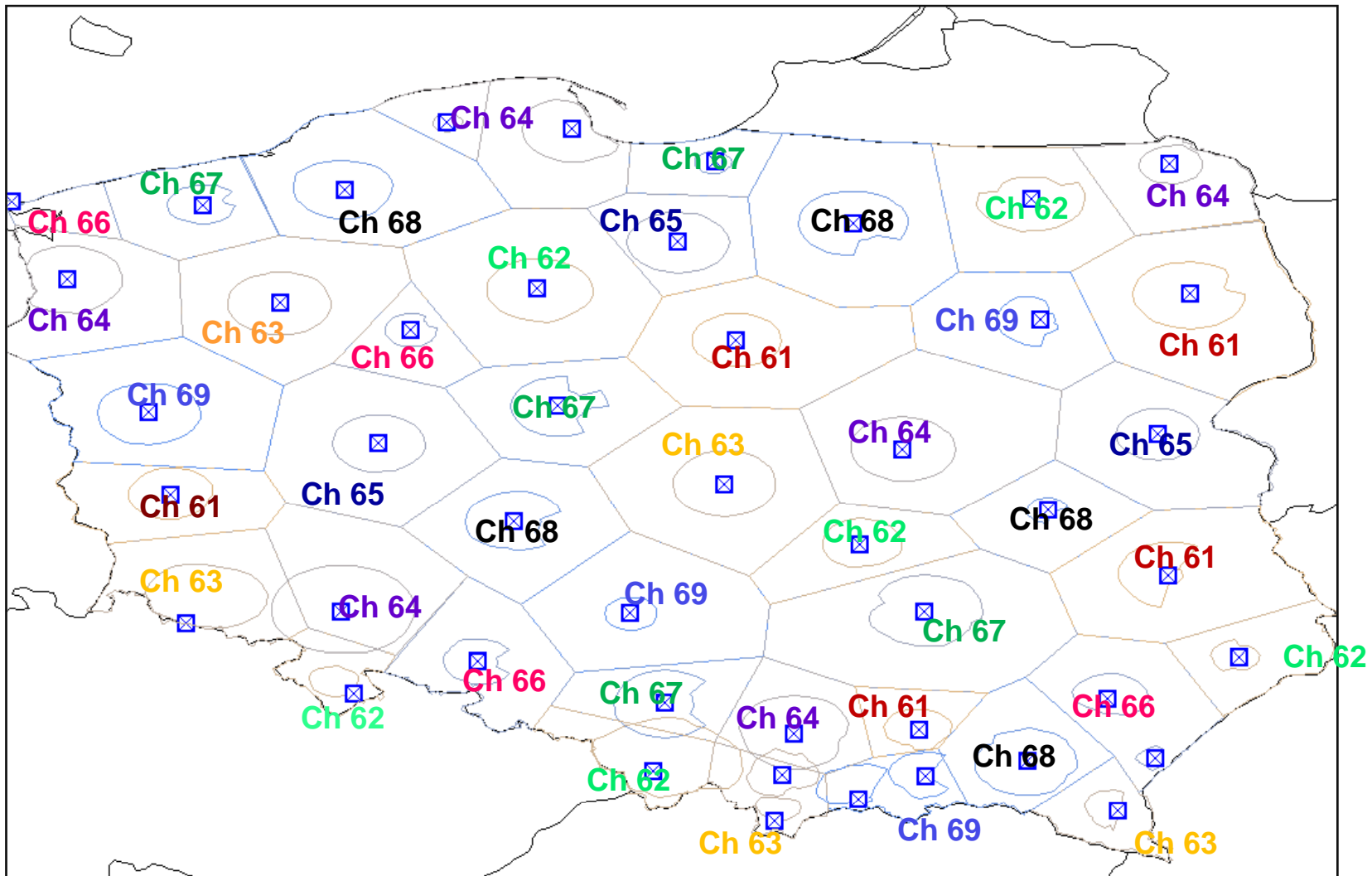




# Channel 67 planning for DVB-T



# A full layer using Channels 61 to 69



# Different impact in case of releasing Channels 61 to 69

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- A. Most countries have planned layers using frequency channels spread all over the range 470-862 MHz
    - Several layers are affected (holes in the coverage) by an allocation to non-broadcasting services in channels 61-69
    - **Different technical solutions might be envisaged to recover the losses**
  - B. In many countries one (or several) complete national layer will be affected plus losses of coverages in other layers
    - The worst case will be areas with losses of several layers
    - Different technical solutions might also be envisaged to recover the losses but **in certain cases might be very difficult to recover one or several complete national layers**
- Can Broadcasting accept decreasing the number of national layers available?**
- Account of Other Services using the band in certain countries are also to be considered: Radionavigation, other military services, Services Ancillary to Broadcasting and Production



# A re-arrangement of all frequencies? New Plan?

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## Option not acceptable for broadcasters:

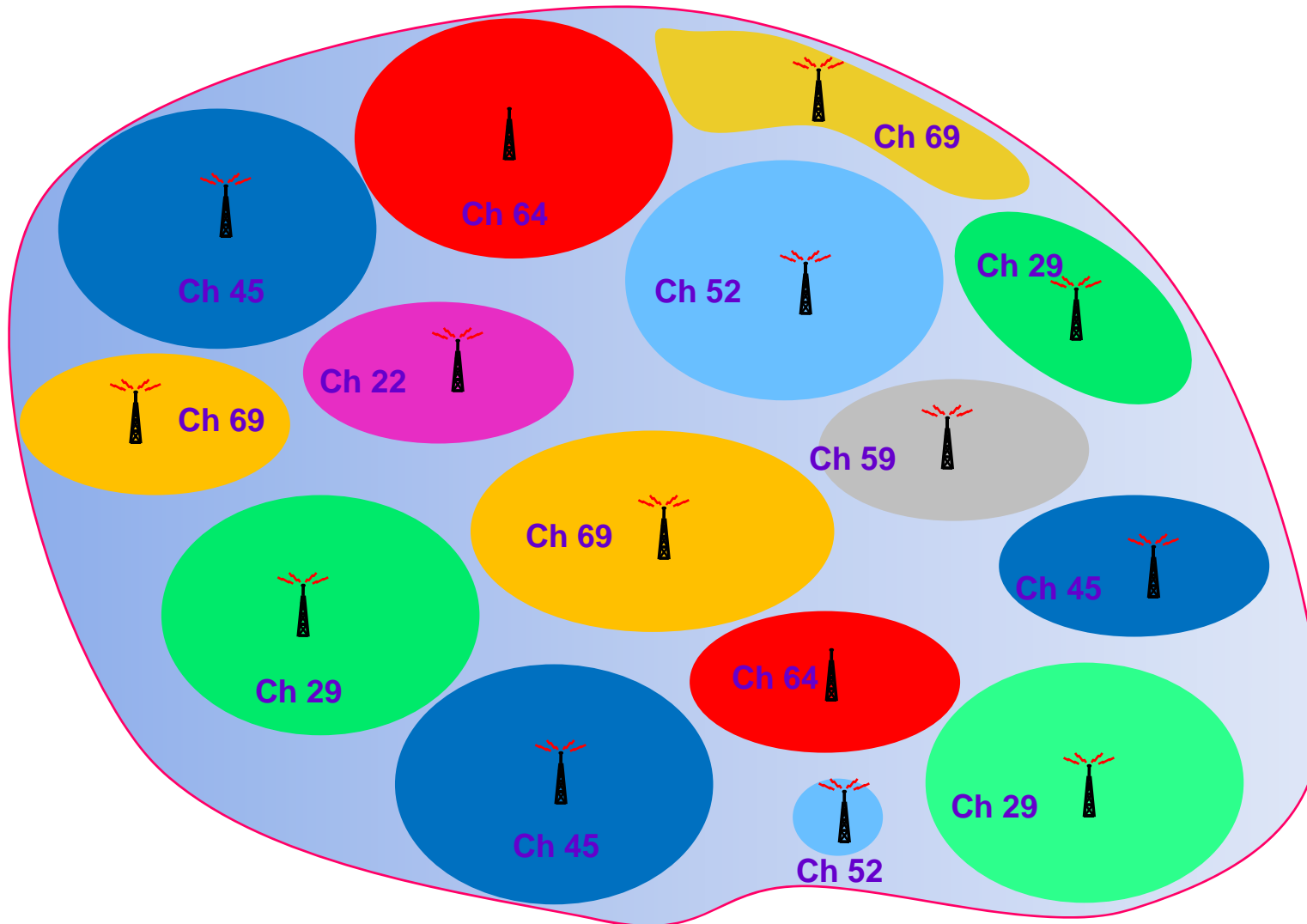
- Legacy issues
  - analogue TV transmitters to be re-used as much as possible
  - fixed received antennas optimised for certain bands
- DVB-T networks already in operation or planned in most European countries
  - a new transition period needed
  - delays in the digital switchover may jeopardise the success of DVB-T
  - broadcasters and network operators have already engaged important budgets
- Even with a new Plan is it not guaranteed to get the same number of layers with the remaining channels in all countries

It is recommended to find solutions in a case-by-case basis and re-inforce coordination with neighbouring countries



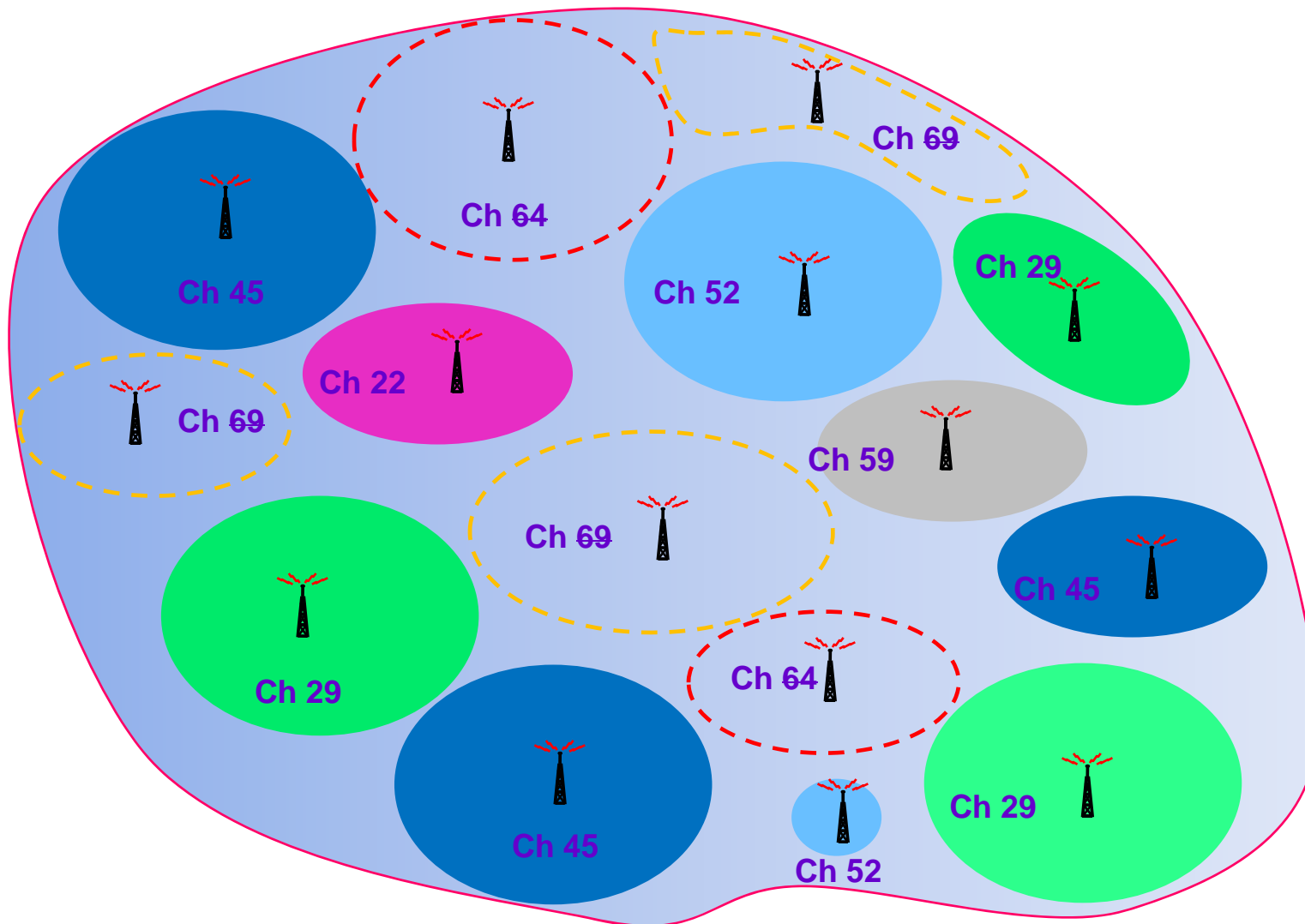
# Enlarge the number of usable channels per site

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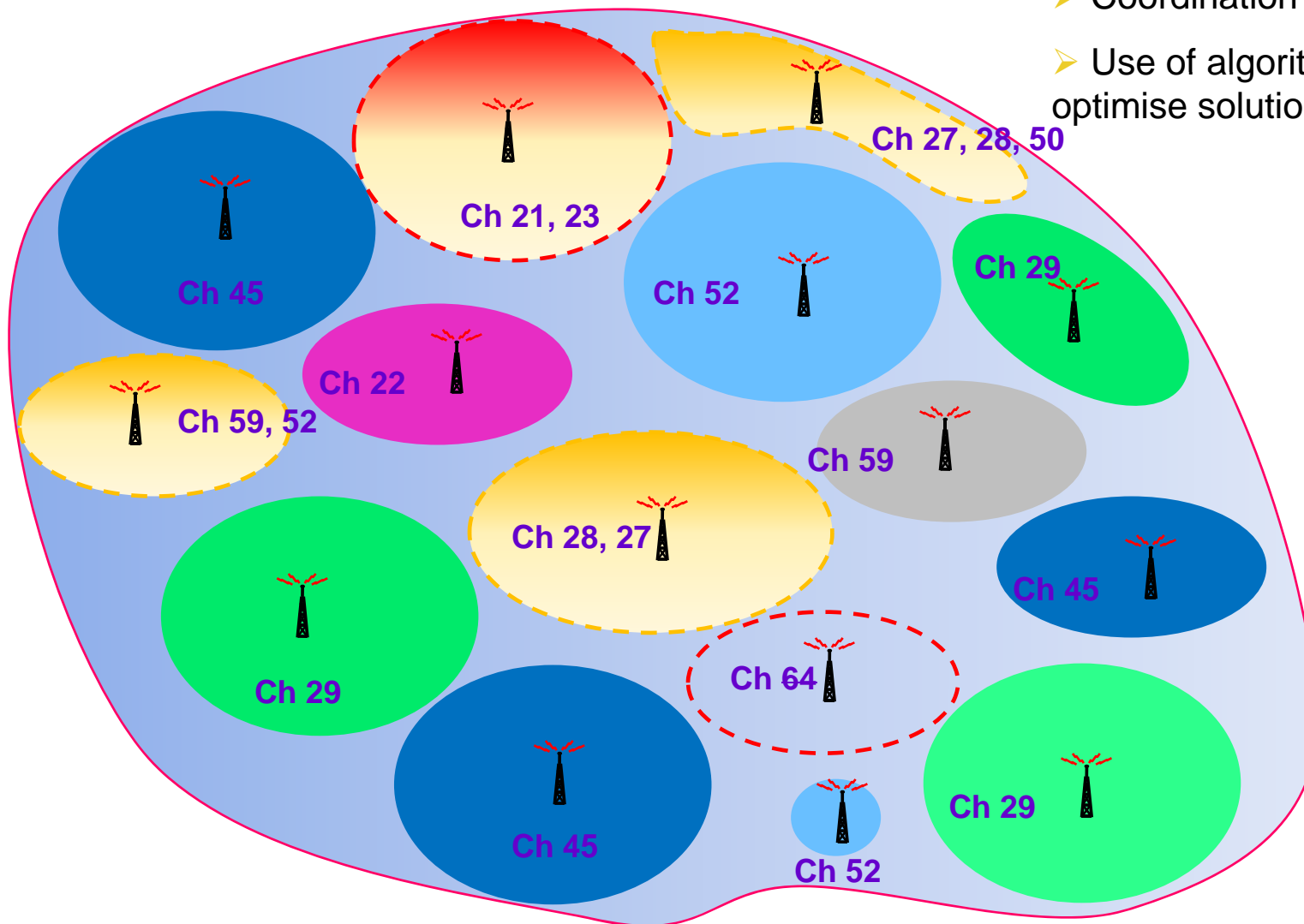
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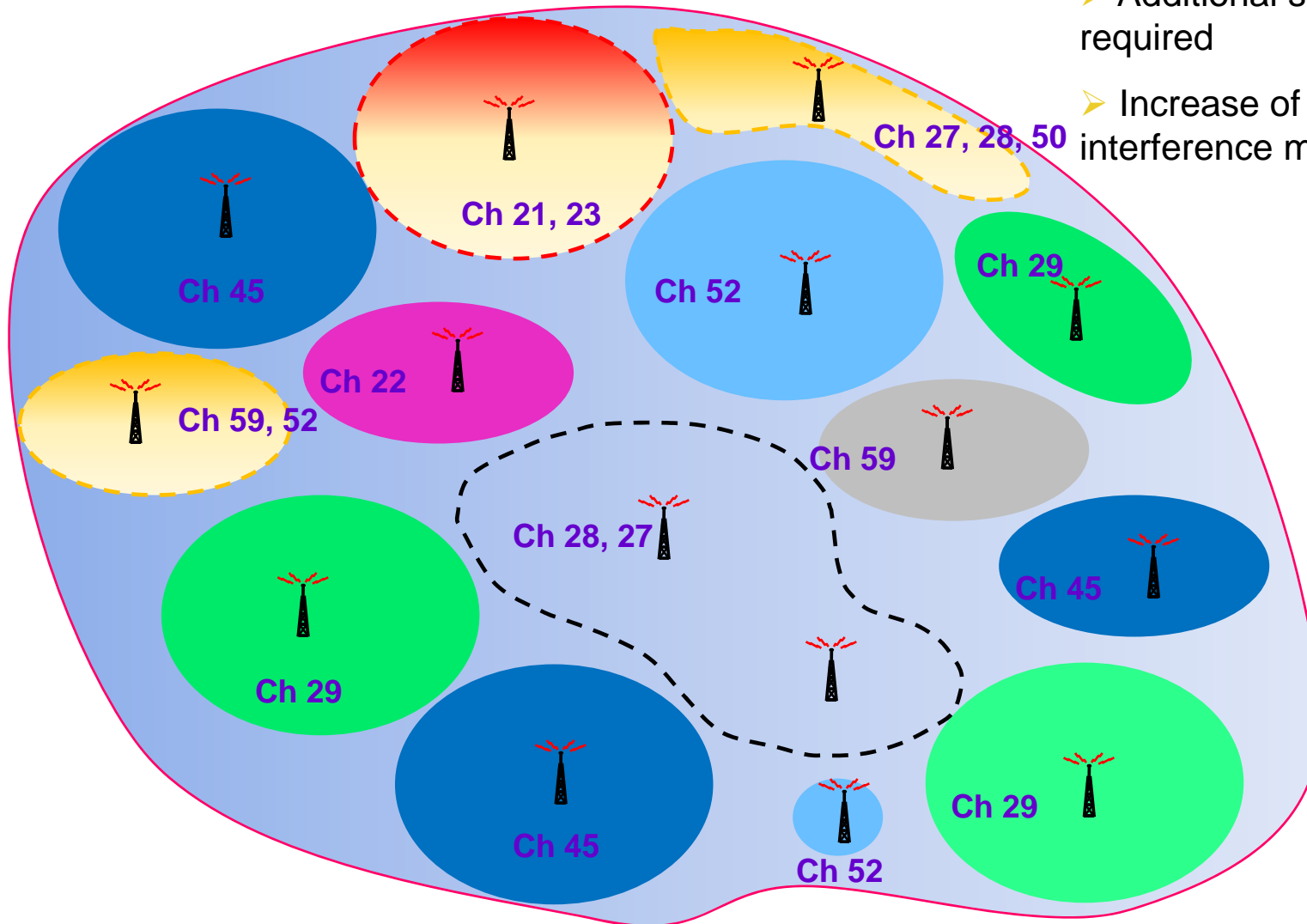


# Enlarge the number of usable channels per site

- Coordination required and
- Use of algorithms to optimise solution/plan



# Enlarge adjacent allotment areas

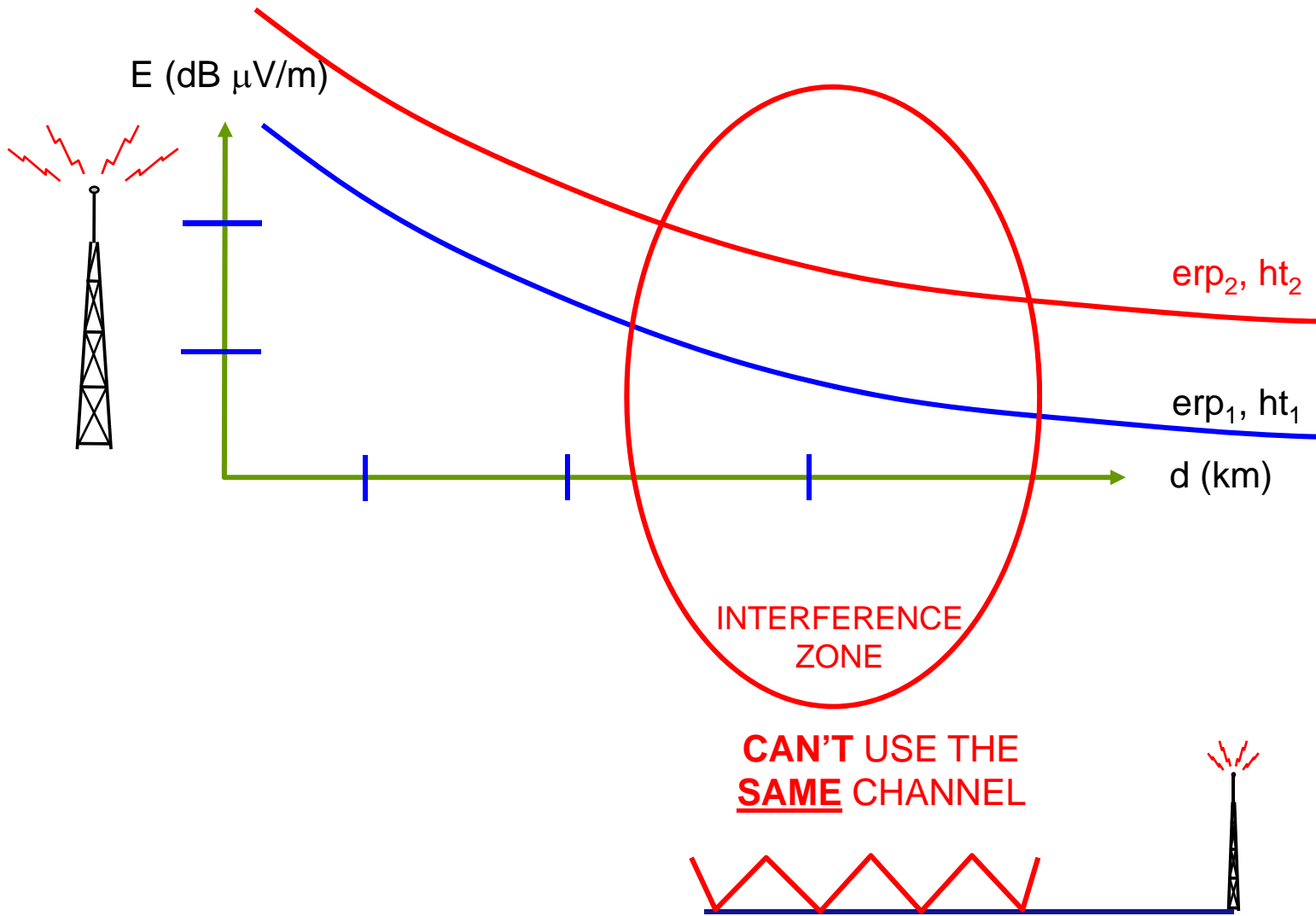


➤ Additional sites may be required

➤ Increase of co-channel interference may arise

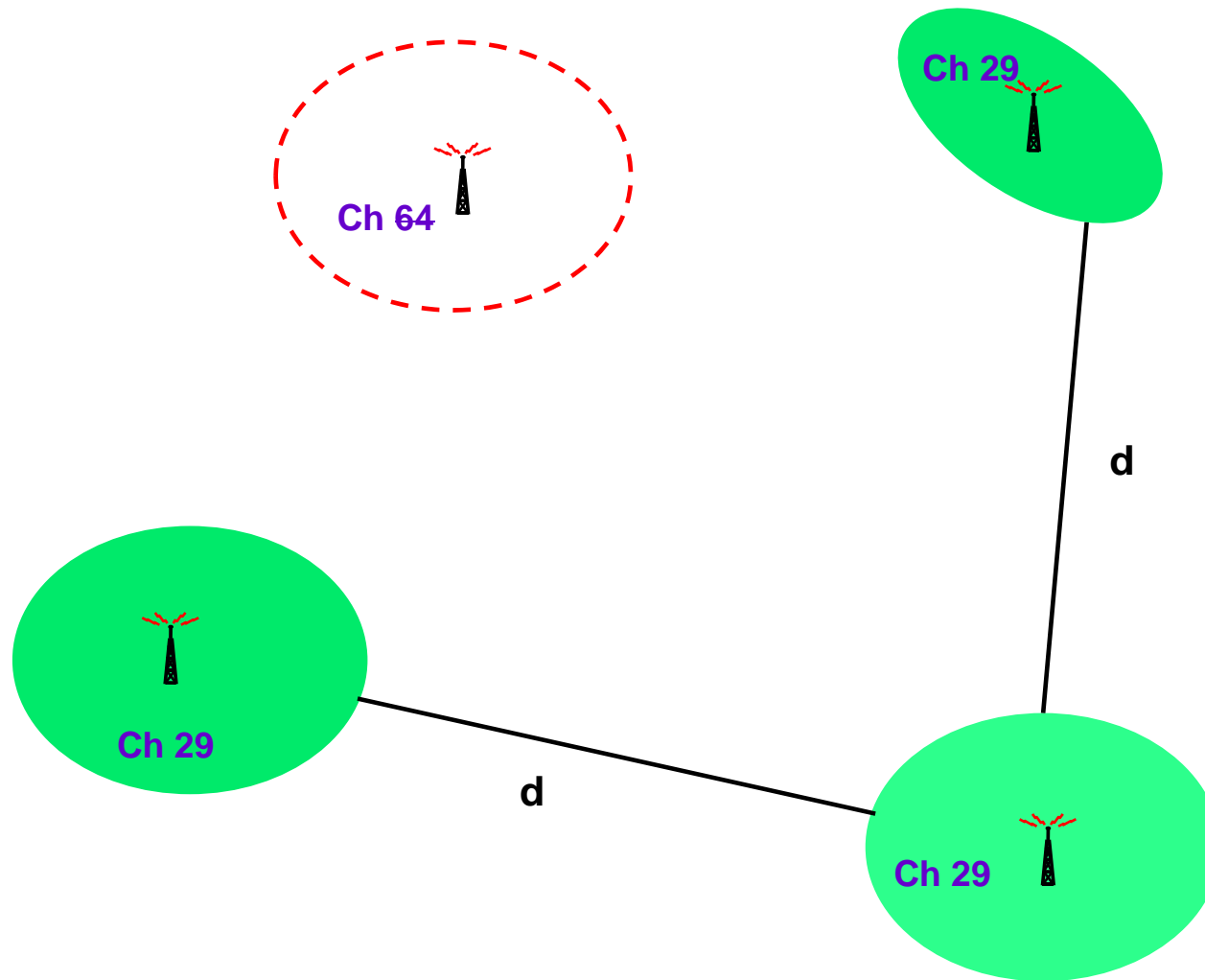


# Propagation and interference basics

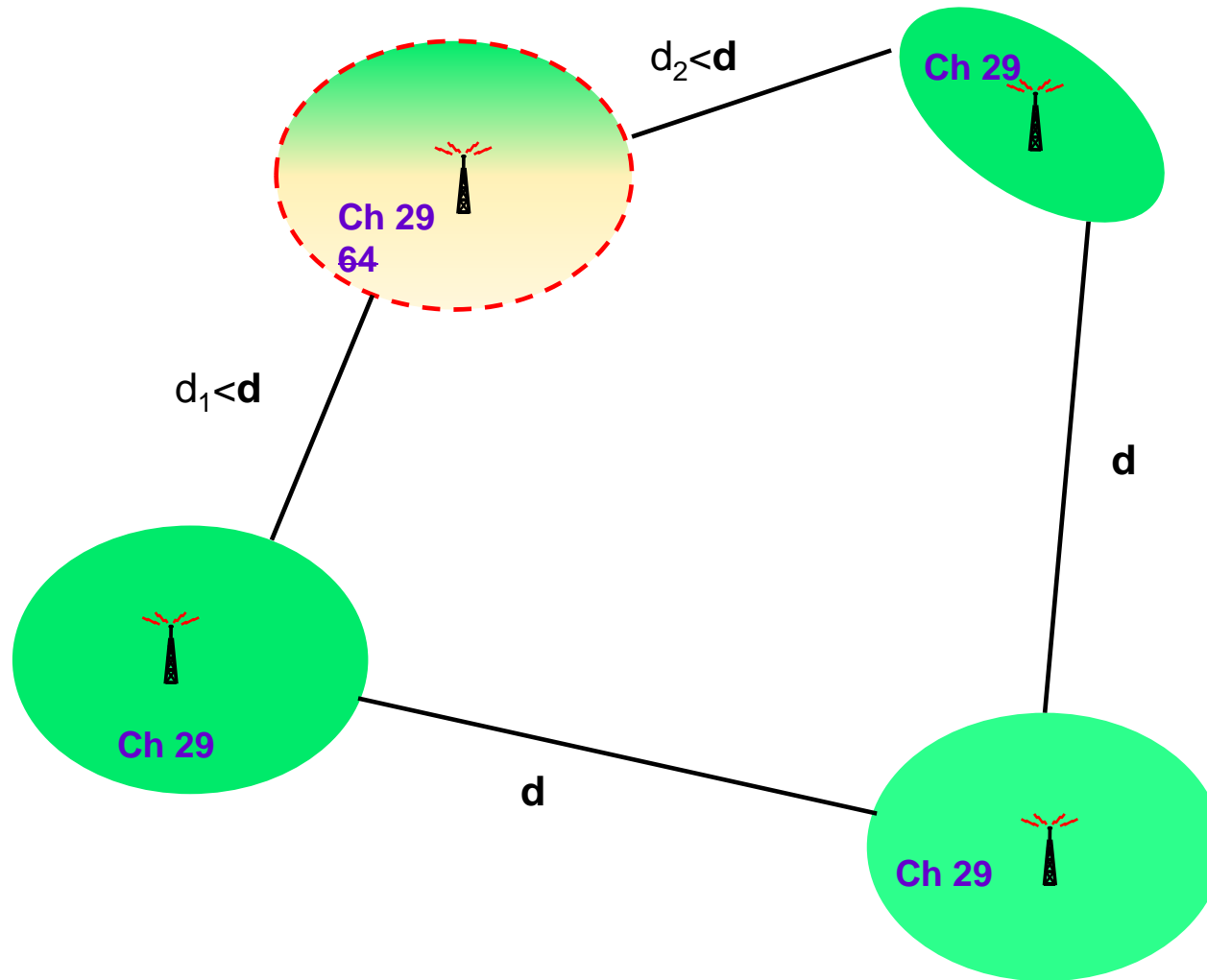


# Reduce the co-channel re-use distance $d$

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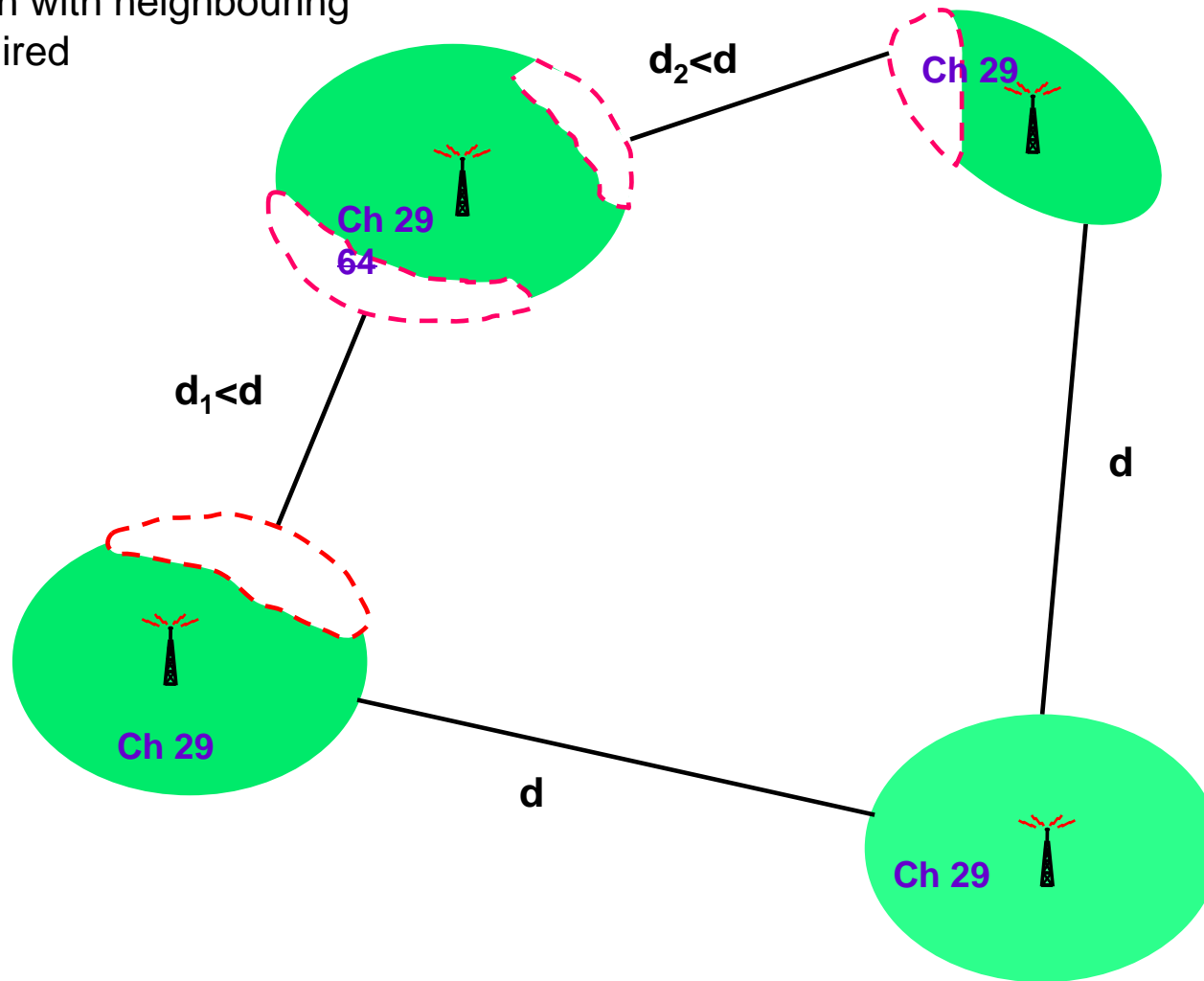


# Reduce the co-channel re-use distance $d$



# Reduce the co-channel re-use distance $d$

- Coordination with neighbouring countries required



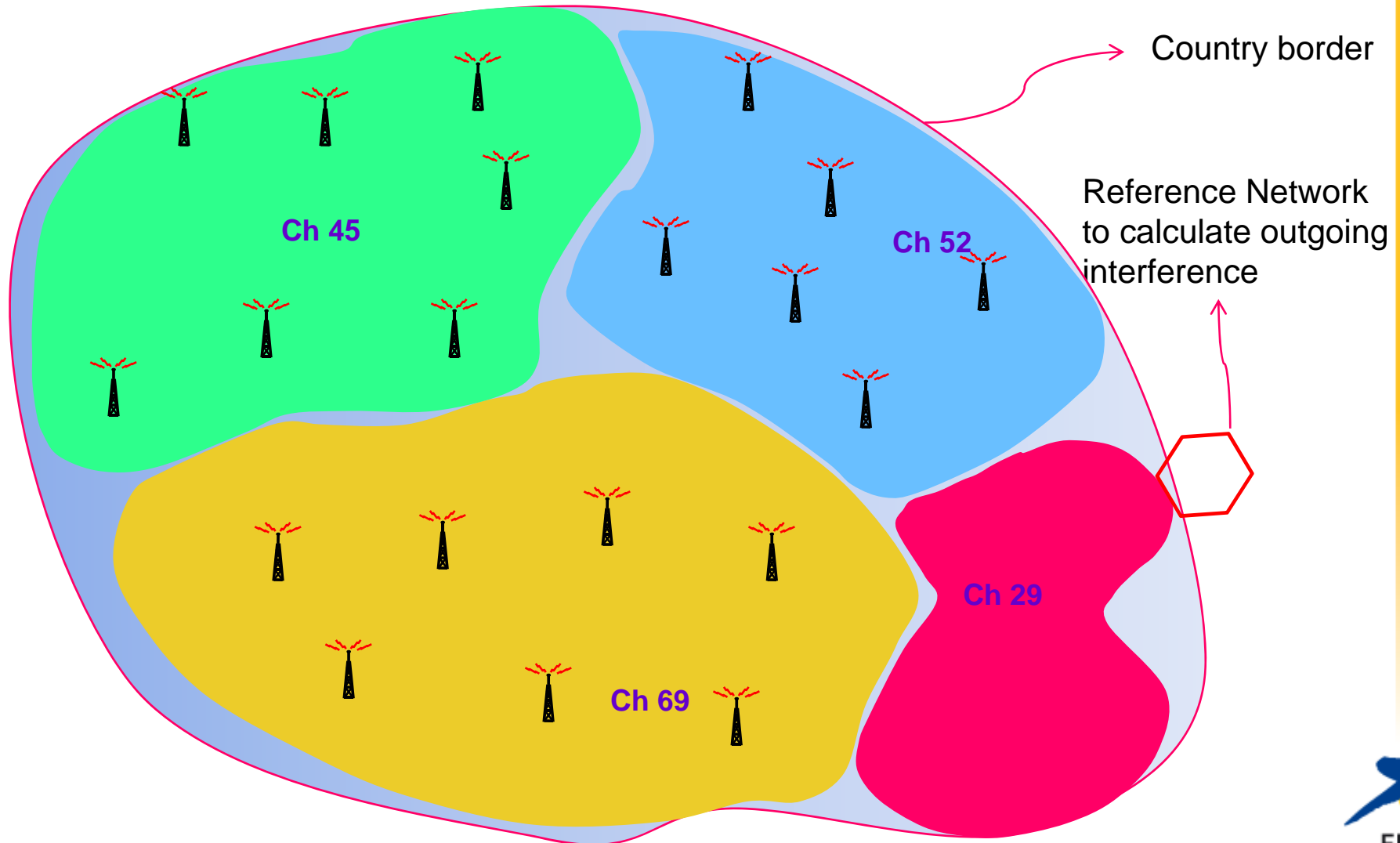
# How to compensate the loss of coverage

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- Reduction of coverage area might be acceptable in certain cases (e.g. fringe areas, areas with no or very low population, areas with overlapping coverages)
- If not acceptable:
  - more dense networks are to be foreseen (decrease power of transmitters and increase number of transmitters)
  - Changes in the transmitting antenna patterns/diagrams to further optimise the areas to be covered (interference decoupling)
  - Changes to the transmitting antenna heights to optimise the range of the coverage
  - Use SFN (i.e. a much higher number of transmitters required and higher operation effort)
- Changes in the modulation scheme can also increase the coverage area (i.e. going from 64QAM to 16QAM) but it will decrease the data capacity available in the multiplex and not possible for countries already planned for 16QAM



# Optimise networks to be implemented in allotments



# Could broadcasting liberate harmonised spectrum?

In general, **YES** and each broadcaster should do its own exercise to analyse the impact in their services and to start finding specific solutions

## **BUT it is not for free ...**

### **Spectrum requirements for Broadcasting**

- There might be a loss in number of layers available for Broadcasting
- Less flexibility for the future
- There might be some coverage losses in some areas

**Broadcasters should clearly define their service needs**

### **Economic cost and delay in the switchover process**

- Changes to transmitter sites and to fixed receive antennae due to changes in frequencies and areas to be covered
- need for more dense networks (increase number of transmitters)
- New coordination process with neighbouring countries

**Broadcasters should ask who is going to pay for that**

