



# How to implement Spectrum Re-Farming

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## Definition

“Refarming” is the term used for the process governing the repurposing of frequency bands that have historically been allocated for 2G mobile services (using GSM technology) for new generation of mobile technologies, including both third generation (using UMTS technology) and fourth generation (using LTE technology).



# Spectrum Refarming

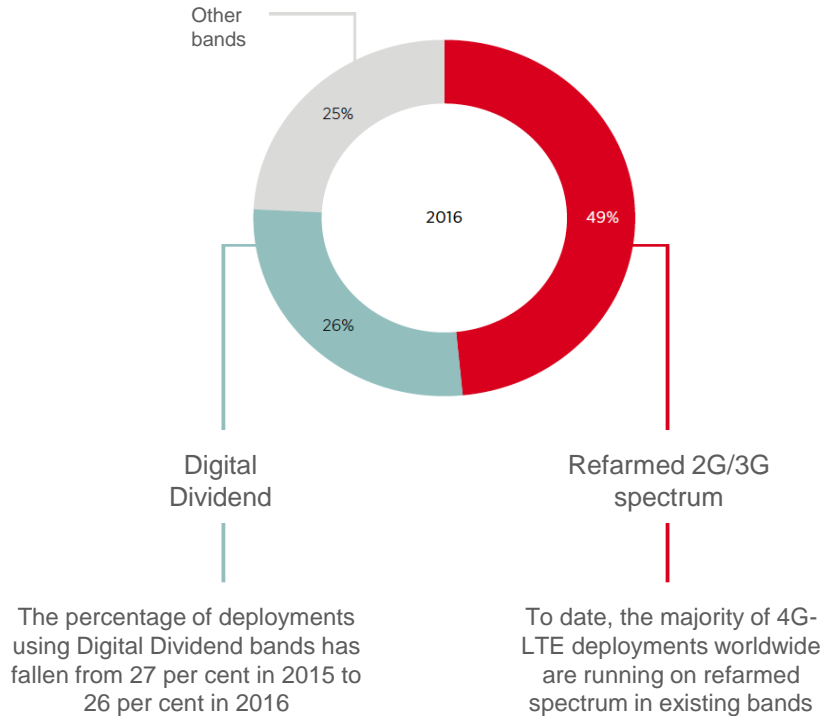
## Concept

- Internationally, refarming is commonly used as a process to govern the repurposing of spectrum bands to more efficient technologies and/or new services
- Service continuity and investment certainty are critical for successful refarming
- Technology neutrality allows for license holders to evolve the technology deployed and the services delivered as markets develop.





# 4G is built on technology neutrality and refarming



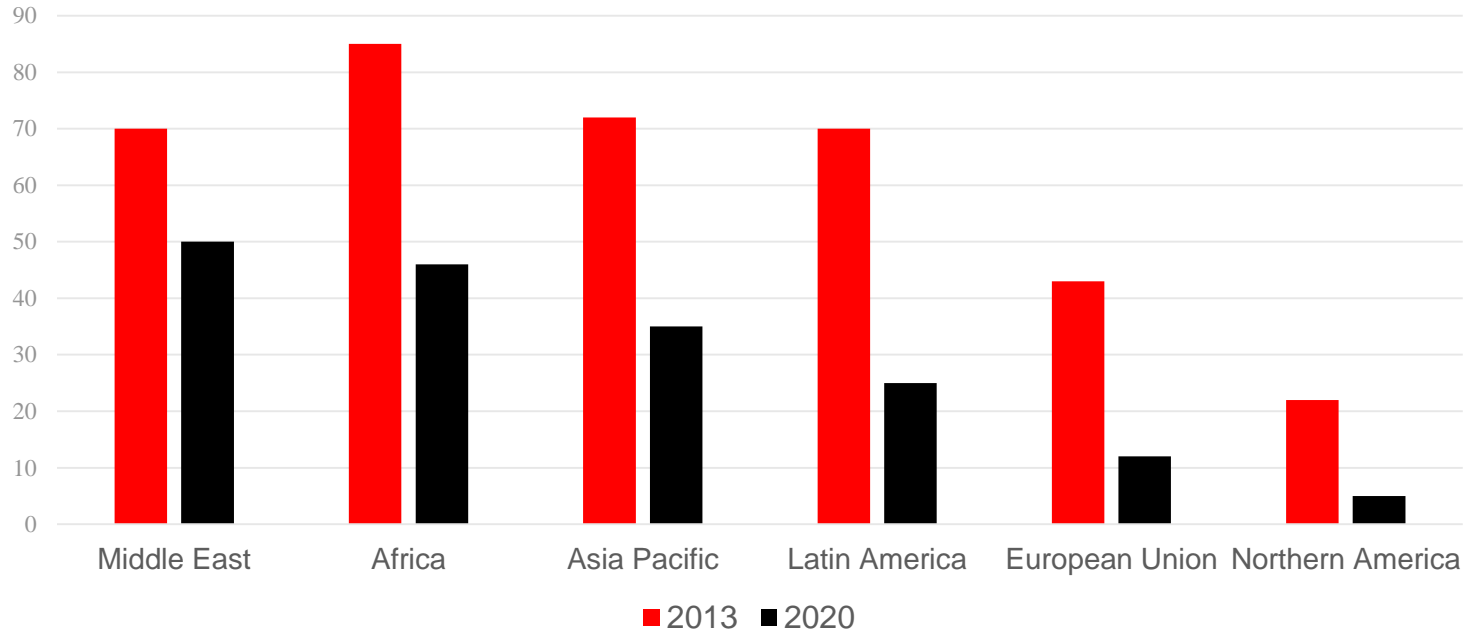
Spectrum bands that have been reformed for LTE:

- ❖ 850 MHz
- ❖ 900 MHz
- ❖ 1800 MHz
- ❖ 1900/2100 MHz
- ❖ 2100 MHz



## 2G refarming by region

### 2G connections as a percentage of total connections





# Spectrum Licensing and Re-farming Framework

## A STABLE LICENSING FRAMEWORK FACILITATES INVESTMENT

Remove service and technology restrictions

Facilitate international harmonisation

Conduct a public written consultation before key decisions

Ensure rights to use spectrum are clearly specified

Develop a road map for spectrum release

## CERTAINTY IS CRITICAL TO SUSTAINABLE INVESTMENT

Governments and regulators should work on the presumption of licence renewal for the existing licence holder

The approach for renewal or any change of licence should be agreed at least three to four years before change happens

Exceptions should only apply if there has been a serious breach of licence conditions in advance of renewal or any change



# Technology Neutrality

- Operators are likely to have different technology roadmaps to suit their own consumer portfolios
- **Technology neutrality** allows for non-interfering technology to be deployed by the license holder in a given allocation of spectrum.
- This allows for license holders to evolve the technology deployed and the services delivered as markets develop.
- Original mobile licences (and other spectrum licences) were technology-specific, e.g., the GSM Directive in the EU specified that only GSM technology could be deployed in the 900 band — EU policy is now technology-neutral.
- In a neutral regime, deployed technology must not create interference with incumbent users, e.g., an incumbent may be able replace GSM with FDD LTE in 1800MHz spectrum, but cannot 'change' the use to TDD BWA technology.





## Best Practices

1. Clearly set out and agree on the approach to refarming and renewal in advance (preferably at least 3 – 4 years prior to expiry) to avoid network investment being postponed
2. In the case of renewal, government should work on the presumption of renewal and incumbent licensees should have the Rights of First Refusal
3. Reshuffle or non-renewal of spectrum should only be limited to situations of market failures or where there has been a serious breach of licence terms
4. Provide stability, certainty and transparency through long-term planning, i.e. develop spectrum roadmaps
5. Progressively remove service and technology restrictions in existing mobile spectrum usage rights
6. Introduce flexible regulatory tools, such as spectrum trading and sharing, to facilitate better spectrum utilisation
7. Evaluate spectrum value in a holistic approach, and focus on long-term socio-economic impact





## Re-farming Case Study: FRANCE (900/1800MHz)

- Refarming in France is operator driven – all 2G licence were renewed in their entirety. Operators decide when to deploy new technologies;
- Operators themselves are responsible in managing the transition from GSM to 3G technology;
- Operators are committed to manage interference between themselves and with adjacent bands;
- Refarming of the 900/1800MHz bands are technology neutral, permitted by European level Directive and Decision.
- Full case study can be found here: <http://www.gsma.com/spectrum/wp-content/uploads/2012/04/refarmingcasestudyfrance20111130.pdf>



## Re-farming Case Study: SWEDEN (1800MHz)

- 2x10MHz renewed for each incumbent to ensure service continuity of 2G GSM service;
- Restructured the band into 5MHz blocks, making it fit for UMTS and other technologies that could co-exist with GSM & UMTS;
- Vacant spectrum was auctioned, technology & service neutral;
- A newly formed joint-venture by several incumbents to consolidate their spectrum assets and operation in the band.
- Full case study can be found here: <http://www.gsma.com/spectrum/wp-content/uploads/2012/07/refarmingcasestudysweden900mhz20111129.pdf/>



Thank you

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