

## Strategic review of spectrum for superfast mobile First lessons

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### Issues surrounding the development of superfast mobile services

The public consultation made it possible to confirm the past and upcoming exponential increase in data traffic on superfast mobile networks. Three courses of action can be taken to meet this challenge:

- make access technologies more efficient;
- optimise network architectures;
- make additional frequencies available.

#### Making access technologies more efficient

As concerns the first course of action, the public consultation helped demonstrate that it is still not possible to fully refarm 2G network spectrum to superfast mobile systems, as they will continue to be used by 2G for some years to come, notably for machine-to-machine (M2M) applications and to deliver services to the still numerous 2G handsets in France and abroad. Here, some market players suggest a medium-term solution of creating a single, shared 2G network that would continue to provide 2G services, by employing only 2×5 MHz of spectrum, for instance. The idea warrants attention, but would need to be assessed in detail when the time comes.

On the matter of 3G networks, they are still recent installations and it is still too early to plan on phasing them out. In the short term, there will therefore be only limited refarming to superfast mobile networks of the frequency bands that 3G systems are using today.

The public consultation served to confirm that a mature industrial ecosystem has built up around 4G LTE in the 900 MHz, 1800 MHz and 2.1 GHz bands, today used chiefly by 2G and 3G. Operators could therefore refarm these bands to 4G. The consultation thus made it possible to ascertain that, in theory, there are no obstacles to making these bands – which today are confined to 2G and 3G<sup>1</sup> – technology neutral. Operators nevertheless believe that the financial details attached to lifting these restrictions should be specified in the very near future.

#### Optimising network architectures

The consultation also served to confirm that operators can develop their superfast mobile networks by optimising their architecture: making the network more dense by adding small cells, adapting to demand in real time through dynamic traffic management, greater integration of Wi-Fi systems into mobile networks, etc. Underlying technological developments provide several possible solutions for improving the capacity of superfast mobile networks further still.

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<sup>1</sup> With the exception of the 1800 MHz band spectrum belonging to Bouygues Telecom, which in 2012 requested that technological restrictions on this frequency band be lifted earlier than planned.

## Making additional frequencies available

The final point that the public consultation helped confirm was the need to assign new frequency bands to electronic communication services, to keep pace with the growing use of superfast mobile networks.

Thanks to their good propagation properties, low frequencies, i.e. those below 1 GHz, enable mobile network deployments across vast swaths of the country under realistic economic conditions, in addition to helping improve indoor coverage. **From a strategic standpoint, then, assigning the 700 MHz has become particularly important to achieving widespread and high-quality coverage for superfast mobile systems in the short and medium term and, further on the down the road, to enabling future innovations.**

Other higher frequency bands are also of interest. See the end of this document for details.

## Allocation of the 700 MHz band

The consultation served to confirm that an already consequential ecosystem exists for the 700 MHz band in Europe, due to its compatibility with Asia's 700 MHz band. Devices could therefore already be compatible, and network equipment should require only minor modifications compared to those being used in Asia.

As these are low frequencies, whose propagation properties lend themselves especially well to achieving widespread coverage, and so **to regional development**, the public consultation queried market stakeholders on how this factor should be taken into account during the allocation procedure.

Contrary to the 800 MHz band, which is associated with 4G technology, **the public consultation did not make it possible to identify new services that would be enabled specifically by the 700 MHz band**. 5G is still only a fledgling concept, and the technology cannot be associated with any specific frequency band today. Because of the 700 MHz band's properties, which are very similar to those of the 800 MHz band, it could be used initially for 4G networks in the same locations as the 800 MHz band. The 700 MHz band could not, however, be coupled with the 800 MHz band in the short or medium term. In other words, the two cannot be aggregated to obtain wider bands, capable of delivering higher throughput for 4G. Lastly, it should be mentioned that not all of operators' technological strategies have been finalised and, in any event, all differ from one another.

**The 700 MHz band could therefore not be easily associated with a new service that is subject to a nationwide rollout commitment, as was the case with 4G and the 800 MHz band.**

**Despite which, the 700 MHz band remains a resource that can be deployed to further regional development.** In particular, it could help improve 4G coverage and quality in certain parts of the country. ARCEP will establish scenarios to this effect, which it will submit to the Government in the run-up to the allocation procedure.

The public consultation also revealed a second major issue attached to the allocation of these frequencies, namely the **question of ensuring a balanced allocation of spectrum assets between the four mobile network operators** in Metropolitan France. Free Mobile currently has fewer frequencies than its competitors, and especially less spectrum in the lower frequencies:

Operator	800 MHz	900 MHz
Orange	10	10
SFR	$10^3$	10
Bouygues Telecom	$10^2$	9.8
Free Mobile	$0^4$	5

*Frequency amounts authorized MHz duplex*

As mentioned earlier, these low frequencies are very important to providing high quality services across the country, whether in sparsely or densely populated areas, and indoors. There are **two conflicting views here**: on the one hand, Free Mobile considers it vital that the allocation procedure include a guarantee that it will be allocated 700 MHz band spectrum, whereas Orange, Numericable-SFR and Bouygues Telecom consider such a guarantee would not be legitimate as, in their view, Free Mobile had an opportunity to acquire 800 MHz frequency band spectrum in the past.

As a result, before the call for applications is issued, ARCEP and the Government will need to determine the extent to which, or whether, this asymmetry must influence how the allocation procedure is designed.

## The other mobile frequency bands

Other bands aside from the 700 MHz band are being examined at the European level, for their suitability in furthering the development of superfast mobile networks. Two in particular emerged from the consultation as good candidates.

First, the L band (1452 – 1492 MHz) appears to be the most attractive option. Using it in SDL (*Supplemental DownLink*) mode could help satisfy some of superfast mobile systems' short-term needs. Added to which, it appears that compatible equipment could be available by 2016. This band could therefore be allocated in the short or medium term.

Stakeholders also expressed interest in the 3.5 GHz band. They pointed to its usefulness for both mobile services, particularly in urban areas, and in supplying fixed internet access (WLL in rural areas). The band also has the advantage of enabling the creation of wider channels, and enable the development of a large LTE ecosystem in TDD mode: the first LTE equipment for this band could be available by 2016. ARCEP could therefore plan on allocating it in the short or medium term.

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<sup>3</sup> SFR and Bouygues Telecom potentially have indirect access to an additional 10 MHz duplex in the 800 MHz band in “priority rollout areas,” covering 18% of the population and 63% of the land mass of mainland France: they have a reciprocal obligation to grant all reasonable frequency sharing requests in these areas.

<sup>4</sup> Free Mobile potentially has indirect access to 10 MHz duplex in the 800 MHz band in “priority rollout areas” covering 18% of the population and 63% of the land mass of mainland France: it has roaming rights over SFR 800 MHz spectrum in these areas.