



**BBC response to Ofcom's Call for Inputs  
"UHF and VHF spectrum planning"**

## Executive summary

The BBC welcomes the opportunity to respond to Ofcom's Call for Inputs on UHF and VHF spectrum planning. As the owner<sup>1</sup> of key elements of the existing UK Planning Model (UKPM), we have a unique insight into the performance, capabilities and requirements of the current approach to TV and radio frequency planning. In that respect, any changes to these practices should be informed by our experience of working with Ofcom and industry colleagues within the Joint Planning Project (JPP) and, latterly, the DTT Frequency Planning Board.

This decision would be important for a successful spectrum management outcome in the UHF band at any time. In the context of a potential clearance programme around the introduction of mobile broadband services in the 700 MHz band, it is critical. A great deal of detailed planning and co-ordination is currently taking place in preparation for a possible 700 MHz clearance. This needs to be underpinned by a frequency planning model which we know to be accurate and which has the confidence of a wide set of affected stakeholders.

Ofcom's Call for Inputs states<sup>2</sup> that the UKPM has been broadly accurate in predicting wide area coverage across the UK. We are nonetheless mindful of Ofcom's obligation to re-tender the current contract for spectrum planning services. We are similarly aware that the planning model needs to reflect the new services seeking to use UHF Bands IV and V – especially 4G mobile broadband and White Space Devices (WSDs). This response seeks to give the BBC's view as how best spectrum planners can best meet the challenges of the coming years, given the changing spectrum environment.

Our clear preference is for Option 2 as set out in Ofcom's Call for Inputs document – maintaining the current UKPM model but adapting it to take into account the realities of new services. We take this view for a number of reasons:

- Ofcom accepts that the current UKPM is broadly accurate. This has come about through a constant process of refining and improvement over a number of years in response to an accumulation of expertise by spectrum planners. We do not believe that this can be replicated with

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<sup>1</sup> Jointly with Arqiva

<sup>2</sup> Paragraph 1.7

any great accuracy or certainty by an off-the-shelf product or with any alternative “clean sheet” approach;

- The risks of moving to a new spectrum planning approach are significant. The resultant impacts of achieving a sub-optimal outcome at this time are very great indeed. Any 700 MHz clearance could be jeopardised if a move was made to adopt a planning approach which is untested in the UK;
- It is important that any planning model has the confidence of all stakeholders with an interest in the broadcast bands. These will include existing TV broadcasters and radio (FM and DAB), PMSE, WSDs and 4G mobile network operators. It is our view that such confidence can best be given by using the UKPM as the starting point for future frequency planning;
- The UKPM has been subject to constant review and revision as circumstances have changed and that will continue to be the case. It cannot stagnate while new and innovative wireless services are being developed and introduced. Indeed, we have already identified some areas in which we could seek to develop the UKPM, namely:
  - Use updated geographic databases for terrain and clutter data;
  - Improve the indoor model;
  - Continue to calibrate the DAB model to improve prediction at 1.5 m;
  - Consider partial correlation between the shadowing process of wanted and interfering signals;
  - Improve predictions for low-height – low power transmitters, in order to better assess interference from LTE and WSDs; and
  - Improve predictions for short-path lengths.
- Since Option 2 will keep the elements of the model that we accept as accurate, and focus mainly on increasing the precision of the impact of new services, the existing planning work will be valid throughout the development period. The modular architecture of UKPM enables

the improvements to be directed in specific components, while ensuring that the well-established parts of the model remain unaffected;

- A considerable amount of effort has been invested in the UKPM over a number of years to improve its execution speed performance. A number of use cases rely on the ability of the model to analyse FM, DAB and DTT networks at short notice. This includes interfering stations from neighbouring countries. Key elements of the UKPM include:
  - the generation of the postcode databases used by the TV and radio industries to allow consumers to check predicted coverage from digital television and radio networks throughout the UK;
  - automated timing and power optimisations for DAB networks;
  - the Code of Practice work<sup>3</sup> including the detailed modelling of network changes through a transition period such as Digital Switchover; and
  - the clearances of the 800 MHz band as well as the potential clearance of 700 MHz.

A final example of the value of the UKPM is the UHF White Space availability calculation tool – a key part of the ongoing work on geo-location that Ofcom is taking forward. Any changes to the planning model could clearly create risk to the numerous benefits that the UKPM offers.

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<sup>3</sup> The Digital TV Switchover Programme contained the detailed analysis of transitional effects through a series of several hundred network changes. The ability to manage those network changes, which was mandated by a “Code of Practice” published by Ofcom, depended on a large amount of pre-emptive mitigation which relied on detailed coverage calculations, conducted in a very short space of time.

## General points

### Defining the UKPM

The Call for Inputs refers to, on a number of occasions, the work of the existing UKPM. However, we believe it would be useful if Ofcom, BBC and Arqiva could develop a common understanding on what precisely constitutes a planning model for the purposes of this Call for Inputs. In particular, we are seeking clarity on which of the following would be deemed to be part of a future planning model:

- The underlying algorithms (possibly including software code and/or executables) with defined inputs, outputs and processes for performing path loss predictions;
- Underlying algorithms, software code and executables for the treatment of interference within a whole network. This will quantify individual multiplex coverage and core coverage over a specific area or over the entire UK; and/or
- Software programmes and output data which are additional to the existing UKPM but are not currently defined within it. The basic functionality of the UKPM does not require these programmes but they complement its use. They allow ease of input, interpretation of output, detailed inspection of coverage and production of the post-code database.

### Comments on Annex 6

Ofcom will be aware that the UKPM has not been optimised or tested at frequencies outside broadcast Bands II, III, IV and V. Additionally the path loss calculation in the UKPM is a BBC/Arqiva implementation of the 'Causebrook' method.<sup>4</sup>

Our preference, as set out elsewhere in this document, is for Option 2. However, should Ofcom be considering alternatives, we believe that some of the potential specifications in Annex 6 are inadequate for a number of planning requirements. In particular:

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<sup>4</sup> ITU Rec. 1546, Rec. 1812 and Hata are not incorporated in the UKPM (although this would be relatively easy with the addition of appropriate modules).

- In addition to the current planning work, the model will need to handle the various 'what if' scenarios that we will be assessing as we consider possible further spectrum clearance. These could include nationwide DTT Single Frequency Networks (SFNs) or cellular type deployments with thousands of wanted transmitters;
- The further expansion of the BBC and commercial DAB networks might consider more than 2,000 transmitters, 900 of them in one SFN. This network is significantly more complex than those suggested in A6.7;
- Coverage to existing rooftop aerials, pointing towards a pre-determined transmitter (historical preferred analogue, preferred DTT or to a specific DPSA layer) needs to be considered; and
- During peak planning periods, the benchmark outlined for a full network run (a few hours) is too high. According to our experience, the run times should be less than an hour using the maximum resolution. Given the most appropriate hardware, the new solution should be able to achieve such short response times, essential for the interactive and iterative planning processes that we employ.

As planning needs evolve, we will continue to develop software that uses the UKPM components as building blocks while providing additional functionality. It is essential that any new solution should provide adequate interfaces to allow this to continue.

## Responses to questions

*(Q1) Do you have a specific requirement for access to a new planning model and if so, what are your specific requirements?*

1. The BBC is licensed to operate two of the six national DTT multiplexes and has an established role in working with government and regulators in ensuring the successful planning of the DTT, FM and DAB networks. In that context, whatever option adopted for future frequency planning, we would have a clear requirement for full and unfettered access to the planning model. This will enable us to continue coordinating with other organisations and agencies to ensure high quality broadcasting services with minimal risk of harmful interference.
2. As described above, broadcasters have developed a number of software tools which incorporate and build on the UKPM. We would require any new model to match the performance of the UKPM so as to be able to support these tools.
3. We also require the ability to enhance the tool following discussions with stakeholders. We currently have that ability (through in-house development resource) and it is critical to future developments that this responsiveness is maintained.

*(Q2) Have we correctly identified and characterised the potential options set out above, and what other options - if any - should be taken into account in our consideration?*

4. Ofcom appears to have broadly identified the viable options for future broadcasting spectrum planning. In particular, we note that it has not precluded an approach which could adopt more than one option. However, we believe that core spectrum planning should take place through a UKPM which is responsive to changing needs. We would also not want to rule out, at this stage, the possibility of a separate approach for discrete projects.

*(Q3) Do you have a preference for (one or more) particular options?*

5. As set out above we have a clear preference for Option 2.

*(Q4) Have we correctly identified and characterised the potential impacts set out above, and what other impacts - if any - should be taken into account in*

*our consideration?*

6. Ofcom does not mention the importance of the planning work already under way in preparation of a potential clearance of the 700 MHz band. This is a very detailed project of immense wider importance to the UK economy. As with any model it is built upon trusted foundations and through carefully considered steps. The UKPM gives certainty to spectrum planners that their work is accurate. There is no indication as to what will happen to the work of the DTT Frequency Planning Board if it needs to rely on altered assumptions which will not be known until new planning models are agreed and put in place.
7. There is also no reference to the impact that this would have on international negotiations on spectrum clearance. Ofcom states that there could be a period of two years in which a new model is agreed. It is unclear how negotiations could continue in such an environment of uncertainty, especially in the knowledge that a developing UK spectrum plan would need to be “back-planned” to take into account the different assumptions in a new planning model. This is particularly critical at this time of fundamental change in the UHF broadcasting bands.

*(Q5) What evidence, whether qualitative or quantitative, should we obtain and/or take into account in considering each of these potential impacts? Please identify any sources of specific evidence to which we should have regard?*

8. We would urge Ofcom to specifically take into account the views of experienced spectrum planners, many of whom sit within the broadcasting community and have been central to the development of the current UKPM. This will help Ofcom to have a clear view of the risks of moving to a completely new planning model at a time of potential and significant changes to the use of broadcasting spectrum.

*(Q6) Have we correctly identified and characterised the potential benefits set out above, and what other benefits – if any – should be taken into account in our considerations?*

9. We would question the benefits as set out in the Call for Inputs as they are not necessarily unique to a new model. Option 2 will also better cope with new co-existence requirements

10. In fact and as stated earlier, Option 2 better achieves these benefits as it will keep the elements of the model that we accept as accurate, and focus mainly on increasing the precision of the impact of new services, the existing planning work will be valid throughout the developing period. The modular architecture of UKPM enables the improvements to be directed in specific components, while ensuring that the well-established parts of the model remain unaffected.

11. Our implementation of the UKPM allows external programs to easily access our tools via well-defined interfaces, making it very easy for third parties to independently extend their functionality.

*(Q7) What evidence, whether qualitative or quantitative, should we obtain and/or take into account in considering each of these potential benefits? Please identify any sources of specific evidence to which we should have regard.*

12. Before any further development is undertaken, we should have a high degree of certainty that any resulting methods will yield better results than the existing arrangement. Appropriate metrics for assessing the relative accuracy of any new model needs to be should be agreed with stakeholders.

*(Q8) Should we place different weights on some impacts and benefits than on others?*

13. As stated above, we believe that Ofcom should be seeking to minimise any identified risks to the work on preparing for a potential future clearance of the 700 MHz band. A great deal of effort has already been put into this work at both a domestic and international level and introducing delay and uncertainty at this stage would be unwelcome.

14. In the same way, we would argue that any benefits around creating certainty in the spectrum planning work ahead of any 700 MHz clearance should be strongly encouraged.

*(Q9) Do you have any comments on the work plan we have outlined? e.g. do you agree with our proposed timing and approach for securing a new model?*

15. We think that the timescales required for implementation of a new model, which must include not only validation but also achieving comparable

functionality with the UKPM and interfacing with other software tools, will be significantly more than the two years suggested by Ofcom.