

OFCOM UHF and VHF Spectrum planning

This is ATDI's response to a call for inputs to Ofcom's proposed plans for potential procurement of models, tools and services.

Question 1: Do you have a specific requirement for access to a new planning model and if so, what are your specific requirements?

Basic Requirements

2.12 Our basic requirements for any future UHF and VHF spectrum planning model are that:

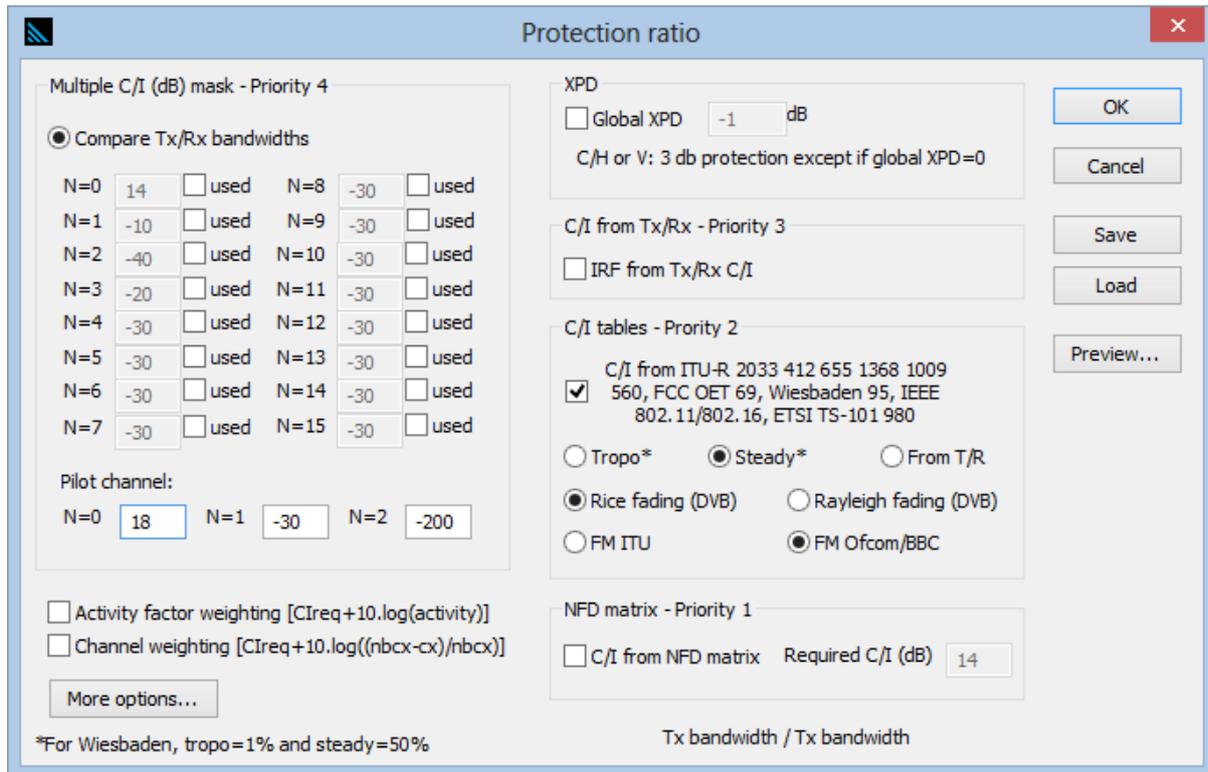
- It should be capable of planning frequencies and predicting coverage for digital broadcast services, on a basis that closely and consistently matches the results experienced in the real world. Accuracy, flexibility and prediction resolution are also important.

ATDI response:

ICS telecom is an comprehensive off-the-shelf radio planning tool featuring both frequency planning and coverage predictions. The automatic frequency planning engine is capable of assigning frequencies to a whole network or a part of it, taking into consideration stations that are already assigned and sharing the same band (either the same Broadcast service or any other service).

Frequency assignment configuration window

The protection ratios can be automatically extracted from standard tables or can be user defined:



Protection ratio configuration

ICS telecom incorporates a wide range of propagation models for generating coverage predictions for digital Broadcast services, generated from international standards (ITU, 3GPP) and adapted accordingly. The reference guide 'Validation campaigns' identifies correlation results reached with ICS telecom in different bands. More correlation results are also available on demand.

- It should be capable of assessing the effect of coexistence of other services, such as white space devices, with digital broadcast services.

ATDI response:

ICS telecom analyses the effect of any service interfering any other Broadcast services that are sharing the same band.

- It should be accessible and available to all stakeholders. This could include access to the tool itself, the underlying parameters, the databases used, the propagation models and the outputs.

ATDI response:

ICS telecom is a commercially available tool which is available to all stakeholders. The parameters and databases can also be shared between Ofcom and its external stakeholders.

- It should be validated against measurements of DTT and DAB data such as field strength.

ATDI response:

ICS telecom offers dedicated features to facilitate the import of measurements and correlations between measurements and predictions. The reference guide 'ICS telecom - Correlation between measurement and prediction' illustrates this.

UHF and VHF Spectrum Planning Options

2.14 We believe that it is an opportune time to consider the future requirements for UHF and VHF spectrum planning, which could include a major review, update or development of a new broadcast spectrum planning model. Options that could be considered include:

- Continue with the existing arrangements. We note here that Ofcom will need to re-tender for DTT spectrum planning services when the existing contract expires and Ofcom will need to consider making arrangements for access to UKPM (as well as to any future UHF and VHF spectrum planning tool) to the winning tenderer;
- Consider (potentially with stakeholders) how to adapt the UKPM to increase the precision with which the impact of new services such as 4G mobile and white space devices can be modelled;

ATDI response:

ATDI's radio planning tool, ICS telecom, provides a flexible platform which utilises 100m digital terrain models and up to 0.01 m digital surface models. This tool also has the ability to utilise three layers of cartographic data; a digital terrain model, a building layer and a clutter layer. A key dependency on the precision of radio propagation modelling is the mapping. ICS telecom is well placed to incorporate the UKPM and using different resolutions and types of mapping data.

ICS telecom also has the ability to report measurements versus predictions, enabling variations between predicted and measured results to be examined.

- Procure an off-the-shelf commercially available UHF and VHF planning software package, and work with the provider to customise it for Ofcom's needs. The customised model (and associated parameters, databases, outputs etc.) would then need to be made available to stakeholders, and potentially be accessible via a web portal or cloud host;

ATDI response:

ATDI support the use of commercially available radio planning software and has a long relationship with Ofcom supplying custom features and functionality based on the user's specific requirements. ATDI consider it key that stakeholders' access information from Ofcom and as a result have developed ICS online and ICS cloud. ICS online enables users to present predictions and results to external stakeholders who may not have access to ATDI radio planning tools.

Both products enable the user to provide stakeholders with visibility and access to coverage, interference and station data via the internet.

- Develop an entirely new bespoke UHF and VHF planning model. This could be undertaken via a procurement process or potentially even developed in house at Ofcom. The new model would be made available to stakeholders and be potentially accessible via a web portal or cloud host (though Ofcom could not offer support if a model was developed in house).
- Alternative approaches to developing a single new model could include developing different models for different situations; or considering a range of models that trade off capability against cost

and time to develop e.g. a “quick and dirty” model based on existing software that has say 70-80% of the capability of an ideal model may suffice and be just good enough given the uncertainties inherent in any statistically based prediction model.

2.15 Whatever form any new planning model takes, one important principle that is key is that the model can be made available to third parties, subject to appropriate terms and conditions.

Question 2: 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?

ATDI response:

ATDI has considered all proposed options and no further comments.

However, the main influencer in radio prediction is the quality of the digital terrain map and clutter. It is not unreasonable that improved precision could be obtained from existing radio propagation models utilising higher raster mapping data such as 50m, 10m, 5m, 1m ,0.1 data.

A higher resolution clutter layer may also improve accuracy.

From experience ATDI associates the development of multiple models with a series of problems which can be problematic, including:

- Discontinuities in coverage predictions
- Determining under which conditions each model should be used
- Complex rules for determining which model should be used and where
- Difficulties testing for accuracy.

However, if the multiple models to be used are based on system type, i.e., fixed DTT coverage and LTE interference into DTT receiver, ATDI recommends that Ofcom use the UKPM model but for other systems, such as white space mobile systems, Ofcom should consider using an alternative model.

Question 3: Do you have a preference for (one or more) particular options?

ATDI response:

ATDI consider the off-the-shelf option to have far greater chance of success. This is demonstrated by ATDI's radio planning tool ICS telecom, which not only meets but exceeds the main user requirements (coverage predictions with accurate models already available, correlations and tuning with measurement), and can be further developed to meet Ofcom's other specific requirements.

The solution incorporates ICS online (including 50mb of dedicated space on the Cloud), enabling stakeholder to access to shared data with Ofcom, such as site information, coverage predictions, interference results via a secure internet link. The reference guide 'ICSOnline_GB.pdf' outlines the key features of this offering.

Impacts

2.16 Currently, the systems underpinning the UKPM are run by each of Arqiva and the BBC. There is substantial history around and complexity in making the outputs available to Ofcom and *potentially to third parties.*

2.17 A change in the UHF and VHF spectrum planning model (whether it is a modified UKPM, a modified off-the-shelf model, or an entirely new model) could have the following impacts:

- It may prove difficult to maintain consistency with historical UKPM coverage predictions e.g. the PSB DTT coverage target of 98.5% of UK households may not be reproduced by a new or modified model; or if it is, it may not be the same 98.5% of the UK households. However, the potential benefits of an improved “common currency” model may outweigh the issue of maintaining backward compatibility with the current UKPM.
- The development and validation of a new or modified model is likely to be a fairly lengthy process (up to two years), with no guarantee that the resulting model would improve upon the current UKPM in terms of accuracy of prediction.
- As the procurement and development process could take up to two years, we would need to continue with the existing UKPM arrangements in the interim.
- Some Ofcom stakeholders have come to rely upon the results produced by the UKPM. Adoption of any alternative or modified model is likely to involve a period during when these stakeholders would need to be made comfortable with the validity of any new or modified model.

Question 4: 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?

ATDI response:

ATDI believe Ofcom has identified all potential impacts. However, from our experience developing models (whether new or modified) the target of 98.5% of UK households covered and validated with measurements could be achieved within a few weeks.

Question 5: 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.

ATDI response:

The development of a new VHF / UHF model must facilitate the use of the tool over a range of different conditions and environments. Both Ofcom and its associates have been involved in the development of ITU-R P.1546, ITU-R P.1812 and ITU-R P.2001, which are all generic models whose purposes are to achieve the same results. However, these models have taken years to develop and Ofcom might consider developing these models further as opposed to starting from scratch.

As part of this development, measurement data would be required to ensure that that any commercial implementations can be tested to Ofcom's satisfaction

Benefits

2.18 The benefit of continuing the existing arrangements around DTT planning are that the UKPM is the "de facto" standard model for DTT and DAB coverage in the UK and has been proved to be generally accurate through many years of experience and backed up by measurements in the field. Another not inconsequential benefit is that the cost, time and risk of developing a new or modified model would not be incurred.

2.19 A change in the UHF and VHF spectrum planning model (whether it is a modified UKPM, a modified off-the-shelf model, or a new model) could have the following benefits:

- A new or modified model can be designed to better cope with DTT coexistence requirements, and any additional broadcast radio requirements. The model can also take account of more recent developments in algorithms and methods.
- A new or modified model should be available to whoever needs it. The wider availability may encourage the potential for innovative analysis by interested parties.

Question 6: 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 assessment?

ATDI response:

ATDI consider that the measurements made by OFCOM/AEGIS and BBC relating to C/I protection ratios in the FM band, may not adequately portray real life. However, ATDI recommend that measurements for DTT/DAB be analysed by ATDI before proceeding further.

Question 7: What evidence, whether qualitative or quantitative, should we obtain and/or take into account in assessing each of these potential benefits? Please identify any sources of specific evidence to which we should have regard.

ATDI response:

None

Question 8: Should we place different weights on some impacts and benefits than on others?

ATDI response:

None

Work Plan

3.5 The outline timetable is as follows:

Phase	Indicative Timetable
Call for inputs.	July 2013
Development of procurement strategy	July - September 2013
Procurement of new/modified planning model	October 2013 – April 2014
Development of appropriate terms and conditions for 3rd party access	Jan – May 2014
Establishment of planning model & software	May – September 2014
Verification and calibration of planning model	September 2014 – March 2015
Start of framework procurement of planning services.	March 2015

Question 9: 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?

ATDI response:

None