Visualyse Professional: Supporting CPMs and WRCs since 1995

Abstract: The work of the ITU-R can be split into cycles that start and end at WRCs. The technical work is summarised in the CPM Report, finalised at the CPM-2 meeting to be held in Geneva 23rd March to 2nd April 2015. Over the last few years, thousands of input contributions have been submitted to the ITU-R's Working Parties and Study Groups – and in this White Paper we describe how many of these were produced using Transfinite's Visualyse Professional radio modelling tool, launched at WRC 95.

CPM and WRC

WRC 2012 set the scene for 3 years of work at the ITU-R that will culminate in November when thousands of delegates head to Geneva to negotiate an update to the Radio Regulations (RR).

The RR defines what services can operate in which bands and specifies what constraints they should be subject to. As the radio spectrum gets ever busier, there are more and more services looking to access the same key frequencies.

The World Radiocommunications Conference (WRC) is the critical meeting where decisions are made, locked into the RR which have the status of a treaty document. So the pressure is on to make the right decisions and so it is key that all delegates are well informed.

Over the last few years there have been thousands of studies in the many ITU-R Study Groups and Working Parties. The results and findings have been distilled into the draft Conference Preparatory Meeting (CPM) Report. At the CPM this draft will be discussed and finalised, ready to be the prime technical input into the WRC.

The CPM Report is split into Chapters reflecting the services, in particular:

Chapter 1: Mobile and Amateur issues

Chapter 2: Science issues

Chapter 3: Aeronautical, Maritime and Radiolocation issues

Chapter 4: Satellite services

> Sub-Chapter 4.1: Fixed-satellite service

> Sub-Chapter 4.2: Mobile-satellite service

Chapter 5: Satellite regulatory issues

Chapter 6: General issues

Within each Chapter, discussions are split by WRC Agenda Item (AI), so, for example, the first being:

AI 1.1: to consider additional spectrum allocations to the mobile service on a primary basis and identification of additional frequency bands for International Mobile Telecommunications (IMT) and related regulatory provisions, to facilitate the development of terrestrial mobile broadband applications, in accordance with Resolution 233 (WRC-12);

This particular AI was the remit of a special group, Joint Task Group (JTG) 4-5-6-7, as discussed in the following section.

JTG 4-5-6-7

The purpose of the JTG 4-5-6-7 was to address AIs 1.1 and 1.2 relating to identification of spectrum for IMT services. It met six times and the work of this group can be reviewed via the Chairman's Report, document 4-5-6-7/715. This, together with associated Annexes, contained:

- A summary of the work undertaken
- Draft CPM text
- Draft New Reports

A Joint Task Group was required as the AIs covered bands where there are a large number of different types of services, and the key activity was to undertaken technical studies on the feasibility of sharing.

The most commonly used radio modelling tool for studies at the JTG was Visualyse Professional.
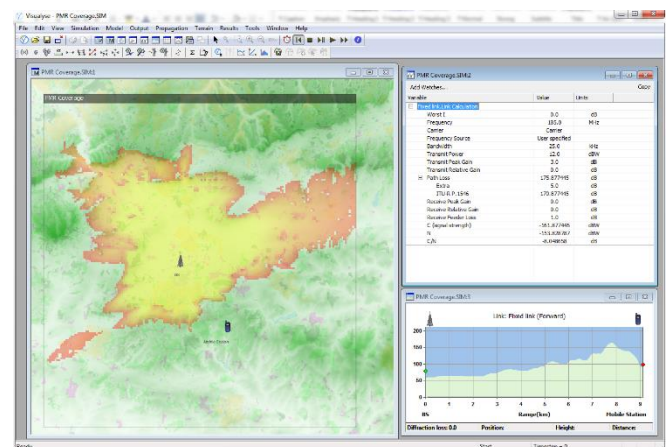
Visualyse Professional

As sharing studies become more complex and challenging, increasingly sophisticated software tools and modelling methodologies are required if practical solutions are to be found for these problems.

Our Visualyse Professional is such a tool as it can analyse almost all types of radio system including mobile, fixed, broadcasting plus other services that might have to share spectrum such as satellite earth stations.

Since its launch at WRC 95, Visualyse Professional has be used to analyse a very wide range of radio systems including link planning, coverage and interference analysis. It was designed as a "Study Tool" able to model:

- Almost any radio system operating above about 30 MHz, including both terrestrial and satellite

- Analyse both co-frequency and adjacent band scenarios

- Analyse generic scenarios and also specific locations with terrain and land use data

- A wide range of different types of methodology, including:

  - Static

  - Area

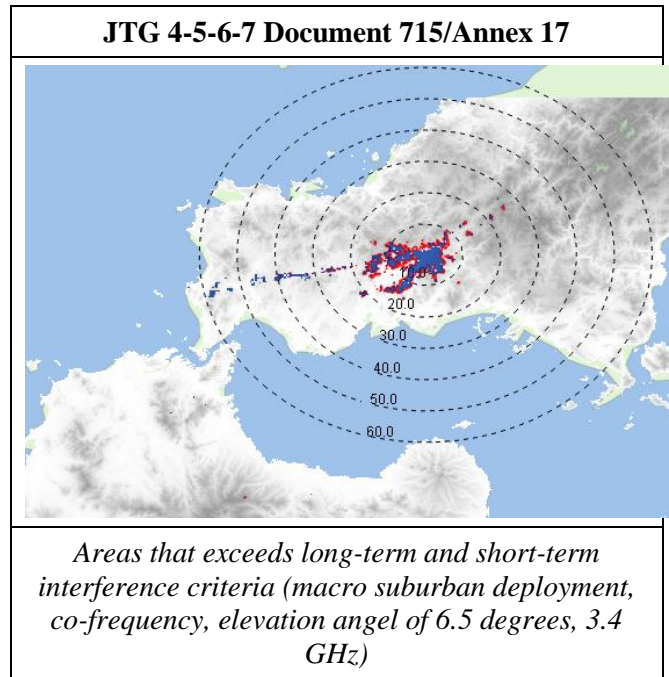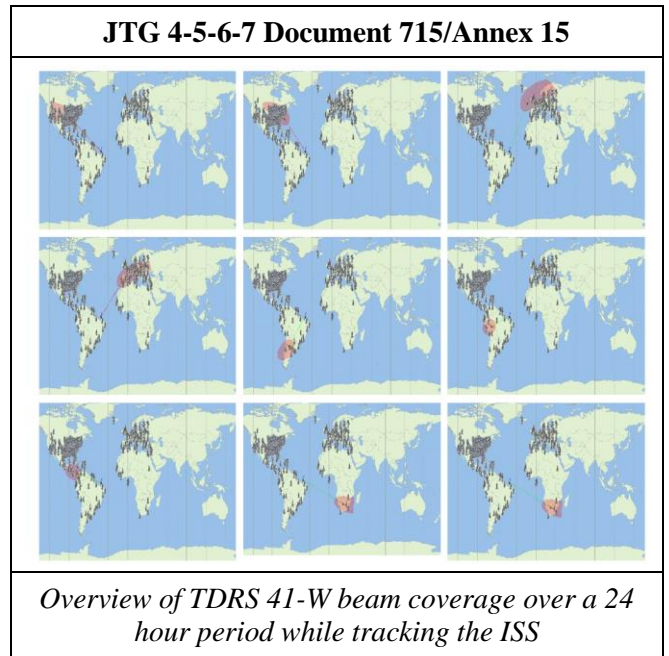 - Monte Carlo

  - Dynamic

  - Input variation analysis

JTG 4-5-6-7 Studies

We have reviewed the Chairman's Report of JTG 4-5-6-7 and identified a few of the studies that used Visualyse Professional. We found examples of screenshots showing Visualyse Professional being used to model:
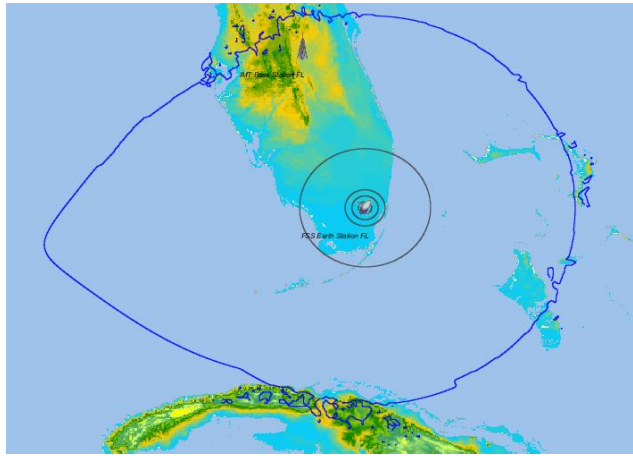
- Satellite Earth stations

- IMT LTE Base Stations

- Terrestrial Fixed Service

- Space Research Service

- Earth Exploration Satellites

- Airborne Receivers

- RLANs

From our work within the JTG as consultants we are aware of many other studies, from IMT LTE mobiles to aeronautical radars.

There would also be many other studies undertaken using our software in the other ITU-R Study Groups and Working Parties on other Agenda Items.
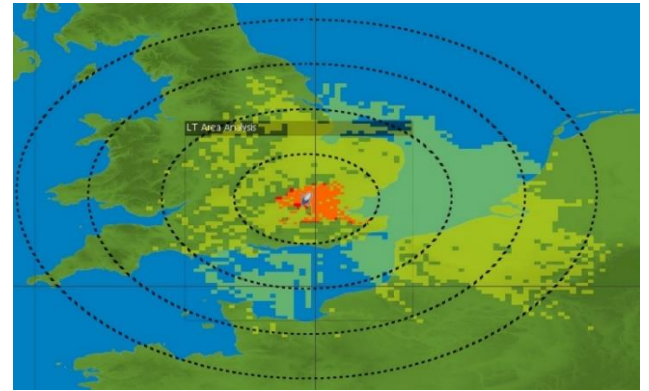
JTG 4-5-6-7 Document 715/Annex 15

Overview of TDRS 41-W beam coverage over a 24 hour period while tracking the ISS

JTG 4-5-6-7 Document 715/Annex 17

Areas that exceeds long-term and short-term interference criteria (macro suburban deployment, co-frequency, elevation angel of 6.5 degrees, 3.4 GHz)

Email us at info@transfinite.com for further information or to give your views on this White Paper
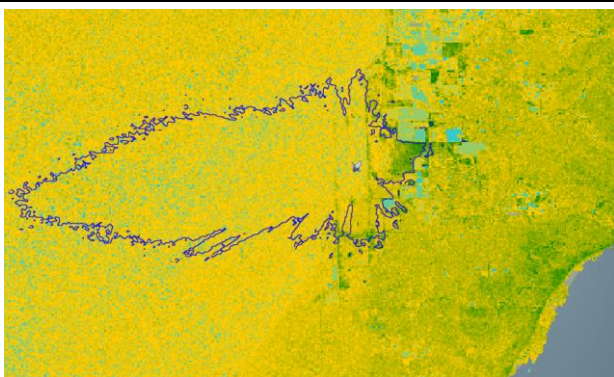
JTG 4-5-6-7 Document 715/Annex 17

Contour in order to mitigate short term interference for the receiving FSS earth station operating at an elevation angle of 5 degrees, showing a distance separation of 312.2 to 487.6 kilometres depending on direction

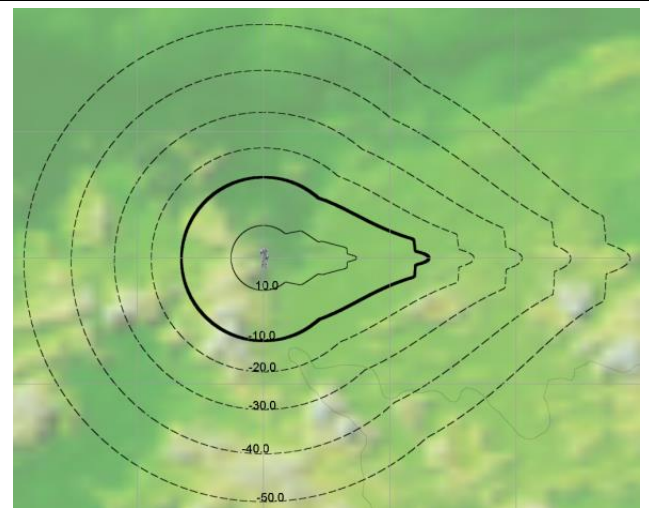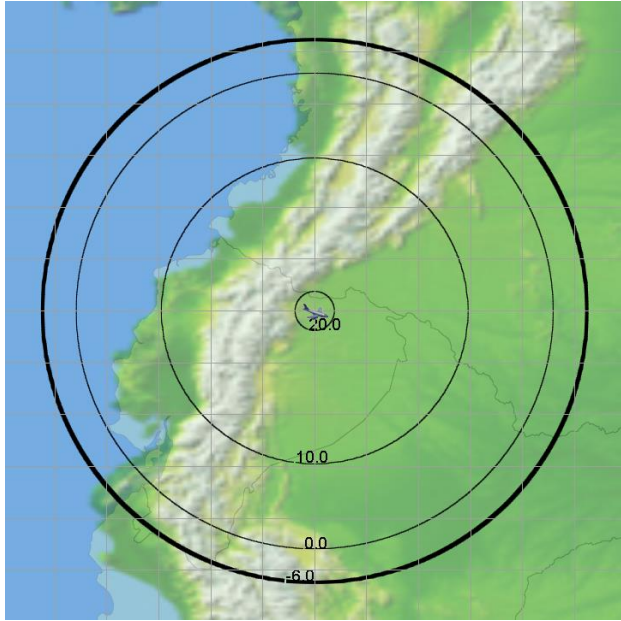**JTG 4-5-6-7 Document 715/Annex 17**

Contour in order to mitigate long term interference for the receiving FSS earth station operating at an elevation angle of 5 degrees, showing a distance separation of 4.9 to 35.1 kilometres depending on direction

JTG 4-5-6-7 Document 715/Annex 17

Protection zone for Brookmans Park earth station with respect to Macro Urban

JTG 4-5-6-7 Document 715/Annex 18

I/N Contours For Fixed Station A and average IMT Base Station Power

Email us at info@transfinite.com for further information or to give your views on this White Paper

JTG 4-5-6-7 Document 715/Annex 33

I/N Contours for IMT base station Interference into an airborne receiver Aircraft Height = 19 km

JTG 4-5-6-7 Document 715/Annex 35 Annex E
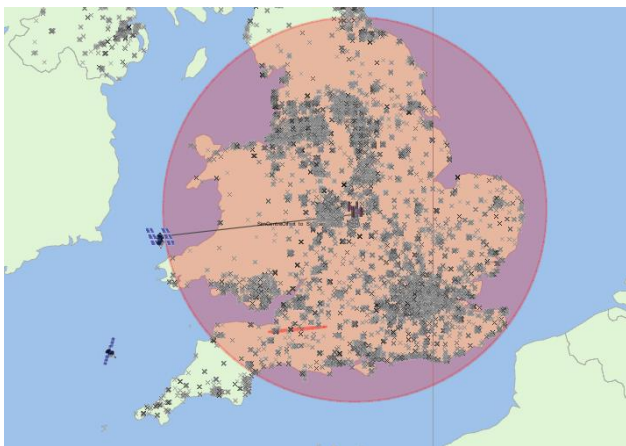
Simulation area over the southern UK with 250 km radius. Crosses indicate 1 km^2 pixels included in the simulation

Contact us

We can help operators and spectrum managers analyse mobile coverage including:

Consultancy Work

Our consultants can assist you by undertaking:

- Studies of compatibility and methodologies
- Analysis of mobile network coverage to meet regulatory obligations
- Support for mobile network backhaul planning

- Management and analysis of planning of bands for private mobile radio
- Link design and radio spectrum planning

Software Products

We have developed a range of radio engineering, spectrum management products including:

Visualyse Professional: the leading "Study Tool" for interference analysis

Visualyse GSO: designed to support the coordination of GSO satellites

Visualyse Coordinate: designed to support the coordination of satellite ES

Visualyse EPFD: checks whether non-GSO FSS networks meet the EPFD limits in Article 22 of the Radio Regulations using the algorithm in Rec. S. 1503

Visualyse Spectrum Manager: a "next generation" web based licensing portal (below) providing workflow and technical analysis
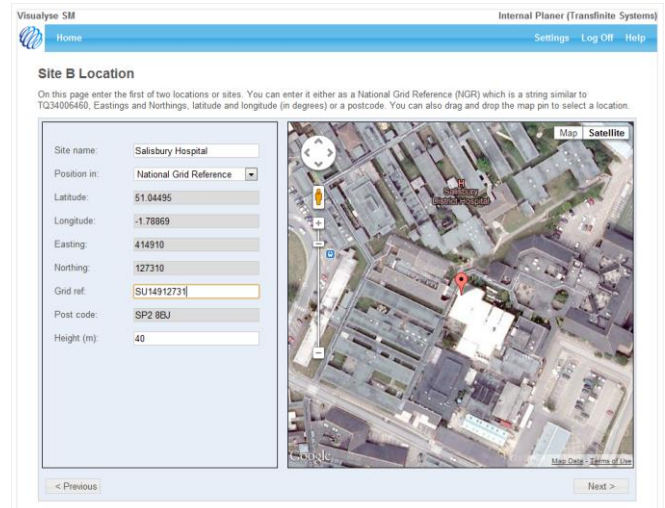
Regulatory Support

- We can provide a range of services to support regulatory activities including licensing and representation at international and regional meetings (e.g. ITU and CEPT).

- We have experience in spectrum auctions and trading, together with operating as a spectrum management organisation (SMO).

We can also provide training services in our products and radio engineering.

Feedback

If you have any questions or comments about this White Paper or would like more information please do not hesitate to contact us at:

Email: info@transfinite.com

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