

Latest

Antenna RF Measurements with a Miniature Helicopter

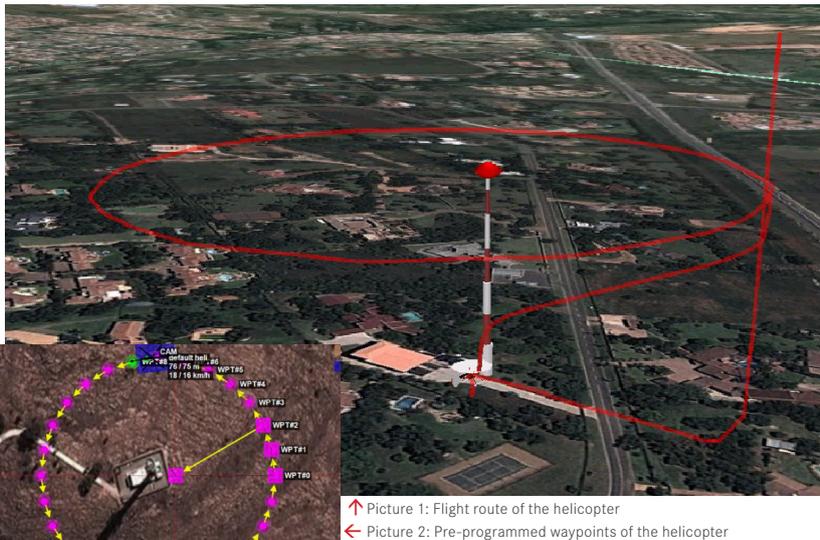
If you are an operator or manufacturer of antennas you need to know whether the true on-site performance of the antenna corresponds to the planned transmission specifications in order to guarantee the promised service level and expected coverage to your customers. On the other hand regulators need to ensure that licensed operators are compliant with their license conditions and that antennas are radiating within the legal EMF (electromagnetic field) limits.

LS telcom's unprecedented miniature helicopter measurement service now allows the cost effective RF performance measurement of any radiating antenna and makes this affordable to most operators.

LS telcom uses a remote-controlled miniature helicopter fitted with an on board radio frequency spectrum analyser and calibrated receive system. The mini-helicopter's programmable flight path will be compiled to suit the requirements of the antenna to be measured and will include various vertical and horizontal flight passes at different altitudes. LS telcom has developed this service capability over the past five years. The solution includes the adaptation of the miniature helicopter vehicle to handle the payload, the development of the measurement software as well as the integration of the measurement system, differential GPS system, autopilot and storage unit onto the flying platform. Several communication links are also employed during the procedure. Koenie Schutte, an experienced Telecommunications engineer and the CEO of LS of South Africa Radio Communications (Pty) Ltd. answers our questions and informs us about the LS telcom miniature helicopter measurement development service. The service was extensively tested in the field at newly established DTT transmission sites for a large pan-African broadcast company.

How do the antenna measurements via miniature helicopter work exactly?

KS: The miniature helicopter with its integrated frequency sensor circles the antenna at a radius of typically 100m for a broadcast antenna and measures the field strength at different levels of altitude. This distance may vary according to the characteristics of the antenna array. During the flight the measurement data is transferred in real-time via radio link to the control station on the ground. The



↑ Picture 1: Flight route of the helicopter
← Picture 2: Pre-programmed waypoints of the helicopter

helicopter can either fly remote-controlled or through pre-programmed differential GPS waypoints. The different waypoints and measurement points are documented in an Excel file. The solution was developed over the past five years as a sophisticated and calibrated system, including the flight vehicle, the sensor, a GPS system, a data storage unit and radio communication links. All in all about a hundred different parameters have to be coordinated during the flight. The fully equipped helicopter used in our project weighs a total of 13.5kilos.

What are the different applications of the service?

KS: You can determine the real on-site performance of antennas in terms of horizontal (HRP) and vertical radiation patterns (VRP) and effective radiated power (ERP). In turn this may be used for propagation model calibration and to control and optimise antenna tilt and null fill as well as optimise coverage. Operators plan their 2D and 3D antenna diagrams for EMC and coverage analysis. As accurate as planning may be, typically 20% of existing interferences are due to

antenna location and set up and cannot be simulated.

Regulators, on the other hand, will find our service useful to determine and confirm that antennas are radiating within the legal and licensed EMF (electromagnetic field) limits and are also in compliance with EMF safety zones for the general public.

Antenna installations may also be inspected by means of high resolution aerial photographs of the antenna and mast infrastructure. This will allow desktop assessment of the condition of the infrastructure and installation standard before sending a team up the mast. This is especially convenient and advantageous for antennas in inaccessible areas, where climbing is dangerous and cost-intensive and normally requires downtime for inspection.

Altogether, our service guarantees optimised antenna performance, regulatory compliance and reduced antenna maintenance costs. For the first time ever the customer will be in touch with what is really going on around its antennas in an easy, quick and cost-effective way.

(Continued on page 3...)

Latest News on the Tool Front: Updates in CHIRplus_BC

Up-to-date with ITU developments

CHIRplus_BC supports new BR IFIC SQLite format



The ITU has changed the format of its BR IFIC (International Frequency Information Circular) to SQLite. The publication on a DVD-ROM contains particulars of frequency allotments and assignments and is issued every fortnight. CHIRplus_BC already supports this new BR IFIC SQLite format. The new format has several advantages over the preceding MS-Access™ format. No user licence is required for this ‘open source’ product for which even the source code is available in the public domain.

With SQLite, the complete data can be stored in one single database file – in contrast to the several files previously necessary in MS-Access™. As the amount of data on the DVDs had constantly increased, it could not be kept in a single MS-Access™ file anymore, but had to be spread over several files.

This is why a linking between the different .mdb database files was necessary during installation, so that software using the data – whether it was CHIRplus_BC, ITU or other software – could access all the various sets of data at the same time. In CHIRplus_BC this concerned the GE06L list of other services, which is included in the FXM part in addition to the broadcast data. Also, the installation of the BR IFIC required the users to reduce the default security settings of the MS-Access™ to a non-desirable level. All these inconveniences were ironed out with the new SQLite format.

Version 5.8.0 of CHIRplus_BC is now capable of working with both formats, the new SQLite (the ‘green’ DVD) as well as the preceding MS Access format (the ‘blue’ DVD). This is because both formats will co-exist for a test

period and to leave time to all users to switch to the new format.

As an ITU-R Sector Member, LS telcom takes part in working groups in Geneva and is in close contact with the ITU. LS telcom was one of the first to receive a sample of the new BR IFIC SQLite format.

ITU-R Recommendation P.1812-2

CHIRplus_BC can also already calculate according to the revised Recommendation P.1812-2. This is the most significant revision of this point-to-area propagation prediction method for terrestrial services in the VHF and UHF bands recommendation, as the geometric determination of knife-edge obstacles has changed from a “Deygout” type to a “Bullington” type, now reducing the representative knife-edges to one only. ←

CHIRplus_BC now supports All Existing Broadcast Systems

New broadcast systems have seen a lot of progress with regards to spectrum efficiency and robustness and in the future they will continue to be the technology of choice for point-to-multipoint unicast distribution. This is why two new broadcast systems were added to CHIRplus_BC. The release 5.8.0 of CHIRplus_BC also accommodates two Chinese systems, the national standard for digital TV, **DTMB** (multi-carrier variant) and the industry standard for multimedia distribution, **CMMB** (terrestrial component).

Looking at audio broadcast, ...

DAB, especially with the **DAB+** variant, which allows more programs in the multiplex due to

the more advanced AAC bit rate reduction, is becoming successful in many countries as a wideband audio system in Band III. It has been supported by CHIRplus_BC for many years.

With regards to narrowband technologies, nowhere in Europe or Asia has a decision been made about a narrowband follow-up system to the analogue FM in Band II. By the end of last year, though, the ITU published two recommendations on **DRM+** known in the documents as Digital System G (ITU-R BS.1114-7, ITU-R BS.1660-5). The first adaptations in CHIRplus_BC for planning DRM+ in band II were made several years ago.

Recently many more DRM+ features were added to the tool. You can now plan DRM+ networks even more comfortably with CHIRplus_BC, as it includes many additional parameters, such as the channel raster for DRM+, automatic determination of minimum

required field strength as well as default protection ratios for the different system variants, in both directions (versus FM and FM versus DRM+, besides the DRM+ versus DRM+, of course).

ISDB-T and **DVB-T2** interference and coverage calculations can already be carried out with CHIRplus_BC since its last major release in October 2011, including the **DVB-T2-Lite** profile.

Searching for an optimal channel?

For several years CHIRplus_BC has supported automatic delay optimisation. This task seems to be manageable manually at first sight, but can only be handled by computers, even if the calculation scenario involves a one-digit number of transmitters only. The implemented approach employs a method derived from “simulated annealing” which is a heuristic optimum search for large-dimensional prob-

lems. The method employs a random generator to determine the next configuration to be evaluated and has huge runtime advantages over a “brute force”.

Simulated annealing is now also available in CHIRplus_BC to assign channels for existing stations in an optimal way. The user can give restrictions for the channels, for both, the total scenario and at individual sites.

The **automated channel assignment** works with pairwise “C/I” result files, i.e. raster based, thus can work with sophisticated real-terrain propagation models for the field strength calculation. The field strength files and even the weight matrix, which is filled using network processor functionality, can be re-used for subsequent runs with different boundary conditions for the available channels. ←

LS telcom at the ABU Digital Broadcasting Symposium, March 2012

“Elements of Modern Frequency and Network Planning” was the title of the webinar that Markus Morgen, Head of Department for Broadcast Services at

LS telcom presented at the ABU Digital Broadcasting Forum in Kuala Lumpur, Malaysia, back in March.

It highlighted regulators’ and operators’ objectives when planning a network. Frank Wandres, Sales Director Asia/Pacific at LS telcom, spoke about Digital Radio in Europe.

LS telcom was also present with an exhibition stand at the event. The forum brought together world experts and representatives of the entire broadcasting industry from 6th – 9th March 2012. ←



Picture: Frank Wandres (at the very right) with the other speakers of the session

Antenna RF Measurements with a Miniature Helicopter

...continued from page 1.

What are the advantages of the miniature helicopter measurement service compared to other measurement methods?

KS: The advantages are numerous. Obviously the main advantage of our service over other methods is cost and safety. Depending on the country, a manned flight in an actual helicopter can cost anything between 7.000€ and 20.000€. Considering these costs our service is very good value for money.

Our miniature helicopter also has an extremely accurate flight path on all axes. It is equipped with an environmentally friendly, low noise electric motor. Compared to manned helicopters, the mini version is highly manoeuvrable and safe to fly in confined flying spaces. In addition, GSM main beam measurements cannot be car-

ried out by a conventional helicopter, as you have to measure very close to the antenna. The radiation aperture is also very close to the near horizon and the sites are normally established in populated areas.

Our mini helicopter can operate in the confined areas without undue risks, which enables us to offer a completely new dimension of service. Traditionally GSM measurements are made on ground level, but require several weeks to be done properly and are often less accurate as they include terrain and ground clutter effects. With our service the customer will receive its measurement results immediately.

As you mention GSM...which technologies can you measure apart from broadcast?

KS: We can measure any service operating in the VHF and UHF bands. We will be in a position to offer GSM, WCDMA and LTE technologies in a few months time.

What does your service include exactly? What are the deliverables?

KS: We prepare and calibrate the system with the sensor that is needed for the specific service or technology, program the flight route and carry out the measurements. The customer then receives a detailed report with all results, including the flight data analysis, horizontal and vertical measurement range as well as 3D visualisation of antenna pattern diagrams.

We will also provide high resolution



Picture: The miniature helicopter including the measurement solution

photos or videos of the actual antenna installation on request or any part of the infrastructure as pointed out by the customer in advance.

What about the price for your miniature helicopter measurement service?

KS: The costing of our services is determined by several primary factors. The number of frequencies and antennas that need to be measured, the technology that needs to be measured and, the location (logistics) of the sites to be measured. Obviously the measurement of a number of sites in the same area would have cost advantages. Should additional flights be required for a video or photo survey of the infrastructure this would also be costed into the price.

If I am interested in the service, what do I have to do?

KS: We need a lead-time of about two months. So from the moment you sign the contract we need on average about two months preparation before

we can carry out the measurements for you. In the meantime the customer has to obtain the local flying permission. The process differs from country to country.

Who do I have to contact for further information?

KS: Our subsidiary Colibrex GmbH sells the service. Colibrex is dedicated to the commercialisation of all our products around the unmanned airborne vehicle including platforms for a variety of applications. Colibrex was founded to exploit the numerous market opportunities that arise from the recent innovations in the area of flight control and embedded electronics of UAV in parallel to the important progress in data transmission and storage of measurement devices. You can send an email to Cédric Gonzalez, CEO of Colibrex, to CGonzalez@Colibrex.com. Alternatively, you can contact me directly on kschutte@lsofsa.co.za. ←



LS telcom delivers Transmitter Containers for World's largest radio network

MultiChoice contracted LS of South Africa Radio Communication Services (Pty) LTD for the integration and installation of broadcast transmitter containers for their radio network.

There is a planned rollout of a full Pan-African network, which will be the largest DVB-T2 network in the world offering a multichannel bouquet.

LS telcom engineers deliver turnkey installations of analogue and digital broadcast transmitters. This includes the pre-installation of FM and TV transmitters in converted shipping containers and the deployment of the pre-installed containers in several African countries. At the LS premises in Johannesburg the containers are converted to transmitter housings before the FM or TV transmitters and associated equipment are installed. Finally, also DVB-T2 systems are fully commissioned onsite by the LS telcom experts to facilitate deployment all over Africa. The system specifications ensure the production of a robust

product that can resist in a harsh environment including the extreme African climate as well as mains supply conditions which belong to the most challenging around the world. The transmitter containers have already been installed in a number of African countries in 2011.

LS of South Africa experts can install any type of equipment. For the GOtv network they installed terrestrial broadcast transmitters from Rohde & Schwarz, radio frequency technology from Spinner and DVB-T2 equipment technology provided by ENENSYS. This way MultiChoice will be able to take full advantage of all DVB-T2 features, including Multiple Physical Layer Pipes (M-PLP) and single frequency network (SFN) operation.

LS of South Africa has been installing

broadcast transmitters in Africa for FM or TV broadcast, analog/ digital for several years. The South African installation team does not only have thorough knowledge on technology and IT systems but also provides a wide range of experience in radio frequency installations from electrical installations and earthing to the management of the manufacturing and assembly process, including the selection of material adapted to the extreme African conditions.

The team currently produces one Tx-container per week for the deployment in Africa. The housing products it produces are not limited to applications in the broadcast industry and can be applied in other areas of telecommunications. ←



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Malaysia**

8th - 11th March 2013

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Las Vegas USA**

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Excellence in Software, Strategic Consulting & Training and Radio Engineering



We provide you with everything you need in broadcast. Our portfolio includes software, consulting, engineering and measurement services for the design, planning and optimisation of broadcast networks. Training on technologies, standards and regulations as well as transmission container commissioning complete our area of expertise. We even offer antenna measurements via a remote controlled miniature helicopter – an unprecedented service for cost-effective and accurate measurements. ←

DVB-T2 Planning on Three Continents

LS telcom's consulting and engineering department carried out DVB-T2 planning studies in several countries.

In **Indonesia** LS telcom planned a regional DVB-T2 network. The deliverables included the core as well as the TV and DVB-T modules of the software CHIRplus_BC, training for the software, mapping data and the computer-based broadcast radio design of the DVB-T2 network of one region in Indonesia. The network design included the coverage planning for one reception mode, the network analysis, such as self-interference, network gain and statistics for

covered areas.

The DVB-T2 planning for **Montenegro** was country-wide and based on the DVB-T network planning study carried out by LS telcom the year before. The previous DVB-T network design was reviewed and adapted to the requirements of the succeeding DVB-T2 system. The planning for this was also carried out for single frequency networks and provided results which are as spectrum efficient as for the previous DVB-T planning. The same number of frequencies covers the same area while the increased data capacity of

DVB-T2 allows showing more programmes or providing channels in high-definition (HD) quality instead of standard-definition (SD) quality.

The nationwide DVB-T2 planning for **Lesotho** comprised one multiplex and was carried out on behalf of Plisch Broadcast Asia Pacific. ←



SPOT ON

FM Relocation and Interference Analyses for Malaysian Company AMP

AMP, Airtime Management & Programming Radio Network Sdn Bhd*, a Malaysian Company, intends to relocate several transmitters in East Malaysia and asked LS telcom to carry out the necessary relocation and interference analyses for several FM broadcast frequencies. They used the broadcast planning software CHIRplus_BC to analyse and guarantee that the relocated frequencies do not cause more interference to the existing networks than the current sites.

* *Sendirian Berhad* = Malay equivalent to incorporated

Italian Regulatory Authority AGCOM acquires CHIRplus_BC from LS telcom

LS telcom has successfully implemented the broadcast planning software suite CHIRplus_BC at the Italian regulatory authority AGCOM. The authority acquired the software for the national digital television frequency planning.

The contract included the implementation of the software, the integration of cartographic data, the migration of all licence data from the old system as well as extensive user training. The software was adapted to the Italian licence conditions and technical requirements.

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