

NEWS

September 2012

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.

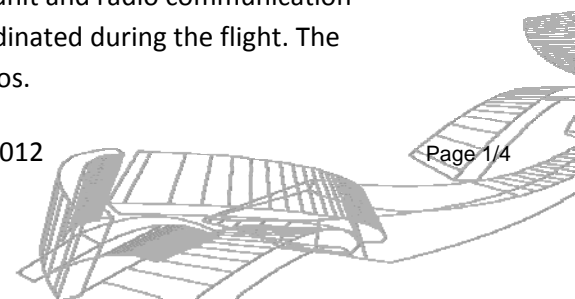
LS telcom uses a remote-controlled miniature helicopter fitted with an on board radio frequency spectrum analyser and calibrated receive system. The mini-helicopter's programmable flight path will be compiled to suit the requirements of the antenna to be measured and will include various vertical and 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 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.

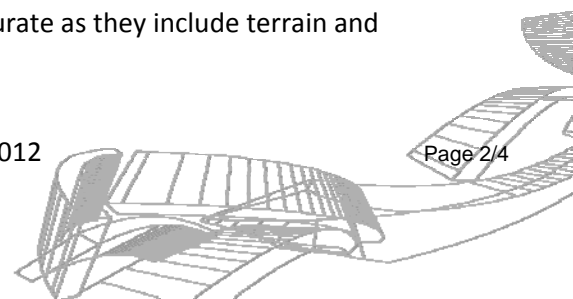
What are the advantages of the miniature helicopter measurement service compared to other measurement methods?

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's 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 carried 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 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?

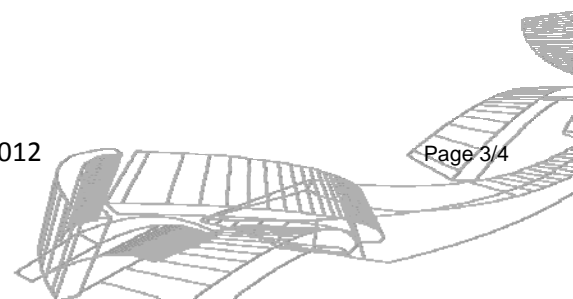
KS: The costing of our services is determined by several primary factors; the number of frequencies and antennas that needs to be measured, the technology that needs to be measured and, the location (logistics) of the sites to be measured. Obviously the measurement of a number of sites in the same area 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 Colibex, to CGonzalez@Colibrex.com. Alternatively, you can contact me directly on kschutte@lsofsa.co.za.





Picture 1 : Flightroute of the helicopter



Picture 2: Pre-programmed waypoints of the helicopter's flight route



Picture 3: The miniature helicopter including the measurement solution

