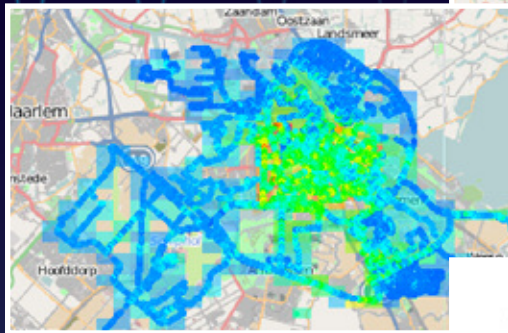
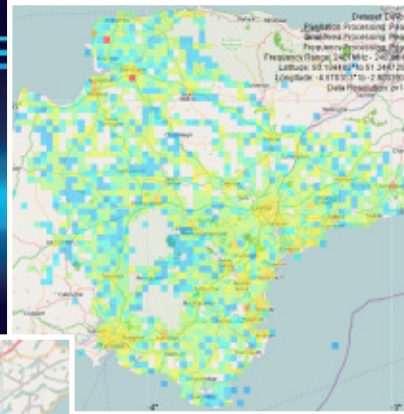




spectrum intelligence systems

RFeye Mobile



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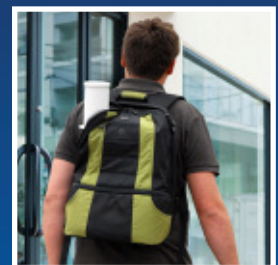
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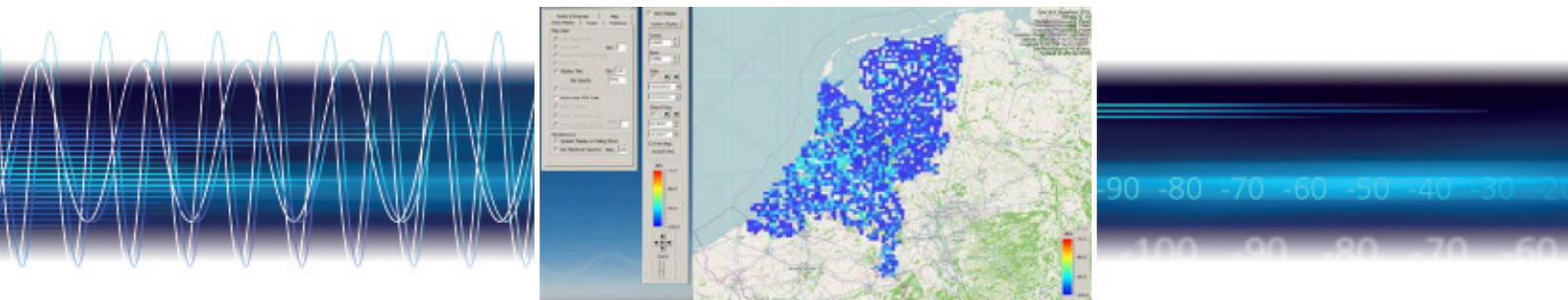
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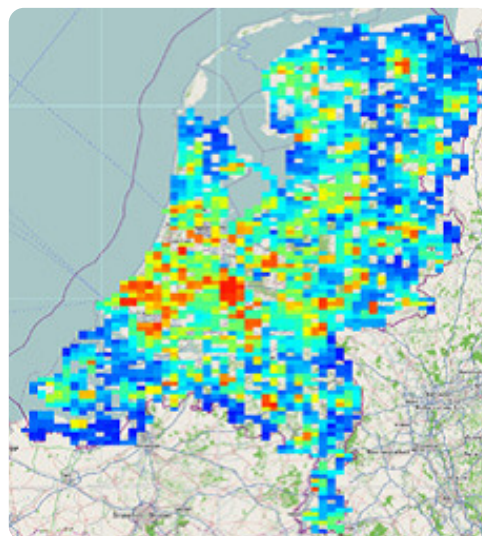


Powerful data collection and analysis system

We are pleased to introduce RFeye Mobile, a fully standalone and cost-effective spectrum monitoring solution for collection, management and analysis of very large spectrum data sets. RFeye Mobile comprises high performance mobile/portable RFeye receivers (available in various system configurations) and RFeye DAS (Data Analysis System), a powerful relational database software product that enables efficient visualisation and analysis of collected data and report generation.

RFeye Mobile has been developed specifically to meet the needs of spectrum regulatory agencies. It produces detailed maps of spectrum usage from national level down to individual street locations that enable regulators to understand and anticipate “pinch” points and vulnerabilities, monitor compliance, identify and monitor trends over the long term. It provides a unique view of spectrum usage that can greatly inform policy and improve regulatory planning and decision-making. In addition, it is a valuable tool for licence enforcement teams who can carry out background research on a given location prior to any site visit.

“*the biggest breakthrough in spectrum monitoring of the last decade*”

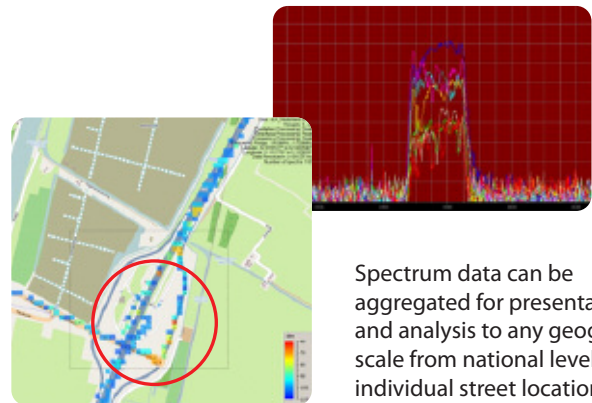


The **Radiocommunications Agency** of the Netherlands has successfully used RFeye Mobile since 2009 and has described it as the “biggest breakthrough in spectrum monitoring of the last decade.”

Why Mobile Monitoring?

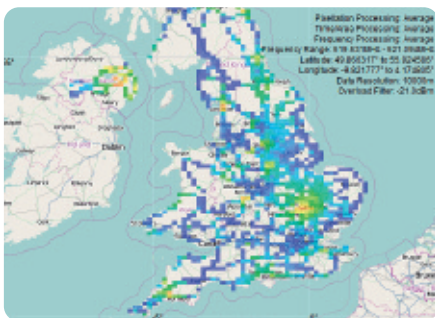
RFeye Mobile spectrum monitoring has two significant advantages over traditional fixed site monitoring systems. It enables gathering of data over a much wider frequency range. Where the range of a fixed monitoring station is useful for frequencies up to around 800 MHz, RFeye Mobile travelling the roads and railways will collect valuable additional data for all frequencies from 20 MHz up to 6 GHz. This provides coverage of important bands such as UMTS, GPS and DCS1800. In addition, many devices have a single physical layer that operates at higher frequencies over relatively short ranges, making their transmissions largely invisible to fixed monitoring. Mobile monitoring captures events that would otherwise be missed and gives a fuller indication of what is happening across the spectrum.

RFeye Mobile is therefore complementary to existing fixed site monitoring. It provides a unique breadth of coverage that can sit alongside the depth of coverage from fixed sites to provide spectrum planners and regulators with a much fuller picture of spectrum usage. The more mobile data that can be gathered, the more detailed the picture that emerges.



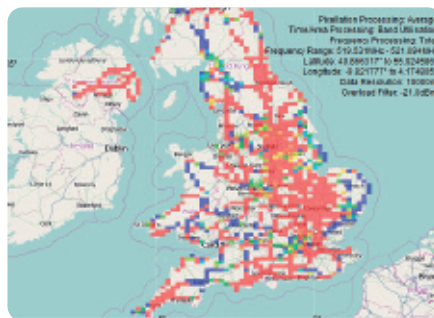
Spectrum data can be aggregated for presentation and analysis to any geographic scale from national level to individual street locations

POWERFUL MAPPING



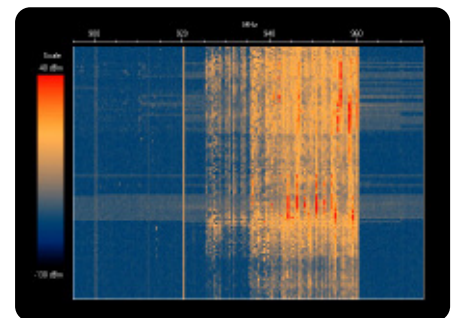
RFeye DAS features multiple, powerful data analysis and display options, such as Mean Signal screens displaying the average signal strength of all measurements taken in a given geographic area for a given frequency band.

INFORMING POLICY



Signal measurements can be analysed to present the percentage band utilisation for informing spectrum policy and planning.

TEMPORAL ANALYSIS



Spectrum use reporting and Spectrogram analysis screens in RFeye DAS provide additional temporal analysis for tracking events through time and to specific locations.

Various Configurations of Hardware

The RFeye receiver is a fully ruggedised (IP 67 rated) field-deployable unit designed to sweep the spectrum very fast and capture all of the data for live viewing or post-event analysis. It represents a breakthrough in value and brings a level of RF performance typical of high end spectrum analysers at an affordable price point. It has exceptionally low noise figure and an excellent spurious free dynamic range. It is light, low power and runs on multiple sources, including battery and 10-48 VDC.

The RFeye receiver can be deployed in various system configurations – StormCase, Backpack or RoofBox. In all cases, data can be logged to a local memory stick or hard disk or relayed remotely via Ethernet, UMTS modem, WiFi or Inmarsat satellite using Inmarsat data modem. The whole system is modular such that it is simple to grow the network by deploying further nodes in the field in any configuration or mixed configurations.



The **RFeye StormCase** is a highly versatile and complete man-portable system containing a ready-deployed and ruggedised RFeye receiver embedded in a sturdy Peli StormCase IM2400. The system is fully configured and ready to go “out of the box”.

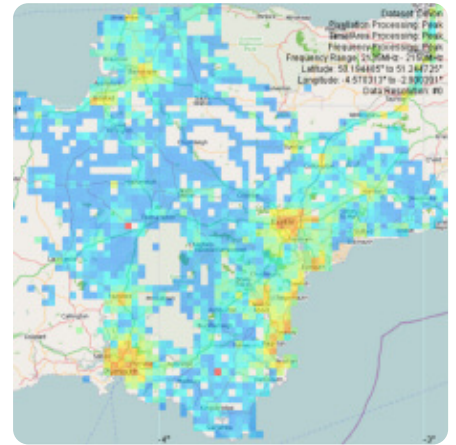
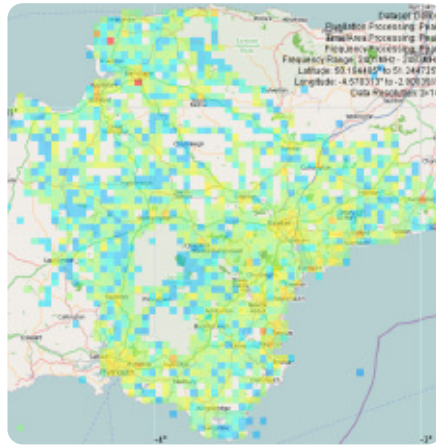
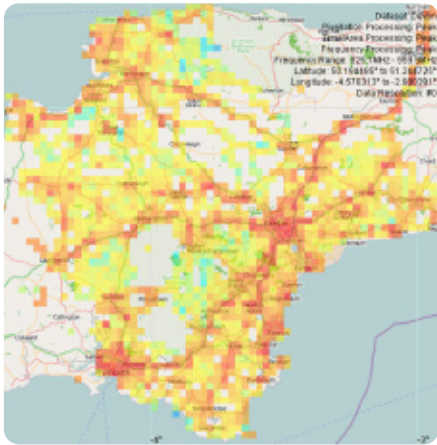
It can be simply put into the back of a vehicle, connected to suitable antenna and switched on to start logging. It can run from the internal battery or be connected to the 12V vehicle power supply.

The **RFeye Backpack** is a compact lightweight system for discreet spectrum surveys on foot in urban or security-critical environments. It has a rechargeable battery with approximately 6 hours of operation time.

We can tailor packages of RFeye Mobile hardware to suit the individual requirements of customers.

The **RFeye RoofBox** is a complete pre-integrated vehicle-mounted solution built into a standard commercial roofbox and includes the RFeye receiver, antennas, power controller and back-up battery.

It comes configured with a choice of internally mounted broadband omnidirectional antenna and/or DF antenna array for AOA direction finding.



Powerful Data Analyser

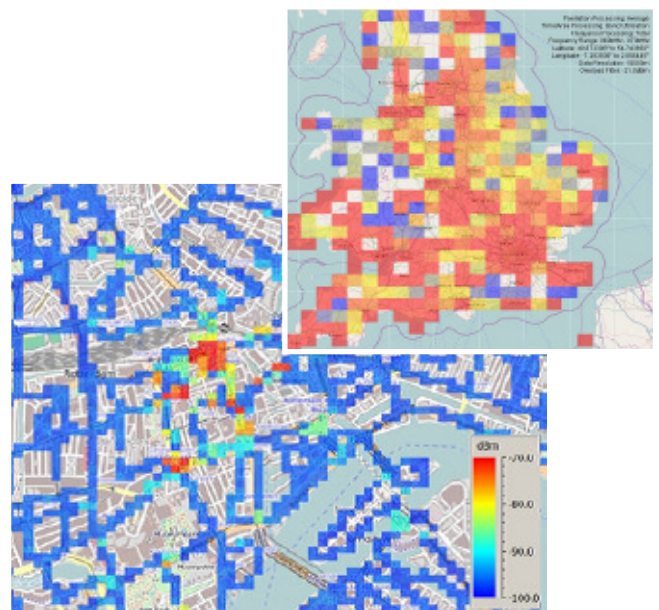
At the heart of RFeye Mobile is RFeye DAS. This is an enterprise level spectrum mapping and analysis database application for the management, analysis and visualisation of the very large data sets collected by modern spectrum monitoring organisations. Using a proprietary database architecture and data processing tools designed specifically for this purpose, RFeye DAS provides fast, fully interactive analysis and visualisation of spectrum usage from the data gathered by the RFeye nodes.

RFeye DAS is able to display and analyse spectral data in a number of different ways, including synchronised map-based displays, spectrum plots and spectrograms, occupancy plots, and time evolutions. Data can be selected by any combination of RFeye node/network, location, time window or frequency range, and resolution can be displayed from national level to individual street location. Many different reports can be produced and tailored to specific requirements.

RFeye DAS is operated from a standalone PC or as a client-server. An optional web-interface enables remote users to access the data analyser.

Direction Finding Capability

The RFeye receiver is capable of simultaneous monitoring and DF geo-location using the multiple RF inputs on the unit. By connecting the receiver to a directional antenna array, it will gather AOA vectors that can be subsequently analysed and mapped in the RFeye DAS application (or viewed in real time with RFeye Live software). In addition, groups of receivers can be synchronised to a GPS reference clock allowing synchronous spectrum sweeps. TDOA calculations can then be performed in RFeye DAS using logged data for post-event geo-location of transmitters.





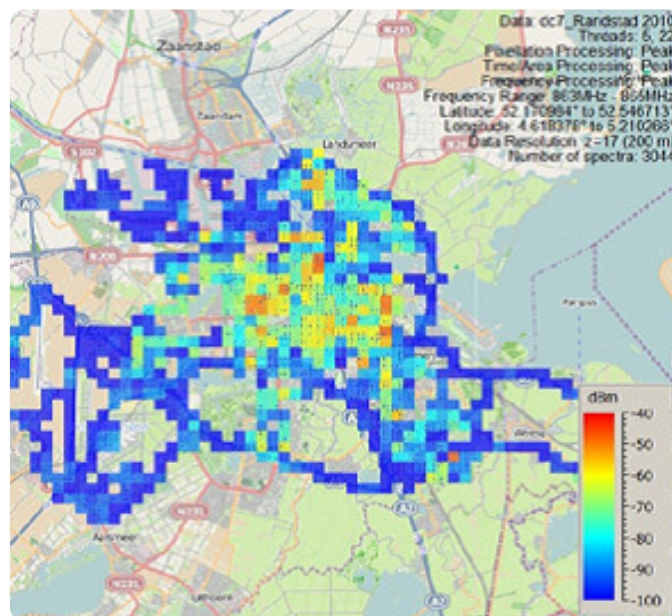
Radiocommunications Agency
Ministry of Economic Affairs, Agriculture and
Innovation

RFeye Mobile has changed the way that the Radiocommunications Agency of the Netherlands collects and analyses data, monitors developments, identifies trends and reports its findings. It allows them to manage terabyte quantities of data from multiple RFeye receivers, visualise and analyse these data in a way that is easily accessible and useful to all parts of the organisation – to spectrum managers, planners, monitoring staff and enforcement officers.

In their 2010 “State of the frequency spectrum” report, the Agency describes how they operated 10 mobile RFeye receivers, travelling 17,000 km, recording 450 hours of data with 1.6 million individual data points. The Agency effectively incurs no additional costs of operating RFeye Mobile – the receivers are packaged in sturdy cases and are simply switched on to log data whenever their officers are travelling in their ordinary course of business.

The Agency intends to increase their RFeye Mobile coverage of the Netherlands year on year with the ultimate goal of operating up to 50 RFeye receivers. They envisage units being placed with road hauliers or on railways to allow for much more intensive data gathering.

The data logged by the receivers are processed, projected onto geographic maps and analysed all using RFeye DAS. The Agency makes the information from DAS widely available across the organisation. For example, prior to a location visit,



enforcement officers are able to consult the database to gather background information about spectrum usage in the locality. This often makes enforcement visits more efficient and productive.

RFeye Mobile is an essential platform in the Agency’s vision of a fully integrated next generation spectrum monitoring and management system. It creates a much more detailed picture of spectrum usage than previously available, enables long-term observations and comparisons of data over time, sharing of information in an accessible form at all levels of the organisation and greatly facilitates reporting.

The **Radiocommunications Agency** (www.agentschaptelecom.nl) is a specialised agency of the Ministry of Economic Affairs, Agriculture and Innovation of the Netherlands. Its three main tasks are to obtain, allocate and protect frequency space.

The Radiocommunications Agency covers the entire field of wireless and wired communication. Wireless and wired applications are so interwoven that a problem in a wired network can have major consequences for wireless communication. The Agency acts as the watchdog, implementer and expert across the entire domain of electronic communication.