SpectrumMap - Cloud Based Solution to Visualize Spectrum Usage
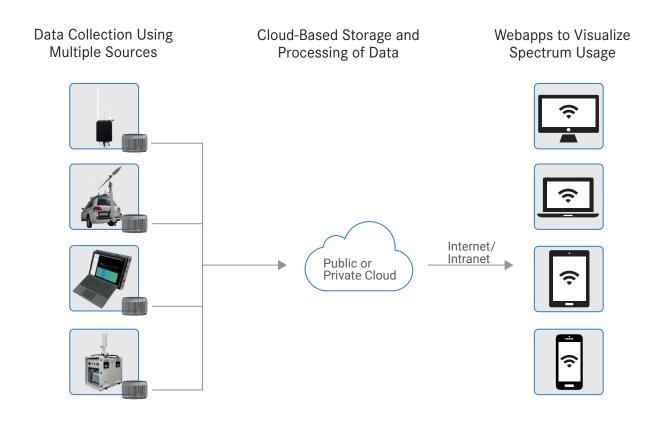
Spectrum monitoring has been evolving ever since the first government monitoring stations in the 1910's. The evolution has been progressing slowly until the last few years when the advent of higher power computing and lower cost storage and higher performance receivers at reasonable cost has brought the ability to deliver wide area monitoring networks to many organizations. More recently the advent of small scale sensors that can monitor large swathes of radio spectrum coupled with processing allowing the real time storage of that data has emerged. The LS OBSERVER system is an approach that leads this design; small nodes that capture vast amounts of spectrum data, store it and allow review at a later date. This is essential for organizations wanting to unravel the complexity of dense spectrum usage in a world of ever greater wireless use, and with it ever greater economic reliance upon the spectrum being available, utilized fully and fairly.

The challenge now facing organizations is how to understand all this spectrum data, how to make the best use of their investment in spectrum monitoring networks, and how to deliver that data to a variety of users, even delivering selected parts of that data to third parties. The vast amount of data can be overwhelming and the value of that data misunderstood to a lot of users within the spectrum organizations.

To solve these problems LS telcom has developed SpectrumMap; a big data analytical tool for spectrum monitoring and policy making.

SpectrumMap is the link between all the data that an organization collects from spectrum monitoring and delivers it as a range of web apps for user analysis and display. Making use of a powerful cloud based server power, designed for multi core processing and rendering of spectrum monitoring as a range of geo-based tools to deliver fast responsive solutions.

Data Collection Using Multiple Sources

Cloud-Based Storage and Processing of Data

Webapps to Visualize Spectrum Usage

Public or Private Cloud

Internet/ Intranet

SpectrumMap stores data from a variety of spectrum monitoring nodes; fixed, mobile, transportable, and portable. All data is stored in the core and is utilized when a user requires analysis. The user is not concerned with knowing the individual monitoring station or complex node names and locations. The user selects the geographic area, the date/time and band/frequency. This natural approach to mining data is more intuitive for the large data sets encountered and allows for much more simple access to the large underlying data.

The key applications are available as web apps meaning no need for powerful client computers. The apps can run with a browser on any operating system type of client machine be it desktop, laptop, tablet or mobile phone.

Applications include:

- Field strength of single frequencies to bands, all user selectable
- Coverage analysis of user selectable bands
- Band occupancy
- Spectrum utilization
- Electromagnetic radiation hazard analysis
- Dynamic band analysis where the display steps through user
- Selectable frequency steps been a start and stop limit.

These applications support analysis of the monitored radio spectrum allowing for clear evidence based decision making of spectrum use, coverage, density and potential interferers. No longer relying upon individual monitoring sites and com-

plex data retrieval methods. SpectrumMap allows for scenario analysis and natural evaluation of the radio spectrum that has been monitored from a network of differing devices and locations.

SpectrumMap is the ideal tool for use in many regulatory and commercial organizations that rely upon publically accountable decision making and enforcement:

- Spectrum policy making: Identifying the real use of bands, their temporal distribution and use of existing licensees. Additionally, the impact of policy decision can be observed such as commitments for band utilization by reviewing occupancy and coverage.
- Spectrum licensing: Assuring spectrum is free to allocate in congested areas; seeing what additional spectrum could be liberalized on a temporal basis; reviewing the evidence based opportunities for dynamic spectrum allocation within bands.
- Spectrum enforcement: Identifying the distribution of spectrum and identification of illegal use, interferers, and compliance to licenzing restrictions.
- Public data: The monitored data can be made available (in whole or part) to the public dependent upon national priorities and commitments to open data.
- Commercial operators: The ability to review the real world of coverage and utilization from a monitoring network.

SpectrumMap - Real world data analysis from spectrum monitoring networks for use throughout your organization.