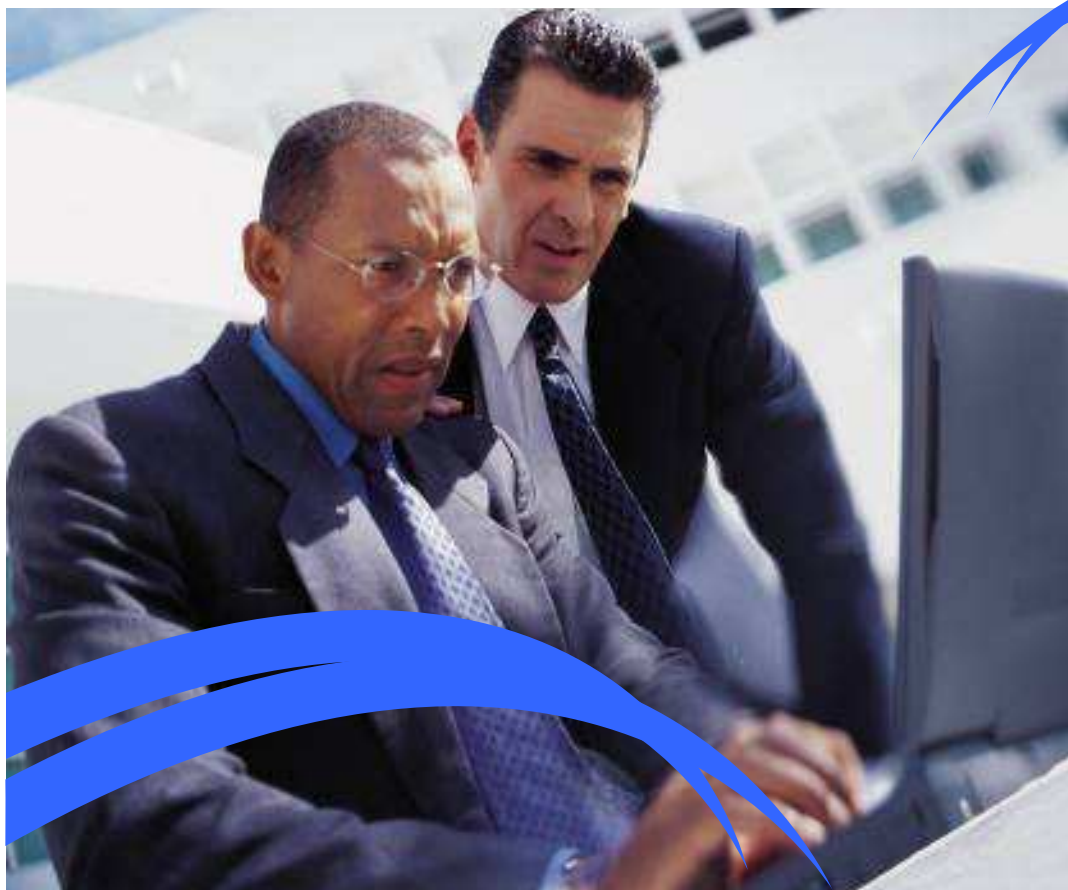# Administration of a National Spectrum Plan

Management Report: *How Innovative Software Supports a Regional Harmonization Strategy.*

CUSTOM SOLUTIONS

The complexity and the finite spectrum resource available in the Information and Communications Technology (ICT) sector is driving the adoption of new technologies at a faster pace than ever before. Moreover, spectrum management is subject to quickly evolving policies and regulations. This requires innovative software that can accommodate these changing technologies and keep pace with the evolving demands in ICT. The platform must be open and flexible, designed for ongoing variation as well as capable of across-the-board management of key components in ICT. This requires a unique and custom solution capable of adapting to the challenges and operational realities in spectrum management.

OPEN SOURCE TECHNOLOGY

The technology platform selected is completely "**open source**". Easily standardized and available, the platform facilitates additional local software capacity building. For example, the current emphasis on promoting *"Women in ICT"* region wide is focused on creating development opportunities. An affordable open source platform is crucial in fostering **local software development,** local empowerment and local ICT expertise. The result of this standardized platform, region wide, is a practical and available infrastructure which can now be affordably extended using local ICT capacity.

A History of Local Software Innovation for ICT

In November of 2011 PW Consulting (PWC) was contacted by ECTEL member states to create a "holistic" software system. The system would support the administration of National Spectrum Plans at the ECTEL/NTRC level. In each ECTEL member state the NTRC provides national spectrum administration. PWC subsequently developed the software over the next 18 months. The system facilitates the transition away from a paper and spreadsheet based approach, for nations Information and Communications Technology (ICT) sector, to a custom system. This comprehensive enterprise wide information management system is the integrated Telecommunications Management System (iTMS).

This action was taken in order to resolve a myriad of internal management issues that were driven by a lack of a proper enterprise wide management system. In effect, the complexity of the ICT sector along with the various tasks associated with managing spectrum resources required a level of technology that was unavailable prior to the *iTMS*. Enterprise management functions and importantly enterprise reporting had become increasingly unmanageable using standalone files and a variety of disparate information systems.

The local and regional authorities had long since considered that a holistic administrative system would provide organization wide visibility. It would also support the overall goal of harmonization region wide. This visibility and administrative power is now available with the advent of the innovative *iTMS* software.

A Holistic System to Support Harmonization

Harmonization requires a consistent and comprehensive management strategy that can be easily and quickly adopted.

Consistent Command and Control

The iTMS software is designed to streamline the management of the ICT sector at the local level. The "National Spectrum Plan" provided to a nation by a regulatory authority ITU/ECTEL requires a comprehensive approach to management of the finite spectrum resources available. Consequently, the adoption of regulations and the compliance of these regulations is a fundamental responsibility of any local governmental administration. The iTMS manages all of these various administrative duties required for a successful national spectrum plan implementation. This includes daily operational execution and ongoing compliance enforcement. Furthermore, the iTMS maintains current and accurate detail on operational practices as well as tracking and verification of revenues associated with frequency authorization, licensing and hardware type approval. Since all data is resident within the database comprehensive reporting is also available for analysis and improved business intelligence.

Comprehensive Management Practice

Customers and Applications Management:

This is the entry point for system after user log on. All customer detail is stored here. This includes multiple business names, business contact numbers, call signs and identification numbers as well as business detail, limited demographics, and history. The system uses information derived from the Application process to establish customer detail. Customers can apply for multiple licenses and each application is maintained in the database. Application Types utilized by any local or regional authority follow prescribed pathways for approval and the granting of a license. Following this pathway each application's status is maintained with each receiving a system generated application ID number. Details on fee compliance, supporting documentation, business viability and full application history are also maintained. The system captures and stores all "Applications" from the existing list of Application Types used (Individual, Class, etc.). Completed Application documents will be first scanned then stored in iTMS for reference, retrieval and export. Furthermore, additional related support documents required for each application can be scanned, linked, stored and then exported from the system. This functionality facilitates application approvals. Transmission of both completed applications and their supporting documents is available with just a keystroke.

Licenses & Services Module:

The system captures all the required information on service characteristics, service codes, service descriptions, license detail and fees. This includes all license types as well as amateur radio, mobile numbers and mobile short codes. The iTMS system will store all

License detail. For each type of "service" that is permitted to operate there is a corresponding License and the License Service Code. Current License status facilitates the review of all Licenses issued as well as those Licenses that have expired or become non-operational etc. There are a variety of major license classifications available with the system (including sub-classes) for example:

- Individual License
- Class License (Multiple Types)
- Special License
- Frequency Authorizations

Financial information on each License type and the associated revenue streams are available in this section. Revenue by period can be verified and all revenues can be tracked monthly along with details on each revenue stream. This allows the system to generate annually adjusted revenue detail by customer and by service, as desired.

Spectrum Management Module:

Spectrum assignment and history is captured along with all assignment information for uplink/downlink frequency. The transmission site, Latitude & Longitude coordinates, and various frequency related "ANNEX" details such as transmitter model number, transmission power, band width, station type, antenna gain, maximum effective isotropically radiated power (ERIP) are stored and displayed here. Management of the radio spectrum requires a combination of administrative, regulatory and technical procedures necessary to ensure the efficient operation of radio communication equipment and services. Simply stated, spectrum management is the overall process of regulating and administering, access to and use of, the radio frequency spectrum. These spectrum management activities embrace four main areas:

- Deciding at a strategic level, in consultation with interested parties, how the spectrum should be used
- Developing and implementing the regulatory framework for such use
- Making the relevant frequencies available through competitions, authorization, etc.
- Maintaining an interference-free environment.

Type Approvals Module:

A type approval (TA) certificate is generated along with all certificate detail and certificate financials. This information also includes product and equipment type, serial numbers, model, date and support documents. For all hardware that is transmitting a signal there is a corresponding TA certificate issued locally. Hardware imports must be Type Approved to comply with the local, regional and international standards for frequency spectrum utilization.

Reference: iTMS User Guide 1.5

Regulatory Optimization and Standardization

Regulations and Spectrum:

As mentioned above the iTMS was designed to manage the administration of a National Spectrum Plan. This includes the management of all service providers using spectrum. Service providers range in size and complexity within any given nation or ECTEL member state. The customer/provider base can range from many smaller Amateur Radio users of spectrum to the larger providers of cellular telephone, fixed line telephones and cable TV services. There is also an assortment of other types of customers such as AM/FM radio broadcasters, aeronautical and ship to shore telecommunications providers as outlined in various regulations (ECTEL). The iTMS is capable of storing and managing all information on each customer/provider type as well as tracking all anniversary dates related to each license granted. This capability along with reporting and revenue tracking insures that all providers are held accountable for spectrum resources used and that there is also an equitable utilization of the scarce frequency resource.

Revenue Accuracy:

Revenue associated with these services plus fee compliance is collected in an accurate and timely fashion. The financial data integrity on all customer/providers is improved allowing the authority to deliver an appropriate administrative pricing model. The impact of this type of current and accurate information readily available supports an **optimized national regulatory organization** which reflects both cost and revenue.

License Management:

Current licensing regulations span a wide assortment of licensees. The management of these licenses is difficult without a system that can track and verify appropriate license volume, types, and status and fee structures. The number of licensees is anticipated to grow quickly with the adoption on newer and technologies further complicating ICT management. The iTMS offers accurate and consistent license tracking capability. All application types, status, frequency and fee structure associated, with each "License Type" is easily managed in iTMS. This enables local and regional authorities to view all providers and **optimize license management** using a "big picture" capability. Conversely, they can "drill down" on a single provider or a single service and

evaluate with precision. For example all **revenue streams** within any given service can be examined. This granular detail by service supports regulatory review and can be reflected in financial metrics such as gross revenue or adjusted gross revenues for each customer and for each service provided. Annual reports and future estimates can be formulated using accurate and precise data. Customer/provider service performance can then be reviewed and aligned with revenue or other regulatory metrics.

Frequency Authorization:

Management of the finite spectrum resource can be effectively enhanced when all frequencies available for each service is readily presented. The status of each frequency authorization is also available. This information supports the assessment of each frequency in use; frequencies allocated but not utilized as well as inactive frequency available from previously licensed providers. Occupancy rates are easily scrutinized. In addition clarity on available spectrum resources can support optimal growth in the ICT sector along with **optimized frequency allocation.**

LOCAL EMPOWERMENT

Amateur Radio – The most recent regulations released by ECTEL (SRO 39), for Amateur Radio, has multiple categories; Novice, General and Advanced. It is anticipated that **additional fees** may be applied for escalating levels of spectrum resources utilized. The iTMS has incorporated these changes. It is a compliant and flexible system that can easily accommodate new fee structures at the local level.

Type Approvals – The processing of Type Approvals (TA) for all frequency emitting hardware used nation wide is a significant challenge. Authorities must ensure that harmful frequency emissions are eliminated and that consumers are protected. All devices utilizing spectrum must be certified and comply with published standards. Automation of this TA processing significantly decreases time and effort required for completing a Type Approval. The iTMS Type Approval module allows for TA processing directly by the national authority or through any third party type approval company. The system maintains a complete inventory of TA, assesses **multiple fees** for processing, and issues certificates. Additionally the Document Management functionality supports the uploading and access to cogent source documentation for any given TA. In effect rapid Type Approval processing and revenue collection is achieved using iTMS.

OPTIMIZE BUSINESS PRACTICES

Knowledge is Power: Business Intelligence and Local Capacity Building

The long term benefits of the iTMS are primarily a function of creating a **permanent repository** of information on all aspects of spectrum use across the nation or the region. Data integrity is supported by adopting consistent naming and numbering conventions in data capture. Furthermore, eliminating multiple formats (Word, Excel, and Hardcopy etc.) and standardizing approaches to licensing, frequency authorizations and revenue collection result in accurate and reliable data. This fosters comparative analysis. The spectrum authority will have a knowledge database that will offer improved access to "Business Intelligence" (BI) and support future **data driven decisions**. The result is optimized strategies and best practice policies.

Open source technologies promote **investment in people** at the local level. These platforms are powerful, proven and affordable. They foster capacity building and can serve as the foundation for local growth in ICT knowledge and expertise. The iTMS is purpose built for a developing country ICT requirement, it is fully supported and maintained and it can act as a platform to launch local expertise and local software development.

Transmitter Map for GENERIC TELECOM PROVIDER

What Administrative Power can do for Frequency Utilization?

Spectrum Harmonization

A harmonized information and communications technology (ICT) policy consistent with the Telecommunications Act and regional implementation models can have a profound impact on other industries within a country. For example **tourism** can be severely and negatively impacted if the local rates for telecommunication services are significantly greater than regional rates. Moreover, the **digital divide** has been identified as slowing overall economic development in a nation state. Consequently, the management of a harmonized policy for the ICT sector can support development opportunities. **Education** and local capacity building in ICT is also driven by consistent and harmonized policies and rates. Furthermore, harmonization can create a level playing field to attract local **investment** and infrastructure growth especially when paired with other pro development policies and programs. Finally, significantly lower rates obviously results in decreased national revenues and this revenue deficit can also be identified and managed effectively with a holistic system; iTMS.
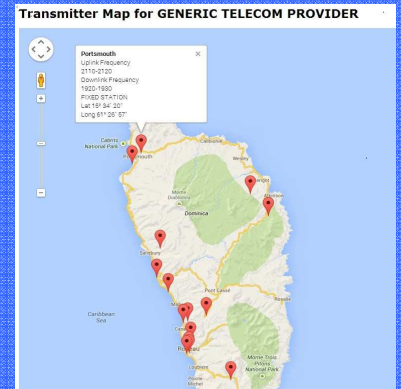
Spectrum Enforcement

Monitoring the use of the frequency spectrum across any nations geography can be effectively delivered by simply using a portable device such as a laptop, tablet or smart phone in combination with a hand held frequency analyzer. By comparing field reading with documented Frequency Authorization detail, stored in the iTMS database, field spectrum enforcement becomes **efficient and effective**. Enforcement may result in additional revenue streams from **frequency infractions** and also improve the overall management of spectrum through improved frequency assignments across any given geography. In addition the iTMS geo-mapping functionality will direct field enforcement to all transmitter sites and provide immediate detail on approved frequency use for compliance and detection activities.

Please contact us for an obligation free demonstration or for an initial consultation with our software experts.

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