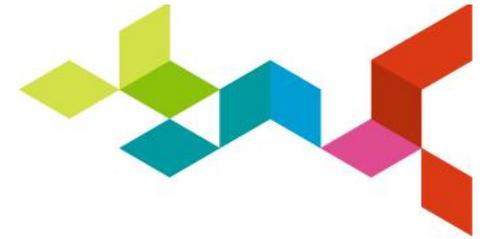


Spectrum Management

Digicel Fiji Limited

Digicel

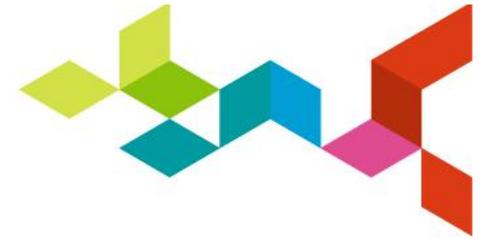


Introduction

- Name: Kalpesh Parmar
- Organization: Digicel Fiji Limited
- Position: Radio Frequency (RF) Manager
- Short Bio:

I am a Radio Frequency (RF) Manager at Digicel Fiji Limited and have been in the Telecommunications industry since 2006, starting off as a fresh graduate with Digicel from the University of the South Pacific. In my tenure with Digicel, I have worked and rolled out mobile networks, not only in Fiji but across the South Pacific, in countries like Western Samoa, Papua New Guinea, Tonga, Vanuatu and Nauru for Digicel's sister companies, with ground works extending to countries like East Timor and the Solomon Islands for preparation towards mobile license bidding. In 2014, I worked in the capacity of a Project Manager to rollout Digicel Fiji's nationwide 3G+ network and launch 4G LTE services to five (5) major towns in the country.

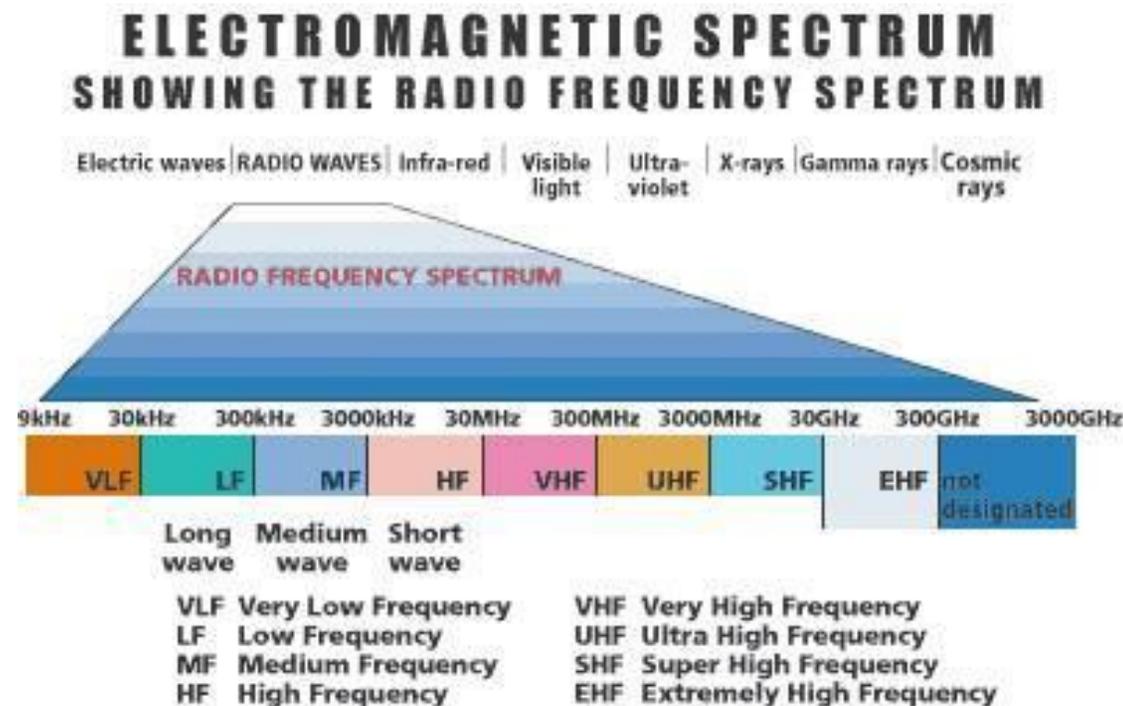
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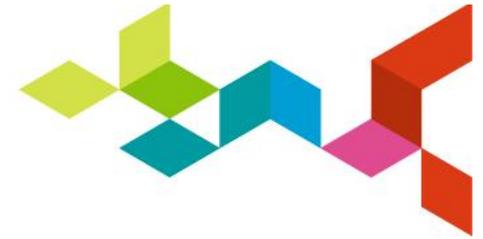


Spectrum

1. What is Spectrum?

- Radio Frequencies – 10kHz to 3000GHz.
- Scarce resource.
- Finite and increasingly precious resource which needs to be managed effectively.





Spectrum Management

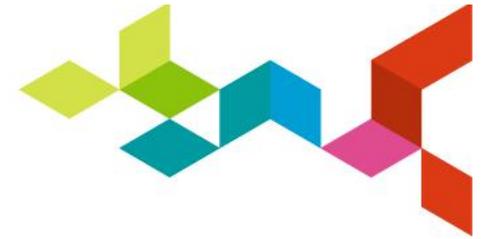
1. What is Spectrum Management?

- Process of regulating the efficient use of radio frequencies to meet customer demands across an increasing range of technologies.

2. Why Spectrum Management?

- Rationalize and optimize the use of radio spectrum.
- Avoid and solve interference.
- Design short and long range frequency allocations.
- Enable and facilitate the introduction of new wireless technologies.
- Coordinate wireless communications with other licensed & unlicensed operators as well as neighbors and other administrations.

Spectrum Management Practices as an Operator

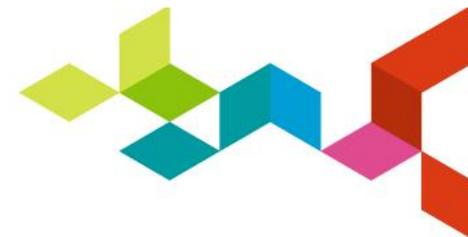


1. Re-farming of Allocated Spectrum

- As spectrum resources are scarce, we need to continuously review which spectrum can be re-used or re-farmed. For example with more smartphone penetration, Digicel realized the possibility and opportunity to reduce capacity of its 2G sites running on 900MHz and allocate the freed spectrum to its growing 3G services running on the same band.

2. Upgrading of Equipment Hardware for Maximum Use

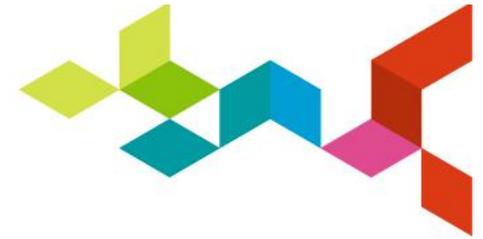
- On the Transmission/Backhaul side, Digicel decommissioned old equipment which were spectrum inefficient and deployed Cross-Polarization Interference Cancellation (XPIC) and Multiple-Input Multiple-Output (MIMO) supported Microwave Transmission links to get more capacity using the same spectrum resources.



Experiences

1. Past Experience

- No proper National Table of Frequency Allocation (NTFA)
 - No oversight or records of frequencies in use.
 - Brings about interference among operators.
 - Degradation of services.
- Spectrum Allocation on wish/greed
 - Inefficient use and wastage of spectrum.
 - Restricted competition and technology advancement due to insufficient available spectrum.
- No open forum/dialogue
 - Not everyone's views/ideas are heard of.
 - Decisions more authoritative.

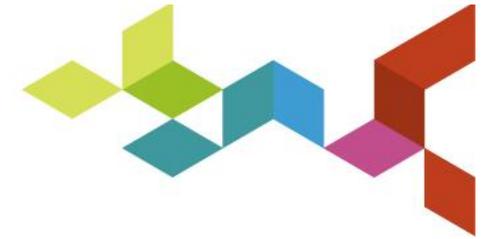


Experiences – Cont'd

2. Current Experience

- The Telecommunication Industry in Fiji has come a long way, especially in the last 5 – 6 years, in bringing standardization and globalization in its structure and all credit goes to the DoC and Shivnesh's team in making this possible.
- There is better spectrum management following global/ITU standards which works to bring harmonization.
- There is a work-in progress NTFA and a better updated Master International Frequency Register (MIFR) to ITU.
- There is fairer process of allocation of spectrum among operators through bids to ensure imminent introduction of new technologies, better competition and end-user services.
- Decisions on National Spectrum Planning are made through open discussions among concerned stakeholders to ensure everybody's interests and views are heard.

Challenges

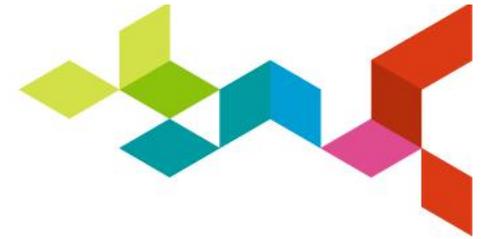


1. Choice of Spectrum

- Fiji, like many other Pacific nations, is made up of a number of scattered islands with rigid terrain, dense vegetation and rural communities so the choice of spectrum in delivering adequate service becomes vital.
- For Example, Digicel runs its 3G+ services on two bands, 900MHz and 2100MHz with the latter preferentially used in dense populated areas where population is densely packed with high capacity demands since adequate bandwidth is available on this higher band. As for the former, this is used more in sub-urban to rural areas to get more coverage spread with minimal capital investment as there is better propagation on lower bands. These lower frequency bands have limited bandwidth as this is already a re-farmed band that was previously used for GSM (2G) services.



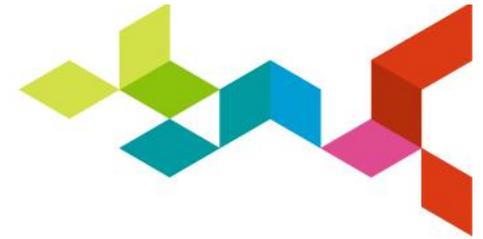
Digicel



Challenges – Cont'd

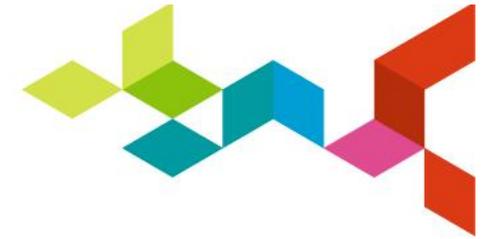
2. Illegal users of Licensed Spectrum

- Spectrum Management to minimize interference is one thing but then there is interference generated from unwanted/illegal users of the licensed spectrum using untested equipment that is not assigned to them by the relevant governing authorities.
- This affects stakeholders that have actually invested in this spectrum through license fees and the services that they provide.
- Identifying interfering sources is a cumbersome task and by the time it is actually suspected, many of the end users of the service have already been affected and so too the revenue generated from them.
- There needs to be stricter regulations/fines to minimize such acts and a testing methodology for all radio transmitting devices that are brought into the country to ensure they meet the National regulatory guidelines and would not interfere with any existing services.



Challenges – Cont'd

- An example of this instance affecting Digicel and the service it provides on its 900MHz 3G+ services is the use of imported cordless phones and P2P links that also operate on 900MHz.
- Another issue is the legacy position of 850MHz systems, such as CDMA850 interfering with 900MHz band systems without any mandatory co-location filtering being used.



Recommendations

- To ensure interference free access to radio spectrum for as many users and as many uses as is possible, spectrum management is very essential.
- Spectrum management is a growing problem due to the growing number of spectrum uses and as a stakeholder in the Telecommunication industry, we must ensure that we work hand-in-hand with the local Telecommunication Authorities/Department of Communication to bring about effective change.
- We must aid the relevant authorities in maintaining the NTFA, make use of awarded licensed spectrum efficiently and report any interference identified to catch culprits affecting this harmonization.
- Be involved in National Spectrum planning and issues as much as possible within your limits to reach a more unified solution and to have your voice heard.