Roger Hislop
Spectrum Sensing in the developing world
Quick facts about Interet Solutions

- Largest provider of alternate last mile services in South Africa
- Majority of SA’s Blue Chip companies are clients (including all major banks, retailers)
- One of the largest MPLS networks in Africa
- Global MPLS via multiple international NNIs
- 16 000m² of Data Centre facilities

International PoPs: New York, London, Germany, Hong Kong, Singapore
IRUs on key undersea cable systems:
- West Coast: SAT 3, MAIN ONE & WACS
- East Coast: SEACOM, EASSy, TEAMS & SAFE
What the world looks like
What the world really looks like
AFRICA IS NOT A COUNTRY
A new way to monitor, manage and optimize spectrum use:

A swarm of low-cost, networked, autonomous Spectrum Sensing Devices

A distributed, open and intelligent Cloud-based White Space Management System
What Have We Built?

Prototype BOM: $160
Olimex A20 Linux board
Custom motherboard
Telit GPS/GPRS
Rtl SDR (TV tuner dongle)
Monopole antenna
Enclosure (weatherproof)

Volume production BOM:
Less than $70
Monitor, manage, automate

Manage

Visualise

Automate
What does it tell you?
### Wideband and detail scan of 2G and 3G cellular by Cell C at 925-960MHz confirmed against National Radio Frequency Plan

**What does it tell you?**

<table>
<thead>
<tr>
<th>Signal detected (wideband sweep)</th>
<th>Signal detected (narrowband sweep)</th>
<th>Assignment</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>925-960MHz</td>
<td>214.2-215.6</td>
<td>Analogue TV (SABC2)</td>
<td>Legacy VHF Ch9 (215.25 V, 221.25 A)</td>
</tr>
<tr>
<td>925-960MHz</td>
<td>237.2-217.8</td>
<td>T-DAB in 214-230</td>
<td>T-DAB in 214-230</td>
</tr>
<tr>
<td>925-960MHz</td>
<td>223.6-225</td>
<td>T-DAB in 214-230</td>
<td>T-DAB in 214-230</td>
</tr>
<tr>
<td>925-960MHz</td>
<td>580-590</td>
<td>DTT characteristic – Klerksdorp mx NW47</td>
<td>Ch65: SABC3, Menlo Park?</td>
</tr>
<tr>
<td>925-960MHz</td>
<td>824.8</td>
<td>827.7 – 832.7 FDD</td>
<td>Nothing detected</td>
</tr>
<tr>
<td>925-960MHz</td>
<td>872.8 – 877.7</td>
<td>868-870 gen SDR</td>
<td>Sort distance radio, alarm systems links</td>
</tr>
<tr>
<td>925-960MHz</td>
<td>867.6-877.6, 878.2</td>
<td>877-880 GSM (pair w 920)</td>
<td>GSM-R run by Transnet Low levels detected in paired link</td>
</tr>
<tr>
<td>925-960MHz</td>
<td>925-935</td>
<td>925-935 MTN uplink</td>
<td>Low levels in uplink band Low levels in uplink band Close to zero level detect Guard band for IMT FDD Strong 3G signal (Cell C refarmed band) Anomalous strong signal detected Strong signal of P-GSM and 3G (MTN part-refarmed band)</td>
</tr>
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<td>925-960MHz</td>
<td>935-945</td>
<td>935-945 Voda uplink</td>
<td>Low levels in uplink band Low levels in uplink band Close to zero level detect Guard band for IMT FDD Strong 3G signal (Cell C refarmed band) Anomalous strong signal detected Strong signal of P-GSM and 3G (MTN part-refarmed band)</td>
</tr>
</tbody>
</table>
So much unused spectrum
The future is SCOS-as-a-Platform: IEEE802.22.3

Interfaces - Detecting

Interfaces - Sensing

Interfaces - Packaging

Interfaces - Transmission

Interfaces - Management

API from other systems (IP link)
A future where only one thing is certain: wireless everything

The history of radio regulation is that of a few establishment players with clear lines between them, and a few, unchanging technologies.

The future is a profusion of wireless devices that make people’s lives better.

And devices that enable criminality and lots of stupidity.
Actually, two things are certain: