Herman Schepers, Founder and Director, Policy Impact Partners

Herman is a global public policy and government affairs leader who has been at the forefront of technology policy and regulatory work with innovators, governments and regulators for over twenty years. At Policy Impact Partners he has built a strong global network of senior level experts that have a trusted reputation for effectively advocating policies that align business and societal goals. This includes working with a broad range of stakeholders to promote innovative ways to connect the unconnected by enabling more efficient utilisation of spectrum.

Before founding Policy Impact Partners he was responsible for spectrum and broadband advocacy at the mobile industry association - the GSMA. In this role he led the global campaign to secure more spectrum for broadband services at the UN’s World Radiocommunication Conference in 2015. He also designed and coordinated multiple advocacy programmes across key markets in the Middle East, Africa and Asia Pacific.
Guest Speakers

- Ms. Yolisa Kedama, Councillor, Independent Communications Authority of South Africa (ICASA)
- Miguel Felipe Anzola, Director General, Agencia Nacional del Espectro (ANE)
- John Leamy, ICT Innovation & Research Manager, Agriculture and Food Development Authority (TEAGASC)
- Haiyun Tang, CEO, Adaptrum
Global Summit
A NEW SPECTRUM MINDSET

November 3-5, 2020
VIRTUAL EVENT

TV Whitespaces - Opportunities and Challenges to Scaling

MS YOLISA KEDAMA - ICASA
NOVEMBER 5, 2020
2018 - Regulations published on the use of Television White Spaces (TVWS).

- provide for the implementation of TVWS through a Geo-Location Spectrum Database (GLSD) System.

- GLSD System - comprised of two main parts, i.e. R-GLSD and S-GLSD.
  - The R-GLSD - developed and commissioned in March 2019.
  - In June 2020, ICASA published a framework for the qualification of S-GLSD providers.
    - The objective - for ICASA to qualify organisations to provide S-GLSD services in South Africa.

- ICASA opted for light licensing regime - No spectrum Licence required

- 3 operators authorised to deploy TVWS networks in response to COVID-19 National Pandemic - CSIR providing S-GLSD service to the operators
  - to facilitate automatic TVWS spectrum assignments to network devices.

- Trial - authorised to deploy in August 2020, expires April 2021

- Service Providers are required to provide ICASA a full report at the end of the trial

- WSDs to be Type approved by ICASA
Current Regulations in place
- Should give confidence on the current and foreseen benefits of the TVWS industry
- Regulatory confidence to all stakeholders and investors within the industry.
- More research to be done on viable business models (S-GLSD providers, pricing) and new potential bands outside TVWS

GLSD
- Protects the primary users (broadcasters) from interference from the TVWS devices.
- Creating local entrepreneurs (SMMEs, small local players on a national level) have an opportunity to participate as S-GLSD providers or resellers.

TVWS Technology
- Effective alternative to microwave or traditional Wi-Fi which covers around 100m distances. TVWS can have a range up to 30 KM, including hilly terrain.
- UHF signals can penetrate obstacles and cover uneven ground without requiring additional infrastructure.
- Serves well in rural environments with difficult terrain which will assist in bridging the digital divide.
### Challenges and Opportunities to Scaling

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Availability of TVWS spectrum in future</td>
<td>Collaboration with MNOs on DSA that do not have national coverage</td>
</tr>
<tr>
<td>Sustainability and viability of business models</td>
<td>Building localised community networks</td>
</tr>
<tr>
<td>Lack of Regional harmonized Type Approval Network in support of economies of scale</td>
<td>Configuration of TV Broadcasting spectrum means that there is considerable geographic variability in white space availability, i.e. rural vs. urban spectrum availability</td>
</tr>
<tr>
<td>Risk of harmful interference from white space devices.</td>
<td>TVWS can be used by Operators to complement for capacity expansion in urban areas including hotspots.</td>
</tr>
<tr>
<td>Availability of TVWS spectrum in future</td>
<td>Collaboration with MNOs on DSA that do not have national coverage</td>
</tr>
<tr>
<td>Funding to deploy</td>
<td></td>
</tr>
</tbody>
</table>

TVWS can be used by Operators to complement for capacity expansion in urban areas including hotspots.
The Authority will issue a Notice to invite interested entities to apply to qualify to operate as S-GLSD service providers.

The qualification process will run for a period of 90 working days.

In the interim, interested parties are allowed to offer internet services using TVWS temporarily during the COVID19 period in terms of the ICTCOVID19 regulations.

The regulation will be fully implemented once the qualification process is completed. The commencement date of the Regulations is 1 April 2021.
End - Thank you
Challenges and opportunities of TVWS deployment in Colombia

Agencia Nacional del Espectro
Advantages and disadvantages of TVWS compared to other technologies

**Advantages**

- Scheme of operation without cost, but under the modality of free use of spectrum with registration in the ANE Database.
- It promotes efficient use of the spectrum by operating under a sharing scheme.
- It works in low frequency band which allows good distances in the data links.
- Channels in remote areas are unlikely to become unavailable, even in the long term.
- Technology already proven and with success stories in operation.

**Disadvantages**

- Channel availability in municipalities as indicated by the ANE.
- Future channel availability cannot be guaranteed.
- It has no protection against interference, it cannot cause harmful interference to TV channels.
- Low availability of equipment
- Automation of the database in development
Challenges in TVWS deployment

- Improve the offer of TVWS devices in the market.

- Promote and encourage the demand for this technology as an alternative connection in remote areas of the country. The ANE initially promotes this use by allowing the use of this spectrum, which is currently assigned to television operators. With the conditions established in the regulations, it has been possible to demonstrate, through pilot tests, connections of up to 15 km in distance and with a download speed of up to 10 Mbps.

- From the ANE to accompany the process of maturation of the ecosystem for this technology
**TVWS operating conditions according to Resolution 105/2020**

- **General conditions:**
  - TVWS devices will operate in the band with primary allocation to TV:
  - TVWS may not cause harmful interference.
  - TVWS cannot claim protection against interference.
  - TVWS must interact with the Database (BDEB) managed by the ANE.
  - While the ANE automates the BDEB, the request for available channels can be made manually and will be valid for up to 6 months, before the expiration of that period the applicant has to re-request the availability analysis. After automated, devices will need to be configured to request every 24 hours.
  - Requests must include the identification data of the person in charge indicated in the resolution.
  - The BDEB allows turning off devices in a zone, devices of a certain type or a specific device, if required.
  - If the cause of interference does not turn off or provide a solution, the ANE may impose the sanctions of Law 1978 of 2019.
**TVWS operating conditions according to Resolution 105/2020**

- **Technical operating conditions:**
  - Operation with 6 MHz channels in the band 470 to 698 MHz, allocated to TV.
  - Point-to-point or point-to-multipoint operation, only at fixed locations.
  - TVWS equipment must incorporate geolocation with a margin of error less than +50 meters.
  - The BDEB indicates the list of channels available in the location of the request, considering:
    - Protection margins, Maximum powers, Maximum heights, Channels prohibited by zones.
    - TVWS devices will be able to use more than one channel from the available channel list.
  - The BDEB can change the availability at any time, even restrict access in some area.
  - Height above the average of the terrain less than 800 meters.
  - Maximum power delivered to the antenna of 12.6 dBm measured in any 100 kHz segment.
  - Unwanted emissions shall not exceed a power of -42.8 dBm measured in any 100 kHz segment.
  - 14 dBm maximum antenna gain.
**Objective:** Development of the platform - TV white space database -TVWS

**Phase 1 (2018) - Investment USD 52K**

Achievements:
- Design, development and production of the robust database.
- Design based on the study and analysis of Colombian regulations.
- Benchmark of functionalities of other existing solutions.
- Implementation of the standard communications protocol (PAWS) adapted to the conditions of the country.

**Phase 2 (2020) - Investment USD 65K**

Achievements:
- Calculation method implementation according to recommendation ITU-R P1546-6 (600MHz, land path, 50% of the time)
- Functional tests of the platform in a real and controlled environment with TVWS device manufacturers
www.ane.gov.co

ANE.colombia

@ANE_Colombia

PBX: 031-6000030

contactenos@ane.gov.co
Case Study on TV Whitespace @ Teagasc, Ireland - ‘AirBand’
Background - **Teagasc** – Agri-Food Knowledge and Science institute (Providing Research, Education & Advice).

Objectives - deliver connectivity over challenging terrain with no line of sight using TVWS, thereby facilitating:

1. Mobile hotspots on the college campus to enable in-field teaching and learning.
2. Deployment of Farmbeats sensor platform for localised and real-time weather data.
3. Rural internet connectivity for local off-campus business and residential uses.
- **Mobile Jeep (on-campus)**
  - Less than 1km, no Line of Sight - 7.6Mbps (d)/7.0Mbps (u) - Students now able to work in fields with real-time data access. [Previously NO connection possible]

- **FarmBeats Sensors**
  - Distance: 0.69km. Measuring weather

- **Small Business (off-campus)**
  - Distance: 3.2km, no Line of Sight - 7Mbps (u)/7Mbps (d) [previously 2.5Mbps/0.2Mbps]

- **Residential Property (off-campus)**
  - Distance: 2.6km, no Line of Sight (foliage). - 9.2Mbps (d)/8.2Mbps (u). [Previously NO connection possible]

Thank you
Delivering Fixed Wireless Broadband over TVWS

None-Line-of-Sight 360° Point-to-Multipoint Network

TVWS Base & Sector Antenna

10km

TVWS Client & Directional Antenna
ACRS New Base Station Products

ACRS 2.5 B1000

ACRS 2.5 B2000

ACRS 3.0 B4000-A

100 – 500 Mbps, 802.11af and 802.22 ASIC, 4x4 MIMO, 4 channel expansion, 4 carrier aggregation
ACRS Client Products

ACRS 2.5
C100
ACRS 3.0
C100-A

ACRS 2.5
C200
ACRS 3.0
C200-A

802.11af and 802.22 ASIC enabled, high performance TVWS CPE starting from $300
ACR2000 SoC – First TVWS ASIC

802.11af + 802.22 Multi-standard with open-source SDK development
Adaptrum TVWS Database Modules

Supporting 18 TVWS country databases so far

<table>
<thead>
<tr>
<th>Country</th>
<th>Regulatory Organization</th>
<th>Database Provider</th>
<th>Report Spectrum</th>
<th>Priority</th>
<th>Devices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barbados (BB)</td>
<td>manual</td>
<td>manual</td>
<td>false</td>
<td>11</td>
<td>View Devices</td>
</tr>
<tr>
<td>Colombia (CO)</td>
<td>manual</td>
<td>manual</td>
<td>false</td>
<td>11</td>
<td>View Devices</td>
</tr>
<tr>
<td>Colombia (CO)</td>
<td>CRC</td>
<td>ANE</td>
<td>true</td>
<td>1</td>
<td>View Devices</td>
</tr>
<tr>
<td>Ecuador (EC)</td>
<td>manual</td>
<td>manual</td>
<td>false</td>
<td>11</td>
<td>View Devices</td>
</tr>
<tr>
<td>Guatemala (GT)</td>
<td>manual</td>
<td>manual</td>
<td>false</td>
<td>11</td>
<td>View Devices</td>
</tr>
<tr>
<td>Kenya (KE)</td>
<td>DSA</td>
<td>Nominet</td>
<td>true</td>
<td>2</td>
<td>View Devices</td>
</tr>
<tr>
<td>Kenya (KE)</td>
<td>DSA</td>
<td>FairSpectrum</td>
<td>true</td>
<td>1</td>
<td>View Devices</td>
</tr>
<tr>
<td>Korea, Republic of (KR)</td>
<td>manual</td>
<td>manual</td>
<td>false</td>
<td>11</td>
<td>View Devices</td>
</tr>
<tr>
<td>Korea, Republic of (KR)</td>
<td>KCC</td>
<td>RAPA</td>
<td>false</td>
<td>1</td>
<td>View Devices</td>
</tr>
<tr>
<td>Mozambique (MZ)</td>
<td>DSA</td>
<td>Nominet</td>
<td>true</td>
<td>2</td>
<td>View Devices</td>
</tr>
</tbody>
</table>

© 2019 Adaptrum. Confidential and Proprietary.
Cloud Based Network Management Software
Remote management, monitoring and upgrade + integrated spectrum scan