CONNECTING THE WORLD

NOMINET
SPECTRUM
MANAGEMENT

Why dynamic spectrum management?

Global internet traffic will nearly triple, while U.S. traffic will grow two-and-a-half times in the next five years *(Cisco 2017)*

Most of this traffic will come from wireless devices such as smartphones and, as the Internet of Things (IoT) grows, everyday household gadgets and manufacturing machines. The wireless spectrum is already in short supply, nearing the limits of its capacity.

So how can growing internet traffic be supported?

The answer: by adopting new models of allocating spectrum. Dynamic Spectrum Management (DSM) is the perfect solution. Unlike the single-user approach, DSM enables the spectrum to be used more efficiently. It relies on a geo-location database that contains details of assets and rules, which allows the spectrum to be allocated in real-time based on the location of the user and other considerations, such as radio parameters and the type of usage.

DSM allows:

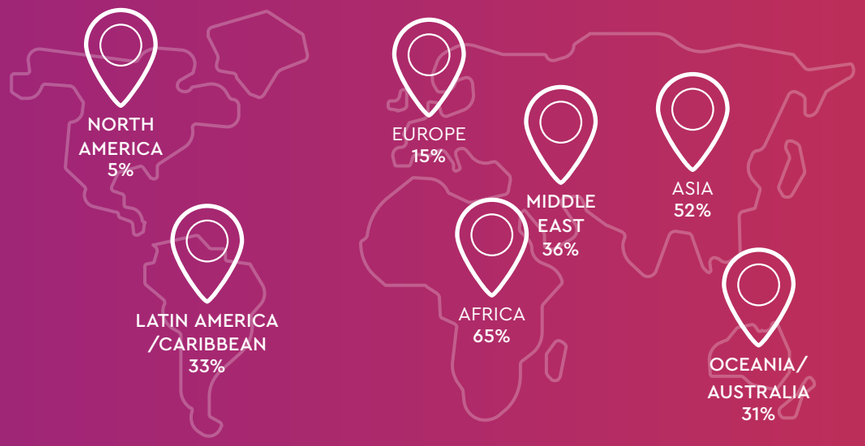
- Wireless advancements for businesses
- More efficient spectrum use
- New market opportunities

World population

7.5 Billion

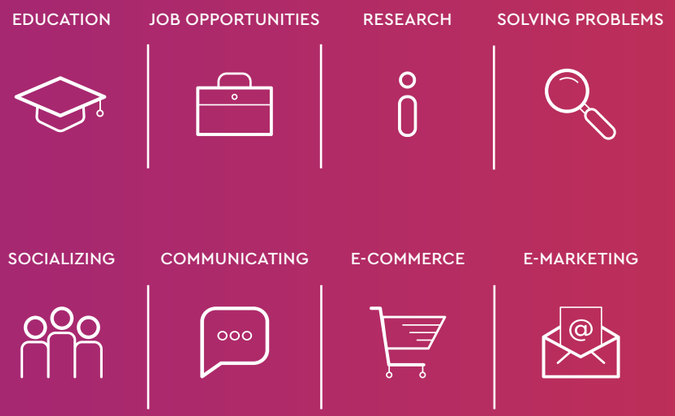
Who's not using the internet?

Source: Internet World Stats 2017



45%

of the world's population are missing out on:



TV White Space

TV White Spaces (TVWS) are transforming the internet, taking broadband to places it could never reach before.

TVWS – the name given to unused broadcasting frequencies in the wireless spectrum left for buffering purposes – uses DSM to manage the usage of the spectrum. TVWS radios offer broadband speeds over several kilometres. The signal can travel through permanent obstacles, such as trees and light structures, as well as uneven terrain.

TVWS is usually free for anyone to use and build their own network. It's perfect for a range of uses, such as providing broadband connectivity to rural communities, delivering wireless connectivity across campuses, and connecting IoT devices.

How does it work?

1
Your TVWS client station'talks' to a base station

2
The base station connects to our database over the internet

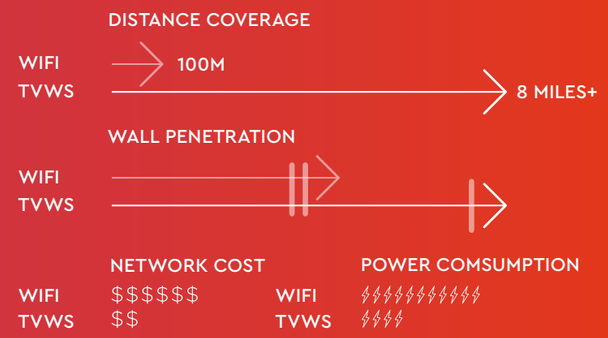
3
Our database gives the stations a list of available channels to use

4
Connect and go

To transmit on TVWS channels, devices must contact a regulator-approved TVWS database to check channel availability in their area. This database needs to be dynamic, as the frequencies in use will vary depending on location and time.

Why TVWS?

WiFi versus TVWS



Source: www.rfwireless-world.com/Terminology/wifi-vs-super-wifi.html

What it means for consumers

For consumers who live in areas where traditional broadband can't reach, TVWS is life changing.

In 2017, 95% of Americans used the Internet. It's an important way to connect with friends and family, get news, search for information and most importantly for the economy, shop. It's something many of us take for granted but there's still greater than 5% of the population who can't do the tasks we take for granted simply due to their location. This includes rural areas and difficult terrain.

For consumers, the benefits of TVWS are clear:

- Internet connectivity in rural areas
- Enhanced indoor connectivity
- ADSL-comparable connection speed

Introducing a cost-effective and easy-to-implement solution such as TVWS can revolutionize lives.

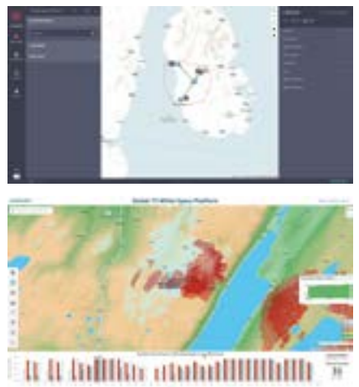
The advantages for network operators

It's not just consumers who benefit from a TVWS solution, but also wireless network operators:

- Line-of-sight not required
- Up to 30 km outdoor connectivity
- No need for complex infrastructure like for 3G/4G/5G
- No need to change radios if the rules to access slightly change
- Enables new business models
- Licence-exempt access to the spectrum

Nominet offers tailored support for potential or existing TVWS network operators, including:

- Use case evaluation
- Spectrum availability studies
- Link feasibility assessments
- Network deployment advisory services
- Radio planning tools



Working with regulators

Nominet works with regulators to customize the rules for accessing the TVWS bands in their countries, while also providing the geo-location databases in other bands. An FFC approved geo-location database is a requirement for TVWS services in the US.

You don't have to incur high costs for setting up your territory for broadband access. A TVWS solution not only transforms internet usage on a global scale, with its low barriers to the communications market, but it also:

- Protects primary users (e.g. DTT broadcasters)
- Decreases cost of designing regulatory frameworks
- Increases spectrum-use efficiency
- Oversees what frequencies are used where
- Enforce spectrum policy on radios

Your TVWS provider can also provide insight into the following:

- Understand how spectrum demand evolves
- Fine tune the rules that determine access to the spectrum based upon real data
- Use the data to analyze and establish the real value of the spectrum

In some markets, the framework is designed to protect primary users, while allowing authorized radios to transmit. Potential interference among secondary users (i.e. TVWS radios) is not handled by the regulatory framework and can be addressed directly by the radios, and managed by the database. In other markets, the geo-location database acts as a connectivity enabler.

The main variations are the maximum transmitting powers of the radios, and the radio certification process. Nominet can help bring together all the stakeholders involved, the regulators, radio manufacturers and the network operators, to make sure you get the right solution for your needs.

FCC approaved geo-location database

San Francisco

Feasibility study

Is TVWS the right solution for the problem you're facing? Talk to us and together we can determine if it is. We can give you a feasibility study or provide availability data for your own tools. If TVWS is right for you, we will help you provide advice and support through the power of our TVWS services. With our experience, we can handle any complex issue to help get your community connected.

Get in touch today:
dsm@nominet.com

Case Study

Working with Microsoft to connect rural America

Over 24m people living in rural areas of America lack an adequate internet connection. This means that they are unable to take advantage of the economic and educational opportunities enjoyed by their urban neighbors. Progress to close the rural broadband gap has slowed in recent years. High costs, the absence of new and alternative technologies, and market and regulatory conditions have all hampered efforts to expand coverage.

This has now changed with TVWS providing affordable, reliable broadband access.

The Microsoft Airband initiative reflects its own experience working around the world to make use of TVWS. This powerful bandwidth is in the 600 MHz frequency range and enables wireless signals to travel over hills and through buildings and trees. Microsoft, along with partners has worked to perfect the hardware and software needed and developed industry-wide standards which now means TVWS is poised to be the technology of choice for rural America.

Nominet is proud to partner with Microsoft on the Airband initiative, providing the Wavedb database to manage the available spectrum as well as helping with planning and implementing the network configurations. Early rollouts have begun in Ohio, Maryland, Maine, Virginia and New York, already proving successful.

Case Study

Bringing wireless connectivity to rural Britain

Connectivity in rural areas of Britain is still an issue. The cost of infrastructure is simply not viable. This leaves many people and premises across the UK without access to broadband or with very limited bandwidth.

The people of the Isle of Arran in Scotland are part of the 8% of the UK population without access to broadband faster than 10Mbps. The sparse housing locations and tough environmental and geographic conditions make traditional connectivity extremely challenging. Poor connectivity has seriously hampered economic growth and innovation, forcing the younger generation to leave the island. Things, however, are changing.

Nominet, together with Broadway Partners and Microsoft, has connected the residents of Arran with the first commercial use of wireless TV white space technology in the UK.

Residents can access speeds of 15Mbps, which now allows them to run businesses, connect with family members across the globe and access online services. A backbone of connectivity opens up the island to a new set of IoT services such as telehealth applications to help support the most vulnerable.

About Nominet

Nominet has been at the forefront of innovation for 20 years through its internet registry solutions, cyber security services, and now dynamic spectrum management. Driven by a commitment to use technology to improve connectivity, security, and inclusivity online, Nominet is a profit with a purpose company, supporting initiatives that contribute to a vibrant digital future.

Trusted by governments and businesses globally as an expert technology partner, Nominet is keen to explore the benefits that spectrum management can bring to revolutionize internet access.

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