TV White Space Solutions
Enabled through Spectrum Management Databases

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SPECTRUM BRIDGE

Spectrum is a finite – but infinitely renewable resource, much of which goes to waste.

The reasons are pretty simple – it is statically allocated for use in a dynamic environment

>> The dynamics are Time, Location and Frequency

Spectrum Sharing is based on the principle of letting others used the unused spectrum (or white space)

TV White Space in the UHF band is reasonably harmonized globally.

The FCC rules are in place

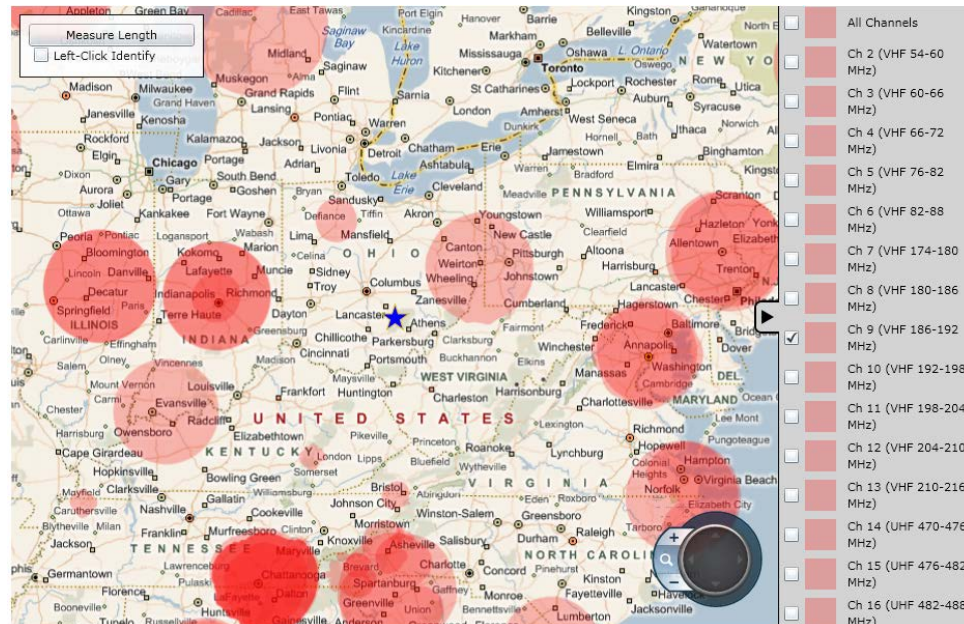>> 2 Databases are currently certified

>> 3 radios are certified

>> 5 radios in the certification process with SBI

The Database is the Regulators preferred approach for TV White Space around the world
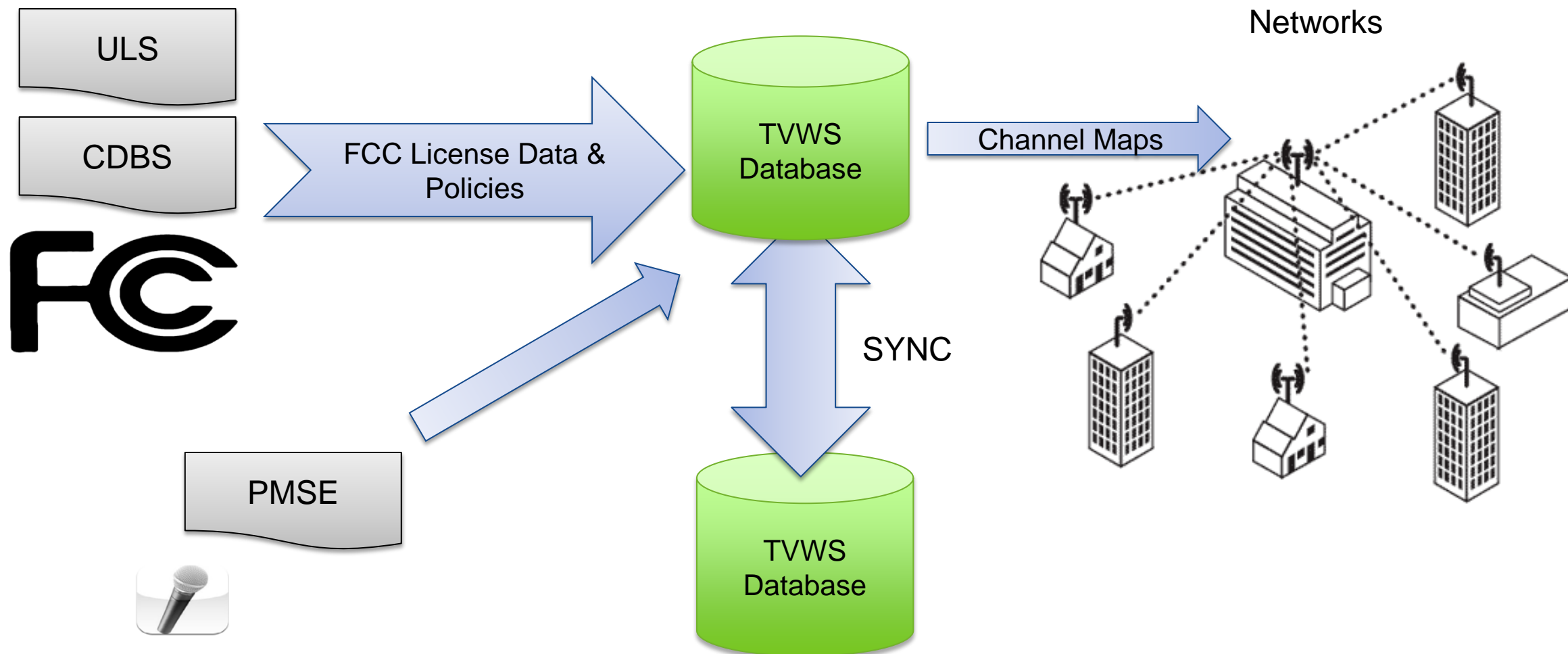
The Database has to understand all the regulatory requirements that determine the coexistence of a primary user with those that are sharing

- Location and operation of primary users
- Interference "Stand-offs"
- Permitted use

To enable sharing without creating unacceptable interference

How it works…

ULS

CDBS

FCC License Data & Policies

TVWS Database

Channel Maps

Radio Access Networks

SYNC

PMSE

TVWS Database

To Date:

√ M2M – telemedicine applications on a hospital campus, EPA sensors in rivers

√ Smart Grid / Telemetry - smart meters and power grid monitoring for electric utilities

√ Video Surveillance – Public Safety and Traffic Monitoring in Wilmington NC

√ Broadband - last mile internet access in rural areas

√ Enhanced Location Services - value added services and advertising at venues (IWM Duxford)

Planned:

❑ Femtocell - backhaul and offload for small cell deployments

❑ Content distribution - multicast video and data in big box stores and convention centers

Database Needs and Services are different for each application

The applications in Wilmington and New Hanover County solved issues that they had previously been unable to address

Interference (congestion) and/or range with existing solutions could be overcome with the use of TV White Space

Applications include:

– Video surveillance

– Facilities control (Lighting)

– Public Wifi Access

– Improved city services

Applications that have an ROI in weeks or months and are repeatable in towns and cities across the country
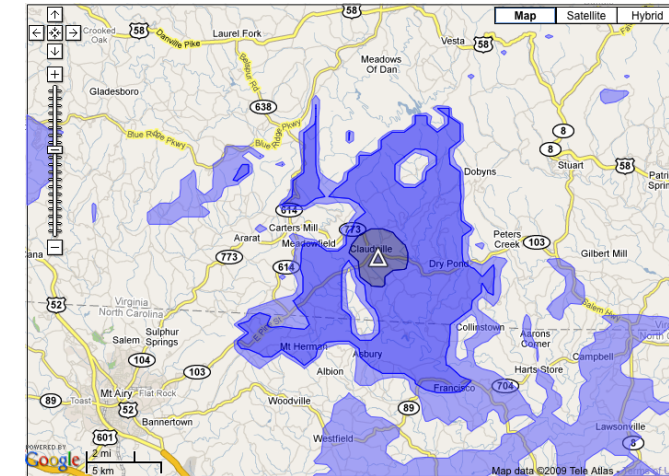
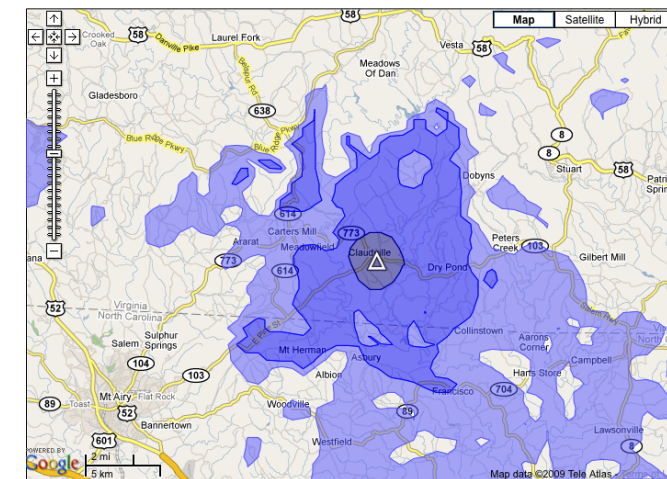Challenged by rugged terrain, heavy foliage and low tele-density

Seeking real NLOS solutions - significantly increased range

Better coverage than alternatives – 10 reduction in APs

So even though first generation equipment may be more expensive than the alternatives the TCO is often much better

2.4GHz coverage

600MHz coverage

- A group of the Administrators (White Space Database Administrators Group) got together and created 2 specifications/standards to satisfy FCC rules

- Database-to-Database Synchronization Interoperability Specification

- Database Calculation Consistency Specification

These documents are published, and available on the FCC website as well as the members websites. They are the result of a lot of hard work – the complexity of the rules and the algorithms required very detail analysis and comparison to get the required results.

The group is very pleased with the outcome. The level of consistency is significantly better than required and better than we had hoped to acheive

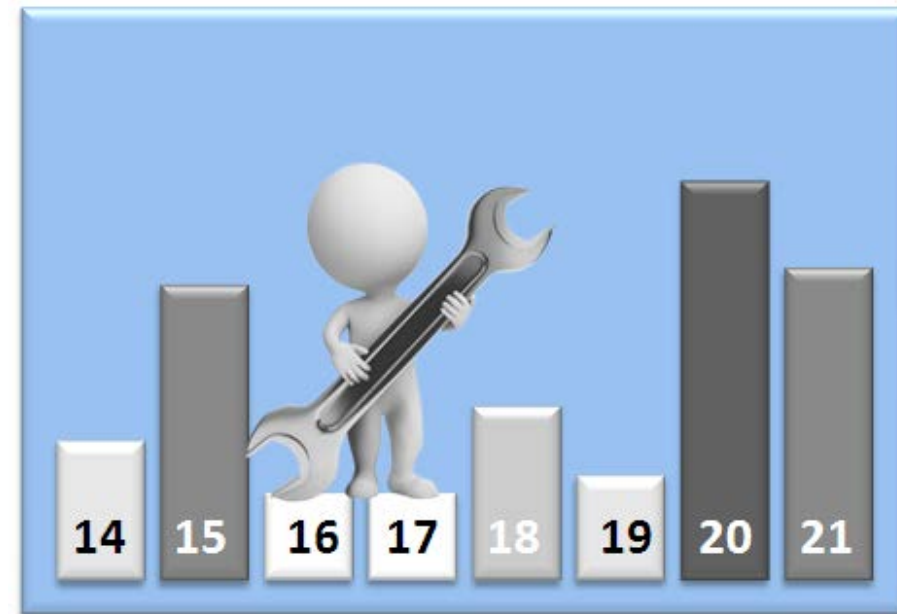Regulators are concerned with protection of incumbent operations

A Database Administrator makes money by facilitating use of white space

White Space is not really "White"

Spectrum availability varies
- – By time, location, device type

Rules consider a radio not a radio network

Spectrum Bridge provides subscription services to assist network operators with planning, management and coexistence issues

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- A product of mixing **MegaWatt** and **milliWatt** transmitters in the same ecosystem.
- Need for co-existence is exacerbated by the nature of excellent VHF and UHF propagation.
- A data base provides the opportunity to mitigate the interference effects of TV services and other TVBDs.

White Space
< 21 dbuV

Protected Area
>41 dbuV

Grey Space
21-41 dbuV
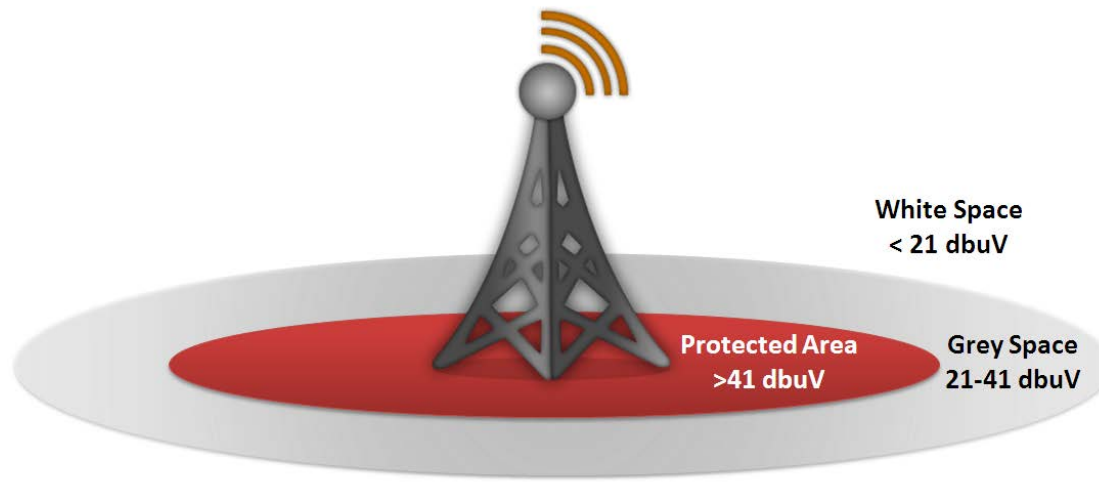
USB connected

Available Channels

Channel availability at 28.74806, -81.36445

Height Above Average Terrain = 1.61m

CH	Frequency (MHz)	Type	Noise Floor	
29	560 - 566	Microphone, Available	-54	🔴
38	614 - 620	Microphone, Exclusive	-55	🔴
7	174 - 180	Fixed 3m	-67	🔴
15	476 - 482	Microphone, Available	-82	🟠
32	578 - 584	PP 40mW	-83	🟠
19	500 - 506	Fixed 30m	-84	🟠
34	590 - 596	PP 40mW	-86	🟠
44	650 - 656	PP 40mW	-86	🟠
13	210 - 216	Microphone, Available	-88	🟠
25	536 - 542	PP 40mW	-88	🟠
42	638 - 644	PP 40mW	-88	🟠
28	554 - 560	PP 40mW	-96	🟡
24	530 - 536	PP 40mW	-102	🟢
8	180 - 186	Fixed 30m	-108	🟢
45	656 - 662	PP 40mW	-108	🟢
18	494 - 500	Microphone, Available	-111	🟢
9	186 - 192	Microphone, Available	-113	🟢
20	506 - 512	Microphone, Available	-115	🟢
5	76 - 82	Fixed 30m	-117	🟢
35	596 - 602	Microphone, Exclusive	-119	🟢
14	470 - 476	Fixed 30m	-125	🟢
6	82 - 88	Fixed 30m	-162	🟢
2	54 - 60	Fixed 30m	-173	🟢

Exclusively Available to Microphone Users
Available to Microphone Users
Available to Microphone Users and TVBDs

Current TVWS rules are rudimentary

The Database can provide very granular and flexible protection
- Change is easy and has no impact on deployed technology
- Updates/enhancements to the rules easily absorbed by the Database
- Rules can be tailored to any combination of location, frequency, time, device

The Database does not have to provide free (unlicensed/license exempt) access to spectrum
- Clearing house options
- Alternative to auctioning spectrum

The Database can manage priority access, QOS and coexistence (1750MHz and 4900MHz)
- Permissions can be limited to maximum "clearing" time
- Permissions can be rescinded for priority use
- The "air traffic controller" for radios

Thank You

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