



# Spectrum Observatory Database (SpecObs)

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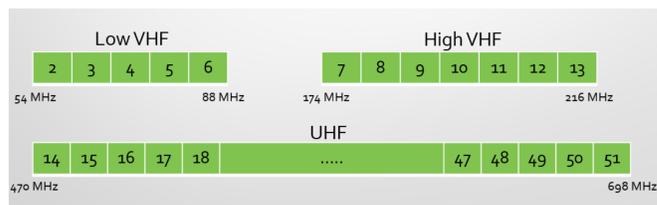
Farzad Hesar, Chang Wook Kim and Sumit Roy  
Electrical Engineering, University of Washington

## Introduction

- Software tool for analysis, simulation, and modeling of Dynamic Spectrum Availability.
- Currently we focus on TV White Space (TVWS) spectrum.
- FCC rules are considered to protect all licensed primary users and to detect WS channels.
- Web-based GUI tools to present various TVWS information.
- <http://specobs.ee.washington.edu/>

## TV White Space (TVWS)

- FCC has opened TV spectrum for unlicensed use by secondary networks
- Total potential bandwidth of 294 MHz
- Most favorable propagation characteristics, including NLOS operation
- Provide increased range of 3x to 5x more than Wi-Fi (2.4 GHz)
- Potential for new broadband wireless access or Offload for 4G/beyond cellular

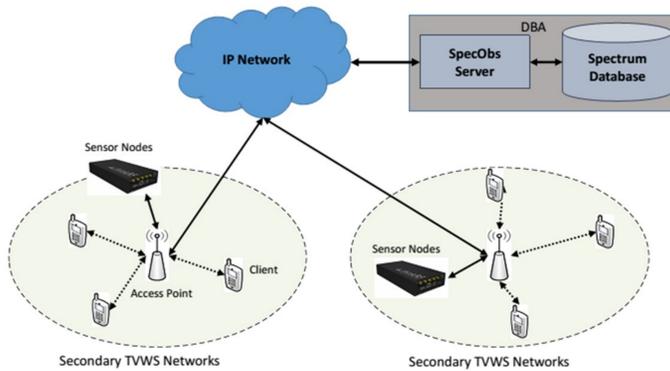


## SpecObs Features

- Provides the list of available white space channels for client's location.
- Query the server using U.S. postal address or latitude and longitude.
- Estimate noise floor (dBm) and achievable capacity (Mbps) for available channels.
- Visualizes protection regions for various classes of primary users such as TV stations, PLMRS, radio astronomy sites.
- Color code total available capacity for the U.S. region

## WS-based Network Architecture

- System components: SpecObs server and spectrum database
- Network components: Access points and associated clients, additional sensor nodes

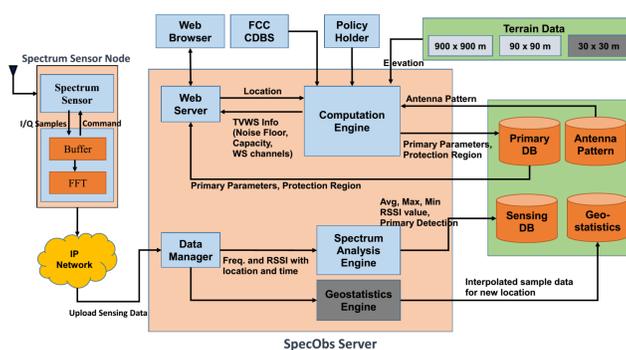


## SpecObs System Architecture

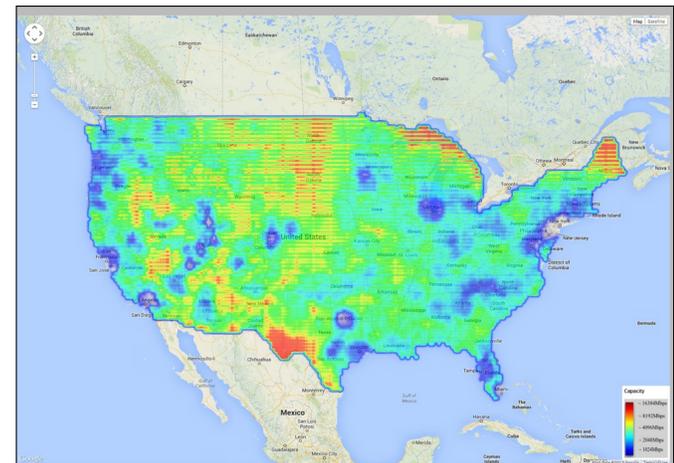
- Two main schemes for predicting WS availability: model-driven and data-driven methods
- Model-driven method: Propagation models are used with primary user information to calculate path loss and protection region
- Propagation models: FCC-curve, Longley-Rice ITM model (Area and point-to-point mode)
- Data-driven method: Spectrum sensors and client feedback is used to collect dynamic data from various locations.

## SpecObs Block Diagrams

- SpecObs server: Divided into several engines for computation, data handling, etc. to support various features.

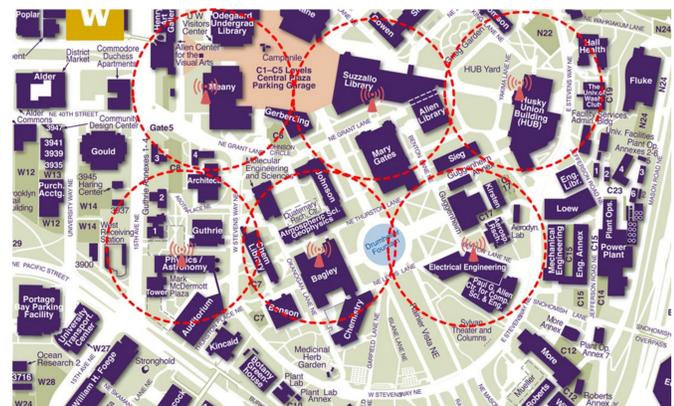


## Available Capacity Heat Map

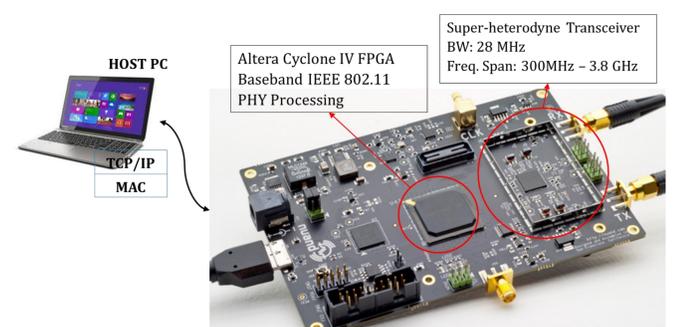


## Work In Progress

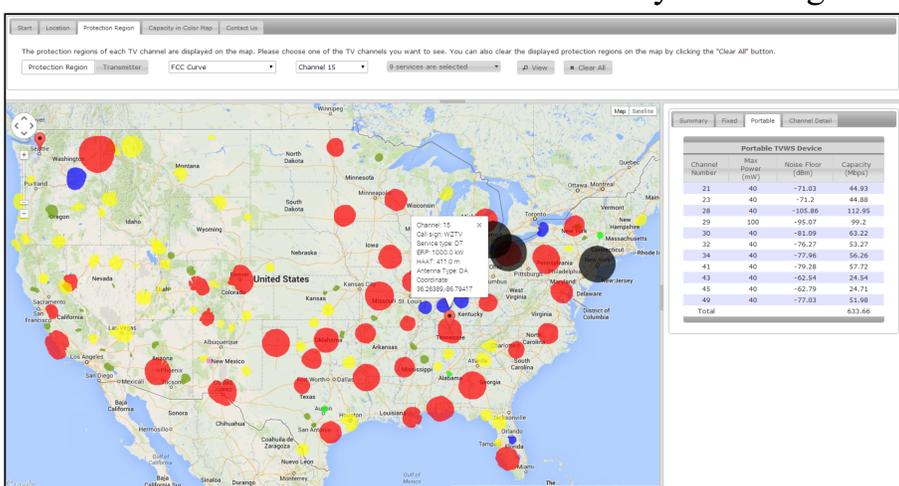
- Planning Trials using campus-wide TVWS-based networks
- Demonstrate using suitable SDR boards as fixed spectrum sensors
- Design and implementation of portable TVBD hardware platforms in USB-dongle form factor



## Hardware Platform



## Active transmitters/Channel availability Modeling



## Secondary Network Planning

