

FCC Experimental License Application for Long-distance Communication over TV Whitespaces

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1. Purpose

This experimental license application is intended for research in long-distance communications over the UHF channels (512MHz-698MHz), known as TV whitespaces. The goal is to understand the potential of opportunistic utilization of TV whitespaces, especially in long-distance communication applications, and to design novel system architectures, protocols and algorithms to achieve optimal performance as well as efficient spectrum utilization.

2. Experiment Platform

The platform we intend to use is called Wide Band Digital Radio(WDR) pictured below. Its major function is to perform frequency translation from WiFi frequency(2.4GHz) to UHF frequency(512-698MHz). Additionally, a power amplifier and an active TV antenna may be used to extend the communication range. All the equipment will be chose in a way to strictly follow the whitespace rules – FCC 10-174.

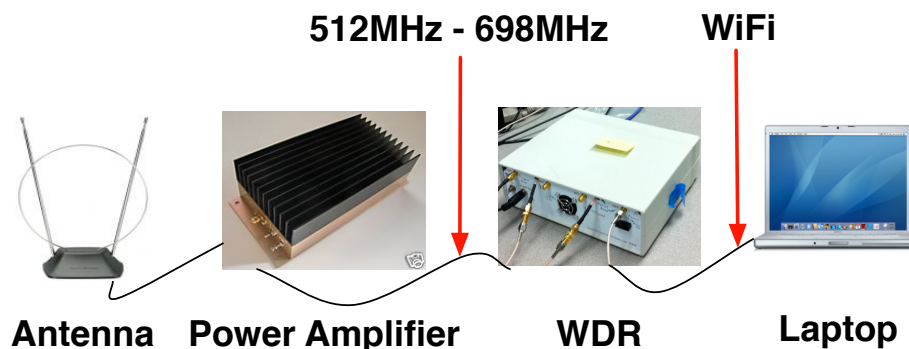


Figure 1 Wide Band Digital Radio

3. Experiment Scenarios

We intend to focus our research on two long-distance communication applications, namely *fixed point-to-point backhauling* and *Vehicular networking*. All the research works described below are under the supervision of Prof. Suman Banerjee.

Fixed point-to-point backhauling

This application is intended to improve the inter-building Internet connectivity at the UW campus (Figure 2). In this scenario, a handful of whitespace radios will be mounted on top of several teaching buildings at the campus area. Each pair of radios will establish a point-to-point link of 1-1.5 mile and communicate through directional antennas over whitespaces. Each radio might have another WiFi interface to provide WiFi access to the users inside the building, thus enabling communications among users from different buildings. Finally, as a fixed whitespace device, each radio will register with a spectrum database before operating and will periodically query the database about channel availability information to comply whitespace rules - 47CFR15.701 through 15.717.

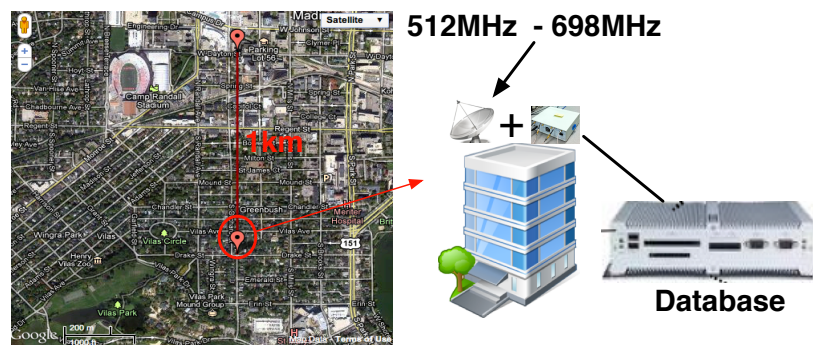


Figure 2 Point-to-point Backhauling over Whitespaces

Vehicular networking

The second application is to explore the possibility of providing Internet access to moving vehicles over whitespaces (Figure 3). As whitespace base stations, a small number of whitespace radios will be placed on towers beside the road, operating as fixed devices. As mode-I devices, a handful of whitespace radios will be mounted on vehicles, serving as whitespace clients. Each base stations will use omni-directional antenna with a coverage of 1-1.5 square mile and provide Internet access to nearby clients. Each client radio will have an additional WiFi interface, operating as a WiFi AP to provide Internet access inside the vehicle. According to the whitespace rules - 47CFR15.701 through 15.717, the whitespace base stations will register with the spectrum database and query it periodically to verify channel availability. To prevent clients from interfering TV broadcasts, the base stations will periodically broadcast channel availability information to client radios on the vehicles.

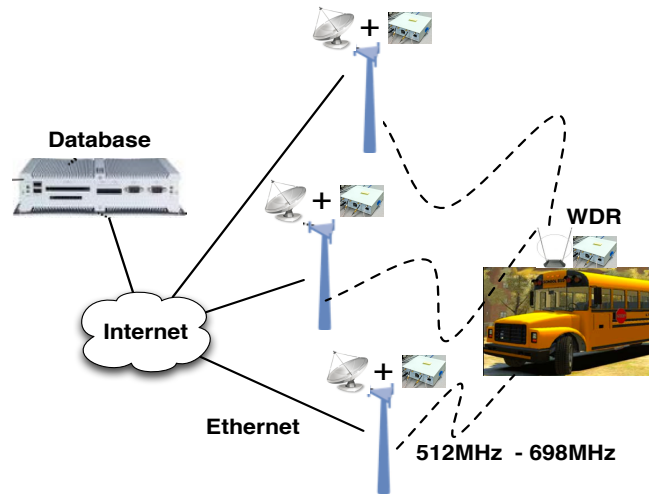


Figure 3 Vehicular Networks over Whitespaces