

Technological Innovations for Rural Broadband and IoT Connectivity

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Rural communities increasingly rely on wireless communication systems for agriculture, telework, telemedicine, and e-commerce, but connectivity is often poor or unavailable in remote rural places. Radio-frequency spectrum is the life-blood of these wireless communication systems, but it is scarce and utilized inefficiently. For example, rural areas often have many unoccupied TV channels, called TV White Spaces (TVWS). This project aims to explore how these TVWS can be best utilized for broadband wireless communication services in rural areas. Along with broadband access, Internet of Things (IoT) technologies ("smart" devices that communicate at low data rates via the internet) have great potential in farming and ranching applications. However, traditional Wi-Fi systems have inadequate coverage areas for most agricultural applications. We propose to test and optimize an emerging technology called Long-Range Wide Area Networks (LoRaWAN) for farm and ranch deployment. We hypothesize that TVWS and LoRaWAN technologies can provide broadband and IoT wireless communication services effectively in rural areas as well as offer helpful new methods for farmers and ranchers to monitor crops, livestock, and other assets. The proposed research is expected to result in new methods to effectively deploy broadband and IoT connectivity for rural people and places with numerous agricultural, livestock and environmental applications.