Operational Description

The CPE-O-RS-WS is operated as part of a TVWS Network. The CPE is used to provide connectivity (Internet Access) to users using Broadband Wireless Access based on WiMAX technology.

The TVWS Network uses the TV White Space spectrum (470-698 MHz) in channels that are not used by licensed or protected users such as broadcasters and wireless microphones.

The CPEs are wirelessly connected to Base Stations (RNU4000-BTS) that are usually installed in high places such as tower, water tanks , rooftops, etc. and from the Base Stations the communication is relayed to the Internet cloud via a gateway/router (Micronoc, CompactNOC, ASN Gateway, etc.)

The CPE uses OFDMA technology in TDD (Time Division Duplexing) mode with adaptive modulation in order to provide a reliable connectivity, the CPE modulation will change automatically according to the link budget between the CPE and the Base Station. The available modulation levels are described in the table below:

Frequency Bands	470-698MHz
Radio Access	802.16e Wave 2
Operation Mode	TDD
Channel Bandwidth	5 MHz
Output Power	24dBm at antenna port
Modulation	QPSK, 16QAM, 64QAM for DL and QPSK, 16QAM for UL
FFT	1024/512 FFT points
FEC	Convolution Code and Turbo Code
Authentication	TTLS and TLS

The CPE will adapt automatically its output power level according to the link budget between the CPE and the Base Station in order to reduce self-interference. In addition the CPE is GPS synchronized with the other CPEs in the area connected to the same TVWS Network in such a way that all CPE's will transmit and receive at the same time, the GPS synchronization mitigates the self-interference between the CPE's in the same network

The CPE can be connected at the customer's premises via POE to any IP device that needs Internet connectivity such as Wi-Fi routers, laptop/desktop computers, IP switches, etc.

CPE RF Circuit Description

The RF circuit is mainly divided in Transmit (TX) path and receive (RX) path. In the TX path a dedicated RFIC converts a digital data stream coming from a WIMAX modem to a modulated analogue signal at the operating frequency in the 470-698 MHz band, after the RFIC the analogue signal goes through an amplifier, filters and through a TX/RX switch and from the switch to the antenna RF connector.

In the RX path, the analogue signal coming from the antenna in the 470-698MHz band goes through the TX/RX switch and from the switch into a band pass filter, from the filter the signal is amplified by an LNA and from there to the RFIC which converts it to a digital signal and transfer it to the WIMAX modem to extract the data.