Project Overview

Project background

As part of the modern world, the level of radio frequency interference (RFI) generated in urban areas has increased expediently over the past years. RFI can come from many sources. Almost everything in your home or car emits some RFI, including fluorescent lights, TVs, cordless phones, electric tools, auto ignition, etc. In solar and DC systems you often have additional sources, such as switching power supplies, charge controllers, DC light ballasts, and inverters (especially modified sine wave types). There are dozens of digital devices in use nowadays, and digital - especially power circuits - emit more RFI than analog (AC). Any digital electronic equipment produces at least some noise. And nearly all equipment now used in PV systems is digital. The most common types of equipment to have problems are charge controllers, DC lights, and some modified sine wave inverters. Nearly all charge controllers send pulses instead of a steady voltage/current to the batteries. High power digital pulses are one of the worst RFI sources.

This has a dramatic effect on the ability to receive HF radio signals by amateur radio operators and other HF radio users, particularly in dense urban areas. There are several methods to overcome RFI as follows:

- Locate and eradicate sources of RFI in your local area. This can be easily achieved in your home but difficult where you have no control over the RFI source. This could be public infra-structure or your neighbor.
- Install a higher and more efficient radio antenna. Once again potentially a simple fix however local government planning rules and residential home block size can be a stumbling block.

Problem

An option being explored by many amateurs and radio clubs is to set up a radio installation in an area with no or negligible RFI. This could be on a farm or a location with low RFI. There are many options available to control a modern HF radio transceiver remotely.

The opportunity and limitations the client has are as follows:

- I have access to a property in central Victoria with no restrictions on antennae and access;
- There is no power available on site;
- No NBN/ADSL is available on site but access to Mobile broadband is available;
- I have a radio, an interface control module, antennas, Raspberry Pi, mobile broadband modem.

Scope of the solution

The project is to basically design and build the following:

- A standalone power supply utilizing solar and a deep cycle battery capable of delivering 12+ volts with a capacity of 20 amps peak load (since we are remote from Melbourne right now, this one remains to be discussed)
- A computer control module that allows you to:
    - switch on the radio remotely
    - Monitor power levels remotely
    - Control the radio remotely
    - Transmit and receive radio signals
    - Switch off the radio remotely
- Radio and antenna installation are not part of the project.

According to the client, there are several new requirements that we should meet:

- An interface for the club members to signup and login
- A super account (admin account) that have all the access to the system
- Friendly-designed UI for the client to use since there might be more elderly
- For convenience purposes, the system will be designed as a web-based system