# Expanding Interoperability of Raspberry Pi
## The Successful RP+Q5 Strategy

## INTRODUCTION

The Raspberry Pi Foundation manufactures the Raspberry Pi (RP) in various configurations and stepped editions. The RP line includes several versatile, cost-effective single board computers, that over the past 15 years has become ubiquitous in various applications (be they hobby based or commercial use).  It should be mentioned that in commercial integrations that include the RP, the unit itself is often hidden or disguised.

The RP is not always a stand-alone device in commercial applications - additional hardware beyond the Raspberry Pi board may be necessary.  An example for this might be an off-grid monitoring site or an application requiring sensor integrations and SCADA (Supervisory Control and Data Acquisition). In such cases, pairing a Raspberry Pi with a FlexSCADA can make a great combination and provide additional information beyond the normal scope of a Pi.  Note that single board computers should not be confused with microcontrollers such as the Raspberry Pi Pico or Arduino Uno. These are not full computers, and are beyond the scope of this document. This document examines pairing the Raspberry Pi 5 with a FlexSCADA Q5 Pro as part of an Amateur Radio Emergency Data Network (AREDN) node as a relevant example.

## THE BENEFITS OF RP+Q5

The Raspberry Pi 5 is a single board, fully functional computer with a modern Operating System (OS).  However, adapters are required to physically connect, control, and monitor many devices as part of a system such as AREDN.  The General-Purpose Input/Output (GPIO) pins included on the Pi are digital.  This means for the RP to use any analog inputs, an analog to digital converter would be required.  Another example is using a Pi to turn a radio on or off.  In these applications, additional physical electronics hardware is needed to control these assets. The GPIO pins were designed to power LEDs, whereas radios will typically have larger power demands that would overwhelm these pins. When monitoring and controlling various components, the ideal overall system would likely require interoperability of many types of components and relevant documentation. In the case of a RP, this can be time consuming. This creates additional complexity as each accessory string interacts differently with other strings. The solution would be an integrated all-in-one, input/output system connected to Raspberry Pi. This would make it a true gateway device. The resulting expanded capabilities and site awareness options presented would be both exponential and more reliable than using multiple cheap stand-alone converters. All of these are important factors where monitoring, control, and response are mission critical.

**MEET FLEXSCADA**

FlexSCADA Q5 comes standard with 8 independently isolated relays, giving the ability to remotely control up to 8 electronic devices (on or off).  These can be radios, antennas, camera systems, lights, heater controls, and other devices within a site.  In the off-grid AREDN example, a solar array may charge a battery bank which powers the site.  The Q5 can be programmed to automatically cut power via onboard logic to non-essential devices to save power. Once the batteries reach sufficient charge, it can then restore power to said devices.  The Q5 can be accessed via a direct interface, a cloud-based push/pull network, or through port forwarding.

**RP+Q5**

Setting up port forwarding via the Raspberry Pi using a VNC client allows the use of the Pi's web browser to connect to all local devices on site. VNC allows remote access to all devices on the site connected to the network switch. This eliminates the need to forward to each device on the network as it is already interfaced directly through the Pi. Control of the Q5, cameras, and other nodes then become easily accessible anywhere in the world.

By combining the computing power of the Raspberry Pi and the robust, all-in-one I/O package of the FlexSCADA Q5, your site can easily and reliably be set up for remote monitoring and control.

**SUPPORT**

For additional information please contact Mission Critical Energy at (716) 276-8465, sales@flexscadafusion.com, or visit us at www.flexscadafusion.com.