

**HIGH PERFORMANCE WIRELESS ROUTER**  
**Revised 22 April 2013**

**INTRODUCTION**

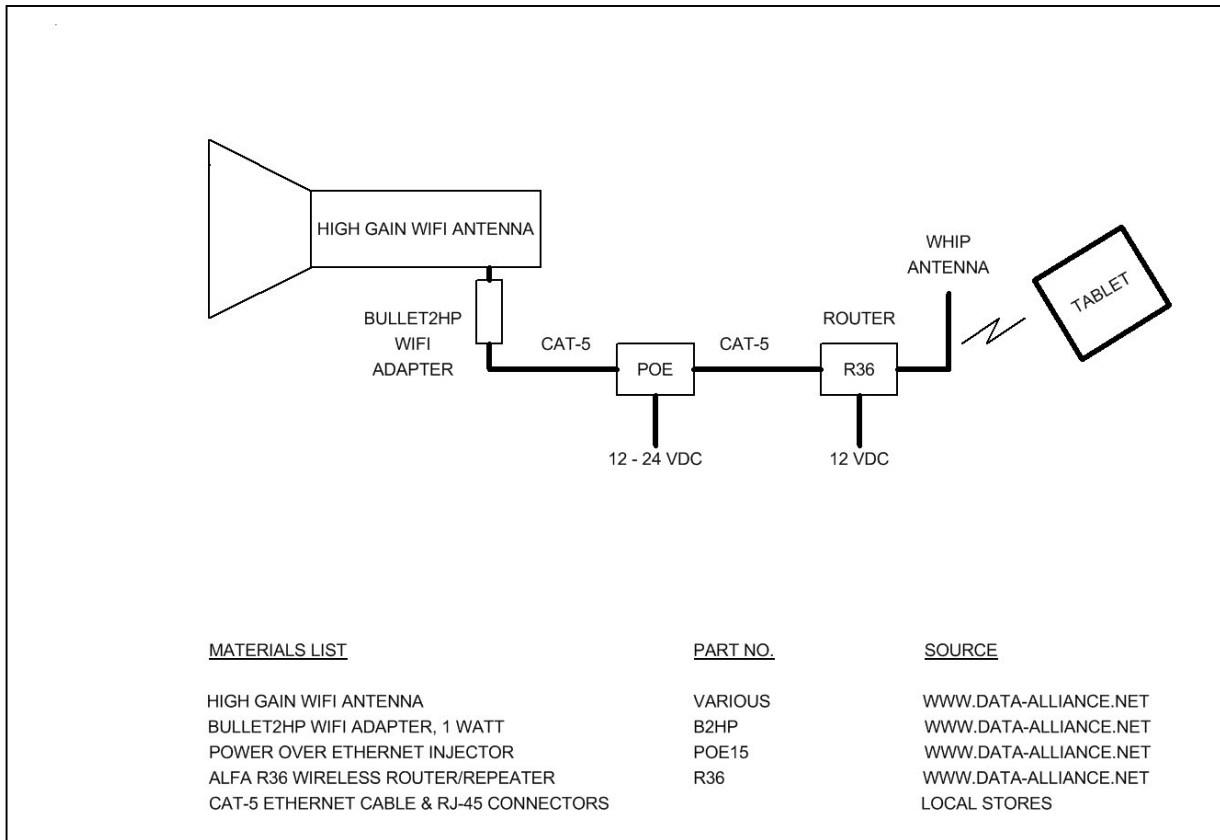
Newer wifi enabled devices such as Pads and Tablets can be quite useful in the presence of a strong wifi signal. But, how can we use them when the desired wifi Access Point (AP) is some distance away and quite weak? The solution is to construct a wifi repeater that can connect with that weak distant signal and rebroadcast it locally as a strong signal.

**MAJOR COMPONENTS**

This report shows how to couple a high gain antenna, a high performance wifi adapter, and a wireless router to offer a strong local 802.11b/g signal connected with a weak, distant signal. Three components are required:

1. A high gain wifi antenna located outdoors and high in the air away from buildings, trees, and other obstructions. A parabolic, panel, or other antenna may be used.
2. A high performance wifi adapter with internal signal processing located at the antenna, with an Ethernet connection to the final component.
3. A wireless router located indoors where the strong signal is desired.

**BLOCK DIAGRAM**



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#### SYSTEM DETAILS

The overall system must be designed for rugged, long-lasting operation in the local environment. That includes rain, wind, sun and temperature range. The system will be powered continuously 24/7. The minimum power requirement of 12 VDC at up to 2 amperes (24-watts) could be provided by solar panels but this has not been tried here.

#### ANTENNA DETAILS

The outdoor antenna should have a gain of from 10 to 20 dBi or more, as needed to ensure a reliable connection to the distant Access Point (AP). The antenna should offer a female N-connector for connection to the wifi adapter. The JKSE waveguide “cantenna” has been chosen. Construction details for the JKSE antenna are given at <http://www.jimkaness.com/engineering/hpb2cantenna.pdf>

#### WIFI ADAPTER DETAILS

The wifi adapter needs to contain signal processing to select and connect with the distant AP signal, including security. The Ubiquity Bullet2HP has been chosen. The Bullet male N-connector attaches directly to the antenna female N-connector for both RF connection and mechanical support. The RF and Ethernet connections are waterproofed by flooding them with silicone grease before making connection. The Bullet2HP must initially be optioned for infrastructure (station) mode and for obtaining a DHCP IP automatically. Further optioning, setup and changes can be made after installation. Optioning and setup information for the Bullet2HP, both before and after installation, are given at <http://www.jimkaness.com/engineering/hpb2cantenna.pdf>

#### REPEATER/ROUTER DETAILS

The repeater/router must accept the Ethernet signal from the wifi adapter and rebroadcast that signal to one or more users concurrently. It must provide for security on its signal to prevent unauthorized use. The Alfa R36 operated in Bridge mode has been chosen. The R36 in Bridge mode must be fully optioned and setup before being placed in service. It cannot be re-optioned after installation without doing a hard ‘reset’ and starting over. The CAT-5 Ethernet cable connects to the R36 WAN port. The LAN and USB ports of the R36 are not used. Using the Alfa R36 in Bridge mode is described at <http://www.jimkaness.com/engineering/r36bridge.pdf>