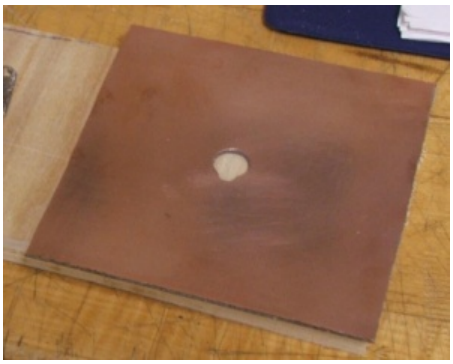


Parts Needed

Copper Clad Board or equivalent

Printed copper board or any other conductive material, such as a CD (because of its aluminum layer) or even tin foil glued to a piece of wood or plastic may be used as a reflector, 110mmx110mm yields better performance as a dish feed. Double sided copper clad also works well as the N-Connector may be soldered to the back of the board for greater durability.

Copper Laminate

Copper PCB

CNT-400, LMR-400, or low-loss pigtail

One end of the cable will need to be N Male so that it may be connected to the antenna; the other end will depend on the hardware being used. The length of the cable will have a negative bearing on overall dBi. The longer the cable, the more signal is lost through attenuation. Heavier insulation on the cable may help, but I recommend that the length of cable between the hardware and the antenna be kept at a minimum.

For using a biquad with a laptop WiFi card or PCI WiFi card you will need a pigtail as such:

N Male Pigtail

If your planning on using the biquad as a feed for a satellite dish I would advise going with heavy duty low loss coax as such:

LMR 400 Coax

Due to the price of the coax and loss with distance you may want to consider using a short run of coax, to a wireless bridge such as a Linksys WET54G or similar, then from the bridge run Ethernet cable over the extended distance to your computer, switch, or router. However this entails possibly keeping the bridge outside which will involve some kind of water protection. A bridge can be connected to the mounting arm of practically any satellite dish by duct tape or cable ties, simply placing the bridge in zip lock bags and cinching the coax and Ethernet cables at either end with cable ties will keep the bridge from water.

One foot (~30cm) of 2.5mm^2 copper wire (~1.5mm diameter)

The ground strand from standard house wiring also works well. This wire will be used to create the antenna element as well as distancing the element from the reflector. This kind of wire can be purchased from practically any hardware store. The wire needs to be of thickness where it is sturdy, but not too thick to bend or solder.

N-connector

The N connector will be the part from which the entire antenna is built. I used S.M. Electronics part# 1113-000-N331-011, but any similar product should work. Keep in mind that everything must be soldered to this connector, and thus it must be durable enough to withstand a torch.

N connectors

Or alternatively you may purchase a kit or a preassembled antenna.

Tools

Soldering Iron

You will need to solder the element of the antenna to the N connector. This can be done with any soldering iron or a small torch.

Dremel Tool, Reamer, or Drill

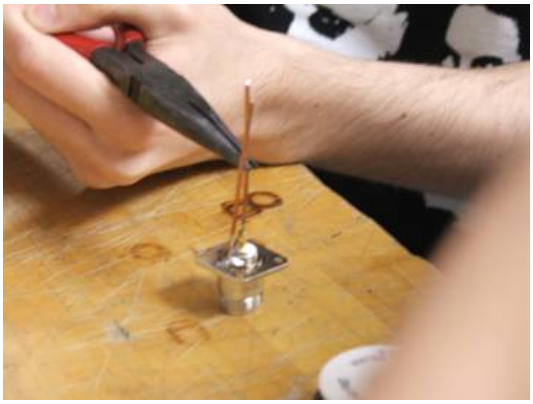
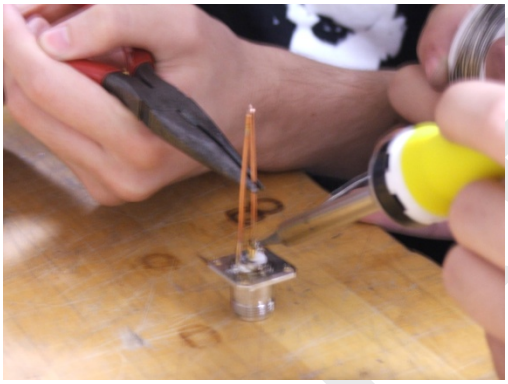
You will need to put a hole in the center of your reflector as to mount the antenna. A reamer, dremel, or drill tool will work well.

Lacquer (optional)

Aerosol Lacquer for preventing corrosion of the copper board.

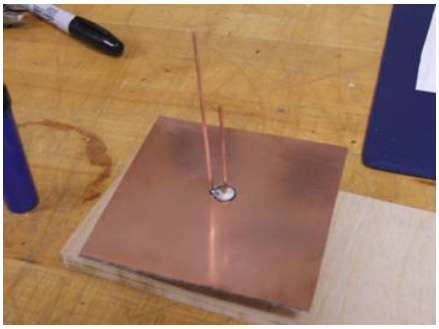
Building the Antenna

Two strands of copper wire will need to be soldered to the N-Connector. Both strands of wire should be as straight as possible and should be about an inch (~25mm) long to give you room to work with later. One strand should be soldered to the center wire of the N-Connector and the other should be soldered to the outside of the N-Connector as close to the center wire as possible, parallel to it. Given the metal of the N-Connector may vary; soldering may be easier to accomplish with a torch.

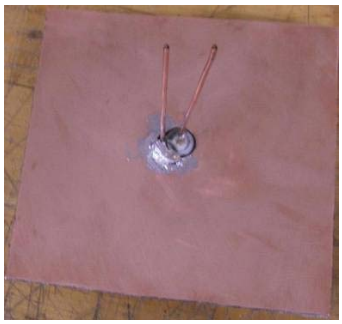

Cut a square piece of the copper board to 123x123mm (approx. 4.8x4.8 inches). This will be the reflector.

Drill a hole in the center of the reflector so that the end of the N connector with the copper wires fits through flush and snug. You may need to use a Dremel tool to broaden the hole to let through the piece of copper wire soldered to the outer portion of the N-Connector. The outer copper wire should be aligned to the center of a side of the reflector, and the center wire should be just above or below it, as close to the center of the reflector as possible.

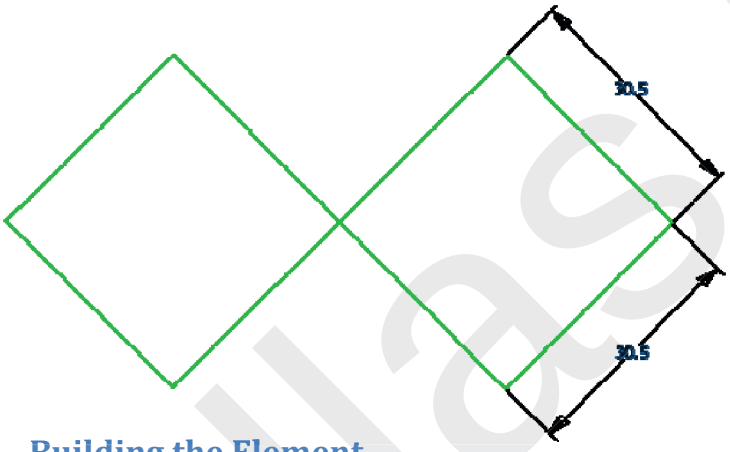



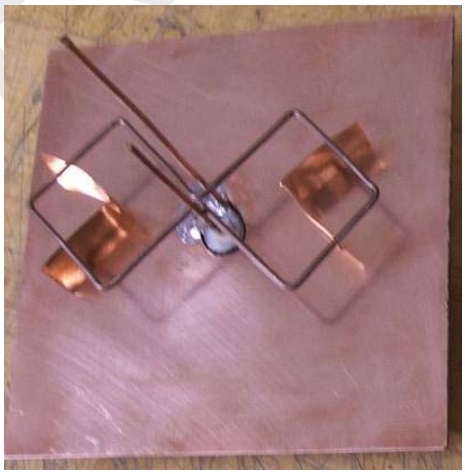
Use steel wool or fine grade sandpaper to remove any tarnish from the reflector, not only will this make the copper look better, it will make soldering easier. If you are using a CD or tin foil this is not necessary.

If using double sided copper clad board, place the N-connector in the hole as shown and solder the back of the N-Connector to the board so that there is a strong bond.



On the face of the antenna, the side with the two copper wires, solder the outer copper wire to the face of the reflector. You may also solder the reflector to the outer portion of the N-Connector to ensure a strong bond between the reflector and the N-Connector, as well as ensuring electrical conductivity. The center copper wire must not be soldered or contacting the reflector or the outer copper wire. When completed you will have the reflector prepared for the element.





Building the Element

Take another piece of the copper wire 10in (245mm) in length and bend it to the shape shown. The angles should be as close to 45 degrees as possible with each length in the quads being the same size (approx. 1.5in (30.5mm), ¼ of the wavelength of 2.45GHz). You may need to trim off a small amount of each end of the wire to achieve this. Symmetry is important. When bending you will want the two ends of the wire to meet in the center, so work from one end of the wire, around one of the squares then a bend outwards to make the other square and back to the center. You may want to use a pair of pliers when bending the wire. This is the biquad element. Now we will be attaching the element to the N connector. The element must be distanced approximately ½ in (15mm) away from the reflector. This measure provides the lowest standing wave ratio and improves antenna performance. You can assure proper spacing by measuring and folding

½ in (15mm) tall pieces of business cards, tagboard, or sheets of metal is in the photo above.

The two copper wires from the N connector will be soldered to either of the center folds of the element. The element, if bent distorted from this work, should be bent back to its symmetrical shape, however the **two middle portions and their copper wires must not be soldered together or touching as seen in the following photo**:

Once all soldering is done insure the entirety of the element is ½ in (15mm) away from the reflector by holding a ruler up next to the reflector. You may want to use the steel wool again to remove any excess solder.

If you will be using a bracket or beam that must be soldered to the back of the reflector or N-Connector as I did, do that now. Once that is done I sprayed the antenna with clear lacquer to prevent corrosion. This step is optional. If you do spray the antenna with lacquer, attach the cable beforehand so that lacquer does not get into the part of the connector your cable is affixed to. **Make sure that the lacquer has no metal content as that may affect performance.**

You can see in the following pictures a couple of implementations of biquad antennas I have constructed.

For satellite attachment use epoxy to attach the Biquad to the feed of the dish so that the element is facing inwards to the dish. In the following photos I have an acrylic enclosure around the biquad, which is optional. You may also use wood to create a new feed mount for a satellite by using epoxy to attach the biquad to the feed.