



Easy to Build WIFI 2.4GHz Yagi Antenna

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Intro: Easy to Build WIFI 2.4GHz Yagi Antenna

This antenna will extend the range of your WiFi or 2.4GHz devices (like surveillance cameras) into many miles and kilometers. A yagi antenna is basically a telescope for radio waves. I tired the pringle can antenna and the Yagi beats it hands down in performance.



Step 1: What You Need

This is an absolutely easy project.

You need an ink jet printer/ Computer

Popsicle sticks

White glue

Crazy glue

Big paper clips

USB WIFI, preferably with an antenna extension OR a 2.4 GHz device

soldering iron and lead

Sanding papers

Scissors

Pliers or preferably a nibbler (see photo below, available at radio shack)
a metric ruler with millimeters or a metric caliper.

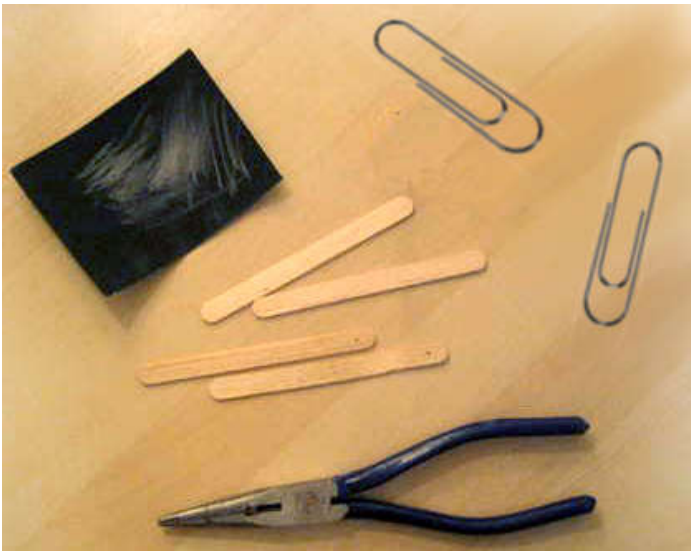


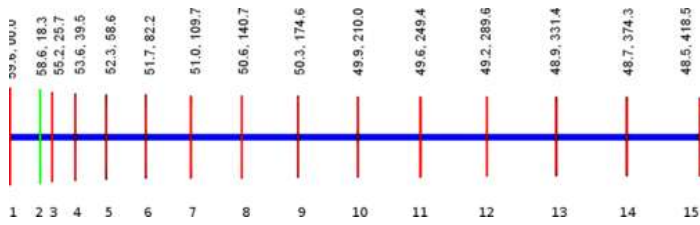
Image Notes

1. nibbler tool to easily cut paperclips without bending them.

Step 2: Building Overview

The building steps are utterly simple:

1. Print out the scaled Yagi antenna diagram (download from next step)
2. Trim paper clips and glue them to diagram
3. Trim Popsicle and glue them to diagram and paperclips, building the antenna backbone
4. Connecting the USB device to the antenna



Step 3: Printing the Yagi Diagram

The most essential point in printing the diagram is getting the correct scale. In the attached zip file below, is three png picture files.

The picture is longer than an Letter sized or A4 sized paper. So you have to print the diagram in two parts (labeled part1 and part2 in the zip file). I have included the full size diagram for you to view.

They should print to scale.

Make sure to set your printer's properties to ORIGINAL SIZE (not "best fit to page" ect..).

Print them in the LANDSCAPE orientation.

Use a ruler or caliper to measure if the print is of correct scale. You will notice vertical bars crossing the horizontal line. The vertical bars represent the Yagi "elements" which will be build out paperclips. The horizontal line is the backbone of the antenna.

You will also notice numbers next to the elements. These numbers are in pairs. The first number is the length of the element in millimeters. The second number, is the distance from the start of the diagram to the element, in millimeters.

If these numbers match your measurements, then your print is to scale and you may proceed.

Now superimpose both prints, until they match at around element 10, and tack with scotch tape or white glue.

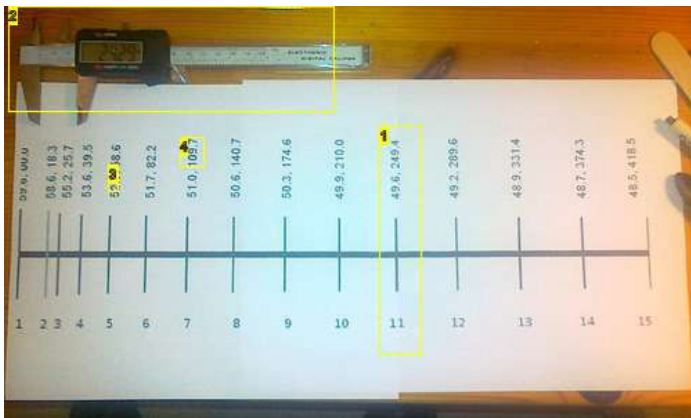


Image Notes

1. When I build my antennas, I split the file at element 11. It should make no difference make sure that the two prints align and superimpose.
2. I used a caliper to check for proper scaling. But you can use a ruler.
3. The first number is the length of the element in millimeters.
4. The second number, is the distance from the start of the diagram, in millimeters.

File Downloads



yagi_correct_for print.zip (86 KB)

[NOTE: When saving, if you see .tmp as the file ext, rename it to 'yagi_correct_for print.zip']

Step 4: Cutting the Paper Clips and Fixing Them

You have to trim the paper clips with a nibbler or plier to fit the vertical bars ("elements"). This is fairly straight forward. Lay the paper clip on the diagram's element and mark the ends with a marker. Snip at the marking.

Make sure that each element fits correctly the length of the bar on the diagram.

Fix the elements in place with crazy glue.

Leave element #2 for later. This is the element that connects to the electronics and is called "the driven element" (as in being driven by electronics).



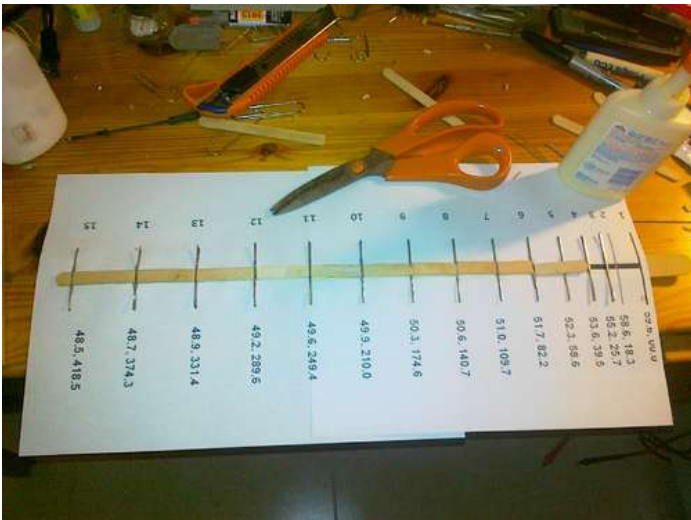
Image Notes

1. The elements are fixed in place with crazy glue.
2. Don't make an element for #2. Leave for later.

Step 5: Building the Backbone

The backbone holds the shape of the antenna. I just cut pieces of popsicle sticks and fit them between the gaps of the elements. I used white glue to fix them in place.

Start from element #15 backward. When you arrive to element #2 move on to the next step.



Step 6: Building the Driven Element

The "driven element" in a Yagi antenna, is usually the second one from the start. It is the element that connects to the USB WIFI or 2.4 GHz electronics.

It is a broken loop and not a straight wire. A loop of wire resonates at a specific radio frequency depending on its dimensions. The dimensions of the driven element in this antenna is set at 2.4GHz, of course.

It just happens that its about the size of a common big paper clip. You need to clip the paperclip so that it loops around and meet in the center but the end not touching, leaving a gap (see photo).

Fix it in place with crazy glue and build the back bone around it.

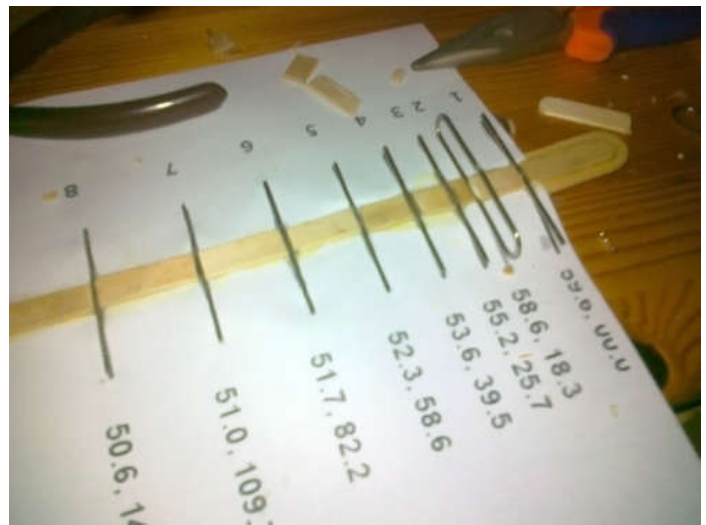
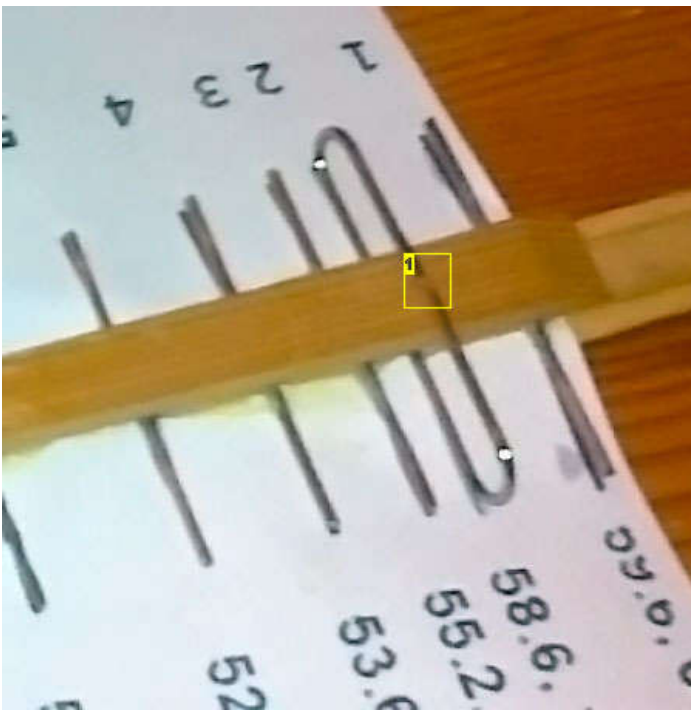


Image Notes

1. Cut the paper clip so that the end meet at the middle but don't touch.

Step 7: Connect the Antenna to the Wifi Modem

This is the most difficult part and depends on the electronic hardware you have. The basic idea is that somewhere on the electronic board of the wifi modem exists a strip antenna and you need to solder a wire between the strip antenna and the driven element.

USB WiFi modems comes either with internal antenna or with external antenna. Those with external antenna, like mine, are easier to connect. Those with internal antenna may need to have their strip antenna modified. I have included some pictures to give some ideas. You need to experiment.

In my WiFi board i did not have to modify the board itself because it had an external antenna. Board with internal strip antenna need have the strip cut at some points at illustrated in the pictures.

I have tried soldering a coax to the strip antenna and the two ends of the active element which did not work in my case. I have no explanation of why that did not work, but other DIYers that have built Yagi antennae connected their antenna in this manner. In my case, I connected a single thin strand of copper wire between the active element of the strip antenna and one end of the loop of the driven element.

Please read the annotations of the pictures for more details.



Image Notes

1. A wire is soldered between the active element of the strip antenna and one end of the driven element.

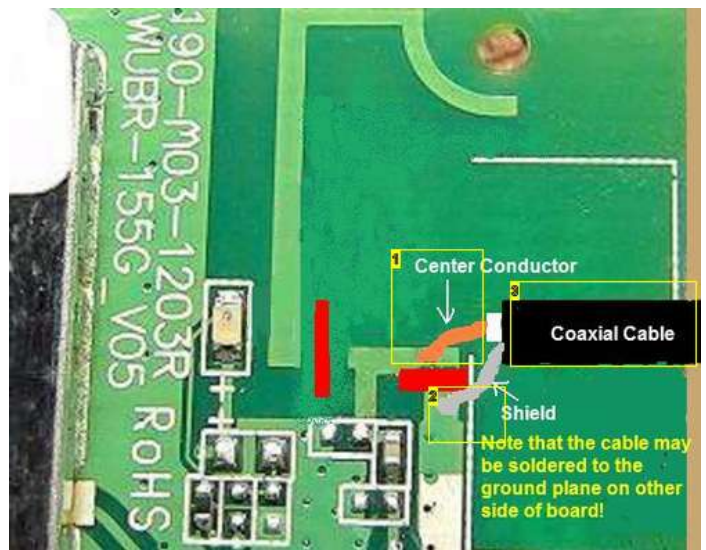


Image Notes

1. This setup did not work with my WiFi board. Simply attaching a single thin wire from the active strip to one end to of the driven element loop worked.
2. This is the ground end of the strip antenna. In my case, I did not attach it to the antenna.
3. In my case I used a single thin wire of solid copper not a coax.

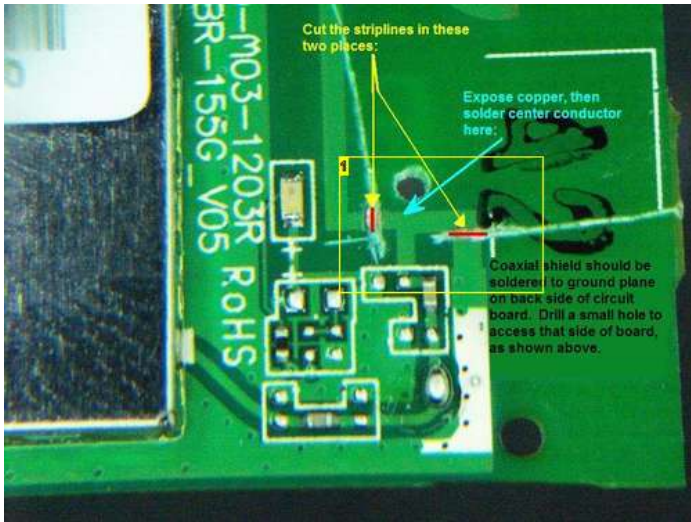


Image Notes

1. This is an example of a board with an internal antenna. WiFi board with external antennae need not have the strip modified because they have a coax cable already attached to the board. My board had an external antenna. I simply replaced the coax on the board with single thin wire of copper and attached it to one end of the loop of the driven element.

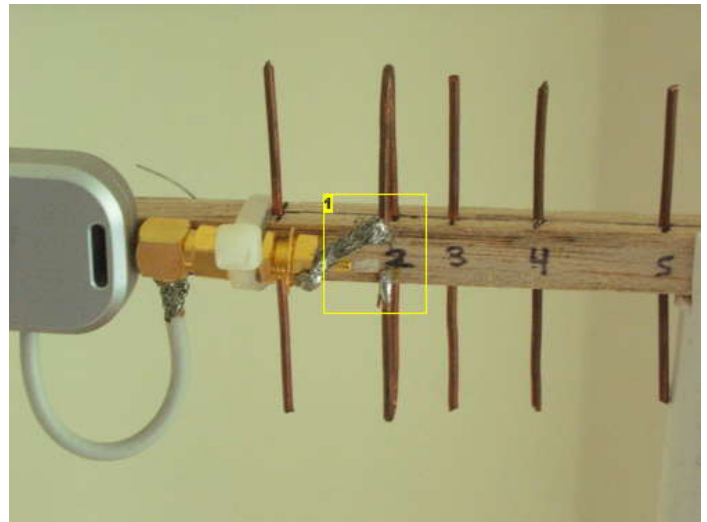


Image Notes

1. Coax soldered to both end of the driven element's loop. In my case that did not work.

Step 8: Performance

The performance was pretty spectacular for this easy to build antenna. I was able to see the WiFi of a hotel that was 2 miles away from my home. The most difficult part was connecting the antenna to the USB modem.

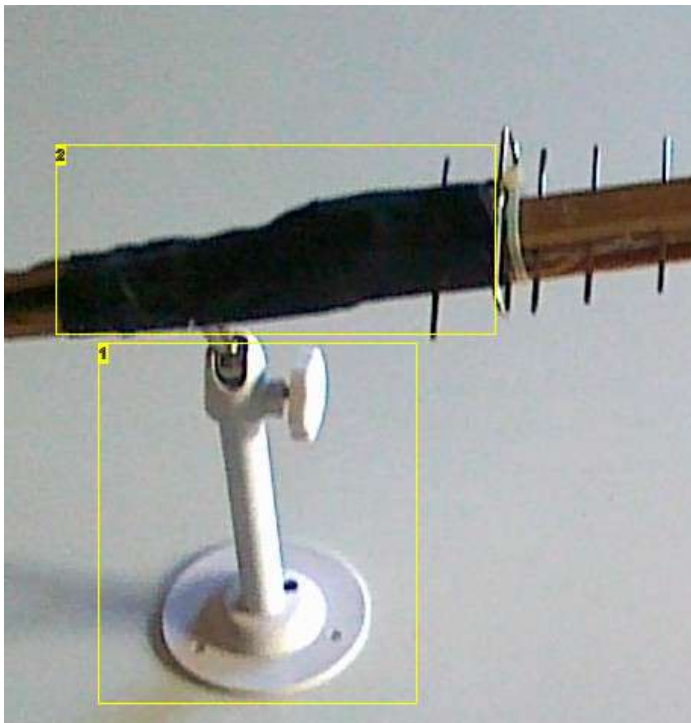


Image Notes

1. I made a stand from an old surveillance camera.
 2. I hot glued the electronics on the antenna and wrapped in heat shrink tubing.

Related Instructables



WiFi cantenna without pigtail (Photos) by TheGoodLife



Bi-Quad WiFi Antenna by TheGoodLife



The Conetenna - a wi-fi antenna by Shadetree Engineer



Wireless Internet Antenna by Shadetree Engineer



WiFi Signal Booster Wok Antenna w/ Directional Antenna from LinkSys (Photos) by liquidCo0L



Make a Wi-Fi Extender by infiniteshadow