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Mad76e - September 2, 2014, 9:20 am

[img]<http://imageshack.us/a/img90/6030/bannermo.gif>
[/img]

Cantenna, the cheapest antenna for the wireless hacker

This is one of my projects i decided to translate and rewrite for you guys. The original is an Svedish text you will find here <http://www.cantennabygge.n.nu/> . In this tut, I will go over some very basic theory, and how to build it. I cant go in normal mode here cos the math will bring most of you to your knees. for those who wishes to see an example [here](#) is a link to a PDF containing the math of hollow waveguides. Its monstrous.. However you will come a long way by not going in depth and rely on a couple of simple rules. The idea is to build the antenna, and then test it in a LOS (line of sight), and i will test it for you guys in different distances and reveal some performance.

First we have to decide what an Cantenna really is.. You can hear it by the name, "Cantenna" comes from the word "Can antenna" which is a good explanation of what we are doing. We are building a wifi antenna from a can!

In an ordinary antenna construction, it is important to get the right feed with the correct impedance! (usually 50 or 100ohm) but we will not have this problem with this model of antenna. Imagine a bottle and you blowing in it to get a tone. It is like a church organ. With the right distance away from the bottom and the right length of the dipole you will get your tone

There are many different types of waveguide antennas out there, the problem with most of them is that you need a welding-machine, and more equipment but the best part is that those are way stronger than the cantenna. Im talking about the "slotted waveguide antennas" [Here are one site covering this](#) Estimated performance is aprox 16-18dBi. We must also mention the [Bi-Quad](#) antenna aswell. I might cover the BI-quad antenna in a different tut in the future. You can use it with a satellite dish as you see on the site, but it work well just as it is. Effect without the sat disk 12-16dBi. All of these antennas are easy to build, and easy to understand, however i believe that the cantenna are the most easiest to build.

So i have used the cantenna for many years. I have used it in my wardriving days and you know, things happens and you buy stronger, better and more reliable antennas and things as this just take up unessesury place in my brain. so i decided to collect all i could about this and write you a decent tutorial

It was not long before the track led me into a closet that should remain closed. I realized pretty quickly that this type of antennas are highly prized in the hacker circles, but that does not sit equally well by the FCC (Federal Communications Commission), and the Swedish equivalent PTS (Post and Tele Styrelsen) It is not illegal to own or use a Cantenna (in Sweden) but they don't like you to use em, and if you use it to take you into someone's network without permission from the owner, and you get caught you're going to get fines for using the antenna in addition to your other charges, if they can prove that your antenna interferes with other licensed frequencies

The purpose of this tut is to show how to build an antenna and how powerful they are, the purpose is not to discuss hacking or similar (Not today anyway). I had intended from the beginning just build an antenna, but it gets two. I want to check and compare a pringelscan against another more professional, that i built entirely of aluminum. The Pringelscan/tin can is most common in hacking spheres, and I want to compare how much difference there is between these to.

So one canntenna is built by a pringelscan, the other of a thicker aluminum tubing. Why I chose a pringelscan is to the inside of this is covered with a thin aluminum foil, cheap to buy and the bottom is made of aluminum. The thin aluminum foil in the cardboard tube is enough for it to be used as an antenna. The phenomenon is called the "skin effect" and is the current that the electromagnetic oscillation we call radio waves generates, which is gaining more superficial in a metal the higher the frequency is. It is therefore important that the surface leads good and is not corroded or full of dust etc. Depending on the material that leads, best had been the gold of course, after silver copper and aluminum but tin and plate works aswell.

Is it worth the cost to build a professional Cantenna by yourself that I do in this case is doubtful, as there actually are a lot of wifi antennas with decent gain out there for \$30-\$40, but the greedy who is satisfied with a "pringelscan / a can of brown beans" will to realize that the price of manufacturing such does not exceeds \$10. The reason I chose to manufacture two cantennas is partly to compare performance. There are a lot of fantasy figures who claims 5km, 10km and 15km or more. These figures seem taken out of the air and do not have anything to do with reality

My goal will be to see if I can connect from my laptop via my mobile that I made into a wireless access point (tethering). The cons are that I can use max 1MB to download and 0.5 Mbps for data transfer via my prepaid simcard, and the the phones Wifi antenna on the phone isn't that good aswell, perhaps 2dBi or something. So every millimeter I'm right in this build will increase the chances of success. Personally, I hope that this experiment will work. It sounds a bit like a fairy tale to get any speed from 1,000 meters with such a weak signal as 2dBi, but then I never tried so do not know the result either (EDIT: But i do know)

While you are careful with millimeters, you should know that an ordinary tin can will do fine for a cantennabuid. Just check the length of the can, it must exceeds 3/4 of a wavelength. However, you should know that there are both advantages and disadvantages of a long Cantenna, more on this later. So where going to go in depth on this, and to understand anything of this you have to be good in math and in physics. Its more to this than you can imagine, however i will try to not be boring about this, and if im doing this right, this is going to be an interesting read.

Well then. back to the building .

What we need is the following .. 1 tin (Pringelscan, aluminum tin or similar metal) or even weld a pipe ..

N connector female chassis connector ..

4 M3x10mm long screws (or longer .. type M3X20MM depending on tube)

4 M3 nuts

1 x 35mm long 2mm thick copper cable

tiny bit of solde

And we may need this tools
a drilling machine

1 x 4mm and 1x 11mm drill

a center punch

hammer

soldering iron

ruler

marker.

Before we put our teeth in manufacturing, it is a lot of math and theory, we have to go through. There is a lot of thinking and planning. Without these three key dimensions of the antenna will not work or perform well. We will go through it one by one.

The inside diameter of the can

The length of the dipole (or half dipole)

And the length from the bottom to the dipole

So we start with the diameter of the can.

the inner diameter of the can is important, it is along this that the radio waves will "bounce". Too small diameter or large diameter reduces the effectiveness. The picture below shows theoretically how the radio waves will behave inside our Cantenna.

You can also see that the dipole (quartz dipole) mounted $1/4$ wavelength from the bottom. The diameter of the tube/can affects this cos when you choosing a smaller tube, it require a longer distance to travel to get a $3/4$ wavelength, and a longer distance from the center of the dipole to the bottom of the can. I will explain more in detail later. If the distance is right obtained a reinforcement of the signal (wave) will occur cos the wave that goes in or out are stored on top of each other and added each time it is reflected in the tube. so theoretical a very long tube will get you a stronger antenna.. but more about that later.

The optimum diameter for the 2400 band (wifi) is 85mm, and my advice is to stick somewhere

between 75-95mm Over 95 and under 75mm works of course, but the effect may be reduced. There is of course an upper and a lower limit where the diameter is either too big or too small. Upper limit is approximately 95mm and lower limit is approximately 75mm This is because each waveguide has an upper and a lower "cut-off frequency" where it starts to function much worse. This is called the "Cut-Off Freq. for TE11 Mode" and "Cut-Off Freq. for TM01 Mode"

However the the Wifi signal in free air is 12,5 cm so a cylinder greater than 125mm wont work any good at all..

This means that our dear pringelscan with diameter 73mm is not at all optimal, but works. I expect pretty weak performance of the pringelscan

The length of the dipole

This part that we leads and fix our copper thread in our N-connector. This copper wire which should be between 1.8 - 2.5 mm thick and shall be solded to the center pin. It it should not under any circumstances be any contact between the center pin and the rest of the contact. Make the dipole a bit too long (35mm), then we can easily correct this after it is solded . The copper thread will be our "Whistle"

[img]<http://images.staticjw.com/can/9574/image011.jpg>[img]

[img]<http://images.staticjw.com/can/2282/image013.jpg>[img]

What determines the length of our dipole is the wave propagation speed in the thread, called Velocity Factor. It depends on the dielectric constant of the medium surrounding the wire. A naked wire in air with nothing except air as insulation, so when we calculate this we must not assume the speed of light 300k in vacuum, we must count speed of light in air from 299.7k when you count the length of a conductor surrounded by air. The wavelength therefore 299.7 divided by frequency and then divided by four if you should have a quarter wave ($299.7 = \text{speed of light in air} / 2,4\text{gigahertz}$ speed of WiFi / 4 for a quarter wave) = 31,2mm. This is the theoretical length. But then things like channel counts.. so we end up somewhere between 29-31 mm. 30mm is a good start.

Another way to figure out the same thing is this. The length of the dipole should be $299.7 / x$ frequency conduction velocity in the material (about 0.95 for copper) divided by 4 for a quarter wave. At 2450 MHz the dipole will be 29,65mm

The length from the bottom of the can to the center of the N-connector

The length is supposed to be a quarter of a full wavelength inside our can. Radio waves tend to do some strange things when they are in contact with the metal, first off they bounce, but they will also change the ratio of the wave depends on the diameter of the pipe, as you can see below, so in a way theoretical it moves faster than light, but im sure some professor can shed a light on that one moa he he he he, i know there must be an explanation, but that part i haven't figured out yet.

So if we change the dimension on our tube, our wave become longer or shorter depending on the dimension, so the smaller tubes used, ie, the wave becomes longer. As a wavelength of a pringelscan becomes $8,58\text{cm} \times 4 = 34.2\text{cm}$ while the wavelength in a can with a 10cm in diameter is $4.44 \times 4 = 17,66\text{cm}!!$

Below you have the diameter of the tube and where you will find $\frac{1}{4}$ wavelength. D= Inner Diameter

Code D=73mm 85,8mm (pringelscan)

D=80mm 70.1mm

D=81mm 67.5mm

D=82mm 64.5mm

D=82.5mm 63.3mm

D=83 mm 62.1mm

D=84mm 59.9mm

D=85mm 58.1mm

D=90mm 51.4mm

D=95mm 47.2mm

D=100mm 44.4mm

The length of the can!

The only important measurement here is that the can MUST be at least $\frac{3}{4}$ wavelength. After that its just to experiment by adding $\frac{1}{4}$ wavelength until you're happy. If the distance is right obtained a reinforcement of the signal (wave) will occur cos the wave that goes in or out are stored on top of each other and added each time it is reflected in the tube. While the effect is strengthened by its length, the worse the beamwidth will be. Imagine the difference between a 3degrees Beamwidth and 25degrees. The further away you pointing your antenna on, the worse its going to be. Example 200 yards away and moving the cantenna 1mm you will not notice anything with an cantenna that have a 25degrees beamwidth. but the one that has a smaller beamwidth you will lose connection. you need a tripod and windless day, and some pure luck to use.

It is true that the longer your antenna is the more profit you will get. however, It reduces the gain slightly after 6 or 7 wavelengths and it is not important to have a longer antenna than that. The disadvantage is that it becomes a total nightmare to target anything, its going to be like a damn laser beam, we have to go half way. Here are an bad example, a wavelength on a pipe with inner diameter of 84mm is about 24cm, which means that we would have an antenna that is 6 wavelengths, which is 144cm! You understand that it would be completely impossible to use it against anything,

So use a length that feels comfortable to work with. Minimum recommended length of a fully functional Cantenna corresponds to a wavelength of $\frac{3}{4}$ but I think that its somewhat weak. A wavelength should be used. But please do not be longer than 50cm how tempting it may be. For each dm it gets longer, it becomes increasingly difficult to target. If you are compelled to want a really long antenna so I suggest that you mount any kind of laser pointer on the pipe, and arms you with a pair of binoculars if you plan to use it at long range.

Most canned foods that you buy today may be a little short (for $\frac{3}{4}$ wavelength), and to solve this "little" problem, we buy just two cans that we either plumbs together with a little tin or welds, depending on matreal in the can. The poor man's solution "tape" together two cans work, but should not be used. If you still want to use this method, ensure that the two cans in contact with each other, it can easily happen that they end up losing touch with each other, and you will lose performance

If you choose I Aluminum tubes so there are a number of companies that sell aluminum tubing Email them as they sell both pipes per meter and after the customer's wishes

Please note that it is the interior dimensions of the tube that is of interest to us (Aluminum tube 90mm. Thickness 3 mm = $90-3-3 = 84$ mm)

$\frac{3}{4}$ of a wavelength of a minimum length required for the antenna to operate. D= Inner Diameter

Code D=73mm are 3/4 wavelength 257,5 mm (pringelscan)

D=80mm are 3/4 wavelength 210,3 mm

D=81mm are 3/4 wavelength 202,5 mm

D=82mm are 3/4 wavelength 193,5 mm

D=82,5mm are 3/4 wavelength 189,9 mm

D=83mm are 3/4 wavelength 186,3 mm

D=84mm are 3/4 wavelength 179,7 mm

D=85mm are 3/4 wavelength 174,3 mm

D=90mm are 3/4 wavelength 154,2 mm

D=95mm are 3/4 wavelength 141,6 mm

D=100mm are 3/4 wavelength 133,2 mm

Ladies and gentlemen ... Let me introduce David and Goliath .. I ordered 420mm but accidentally got 500mm! I'm not complaining .. :) Since I do not have a precision saw, I get to make it a bit longer than I originally thought :)

[img]http://images.staticjw.com/can/7968/image015.jpg[/img]

Theoretically im hoping to get a directional antenna that has between 10-12dBi, it all depends how thoroughly I'm with the tenths on my millimeters. The pringelscan (extended version) has slightly lower performance, perhaps 5-9 dB partly because the diameter is not optimal, partly because it goes into more wavelengths in the aluminum cantenna. The more wavelengths you get in, the stronger it becomes.

Mad76e - September 2, 2014, 9:24 am

Amplification

The Idea of to getting an better antenna is that you want to get better reception. No matter if it is a 3G antenna or antenna to your TV, they work in basically the same way. Even in the wireless world, the term dB (sometimes even dBi) is used when talking about amplification

My monster antenna in aluminum provides more than 12dB, but things like contacts joints and length of the cable dampened the gain down a bit. Unfortunately, the longer the antenna cable (pigtail in this case) you have, the more power is lost, so to bet a buck or 2 on the right low loss cable, and a try to use as short cable as you can.

Small table ..

3 dB 2 times amplification

6 dB $2 \times 2 = 4$ times amplification

9 dB $2 \times 2 \times 2 = 8$ times amplification

12 dB $2 \times 2 \times 2 \times 2 = 16$ times amplification

So normal people understand .. a "6dB gain" is the same as cutting the distance to the router in half. If you were 1 km away from the router with you current antenna, (in a line of sight) and change it with an antenna that's given you "6dB gain". it will be the same thing as you stood 500m from the same router with your old antenna. The closer you are the better coverage and data you have in theory.

calculator

There are a number of sites that offer a calculator to figure out the dimensions, then you may have found a can of measurement other than those I have given here.

<http://www.wikarekare.org/Antenna/WaveguideCan.html>

<http://kioan.users.uth.gr/wireless/cantenna/>

Finally we passed theory, now its time to practice what we leaned

Now is the time to practice what we learned so far. The principle is the same for any of the cans/tubes/pipes you choose. My favorite is the pringelscan, but you may have already caught on to something different, perhaps canned goods "Doles pear slices" or something else, so be it. First we head to the supermarket and buy ourselves a can or tube. The can may be a pringelscan or even a tin can with the minimum diameter between 7,5-10cm, and of course so long as you can. (minimum 3/4 wavelenght tho)

If you go with a pipe you have to wield a plate in the botton in one of end of the pipe. It does not need to be airtight tho. but you have to fix it tight cos it should never be a gap (1-2mm) between the pipe and the plate

... and then we head to the hardware store. Where do we get the M3 screws and nuts and a little solder. We buy a copper thread and N-connector on the hobby shop, possibly at a retailer that deals with radio traffic

[img]http://images.staticjw.com/can/1749/image019.jpg[/img][img]http://images.staticjw.com/can/9027/image060.jpg[/img][img]http://images.staticjw.com/can/2282/image013.jpg[/img]

Ohh regarding the copper wire, it doesn't matter if it has a silver coating or not as long as the leading thread is 2-2,5 mm thick

After we emptied the pringelscan on its content (Buurp!), We must measure and drill holes for the N-terminal. We can start by scribing a mark, possibly making a smaller hole first with an awl before we drill. You need 11mm drill bit to the N connector and 4mm for the fixing screws. The second thing we must do is to solder the copper wire

[img]http://images.staticjw.com/can/9910/image064.jpg[/img][img]http://images.staticjw.com/can/9574/image011.jpg[/img]

When the thread is finally solded and cooled, it's time to shorten it to the appropriate length. We measure the entire length of the wire down to the bottom of the N-connector, and cut it at the right length, then we attach the N-connector in the can . Please note that I choose the M3 screws with countersunk heads, cos I want to have as little metal as possible to stand up inside the tube cos that can cause interference. The nuts are always fixed on the outside :)

[img]http://images.staticjw.com/can/1700/image003.jpg[/img][img]http://images.staticjw.com/can/1013/image030.jpg[/img]

Important regarding the pringels-antenna

When repeating performance tests was not to the satisfaction, I have come to a conclusion that 25,5cm is too small to work without a front catcher, so to fix this, we had to either screw together a front collector or tape on another pringelscan, and im to damn lazy to do this, so im going to cut the bottom and tape in another pringelscan. Here is a picture of a front catcher and a picture of how the antenna looks after you extended it. and now it works as it should. It seems that 3/4 of a wavelength becomes really 85,85mm x 3, ie 257,55mm. An single pringelscan is unfortunately only 255mm (-3mm when the bottom of the can is Countersunk..)

Now what?

The antenna itself is now finished and we are ready to use the antenna. What we need is a so-called Pigtail. A pigtail is an converter with a wire in between. This cable is connected between your USB adapters RP-SMA connector and the antennas N-connector. What you do is you screw of the antenna on your Wifi-adapter and replace the cable in the same location as the antenna was. Note that different antennas have different connectors, you must be aware of the relationship that you have on your wireless card before ordering. The one I will use looks like this .. and is about 50cm long.

[img]<http://images.staticjw.com/can/5423/image032.jpg>[/img]

[img]<http://images.staticjw.com/can/5468/image001.jpg>[/img]

[img]<http://images.staticjw.com/can/2271/bild-5.jpg>[/img]

Oooh.. I want more therory, i want to improve my cantenna

Well, there is a couple of things you can try before making the antenna. You can optimize it for a specific channel. In that case were going to use a specific hight on the dipole and shift the position of the N-connector

In Europe, the Wifi in 2400 the band are spitted in 13 channels. For all these channels, you can only optimize for 1 with a Cantenna. It works on all channels, but works best on the channel you selected .. The length of the dipole from the bottom of the N-connector to the top is very thoroughly down to the 100th of a mm. With 90% of the Swedes insist on running their routers on auto so they end most on either on channel 1 or 6, so my tip is to optimize for channel 3 when you have performance on both Channel 1 and 6

Length on the dipole, these are the same no matter the diameter of the tube

Code channel 1 = 31,318mm

Channel 2 = 31,008mm

Channel 3 = 30,994mm

Channel 4 = 30,880mm

Channel 5 = 30,817mm

Channel 6 = 30,754mm

Channel 7 = 30,691mm

Channel 8 = 30.628mm

Channel 9 = 30,566mm

Channel 10 = 30,503mm

... and so on

However the Height from the bottom of the can to the center of the N-connector varies unfortunately, depending on diameter of the can, so

Code 85mm = the difference between channel 1-13 is 5.014mm Channel 1 begins at 60,295mm and ends on Channel 13 on 55,280mm

84mm = the difference between channel 1-13 is 5.510mm Channel 1 begins at 62,397mm and ends on Channel 13 on 56,866mm

83mm = the difference between channel 1-13 is 6,116mm Channel 1 begins at 64,825mm and ends on Channel 13 on 58,708mm

82mm = the difference between channel 1-13 is 6,872mm Channel 1 begins at 67,668mm and ends on Channel 13 on 60,795mm

81mm = the difference between channel 1-13 is 7,838mm Channel 1 begins at 71,051mm and ends on Channel 13 on 63,213mm

80mm = the difference between channel 1-13 is 9,106mm Channel 1 begins at 75,161mm and ends on Channel 13 on 66,065mm

Damn! I already built it you dumb fuck! so what can i do!

Well we can improve it still by attach a funnel to your Cantenna. The funnel provides amplification from 3dB with a double diameter of the funnel (to clarify .. is the inside diameter on the can 8cm so will funnel inner dimension being around 16cm to get the 3 dB extra) The optimum angle is 30° advantage of the funnel is that it somewhat easier aligning the antenna. Talk to someone who works at a metal company that can make a funnel .. I want to point out.. You don't get the gain of 3dBi antenna but you will get 3dBi better results on the routers that you connect to with a funnel. so 4x will give you 6dBi however im not sure that more than 4x Diameter will preforms better than 6dB, just simply cos i don't had the chance to test :)

The cantennan will now change name to a Horn

[img]<http://images.staticjw.com/can/2832/image049.jpg>[/img]

This is how my monstecantenna looks today. Its an old pic. the funnel are 4 X 85 mm = 340mm diameter on the funnel

[img]<http://images.staticjw.com/can/2591/pict0061.jpg>[/img]

Mad76e - September 3, 2014, 8:55 am

Tests

To test our stuff, we need to find a comfortable distance to try .. "Line of Sight" is desired but I would like to keep track so no one with long fingers decides to pick my equipment. As I mentioned before, I intend to try to use my phone as a tethered router, and i know that the WiFi-signal isnt the best, but i still hope i can make something out of it.

The distances I intend to try is 180meter, 414meter, 580meter, 919meter, 1003meter and 1044meter, and possibly a bit more. Finding 1000meter "line of sight" proved to be a hard nut to crack, and I had to resort to Google Maps to find it. Reason for these odd dimensions is that I selected these sites because they are a bit remote and does not attract to much attention. I would rather stand in a place that gives less attention than a place that definitely catches one's interest

To stand with computer and Cantenna on the roadside involves some risks and some prying eyes. So some of these tests may be made on the darker hours of the day. I do nothing illegal with what I do, but I do not want the whole village where i live whisper around and speak ill about what i do. It's

so easy for stuff to be a hen of a feather in this village. And soon you have a whole bunch of "idiots" who think I hack every wireless accesspoint in the village (with i do, but that has nothing to do about this LOL) So far I have not solved how I will do to keep the antenna steady. I need some type of device that can keep it still like a tripod. I have a temporary rig clear that I will use during the tests, if now nothing shows up

Note: Picture was taken before the funnel was manufactured
[img]<http://images.staticjw.com/can/4278/p7120208.jpg>[/img]

The Aluminiumcantenna

When the performance is so very far apart, I decided to divide the tests. First, we test the aluminumcantenna, and then we take pringelscantenna. The pringelscantenna are actually quite a few inches longer than alumiumcantenna with the extra extension I made to it

First test 580meter.

The aluminumcantenna is only used in this test, the router does not show up in the program called "SSIDer" with oginalantenna (4dB antenna), and the pringelscantenna was not tested at this distance when I was parked right outside the kitchen window next to a house and did not want to be left on the site for longer than necessary because I wanted to avoid the prying eyes

The distance is a bit surprising 580 meters according to the Eniro maps, but it was by far the best place. A track in inSSIDer showed that the router renamed to "Test" was around 80dB, which is not at all desirable, but I'm sitting in a car, and direct it through the rear window and some bushes covers partly the way. The router (mobile) have low 2dB gain. So even though it's the good numbers. According to the manufacturer, it is about 4 times longer than the original antenna on 4dB can handle.

[img]<http://images.staticjw.com/can/2277/karta.png>[/img]

But when i run speedtest I get pleasantly surprised, at the same time it feels a little weird. I had expected a slightly lower speed when I have that reception, but no! Please note that mobile broadband is limited to 1Mb / s DL and 0.5Mb / s UL. It is also interesting to note the average high ping time despite the distance

[img]<http://images.staticjw.com/can/2783/2053541147.png>[/img]

Second test 930meter

The test started off a little shaky, and I thought at first that I would not be able to perform the test because it does not want to connect properly. In the end, after I restarted the computer, I got a reception. InSSIDer telling me that I have a lousy reception, 89-90dB and Windows tells me that I have two bars in reception.

[img]<http://images.staticjw.com/can/9144/930.jpg>[/img]

Interestingly, the speedtest, here you can see some difference with the previous test, the biggest difference is on Upload. Here it is important to mention that even though it obviously works to surf against a 2dB router at this distance, it is not optimal, and nothing I would recommend to try, or even brag about. Pringelscantennan does not work on this distance, its simply too weak.

[img]<http://images.staticjw.com/can/9532/919.png>[/img]

Third test 1044meter, 1st attempt .. First failure ?!

This test was as I said already pretty skeptical against before i started this, cos the cell phone is not built to be a router, and that it may only provides about 2dBi. But there is a twist to the story. InSSIDer does find the router!! :) and I can see that it is between 93-95dB I had not expected this, I was expecting a blank page .. Windows 7 will also find the router but it fails in the handshake, so the result is that it links up and down all the time. I was therefore unable to do any testing at this distance. Therefore, I can say with quite a large probability that had there been a router with a 4dB antenna or better, I would have undoubtedly been able to get a working link to this distance for a speed test.

(Note: I will return to this test, as I afterwards came on what the error is,) However, it will not be in the same place then for some reason, very heavy traffic has been driving on this road at night, so I really do not . but it is better to flee than bad fencing with questions and answers that they still do not understand. and for this test i do have the funnel on!

[img]<http://images.staticjw.com/can/9501/untitled.jpg>[/img]

Fourth Test 1003meter with funnel

That said, this was not easy to get started, but finally I got it up and running. Here are the limits of this antenna. InSSIDer saying 90-92dB. Although the Speedtest behaves as expected. Windows shows a bar in reception

[img]<http://images.staticjw.com/can/6162/1000.png>[/img]

While I note the facts that it's crappy reception at this distance, I am overjoyed that I burst the kilometer with a home made antenna, additionally directed to a mobile phone that has an app that makes it into a router of about 2dB is completely fucking crazy

[img]<http://images.staticjw.com/can/5828/100a1.jpg>[/img]

The Pringels cantenna

Well i got problems from the start with this so i decided to do only one test. This shall not be considered a failure tho, cos this antenna preforms almost 3 times greater than the original 4dBi antenna

Prolonged pringelscantenna 414meter

The test took a while to do. The main reason to this is the nightmare to aim probably because I extended it a little to

much. Not that the connection malfunctioned, but as i said it was difficult to target the router cos the Beamwidth are quite small. But the test was successful. InSSIDer says 89-91dB, I hid the cell phone in a bush LOS, so that into account, I'm still pretty happy to get a connection.

[img]<http://images.staticjw.com/can/9379/cantenna.jpg>[/img]

As you look at speedtest, I have a lot of problems with the Download speed. I do not think I try the longer distance than this. Maybe, maybe, maybe I can get a 30-50 meters more, but that's the limit, cos the nightmare to aim

NOTE to myself: The smaller diameter on the can the smaller the Beamwidth become aswell especially when using 2 pringels-cans (facepalm)

[img]<http://images.staticjw.com/can/6182/cantenna1321.png>[/img]

The difference between "original antenna 4dB" and the Pringelscantenna

So finally a test to determine the difference between the original antenna and the pringelscantenna distance is staggering 180 meters :) just on the edge of what the original antenna can handle. The Original antenna can not preform here, which we already know. Inssider says that is between 87-91dB, and it's really bad for this type of antenna. But to connect to the router did not work. it drops the connection as soon as it was connected

[img]<http://images.staticjw.com/can/6236/180meter.png>[/img]

However, it is a different show with Pringelscantenna. We get two bars on the windows and in inSSIDer we have 75-85dB. Speed Test can be performed.

[img]<http://images.staticjw.com/can/4188/2067484865.png>[/img]

This is all i had for you this time!

Troye - September 4, 2014, 11:05 am

Great job on this thread, noob. It will help a lot of people.

PinkPanther - September 4, 2014, 11:36 am

Nice guide Mad! I've always been afraid to construct a waveguide antenna because of the tight tolerances, but it looks like you managed it!

HIGH PAID FELLA - September 4, 2014, 11:40 am

Really nice, my nephew bought some wifi-cracker shit for 50eu without asking me. ?

Anyways gj.

-zERaIT - September 4, 2014, 11:47 am

Well written tutorial, goodjob!?

Mad76e - September 5, 2014, 8:23 am

Thanks guys, if you have any qrestions, just ask

archangel.dmitry - September 6, 2014, 12:02 pm

Great thread. But, could you test using file transfer rather than speedtest? It should show time stability of signal.

Mad76e - September 6, 2014, 2:02 pm

(Sep 6, 2014 12:02 PM)archangel.dmitry Wrote: [\[CITE\]](#) Great thread. But, could you test using file transfer rather than speedtest? It should show time stability of signal.

Hmma.. I didn't think about that.. Next time i do i will try it as well.. I might do some changes later on..

Thanks for the tip

?Nuski - September 6, 2014, 6:07 pm

Nice guide looks very professional and is very detailed

Mad76e - September 8, 2014, 9:26 am

(Sep 6, 2014 06:07 PM)Nuski™ Wrote: [\[CITE\]](#) Nice guide looks very professional and is very detailed
Thanks Man! much appreciated :)

I may update this soon (if i got the chance to do so, i need to get the equipment together again and my shoulder hurting like hell for weeks now)

R3V1V3Dsu - September 8, 2014, 1:31 pm

Nice build. I'm trying different kinds of antennas currently, like the yagi and some patch antennas.

Today - September 8, 2014, 9:23 pm

Would Love to see this in a PDF version mate. Great thread.

AURUM - September 8, 2014, 10:52 pm

Very HQ thread. I will make it into a pdf if you will allow me. thanks :)

Mad76e - September 16, 2014, 2:44 am

(Sep 8, 2014 10:52 PM)sp4ceRH1N0 Wrote: [\[CITE\]](#) Very HQ thread. I will make it into a pdf if you will allow me. thanks :)

Well go ahead.. You got my permission :P

Just post a link to it in here

HIGH PAID FELLA - July 23, 2015, 3:23 am

Bump for this very naice thread of Mad.

Mad76e - July 23, 2015, 7:01 am

Guys. Im going to make a clean PDF off this thread , and add some more info to it.. If you want to buy that I will take \$5,(look at e-book bazaar) or hit me up with a PM for a discussion. ..

5tax - July 27, 2015, 4:37 am

Huge guide and visually apealling, thanks a lot