I want to see farther

XFocus Team

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X'con 2005

Something you needed

- **Devices**
  - **Wifi Card**
  - **Bluetooth Doggle**
- **Antennas**
  - **Beam Antenna**
  - **Omni Antenna**
- **Pigtail**

Chose your wifi card

- **Chipset & Compatibility**
  - **Support monitor/master mode ?**
  - **Support packet injection?**
  - **Support linux ?**
    - **Ndiswapper is great, but it's no help for us.**
  - **Support Wireless Extensions ?**

Chose your wifi card

```
[root@TOMB tk]# iwlist wifi0 scanning
wifi0     Scan completed :
          Cell 01 - Address: 00:11:22:33:44:55
                    ESSID:"research"
                    Mode:Master
                    Frequency:2.462 GHz (Channel 11)
                    Quality:0/70  Signal level:-53 dBm  Noise level:-86 dBm
                    ……
[root@TOMB tk]# iwlist eth1 scanning
eth1      Interface doesn't support scanning : Operation not supported
```

Chose your wifi card

- **Transmit Power**
- **Receiver Sensitivity**
- **Connector included ?**
  - **Easy to modify?**

Chose your wifi card

- **802.11b**
  - **Prism Chipset**
    - **Senao SL-2511CD PLUS EXT2**
    - **ASUS WL100**
  - **Realtek RT8180 Chipset**
- **802.11g**
  - **Atheros Chipset**
  - **Ralink RT2500 Chipset**

Chose your wifi card

- **Lucent Family**
  - **Agere(ORiNICO) & Avaya**
  - **OEMs**
- **Cisco Air-LMC350 Series**
  - **Air-LMC352**
- **Broadcom & TI Chipset**

Trap !

- **Pay attention to Hardware Rev !**
  - **eg: D-Link DWL-650**
    - **DWL-650(A1-J3)**
    - **DWL-650(K1)**
    - **DWL-650(L1/L2/M1/P1)**

  - **LinkSys WPC11、SMC 2632W……**

Chose your bluetooth

- **Easy to modify?**
- **Transmit Power**
  - **Class I** 100mW(+20dBm) 100m
  - **Class II** 2.5mW(+4dBm) 10m
  - **Class III** 1mW(+0dBm) 1m
- **Receiver Sensitivity**

Power	Model	Manufacturer	Sensitivity
Class I	MS-6967	MSI	-90 dBm
Class I	BT3030	TECOM	-76 dBm
Class I	F8T001	Belkin	-80 dBm
Class I	BT-700	Acer	-70 dBm
Class I	USBBT100	LinkSys	-80 dBm
Class I	USBBTC1A	Billionton	-80 dBm

Chose your bluetooth

- **Compatibility**
  - **CSR**
  - **BroadCom**

```
[tk@TOMB ~]$ sudo hciconfig hci0 features
hci0:   Type: USB
        BD Address: 00:11:12:33:44:55 ACL MTU: 128:8 SCO MTU: 64:8
        Features: 0xff 0xff 0x05 0x00 0x00 0x00 0x00 0x00
                <3-slot packets> <5-slot packets> <encryption> <slot offset>
                <timing accuracy> <role switch> <hold mode> <sniff mode>
                <park state> <RSSI> <channel quality> <SCO link> <HV2 packets>
                <HV3 packets> <u-law log> <A-law log> <CVSD> <power control>
```

Chose your antenna

Enough gain

Gain (Sender)	Gain (Receiver)				
	18dBi	14dBi	8dBi	6dBi	5dBi
18dBi	3.4 miles	2.5 miles	1 mile	1100 yards	656 yards
14dBi	1.5 miles	1.5 miles	1 mile	874yards	656 yards
8dBi	1100 yards	1100 yards	1100 yards	874 yards	656 yards
6dBi	874 yards	874 yards	874 yards	874 yards	656 yards
5dBi	656 yards	656 yards	656 yards	656 yards	656 yards

Chose your antenna

- **Easy to take**
  Easy to find
- **Proper size**
  Proper price

Arecibo, 305m

Chose your antenna

- **Hertz antenna**
  - **Half-Wave Dipole**
- **Marconi antenna**
  - **Quarter-Wave Monopole**

Chose your antenna

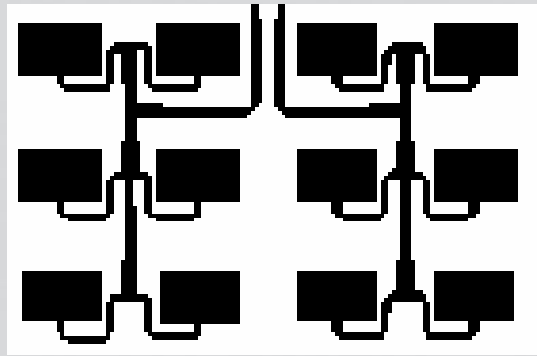
- **Yagi Antenna**
  - **10 dBi ~ 16 dBi**
- **"Flat Panel Antenna"**
  - **5 dBi ~ 24 dBi**
- **Homemade Antenna**
  - **Good pastime**
  - **No bad gain**

Yagi Antenna

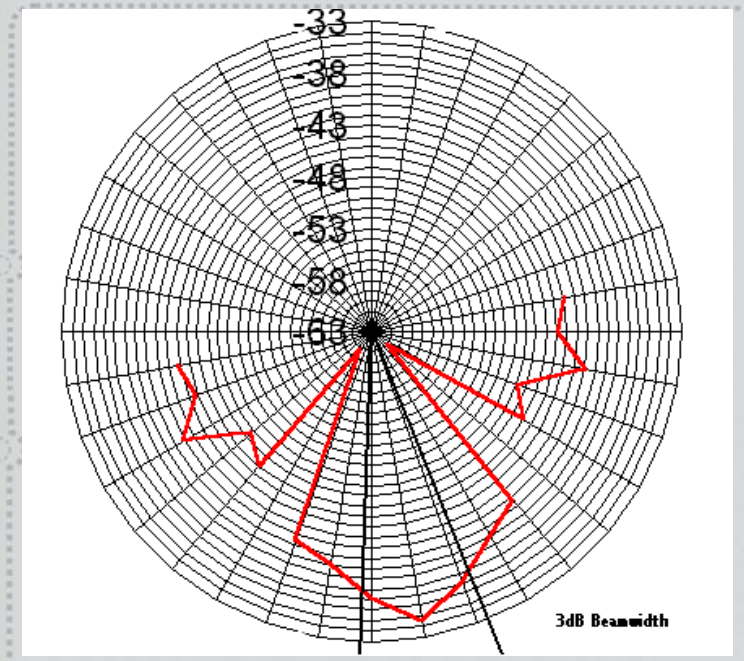
- **Hidetsugu Yagi & Shintaro**
- **Cheap price**
  Acceptable size
- **Medium gain**

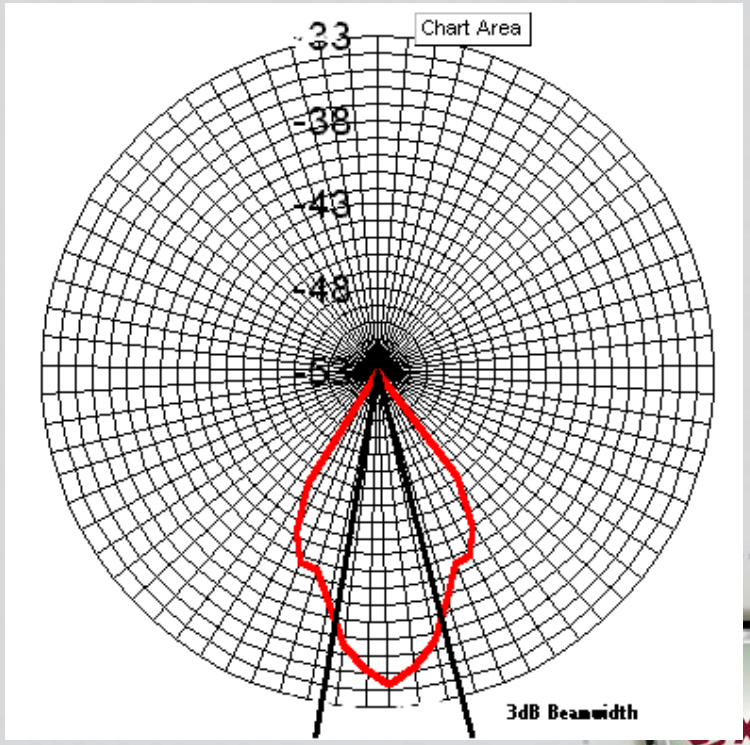
“Flat Panel Antenna”

- **Could more than 20dBi**
- **Portable**
- **Maybe expensive**



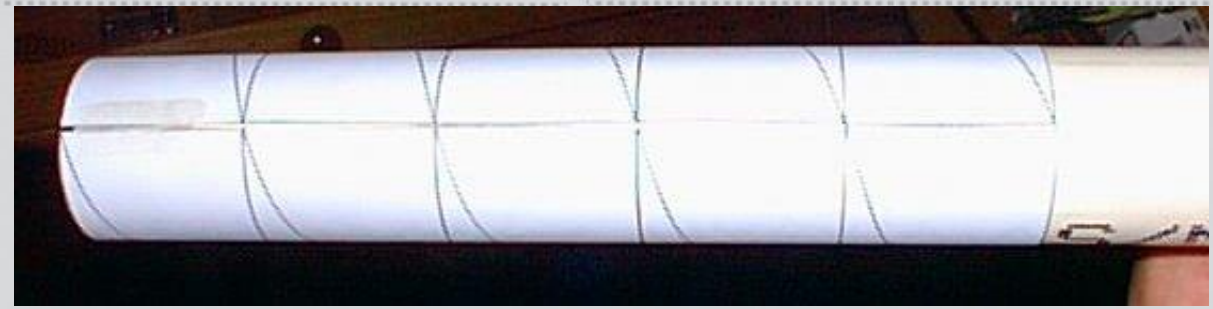
Homemade Antenna

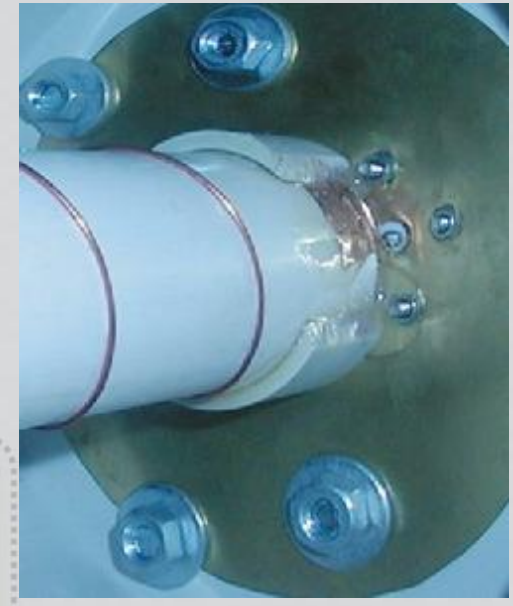


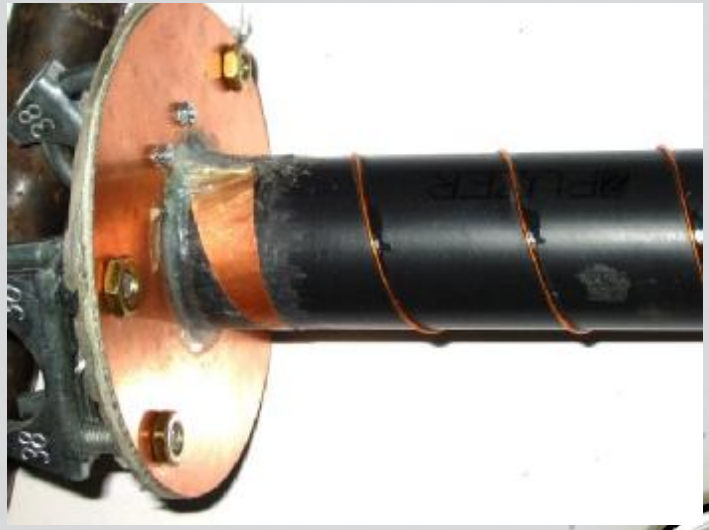


Homemade Antenna

Homemade Antenna







Homemade Antenna

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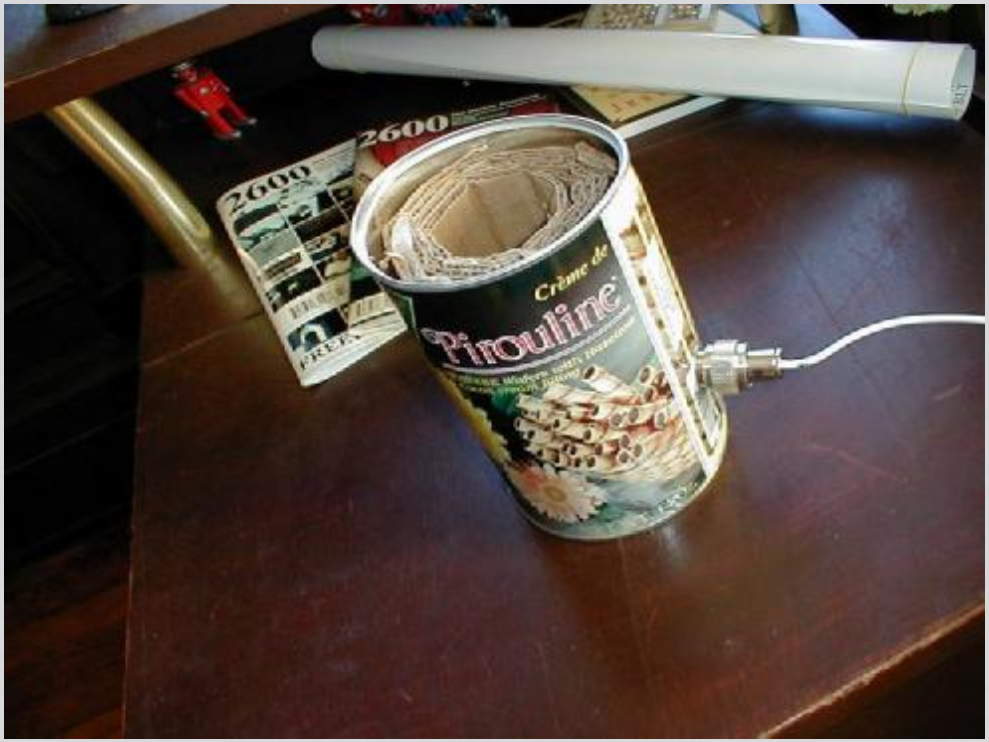
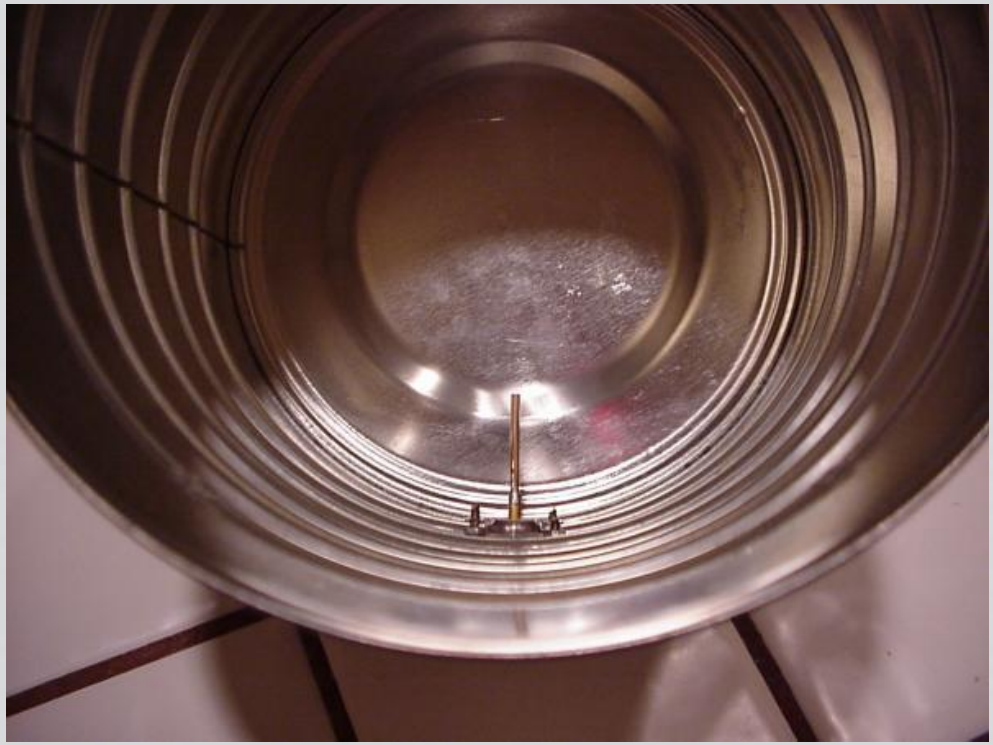


Homemade Antenna



Homemade Antenna

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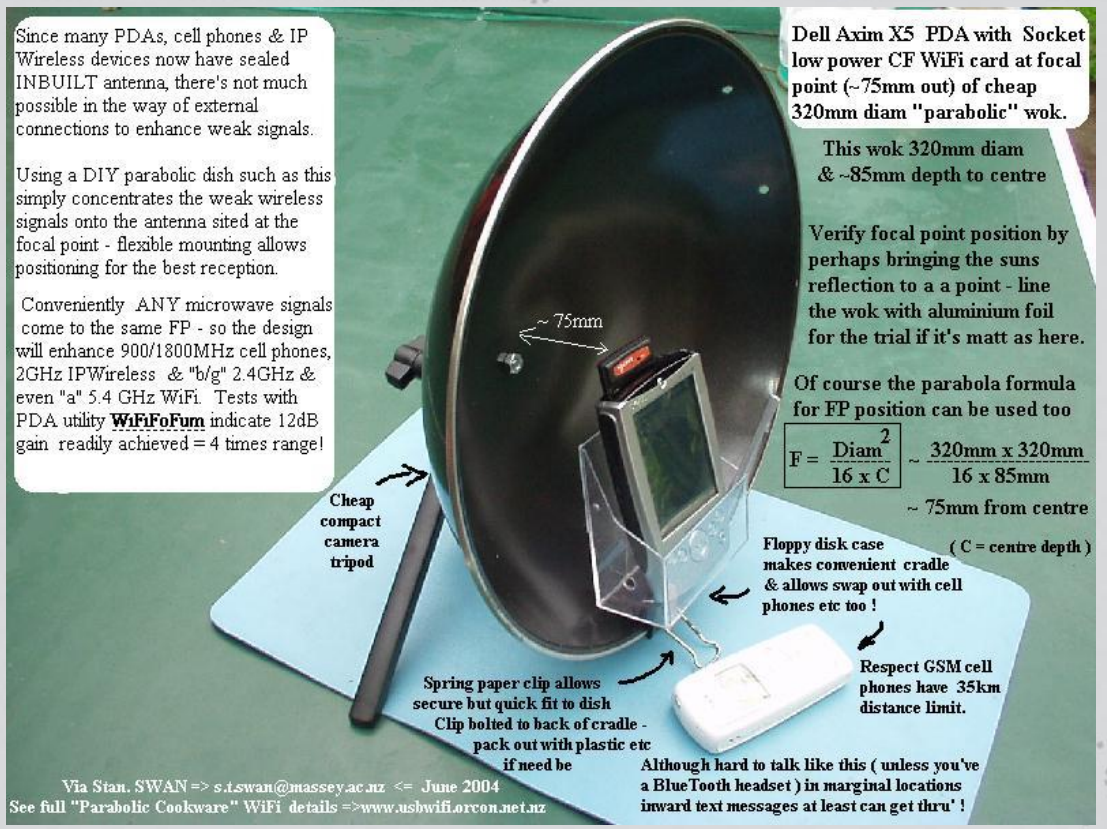
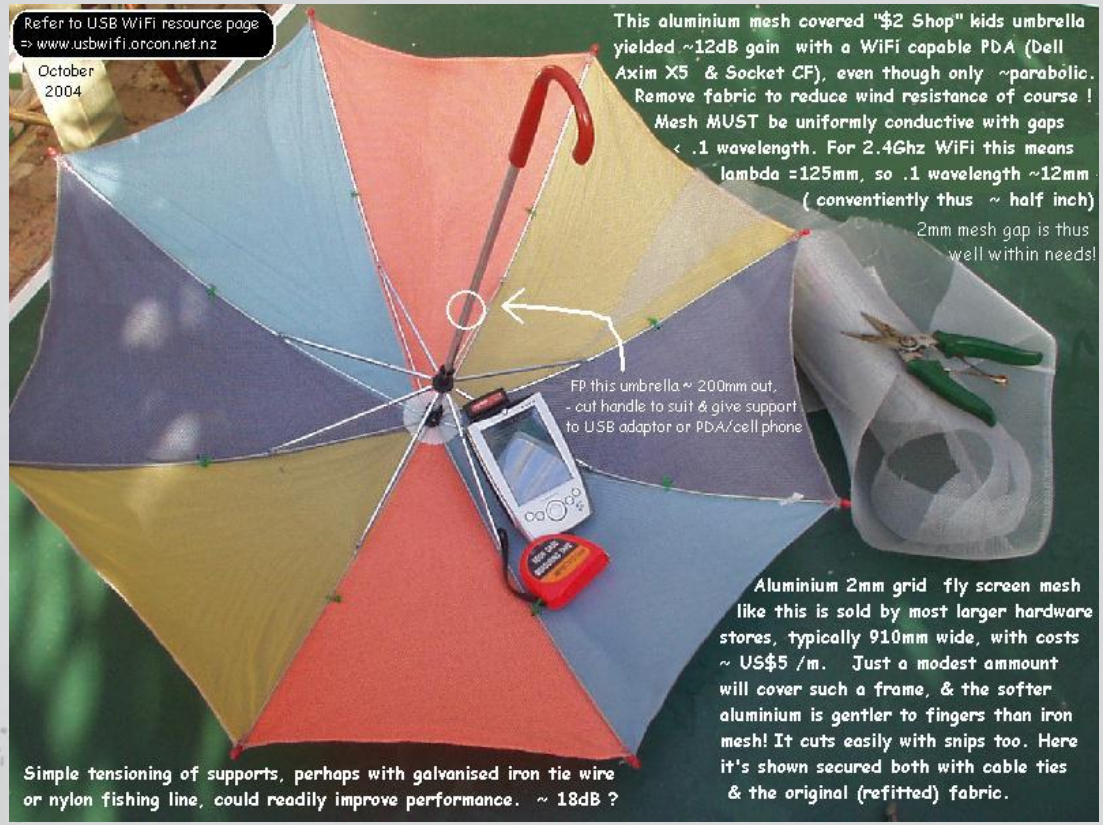
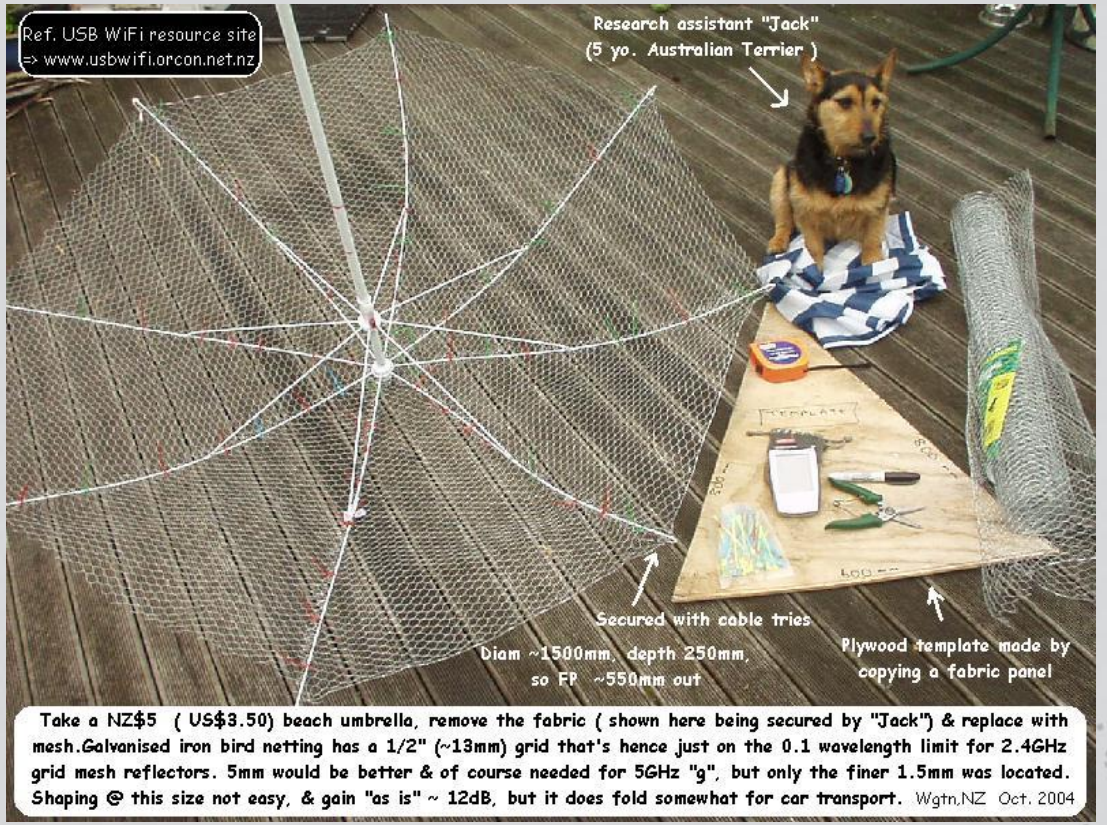


Homemade Antenna



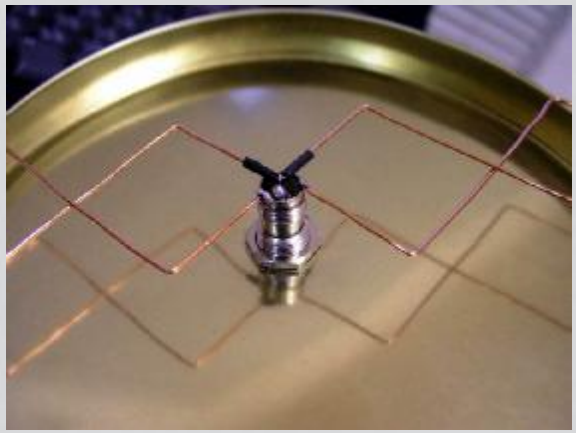
Homemade Antenna



Take a NZ$5 (US$3.50) beach umbrella, remove the fabric (shown here being secured by "Jack") & replace with mesh.Galvanised iron bird netting has a 1/2" (~13mm) grid that's hence just on the 0.1 wavelength limit for 2.4GHz grid mesh reflectors. 5mm would be better & of course needed for 5GHz "g", but only the finer 1.5mm was located. Shaping @ this size not easy, & gain "as is" ~ 12dB, but it does fold somewhat for car transport. Wgtn,NZ Oct. 2004

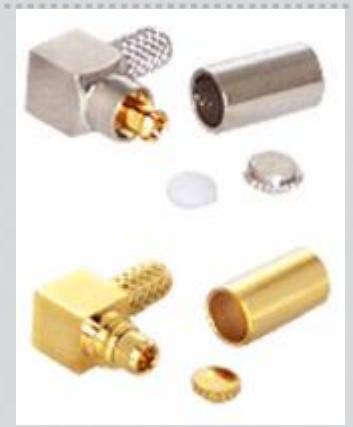
Homemade Antenna

- **Satellite TV Antenna + Hertz Antenna**
- **Diamond Dipole + Reflector**
- **USB Doggle + Paraboloid**
- **Helix Antenna**



Pigtail

- **Device**
  - **MC-CARD(Lucent Family)**
  - **MMCX(Others)**



- **Antenna**
  - **TNC**
  - **SMA**
  - **……**

Pigtail

- **Connector included**
  - **Take a equal pigtail**
- **Connector not included**
  - **Modify**
    - **Weld with a connector**
      - **Nice looking**
    - **Weld with a cable**
      - **Nice performance**

Example 1

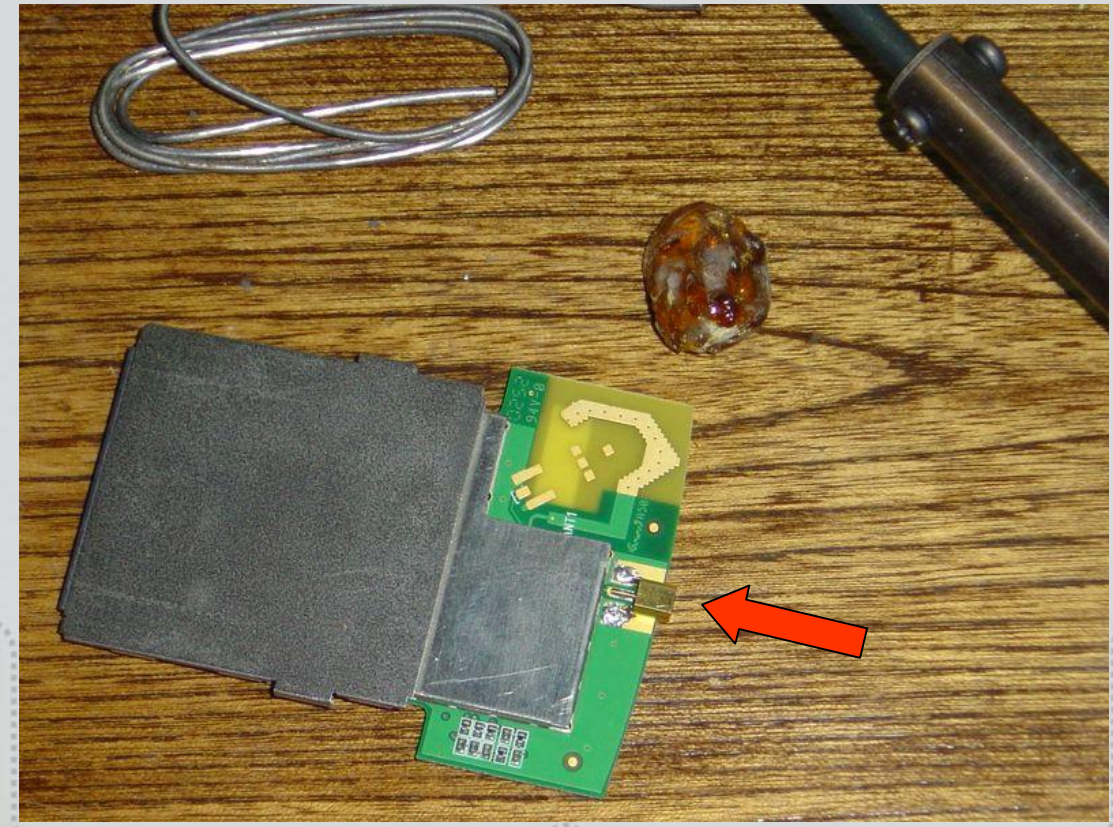
- **Siemens SS2521**

Example 1

- **Open**

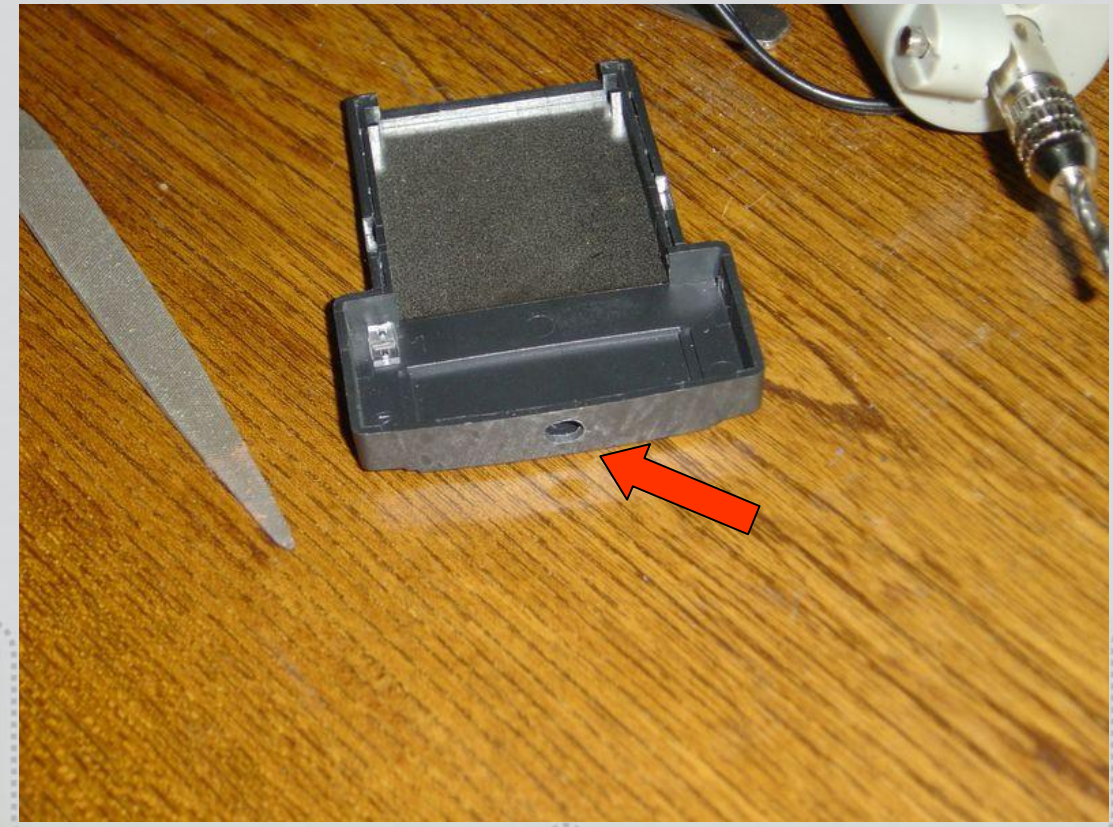
Example 1

- **Weld a MMCX connector**



Example 1

- **Drilled the shell**



Example 1

- **WiFi Card + PDA + Yagi Antenna**

Example 1

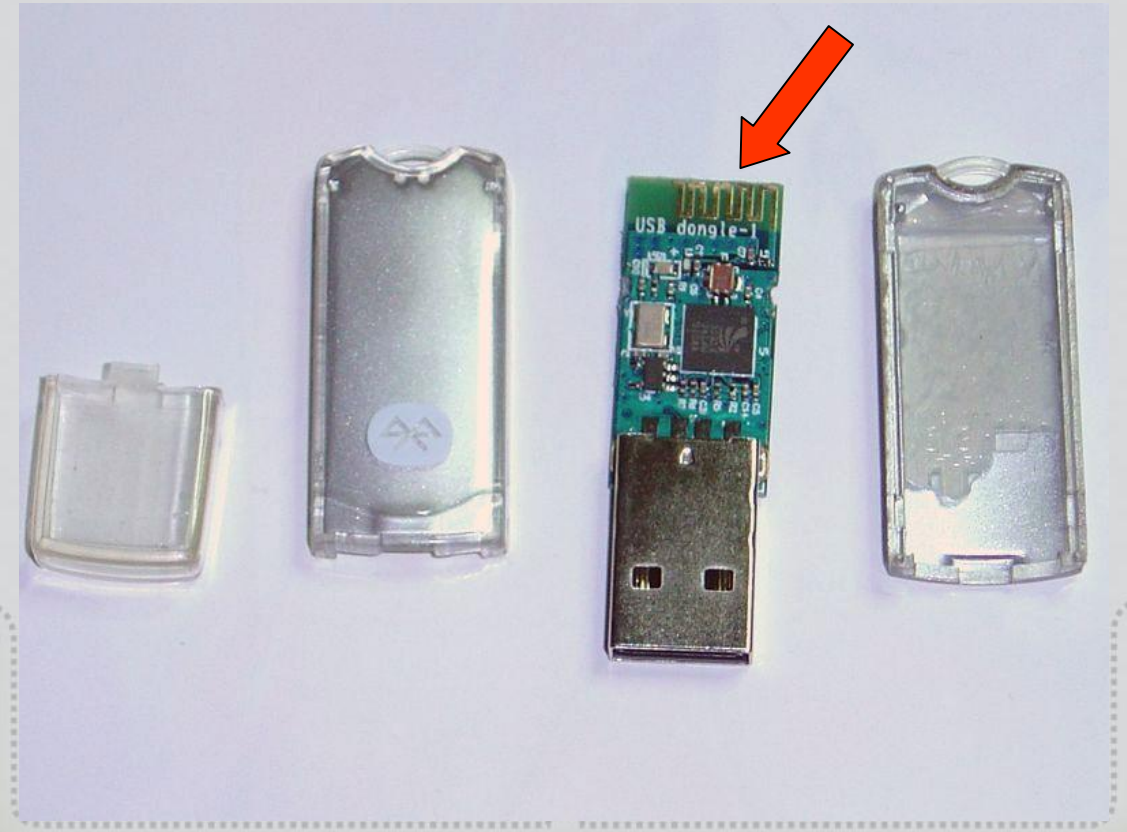
- **Let's work together !**

Example 2

- **A cheap Class 2 bluetooth doggle**

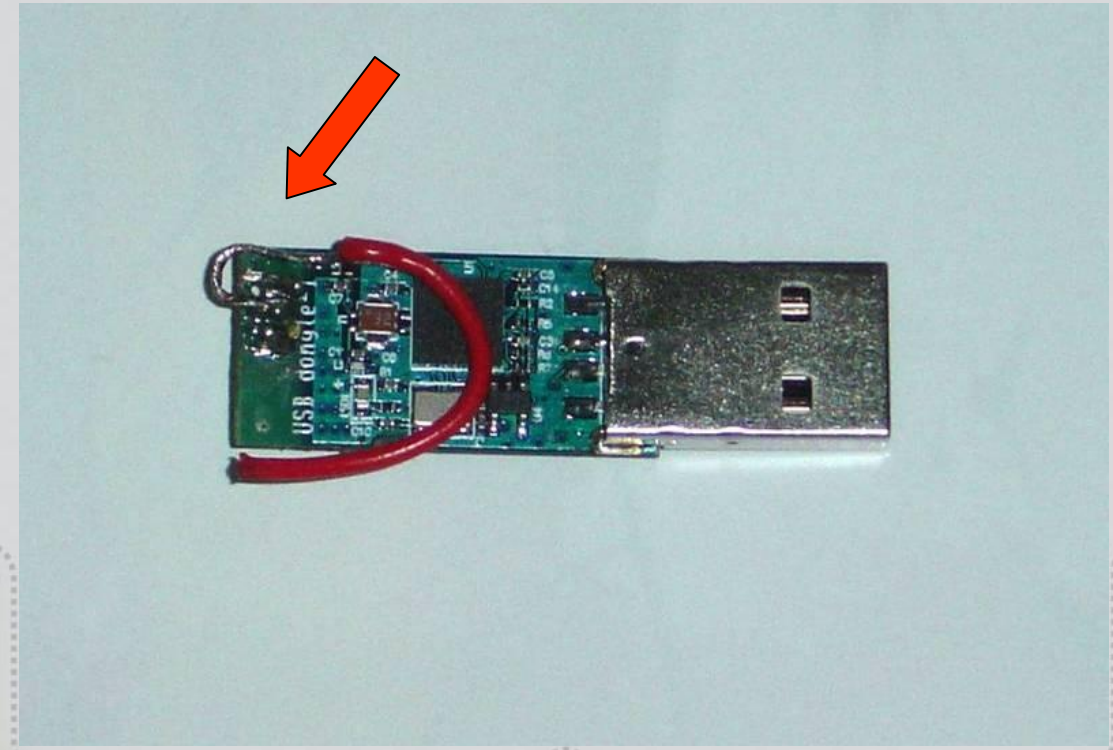
Example 2

- **Intenerate glue with hair drier**



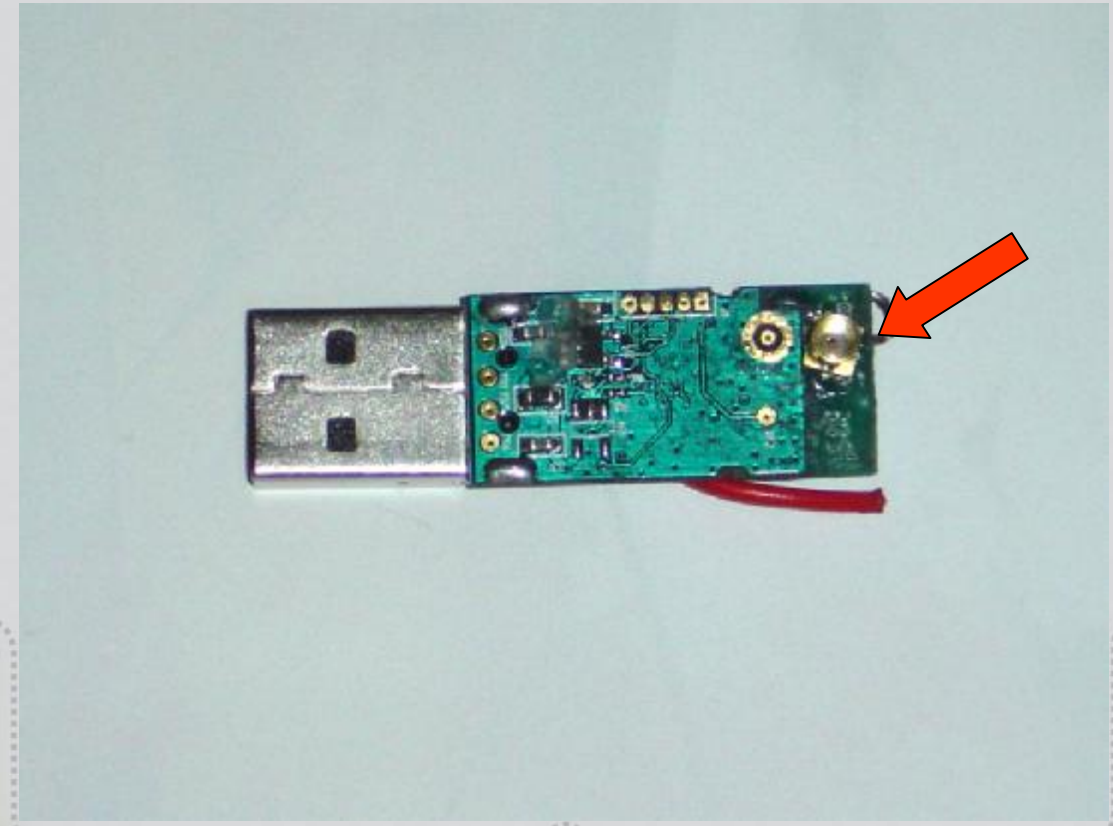
Example 2

- **Scrape off the print antenna, weld with a short wire**



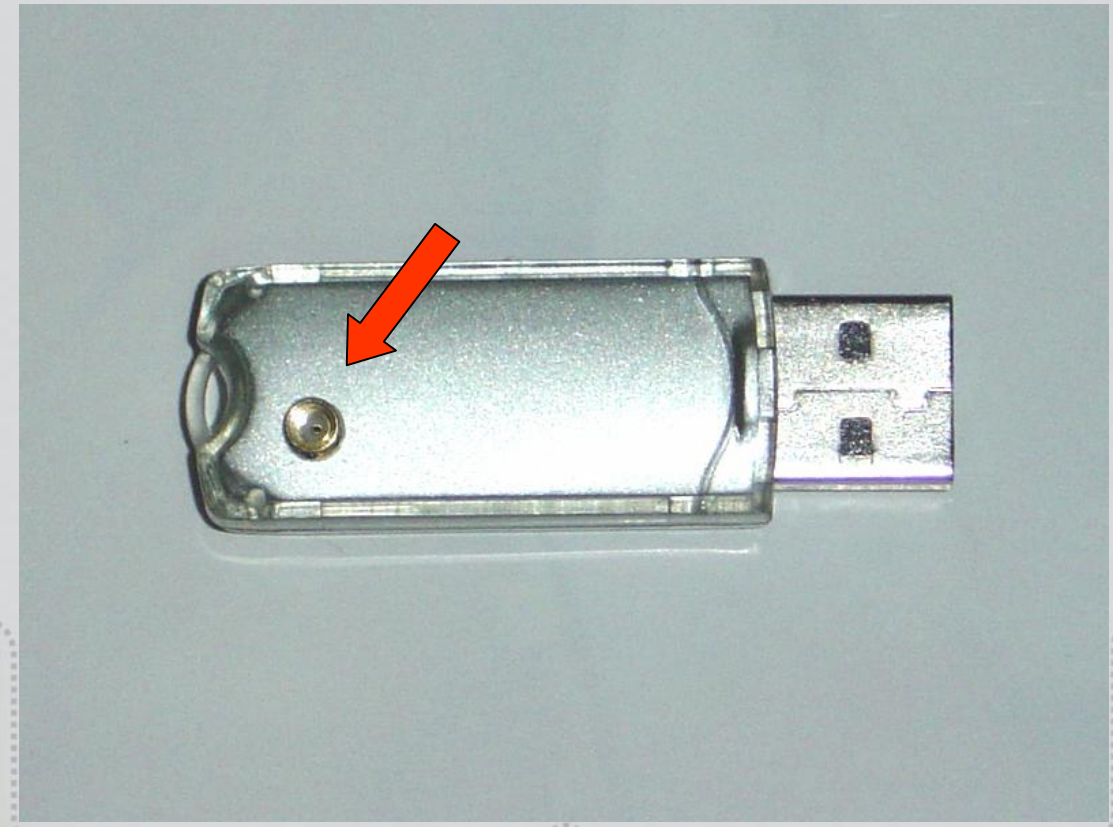
Example 2

- **Drill PCB for welding MMCX**



Example 2

- **Drill shell for MMCX**

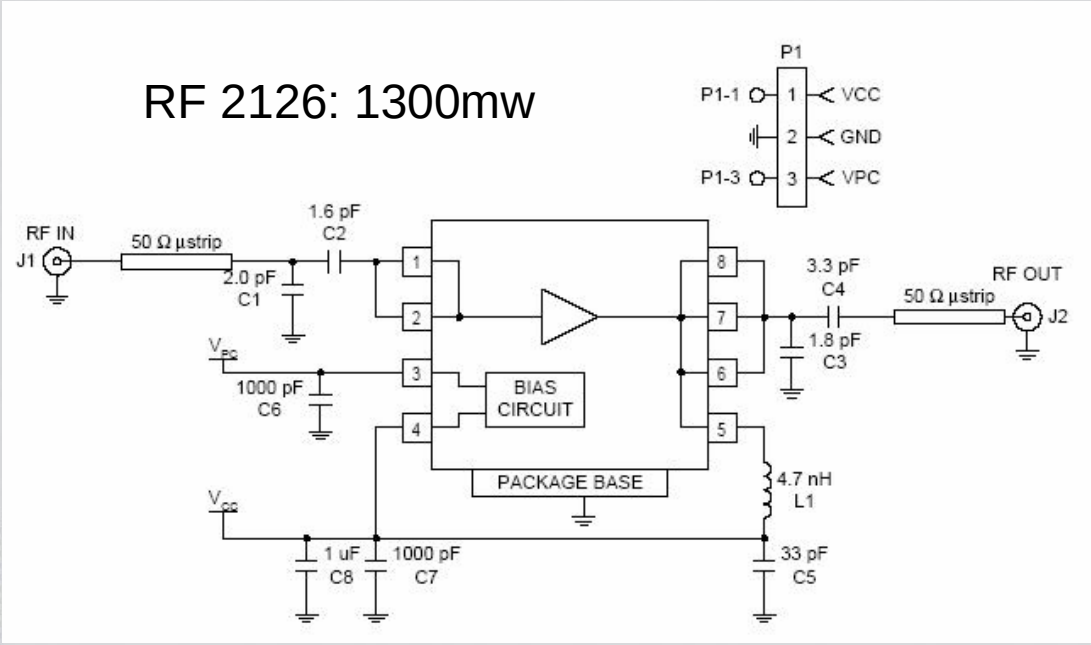


Example 2

- **Done ！**

What else shoud we do ?

- **Homemade a RF microwave amplifier**
  - **More than 1000mw output power**



DEFCON Wifi Shootout

X'con 2005

- 2004
  - 55.1 miles
- 2005
  - 125 miles
- 2006
  - ?

See you next year
See you XCon 2006 !

- **tombkeeper[0x40]xfocus.org**