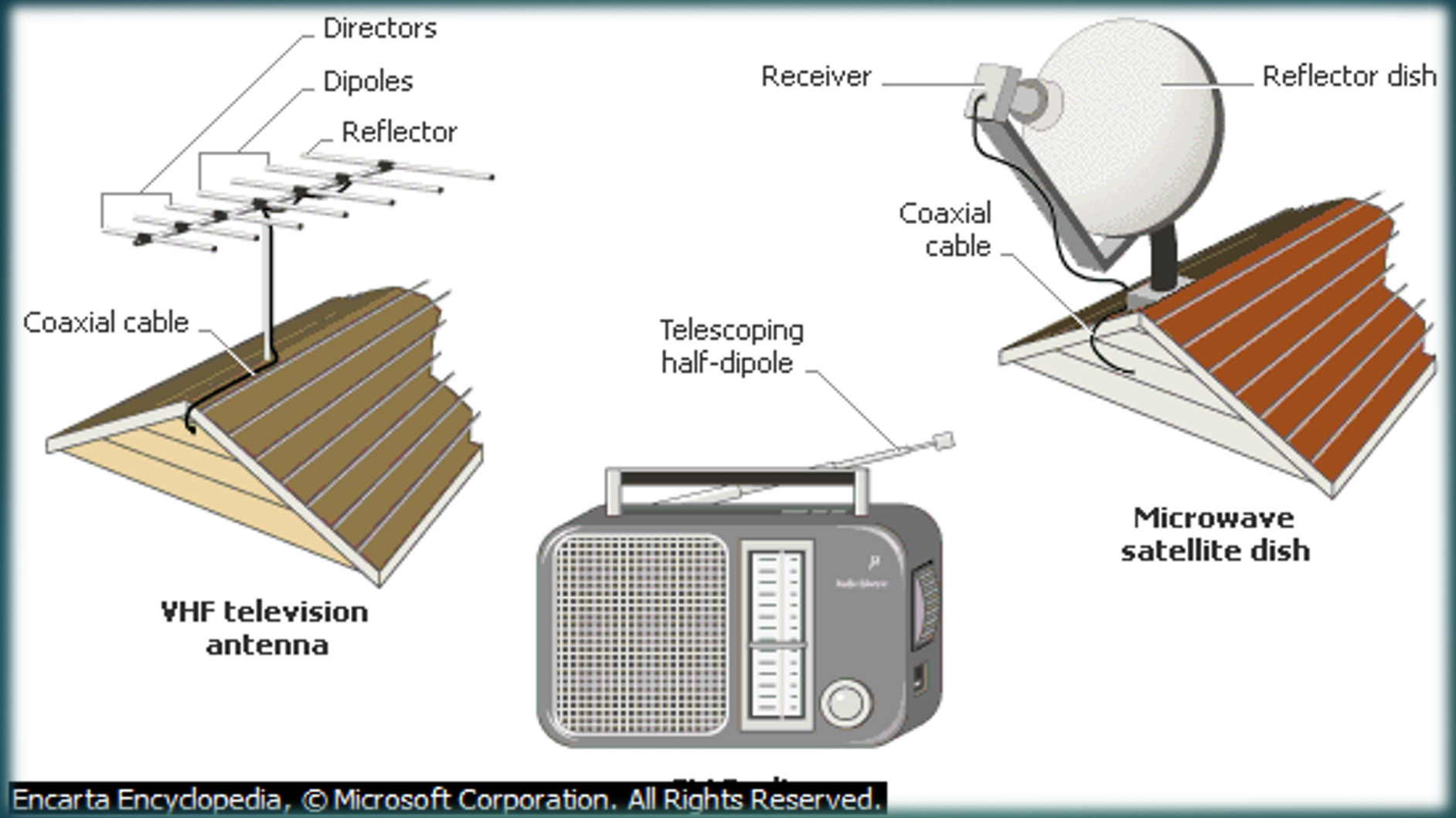


ANTENNA

The aerial, device used to radiate and receive radio waves through the air or through space. Antennas are used to send radio waves (as Transverse Electro magnetic signal) to distant sites and to receive radio waves from distant sources. Wireless communications devices is impossible without it.

In my point of interest
In the Project assigned on the B.Tech Final Year

I experimented upon

Broadband Antenna & Its development

To, receive Ultra wide Band signals in (Giga Hz range)

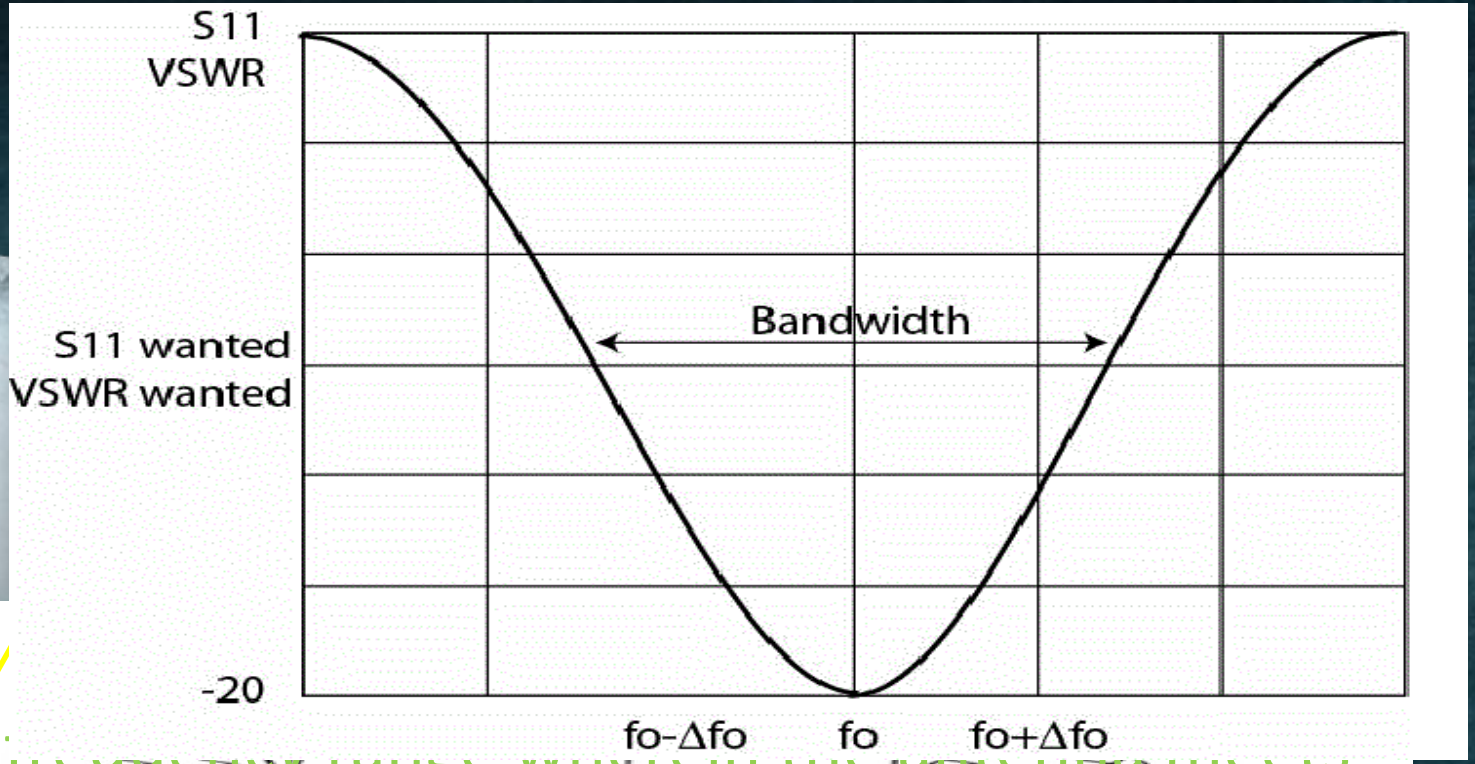
While the size is too tiny

Antenna Presentation Book

ECE 4th Year, RERF

Radiation Pattern

Basic conceptions

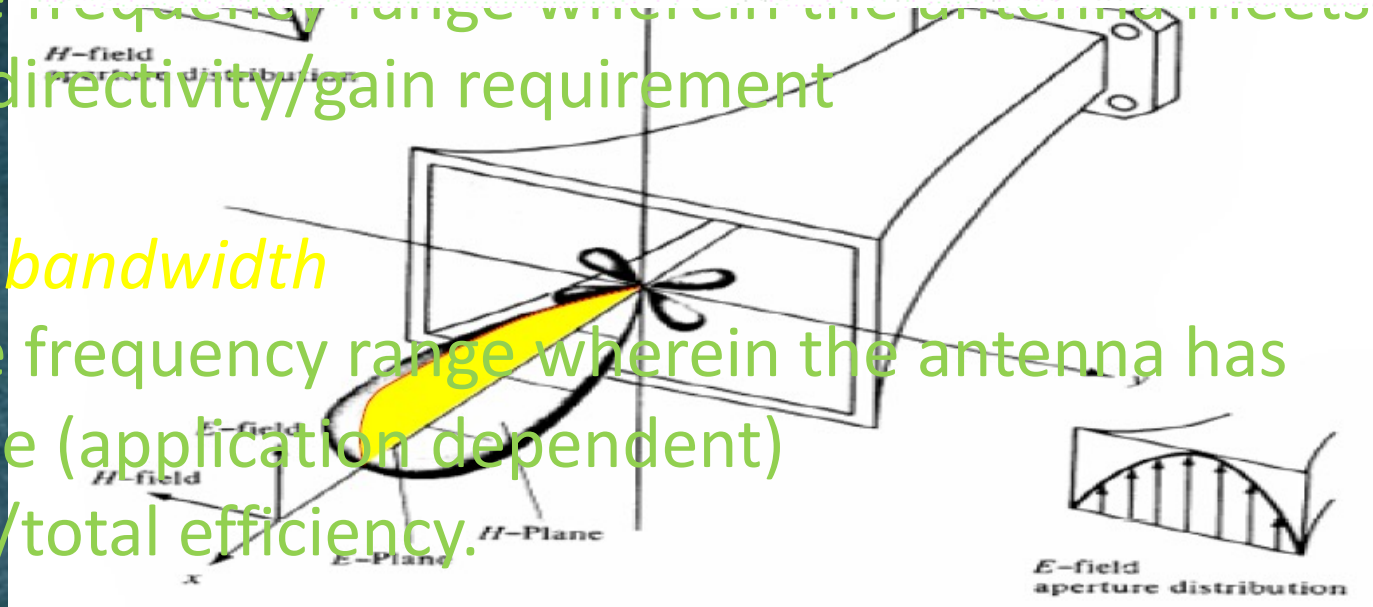


Directivity

This is the frequency range wherein the antenna meets a certain directivity/gain requirement

Efficiency bandwidth

This is the frequency range wherein the antenna has reasonable (application dependent) Radiation/total efficiency.



Micro strip Antenna

Radiating Patch on one side of the di-electric substrate (Er < 10)
which has a good plane line on the other side.
Patches are mainly ... of
any shape
The di-electric constant is taken as low as E < 2.5

Advantages

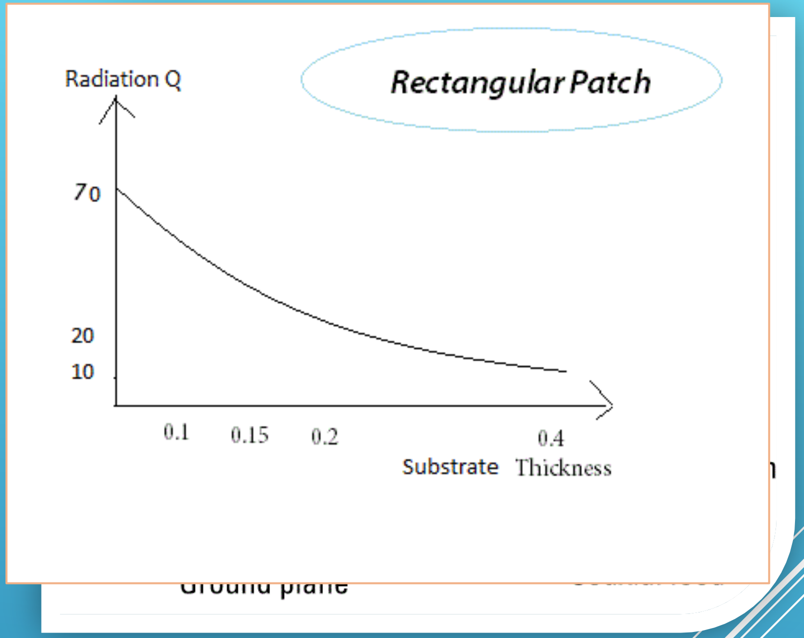
- ❖ **Light weight, Low volume Thin Profile configuration**
- ❖ **Low fabrication cost readily for mass production**
- ❖ **Both Linear Circular polarization is possible with simple feed**
- ❖ **Dual-Triple Frequency band & Dual polarization can be made**
- ❖ **No cavity is required in background so, matching network can be fabricated dynamically with antenna structure**

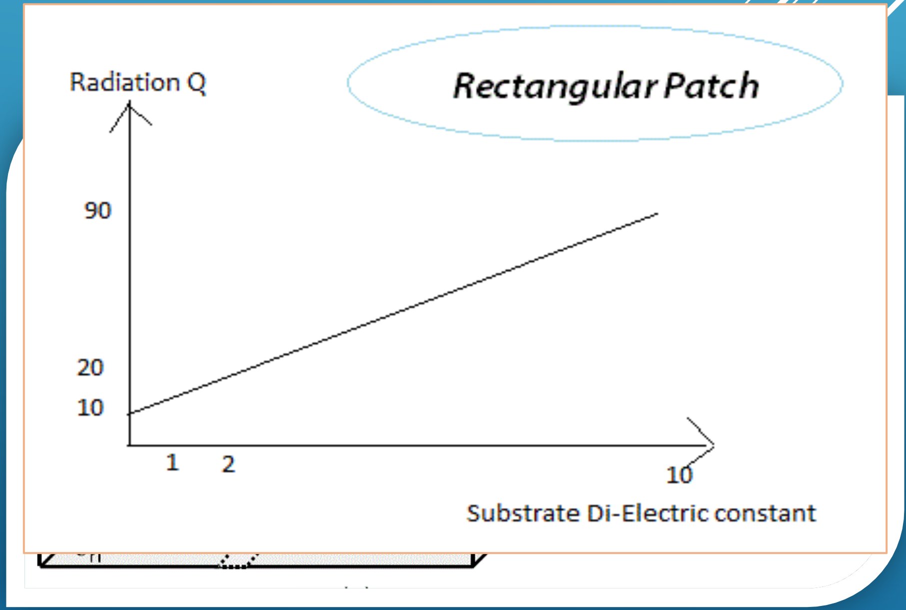
Uses →

- ✓ Short range Communication device
- ✓ Bulk Sensor
- ✓ In PCB it is also mounted

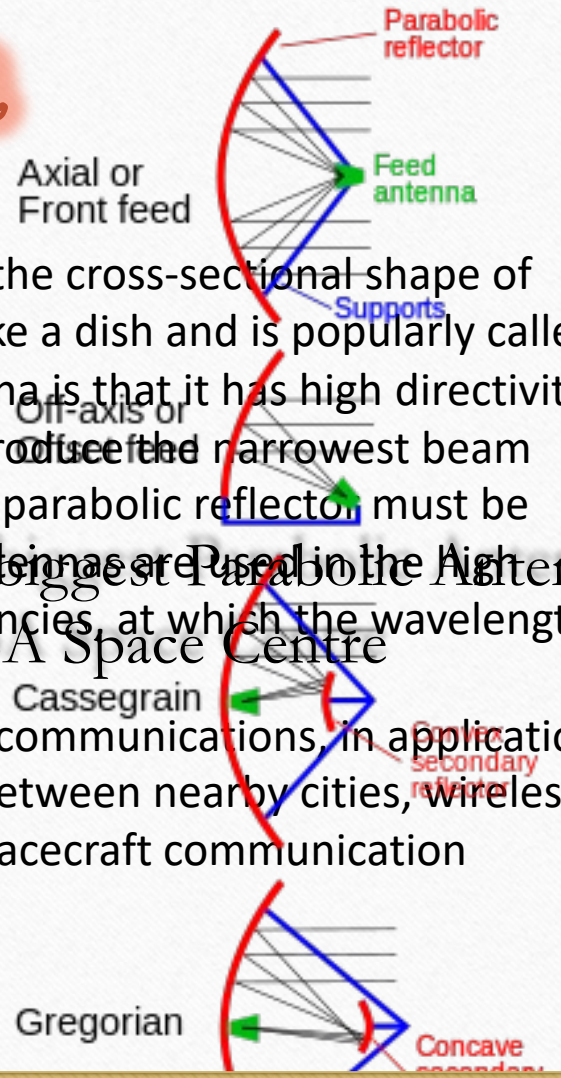
Disadvantages

- Narrow Bandwidth
- Tolerance problem
- Lower gain (6 dB)
- Large Ohomic loss in feed structure of arrays
- Mostly radiate in half space
- Complex feed structure for high performance arrays
- Poor end-fire radiator
- Lower Power handling capability





Parabolic Antenna

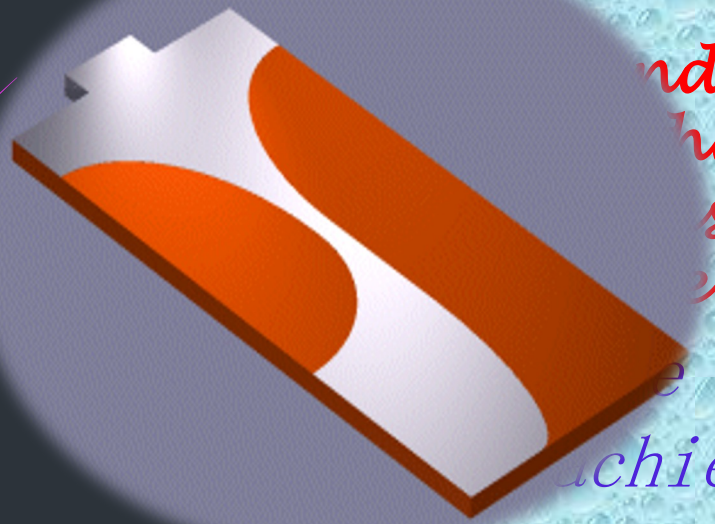


urved surface with the cross-sectional shape of
d like a dish and is popularly called
tenna is that it has high directivity
n produce the narrowest beam
he parabolic reflector must be
a antennas are used in the high
uencies, at which the wavelengths
nt communications, in applications
s between nearby cities, wireless
spacecraft communication

Its world's biggest Parabolic Antenna, located at NASA Space Centre

Application ::--- Radar antennas, in which there is a need to transmit a narrow beam of radio waves to locate objects like ships, airplanes, and guided missiles. With the advent of home satellite television dishes

Vivaldi Antenna



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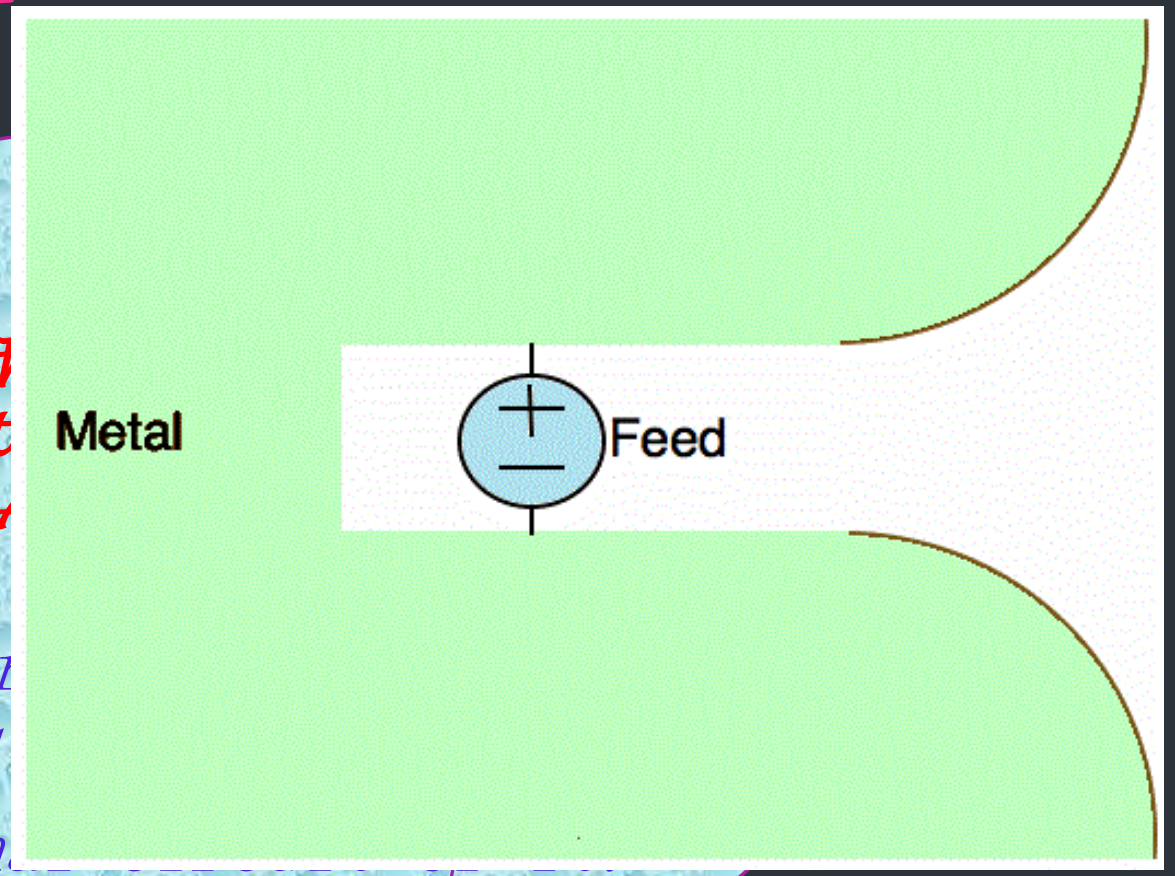


Affecting factors , Parameters & Measurement

A better approximation for the resonant length is:

$$L \sim 0.49\,\lambda_d = 0.49\left(\lambda_0/\sqrt{\epsilon_r}\right)$$

This formula includes a first order correction for the edge extension due to the fringing fields

with:

L = resonant length

λ_d = wavelength in PC board

λ_0 = wavelength in free space

ϵ_r = dielectric constant of the PC board *material*

Other parameters that will influence the resonant frequency:

Ground plane size

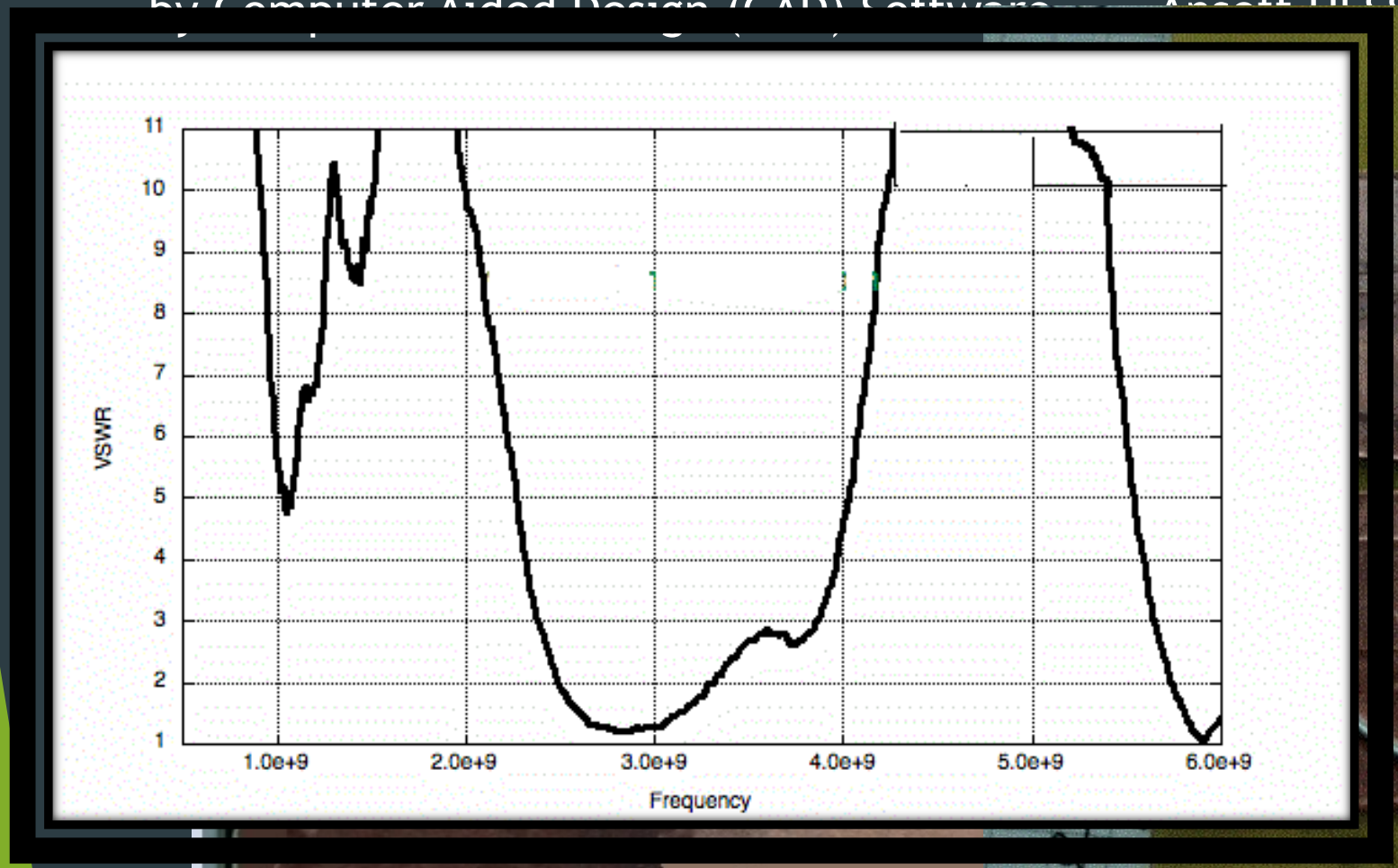
Metal (copper) thickness

Patch (impedance) width

For Experimental procedure

The Frequency provided to the Antenna is 2.8- 5.2 GHz

I worked with Pitch board sheet covered with metal foil……. Along with simulation by Computer Aided Design (CAD) Software Ansoft HFSS



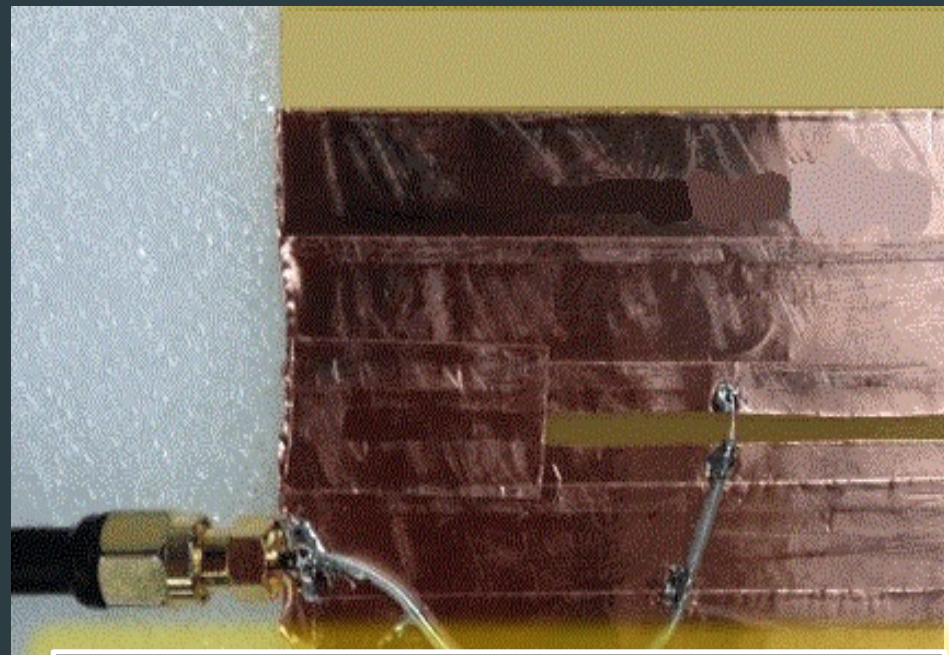
The VSWR for the Antenna

The plate of experiment (Warped by Copper foil)

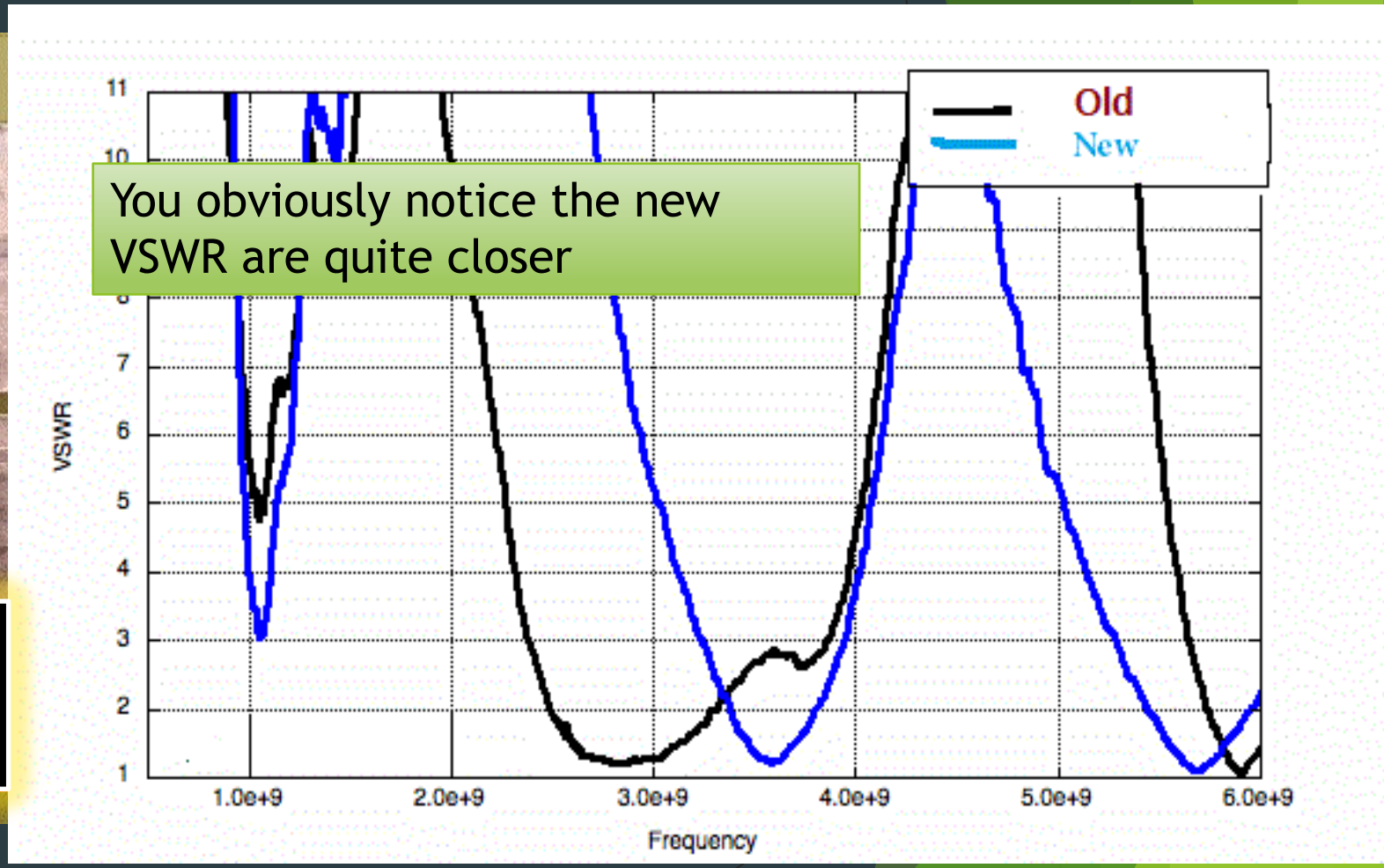
Cut the slot along the middle of the Plate
& attached wire to provide signal of higher frequency

The length of the Antenna plays an important role

I decrease the effective length of the Antenna by some measured distance and got a better result

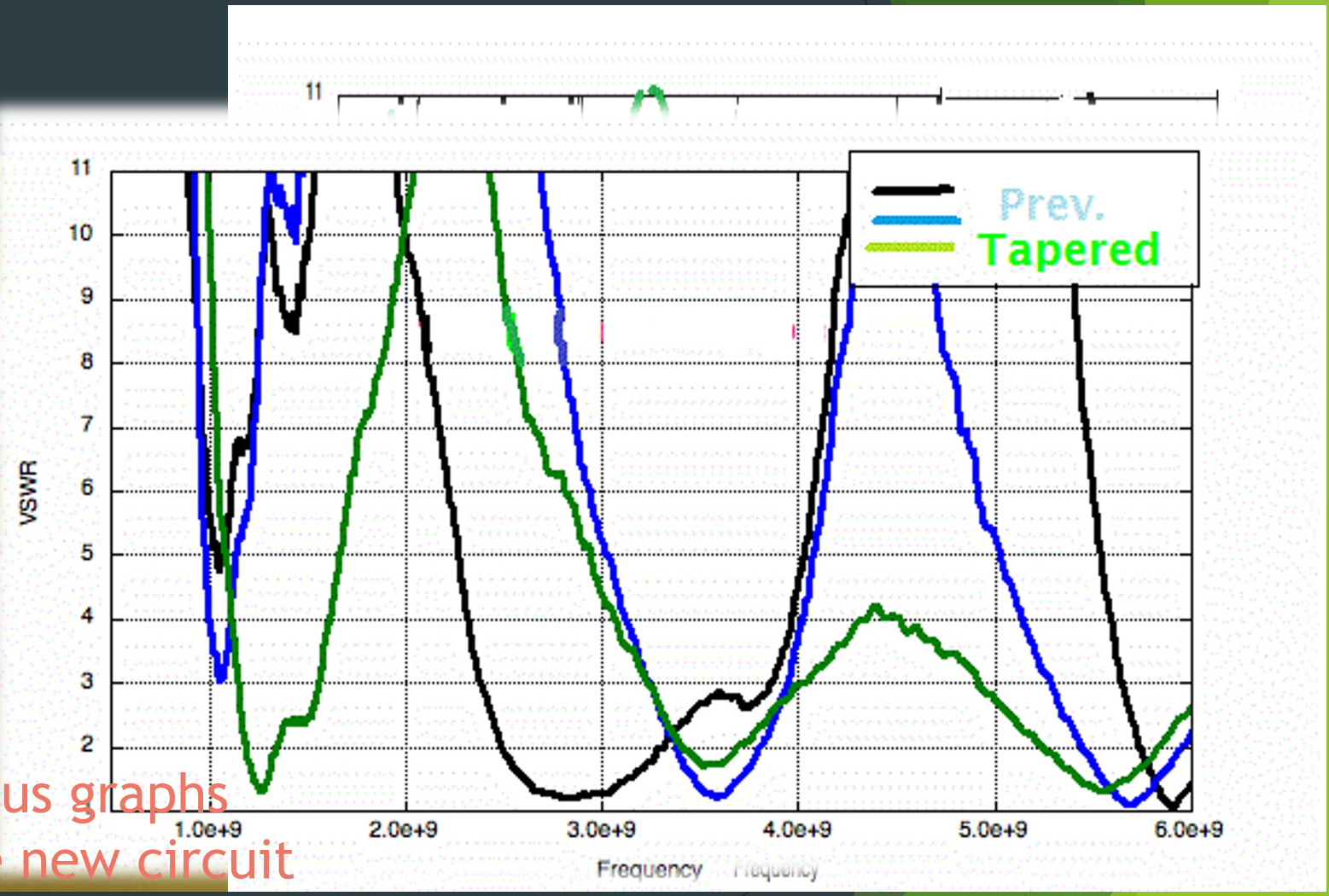


That’s because it improves impedance matching corresponding to the wavelength



The Frequency provided by the Antenna is (3.3 - 4.1) GHz & (5.2 – 6.3) GHz

To make Vivaldi, We have to taper its side ---- Which allows greater band-width

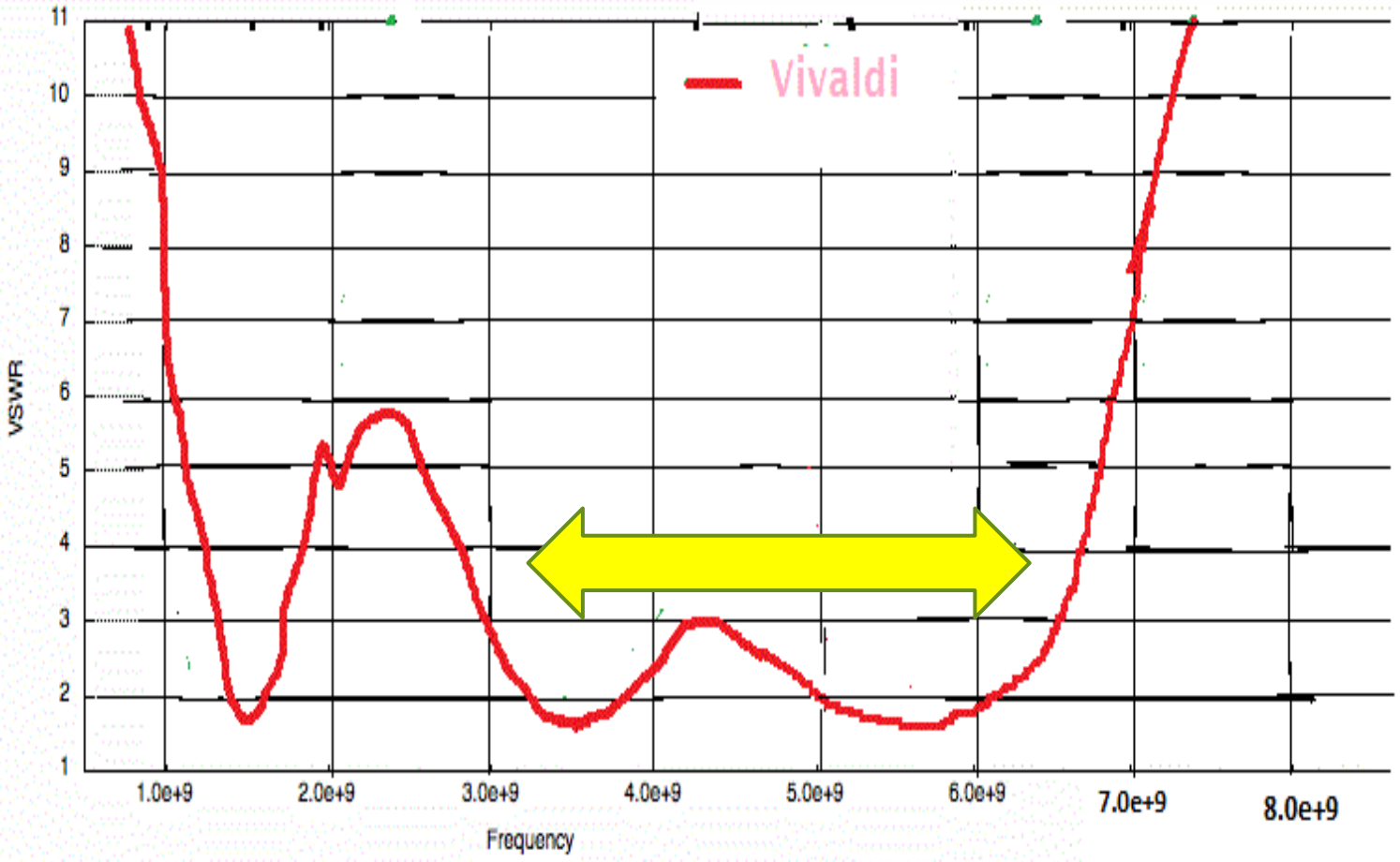


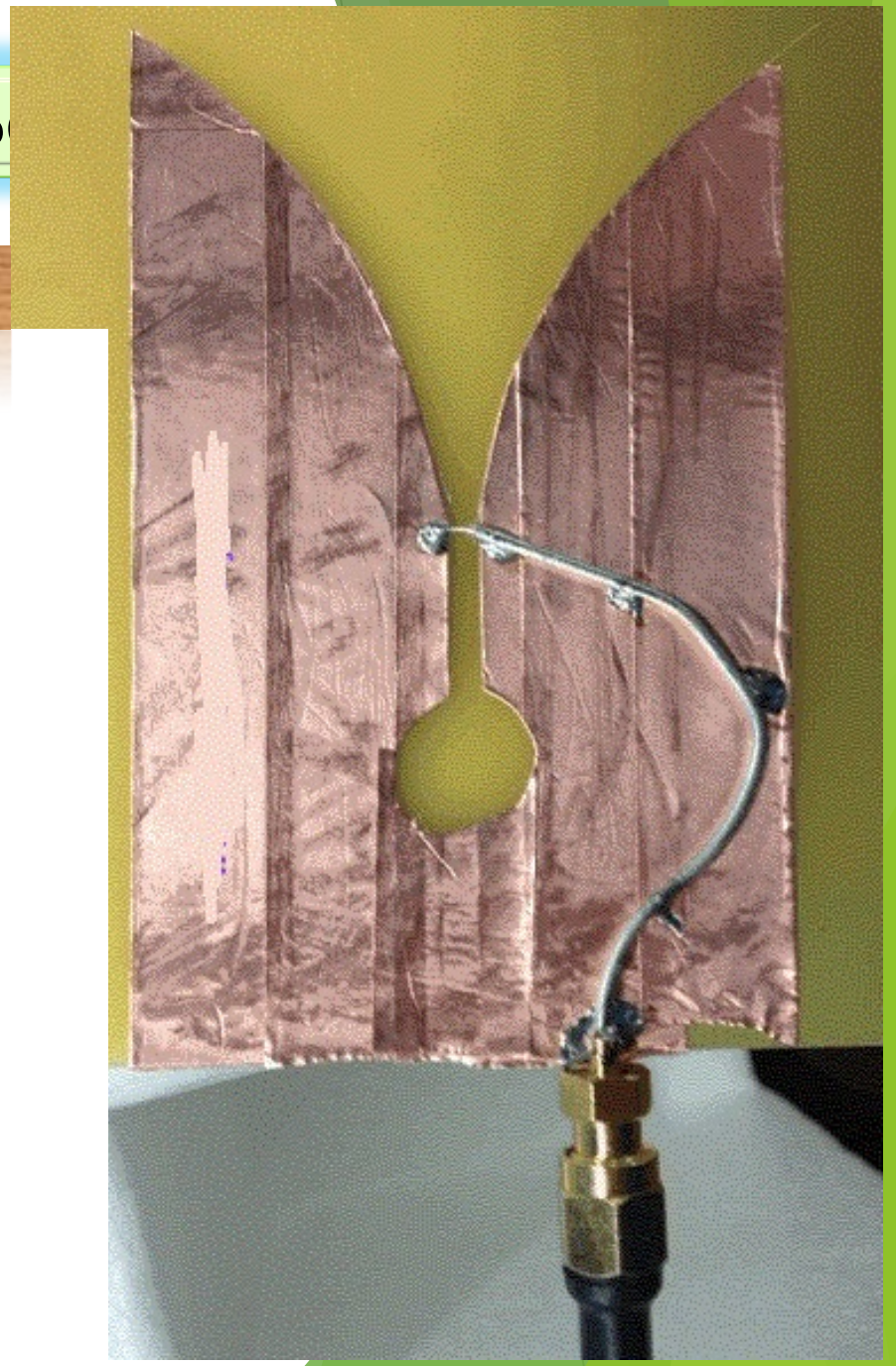
In comparison with the previous graphs we find the band width of the new circuit is more than the previous

The Frequency provided by the Antenna is (3.1- 4.1) GHz & (5.0 – 6.5) GHZ

The Main Objective Is Achieved by tapering B

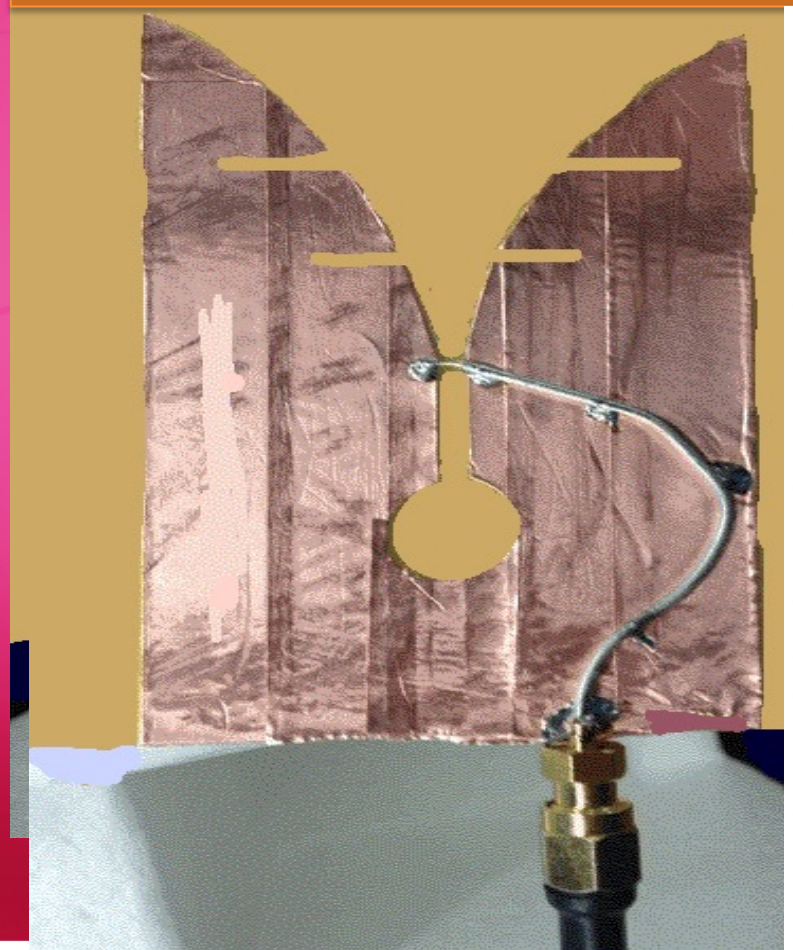
The band width we obtain after completing Vivaldi is marked

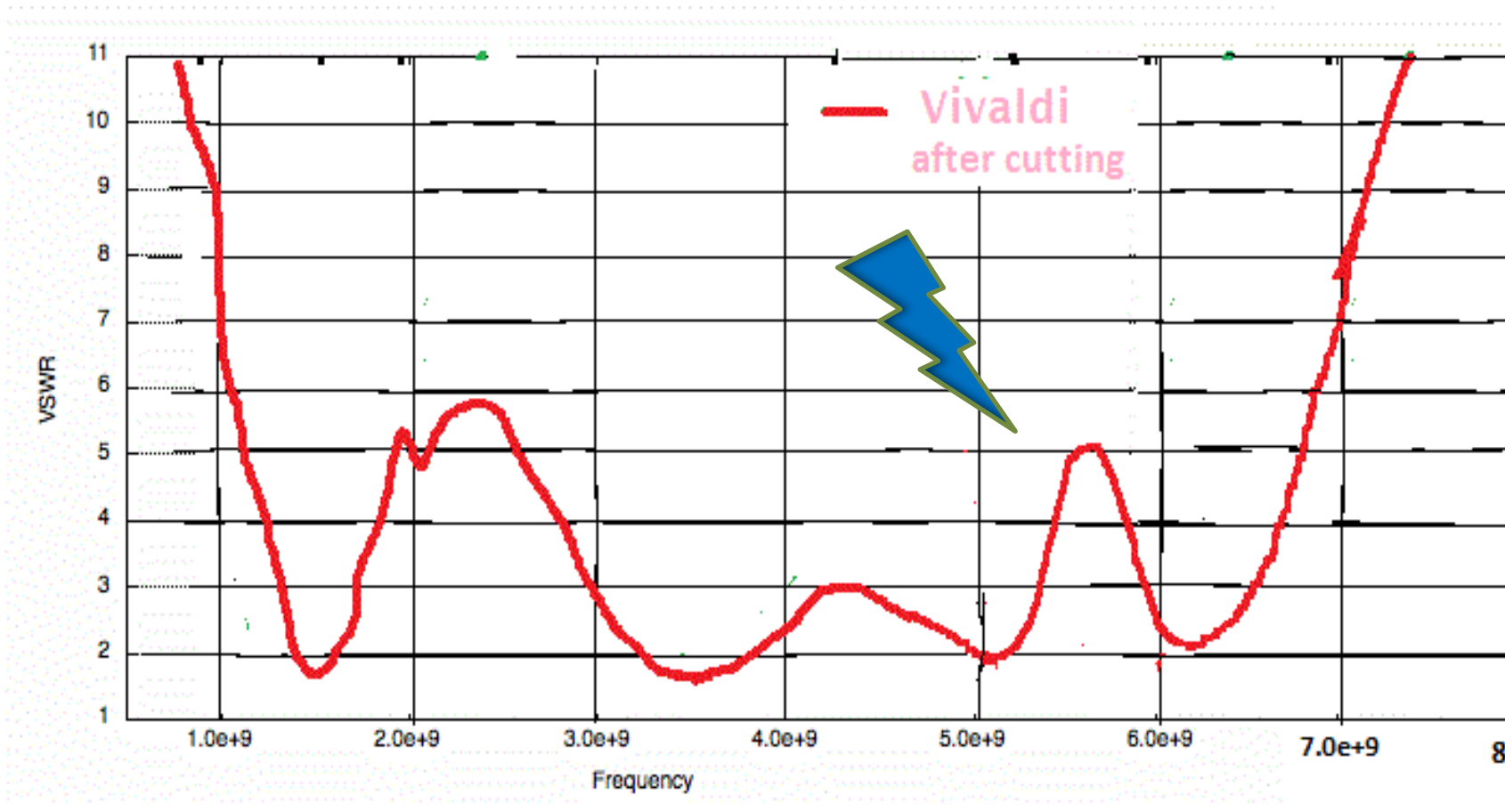




Achieved Band Reject Facility by cutting the tapered sides of the Antenna

The Range of Band-width (to be stopped) can be chosen by the calculating the wavelength
& then removing it from Antenna by measurement





System	Application
Aircraft and ship antennas	Communication and navigation, altimeters, blind landing systems
Missiles	Radar, proximity fuses, and telemetry
Satellite communications	Domestic direct broadcast TV, vehicle-based antennas, communication
Mobile radio	Pagers and hand telephones, man pack systems, mobile vehicle
Remote sensing	Large lightweight apertures
Biomedical	Applicators in microwave hyperthermia
Others	Intruder alarms, personal communication, and so forth

Bibliography & Sources

My Guides :--

1. Satyajit Chakrobarty sir
2. Arijit Majumdar sir
3. Milan Majumdar sir

} From SAMEER, Kolkata

From Regent Education & Research Foundation

Books :~~

1. Broadband Microstrip Antennas By Girish Kr. Ray & K.P.Ray
2. The Basics of Patch Antennas By D. Orban & G.J.K.Moernaut
3. Basic Antenna Theory By Ryszard Struzak
4. Antenna Theory By C.A.Balanis
5. Antennas By John.D.Kraus
6. Principles of RADAR By Scholnik

Web Resources ::~~

1. www.wikipedia.org
2. IEEE explore research papers

Also Thanks to all my classmates

Future Planning

Broadband Antenna with
higher gain and
wide band-width
(2.7 -- 10.2) GHz

*** Mainly applicable for ***

Defense Air-Craft Target detection
Automated Missile launching at Target
Weather prediction
Satellite Communication

That’s part is completed till now

Thank You

Any Related Query ??

Arkadip Basu