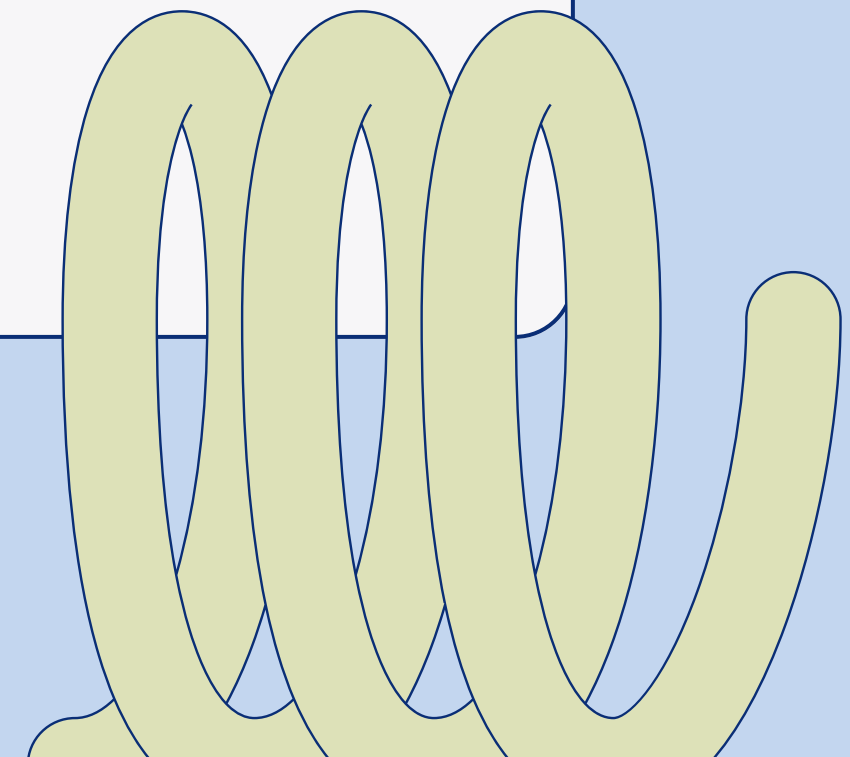
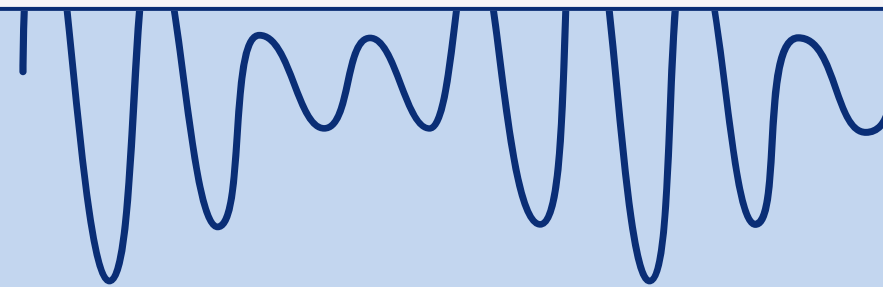


**KRITTIKA SUMMER PROJECT**

# **Errors Introduced by Flat and Spherical Radomes**



# INTRODUCTION TO RADOME

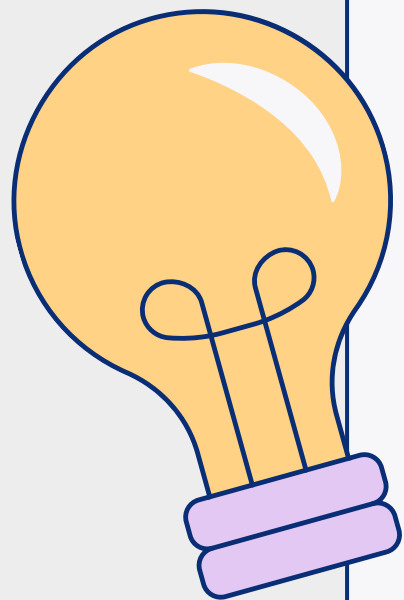
Radomes are protective covers placed over antennas to shield them from weather while allowing signals to pass through. The material and shape of a radome can affect how signals travel through it, potentially causing errors in signal strength or direction.



# Shape and Errors

The distance a signal travels inside a radome depends on the radome's shape and the angle at which the signal enters.

- For a rectangular radome, signals hitting at sharp angles travel through more material, which can cause bigger errors.
- But in a curved radome, the thickness the signal passes through stays about the same, no matter the angle. This helps reduce errors caused by the signal angle.

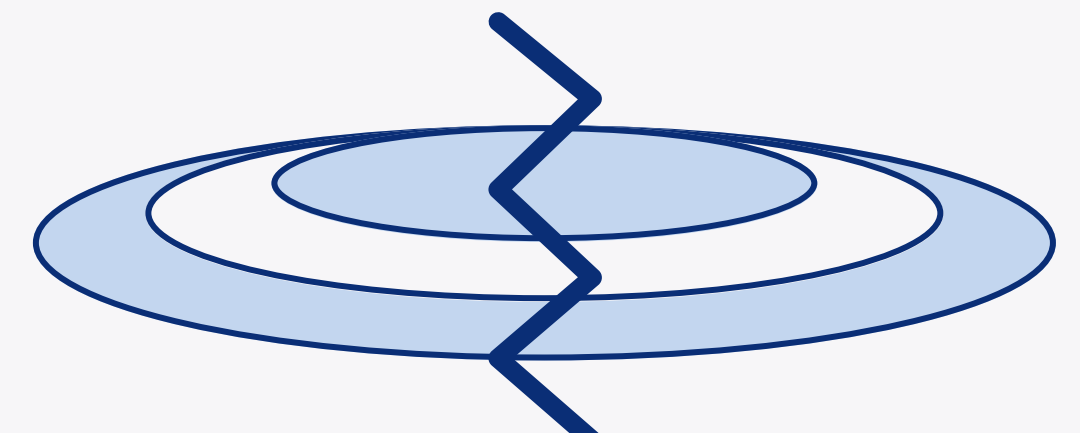


# What really happens?

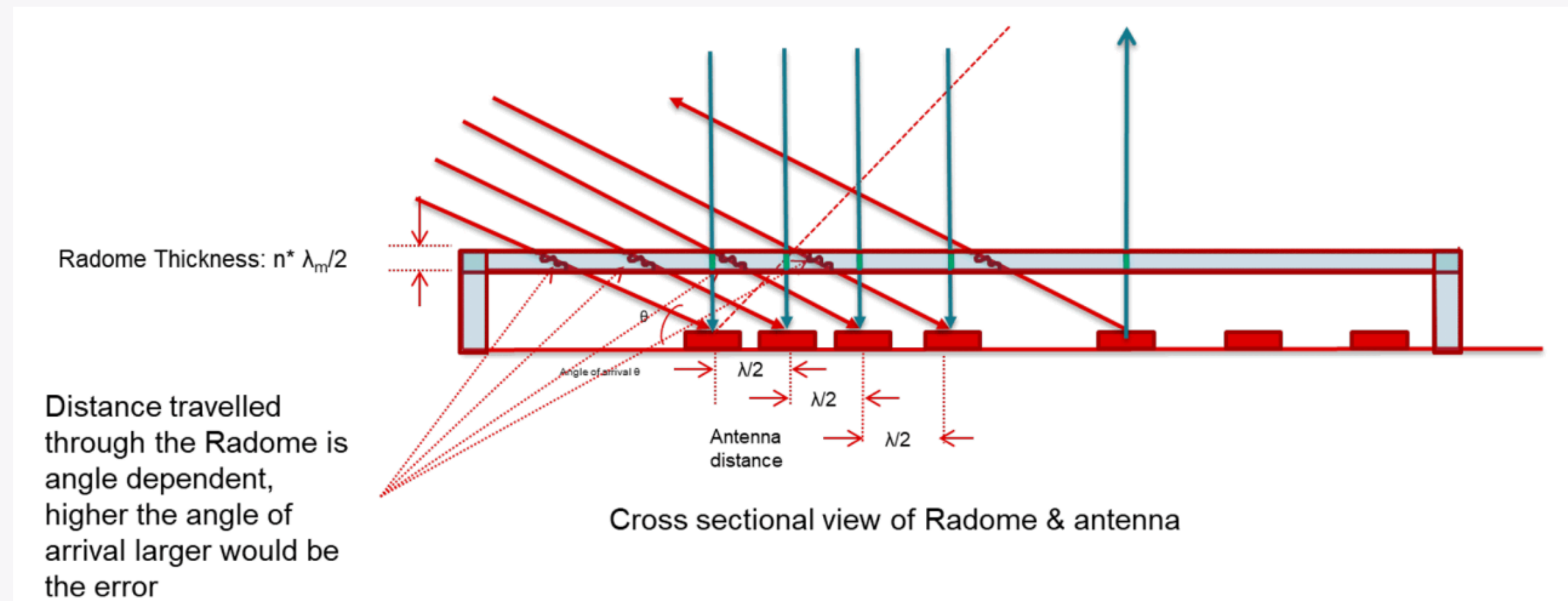
When a radar signal hits the radome straight on (at boresight), it travels through a distance equal to the radome's thickness. This distance is designed to cause reflections inside the radome to cancel out, reducing signal loss.

However, as the signal comes in at sharper angles (grazing angles), it travels through a longer path inside the radome wall. This causes multiple reflections that don't cancel out well. These reflections create ripples and dead spots (nulls) in the radar's detection pattern, leading to errors in estimating the signal angle.

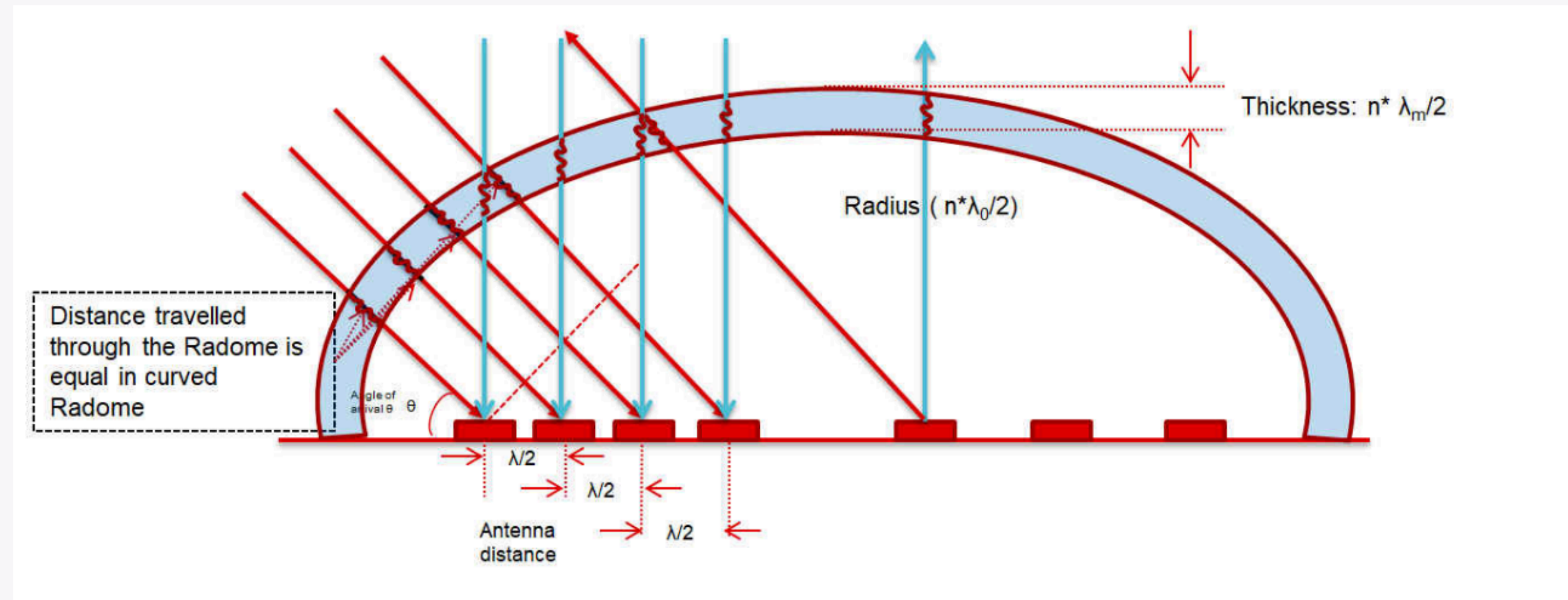
One way to reduce these errors is to make the radome wall thinner at the edges (tapering), but this can make the radome weaker physically.



# What happens in Rectangular Radomes?



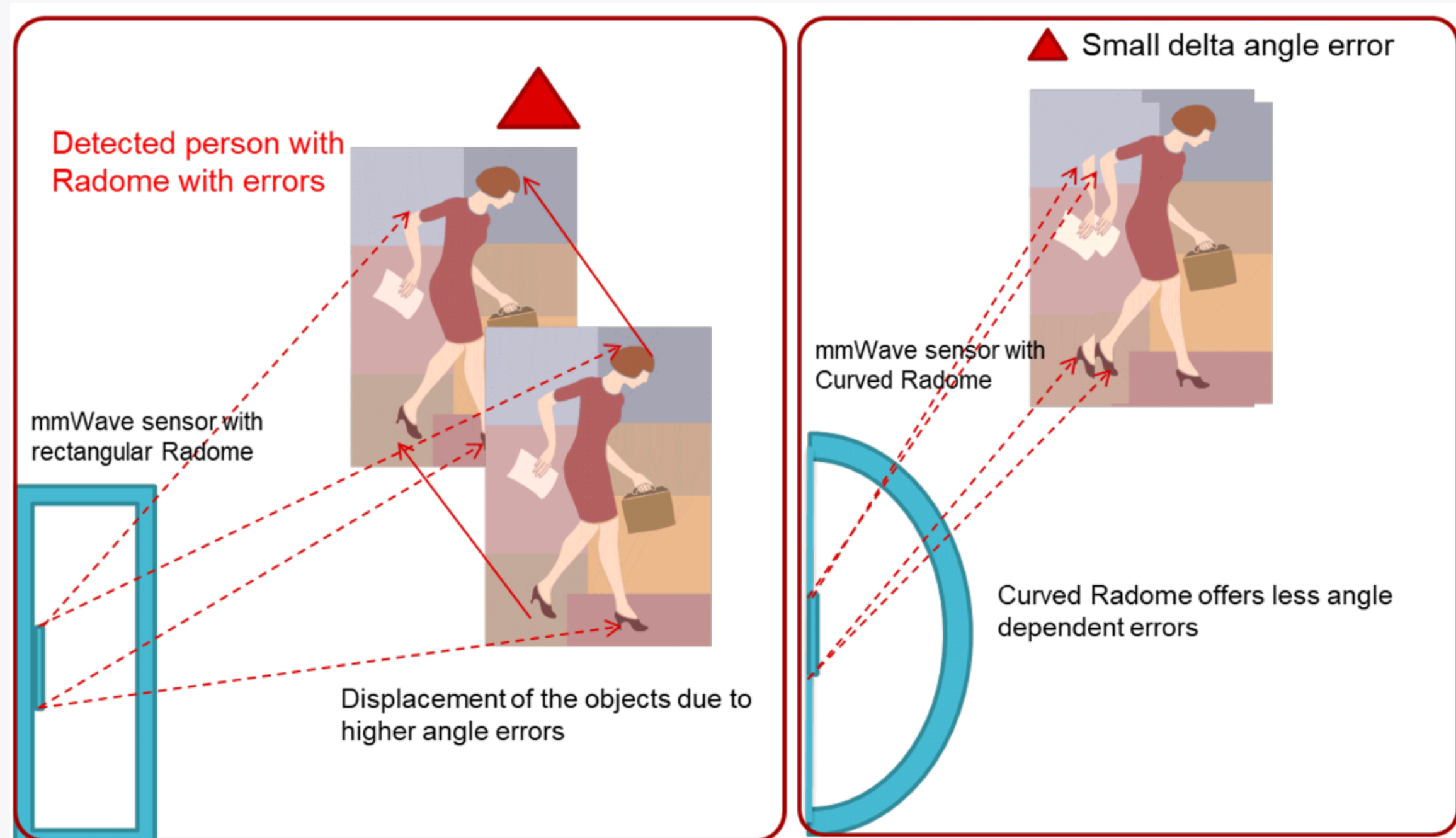
# What happens in Spherical Radomes?





# Consequences of Shape?

Rectangular radomes cause larger errors at sharp (grazing) angles because the signal travels through more material.



Spherical (curved) radomes keep the signal path more consistent, resulting in fewer angle errors.

- Due to these errors, objects may appear shifted from their true positions, especially when they are far from the radar.
- The further the object is, the bigger the displacement caused by the angle error.

**THANK YOU**

