SNS COLLEGE OF ENGINEERING

(Autonomous)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

19EC504 – TRANSMISSION LINES AND ANTENNAS

III YEAR/ V SEMESTER

UNIT 4 – SPECIAL ANTENNAS

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RECONFIGURABLE ANTENNA

- A Reconfigurable antenna is an antenna capable of modifying dynamically its frequency and radiation properties in a controlled and reversible manner. In order to provide a dynamical response, reconfigurable antennas integrate an inner mechanism (such as RF switches, varactors, mechanical actuators or tunable materials) that enable the intentional redistribution of the RF currents over the antenna surface.

TYPES OF ANTENNA RECONFIGURATION

1.Frequency reconfiguration:

Frequency reconfigurable antennas can adjust dynamically their frequency of operation.

2.Radiation pattern reconfiguration:

Radiation pattern reconfigurability is based on the intentional modification of the spherical distribution of radiation pattern.

3.Polarization reconfiguration:

Polarization reconfigurable antennas are capable of switching between different polarization modes

4.Compound reconfiguration:

Compound reconfiguration is the capability of simultaneously tuning several antenna parameters, for instance frequency and radiation pattern.

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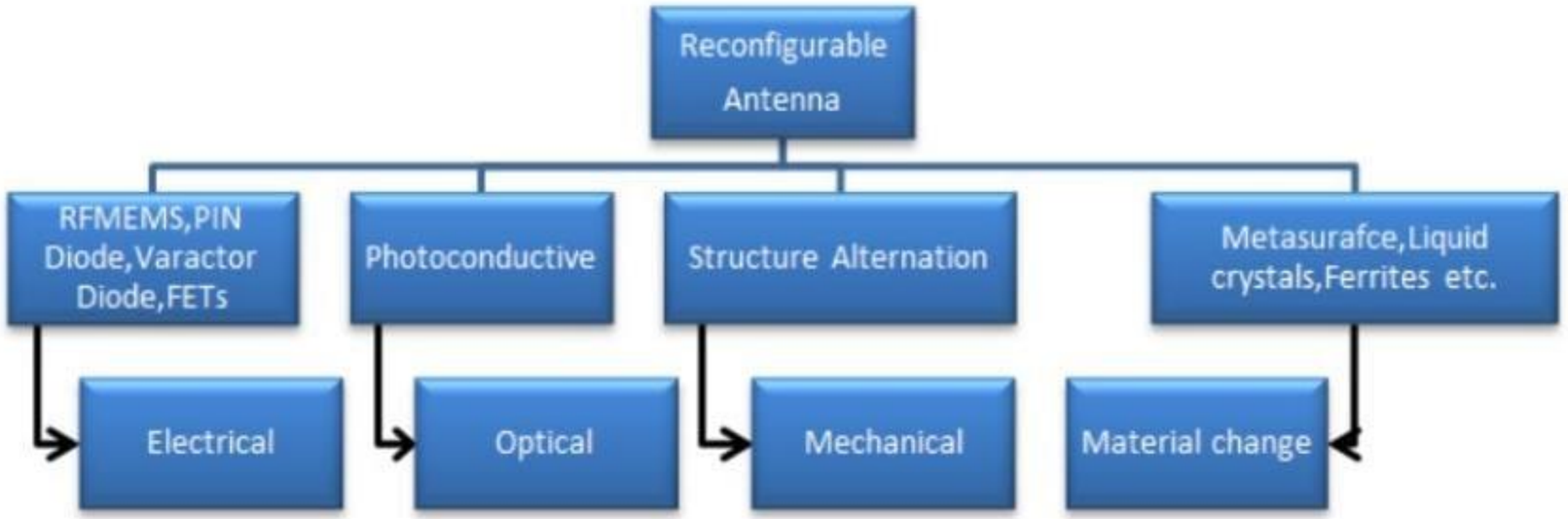
RECONFIGURABLE ANTENNA

Reconfigurable Antennas and Their Applications



FREQUENCY RESPONSE OF ANTENNA

Frequency response is the input impedance over the frequency range. The complex input impedance can be represented as:

$$z_{in}(\omega) = R(\omega) + jX(\omega) \quad (1)$$

where Zin(ω) is the complex input impedance, R(ω) is resistance, X(ω) is reactance and $\omega = 2\pi f$ is the frequency in radian. The complex input impedance describes the antenna as a circuit element. The antenna's input impedance determines the reflection coefficient (Γ), return loss (RL), VSWR (voltage standing wave ratio).

$$\Gamma = \frac{z_{in}(\omega) - z_0}{Z_{in}(\omega) + z_0} \quad (2)$$

where $Z_{in}(\omega)$ is input impedance of the antenna and Z_0 is the characteristics impedance of the transmission line. Γ is always a negative number. We can also use S_{11} to represent Γ .

$$\text{Return Loss=RL= } -20 \log \Gamma \quad (3)$$

The return loss is always a positive number. The possible values of return loss range from 0 dB to ∞ dB. The voltage standing wave ratio (*VSWR*) is defined as:

$$VSWR = \frac{V_{\max}}{V_{\min}} = \frac{1 + |\Gamma|}{1 - |\Gamma|} \quad (4)$$

THANK YOU