

Communication Technology (Transmission Media) (Prof. Weiland / Prof. Jakoby)

1 Introduction of transmission media

2 Fundamentals of radio wave propagation and antennas

2.1 Time-varying and time-harmonic electromagnetic fields

2.2 Monochromatic plane-wave propagation

Plane-wave propagation in lossless, low-loss dielectric and in good conductive media (skin effect); Reflection and transmission at plane boundaries; Scattering and diffraction

2.3 Radiation and antennas

Antenna radiation characteristics, Ideal dipole and short dipole; Antenna arrays, Image theory; Examples of real antennas

2.4 Power budget of radio links

2.5 The mobile radio channel

3 Passive Radio-Frequency (RF) Circuits with R-, L-, C-Lumped Elements

RF behaviour of R, L, C matching by RF-lossless transformation circuits; Serial-parallel transformation; Impedance diagram; RF-filters with L and C

4 Transmission lines

4.1 Theory of Transmission Lines (TEM-lines)

Pulses on lines, Line equations for sinusoidal (harmonic) signals; Lossless TEM lines: The Smith chart, Filter- and transformation circuits; Transmission on TEM lines with losses (skin effect, skin depth)

4.2 Non-TEM waveguides and cavity resonators

Rectangular and circular waveguides, Stripline and microstrip lines, Optical fiber, Cavity resonators

4.3 Waveguide components

Scattering parameters for the description of N -port RF-circuits; Waveguide splitter, Circulator, Directional coupler (Hybrid)
