Printed Circuit Board Transmission Lines

Recall that a transmission line must consist of two separate conductors. Typically, the volume between these conductors is filled with a very low-loss dielectric.

For example, a coaxial line has an inner conductor (conductor #1) and an outer conductor (conductor #2), with the cylindrical space between filled with dielectric.

However, we can likewise construct a transmission line using printed circuit board technology. The substrate of the circuit board is the dielectric that separates two conductors. The first conductor is typically a narrow etch that provides the connection between two components, while the second conductor is typically a ground plane.

Below are some of the most popular types of printed circuit board transmission lines:
Microstrip
Probably most popular PCB transmission line. Easy fabrication and connection, yet is slightly dispersive, lossy, and difficult to analyze.

Stripline
Better than microstrip in that it is not dispersive, and is more easily analyzed. However, fabrication and connection is more difficult.

Coplanar Waveguide
The newest technology. Perhaps easiest to fabricate and connect components, as both ground and conductor are on one side of the board.

Slotline
Essentially, a dual wire transmission line. Best for “balanced” applications. Not used much.
An antenna array feed, constructed using microstrip transmission lines and circuits.

A wideband microstrip coupler.