



Designing Microstrip Bandpass Filter at 3.2 GHz

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Abstract: Bandpass filters play a significant role in wireless communication systems. Transmitted and received signals have to be filtered at a certain center frequency with a specific bandwidth. In designing of microstrip filters, the first step is to carry out an approximated calculation based on using of concentrated components like inductors and capacitors. After getting the specifications required, we realized the filter structure with the parallel-coupled technique. Experimental verification gives comparison, how close the theoretical results and measurements look like.

Keywords: Wireless communication, WiMAX, bandpass filter, parallel-coupled microstrip, computational electromagnetics.

1. Introduction

The advances of telecommunication technology arising hand in hand with the market demands and governmental regulations push the invention and development of new applications in wireless communication. These new applications offer certain features in telecommunication services, that in turn offer three important items to the customers. The first is the coverage, meaning each customer must be supported with a minimal signal level of electromagnetic waves, the second is capacity that means the customer must have sufficient data rate for uploading and downloading of data, and the last is the quality of services (QoS) which guarantee the quality of the transmission of data from the transmitter to the receiver with no error. In order to provide additional transmission capacity, a strategy would be to open certain frequency regions for new applications or systems. WiMAX (Worldwide interoperability Microwave Access) which is believed as a key application for solving many actual problems today is an example [1].

In realization of such a system like WiMAX we need a complete new transmitter and receiver. A bandpass filter is an important component must be found in the transmitter or receiver. Bandpass filter is a passive component which is able to select signals inside a specific bandwidth at a certain center frequency and reject signals in another frequency region, especially in frequency regions, which have the potential to interfere the information signals. In designing the bandpass filter, we are faced the questions, what is the maximal loss inside the pass region, and the minimal attenuation in the reject/stop regions, and how the filter characteristics must look like in transition regions [2].

In the process to fulfill these requirements there are several strategies taken in realization of the filters, for example, the choice of waveguide technology for the filter is preferred in respect to the minimal transmission loss (insertion loss). This strategy is still actual in satellite applications. The effort to fabricate waveguide filters prevents its application in huge amounts. As alternative, microstrip filter based on printed circuit board (PCB) offers the advantages easy and cheap in mass production with the disadvantages higher insertion losses and wider transition region. In this work we would like to give a way to conceive, design and fabricate bandpass filter for the WiMAX application at the frequency 3.2 GHz with parallel-coupled microstrips as opposed to the [3] which designed filter for wireless local area network 5.75 GHz, and [4] which used the composite resonators and stepped impedance resonators for filter realization.

