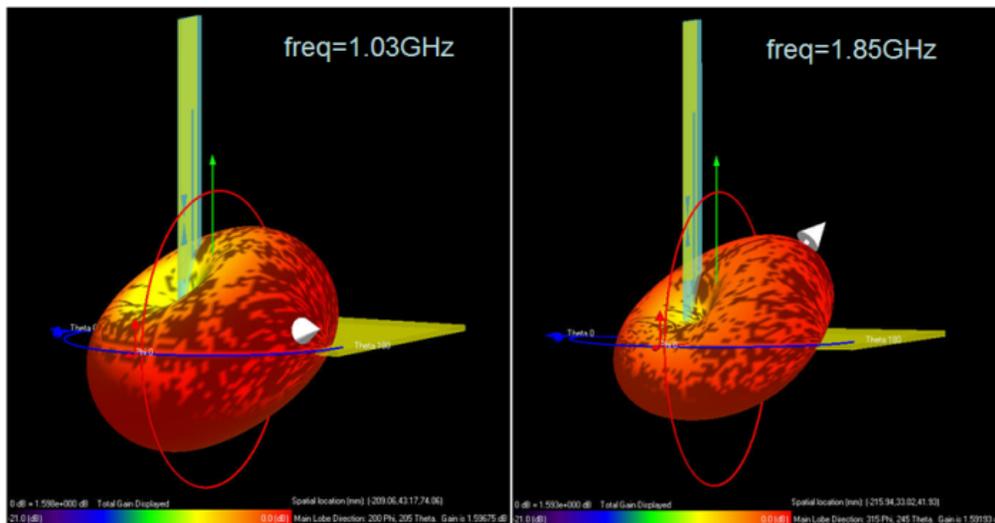


# EM Insights Series

## Episode #3: Wireless Network Card Antenna Design



Agilent EEsof EDA  
September 2008

# Application Overview

## Typical situation

Although there are many EM simulation technologies and tools available in the market place that antenna designers can use, it is still a hard question to answer which one is the best for a particular application. In the case of wireless network card antennas, there are only a few design examples that users can reference.

## Potential users and targeted market

- Wireless network card manufacturers
- Antenna designers

## EM product used

- [Electromagnetic Professional \(EMPro\)](#)

<http://www.agilent.com/find/eesof-empro>

# Design Challenge

## Design challenge

Wireless network card antenna designers are oftentimes challenged to reduce the size but it's a difficult design task without the aid of EM field solvers or visualizing current/field patterns on the antenna.

## Problem solved

With EMPro, the design of a wireless network card antenna is simple and quick. The ultra fast simulation capability of EMPro enables designers to quickly test and verify various different configurations and sizes of antenna. EMPro's slick visualization feature enables designers to visualize the current and field pattern on the antenna surface, consequently it visually helps designers effectively design smaller antennas.

## Value delivered

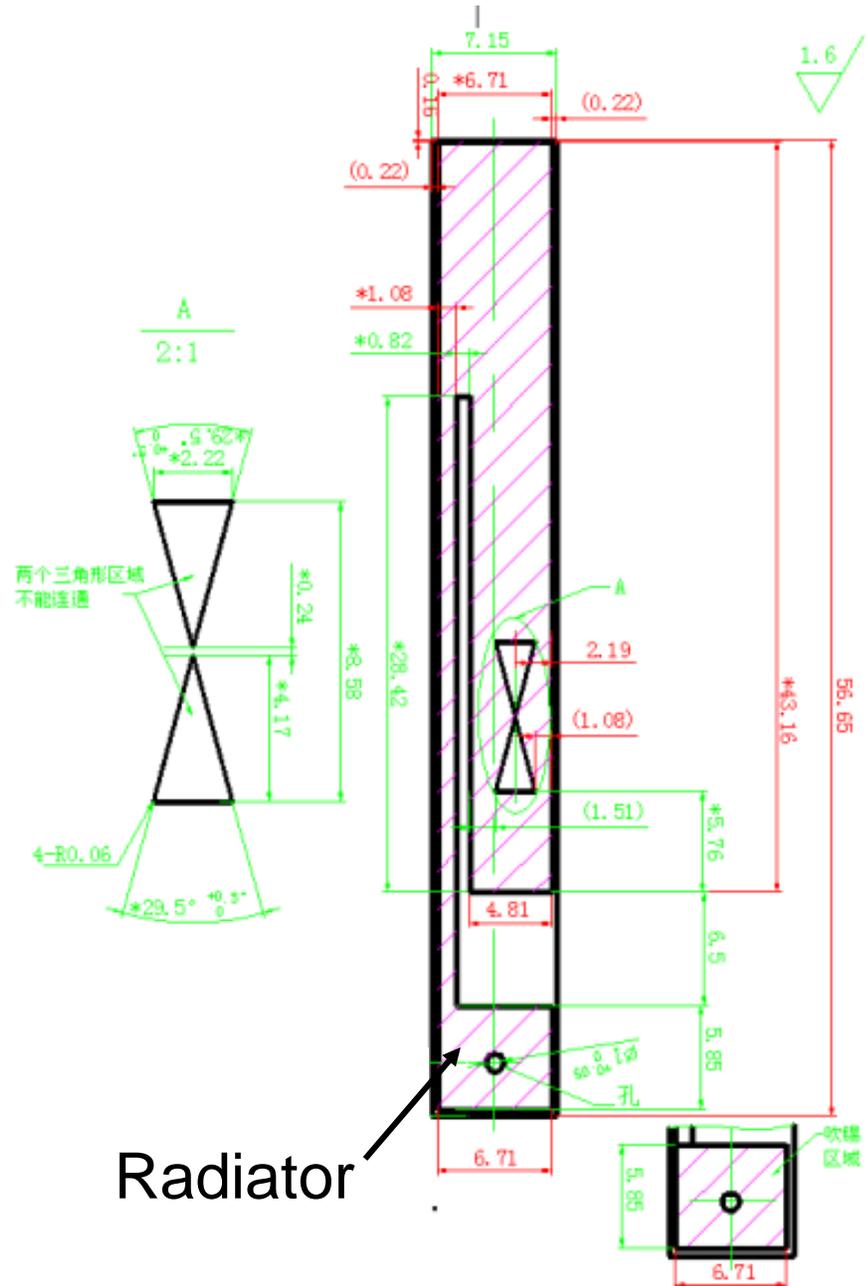
Designers can quickly design and test antennas for wireless network card application with EMPro's specialized antenna simulation capabilities.

# Wireless Network Card Antenna

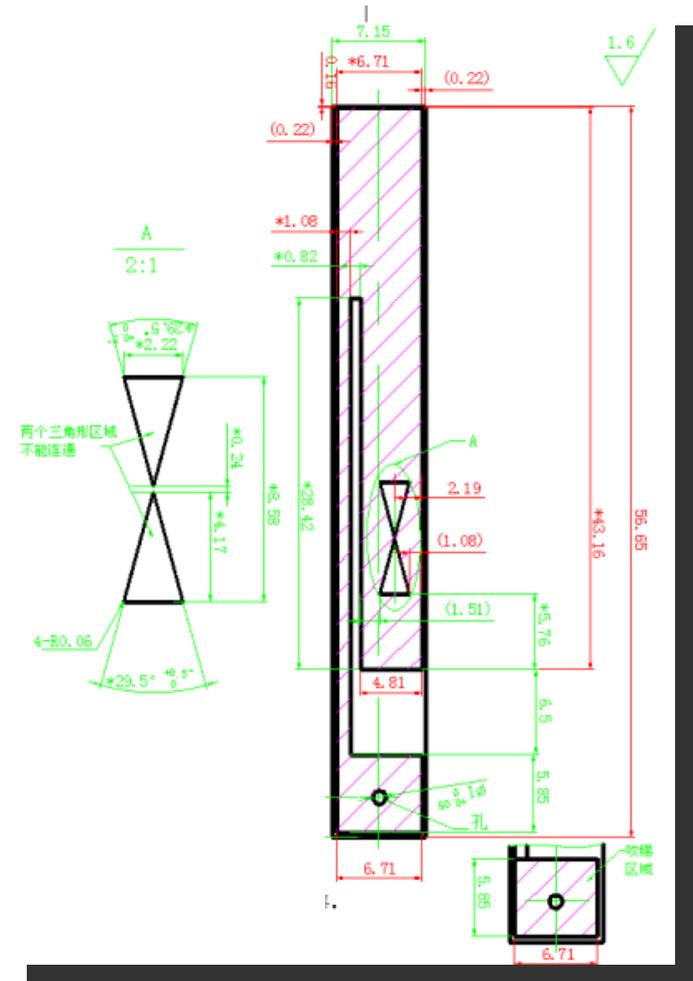
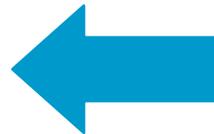
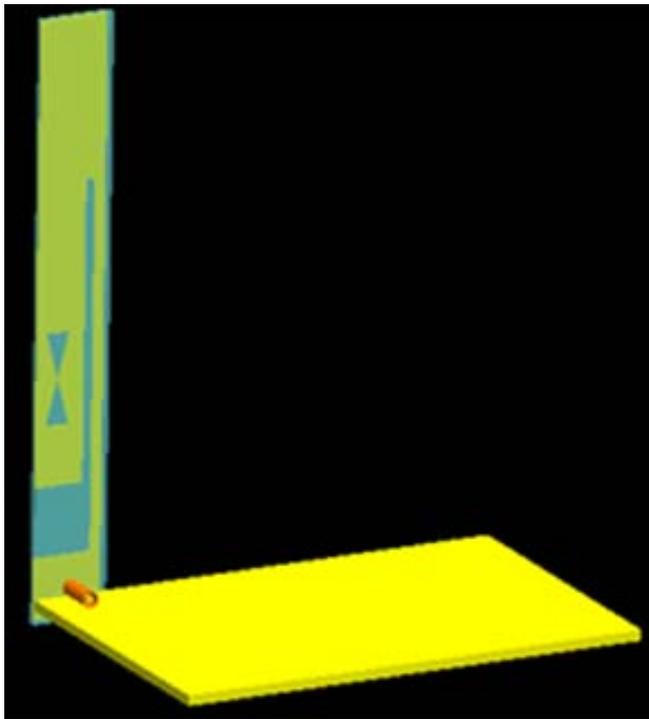
Many PCs and laptops use external wireless network card for networking. Since the antenna performance is critical to the overall system performance, the antenna must be properly designed.



# Antenna Dimension



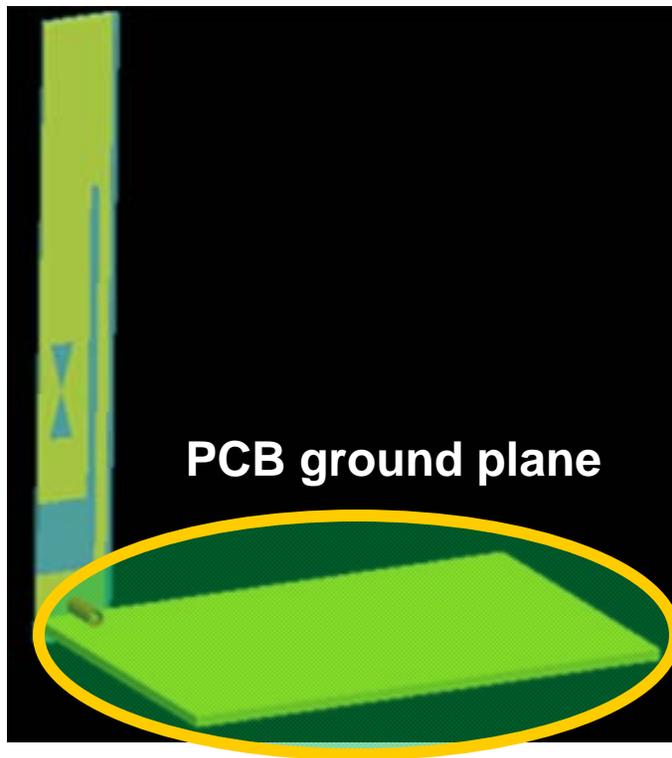
# Modeling Antenna in EMPro



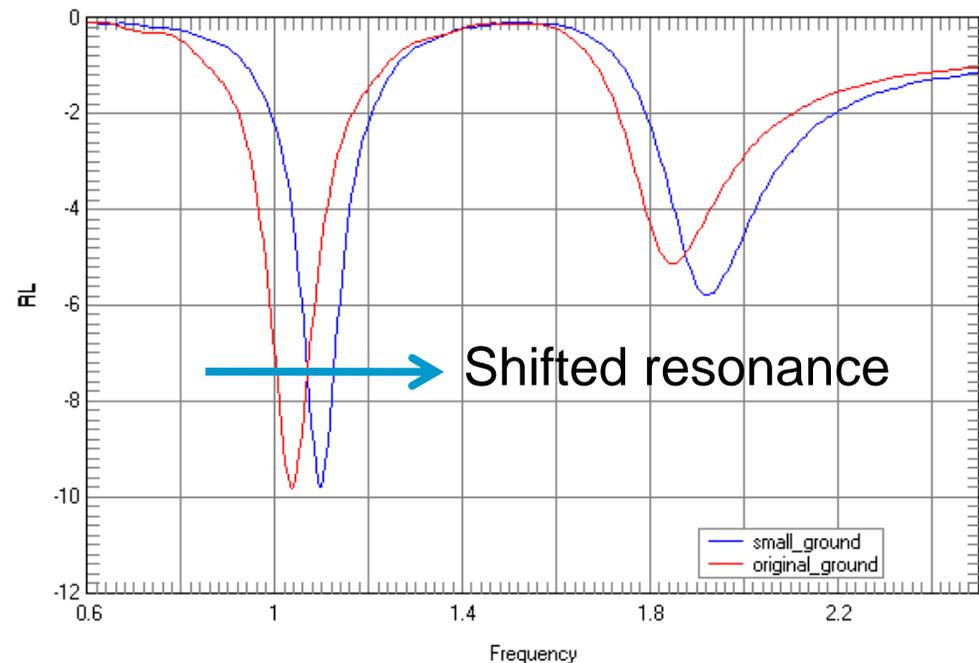
With EMPro's drawing engine, the radiator can be easily and accurately entered.

# Network Card's Ground Plane on PCB

The size of the ground plane affects the resonance frequency of antenna, so antenna designers must analyze the antenna with ground planes attached

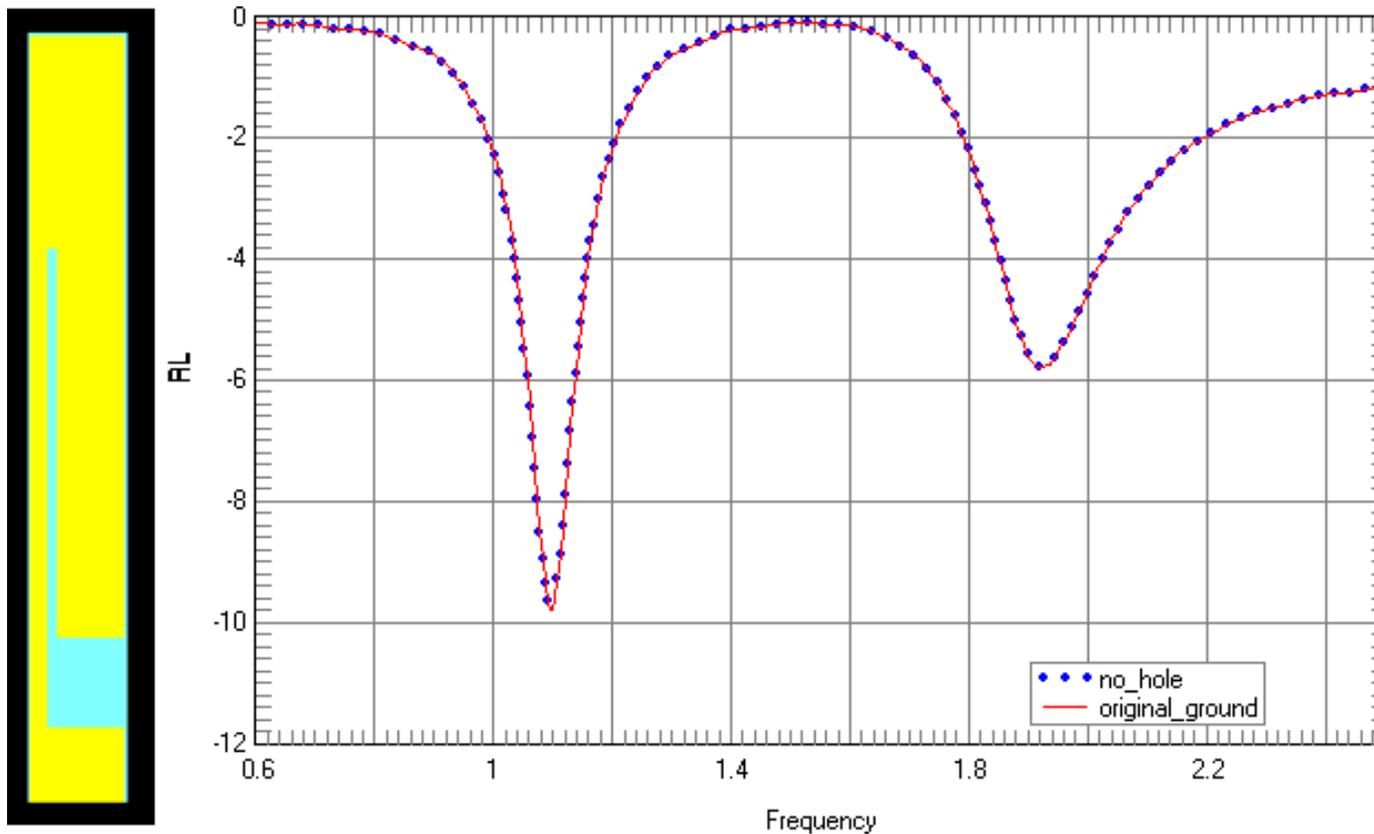


Changing the ground plane from 45 x 30 mm to 30 x 25 mm results higher resonant frequency



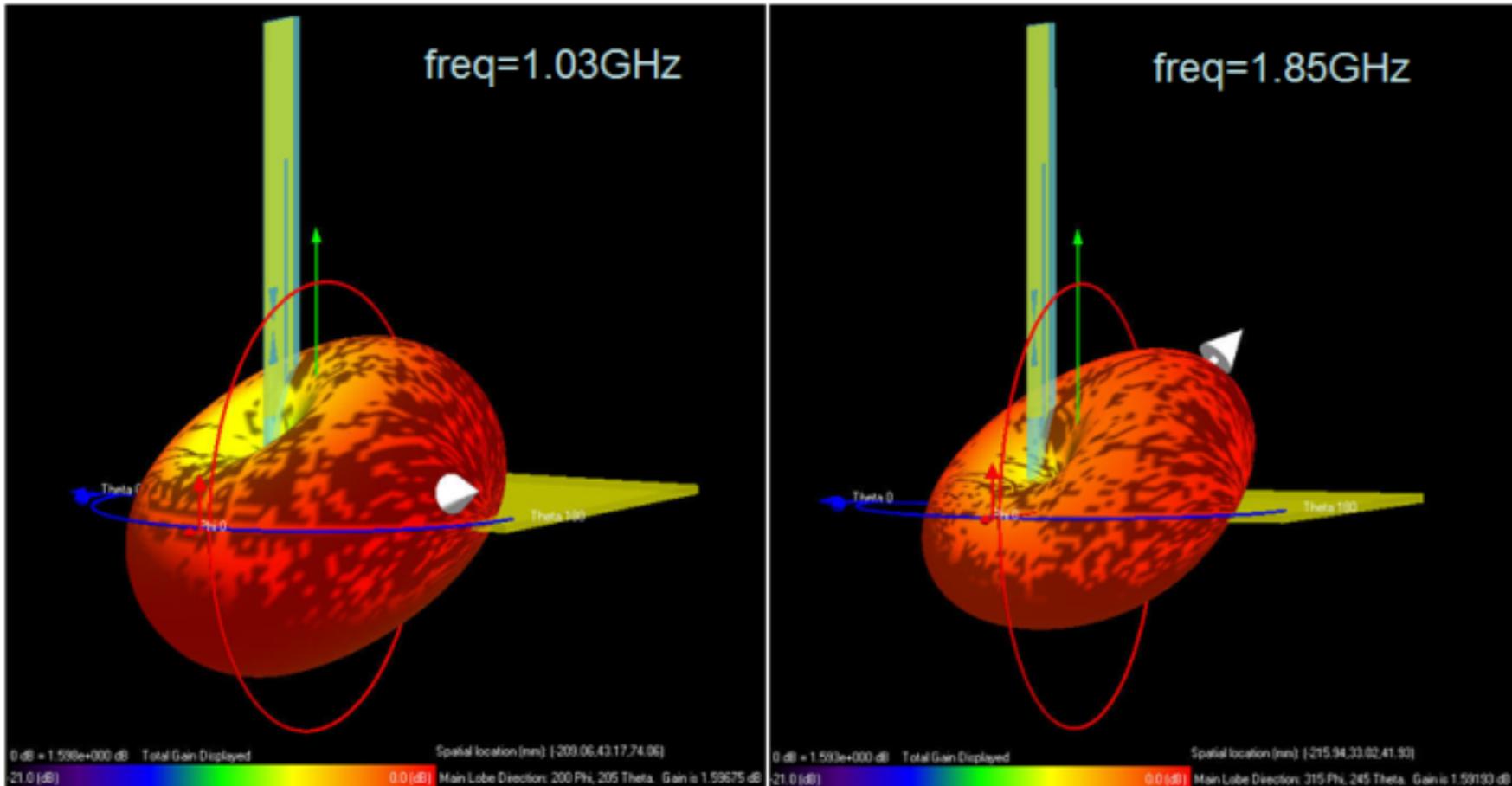
# Antenna With and Without Localizer

The EMPro simulation demonstrates that the presence of localizer doesn't change the antenna's resonance frequency and the current distribution much.



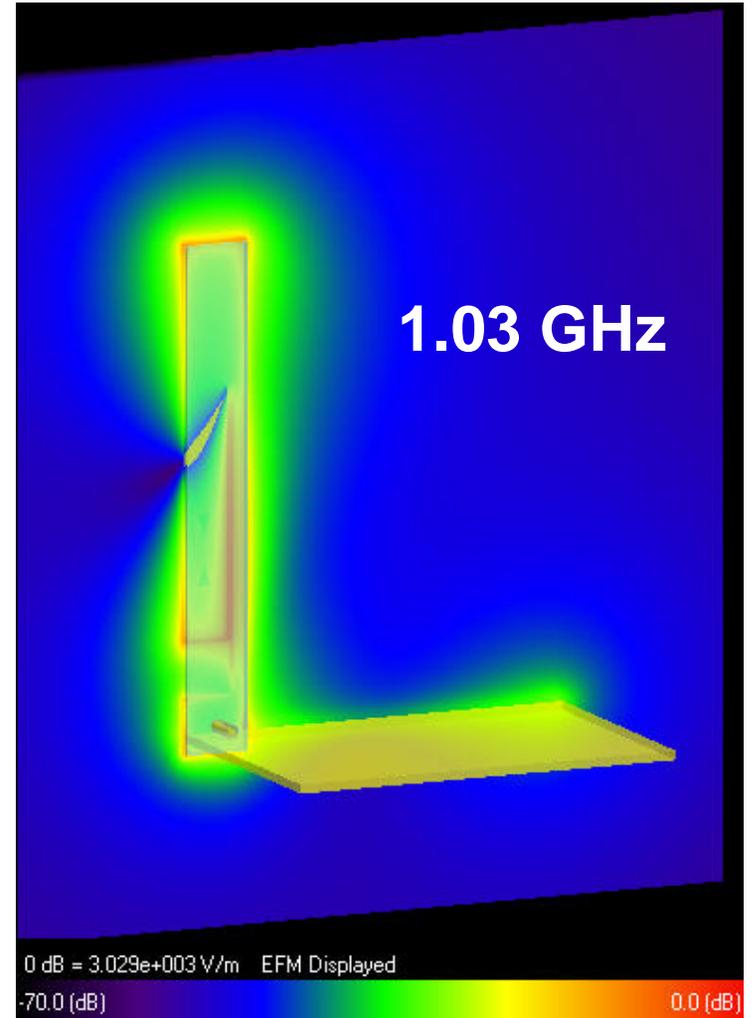
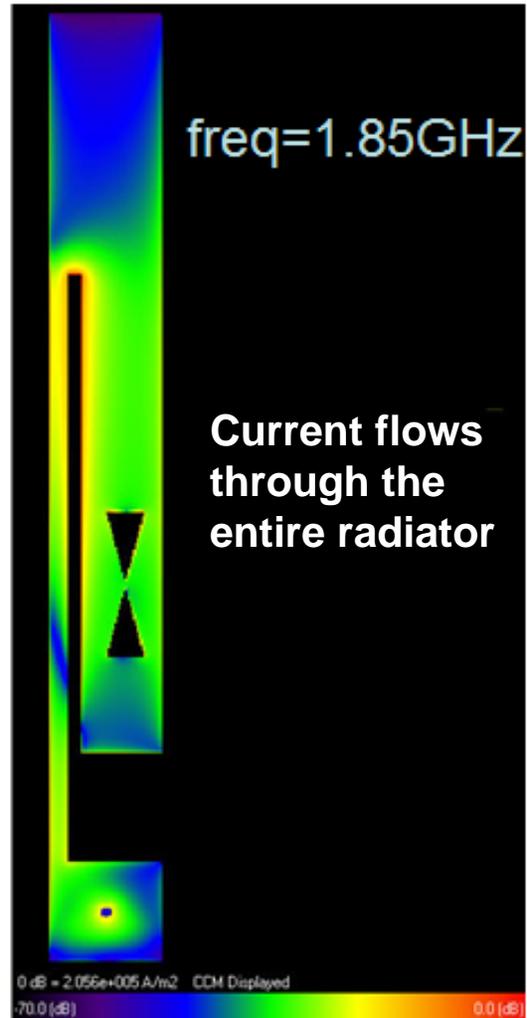
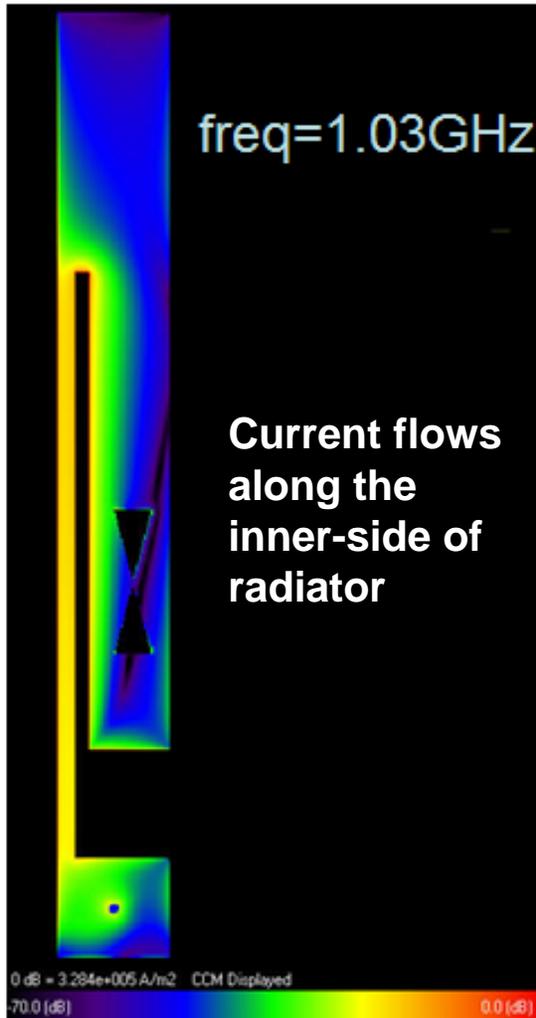
# Far-field Pattern

At both frequencies, the antenna has good far-field patterns



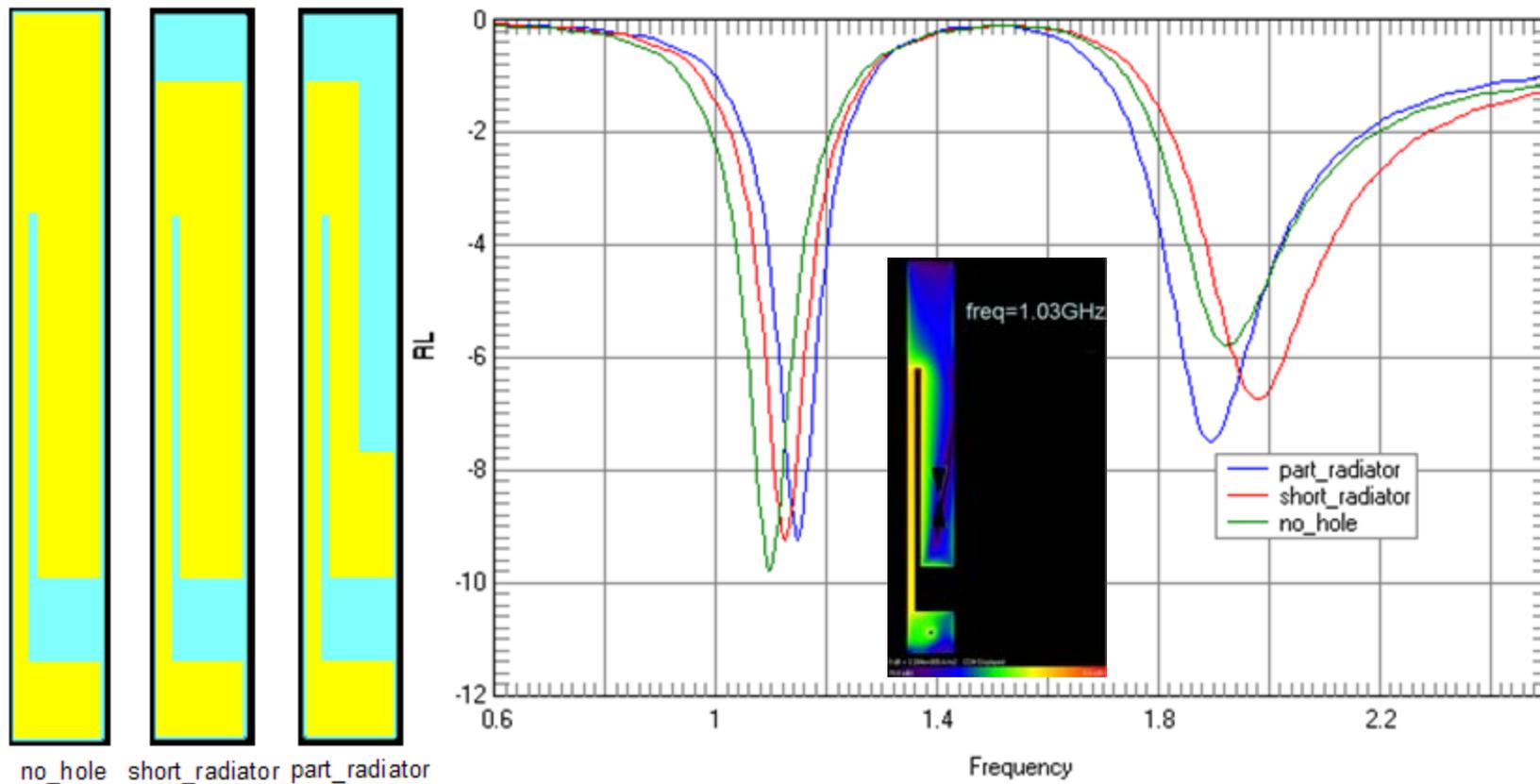
# Current and E-field Plots

## E-field pattern

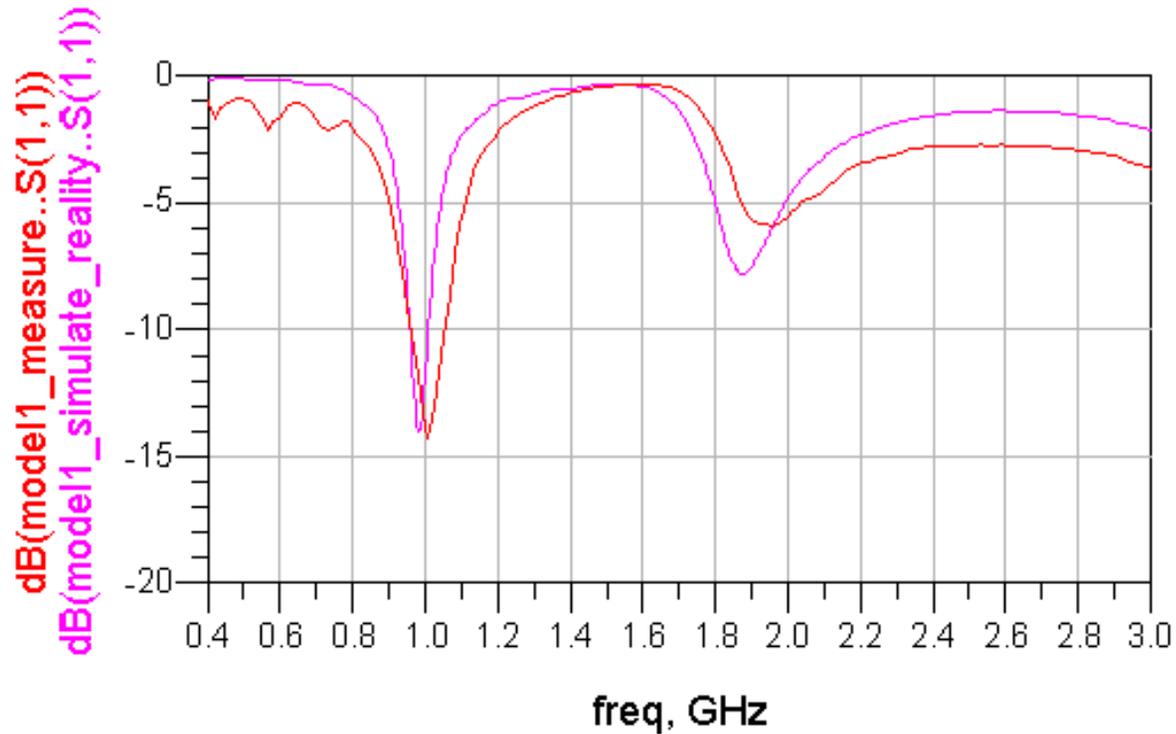


# Smaller Antenna?

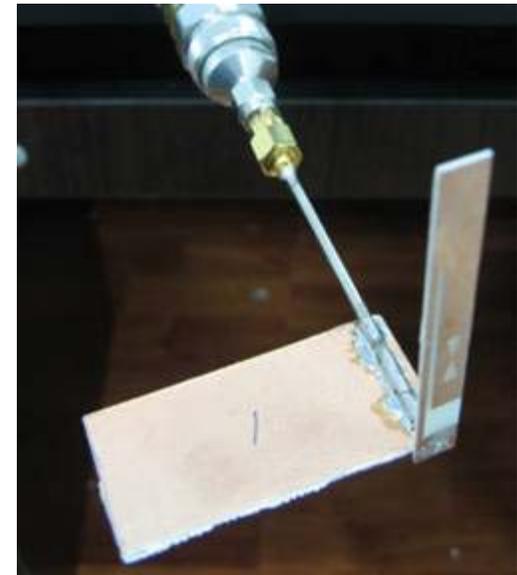
The antenna size may be made smaller by cutting the top side of antenna off where the current flow is less.



# Measured vs. Simulated Comparison



red = measured, pink = simulated



Measurement setup

## Episode #3 Summary

- With EMPro, the design of wireless network card antenna is simple and quick. The ultra fast simulation capability of EMPro enables you to quickly test and verify different configurations and sizes of antenna.
- EMPro's visualization feature enables designers to visualize the current and field pattern on the antenna surface, consequently it visually helps designers effectively design smaller antennas.

### Interested in learning more about this application?

- Request an [evaluation copy of EMPro](http://www.agilent.com/find/eesof-empro-evaluation)  
<http://www.agilent.com/find/eesof-empro-evaluation>
- Request a [demo of EMPro](http://www.agilent.com/find/eesof-empro-demo)  
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Printed in USA, March 30, 2009  
5989-9983EN