Electromagnetic (EM) Models/Simulations - BBTLine's RF Splitters

Shown Below are Simulation models for several of BBTLine's Broadband Microstrip RF Splitters (also known as RF Power Dividers or RF Combiners).

EM Simulations/Models of the BBTLine Splitters were created in both the Keysight ADS (Advanced Design System) Momentum Simulator (a "2.5D" planar Electromagnetic Simulator) and the Keysight EMPro Simulator (a true 3-D Electromagnetic Simulator).

The ADS Momentum Simulator, being a Planar "2.5D" solver, does not solve for vertical currents in the ground via structures and also makes approximations, rather than directly solving, for metal thickness effects. The assumption is that the splitter substrate is thin enough (relative to the highest frequency wavelength) that these effects are negligible.

The EMPro 3-D Simulator does solve for vertical via currents and also does account for true metal thickness effects.

Simulations were performed using a high end workstation from Puget Systems (20 2.6 GHz processors and 128 GB RAM). Even with this computing horsepower, the larger 16-Way and 8-Way Splitter models still had to be broken down into separate sections in order to simulate the overall splitter. RAM was quickly exhausted if the entire 16-Way or 8-Way Splitter model was attempted in a simulation. The S-parameters from the separate sections were then pieced/cascaded together in order to obtain the full structure result.
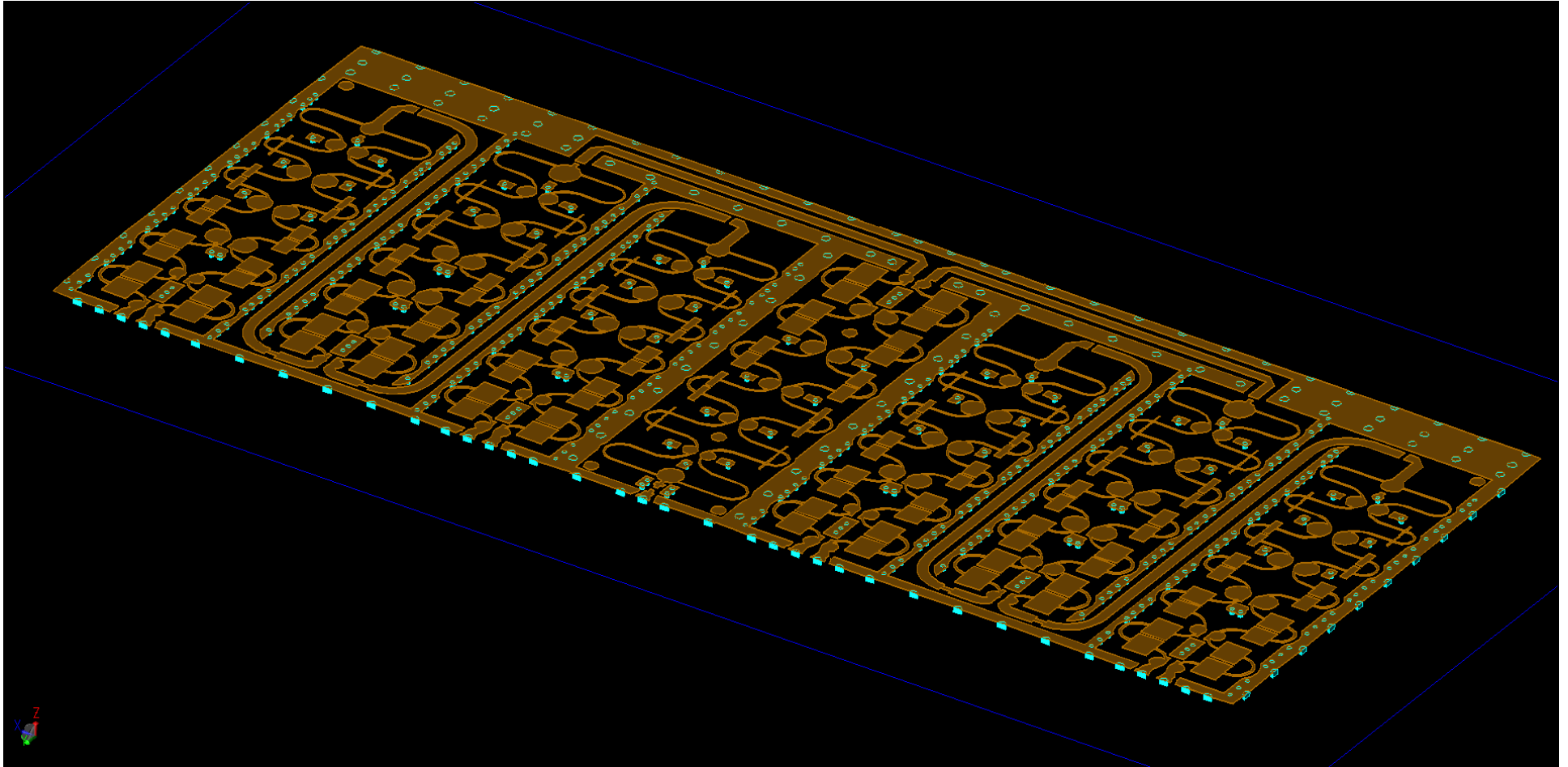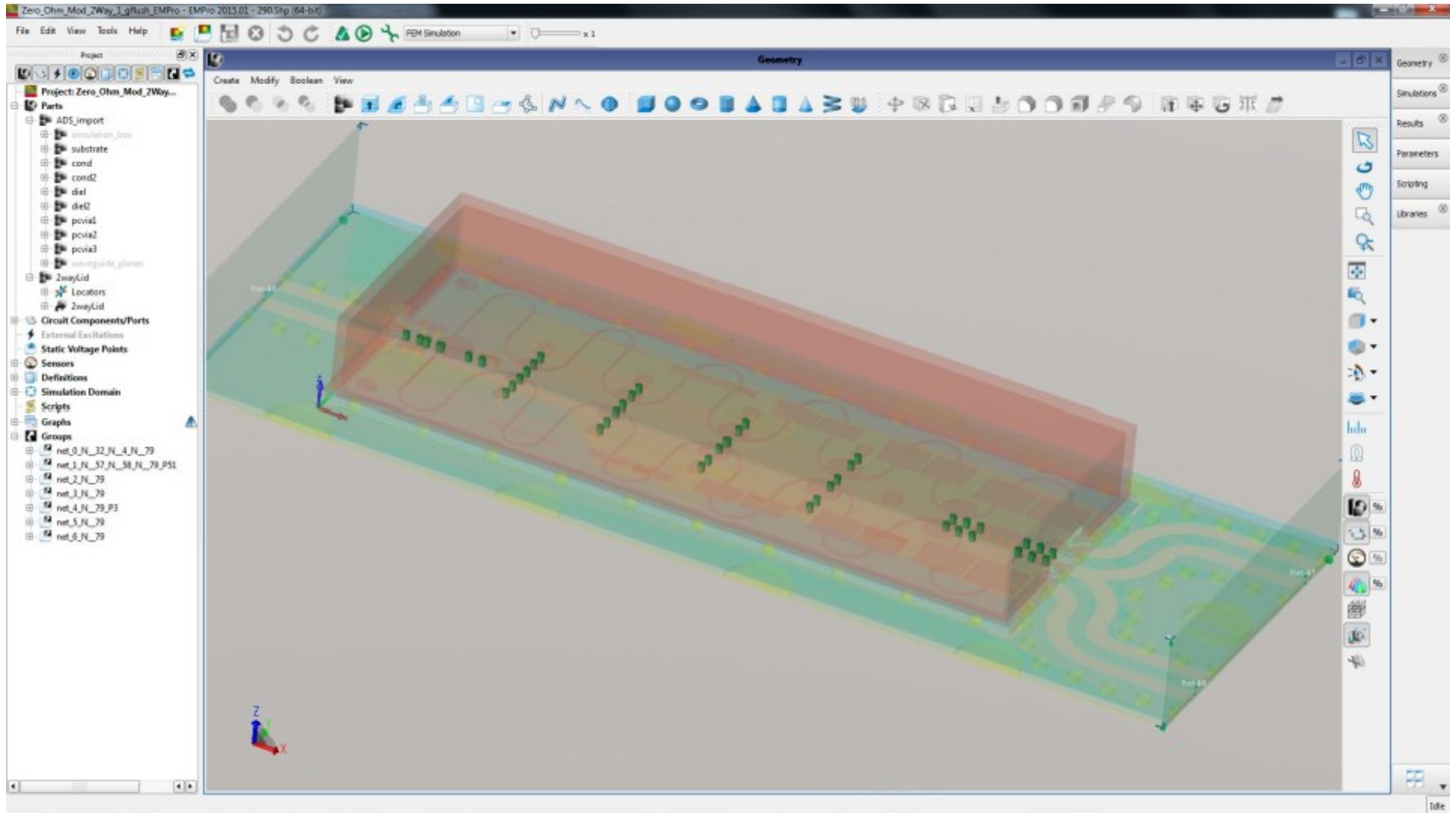
Figure 1. An 8-Way Version 1 Microstrip RF Splitter Simulation Model in EMPro (shown without components)
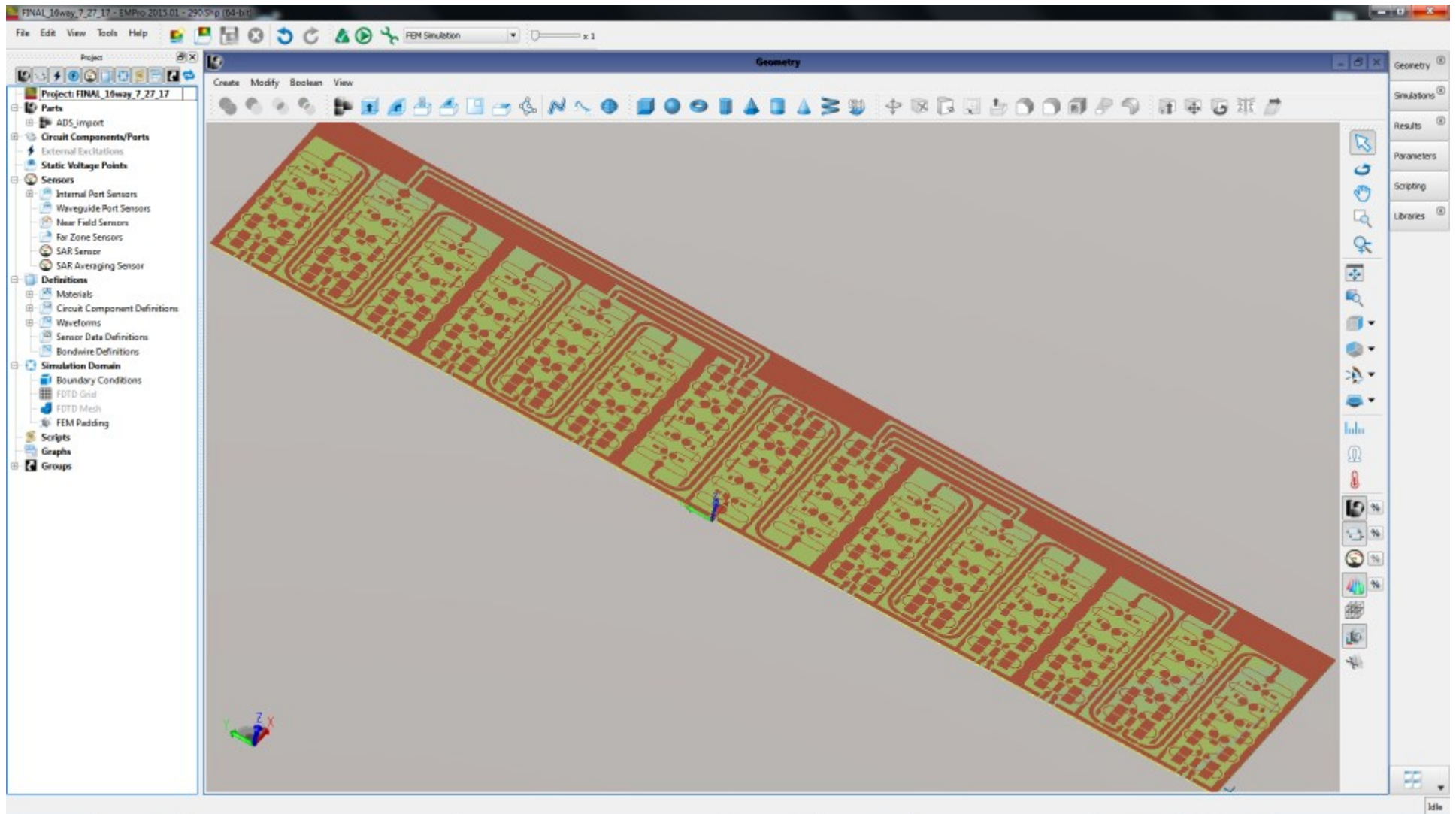
Figure 2. A 16-Way Version 1 Microstrip RF Splitter Simulation Model in EMPro (shown without components)
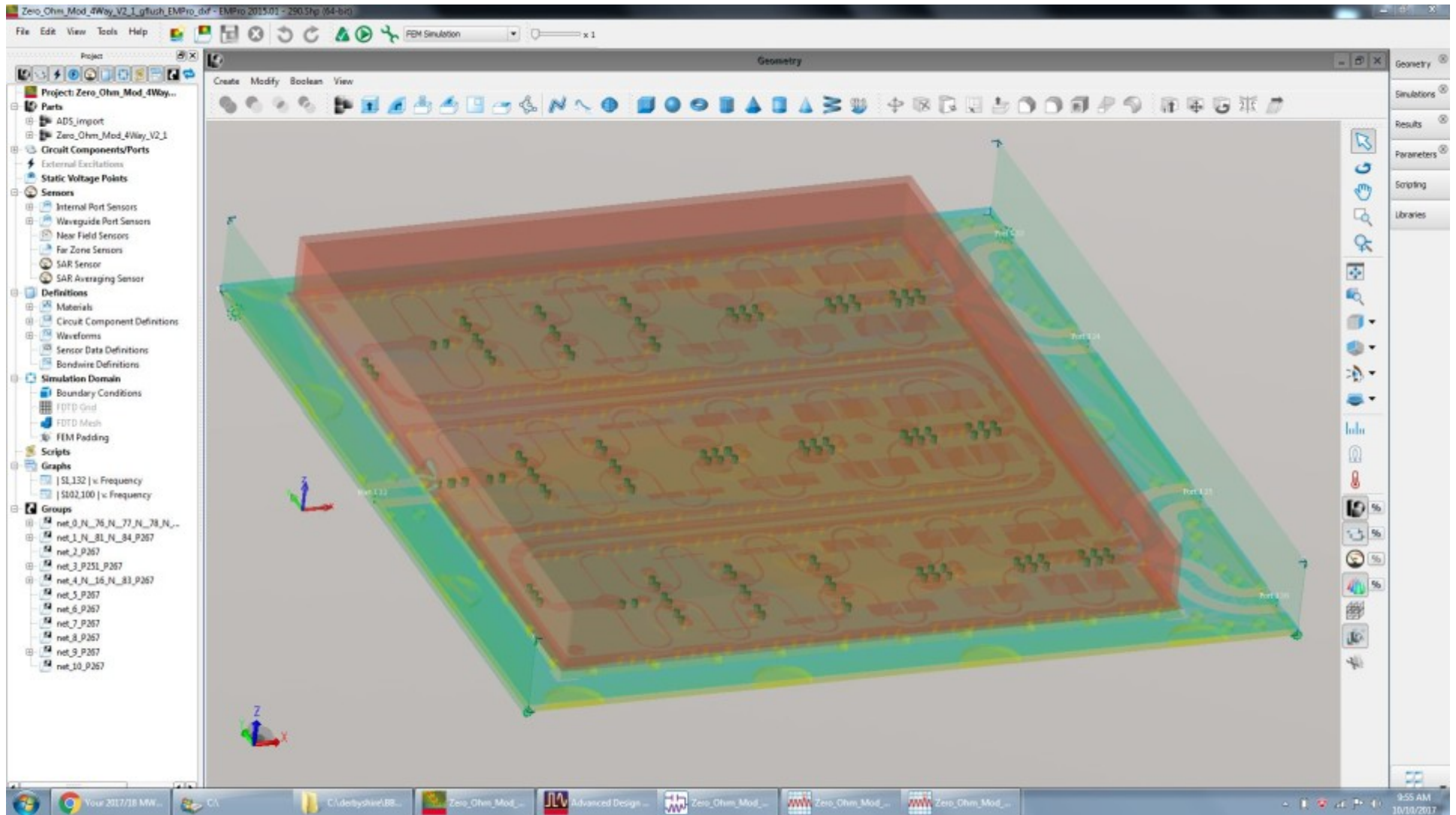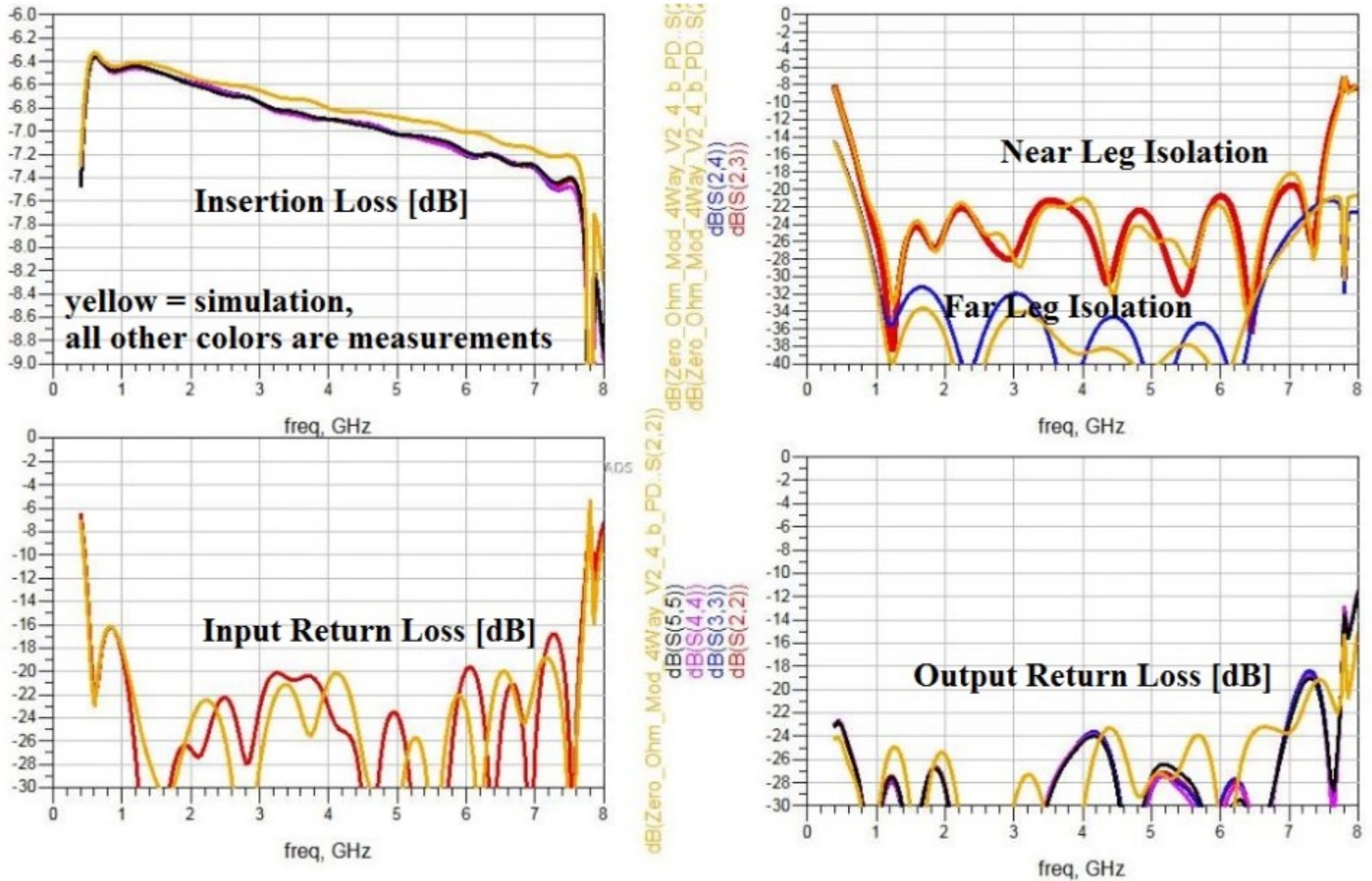
Figure 3. A 4-Way Version 2 Microstrip RF Splitter Simulation Model in EMPro (simulated with Shield Can)

Figure 4. A 2-Way Microstrip RF Splitter Simulation Model in EMPro (simulated with Shield Can)

The simulation models match quite well with the measurement results as shown below for a 4-Way Version 2 RF Splitter:

Figure 5. A 4-Way Version 2 Simulation And Measurement Comparison