From: Exchange nathaniel.fargo@utah.edu Subject: Initial Results with Branch Networks

Date: May 28, 2025 at 13:33

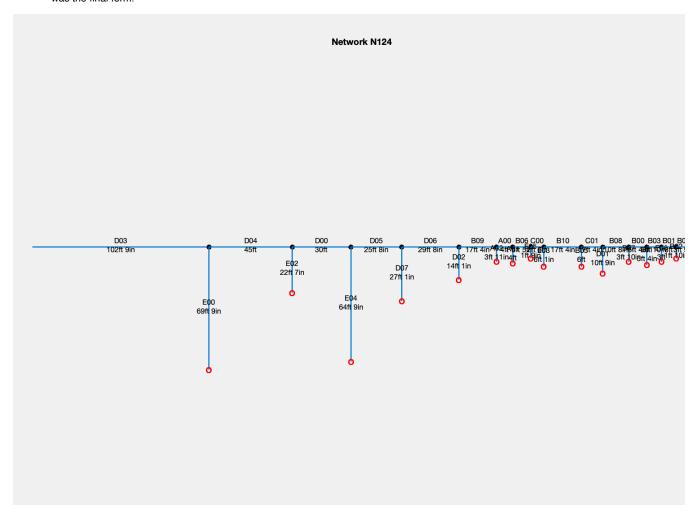
To: Cynthia Furse cynthia.furse@utah.edu



#### Hello C,

I've been doing more measurements and network building, and wanted to share some plots so you know what I've been working on.

Here's the network I build and tested (distances not to scale but longer indicates longer). I performed tests along the whole way, but this was the final form.



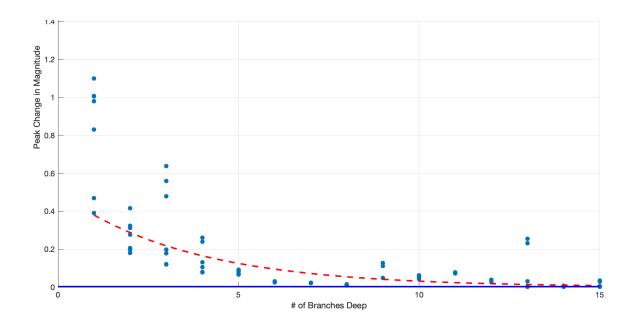
As I built up the network I recorded data at each step. By comparing the difference in the network results against the depth into the network (how many branches the signal has passed through) I made some plots to get an estimate of how deep we can "see" in the network. Likely we won't be able to pull useful information at those depths but it seems like we can still see differences at 10-17 branches deep.

Using the difference in magnitude as the statistic to compare seemed like the best bet.

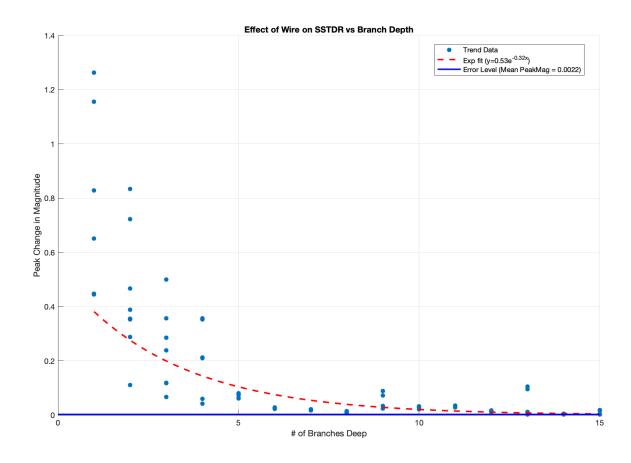
The results do change per frequency, so I'll show a couple.

### 3 MHz:

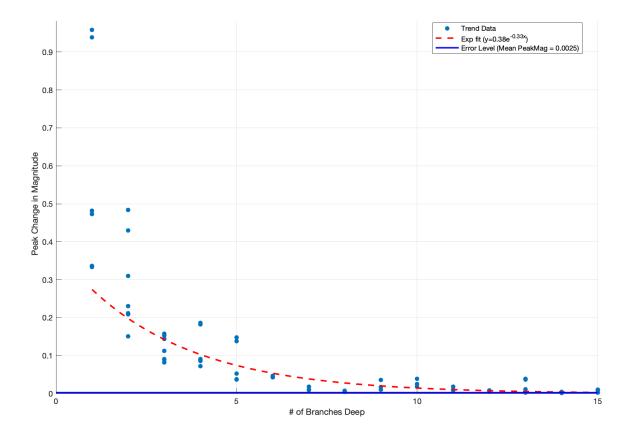




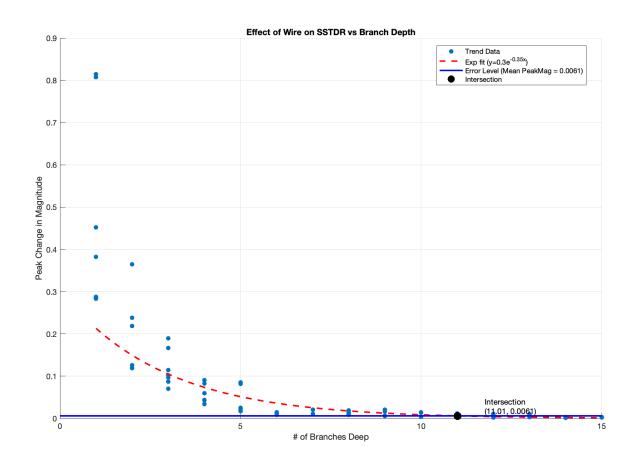
# 6 MHz:



### 12 MHz:



# 24 MHz:



The variability in the scatter plot is from different network configurations, not taking the same measurement multiple times.

The blue bar on the bottom represents the variability when I kept the network the same and just took measurements over and over (2 sets of ~25 measurements each).

I'm ready for any next steps:

- Algorithms to pick apart the network (onion peeling?)
  Testing the thing you wanted testing
  Going back and taking more measurements

Best, Nathaniel