



# IEEE 802.3ap

## Proposal for S-parameter Extrapolation to DC

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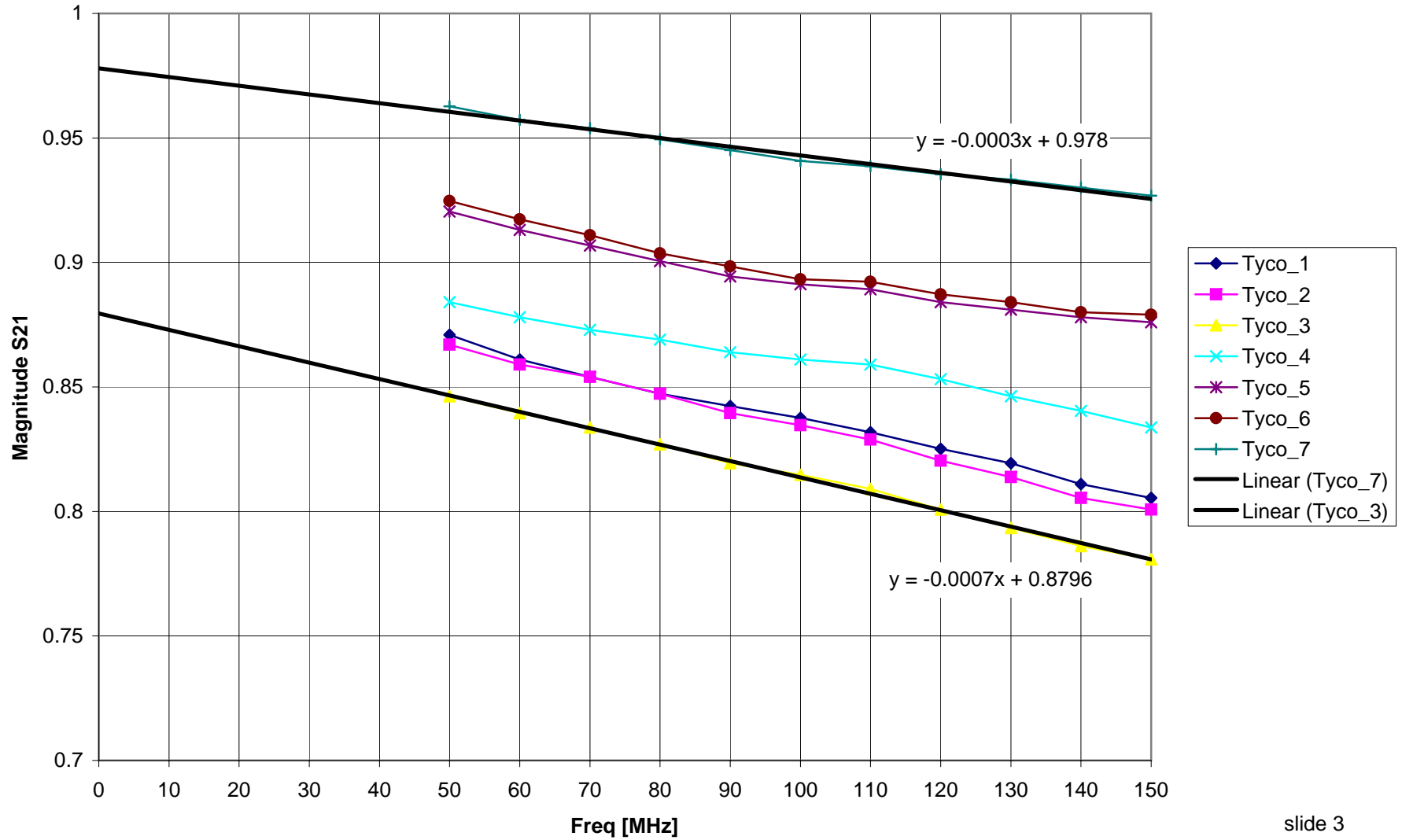


# Problem Statement

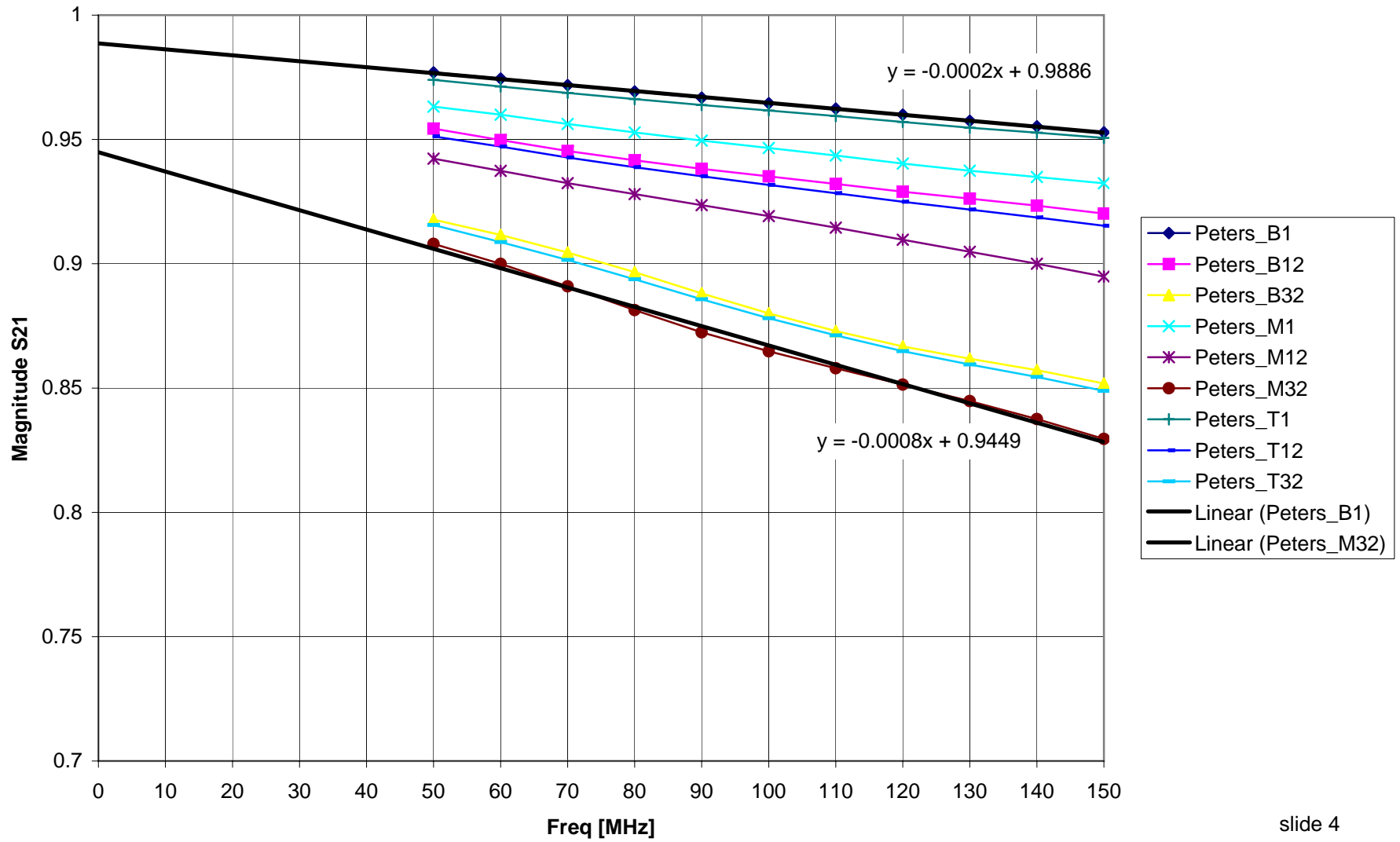
- In order to compute time domain pulse responses, frequency domain data needs to include data down to and including DC.
- Reported Techniques The Cause Problems
  - “Extrapolating” to Magnitude = 1 at DC
  - Extrapolating wrappedPhase
- Proposed technique
  - Linear extrapolation of linear magnitude and unwrapped Phase
  - Channel Adhoc Measurement Requirement
    - $F_{\min} = 50\text{MHz}$ ,  $F_{\text{step}} = 10\text{MHz}$
  - Use 10 lowest frequency points and perform MSE linear fit.
    - 50MHz to 140MHz points are used



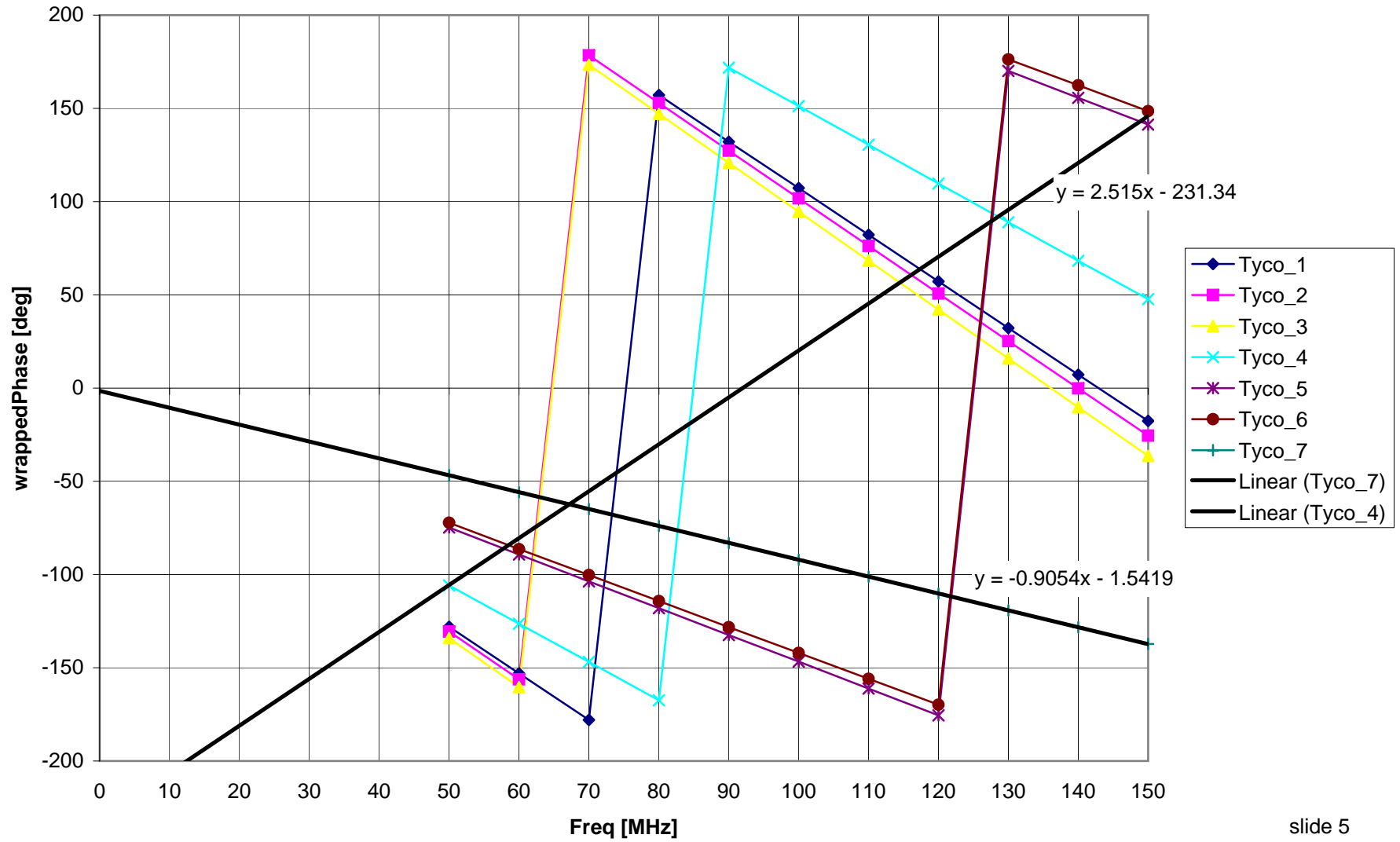
# Magnitude Tyco Channels



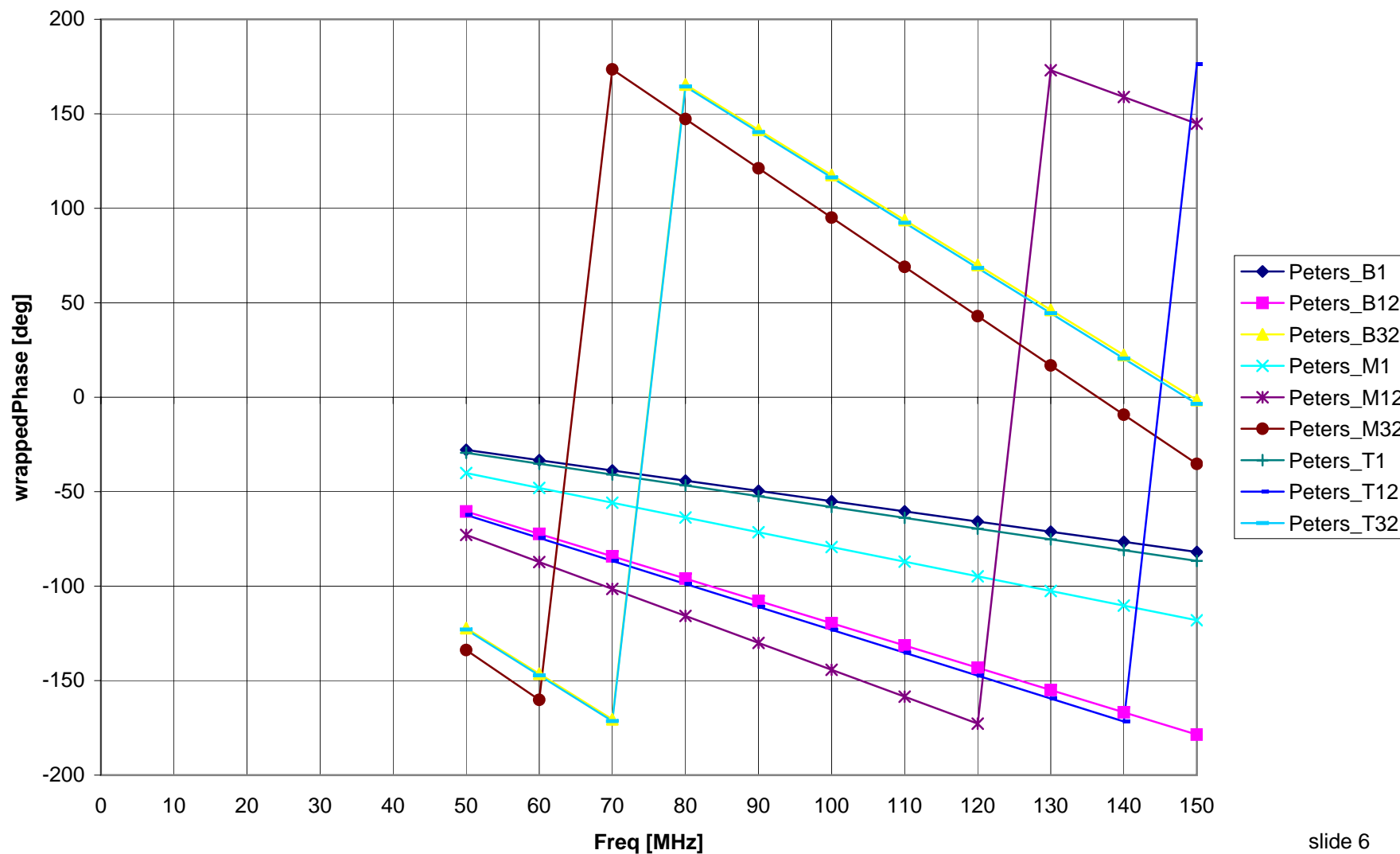
# Magnitude Peters Channels



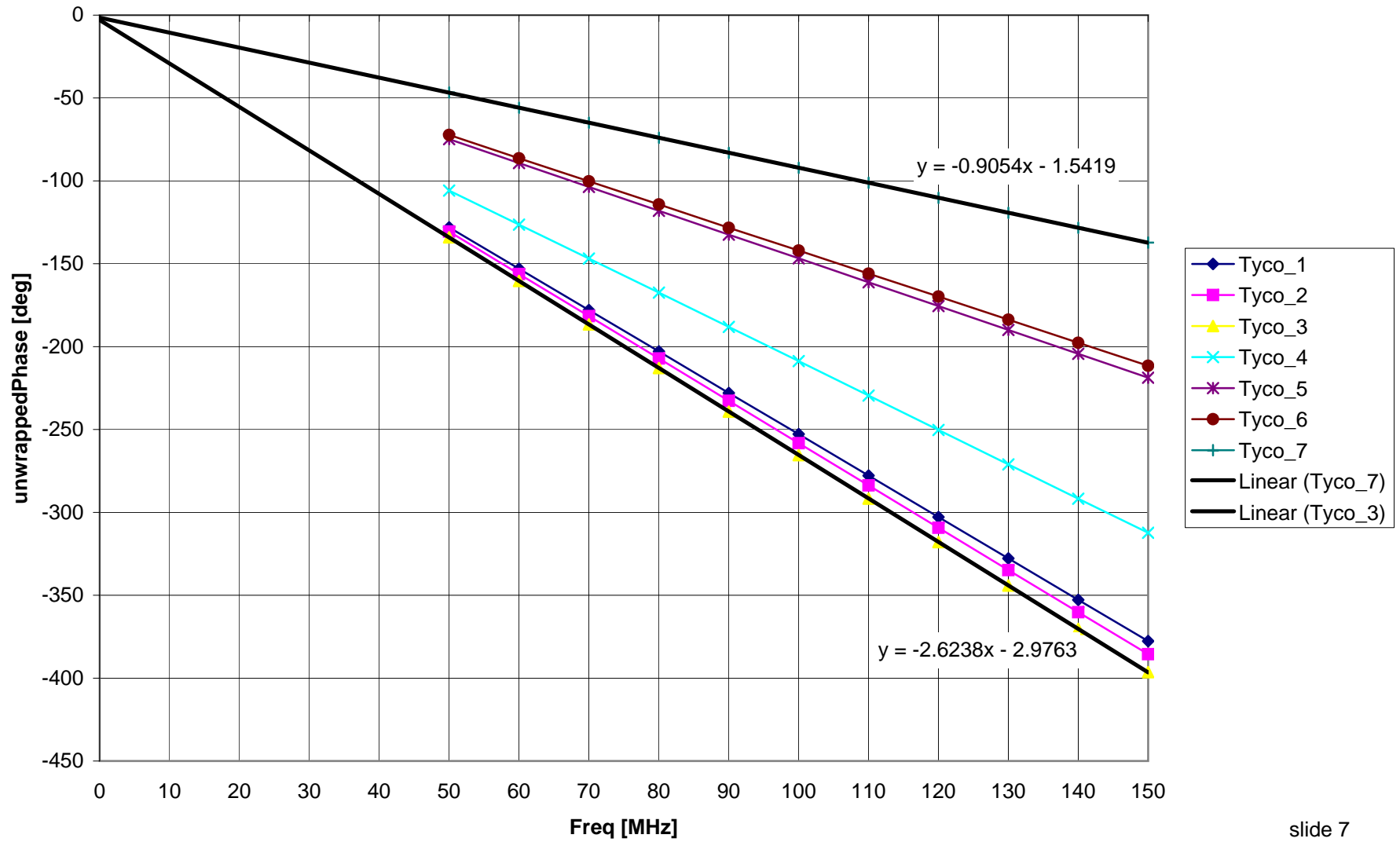
### wrappedPhase Tyco Channels



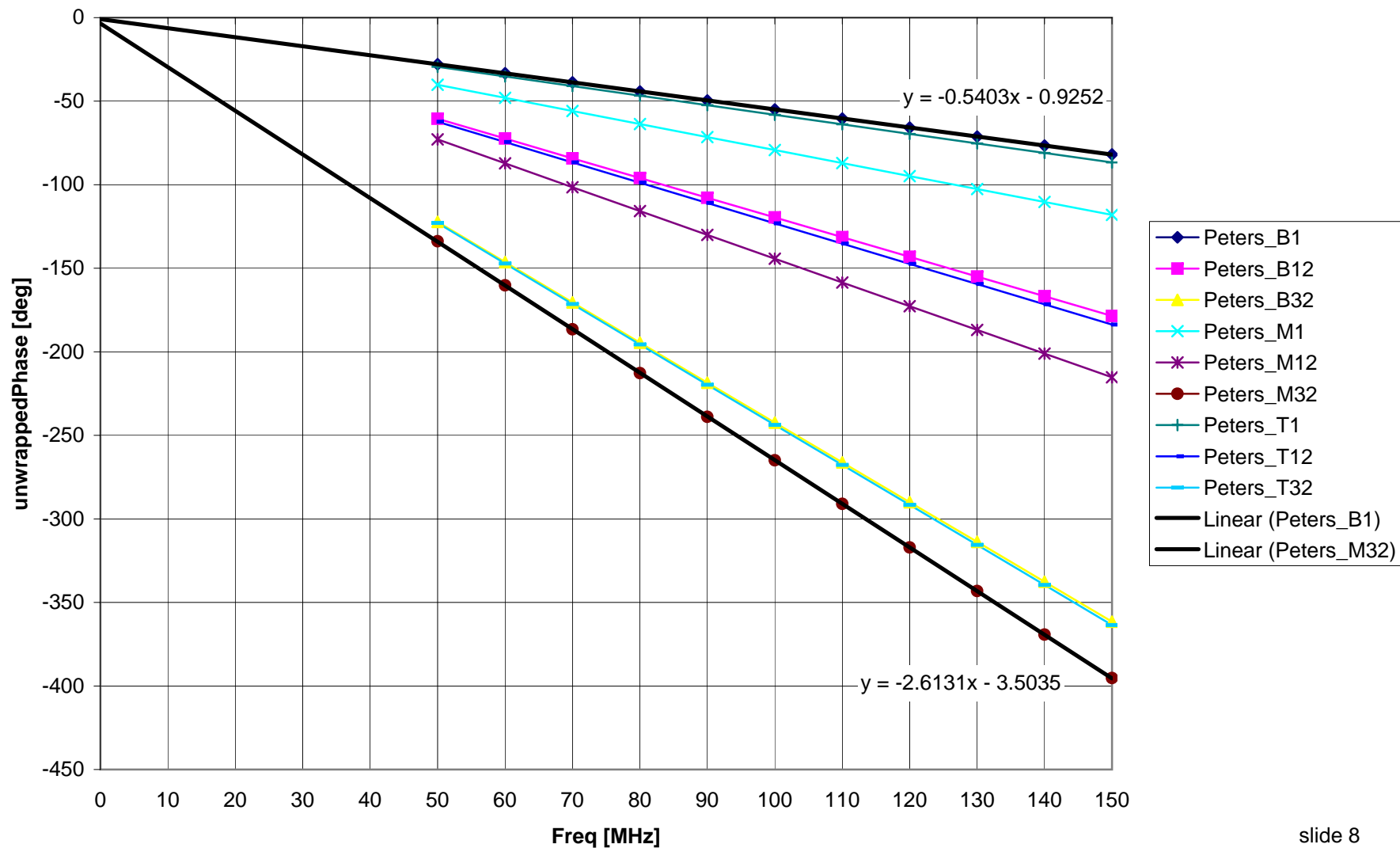
wrappedPhase Peters Channels



### unwrappedPhase Tyco Channels



### wrappedPhase Peters Channels





# StatEye Extrapolation

- The proposed technique is similar to the StatEye v3.0f DC extrapolation technique.
  - 10 point linear extrapolation of linear magnitude and phase
- StatEye does not appear to use `unwrappedPhase` **prior** to performing extrapolation to DC. Unwrapped phase is used later when performing linear interpolation if needed for FFT.

```
% find the magnitude of the channel transfer function at DC
```

```
[a]          = polyfit(data.f(1:10), data.abs(1:10), 1);  
data.dc      = a(2);
```

```
[p]          = polyfit(data.f(1:10), data.phase(1:10), 1);  
param.dcPhase = p(2);
```



# Conclusion

- Proposed technique
  - Linear extrapolation of linear magnitude and unwrapped Phase
  - Channel Adhoc Measurement Requirement
    - $F_{\min} = 50\text{MHz}$ ,  $F_{\text{step}} = 10\text{MHz}$
  - Use 10 lowest frequency points and perform MSE linear fit.
    - 50MHz to 140MHz points are used

