

Joel Goergen – Force10 Networks

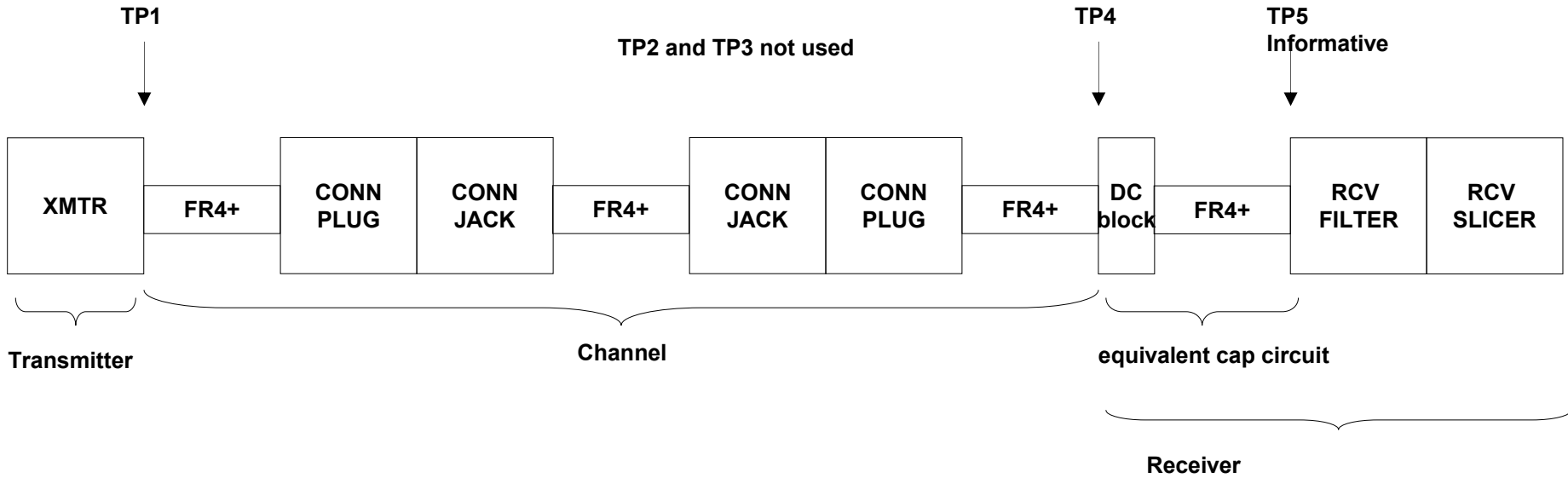
[joel@force10networks.com](mailto:joel@force10networks.com)

**Subject :** IEEE 802.3ap Backplane Ethernet

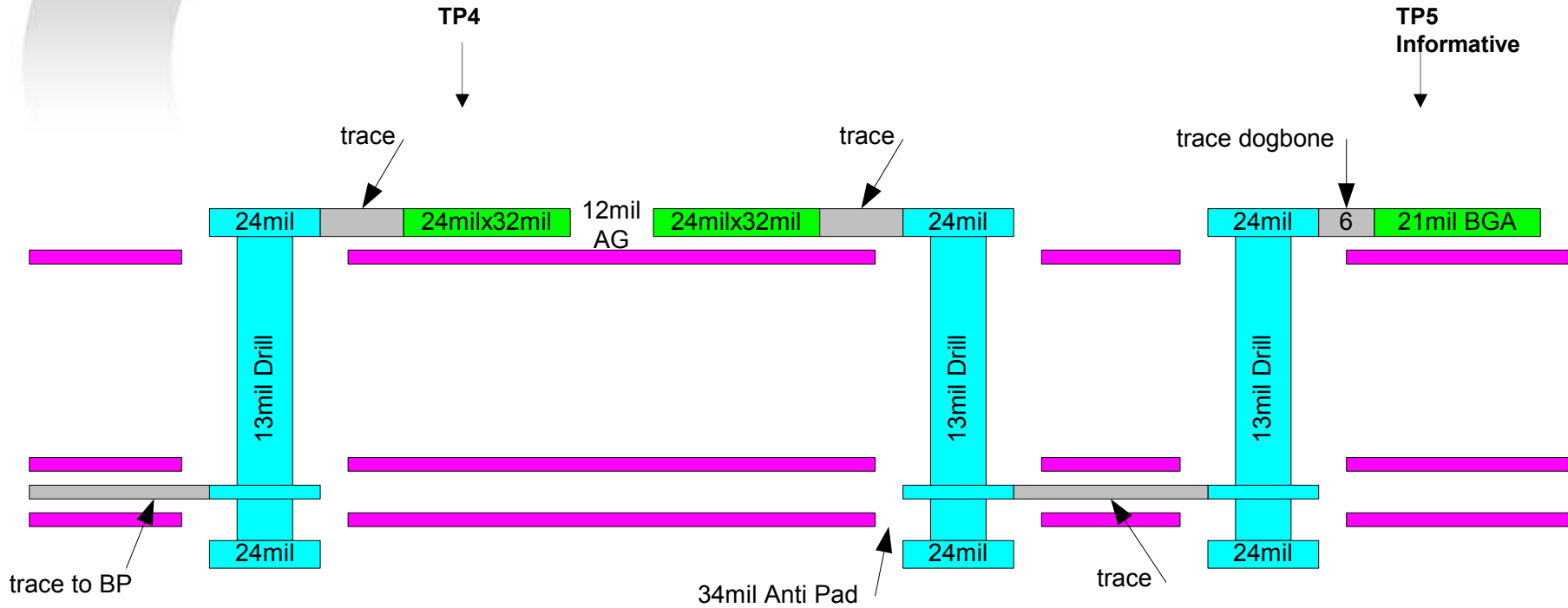
**Abstract :** This presentation describes system level constraints in defining TP5 with an equivalent capacitor circuit model.

- Physical Description Identifying a Clean Launch Route to a BGA Device.
- Identify Design Constraints and Concerns.
- Recommendations.

# Channel Simulation Model

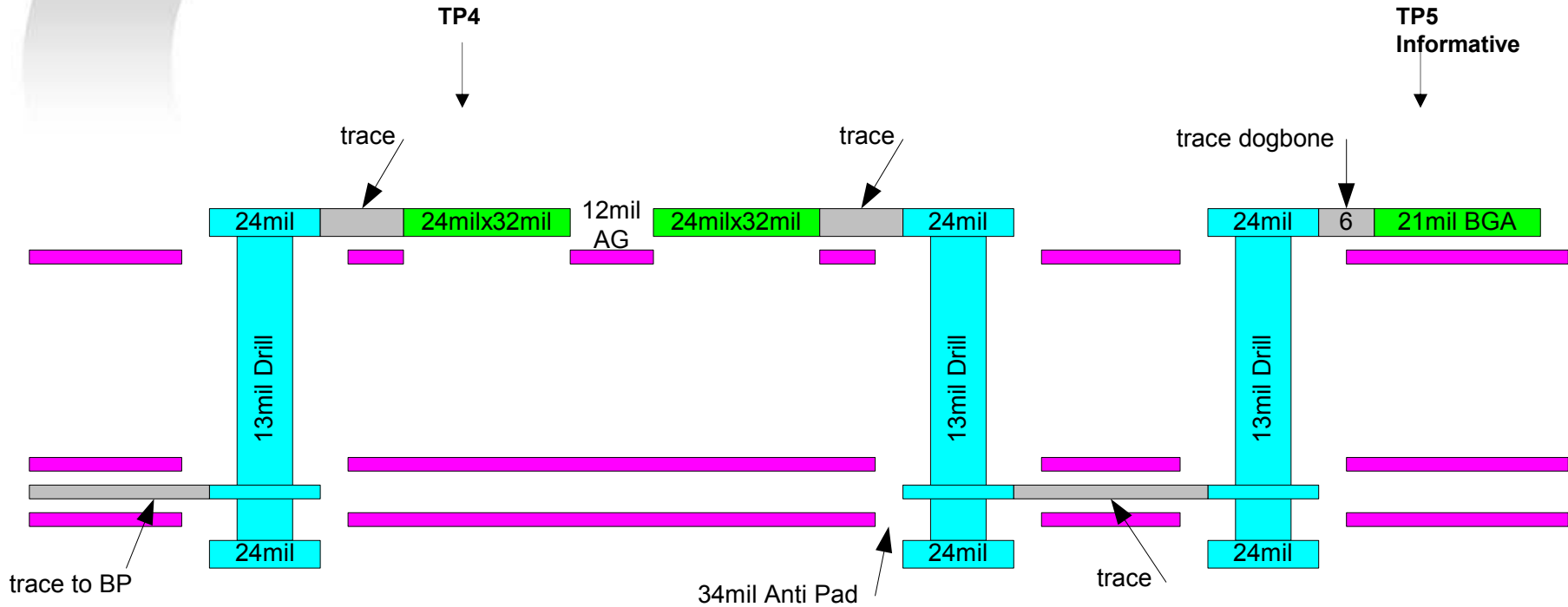


# Physical Description – Case 1



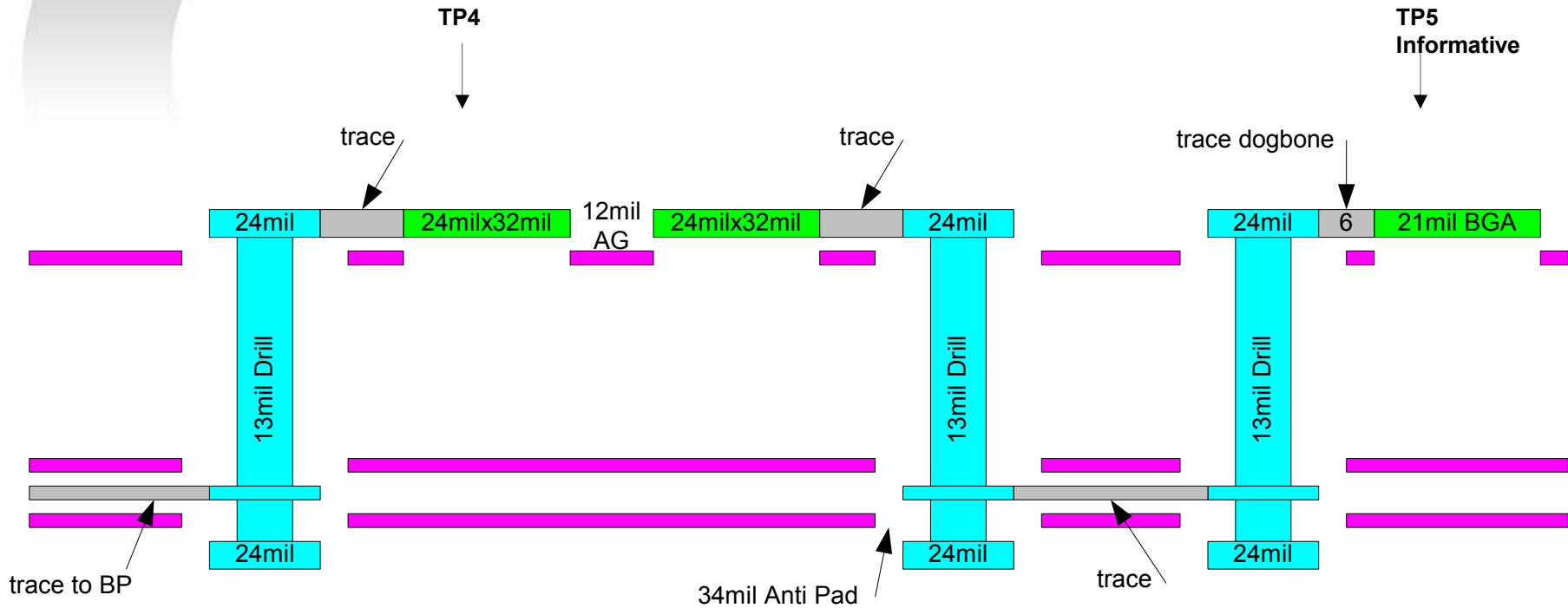
- Poor Signal Integrity – SDD11/22/12.
- Standard Cad Approach.
- Easiest / lowest cost to implement.

# Physical Description – Case 2



- Crosstalk to traces routed under the open ground pad is an issue.
- Allows good pin escape from the BGA.
- Poor Signal Integrity - has high SDD11/22/12 at the BGA.
- Potential to require additional routing layer.

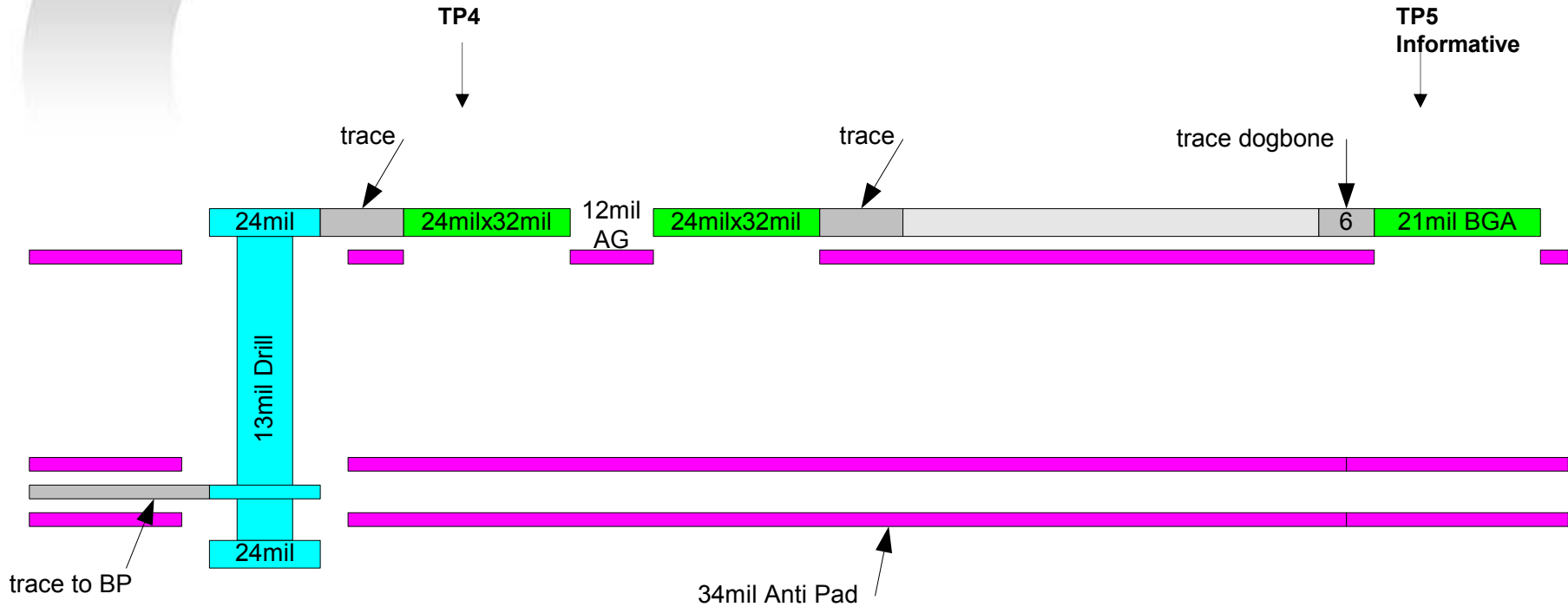
# Physical Description – Case 3





- Allows for inner high speed pad usage within the BGA.
- Medium Poor Signal Integrity – SDD11/22/12. Has the extra VIAS to content with in the break out.
  - Increases pad impedance to reduce SDD11/22.
- Crosstalk to traces routed under the open ground pad is an issue for both the BGA and the Capacitor foot print.
- Allows good pin escape from the BGA.
- Potential to require additional routing layer.
- Requires 50mil pitch BGA packaging to avoid ground plane isolation on the ground layer under the BGA pads.

# Physical Description – Case 4



- Ideal Signal Integrity.
  - Eliminates two VIAS.
  - Increases pad impedance to reduce SDD11/22.
- High speed BGA pins must reside on the outer pin rows.
- Crosstalk to traces routed under the open ground pad is an issue for both the BGA and the Capacitor foot print.
- Requires 50mil pitch BGA packaging to avoid ground plane isolation on the ground layer under the BGA pads.
- Potential to require additional routing layer.

- Case 3 is the best choice for flexibility in pin definition.
- Case 4 is the best choice for over-all performance.
- We should model Case 3.