ATCA™ Platform Considerations for Backplane Ethernet

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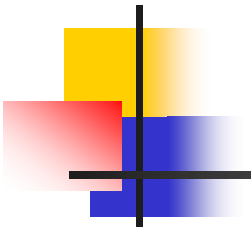
Introduction

- This presentation discusses ATCA™ platform design parameters
- Highlights some of the learning
- Set the stage up for discussion



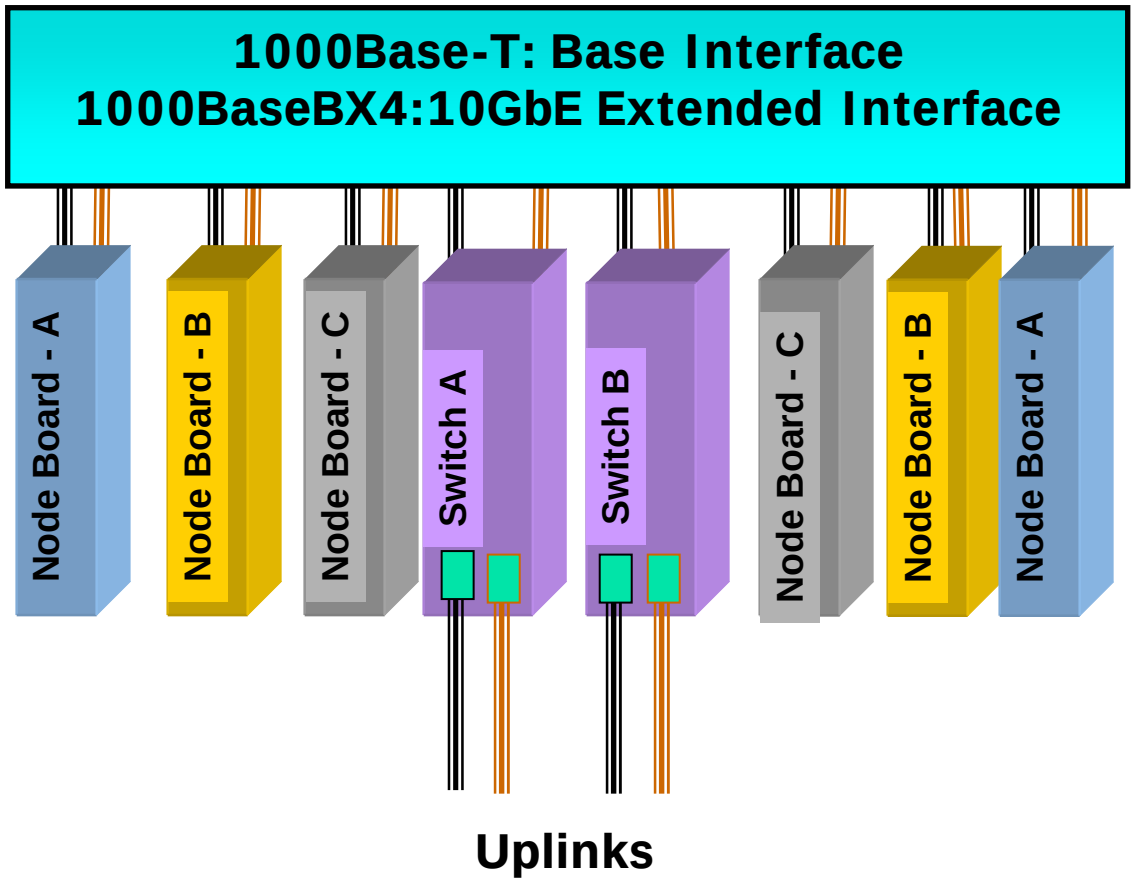
Outline

- ATCA™ Overview
- ATCA™ System Block Diagram
- Example design details
  - Area, Power and other considerations
  - Sample ATCA ™ Backplanes
  - Test results
- Summary

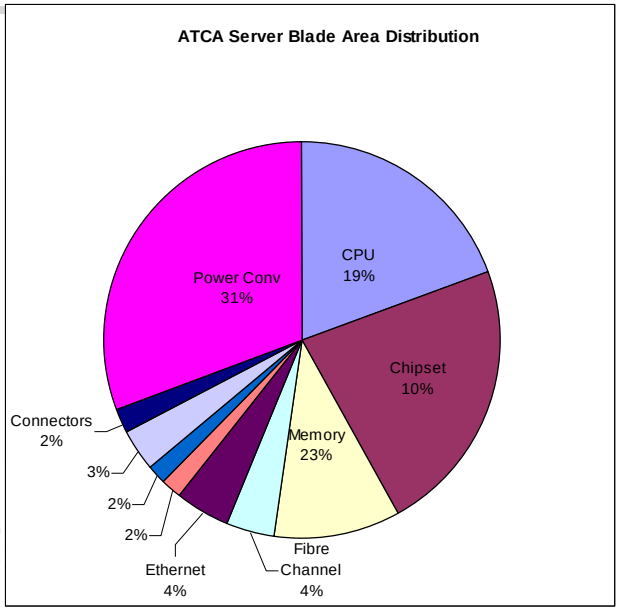
What is ATCA™?

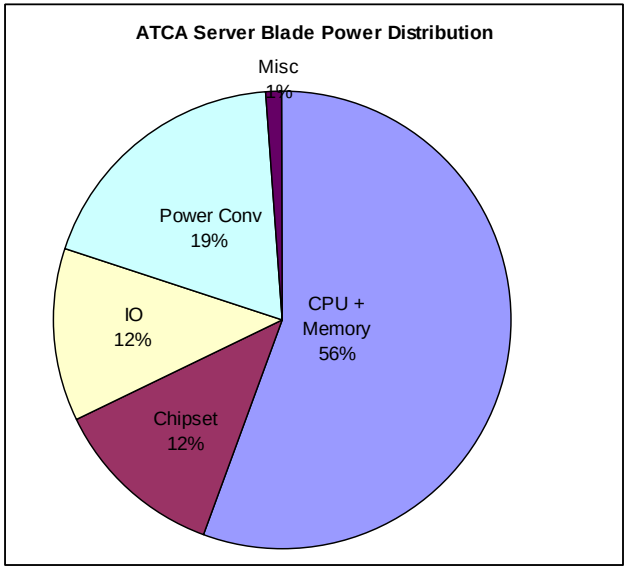
- **ATCA™ is the official PICMG® standard (PICMG® 3.x) for open architecture for modular computing**
  - **Tailored to meet the needs of communication networks infrastructure**
- **Defines a set of specifications covering**
  - **Mechanical**
  - **Shelf management**
  - **Power Distribution**
  - **Data Transport**
  - **Regulatory requirements for “carrier grade” deployments**
- **Specifications can be found at** http://www.picmg.org/

ATCA™ System Block Diagram



ATCA™ Server Blade





ATCA™ Blade Summary: Area

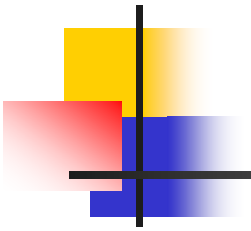
- Total Area ~140 in^2 (~12.68” x 11.02”)
- ~85% area is consumed by CPU, chipset, memory and power conversion and distribution
- ~5.8 in^2 consumed by current dual GbE solution
- For IO processors (line IO Cards) ~70% of total area is consumed by network processors and IO add-in cards
- ATCA™ switches are full slot, capable of supporting dual fabric in one slot

ATCA™ Blade Summary: Power

- Maximum power per blade is 200W
- ~88% of total power is consumed by CPU, chipset, memory and power conversion and distribution
- ~5W consumed for a dual GbE solution
- For IO processors (line IO Cards) ~80% of total power is consumed by network processors and IO add-in cards
- ATCA™ switch takes up a full slot
  - 10GbE switch (silicon) budget is ~35W

Other Considerations

- System BER of 10^{-12} or better
- RF Compatibility
  - 6dB margin to FCC Class A required
  - 6dB margin to FCC Class B desired
- Speed Auto-negotiation between 1000Base-BX and 10GBase-BX4 is not available in current solution
  - Done during power up through electronic keying mechanism
- Auto-negotiation is desired for future platforms
- Cheaper system cost than existing XAUI based solution is essential for customer pull
- Power needs to be half of current XAUI solution, i.e. equivalent to 2x single XAUI lane



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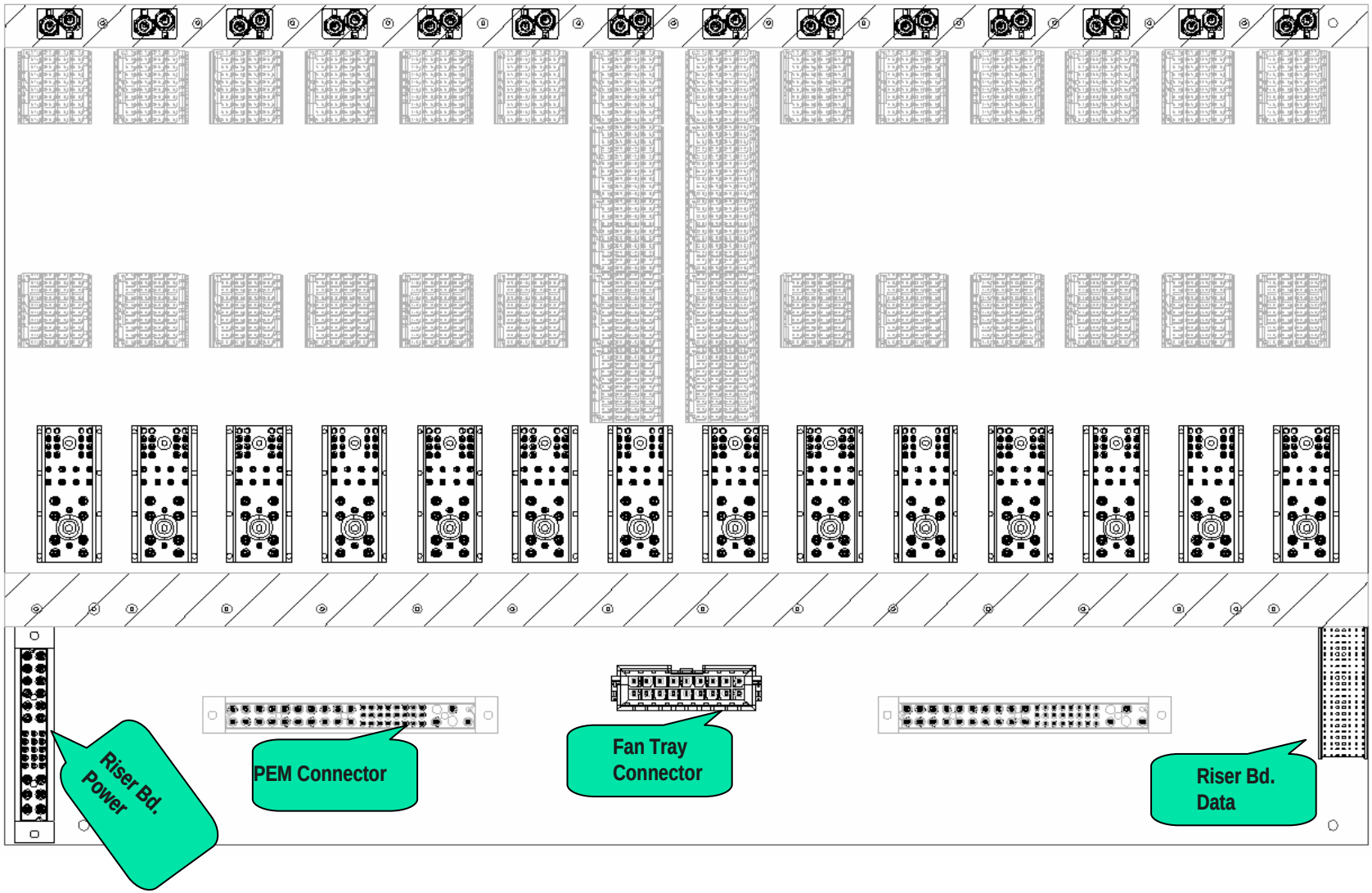
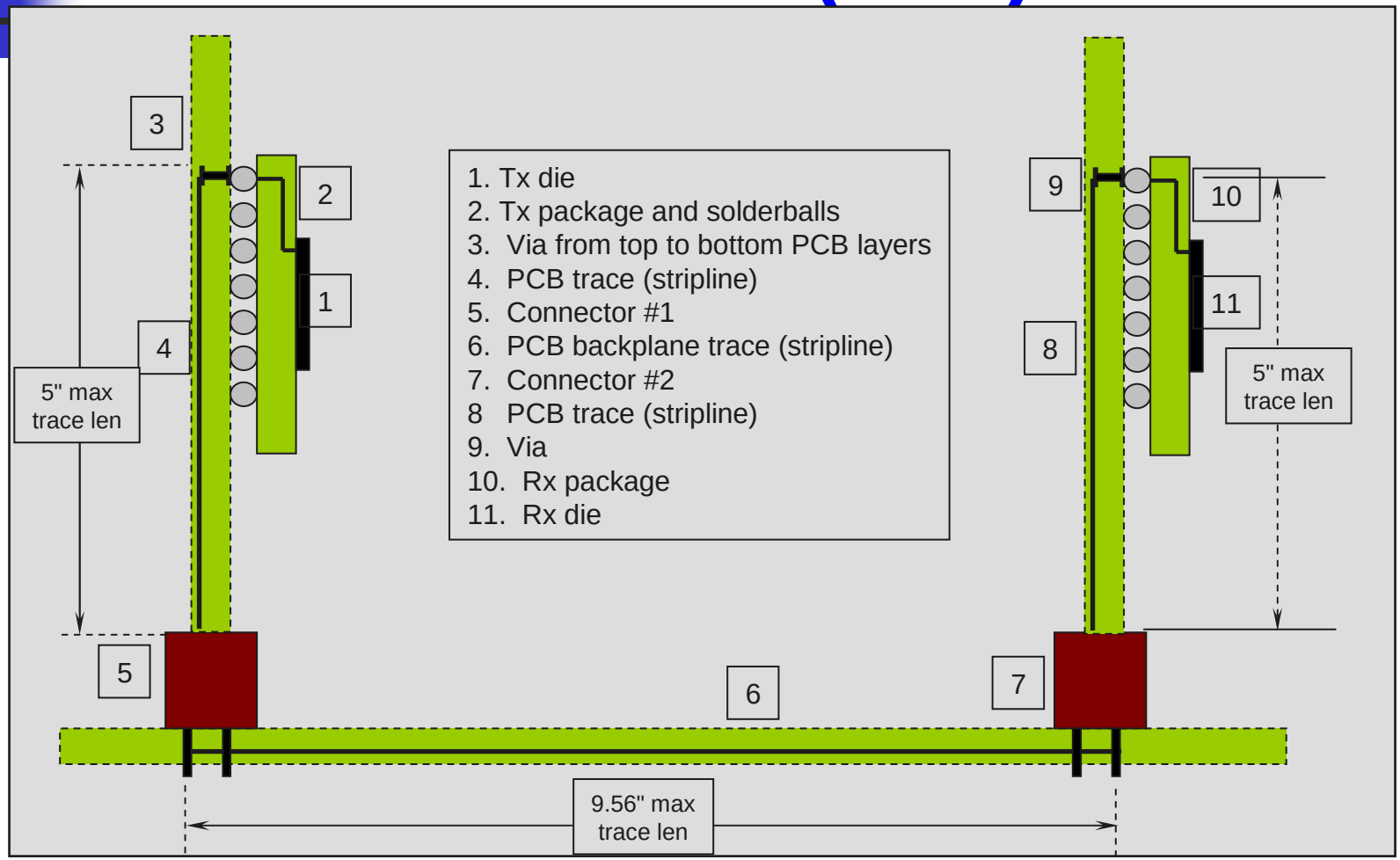
ATCA™ Backplane View



ATCA™ Production Backplane Channel (Star)



ATCA™ Backplane Physical Parameters (1 of 2)

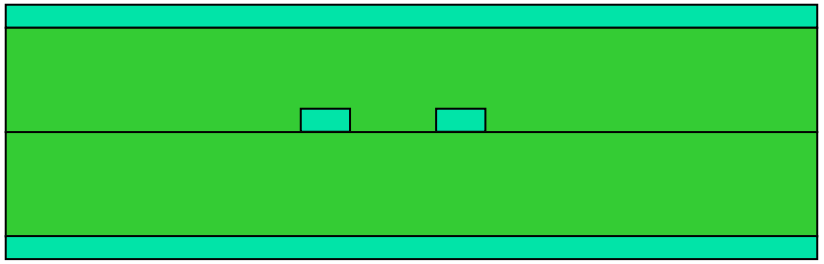
Plane (1 Oz Copper, 1.3 mils)

Prepeg (9.5 mils)

Signal (1 Oz Copper, 1.3 mils)

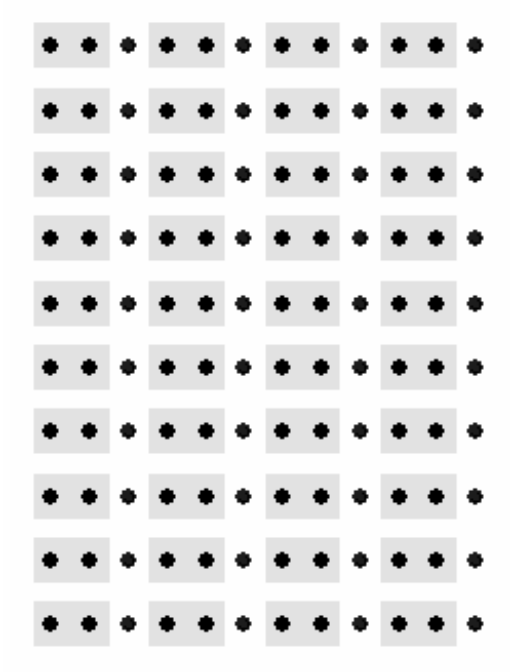
Core (10 mils)

Plane (1 Oz Copper, 1.3 mils)

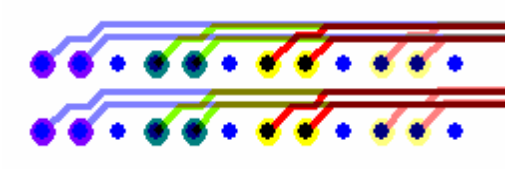


- Material Used: Nelco 4000-13; Er = 3.8
- Total Backplane Thickness: 188 mils +/- 10%
- Differential Pair Trace Width: 8 mils
- Differential Pair Spacing: 11 mils
- Trace-to-Trace Spacing (minimum): 35 mils
- Trace-to-Pad Spacing (minimum): 14 mils
- Maximum Differential Pair Trace Length: 9.556 inches
- Minimum Differential Pair Trace Length: 1.104 inches
- Differential Pair Tolerance: +/- 10 mils
- Differential Pair Group Tolerance (Tx or Rx): +/- 15 mils

ATCA™ Backplane Physical Parameters (2 of 2)



Anti-Pad Size: 115 mils x 69 mils
Finished Hole Size: 24 mils +/- 2 mils
Pad Size: 40 mils (Unused Pads Removed)



Typical Breakout Pattern (4 layers)

Backplane Trace (Layer 2)

Plated Through Hole

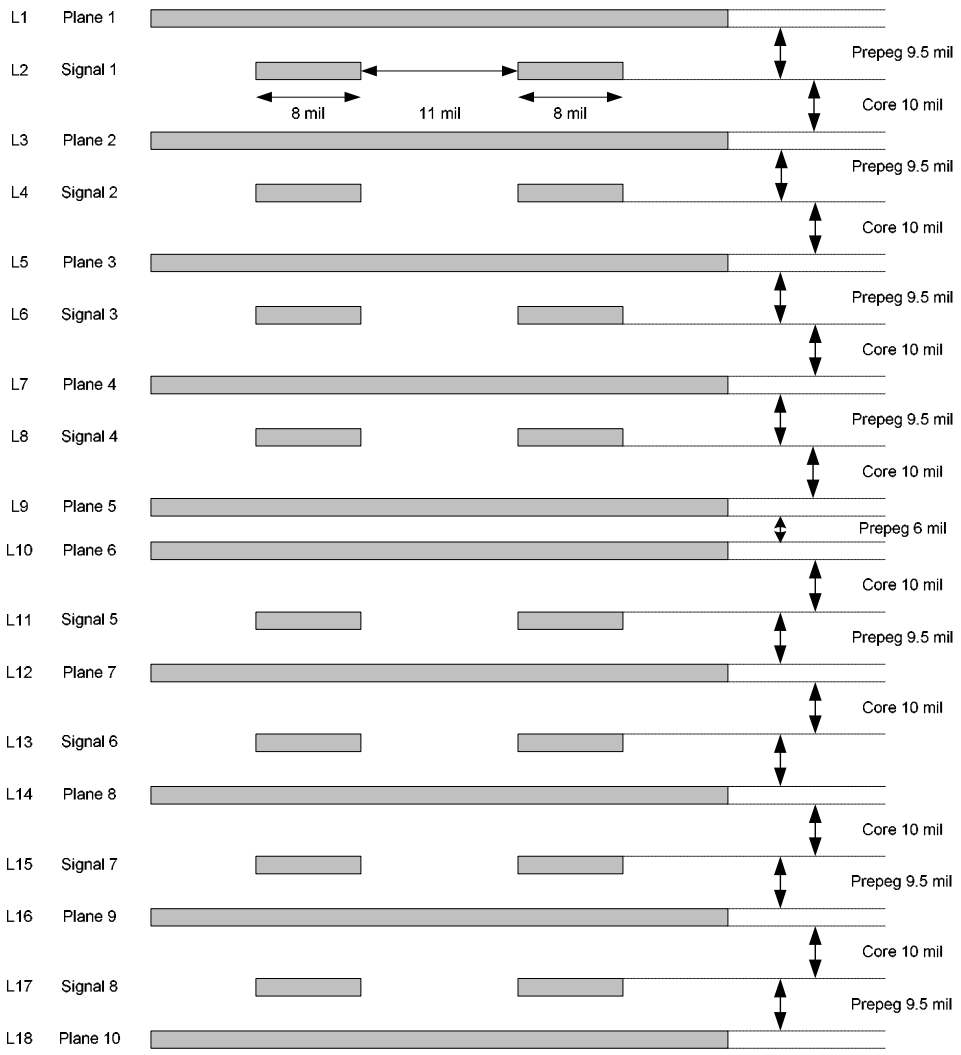
Maximum Stub Length: ~195 mils (Items 10, 14)

Plated Through Hole

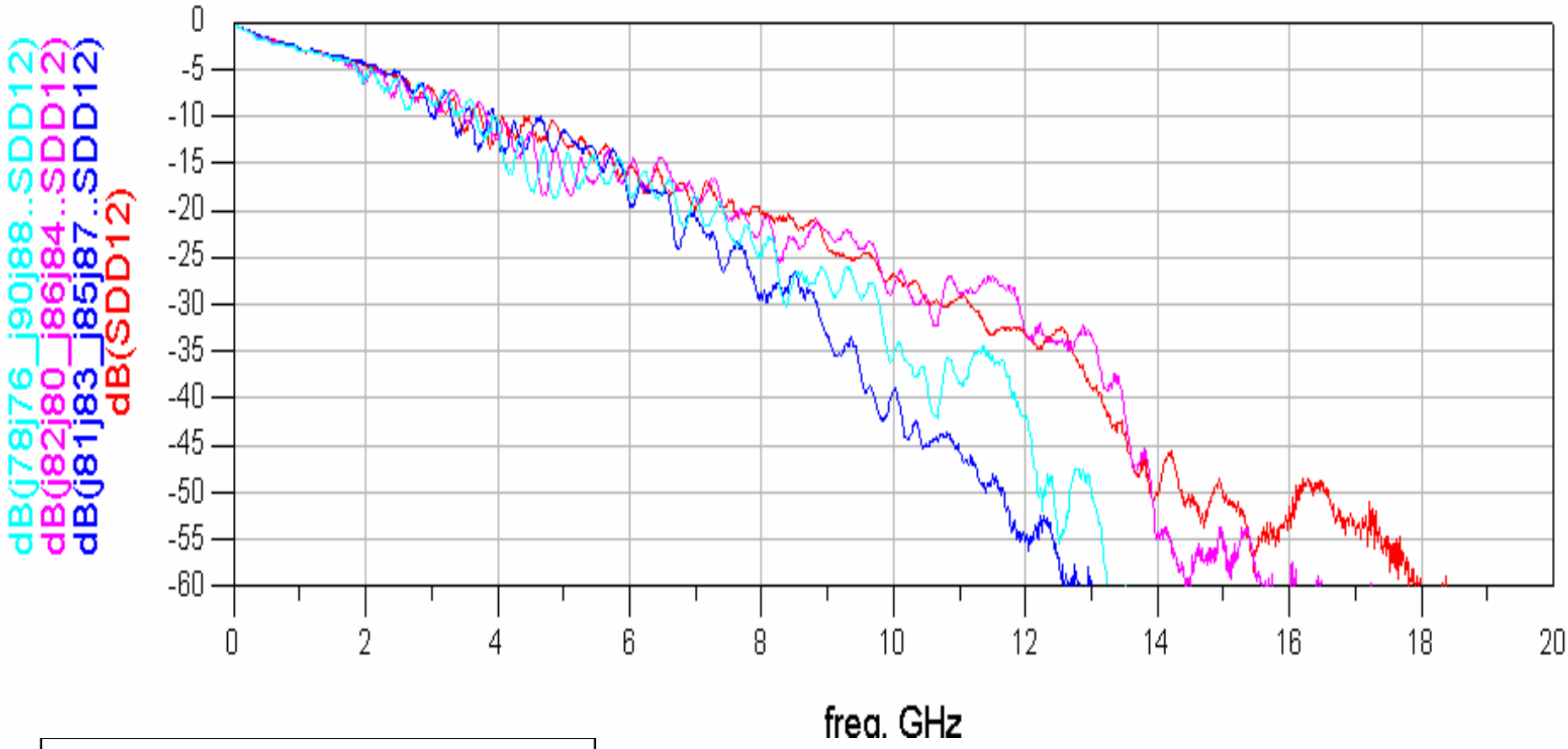
Backplane Trace (Layer 17)

Minimum Stub Length: ~10 mils (Items 10, 14)

Backplane PCB Stack up



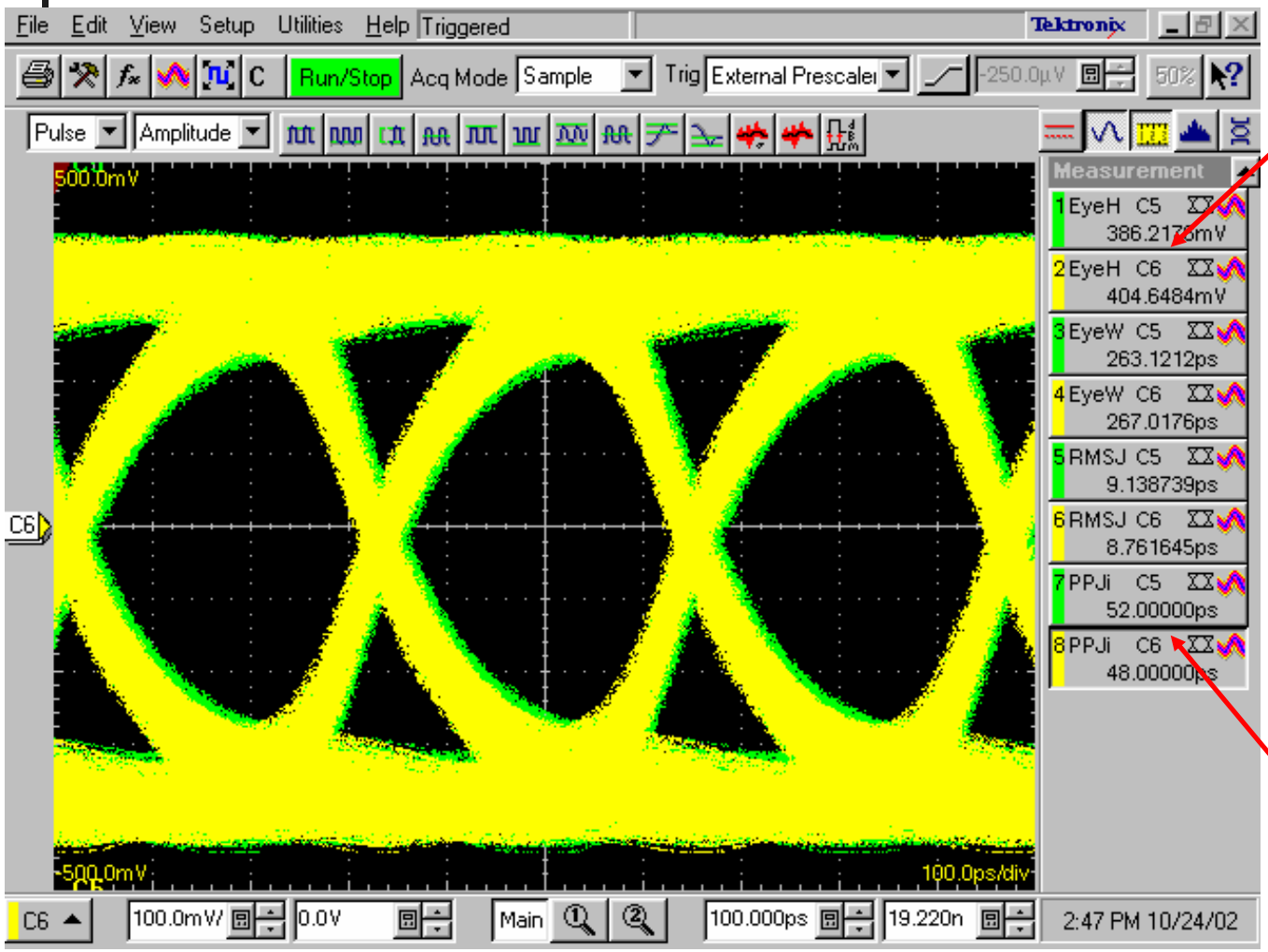
Typical s21 Measurements



Note:

Layout dependent effects almost invisible up to 1.8 GHz. After 1.8 GHz layout is critical

Slot 14 J76 to Slot 8 J88- Slot 14 J78 to Slot 8 J90



XAUI input specification : Horizontal eye opening : 144ps

XAUI input specification : Jitter max : 208ps.

Summary

- ATCA™ based servers represent a fast growing application space
- ATCA™ boards have stringent power and area constraints
  - 10 GbE solution should stay within these limits
- Cost targets for 10GbE solution should be cheaper than a XAUI solution to be attractive