

LCR

EMBEDDED
SYSTEMS, INC.®

Chassis • Backplanes • Integrated Systems

**Infinite Possibilities,
Infinite Choices,
Infinite Challenges?**

*How a Chassis Manufacturer Manages the
Broad I/O Options of the VPX Form Factor*

Helping Our Customers Achieve Their Mission



www.lcrembeddedsystems.com

VPX: A Chassis Manufacturer's Perspective

What challenges does a chassis manufacturer face when implementing VPX?



What is LCR's perspective?

Our products include:

- Electronics Packaging
- Rugged chassis & backplanes
 - MIL-STD-810, MIL-S-901, MIL-STD-41, etc.
- Mostly open-standards-based
 - VPX, VME, cPCI, ATCA, COM-E
- Substantial design expertise



What is LCR's perspective?

Our customers include:

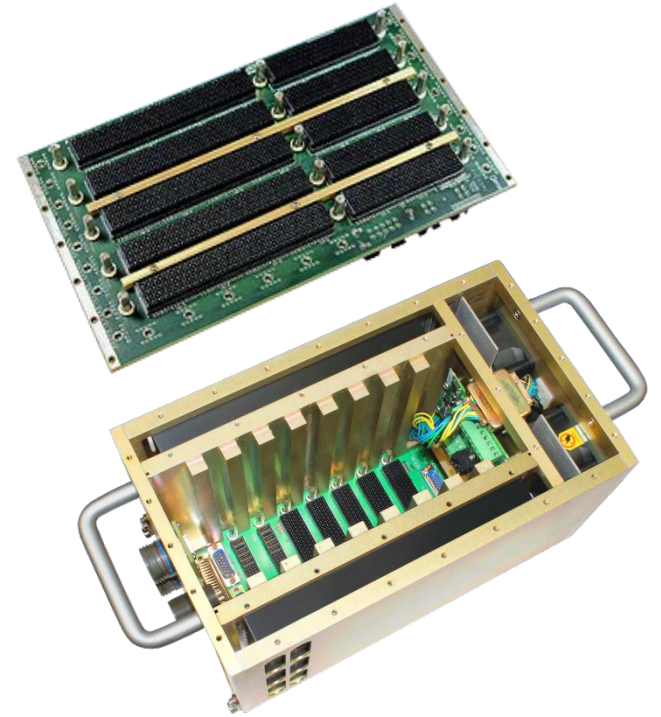
- Predominantly mil-aero
- Low volume/high mix
- Custom solutions

“I need COTS, but ...”



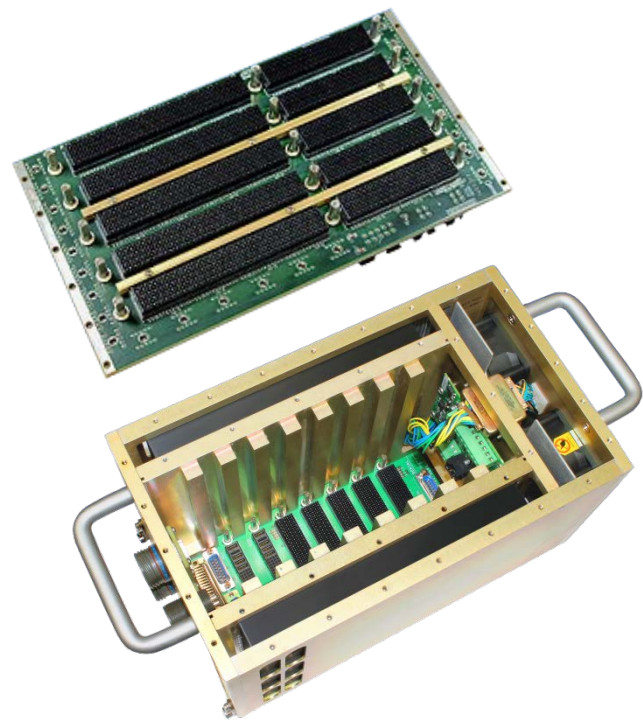
The Increasing Demand for VPX

- VPX is proving to be the current choice for many new defense programs.
- The majority of new opportunities (according to LCR) are in the 3U VITA 48.2 form factor with an ARINC 404 enclosure.



VPX Backplanes: Infinite Possibilities

- VPX backplanes bring an unparalleled degree of “openness” when compared to other open architectures.
- Backplane users have a nearly infinite possibilities when designing their backplane interconnects.



VPX Backplanes: Infinite Possibilities

- Unparalleled support of I/O variety:
 - Quantity
 - Speeds/Signal Integrity
 - Flexibility
 - Copper alternatives (RF/Fiber)



Too good to be true...?

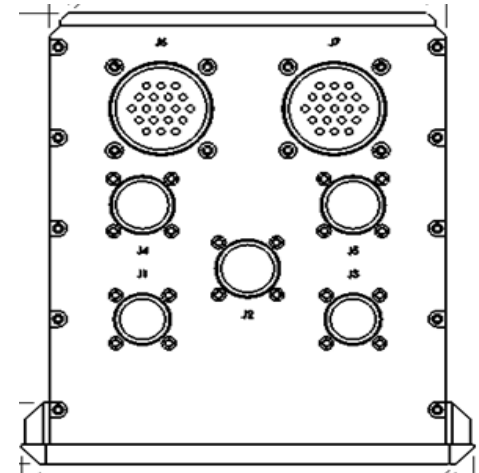
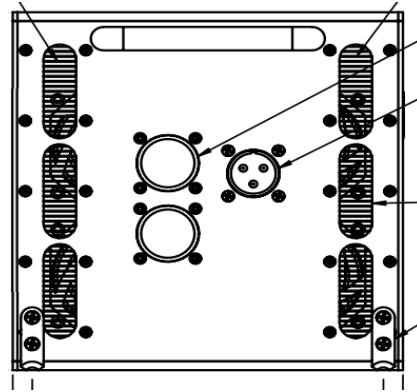
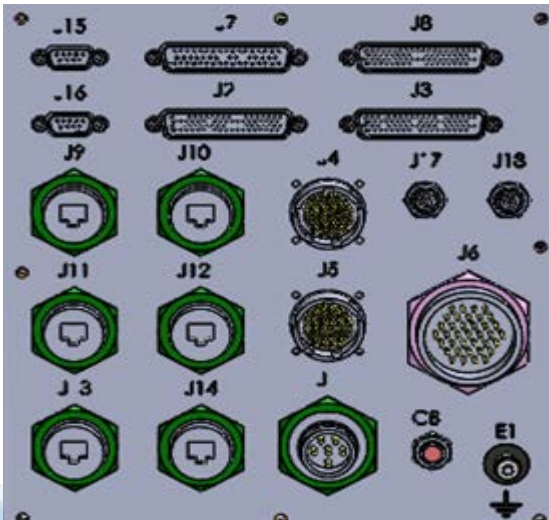
- Customers are choosing VPX for new designs and housing them in the rugged ARINC 404 form factor,
- VPX backplanes offer tremendous flexibility, and
- VPX offers unparalleled I/O support.

Sounds Great!!!! But...



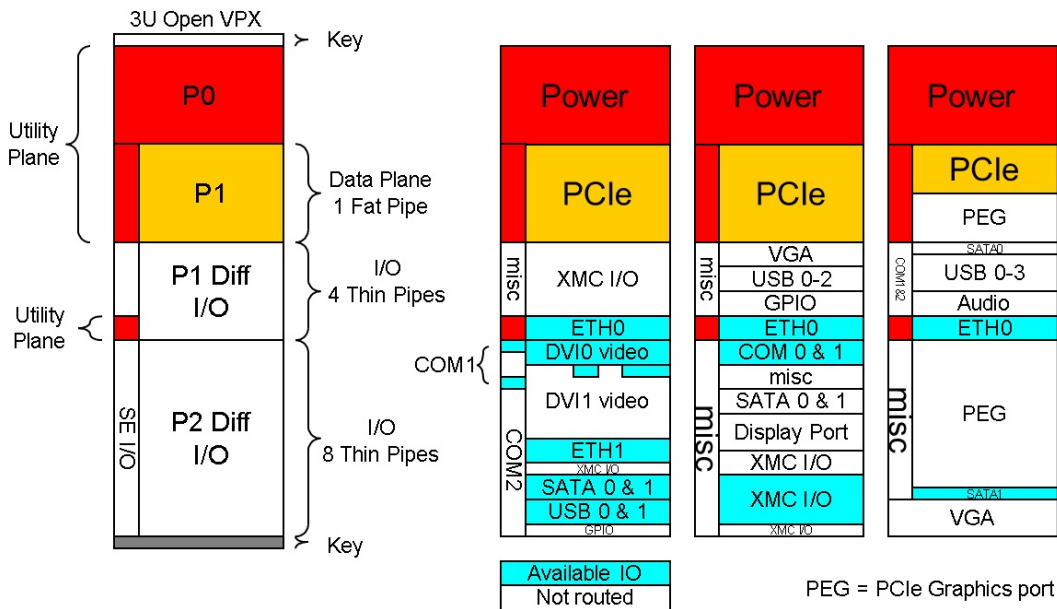
Infinite Possibilities, Infinite Challenges?

So many options that no two customers ever want the same I/O coming out of the system!



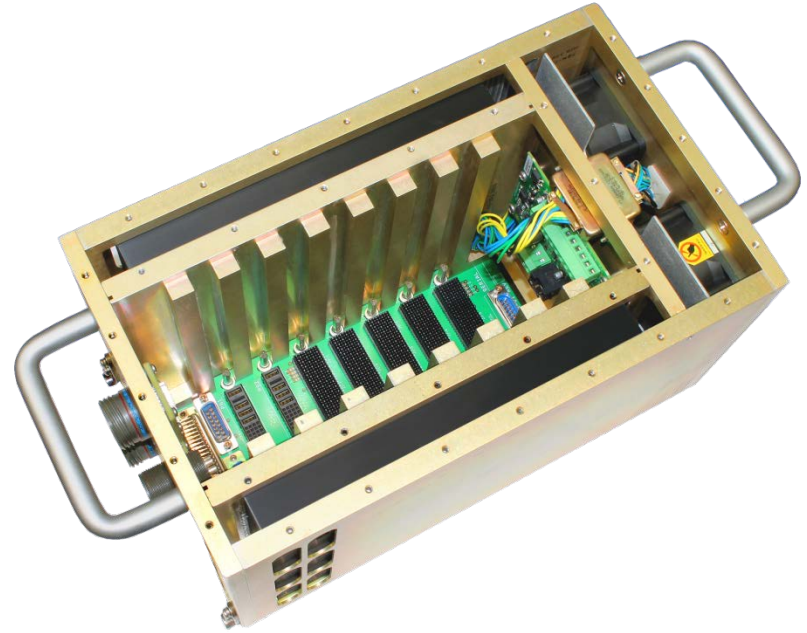
Infinite Possibilities, Infinite Challenges?

A backplane and its I/O, designed around a given CPU board, will very likely require a “re-spin” if a different CPU board is used.



Infinite Possibilities, Infinite Challenges?

Also, ARINC 404 chassis form factor severely limits the card cage orientation and backplane access.



Managing the Possibilities

A lot of planning must be done for potential I/O combinations to minimize:

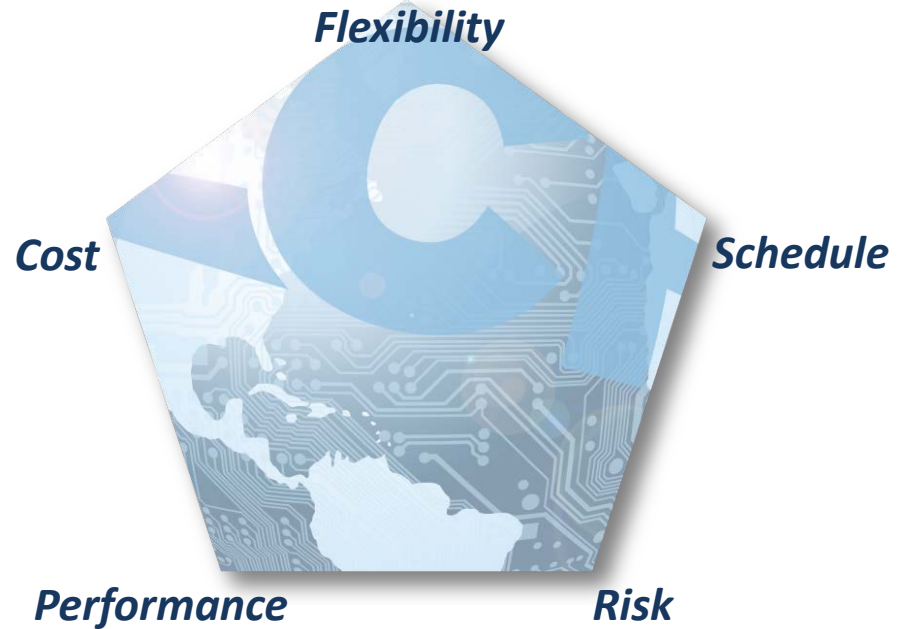
- High development costs,
- Longer development lead times, and
- Risks associated with new development.



Managing the Possibilities

How to get the I/O out in an organized way?

- Offer the most flexibility,
- Best cost
- Best schedule efficiency,
- Best performance, and
- Least risk



in a rugged design that can support the military environment.

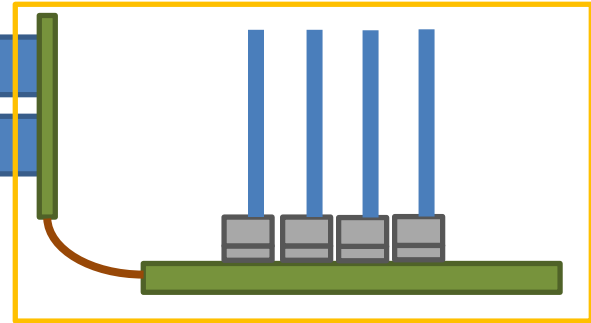
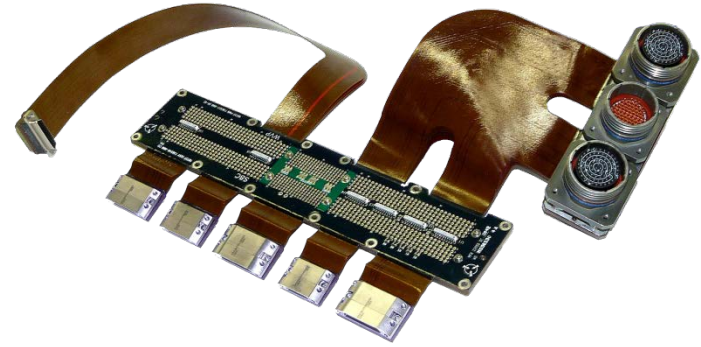
What are the options?

1. Monolithic Backplane & Flex
2. Discrete Backplane & Flex
3. Backplane Cables
4. I/O Transition Board
5. RTM I/O Board
6. VPX RTM Cables



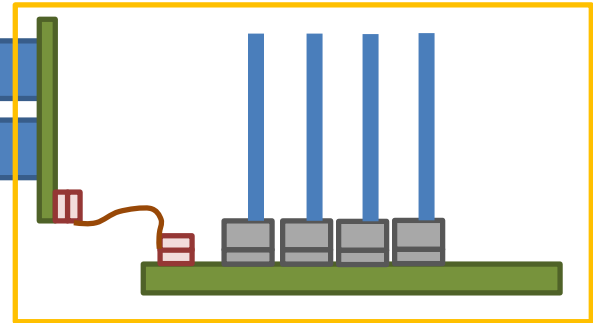
1. Monolithic Backplane & Flex

- + Offers good signal performance
- + High signal density
- Expensive (in low volumes)
- No flexibility:
 - Any change to backplane or I/O incurs expensive development
- Specialized manufacturing/design skills



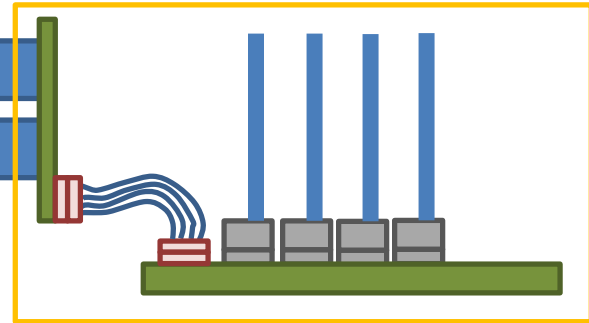
2. Discrete Backplane & Flex

- + Offers good signal performance
- + High signal density
- Expensive (in low volumes)
- Better flexibility than monolithic flex, but still not great
- Specialized manufacturing & design skills



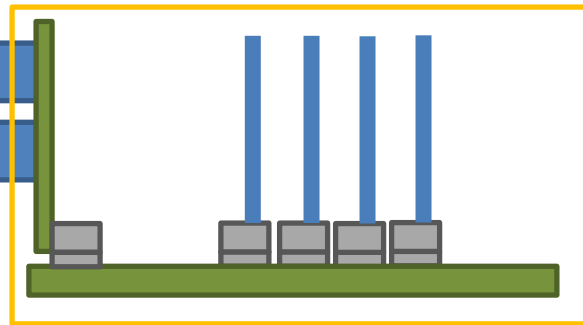
3. Backplane Cables

- + Flexible and can be easily replaced.
- + Inexpensive
- Hard to match performance levels
- Cable management is difficult in rugged environment.
- Susceptible to assembly error



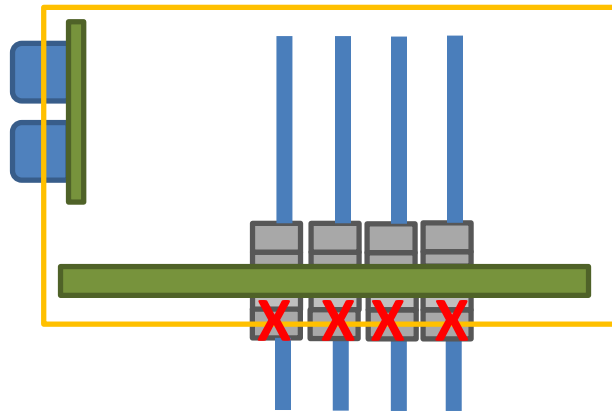
4. I/O Transition Board

- + Good signal integrity
- + Can add supporting circuitry
 - Filtering, circuit protection, processing
- + Rugged
- Expensive (in low volume)
- Tight tolerances required
- Flexibility is limited



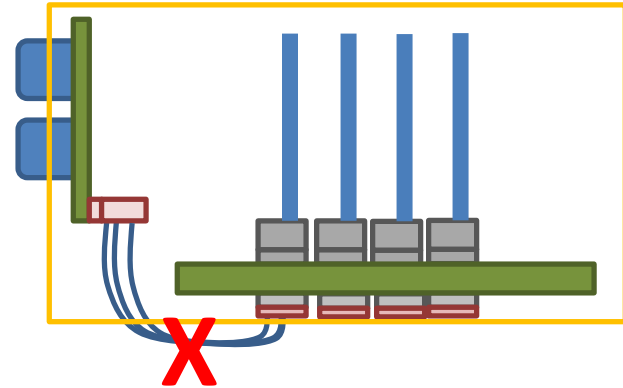
5. RTM I/O Board

- + Good signal integrity
- + Can add supporting circuitry
 - Filtering, circuit protection, processing
- + Rugged
- Expensive
 - Mostly to add supporting card cage
- Flexibility is limited
- Still potentially requires cabling to route to I/O panel
- Most importantly, not an option in many ATR enclosures where RTM access is not available



6. VPX RTM cables

- + Most flexible (any pin on backplane can be connected)
- Expensive
- Long lead times
- Hard to match performance levels
- Cable management difficult in rugged environment
- Most importantly, not an option in many ATR enclosures where RTM access is not available



Choosing the Best Solution

Factors to balance:

1. Cost
2. Schedule
3. Risk
4. Performance
 - Electrical
 - Environment
5. Flexibility
 - What is most likely to change or upgrade in the future?



Choosing the Best Solution

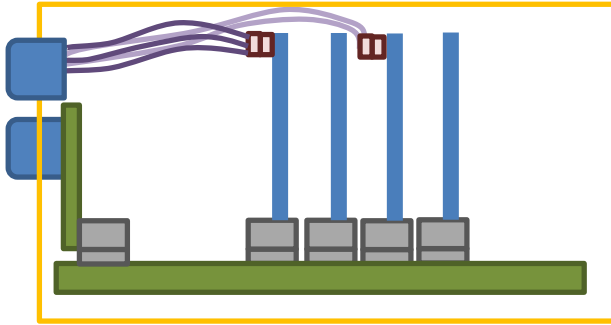
General guidelines:

- Minimize connection points to improve signal integrity
- Boards/flexes vs. cable assemblies:
 - Less error-prone
 - More \$\$ in low vol (cable assemblies more \$\$ in high vol)
 - Better performance
 - Less flexibility
- Hard-mounted products more durable, but require tighter tolerances

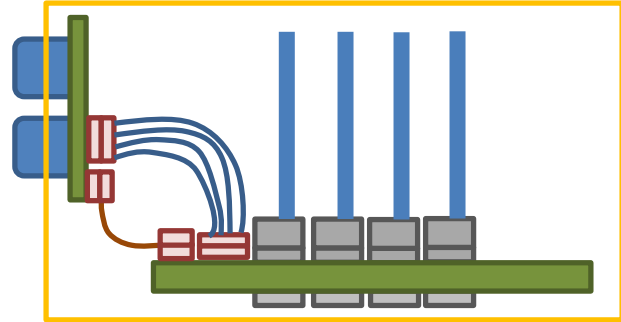


Combining solutions

Sometime combining various techniques is best



I/O Transition Board
& Blade Cables



Discrete Flex &
Backplane Cables



Thank you!

Ken Brown

Applications and Program Manager

kbrown@lcrembedded.com

www.lcrembeddedsystems.com

