

SEE
THE **FUTURE.**
CREATE YOUR OWN.

Use of RapidIO in Telecom Infra- structure Systems

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Agenda

- ◆ **Disclaimer!**
- ◆ **New technologies in telecom**
- ◆ **RapidIO in telecom?**
- ◆ **Architecture impacts?**
- ◆ **RapidIO and Building Practice**
- ◆ **Summary**

Disclaimer!

None of what is said in this presentation has any relation to Ericsson products

The pace in telecom is high, new requirements are popping up

In 3G / WCDMA:

- ◆ HSDPA ~15 Mb/s
- ◆ “HSUPA” (enhanced uplink)
- ◆ Even higher bandwidths (~100 Mbit/s)
- ◆ Lower latency
- ◆ Lower costs
- ◆

Wireline:

- ◆ ADSL: 0.5 – 8++ Mb/s
- ◆ VDSL: 20+ Mbit/s
- ◆ Even higher bandwidths (~100 Mbit/s)
- ◆ Lower latency
- ◆ Lower costs
- ◆

Infrastructure telecom manufacturer dilemma

- ◆ **Very complex systems (nodes as well as complete networks)**
- ◆ **Development costs are high**
- ◆ **Volumes are medium (n x 100 k / year)**
- ◆ **Products are expected to have a long lifetime**
- ◆ **and to be faultless**
- ◆ **.. and to be future proof**
- ◆ **And then frequent new requirements**

Consequently, telecom manufacturers are looking for technologies ...

- ◆ **Cost effective**
- ◆ **Cost reduction potential (technology, market)**
- ◆ **Possibly many suppliers (or in-house)**
- ◆ **Performance**
- ◆ **Reliable**
- ◆ **Future proof, i.e. with a “mechanism” for further development**

Specifically: Drivers towards a new interconnect

- ◆ **Higher bandwidths**
- ◆ **Smaller linewidths => lower voltages.**
Some interconnects like Utopia requires higher voltages than new semiconductor linewidths are directly supporting
- ◆ **Scalability**
- ◆ **Design costs: standard interconnect instead of tailored**

- ◆ **And of course: cost, cost and cost!**

RapidIO

- ◆ **Open standard!**
- ◆ **Many suppliers**
- ◆ **Technology maintenance and development is handled by RapidIO Trade Association**
- ◆ **High performance, e.g. bit rates up to 40 Gbit/s**
- ◆ **=> future proof, cost reduction potential, performance**

- ◆ **Cost effective?**
- ◆ **Architecture impact?**

RapidIO cost effective?

- ◆ **Compared to in-house solutions**
 - To compare cost effectiveness of in-house and external technologies is difficult
 - External technologies have higher volumes, lower margins, ...
 - When the technology has become a commodity, why do it yourself?
- ◆ **Compared to other interconnect technologies**
 - PCI express + AS: timing, market and products (AS).
 - Ethernet backplane: standardization started 2004. Requirements look very similar to RIO, phy layer similar ...
- ◆ **“Conclusion”**: Yes, **RIO is**, and have to be, **cost effective!**

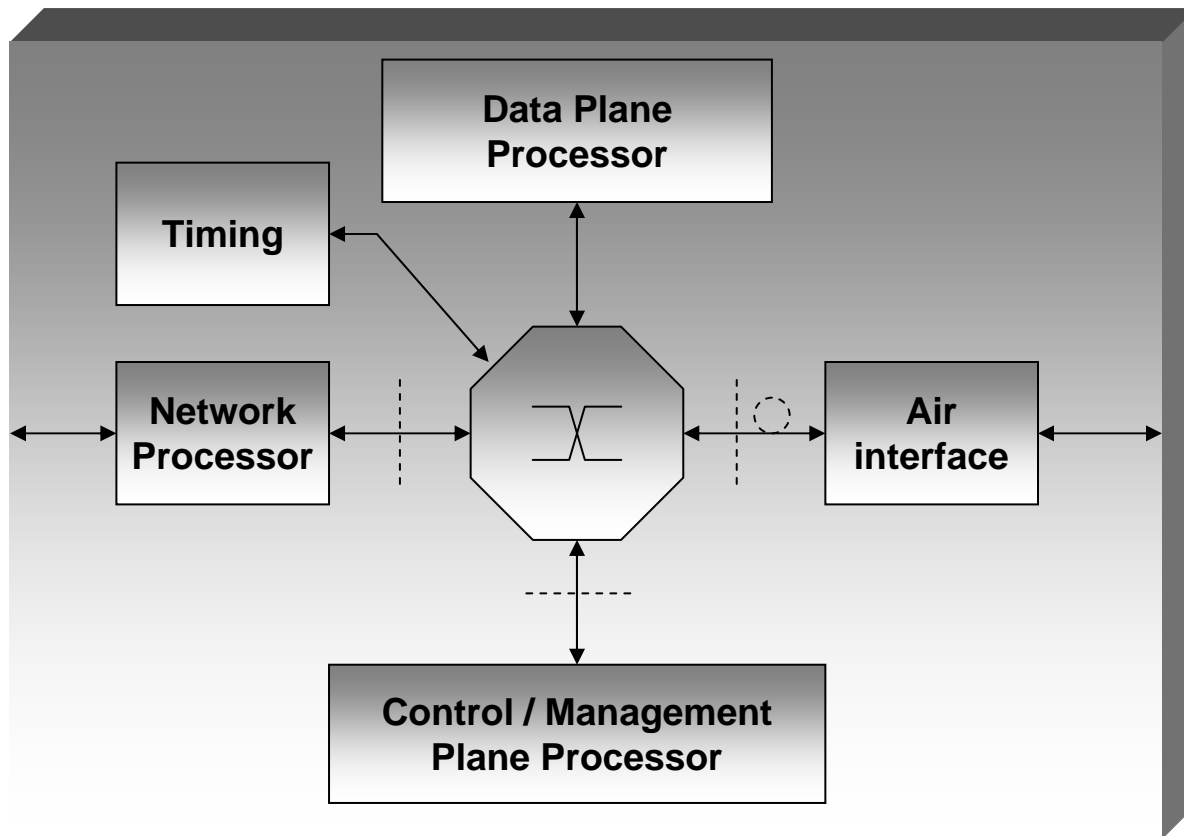
Scenarios to introduce RapidIO

- ◆ **Board level (e.g. baseband board)**
 - Cost and performance driven
 - RapidIO is encapsulated, and not visible outside board
- ◆ **System level**
 - Using RIO for “everything”
 - Cost driven?
 - New architecture, has to be validated

RapidIO architecture impact?

- ◆ **Is it necessary to change architecture when using RapidIO**
 - No. Might be a migration issue.
 - Swapping existing interconnect to RapidIO?
- ◆ **To fully use RapidIO advantages the architecture has to be changed!**

One interconnect for all intra RBS communication?



RBS Connections

- ◆ Components
- ◆ Blocks
- ◆ Boards/Plug In Units
- ◆ Sub-racks

On board interconnect migration

Legacy interconnects

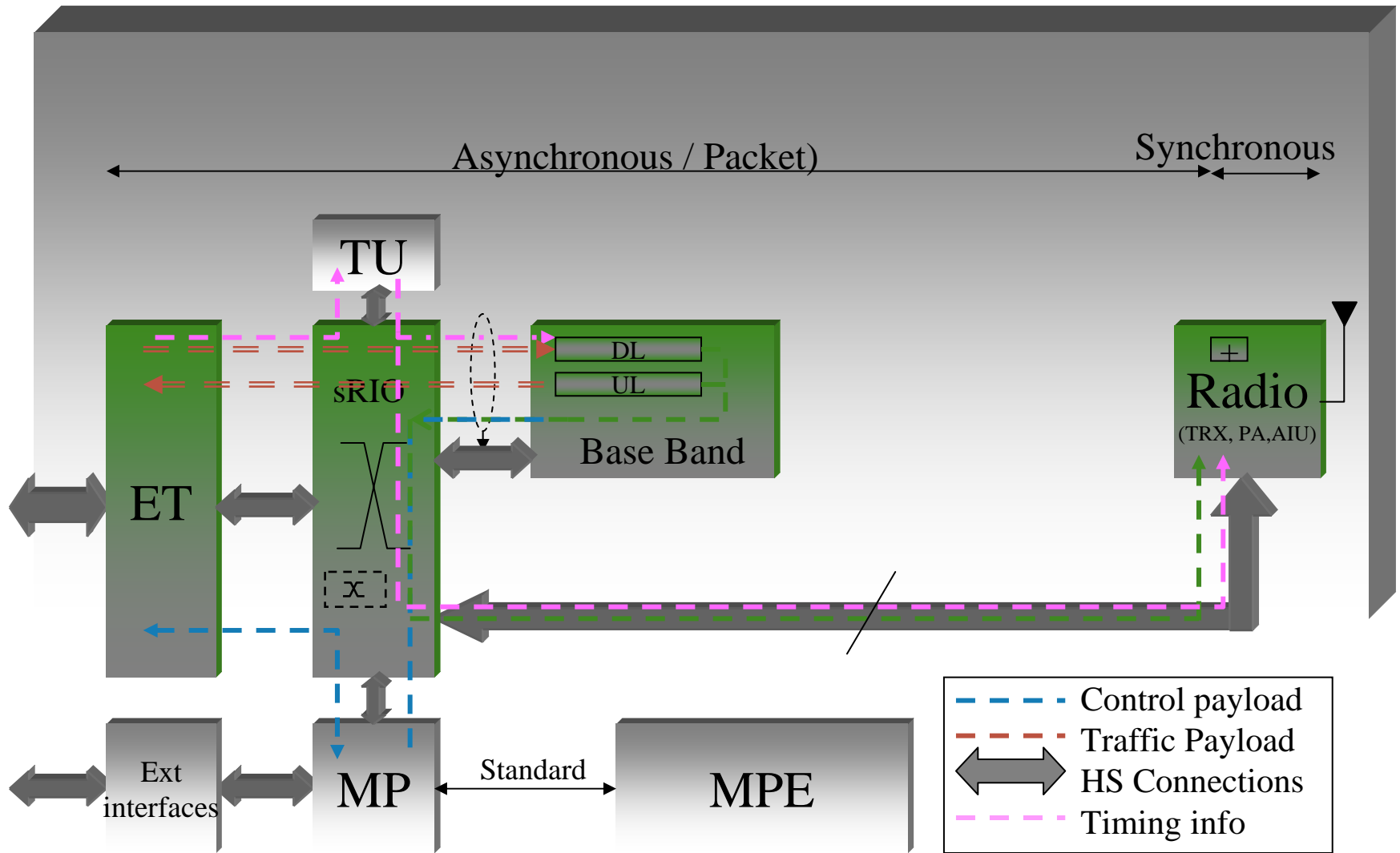
- Utopia
- CSIX
- PCI / PCI-X
- SPI-3 / SPI-4
- RMII / GMII / XGMII
- TDM-bus (H.110)
- POS-PHY
- 860 bus
- IDE / SCSI
- ...

Now / Near future interconnects

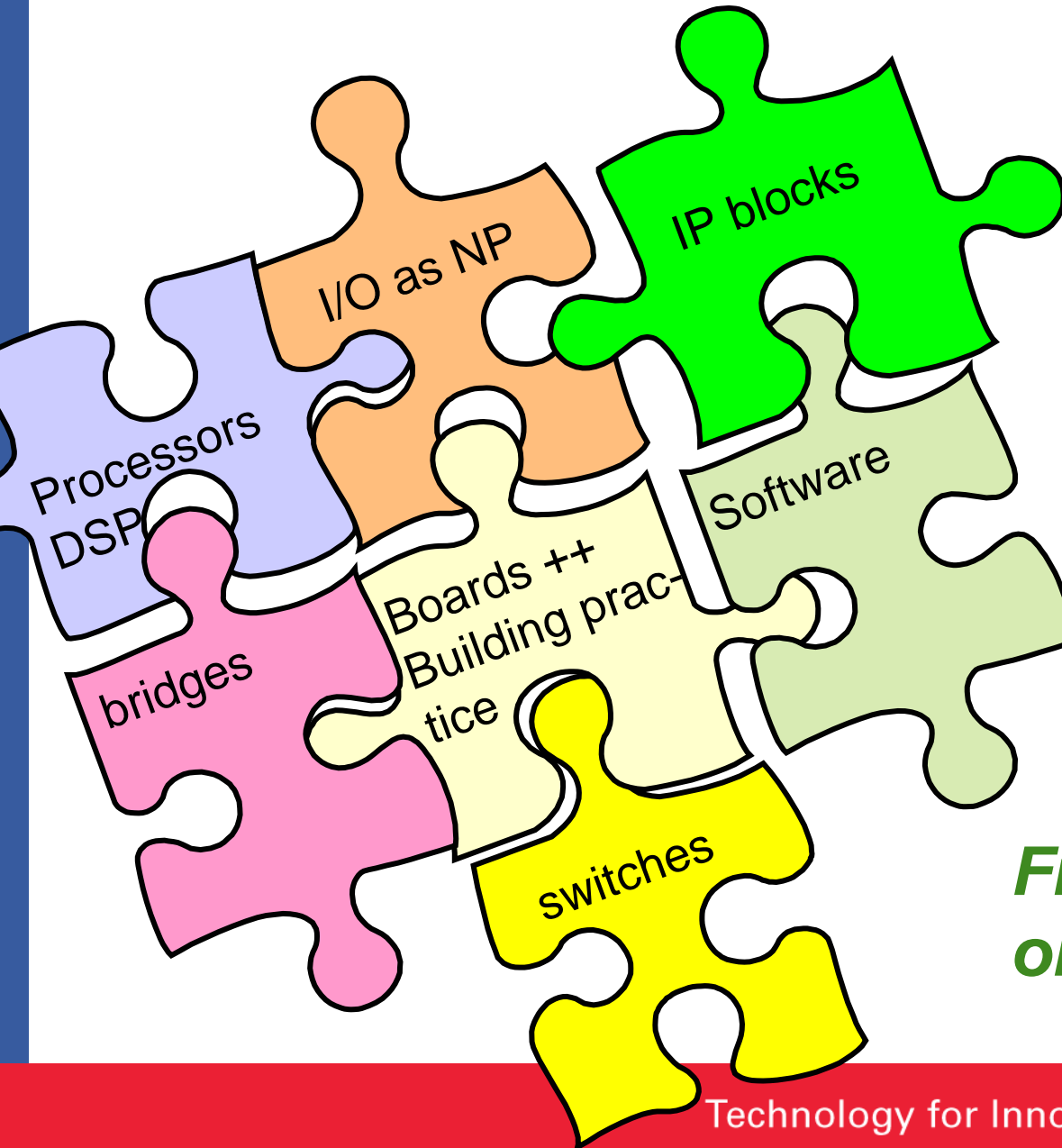
- AUI / XAUI
- FC
- Infiniband
- S-ATA
- PCI Express
- Serial RapidIO
- ...

How to avoid lots of bridges ?

sRIO based architecture



RapidIO in RBS



RapidIO will not be used in RBS until **all** these are in place, e.g. processors with RIO i/f.

From more than one supplier!

Building practice

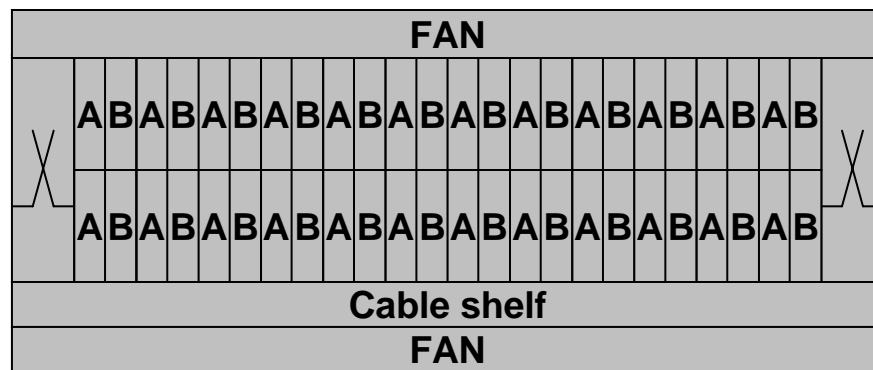
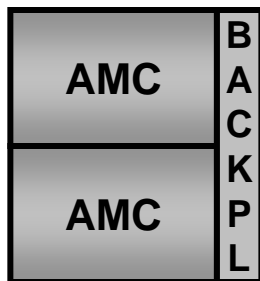
- ◆ **AdvancedTCA will be adopted if / when *it becomes a mature technology (i.e. cost effective).***
- ◆ **Migration?: Use the AdvancedMC specification for mezzanine cards, in existing equipment practices on carriers.**
- ◆ **One way of evolution is the AMC straight to the backplane concept**



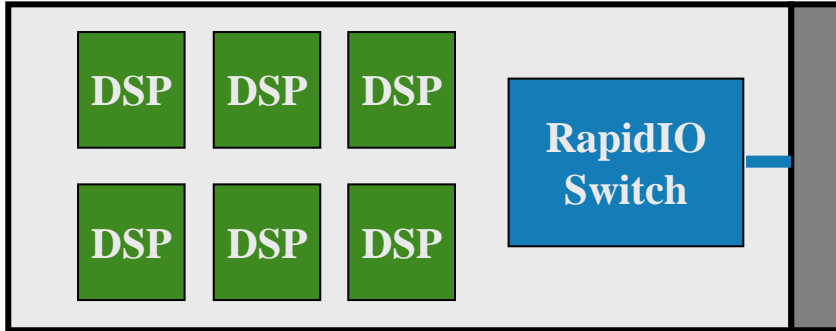
μTCA? AMC direct to a backplane

In general:

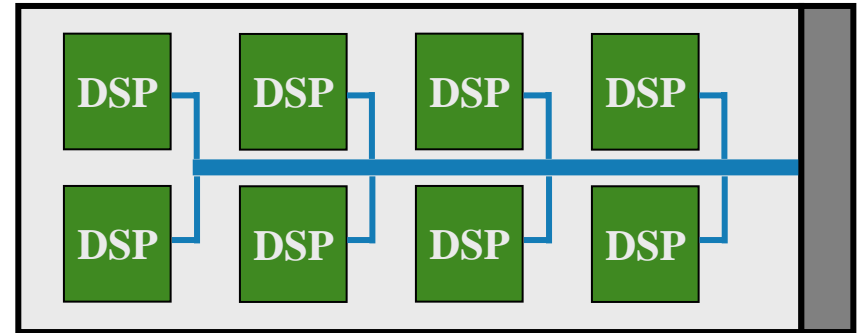
- ◆ Same spec as AMC in ATCA
- ◆ Two rows
- ◆ Dual star
- ◆ Front access only



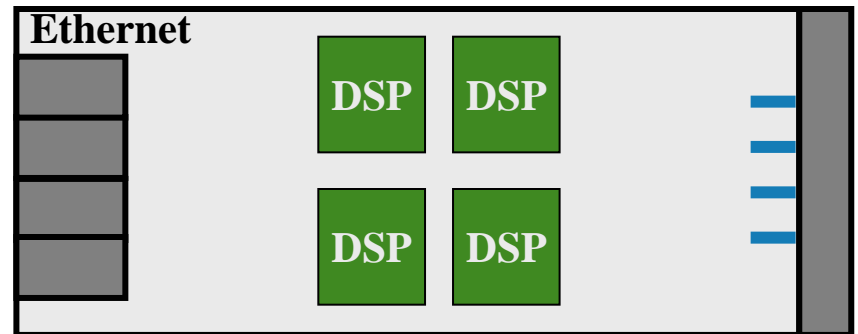
AMC/RapidIO possibilities



DSP cluster + RIO switch



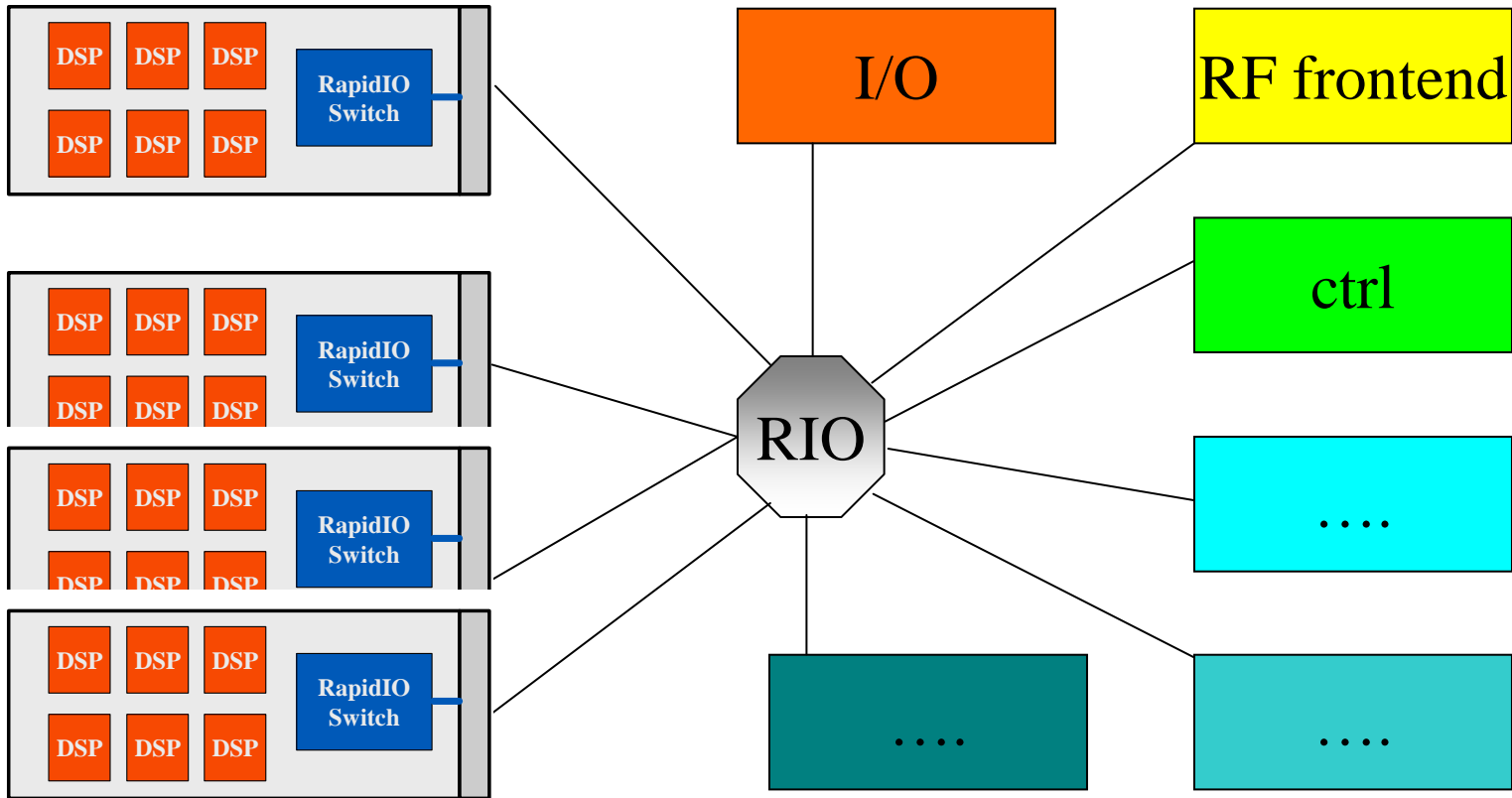
DSP cluster, RIO



DSP cluster, RIO + ethernet

Architecture with AMC & RapidIO

DSP cluster bank



> 1 interconnect on an AMC?

Technology comes with different interfaces, different between vendors

- **Processors – sRIO / PCI express**
- **DSPs – sRIO / Ethernet**
- **NPs – sRIO / PCI express / Ethernet / who knows**
- **Discs – S-ATA / FC**
- **External interconnect – Infiniband / 10 GE / OC192 / sRIO / PCI express**
- **...**

How to avoid multiple solutions?

Benefits with RapidIO and AMC

Vendor

- ◆ Standard product development
- ◆ One solution fit many
- ◆ Alignment w technology trends
- ◆ Volumes!

Manufacturer (OEM)

- ◆ Standard product development
- ◆ commodity
- ◆ Alignment w technology trends
- ◆ Low prices
- ◆ Simple building blocks, reusable etc

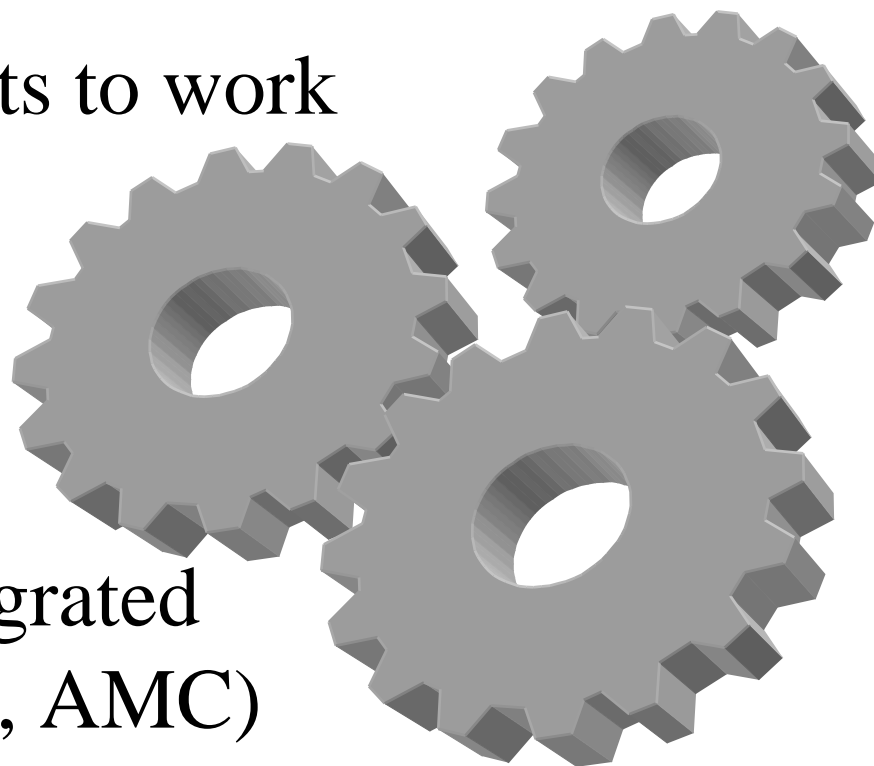
Does it have to be RapidIO

- ◆ No
- ◆ Other technologies as ethernet and PCIeexpress + AS might be competitive
- ◆ Manufacturer (OEM) choice will be based upon:
 - Cost
 - Usability / Design environment
 - Area of applicability (reuse)
 - Performance
- ◆ Manufacturers might even use more than one interconnect in the same unit

RapidIO has an excellent position now

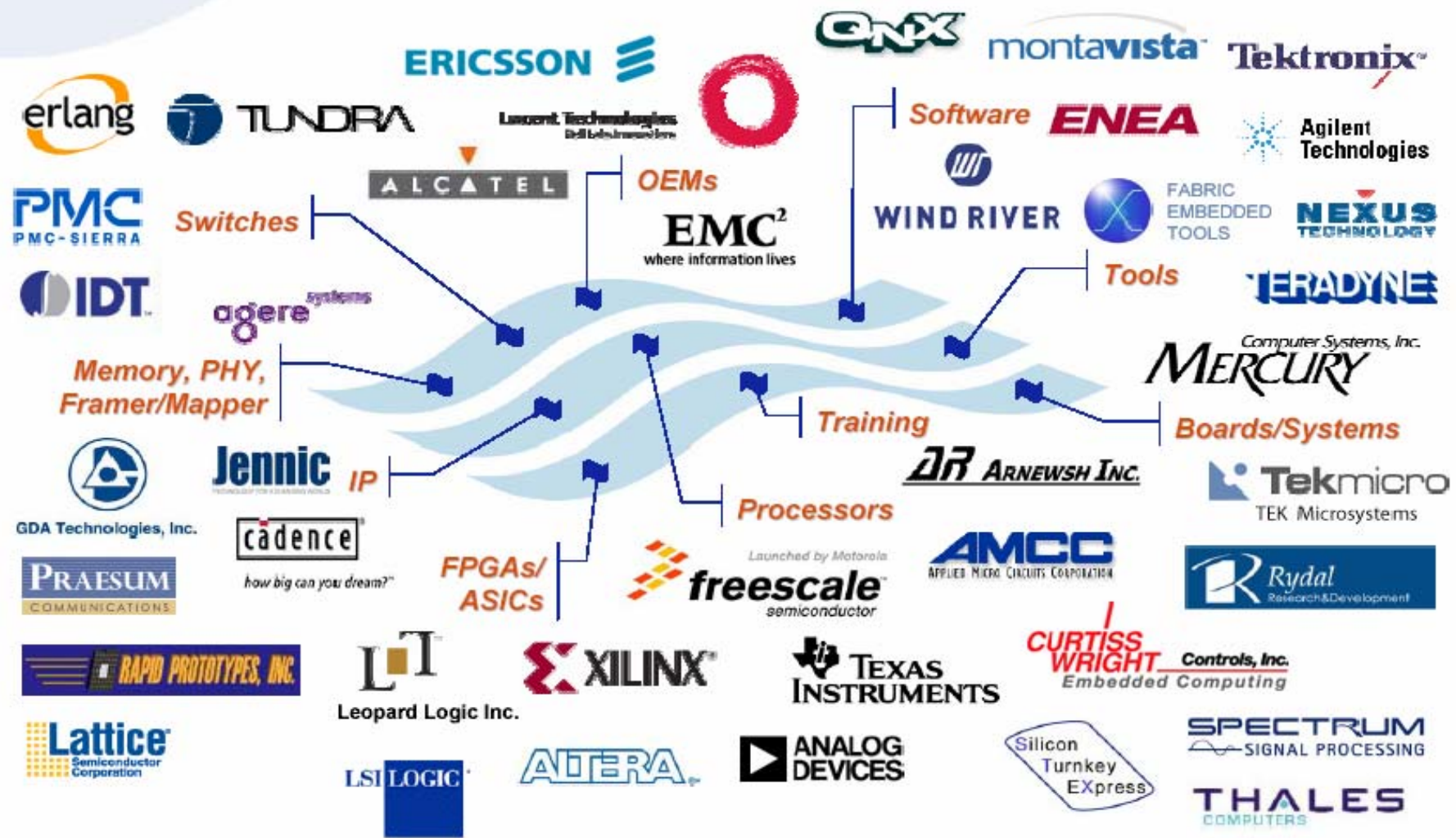
The RIO machinery starts to work

- Technology
- Standards
- Products
- IP-blocks (?)
- Building practice integrated with RapidIO (ATCA, AMC)





Look Who's Riding the Wave



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Get to market faster
with TI products, support
and partners.



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