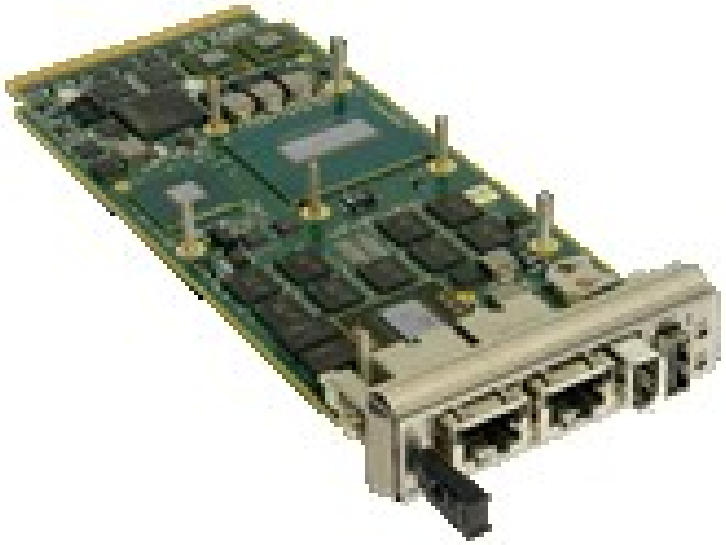
CONCURRENT TECHNOLOGIES

AdvancedMC Industry Perspective



Concurrent Technologies Products and Markets

VPX	AdvancedMC	VME	CompactPCI	XMC/PMC
				
Defence		Defence	Defence	Defence
	Telecom		Telecom	Telecom
Transport		Transport	Transport	
		Industrial		
	Physics CERN	Physics CERN		

AMCs in Telecom

- AMCs were conceived as mezzanines to add functionality on AdvancedTCA boards for telecoms applications located in central office type environments
- The MicroTCA standard was devised to allow small-size systems to be created using AMCs
- MicroTCA telecom applications include wireless base-stations, test equipment and mobile edge servers


IDT Integrated Device Technology

PRODUCTS APPLICATIONS SUPPORT BUY & SAMPLE

IDT, NVIDIA and Orange Silicon Valley Drive Supercomputing to Edge of Wireless Network for Real-Time Analysis and Services

New Platform's Mobile GPU Clustering Enables Big Data Analytics at Local Base Stations for More Timely and Pertinent Results

Press Room Quick Links

About IDT Quick Links

SAN JOSE, Calif., Feb. 25, 2015— Integrated Device Technology, Inc. (IDT®) (NASDAQ: IDTI) announced today that it has developed with NVIDIA® and Orange Silicon Valley a supercomputing platform that can analyze 4G to 5G base station bandwidth data in real time, enabling network operators to monetize the voluminous data flowing through their communications systems. By connecting clusters of low-power NVIDIA Tegra® K1 mobile processors with IDT's RapidIO interconnect and timing technology, the platform can deliver real-time data that network operators can use to provide consumers a more responsive and interactive experience.

Designed for high performance computing, IoT appliances and wireless access networks handling 4G and higher traffic, the platform features cutting-edge deep learning and pattern recognition computing capabilities. By installing the hardware at multiple, geographically dispersed base stations along the edge of the network, the Big Data problem is solved by distributing the computing capacity and delivering lightning-quick analysis of locally generated data, such as social media content.

"For example, if you tweet that you've just seen a movie and are headed out to dinner, some nearby dining options could pop up on your screen," said Sailesh Chittipeddi, IDT's vice president of Global Operations and chief technology officer. "Or the technology can be used for mass transit, if you're standing at a bus stop, you can check your phone for the precise location of your bus. The possibilities are virtually endless."

Chittipeddi refers to the platform as "supercomputing at the edge" because the technology is deployed and analysis conducted at local base stations—at the edge of the wireless network—rather than in a central location, removing the bottleneck between the base station and the core of the network. "The solution was developed with an architecture designed to handle the emerging market for

Pictures courtesy of Pentair

AMCs in Defence

- A limited number of vendors provide AMCs for use in rugged military applications
- The Rugged MicroTCA specifications are credible but were released rather late
- Concurrent Technologies has a strong position with VME and VPX for defence and hasn't seen any pull for rugged MicroTCA

Pictures courtesy of Vadatech

AMCs in Semiconductor Process Equipment

- **Controls wafer lithography equipment for 14nm process nodes**
  - 50kHz motion control loop; Going to 100kHz
  - 20us (10us) for processing and communication
  - RapidIO & 10/40GbE switching
- **Based on a combination of Intel x86, PowerPC, DSP and FPGA single width AMCs**
- **Water cooled**

Picture courtesy of Prodrive

AMCs in High Performance Embedded Compute (HPEC)

- **Based on RapidIO, Concurrent Technologies has:**
  - Demonstrated an AdvancedMC based HPEC platform at International Supercomputing Conference (ISC) 2015
  - Have delivered AdvancedMCs for a cluster technology demonstrator in the CERN Data Centre driven by IDT
- **Key advantage are:**
  - Granularity – small AMC modules are easy to stack
  - Low Latency – RapidIO enables lower system latency for better parallel performance
  - Easy to use – FIN-S layer enables any socket based application to work transparently over RapidIO
  - Scalable up to cabinet level and beyond using top of rack RapidIO switches

Good for technology demonstrator use
Embedded long-life not of significant value
Price is likely a limiting factor

RapidIO

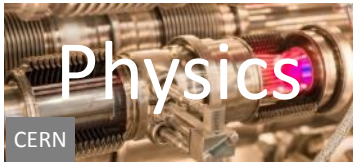
AMCs in Physics

- Created demand for double width modules
- Fulfils the need to mix commercial off-the-shelf and proprietary modules
- Good level of technical maturity
- Starter kits readily available to help with evaluation and deployment

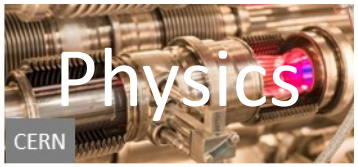
Pictures courtesy of powerBridge Computer

Double width AMCs dependent on Physics

VME: 1 design = multiple segments



AMC: Single and double width



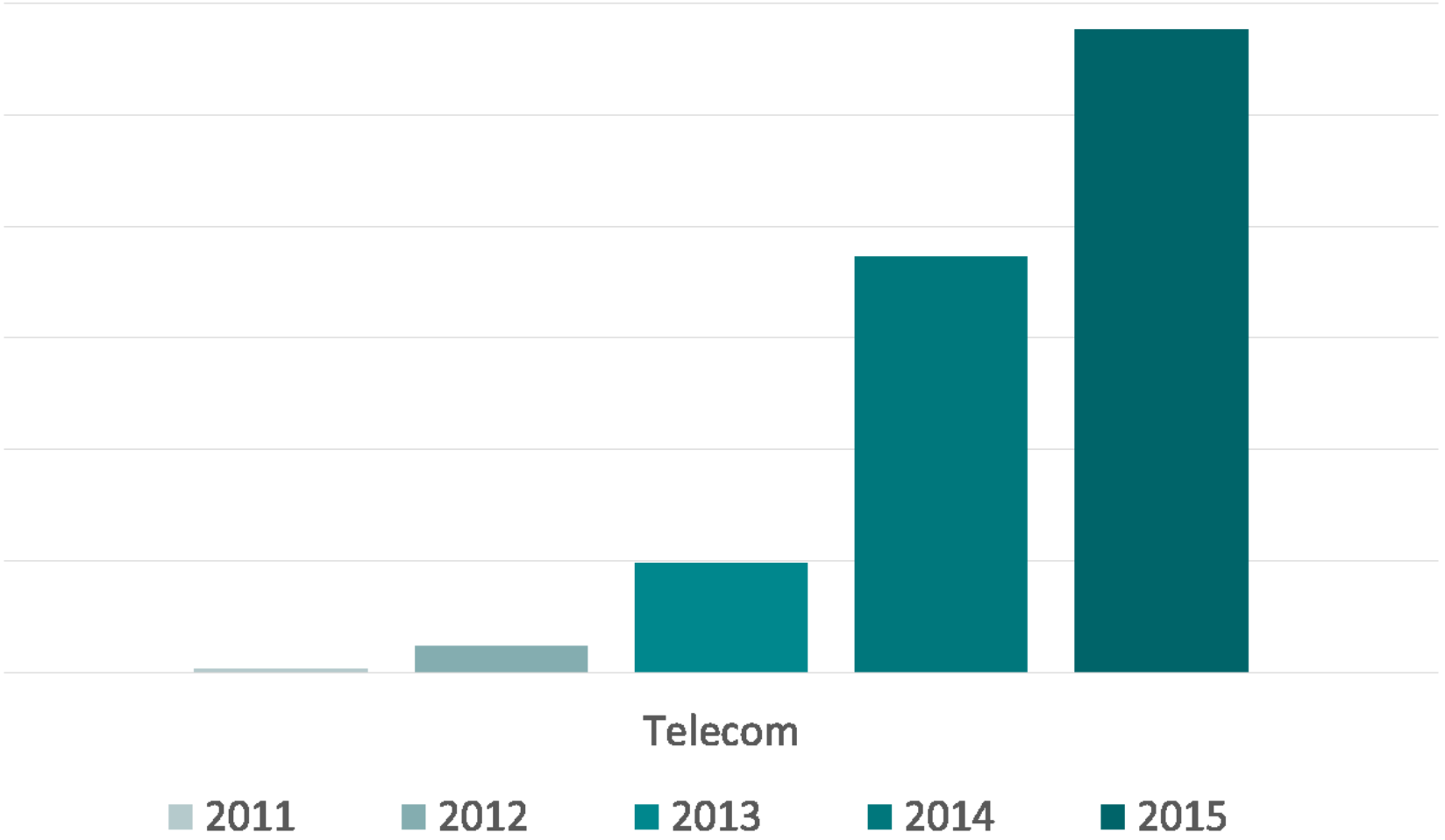
SPE

Defence

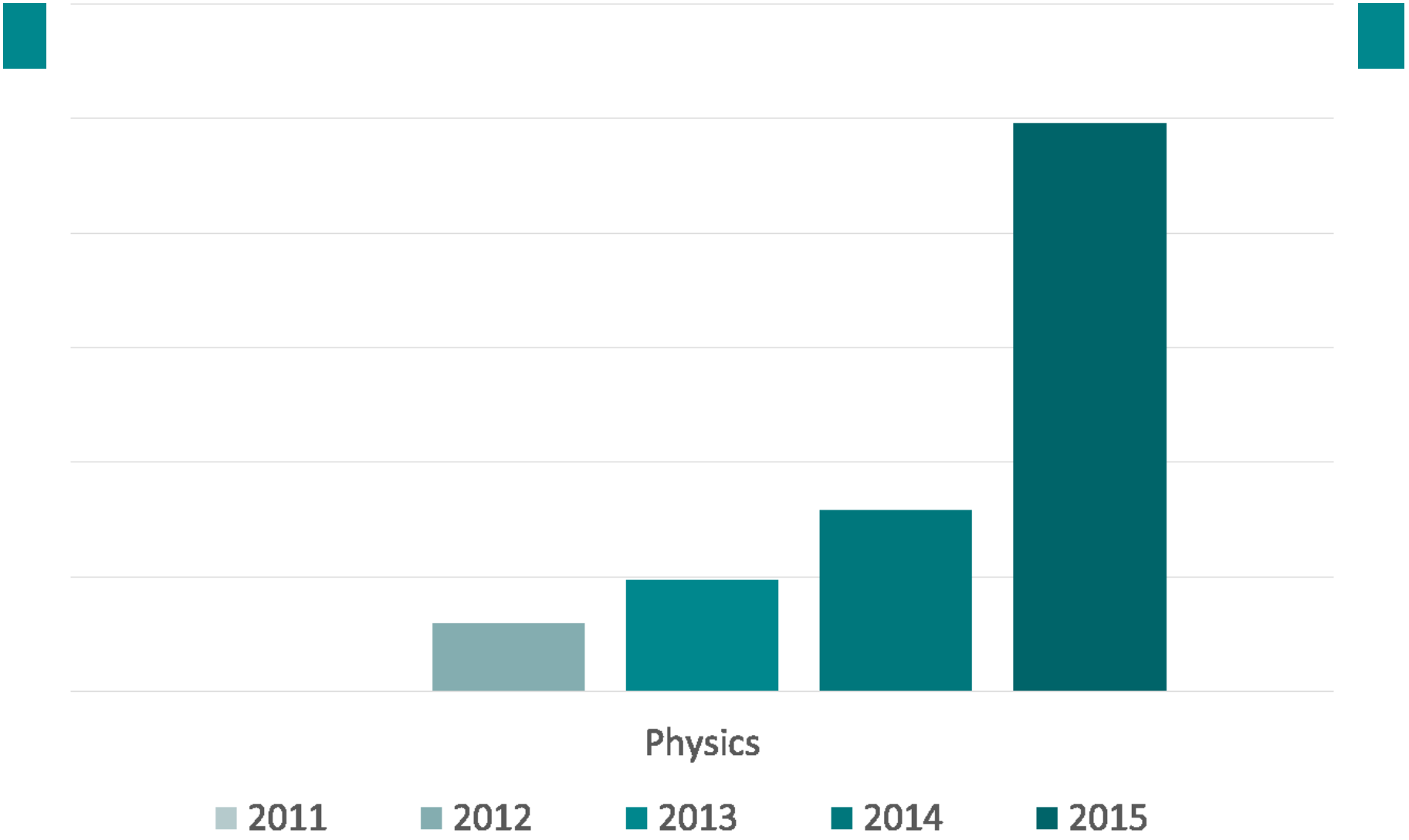
HPEC

AMC Growth - Telecom

Year on year growth as more programs come to deployment



AMC Growth - Physics



Summary

- **AdvancedMC market growing nicely (for us at least)**
- **Double wide AMCs are driven by demand from the Physics community**
- **Some new interesting emerging applications for single width AMCs**
- **Physics market is attractive because:**
  - Long Life Cycles
  - Remote management capability is valued
  - Projects are forecast well in advance