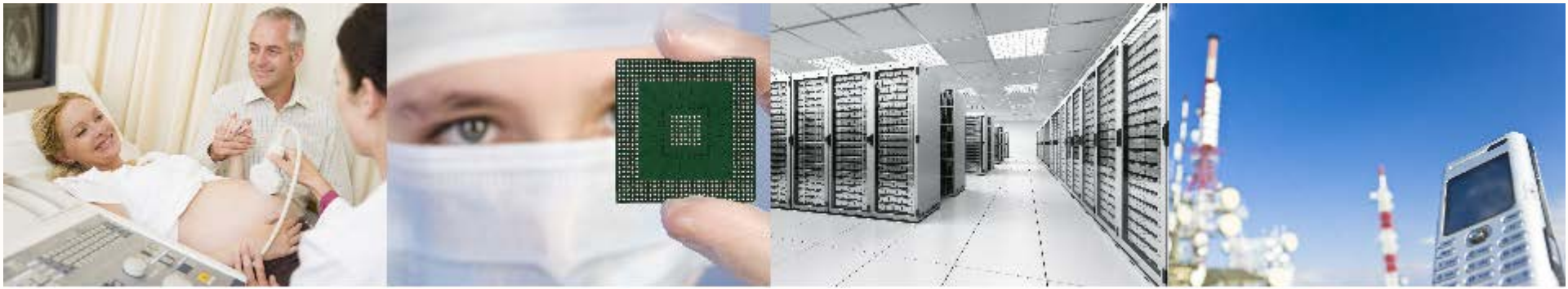

A 1024-core 70GFLOP/W Floating Point Manycore Microprocessor

Andreas Olofsson, Roman Trogan, Oleg Raikhman
Adapteva, Lexington, MA

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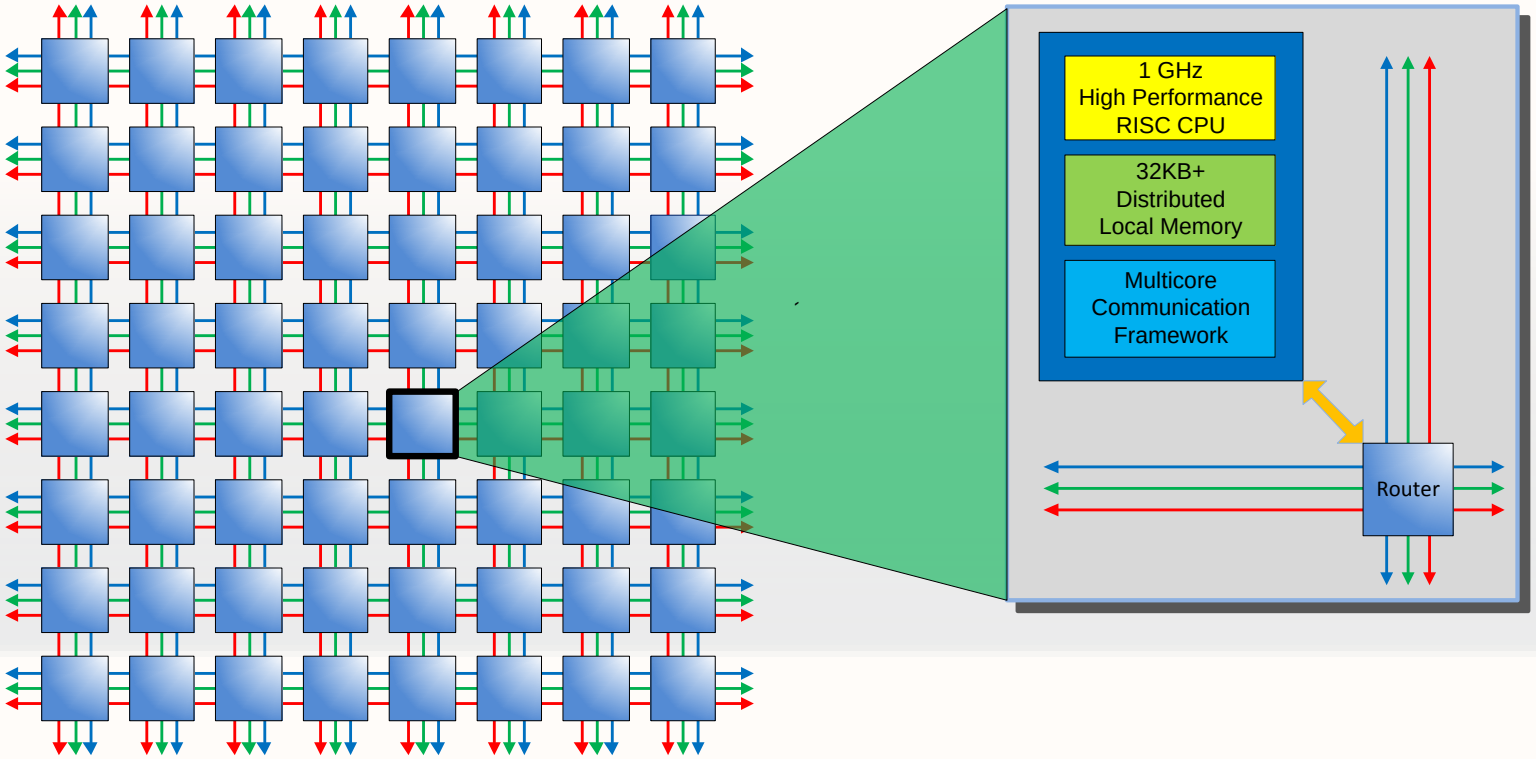
Epiphany™ Multicore Architecture Intro



ANSI C Programmable

IEEE Floating Point

70 GFLOPS/W

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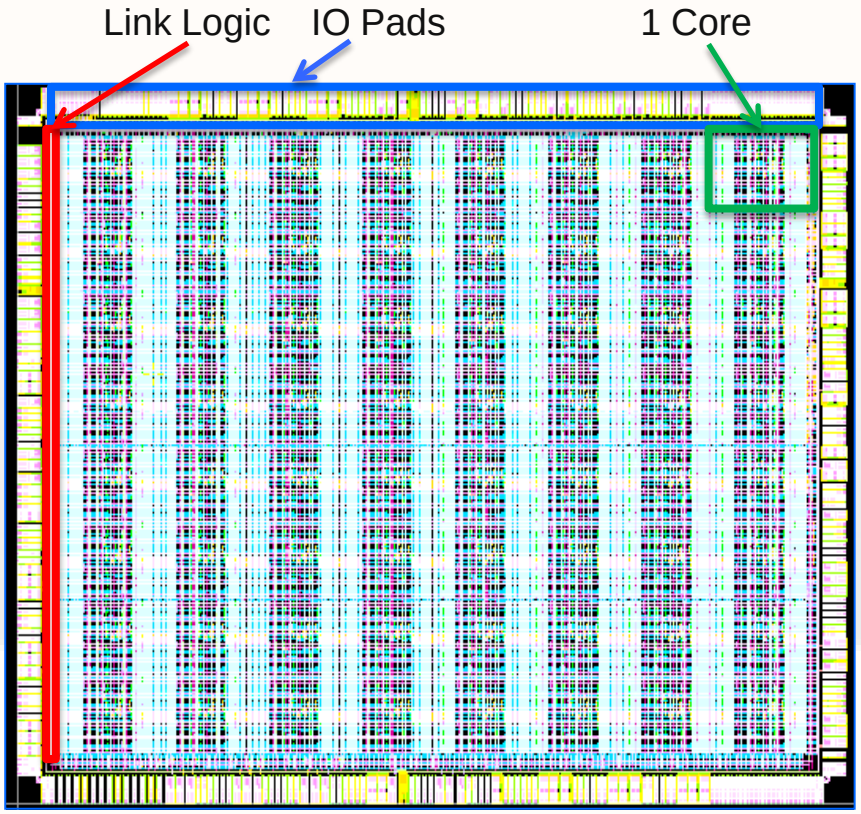
Epiphany™ 28nm Product Announcement

- 64 RISC cores
- 800 MHz Operating Frequency
- 100 GFLOPS
- < 2Watt Max Chip Power
- 25mW & 0.12mm^2 per core
- Up to 70 GFLOPS/Watt
- 2MB On-Chip SRAM
- Only 10.0 mm^2 silicon area
- Scale to 1000's of cores on chip
- In Fab, available Q1,2012



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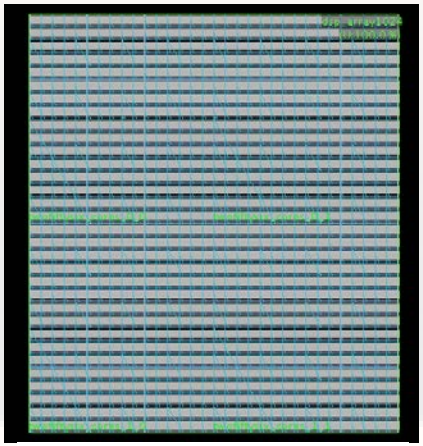
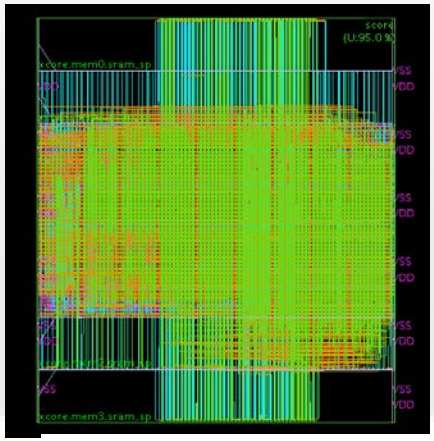
Hold on...the title said 1024 cores!

- We can build it any time!
- Waiting for sponsor/customer
- LEGO approach to design
- No global timing paths
- Guaranteed by design
- Generate any array in 1 day
- ~130 mm^2 silicon area



1024 Cores



1 Core

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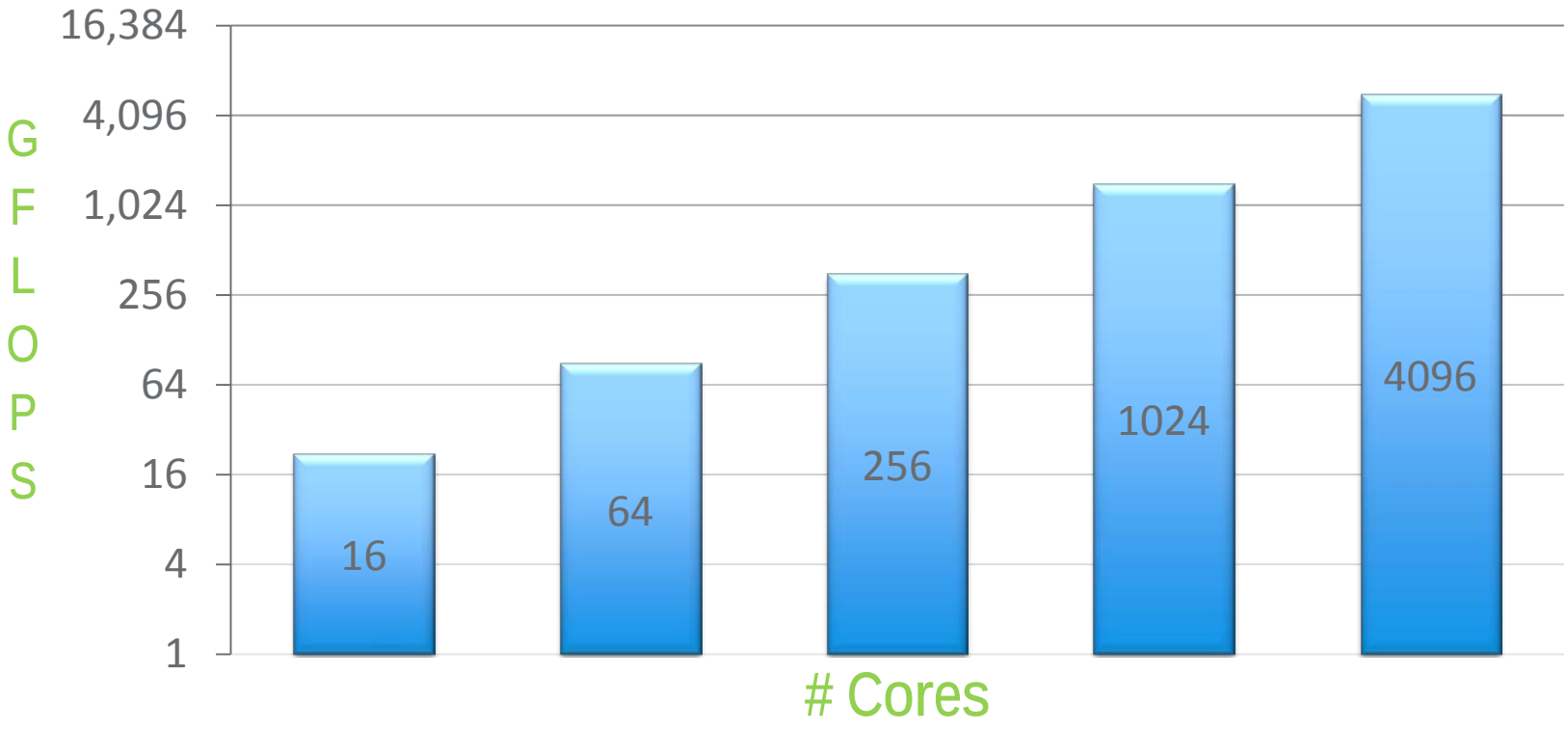
Epiphany™ Single Chip Performance Scaling



On-demand scaling from 0.25W to 64 Watt

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Epiphany, Server Performance Without the Power Drain

	Processor	Compiler	Operating Speed in Mhz	CoreMark™ /MHz	CoreMark™	EEMBC CERTIFIED	Parallel Execution	Comments	Date Submitted
1195	Tilera TILEPro64 (TLR36480BG-9C) 866	gcc 4.4.3	866	167.60	145153.74		62: PThreads	comment	12/16/10
1040	Tilera TILEPro64 (TLR36480BG-9C) 866	GCCEDG gcc 3.2 mode (tile-cc 2.1)	866	140.06	121291.16		62: PThreads / core affinitized	comment	11/20/09
1154	Intel Xeon L5640 ES (2) (Fujitsu RX300 S6) 2266	GCC4.1.2 20080704 (Red Hat 4.1.2-46)	2266	52.33	118571.75		24:PThreads	comment	08/05/10
1153	Intel Xeon L5640 ES (2) (Fujitsu RX300 S6) 2266	GCC4.1.2 20080704 (Red Hat 4.1.2-46)	2266	40.87	92612.09		16:PThreads	comment	08/05/10
1152	Intel Xeon L5640 ES (2) (Fujitsu RX300 S6) 2266	GCC4.1.2 20080704 (Red Hat 4.1.2-46)	2266	40.49	91743.12		12:PThreads	comment	08/05/10
1221	Intel Core i7 2600 3392.236	GCC 4.4.5	3392.236	29.35	99562.34		16:PThreads	comment	03/12/11
1006	Intel Xeon X5450 3000	GCC4.3.2 [gcc-4_3-branch revision 141291]	3000	28.31	84943.73		8:Fork	comment	08/10/09
1151	Intel Xeon L5640 ES (2) (Fujitsu RX300 S6) 2266	GCC4.1.2 20080704 (Red Hat 4.1.2-46)	2266	27.90	63227.48		8:PThreads	comment	08/05/10
12[illegible]	Adapteva EpihanyIII (E16G301) 800	GCC4.7.0	800	24.35	19478.00		16:Proprietary	comment	09/08/11

20-100W

2W!!

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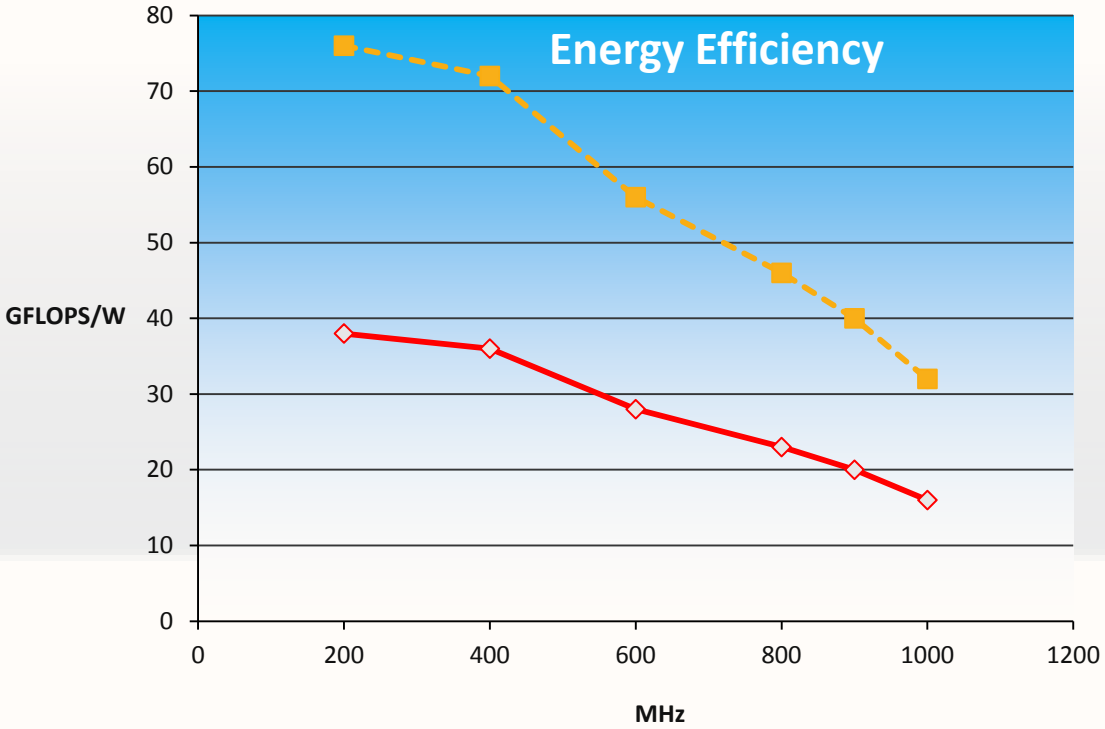
Energy Efficiency Lab Measurements



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What this means for Embedded Systems

- 10x-50x boost in energy efficiency
- Put the #1 Supercomputer of ~1995 in a smartphone
- Make a solar powered 1 PFLOP supercomputer
- Put processing closer to the sensor
- Prototype real time real time systems entirely with floating point and C/C++

Summary

- Currently providing easy to use development kits based on 65nm platform
- Soon sampling the world's most energy efficiency processors in 28nm
- Looking for collaborators that can quickly demonstrate real time applications running on the Epiphany Multicore Architecture
- Reached profitability in August 2011, we're here to stay!

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