AMD Fusion Family of APUs

Bob Grim, Director
AMD Product Marketing

December 7, 2010

Content Under Embargo Until January 4, 2011
at 12:01am ET

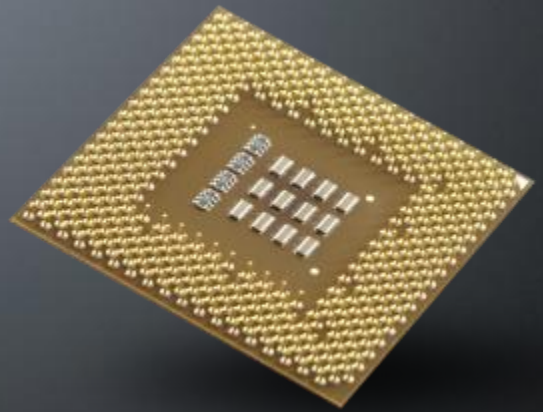
AMD
The future is fusion

Agenda

- **Third Generation of Personal Computing**
  - HD 2.0
  - Personal Supercomputing
  - AMD AllDay™ Power
- VISION Technology for 2011
- Product Demos

World-class Platforms: Only from AMD

Only two companies develop and deliver
x86 processors in volume



Only two companies develop and deliver
leading-edge 3D graphics

Only AMD can do both

People Prefer Visual Communications

Verbal Perception

Words are processed at only 150 words per minute

Visual Perception

Pictures and video are processed 400 to 2000 times faster

What Matters Today:

- Rich visual experiences
- Multiple content sources
- New types of applications

The Big Experience/Small Form Factor Paradox

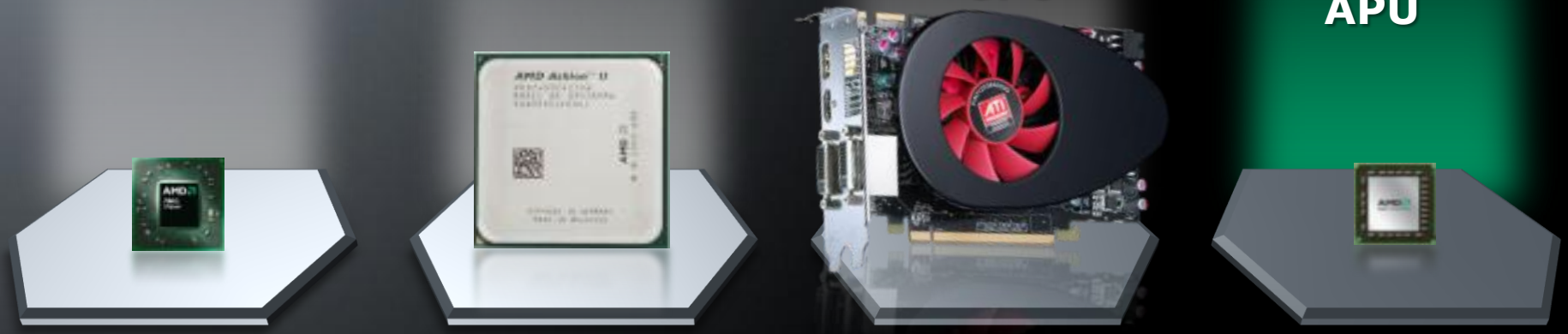
Technology	Mid 1990s	Mid 2000s	Now: Parallel/Data-Dense
Display	4:3 @ 0.5 megapixel	4:3 @ 1.2 megapixels	16:9 @ 7 megapixels
Content	Email, film & scanners	Digital cameras, SD webcams (1-5 MB files)	HD video flipcams, phones, webcams (1GB)
Online	Text and low res photos	WWW and streaming SD video	3D Internet apps and HD video online, social networking w/HD files
Multimedia	CD-ROM	DVDs	3D Blu-ray HD
Interface	Mouse & keyboard	Mouse & keyboard	Multi-touch, facial/gesture/voice recognition + mouse & keyboard
Battery Life*	1-2 Hours	3-4 Hours	All day computing (8+ Hours)

*Resting battery life as measured with industry standard tests.

AMD
The future is fusion

Paradox Solved: One Design, Fewer Watts, Massive Capability

Northbridge + Dual-Core CPU + Discrete-level DirectX® 11 GPU = "Zacate" AMD Fusion APU



- 66 sq. mm
- 13 watts

- 117 sq. mm
- 25 watts

- 59 sq. mm
- 8 watts

- 75 sq. mm
- 18 watts

First AMD Fusion APUs Address Two Distinct Markets

18W "Zacate" APU
Mainstream

- Mainstream notebooks
- All-in-one desktops
- Better gaming performance at lower power[1]

9W "Ontario" APU
Low Power

- HD Netbooks
- Ultra-small form factors
- 10x graphics performance over today's netbooks[2]

Up to 10-plus hours of battery life!*

New low-power "Bobcat" x86 cores and a DirectX®11 GPU

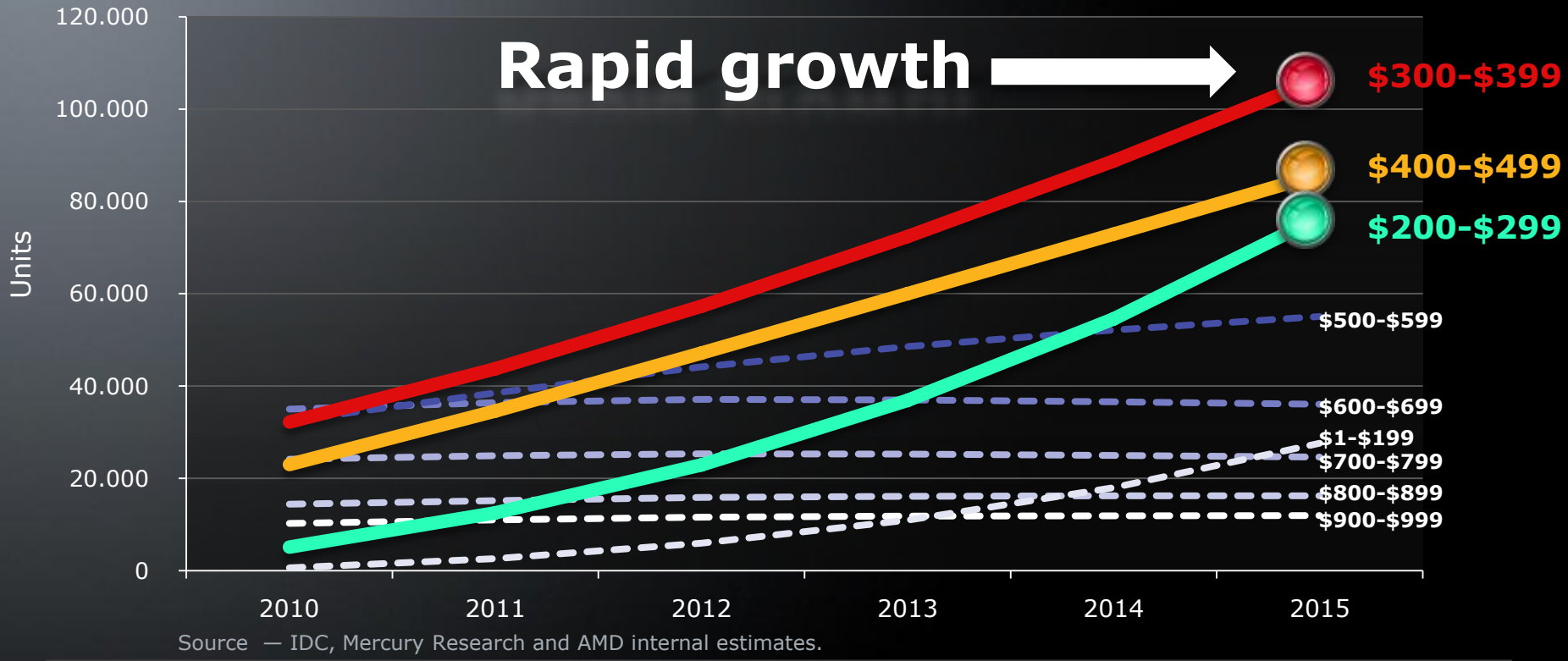
1) Based on 3DMark Vantage Entry of "Danube" platform (Athlon P320/RS880) = 2133 compared 3Dmark Vantage Entry of "Brazos" with "Zacate" APU = 3294 (54% higher)

2) 3DMark 06 of Intel Atom N-450 = 157 vs. 3DMark of "Brazos" with "Ontario" = 1748

*Resting battery life as measured with industry standard tests.

APUs Targeting the Notebook Market Sweet Spots

Projected Global Notebook Volume by Priceband 2011-2015



Source — IDC, Mercury Research and AMD internal estimates.

AMD Fusion Provides an Optimal User Experience

The "HD 2.0" Era Begins with AMD Fusion APUs

Personal Supercomputing in a Notebook

AMD AllDay™ Power

HD 2.0 -- Enabling All Consumable HD Content to be Viewed in HD

A better Internet experience

Great looking videos and 3D

The best-looking games

Leveraging Software Ecosystem for HD 2.0 Experiences

A better Internet experience



Great looking videos and 3D

The best-looking games

AMD Fusion APUs Offer Personal Supercomputing in a Notebook

Tools for your digital life

nero

SONY

VIEWDLE

DIVX

ROXIO

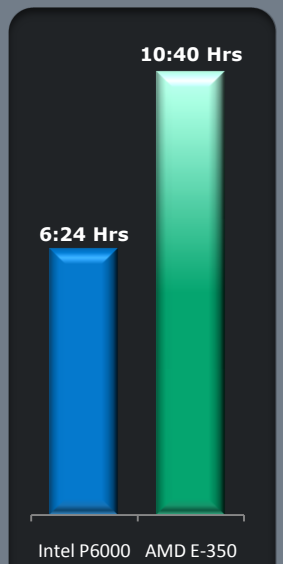
"AMD Fusion gives developers the ability to dream of products not possible before."

- Laurent Gil, CEO Viewdle

"Llano" APU is designed to deliver more than **500 GFLOPs** of processing power - **33 times more** than a single CPU provided just two years ago*

*Theoretical peak performance

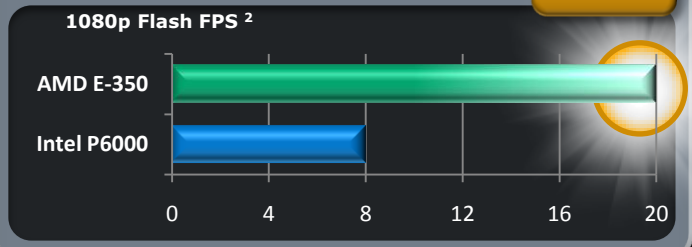
AMD Fusion APUs: E-Series Performance Comparisons



AMD AllDay™ Power[1]

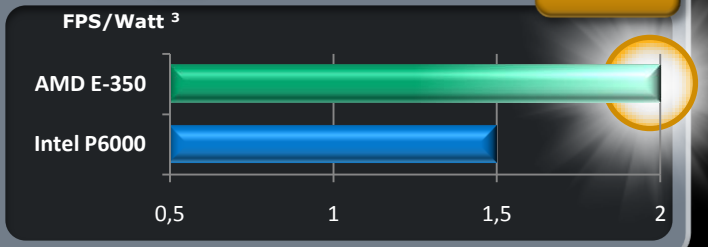
HD 2.0
Visual Performance

150%



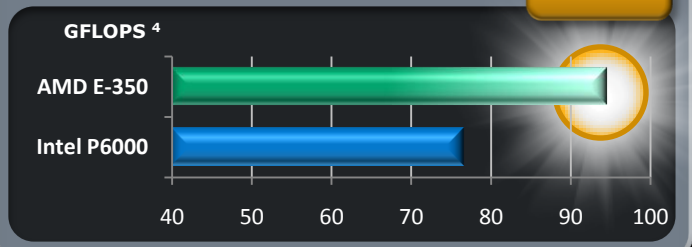
Innovation
Efficient and powerful

27%



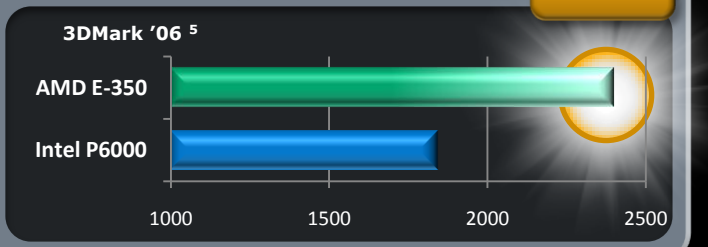
Compute Capacity
Power to do more

23%



Gaming
Immersive experience

30%



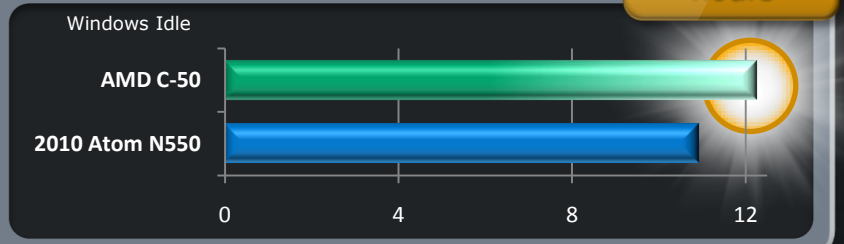
1, 2, 3, 4, 5 – See footnotes on slide 44 and configuration data on slide 45.

AMD Fusion APUs: Dual-Core C-Series Performance Comparisons

Superior *Battery Life at Idle*

to competitive netbook offerings[6]

Over 12 hours



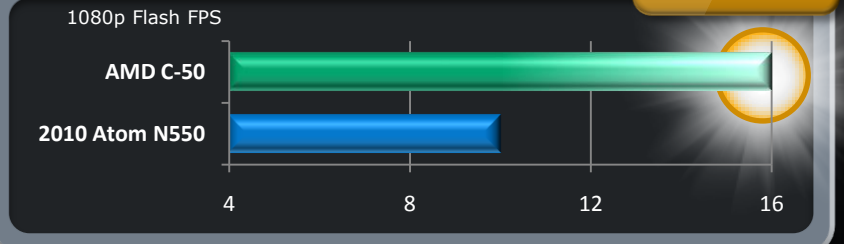
Competitive *Price Points*

can be enabled with "Brazos"-based products

Better *Web Experience*

than any netbook on the market[7]

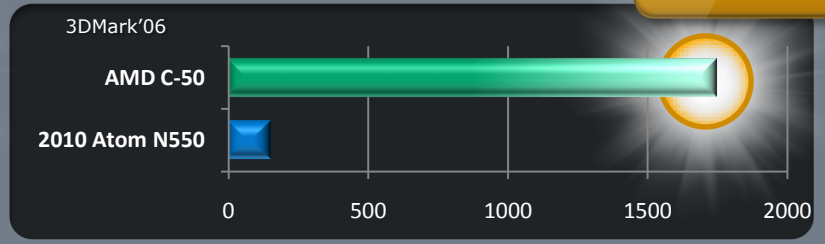
60%



10X Better *Visual Performance*

crushing any netbook on the market[8]

>11X



6, 7, 8 – See footnotes on slide 44 and configuration data on slide 45.

Reviewer Praise for the AMD "Zacate" E-Series APU

"We got a very early look at Brazos, and AMD is offering something unprecedented: discrete GPU performance in a single chip CPU/GPU package."

- Andrew Ku

tom's hardware

"There's no telling whether Intel will be able to reach the sweet spot of power efficiency and performance AMD appears to have achieved with Zacate…"

- Cyril Kowaliski

THE TECH REPORT
PC Hardware Explored

"Without a doubt, Brazos and AMD's Zacate E-350 processor offer excellent performance-per-watt efficiencies that will likely have Intel on its toes in a big way moving forward."

– Dave Altavilla

HOT

"From the looks of it, AMD has all of the right ingredients for some very competitive entries in the mainstream and ultraportable notebook markets. Now it's just up to the OEMs to build something cool out of it."

– Anand Shimpi

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Accelerating the AMD Fusion Advantage

- **AMD Fusion Experience Program:**
  - Enablement of software developers through our SDK roadmap, OpenCL™, DirectCompute and new Internet APIs
- **AMD Fusion Fund**
  - www.amd.com/fusionfund
- **AMD Fusion Developer Summit:**
  - June 14-16, 2011
  - Bellevue, WA, USA (close to SEATAC) at The Meydenbauer Conference Center
  - www.amd.com/afds

Agenda

- Third Generation of Personal Computing
  - HD 2.0
  - Personal Supercomputing
  - AMD AllDay™ Power
- **VISION Technology for 2011**
- Product Demos

AMD Fusion Family of APUs: Ecosystem & Consumer Positioning

Ecosystem

Products

"Llano" = AMD A-Series APUs

"Zacate" = AMD E-Series APUs

"Ontario" = AMD C-Series APUs

Consumers

Introducing the VISION Engine

encoding

mpeg4

HDMI

Catalyst

comput

transc

AVIVO

Aspect Ratio

gpu

decoding

1080p

direct 2d

VISION Engine Features and Benefits

Technical Features

VISION Engine

VISION Engine Driver

- Radeon™ Cores
- Video Accelerator
- DirectX® 11

Benefits

Accelerated Experience

1) **HD Video** - for fast and smooth HD Video processing & playback

2) **Rich Internet** - fast rich Internet page loads

3) **Applications** - fast application processing

4) **HD Gaming** - for fast and smooth HD and 3D Gaming

Software

CyberLink, nero, DivX, Adobe, Office, SONY, ROXIO, turbine, codemasters, FIRAXIS

AMD VISION Engine Software

- AMD VISION Engine is the software suite for all AMD Fusion APUs and is based on AMD's award-winning Catalyst™ software suite

Three major components:

- AMD Catalyst Control Center™
- Unified Graphics Display Driver
- OpenCL driver

O/S Support:
- Windows 7
- Windows Vista
- Windows XP
- Linux

- **Released monthly**
- **Microsoft® certified**
- **Supported on:**
  - Desktop
  - Notebook

Fact: More than 50 Million AMD Catalyst™ drivers downloaded in 2010!

VISION at the Point of Sale

RSA TRAINING

In Person (NA)
Best Buy

Online (NA)
Staples

IN STORE PRESENCE

Latin America
HP

China
Lenovo

Europe
HP

ONLINE PRESENCE

Dell: 14 European
Countries

PROMOTIONS

Russia
Toshiba

Europe
Toshiba

NA
Acer

We Have an Unprecedented Number of Products in Market

AMD Fusion APUs: The Clear Advantage

OEMs

- Reduced complexity & thermal power
- Full experience in sleek form factors
- Visibly superior: easy to sell

Developers

- APIs portable across platforms
- Reduced bottleneck
- Improved performance, programmability

Consumers

- HD 2.0
- Personal Supercomputing
- AMD AllDay™ Power

Agenda

- Third Generation of Personal Computing
  - HD 2.0
  - Personal Supercomputing
  - AMD AllDay™ Power
- VISION Technology for 2011
- **Product Demos**

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ATTRIBUTION

Backup

AMD Notebook CPU/APU Roadmap

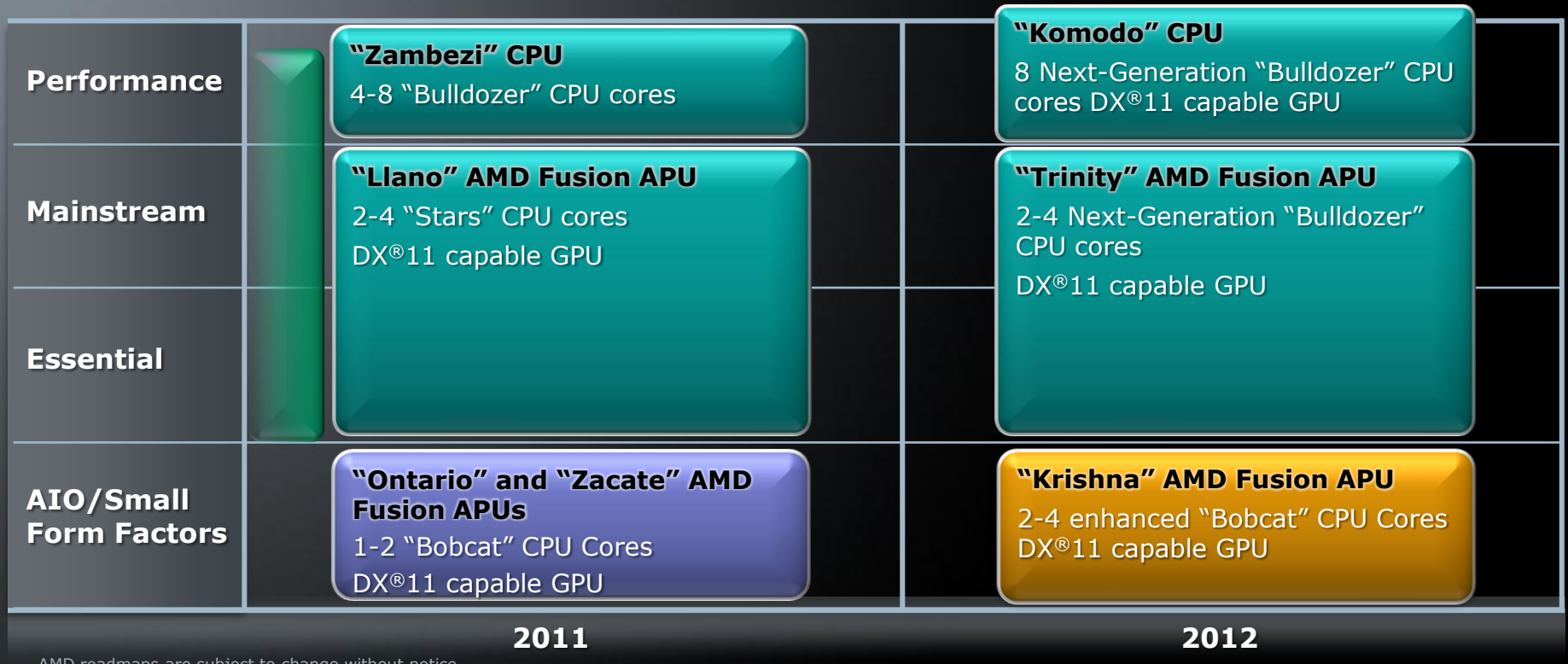
45nm 40nm 32nm 28nm

	2011	2012
Performance	**"Llano" AMD Fusion APU** 2-4 "Stars" CPU cores DX®11 capable GPU	**"Trinity" AMD Fusion APU** 2-4 next-generation "Bulldozer" CPU cores DX®11 capable GPU
Mainstream		
Essential	**"Ontario" and "Zacate" AMD Fusion APUs** 1-2 "Bobcat" CPU Cores DX®11 capable GPU	**"Krishna" and "Wichita" AMD Fusion APUs** 1-4 enhanced "Bobcat" CPU Cores DX®11 capable GPU
HD Netbook		
Tablets		

AMD roadmaps are subject to change without notice

AMD Desktop CPU/APU Roadmap

45nm 40nm 32nm 28nm



AMD roadmaps are subject to change without notice

AMD Notebook Platforms

2010

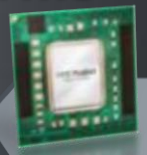
"Danube" Platform
Mainstream

- Quad- and triple-core computing for mainstream
- DirectX®11 capable discrete GPUs
- Up to 7 hours resting battery life*

"Nile" Platform
Value & Essential

- True gaming & superior video performance
- Up to 7.5 hours resting battery life*

2011

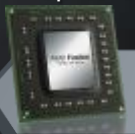


"Llano" APU
Mainstream

- Heterogeneous compute in single die
- Amazing HD entertainment

"Zacate" 18W APU
Value & Essential

- Significant GPU performance increase over prior generation
- Up to 8.5+ hours resting battery life*



"Ontario" 9W APU
Essential

- HD Internet computing
- Up to 10.5+ hours resting battery life*

2012

"Trinity" APU
Mainstream

"Wichita" APU
Essential & Tablets

"Krishna" APU
Value & Essential

Note: Processor features and schedule are preliminary and subject to change without notice.

*Resting battery life as measured with industry standard tests.

AMD
The future is fusion

AMD Desktop Platforms

2010

AMD Phenom™ II CPUs Enthusiast

- Ultimate performance, up to 6-core computing
- Immersive gaming when combined with DirectX®11 capable GPUs

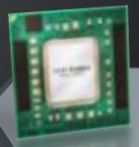
AMD Athlon™ II CPUs Mainstream and Small Form Factor

- Amazing price/performance, quad-core computing
- Industry-leading DirectX®11 capable GPU performance

2011

"Bulldozer" CPUs Enthusiast

- 32nm architecture, 4-8 cores
- AMD Radeon™ HD 6000 Series discrete DirectX®11 capable GPUs



"Llano" APU Mainstream

- DirectX®11 capable GPUs on die

"Zacate" APU Small Form Factor

- Unmatched flexibility for sleek, compact industrial designs

2012

"Komodo" CPUs Enthusiast

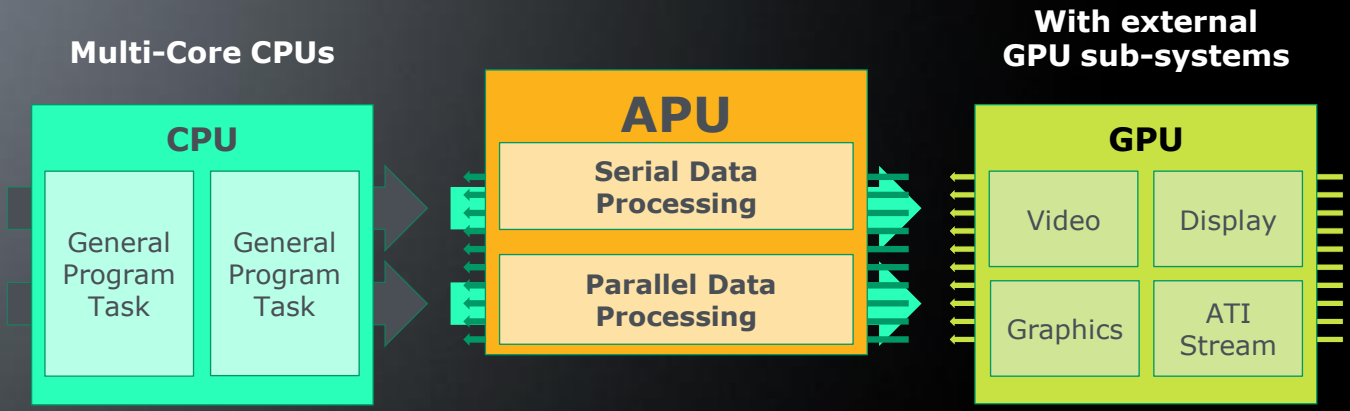
"Trinity" APU Mainstream

"Krishna" APU Small Form Factor

Note: Processor features and schedule are preliminary and subject to change without notice.

AMD
The future is fusion

The AMD Fusion Family of Accelerated Processing Units



Designed for
> General purpose tasks
> Most common applications
> Data processing serially

> General-purpose, programmable scalar and vector processor cores, forming a heterogeneous capability
> High-speed bus architecture
> Shared, low-latency memory model

...All on the same die

Designed for
> Specialized tasks (e.g. graphics, video)
> Most visual applications
> Data processing in parallel

Excitement Building for AMD Low-Power x86

Advanced Microarchitecture

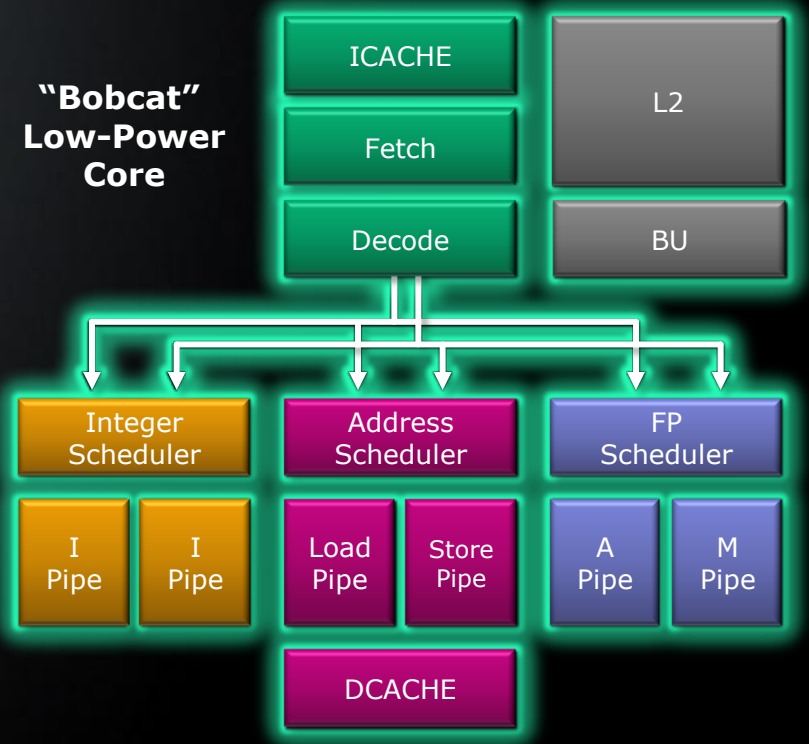
- Dual x86 decode
- Advanced branch predictor
- Full out-of-order instruction execution
- High-performance floating point
- 64-bit instruction set

Small Core

- 40nm / 10 metal layer process

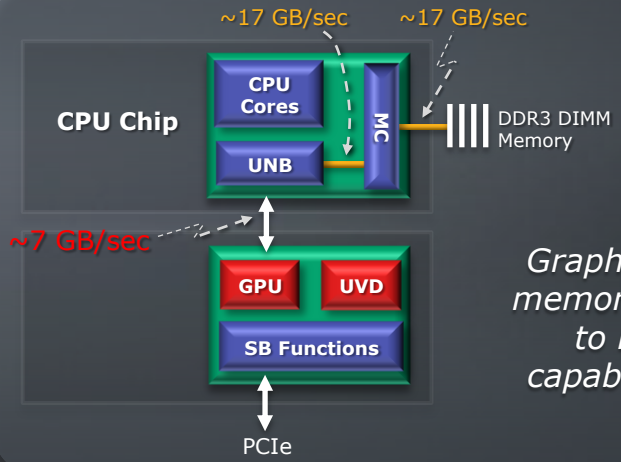
Low Power Design

- Minimizes data movement
- Clock gating, power gating
- System low-power states



Graphics and Media Processing Efficiency Improvements

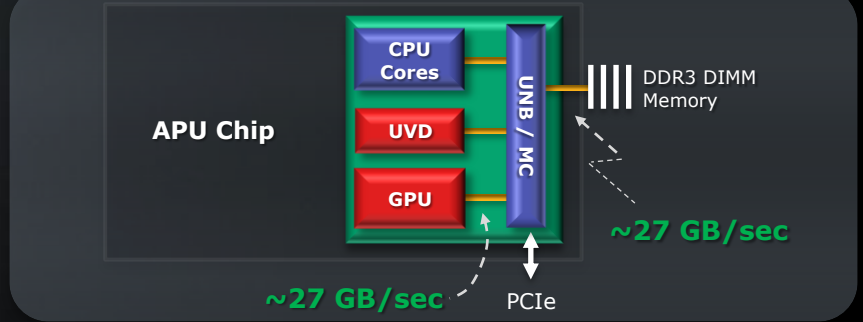
2010 IGP-based Platform



Graphics requires memory bandwidth to bring full capabilities to life

Bandwidth pinch points and latency hold back the GPU capabilities

2011 APU-based Platform



- 3X bandwidth between GPU and memory
- Even the same sized GPU is substantially more effective in this configuration
- Eliminate latency and power associated with the extra chip crossing
- Substantially smaller physical foot print

"Ontario" & "Zacate" Architecture

APU

> 2 x86 CPU Cores (40nm "Bobcat" core – 1 MB L2, 64-bit FPU)

> C6 and power gating

> Array of SIMD Engines

- DX11 graphics performance
- Industry leading 3D and graphics processing

> 3rd Generation Unified Video Decoder

> H.264, VC1, DixX/Xvid format

> DDR3 800-1066, 2 DIMMs, 64 bit channel

> BGA package

Display and I/O

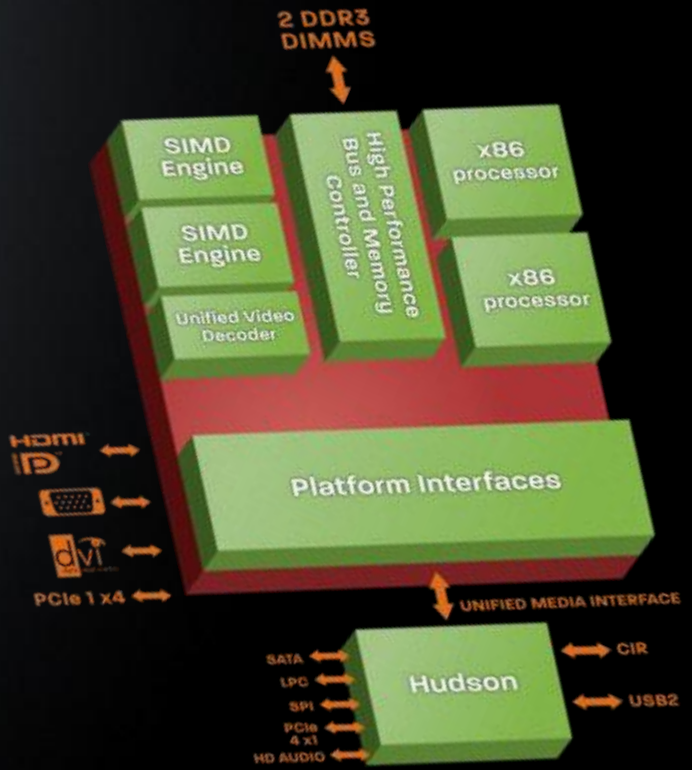
> Two dedicated digital display interfaces

- Configurable externally as HDMI, DVI, and/or Display Port
- Also supports a single link LVDS for internal panels

> Integrated VGA

> 5x8 PCIe®

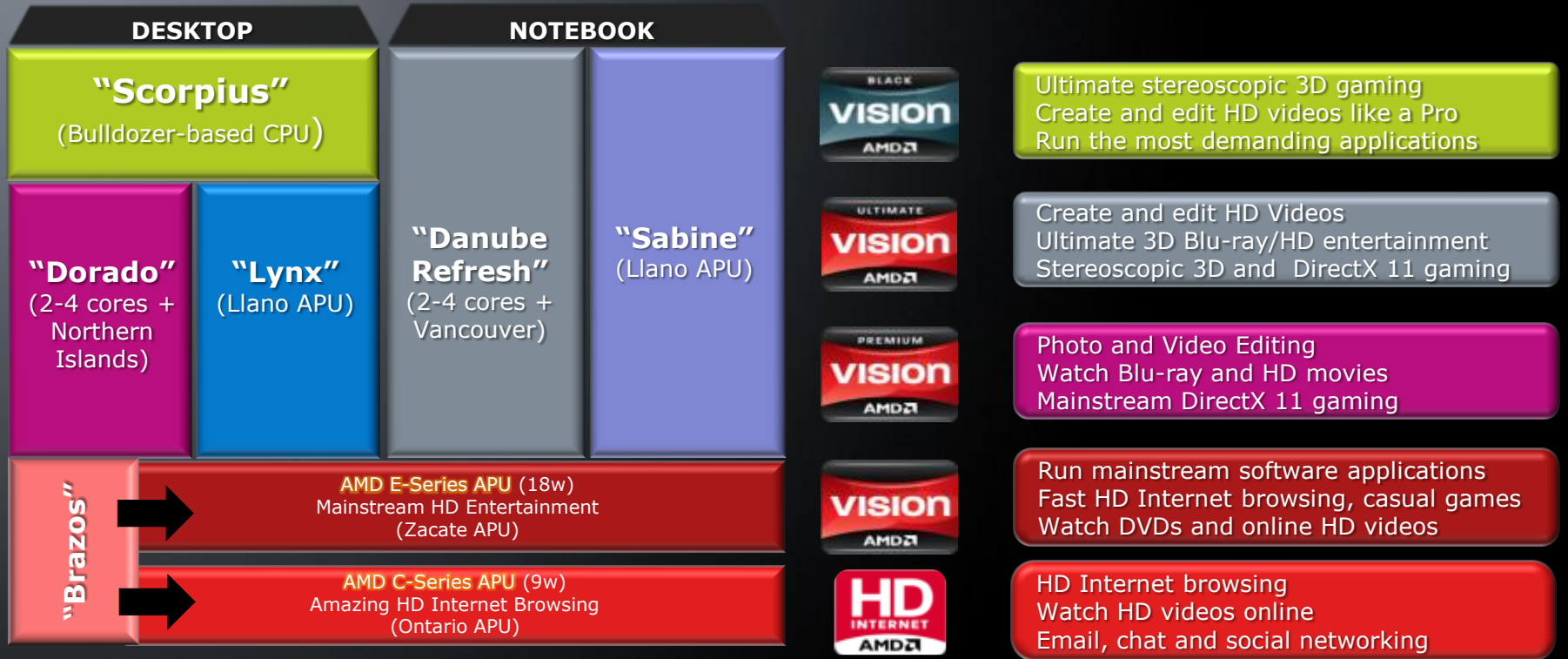
> "Hudson" Fusion Controller Hub



"BRAZOS" PLATFORM - DEFINITION

"Ontario" / "Zacate" APU	Description
Tech/Package	40nm / FT1 BGA, 413-Ball, 19x19mm, .8mm pitch
TDP Configs	18W, 9W
Processor Core	Bobcat (2 cores), 512KB L2/Core, 64-bit FPUs
Memory	DDR3, 800-1066, 1.35V/1.5V (Single Channel, 2 DIMMs)
Graphics Core	DX11 capable, UVD3 enabled
Displays	-Digital Display I/F DP0: Display Port, HDMI, DVI, LVDS -Digital Display I/F DP1: Display Port, HDMI, DVI -VGA from integrated VGA DAC
Power Management	-Core/NB P-State Transitions -Core Level: CC6 Power State -Package Level: PC6 Power State -L2 Cache power gating
"Hudson"-M1 FCH	
Tech/Package	65nm / FC BGA, 605-Ball, 23x23mm, .8mm pitch
TDP Configs	2.7W to 4.7W for typical configurations
UMI	x4 Gen1
SATA	6 Ports, 6Gb/s
USB	14 USB2.0 Ports, 2 USB1.1 Internal Ports
PCIe GPPs	4x1 Gen2
HWM	Incorporates Fan Control, Voltage Level Sensing
CIR	CIR Reciever
Clock Gen	Integrated
Discrete GPU	"Vancouver" Family AMD - Radeon™ HD 6000M
Motherboard	
Stackup	Minimum 6 layers for notebook designs
Power Rails	SVID for VDDCR_CPU & VDDR_NB, fixed voltage for other rails
Software/Firmware	
Software	Drivers: Windows7, Windows Vista, Linux
Firmware	SBIOS, VBIOS, Diagnostics, Utilities

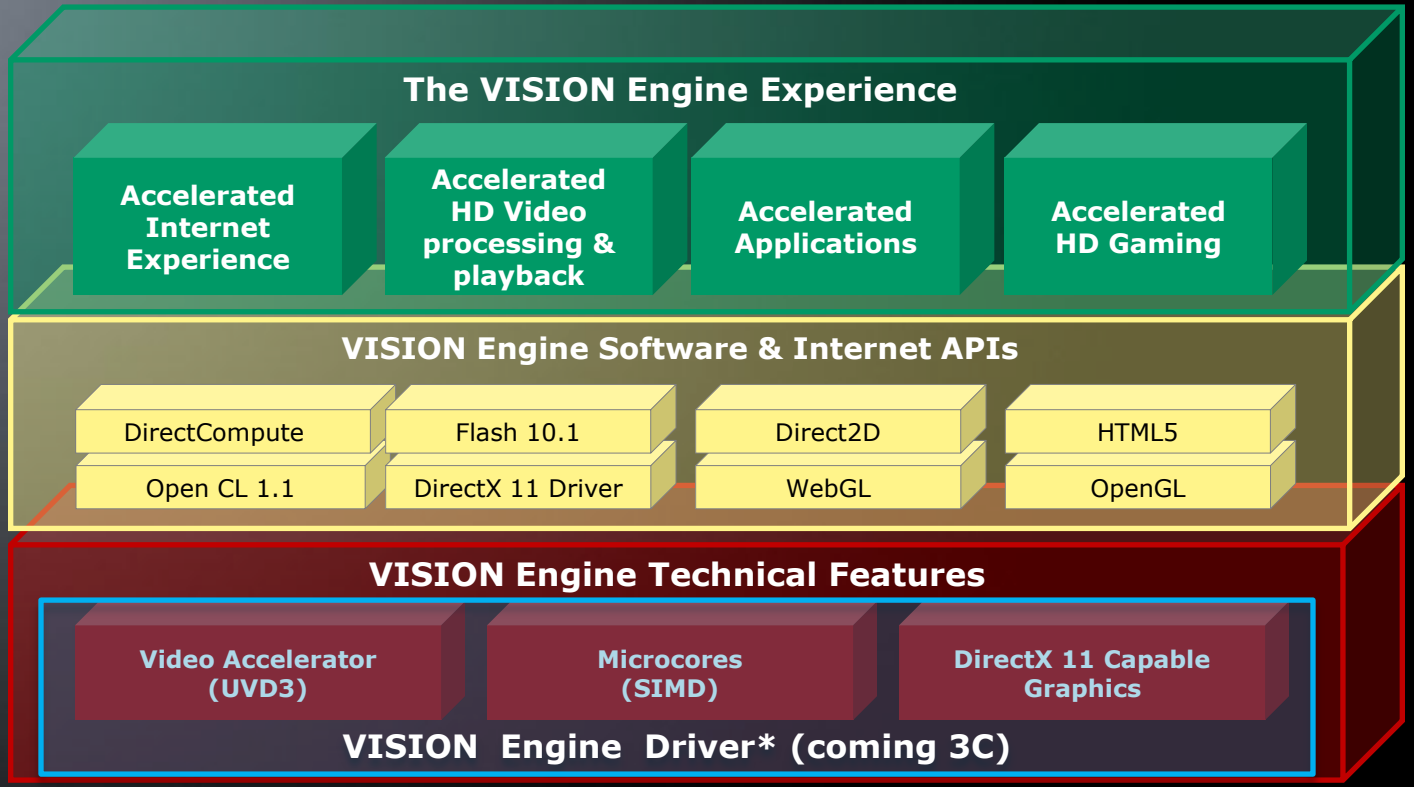
2011 Platform Line-up
Transition from Codenames to VISION Branding



Additional hardware and / or software required for enablement of some features. Not all features will be supported on all components or systems

AMD The future is fusion

VISION Engine Architecture



VISION Technology Features & Benefits

VISION Engine

Video Acceleration
- Smooth, vivid HD Video
- HD & 3D movies
- HD Video conferencing
- Video quality enhancement

Application Acceleration
- Accelerated creativity apps
- Accelerated productivity apps
- Accelerated transcoding

Internet Acceleration
- Faster Internet Browsing
- Enhanced visual quality

Gaming
- Fast HD and 3D gaming
- Life-like visual effects

APU

Sleek & Energy Efficient
- AMD AllDay™ battery life*
- Thin and light designs
- Runs cool and quiet
- Open support for the latest networking technology (wireless A/B/G/N, WiMax, 3G, 4G, LTE)

Multi-core Technology

Enhanced Productivity
- True Multi-core Processing
- Performance on demand
- Secure and efficient virtualization

AMD Radeon™ Graphics

Immersive Graphics
- Multi-monitor support
- Dual graphics support
- Switchable Graphics
- HDMI 1.4a

*AMD defines all-day battery life as 8+ hours resting battery life as measured with industry standard tests.

Footnotes

1. In testing conducted by AMD performance labs the 2011 Low Power platform reference design "Zacate" E-350 demonstrated up to 640 minutes/10:40 hours or "all-day" battery life while idle while the comparable Intel Pentium 6000 system demonstrated 384 minutes/6:24 hours. All testing performed using a 6-cell Li-Ion, 62.2 Whr battery. AMD defines “all day“ battery life as 8+ hours of idle time. Active battery life data pending. **BR-C1**
2. In testing conducted by AMD performance labs streaming Flash Video at 1080p the 2011 AMD VISION-based notebook demonstrated an average 20 frames per second, while the comparable Intel-based notebook demonstrated an average 8 frames per second. **BR-C2**
3. In testing conducted by AMD performance labs streaming flash video at 1080p the 2011 AMD VISION-based notebook averaged 2.0 frames per second/watt while the Intel- based notebook averaged 1.5 frames per second/watt. All scores rounded to the nearest 10th of a frame per second per watt. **BR-C3**
4. In testing conducted by AMD performance labs measuring compute capacity as measured in GFLOPS the 2011 AMD VISION-based notebook scored 94 GFLOPS while the comparable Intel-based notebook scored 76.6 GFLOPS. GFLOPS calculations are based on two subscores of Sandra2010_ProEngineer, gpgpuproc - Native Float Shaders-MPixel/s and cpumm - Multi-Media Float x8 iSSE2-MPixel/s which measure total capacity for the GPU and CPU respectively. All scores rounded to the nearest 10th. **BR-C4**
5. In testing conducted by AMD performance labs, tests were performed using 3DMark '06 benchmark scores, the 2011 AMD VISION-based notebook scored a 2399 while the Intel-based notebook scored 1842. All scores rounded to the nearest whole number. **BR-C5**
6. In testing conducted by AMD performance labs the 2011 Low Power platform reference design "Inagua" C-50 demonstrated up to 735 minutes/12:15 hours or "all-day" battery life while idle and the comparable Intel Atom N550 system demonstrated 655 minutes/10:55 hours. All testing performed using a 6-cell Li-Ion, 62.16 Whr battery. AMD defines “all day” battery life as 8+ hours of idle time. Active battery life data pending. **BRNB-C1**
7. In testing conducted by AMD performance labs streaming Flash Video at 1080p the AMD 2011 HD Internet technology-based netbook scored of up to 16 frames per second (fps), while the competing Intel-based netbook scored up to 10 fps. FPS rounded to the nearest whole second. **BRNB-C2**
8. In testing conducted by AMD performance labs using 3DMark '06 benchmark scores the AMD 2011 HD Internet technology- based netbook scored 1749 while the competing Intel-based netbook. scored 150. All scores rounded to the nearest whole number. **BRNB-C3**

Footnotes

System Configurations

AMD Systems

Mainstream:
The AMD “Zacate” E-350 reference design consisted of a 1.6Ghz 2C B0 Ontario + Hudson M1 APU 18W E-350 2GB (1x2GB) DDR3-1066 system memory, AMD Radeon™ HD 6310 Discrete-Class Graphics with 15.6” 1366x768x32 – LED Backlight.

Netbook:
The AMD “Inagua” C-50 reference design consisted of a 1.0Ghz 2C DC Ontario + Hudson M1 APU 9W C-50 2GB (1x2GB) DDR3-1066 system memory, AMD Radeon™ HD 6310 Graphics with 15.6” 1366x768x32 – LED Backlight.

Intel Systems

Mainstream:
Intel system was Acer Aspire AS5740-5255 with Intel® Pentium® Processor P6000 (3M Cache, 1.86 GHz, 2C, 2T), Intel® HD Graphics, 2GB (2x1GB) PC3-8500 - Samsung M471B2874EH1-CF8

Netbook:
Intel system was Acer Aspire AS5740-5255 with Intel® Atom® Processor N550 (1M Cache, 2C,4T, 1.50 GHz), Intel® Graphics, 2GB (2x1GB) PC3-8500 - Samsung M471B2874EH1-CF8