AMD Brings New Value to Radeon

New form factors, memory technologies, driver capabilities, & DirectX 12 support

Summary

The PC gaming graphics industry today has very few players but many problems. Today's PC gaming enthusiast market essentially has only two graphics players remaining, AMD and Nvidia. There is a constant back-and-forth between these two players in terms of bringing new features that gamers want and need.

AMD's new Radeon 300 series does just that while also adding value to the Radeon name. This report focuses on AMD's new Radeon 300 series family. It is a combination of new ASICs (application-specific integrated circuits) and memory technologies as well as innovative new features that give new life to existing architectures. The new Radeon 300 series is AMD's own push to sweep the high-end while still giving beneficial features to Radeon gamers at all tiers.

A Top-Down Offering

AMD's new Radeon 300 series is composed of a broad range of offerings, ranging from the mainstream to the high-end enthusiast. These technology offerings incorporate some of the latest GPU, memory, display, and driver technology. AMD's new line of graphics cards starts with the 2GB R7 360 and 4GB R7 370 and extends to the 4GB Fury X with cutting-edge HBM (High Bandwidth Memory) memory technology, enabling the fastest graphics memory bandwidth in the world.

Fury X

When the Fury brand was introduced under the ATI brand in 2001, it set itself apart from every other product available in the market and was a major innovation in the graphics industry. Today, AMD is looking to rekindle the excitement around the Fury brand with the new R9 Fury line of high-end cards. We believe that the AMD Radeon R9 Fury X GPU is once again establishing a category of its own as **the first GPU with HBM technology**. AMD's Fury X card is a water-cooled 7.5 inch graphics card, which is much smaller and consumes less power-per-square-inch than most high-end graphics cards on the market today.

This graphics card's small size is possible, because AMD replaces the GDDR5 memory on the PCB (printed circuit board) with HBM memory technology. With HBM memory on-package, AMD reduces the amount of area taken up by the GPU and memory by 3x. Thus, AMD R9 Fury X cards can be installed in PC form factors that most enthusiasts could never have considered in the past. The switch from GDDR5 to HBM not only saves space, it also saves a significant amount of power. The result is **a more powerful and efficient graphics card with significantly faster memory**.

The GPU portion of AMD's Radeon R9 Fury X is built on the mature 28nm process technology. The GPU packs in 4,096 Stream Processors in 64 compute units at clock speeds up to 1,050 MHz; it also has 256 texture units and 64 ROPs. The whole R9 Fury X graphics card itself boosts performance to 8.6 GFLOPS (Giga Floating Point Operations Per Second) from 5.6 GFLOPS, an increase of 65% over the previous generation.

The R9 Fury X uses 4GB of HBM memory on a 4,096-bit memory interface, which delivers up to 512 GB/s (Gigabytes Per Second) of memory bandwidth, an increase of around 63% over the previous high-end AMD Radeon R9 290X with 320 GB/s of bandwidth. The R9 Fury X is an advanced feat of engineering to accomplish this memory bandwidth.

The AMD Caribbean Islands Family: Not Just a Rebrand
While AMD's Fury X provides a halo for the Radeon brand, AMD still has other new graphics cards in the Radeon 300 series including the following air cooled cards:

- **R9 390** & **R9 390X** each with 8GB of GDDR5 and 275W for 4K gaming
- **R9 380** 2 or 4GB of GDDR5 and 190W for 1440p gaming
- **R7 370** up to 4GB of GDDR5 and 110W for everyday gaming
- **R7 360** up to 2GB of GDDR5 and 100W for everyday gaming

AMD has been hard at work over the past year-and-a-half optimizing and re-architecting the microcontrollers within the ASICs themselves. Combined with the improvements to their manufacturing process, AMD has been able to squeeze more performance out of each of their cards and increase performance while maintaining the same price tier as its predecessor.

- The **R9 390** and **R9 390X** replace the R9 290 and R9 290X and are both 300 GFLOPS faster than their predecessors (5,100 GFLOPS and 5,900 GFLOPS respectively) without increasing power in typical workloads.
- The **R9 380** also benefits from the maturing of the 28nm process technology and AMD's optimizations. It gains roughly 200 GFLOPS in performance: from 3,290 GFLOPS to 3,480 GFLOPS in compute performance.
- The **R7 370**'s compute capability of 2,000 GFLOPS is also faster by 200 GFLOPS than its predecessor's (R7 265) 1,800 GFLOPS.
- The **R7 360** has a compute performance of 1,610 GFLOPS, slightly more than the 1,536 GFLOPS of the R7 260.

In all cases, AMD increased performance and also added many features that previous generations did not have. Some of those features are enabled through the driver and others are done in hardware. But all of the GPUs listed above will support DirectX 12, Vulkan, and Mantle graphics APIs.

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Driver Update Brings New Use Cases & Value

Whenever a company like AMD launches a new series of graphics cards like the Radeon 300 series, they usually accompany it with a new graphics driver. However, AMD is not simply updating their drivers to support the R9 Fury X, **they are completely overhauling their drivers across the board**.

AMD is releasing a two-phase driver release with Catalyst 15.15 and 15.20. The 15.15 drivers are available immediately, and the 15.20 drivers are coming a few weeks later. The Catalyst 15.15 drivers bring new features like:

- **FPS Targeting**: The ability to save power by setting a maximum FPS target
- **Virtual Super Resolution**: The ability to downscale a game from a high resolution to a lower resolution, giving a user higher-quality textures in game (also known as supersampling)
- **Performance optimizations**: Adding game performance optimizations to AMD R9 Fury X and other graphics cards

Although Catalyst 15.15 drivers will not be available for Windows 10, Catalyst 15.20 will be. The Catalyst 15.20 drivers will bring features like:

- **Catalyst Uninstaller**: Allows users to uninstall their AMD catalyst drivers cleanly, so new drivers can be installed without incident
- **OpenCL 2.0 optional features**: Multiple performance and feature additions
- **FreeSync + CrossFire**: The ability to run FreeSync dynamic screen refresh technology with multiple GPUs in CrossFire mode.

Catalyst 15.20 divers will also have Windows 10 specific features like:
- **HEVC (High Efficiency Video Codec)**: Enables quality streaming and 4K experiences
- **DirectX 12**: Support for the low-level efficient graphics API for Windows 10
- **Windows 10 WHQL (Windows Hardware Quality Lab)**: AMD's latest driver release (15.20) will be WHQL and WHQL for Windows 10 as well

Display Technology Innovation

AMD has been pushing the industry forward with new display technology innovations. Their FreeSync technology brought dynamic screen refresh rates using an industry standard, DisplayPort 1.2a. But AMD is not stopping with just FreeSync, even though they will support FreeSync in all Radeon 300 series R9 series GPUs.

AMD is also bringing support for HDR monitors to the Radeon 300 series, enabling support for colors up to 16 bpc or **16-bit color**. This move is forward-thinking, because many standards are already moving towards higher color quality; Netflix is pushing with 10-bit color and Dolby with 12-bit color. Currently, most games and media are shown in 8-bit color, so increased color depth can also add to gamers experience and improve overall realism.

AMD's Commitment to VR with Liquid VR

AMD shows commitment to VR (Virtual Reality) in many ways, but the most important one is through the creation of their Liquid VR technology. This technology is designed to streamline the process that games and content go through to render and ultimately land on the head-mounted display of a user. Liquid VR is designed to reduce the latency of VR gaming and allow for low-latency head tracking to improve the immersive nature of VR. AMD also supports scalable rendering for multiple GPUs while using VR, which allows for higher frame rates and more natural experiences.

AMD has also been present at many key VR events and closely cooperates with many VR game and content creators to help create better VR content. AMD is consistently a headlining sponsor for the VR LA meetup, which has now grown into an expo and will be held at the LA Convention Center. AMD has shown time and time again that they believe the future of gaming is VR and that they will continue to invest in it.

Windows 10 & DirectX 12

AMD has a very close relationship with Microsoft, and it shows in their preparations for Windows 10 and DirectX 12. AMD is poised to be fully ready for Windows 10 when Microsoft launches the operating system in late July 2015 with important Windows 10 features like HEVC (High Efficiency Video Codec) and WDDM 2.0. AMD created the Mantle API, which is their own low-level graphics API, meaning that they already have extensive experience in creating and supporting low-level graphics APIs.

DirectX 12 will bring new levels of performance and efficiency to graphics cards, and **all of AMD's Radeon 300 series will support DirectX 12**. Support for HEVC also means that gamers using AMD's Radeon 300 series in their Windows 10 PCs will be able to smoothly playback HD video all the way up to 4K as well as game streaming using minimal power.

Call to Action

AMD's new Radeon 300 series offers a multitude of reasons to upgrade for all different type of gamers. The AMD R9 Fury X offers a brand new architecture to entice even gamers with the latest cards to upgrade. The Caribbean Islands family of cards offers gamers that have not upgraded recently a broad array of features that their GPUs very likely do not have yet. AMD's new GPU offerings are part of the company's effort to push for more power efficiency and performance while still adding new and beneficial features with HBM enabling new form factors as well as DX12 and new drivers to improve performance.

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