

Scalable, low-latency application streaming for CSPs

Intel and Scalable Graphics provide the infrastructure for CSPs to address Cloud Gaming, VDI and Virtual Workstation opportunities

Real-time streamed services offer great opportunities for CSPs to build a long-term customer base and maximize customer lifetime value (CLV). Three particularly fast-growing application areas are Virtual Desktop Infrastructure (VDI), virtual workstation and cloud gaming.

Executive Summary

Cloud service providers (CSPs) need to innovate technically and commercially to build 'sticky' customer relationships. At the same time, they need to deliver profitable services which meet current and future customer needs.

Real-time streamed services offer great opportunities for CSPs to build a long-term customer base and maximize customer lifetime value (CLV). Three particularly fast-growing application areas are Virtual Desktop Infrastructure (VDI), virtual workstation and cloud gaming.

All three of these rely on delivering streamed services with low and constant latency and high image fidelity. This requirement presents substantial technical challenges when it comes to delivering consistently in real-world applications. In addition to overcoming the technical challenges, CSPs must make these streamed services work commercially by maximizing the streams or sessions per server, and do so while meeting stringent customer SLAs.

Intel and Scalable Graphics have developed a solution to stream 3D applications with very high image quality and low latency, based on Intel® Iris™ Pro Graphics and with it, Intel® Quick Sync Video. The solution can also take advantage of Intel® Processor Graphics on client side for even better experience. The stream density of some of the form factors Intel Iris Pro Graphics is available in (for instance some of the ultra-dense Intel® Xeon® Processor E5 Family servers, or the Intel® Visual Compute Accelerator Card) allows CSPs to provide low latency cloud-based streaming services at a total cost of ownership (TCO) which is commercially attractive both to CSPs and their customers.

Business Challenge: Building CSP business with streamed services

CSPs face a host of commercial and technical challenges to build and maintain sustainable and profitable businesses. To build the kind of 'sticky' customer relationships which maximize CLV, CSPs need to:

- Identify and exploit upcoming market opportunities
- Deliver the specific apps the market wants now
- Provide very high quality, secure services
- Be cost competitive
- Meet the customer's SLA requirements

Some of the greatest opportunities for CSPs to achieve these goals lie in services which rely on low-latency, high-fidelity high bandwidth streaming. The three most vibrant of these opportunities are VDI, cloud gaming and virtual workstation. VDI offers the opportunity to fundamentally rethink how some businesses deliver enterprise computing to a range of devices. Driven by the use of an increasingly wide range of client devices, the CAGR for the VDI market will hit 27.35 percent by 2020.¹ The cloud gaming market is growing at a CAGR of over 29 percent (Technavio²), and will be worth more than \$1.6 billion by 2020. Collaborative real-time 3D Cad and modelling fundamentally changes how product design in industry and architecture will be delivered over the coming years. Design, engineering and product teams will be able to work collaboratively on a centralized platform, accessing and contributing to projects from multiple devices and locations.

Each of these areas offers a real opportunity for CSPs to build profitable, long-term relationships with loyal customers. But each also has the same challenges: how do you provide a fluent user experience that matches or exceeds that of an installed solution, and how do you do that cost effectively?

The user experience relies on delivering great image quality, low latency, consistent latency (especially for gaming and video applications), and seamless delivery of a high-quality customer experience to a range of device types. The economic challenge lies in ensuring enough concurrent sessions per server to make the infrastructure costs manageable.



Figure 1. The cloud gaming market 2016-2020, Technavio (www.technavio.com)

High-value streamed services for CSPs

The combination of Intel Iris Pro Graphics with Intel Quick Sync Video, and Scalable Graphics' middleware revolutionizes CSPs' ability to deliver key streamed use cases at compelling TCO with excellent user experience. The experience is enhanced further when Intel Processor Graphics is present on the client.

VDI used to be an in-house technology, streaming inflexible client images across a corporate network. Now, CSPs can offer a fully cloud-based service with excellent customer experience, fully responsive delivery (responding to the characteristics of the client device) and very good value for money. Because the solution eliminates fixed costs and scales according to customer need, Small and Medium sized Businesses (SMBs) and less technologically sophisticated companies can now access enterprise-grade technology. As user needs are developing, cloud VDI can be highly customized to include even the most advanced and demanding 3D applications. For CSPs, VDI presents an opportunity to build long-term value-added relationships with great CLV. For the customer, the fast delivery of resources from a centralized environment offers unparalleled flexibility and control.

Virtual workstation apps are related to VDI, and offer ubiquitous access to most applications which once required specialized workstations. But the virtual workstation actually improves customer experience, making it much easier for design teams to collaborate on shared workspaces and projects. More than that, designers and engineers can now access and collaborate on even the most complex design projects from any device in any location. This will speed time to market and time to revenue for thousands of companies as project design cycles become more efficient.

Cloud gaming is a massive market, and growing rapidly (over 29 percent per year CAGR³). It is great for users, because they can access their favorite games from any device at any time, just by logging in. It is also increasing the gaming user base beyond those who invest in specialist hardware to a much broader range of players – especially smartphone users. But cloud gaming is also great news for CSPs and the game development companies they serve. It offers games companies maximum scalability and availability, reduced infrastructure costs, and speedier time to market. For CSPs it is a golden opportunity to build significant long-term customer relationships.

Success in all these markets relies on low latency and high density computing to offer both the performance and the economic model needed to support CSPs and their customers.

Scalable, low-latency streaming for CSPs

Intel and Scalable Graphics together offer CSPs solutions to both the business and the technical challenges in exploiting the tremendous market opportunities of streamed services. The business challenge is to offer the services at a commercially workable price point, and the technical challenge is to deliver reliable low-latency streaming at high image fidelity.

The solution offers a compelling TCO for CSPs, through enabling higher density and lower cost-per-stream. The Intel Iris Pro Graphics with Intel Quick Sync Video is available in a range of form factors which provide hardware accelerated reliable streaming at densities that allow CSPs to offer attractive price points with excellent reliability.

Scalable Graphics has experience dating back to 1998 in developing advanced middleware technology that optimizes graphics, network, compute and device performance to reliably and consistently minimize network latency in streaming applications. Its expertise in tuning each interconnecting element to achieve maximum performance gain is unparalleled, and consists of a number of unique highly developed algorithms which together deliver low and consistent latency. Such latency attributes are critical for

CSPs to explore growing commercial opportunities in VDI, cloud gaming and remote workstation markets.

In order to further improve performance, Scalable Graphics is working with Intel to optimize its algorithms to make use of the Intel Processor Graphics. Together, all these elements create a robust platform for CSPs to maximize the opportunities offered by the media streaming market.

Solution Architecture: Application Streaming

The video processing capabilities from Intel and the 3D cloud optimization middleware from Scalable Graphics together ensure that the compute requirement on the client device is significantly reduced (although it is also tuned to take advantage of Intel Processor Graphics on the client device when it is present).

The combination of hardware-based video encoding with sophisticated and highly tuned middleware means that CSPs can deliver high-quality interactive services to most client devices which have an Internet connection and real-time decoding capability. The combination of the powerful graphics processing of the Intel Quick Sync Video and Scalable Graphics' algorithm optimization delivers a consistent user experience on a much wider variety of devices.

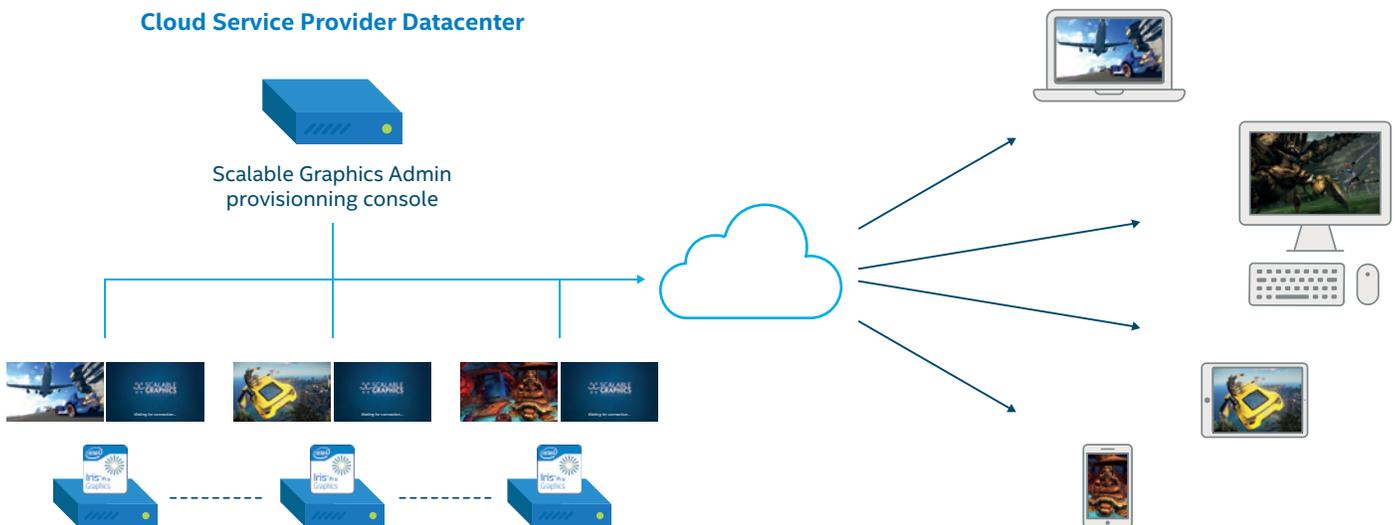


Figure 2. Solution schematic

The key components of the solution are the Intel Iris Pro Graphics and Scalable Graphics 3D Cloud Middleware.

Intel® Iris™ Pro Graphics

Intel Iris Pro Graphics with Intel Quick Sync Video has a range of benefits which help CSPs:

- Reduces the amount of network bandwidth needed (lower bit rates) for better video quality by compressing the video prior to transmission

- Fast transcoding for video into multiple formats and bit rates, reducing the amount of time needed to process video inputs
- Reduces the amount of storage needed for those multiple formats through higher compression processing
- Allows for real-time transcoding into multiple formats from the stored format, reducing the need to store all possible media formats

Scalable Graphics 3D Cloud Middleware

The Scalable Graphics Middleware embodies nearly 20 years' accumulated experience in computer graphics, parallel computing and high-speed networking, delivering one of the highest quality 3D cloud middleware available.

Scalable Graphics 3D Cloud middleware offers full desktop or single application capture video streaming of the sequence of images to the client (over WAN or LAN)

- Sound capture, compression and streaming to the client
- User inputs handling (keyboard, mouse, joystick) from the client

Crucially, it offers all these with no need to modify the 3D application. The solution maximizes the potential of the built-in Intel Processor Graphics, offering previously unattainable levels of performance for VDI and 3D applications.

Key Business Benefits to CSPs

Using Intel® Visual Compute Accelerator (Intel® VCA) and Scalable Graphics 3D Middleware, helps CSPs to extend competitive advantage with a highly scalable delivery capability:

- Finely tuned network, compute and streaming optimization based on Scalable Graphics Cloud 3D middleware algorithms, with high-fidelity low-latency streaming services to support growing commercial opportunities in VDI, cloud gaming and remote workstation markets
- The ability to stream nearly all 3D applications to any device which has real-time decoding and an Internet connection
- Reduce TCO with an optimized hardware accelerated solution and a high density design that lowers data center power consumption and floor space

Conclusion

The Intel Media Delivery Service with Scalable Graphics provides a high-quality, cost-effective, low-latency platform for CSPs to offer streamed media services.

As the cloud gaming, VDI and virtual workstation opportunities continue to evolve, CSPs can build profitable long-term customer relationships using cost-effective standards-based technology.

Solution Provided By:



¹ <http://www.nrmarketresearch.com/global-virtual-desktop-infrastructure-market-2016-2020-market-report.html>

² www.technavio.com

³ Global Cloud Gaming report, www.technavio.com

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