



## The Case for Arumai's Private CDN for Video Delivery for Arumai Licensees

We are in the age of digital businesses. The global society is increasingly communicating, transacting, buying, learning, and relaxing via the Internet. TV services are in the midst of immense disruption enabled by online services. OTT capable consumer device sales will grow from 2.9 billion units in 2016 to 3.5 billion units by 2021. Cisco System's Visual Networking Index forecasts that global data transfers will grow at a whopping 22% CAGR from 2015 to 2022, reaching 194EB/mo in that timeframe. Per capita online video consumption is growing steadily worldwide by every metric. Video is expected to account for more than 80% of that traffic. Adobe's Q1 2016 Digital Video Benchmark Report, for example, showed a 107% year-over-year increase in authenticated video viewing.

Arumai's Private Content Delivery Network (CDNs) is a specialized network solution to ensure high-quality, low-latency delivery of digital data to end consumers of its licensees. Global CDN revenues for video alone will cross \$4B in 2017, with regions like Latin America growing at a CAGR of over 25% over the next five years. 2 CDN customers saw their traffic grow by 85% in 2016 alone. There is a rich ecosystem of CDN vendors serving the needs of businesses to reach consumers in domestic and worldwide markets. However, a growing number of content providers—managed Pay TV service operators such as telcos and MSOs—are finding that building their own CDNs better serve their business interests.

Content companies—video service operators, broadcasters and OTT service providers—are seeing both subscriber counts and video traffic grow at rapid rates. With content libraries becoming increasingly uniform across providers, differentiation relies heavily on quality of service and profitability relies increasingly on operational efficiency.

As traffic grows and quality of service becomes a paramount differentiator, private CDNs gives Arumai's customers better quality control and long-term total cost of ownership when compared to commercial CDNs. Private CDNs, sometimes referred to as managed CDNs or do-it-yourself (DIY) CDNs, are built and run by Arumai for their own use for licensees of its Cloud-Based Transcoding and Streaming System for Media Companies (Arumai TranStream™). Private CDNs are most well known for their use by the largest global content providers. For example, Apple is estimated to have shifted nearly three-fourths of its traffic to its private CDN<sup>4</sup>. YouTube has long leveraged its own CDN, supported by Google's own servers collocated in the data centers of ISPs worldwide. Netflix, Pandora, Twitch... the list of content companies that have built their own CDNs and reaped clear business benefits from that decision continues to grow. That said, DIY CDN is a major undertaking. It is best suited for companies with adequate in-house expertise, high expected traffic growth and regionally-dense subscribers/viewers. As OTT video consumption grows, regional density is emerging as one of the most important factors in the decision to use a private or a commercial CDN. In this paper, we look at Arumai's build v/s buy considerations for CDNs in the context of its Phase Reviews.

### **TOTAL COST OF OWNERSHIP**

On the surface of it, it appears that commercial CDNs are becoming increasingly affordable. CDN prices have come under significant pressure, with the largest customers able to negotiate significant discounts on list prices. According to recent findings, commodity CDN pricing continues to fall with average pricing



down 20% in 2015, but pricing lowered by nearly half for the largest customers. Pricing varies by geography; the lowest rates in the United States are approaching \$0.0025 per GB delivered for the largest customers, but market average rates are about \$0.05 per GB and can be as high as \$.12 per GB for high-SLA applications in sparsely networked countries. Online Video Platform (OVP) vendors are a good source of preferred pricing for smaller customers who can benefit from bulk discounts negotiated by OVPs with major CDN vendors. By Arumai foregoing hosting fees (versus \$0.02 per GB) and streaming through its proprietary streaming video protocol foregoing streaming fees (versus \$0.05 per GB), foregoing up to \$0.05 per GB delivered is a competitive advantage.

Nonetheless, as content volumes grow, the cost of owning and operating a private CDN begins to look more attractive than pay-as-you-go, even with these heavily discounted rates. This is increasingly true as equipment and software licensing costs for DIY CDNs continue to fall. The chart below shows an example of how this pricing dynamic plays out over time. While there is an upfront CAPEX and an upfront delay in service deployment, the investment quickly pays for itself and then costs are controlled over the long term.

Commercial CDN pricing, even with substantial discounts, is eventually correlated to the bitrate of video streams, the number of subscribers, and the number of hours of video watched per subscriber. With increase in resolution past HD to 4K, and consistent transition away from linear TV to on-demand consumption on devices, these costs will inevitably increase over time. This strengthens the value proposition of Arumai's build v/s buy decision.

Under the assumption that the private CDN performs reliably, cost eventually becomes a solid consideration in the build v/s buy decision. It is important for us to emphasize that this is a big assumption. The network must operate reliably and flawlessly across all target geographies, and in the face of network outages, unexpected traffic spikes, and so forth.

## **ECONOMIES OF SCALE**

Private CDNs have historically not been for the faint of heart and are typically the more cost-effective choice only for the largest of content providers. It is important to note that this Arumai limits content to entertainment video; foregoing radio, gaming, and social media which are all massive video data use cases in their own right. Companies that have adopted private CDNs today include Amazon, Facebook, Google, Microsoft, Netflix, Twitter, and Valve. While some of these (e.g., Netflix) have brought all their traffic in-house, most are taking a staged approach and continue to use third-party CDNs for some portion of delivery. On the flip side, it is worth noting that well-recognized content providers such as Disney and the NFL do not currently build their own CDN. This is because their scattered audiences, relatively lower traffic volumes, and highly demanding live streaming applications do not currently justify the cost or effort of building, managing and maintaining an in-house operation.

At the current point of time, 100,000 subscribers in a close geographical area is the rule-of-thumb inflection point for strongly considering private CDN deployments. Tweet this! This number is expected to fall gradually over time.



Several factors are driving the value proposition for private CDNs. Products and solutions that help operators build and deploy private CDNs are maturing. Server and networking equipment vendors are better able to serve the needs of enterprises, and data volumes continue to soar. Private CDNs offer value in terms of quality of service and lower operating costs for even Tier II and Tier III operators with geographically dense subscribers.

We believe that these factors will cause more and more content companies to fall within the profile that could benefit from choosing DIY. Accordingly, we expect that a growing number of content companies will move toward Arumai's private CDN over the next five years. In fact, our CDN market analysis uncovered that increasing use of private CDNs is one of the more significant restraints against growth of commercial CDN revenues.

### **FEATURES, REACH AND EFFICIENCY**

Given that private CDNs are specifically built for the company's own operations, they need not include the rich feature sets and wide portfolio of value-added services that commercial CDN vendors need to implement. As solutions to build private CDNs grow in number and increase in maturity, it is becoming less expensive, less difficult and less risky for companies to build and run high-performance CDNs on their own. Time to implement is also falling into the range of weeks rather than months.

Another motivation for choosing the private CDN approach is the potential for acquiring deeper insight; thus, enabling richer, more real-time analytics. Commercial CDN customers are largely forced to rely on limited data available from their CDN provider. In contrast, content companies with their own CDNs can get very granular insight into both customer behavior and network problems. Data points that can be gathered, analyzed, and acted upon include which device is being used by a given subscriber, what program is being streamed, what network type is in use, fine-grained views into network performance, and so on. This in turn allows delivery of better, more personalized services to users. It also enables better targeting of advertisements and better customer relationship management.

On the flip side, real-time insights and analytics allow the rapid identification, diagnosis and remediation of potential network issues, thus maintaining quality of service and maximizing user satisfaction. The option to use private CDNs for a portion of traffic while offloading the rest to third-party CDNs allows companies to hedge their bets and gradually scale up on deployments. For example, companies will often make the trade-off of using their private CDN for large clusters of audiences in their home market or in given regions, while handing off traffic to third-party CDNs for more globally distributed users. To give another example, companies can build out internal CDN capacity for their typical concurrent subscriber volumes and offload any temporary peaks or unexpected surges to a commercial CDN.

### **CONTROL AND QUALITY**

Commercial CDNs must necessarily juggle their infrastructure and resources across all their individual customers. The "secret sauce" used to run and optimize these networks is a differentiator for the CDN vendor but results in loss of fine-grained control for individual companies. In contrast, private CDNs offer the option of more control and therefore allow the opportunity for tightly controlling individual



components in the workflow. When executed properly, this allows companies to achieve tighter control over quality and reliability while simultaneously managing and controlling costs.

For instance, as the operator of a private CDN Arumai has complete control over the size and contents of all caching components, which form a critical piece of the CDN. Tailored control over what data is available in edge caches and origin caches, and how cache misses are handled can improve cache hit rates. This in turn can dramatically reduce traffic to origin servers, particularly under surge conditions. Facebook<sup>6</sup>, for example, used this strategy to its benefit while implementing its live video feature. Such optimization delivers game-changing results, such as lower latency, lower infrastructure needs, and higher operational efficiency across the entire workflow. In addition, companies have the freedom and ability to optimize the deployment of caches according to geographic regional need, again reducing latency and improving user experience.

Similar control is also beneficial from a security standpoint, where a company's data is never collocated with other vendors' datasets, and the company remains in control of all its physical and virtual assets. Coming back to the criterion of scale, companies that already own major data centers of their own or have access to underutilized data center capacity from their telecommunications provider can leverage these assets towards operating their private CDN. This further bolsters the economical side of Arumai's argument. It simultaneously strengthens the company's ability to differentiate on user experience and minimize glitches or latency that might interfere with user engagement and business transactions.

A private CDN requires a backbone of sturdy equipment that promises very low latency and optimal quality. Solutions such as that from Edgware can be purpose built, are scalable and combine the hardware and software required for seamless video delivery over broadband for IPTV or OTT video delivery.

Arumai is a vendor of TV workflow and delivery solutions. Edgware provides hardware and software systems that deliver TV content over IP networks, with the stated goal of delivering TV with no buffering, no delays and no glitches. The company provides the hardware infrastructure and software intelligence required by operators to process, deliver, and monitor streaming video content.

Edgware's TV CDN architecture includes content processing functions such as creating Live-to-VoD content, which are delivered on centralized cloud IT infrastructure. It then provides distributed delivery elements to allow this video/TV content to successfully scale up to high streaming volumes. A key aspect of allowing such scaling is request routing functions, which are intelligent algorithms designed to select the best source to stream TV to each user. Edgware delivers request routing functions that scale to very large volumes of viewing requests, are delivered from a software-based layer, and run on standard IT or cloud infrastructure.

Their delivery solution includes a number of features that are designed to streamline delivery in order to reduce costs and improve quality of service. For example, to scale out the delivery of personalized TV streams, Edgware uses distributed TV servers that stream, cache, repackage, pause-live TV, perform ad insertion, and encryption. The TV servers can be virtualized, running on general purpose hardware. That said, most operators prefer to use purpose built TV servers for highest density and highest reliability. This



architecture enables a highly deterministic experience for the viewer; it delivers TV without buffering, with low latency and with equipment that is easy to operate.

This TV CDN architecture provides a comprehensive solution for operators seeking to take control of their TVE/OTT workflows and strategically plan ahead to take the fullest advantage of emerging market opportunities.

## **CONCLUSIONS**

- OTT is the new normal for every type of content business. Growing on-demand, device-based content consumption is stressing networks and operations budgets alike. The advent of 4K and virtual reality content is only one example of why data volumes will continue to grow over time. These soaring data volumes, coupled with the business criticality of services and content delivered over the Internet, are continually elevating the role of a CDN as a make-or-break operation for digital businesses.
- The DIY option for CDNs today is most meaningful for large companies delivering terabytes of data to hundreds of thousands of users. These companies are most reliant on high-performing network capabilities and are most sensitive to cumulative OPEX costs. They derive the highest gains from building and operating their own CDNs. Furthermore, only these companies have the internal scale and expertise to justify the outlay and effort of building one's own CDN and, over time, running and maintaining it.
- Private CDNs will gradually gain footprint across content companies as data volumes increase for all enterprises, as equipment costs fall, and as private CDN solutions become more sophisticated and easier to deploy. Over the next five years, more and more service providers and broadcasters are expected to find themselves fitting the profile of a company who can benefit from its own CDN.

## **CALL TO ACTION**

As video delivery and consumption over broadband becomes a way of life, it is imperative for content companies to evaluate their options that affect cost of ownership and business differentiation for the long term. When viewership for multi-screen and online video gains critical mass, then there are several factors that need to be considered before making the decision.

## **ARUMAI TECHNOLOGIES, INC.**

Arumai's groundbreaking video frame manipulation techniques, proprietary streaming systems and methods, and OTT Video Suite of products make any video content universally enjoyable in high quality on any screen, by any viewer, across any network, at any time enabling a pure play OTT products and solutions company. Every day our solutions deliver millions of content streams to mobile phones/handhelds, tablets/laptops/PCs, Blu-ray Players, Game Consoles, and Smart TVs, and in every market in the world on behalf of content owners, mobile service providers, cable companies, satellite companies, telecom operators, streaming video providers – OTT products and solutions.