

Cloudflare Workers for Gaming

Approach

Currently, AAA game publishers like EA, Activision-Blizzard and Riot don't use any kind of Cloudflare product to improve their gaming traffic. This report details a basic glance at how the Cloudflare Workers (CFW) could approach building a product that is attractive enough to lure those publishers onto Cloudflare's content delivery network (CDN).

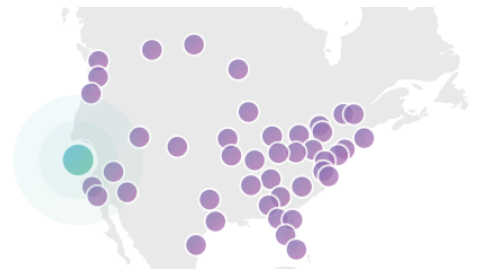
For most of my research I've used League of Legends publisher **Riot Gaming** as a proxy for the entire gaming industry, because they're the largest game developer that I already have some understanding of. Additionally, they have well documented architecture <https://technology.riotgames.com/news/architecture-league-client-update>, and community that posts frequently about the company's network.

**means further research is needed for other AAA game developers, as well as indie developers*

Interesting Fields of Expansion for Game Developers

Distributed Bespoke Game Servers

Riot currently uses a private content delivery network (CDN) for their games, which uses one server for each other their "regions", like North America, Asia Pacific, Europe, etc. In all of North America, Riot's only game server is in Chicago, which means pings of 70ms+ on the West Coast, and upwards of 300ms for anyone playing overseas.



Cloudflare's server locations across the US

Cloudflare has a ton of servers spread across the country, which could be used to improve the latency experienced by gamers who live far from the server.

Cloud Computing (NVidia GeForce)

Non-gaming personal computers often struggle with RAM when running games like League of Legends. For other games with more updated graphics, the processing power that goes into rendering these graphics is often incredibly expensive for older computers. A solution that Nvidia has adopted is to have the graphics and rendering processes run on their cloud servers, and allowing users to simply stream the video feed to their computers.

This is a relatively new market, and Cloudflare could potentially address it, but one of the major drawbacks in my mind is that Nvidia has already cornered this market aggressively, and the kind of dedicated gamer who might need this service likely have their own custom gaming PCs.

Proposed Product Innovation:

I chose to work on the first problem, because:

- **Creating Incentives:** Riot developers have no incentive to use CFW if their primary product goes through a private CDN that Cloudflare doesn't support.
- **Lag is most important:** Gamers consistently list laggy servers as their greatest source of frustration, almost always over graphics.
- **Cloudflare already has the servers:** Riot has one server in Chicago
- **Easy to test:** Riot is in the process of releasing a series of new games, which this architecture can be launched and tested with, if a relationship can be established.

Custom calling protocols + endpoints for bespoke servers in CFW

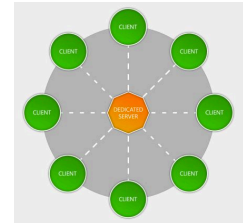
Cloudflare's CDN is optimized for HTTP/TCP calls to web-servers, and it's really good at improving the latency on these fairly slow protocols. However, to reduce latency, game developers use custom calls to

private servers with their own architecture; what works for Riot wouldn't necessarily work for Activision-Blizzard, and vice versa. These calls are typically measured in bytes rather than kilobytes.

To accommodate for this, I propose we create an endpoint where the existing architecture of Riot's tailored bespoke servers can be distributed across Cloudflare. Cloudflare should also create packages that would allow game developers to import their own custom calling protocols, or design these custom protocols from scratch.

Risks & Concerns

Locality of Match-Making: Currently, having the game hosted on a single highly dedicated server allows for better long distance communication at the expense of longer distances. Using local Cloudflare servers, we would reduce the latency for players playing who are closer together, but increase latency for long distance games.



Hardware Incompatibility: Also, it's possible that this migration from the custom server is logistically impossible, because the hardware that Riot's servers use might be incompatible with CF server hardware, or integrate so poorly that the latency loss is actually worse than the status quo.

Bandwidth Limitations: Web-server calls are slow but contain much more information, the CF network which is optimized for that might be poorly configured to support fast and tiny custom call to gaming servers (think several race cars and a few trucks driving on the same road).

Goals & KPI

The initial goal of this phase of the vertical would be to effectively move AAA game developer's dedicated servers onto the cloud, which would enable people to play without the large latency gaps these dedicated servers create due to their scarcity. This would then incentivize all game developers to move their CDN onto Cloudflare's network.

Important KPI that we would want to monitor before and after changes in are:

- Ping of users who live far from the dedicated server
- Ping of users who live close to the dedicated server
- Ping in games that are hosted between players who are geographically closer to each other
- Distribution of lag spikes; lower median latency at the expense of more lag spikes is also a poor sign of performance
- Impact of performance for other users of the Cloudflare services after this product is rolled out
- **Most importantly: the rate of acquisition of game developers and publishers as customers**

Rollout / Testing process

- V 0.1: Create very basic custom calling protocol builder in CFW
- V 0.2: Create simple end point for connection with private Riot CDN servers, invite Riot software architects for feedback and improvement
- V 0.3: Create alpha testing system in connected to one of Riot's new releases (Legends of Runeterra)
- V 0.3.2: monitor performance of CF hosted games against Riot's dedicated server's performance, tweak and improve until performance is on par
- V 0.4: Test game latency for cross country games hosted on CF
- V 0.5: Launch beta with Riot's new game, market towards users previously gated by poor internet access
- V 0.6: Invite other game publishers like Wargaming, Epic, etc. to build with the custom protocol on CFW
- V 0.7: Release sandbox mode for all AAA game developers, follow similar lifecycle as with Riot previous games, focus on low latency genres like Real Time Strategy initially because they're less punishing
- V 0.8: Develop services for indie gaming platforms.