

*This is an excerpt from an event on February 23, 2021. Please refer to the forward looking statements disclaimer provided at the beginning of the event read by Betsy Frank.*

## **JERRY HUNTER, SVP, ENGINEERING**

Hi, I'm Jerry Hunter, SVP of Engineering at Snap. It's a pleasure to speak to you all today. I am excited to talk about the work we have done to build the technology foundation that underlies the Snapchat application, and the platforms that our Snapchat community and partners use each day. Snap was an early mover to build on top of third party Cloud Infrastructure and this has been critical to our early success. We have also done a tremendous amount of work over the past couple years to rebuild our proprietary technology stack in order to make it easier and more efficient for our engineers to innovate on top of the Cloud Infrastructure. This has allowed us to accelerate our pace of development to a level that we believe has been impactful for Snapchatters, our advertising community and the many partners who are building businesses on Snapchat. Now let's dive in a little deeper to discuss our technology stack and how it is helping to empower all of this innovation.

There are four primary components to our technology stack, which are pictured here on the slide:

- 1) First we have the third party cloud infrastructure partners that we leverage. Today those are Amazon Web Services, or AWS, and Google Cloud Platform, or GCP.
- 2) Second, is the Snap backend base layer, which we recently rebuilt in-house. This layer contains nearly all of our connections to the cloud, common services used across our products, and serves as the base layer upon which we innovate on behalf of our community and partners.
- 3) Third, are the customer facing products and platforms that Snapchatters, our advertising partners, creator partners, and content partners use each day. These are separate boxes here because they are built on separated code bases with clean well-defined boundaries, meaning we modularized our code base on the mobile phone.
- 4) Fourth are our self serve platforms that our partners leverage to build their products and businesses on Snapchat including our monetization platform accessed via ads manager, Snap Kit, Minis, and the Snap Games platform.

Let's start at the bottom with the cloud.

We built Snapchat on cloud-based infrastructure from day one, as opposed to building our own data centers. We are fortunate that this was an option when we began to build our company nine years ago. We have evolved over time from a single cloud partner into a multi-cloud approach. There are several reasons why this strategy is important to our success.

By leveraging third party cloud providers for basic infrastructure needs such as storage, compute, and media delivery we are able to access fully scaled and expandable capacity from day one for any

product or service we launch with no upfront capital commitment. This was very important in our early days and remains an equally important advantage today, as it lowers the cost of rapid innovation and product development. The implications for our capital expenditures may be obvious, but the benefits extend far beyond this. We do not have to dedicate scarce engineering time and resources to building and managing infrastructure and services that are necessary to make our products work, but that are not critical to differentiating our core product value. When we launch new products such as Spotlight, we can therefore move faster through the development phase and launch to our community with confidence we will have the capacity to handle rapid adoption with attractive unit economics at the outset.

This advantage is amplified by our multi-cloud strategy, which enables us to select the optimal service from the optimal cloud partner for each of our workloads at any given time or phase of development. As each Cloud Partner is constantly innovating to deliver differentiated services and expanding the scale of their operations, we benefit from improving pricing and quality of service over time. We are continuously implementing migration projects to redirect work loads in order to optimize for service and cost across clouds. In 2020 alone, we've completed four major cross-cloud migration projects, and in each case have benefitted from material cost and quality improvements.

The ability to optimize across partners, and to access their immediate scale is increasingly important as we accelerate our growth in new markets. By leveraging third party cloud partners we can enter a new country or region and immediately have the benefit of local connectivity and infrastructure at scale. This allows us to leverage infrastructure in regions all over the world on an as needed basis.

In the early days, we utilized a single cloud in a single region in the middle of the US. If you were in India, and you were communicating with somebody a mile away from you, those communications had to travel all the way back to the US and then make their way back to that person in India. That delay made the app feel clunky and slow. Today, utilizing regionalized infrastructure allows us to get our service as close to the customer as possible to improve performance for our Snapchat community.

One last but important point regarding our use of third party cloud infrastructure partners is that we have a high degree of optionality and flexibility over time. We can pivot or adjust our strategy over time by adding new Cloud Infrastructure partners or potentially bringing individual services or workflows in house. We regularly deep dive on the economics and efficiencies, including which clouds we use for which services, and the high level build versus rent economics. Due to the flexible nature of our model, we could easily choose to build and operate some of the services in-house if we can do so more efficiently than a third party could (which so far has resulted in us not building internally given their scale and the cost benefits that come with scale). While this could make sense for some services at some point, thus far the practical implications of our analysis has been working

with our cloud infrastructure partners on favorable rate negotiations that were informed by this work. For example, we completed rate improvement and new service negotiations with each of our providers in every quarter of 2020 and we expect that these relationships will continue to evolve as we work together over time.

A lot of the flexibility I've mentioned today, including the ability to migrate workflows or specialized services between Cloud infrastructure partners is empowered by our work to rebuild the base layer of the Snap technology stack, where we manage and maintain the vast majority of our connections to the cloud. This is the middle layer of our technology stack that you saw earlier, and is what decouples our Snapchat and Partner facing platforms from our cloud infrastructure providers.

This layer is central to how we manage our overall product development. Practically speaking, we broke up a monolithic backend code base, which was a bottleneck on both engineering velocity and availability, and transformed it into a web service backend where small, nimble engineering teams could make changes independently to more quickly deliver innovation to our end users and partners.

This strategy allows us to have dedicated teams focused on managing the efficiency of our Cloud Infrastructure who can constantly tune and optimize what services we use, what provider we use, and how we use those partners. We also centralize internal services here that span all products within Snap - such as identity and friend graph. This makes it much easier and faster for the teams that build our customer-facing products to innovate. It also benefits our unit costs by streamlining connections, and it improves performance.

To put a finer point on this, we now have a dedicated team focused on operational excellence that sits over this backend base layer with clear visibility and instrumentation over the workflows that run end to end from our customer facing platforms such as the Camera, all the way back to our third party cloud partners. This has allowed us to focus on performance as a feature across our technology stack in order to make our application and features work faster, more reliably, and more efficiently. One of the most exciting aspects is that we consistently find that when we take action to make something more reliable, it not only drives more engagement with our community, but it also allows us to get unit cost efficiencies. Likewise, we almost always find that these efficiencies make our workflows faster and more reliable for our community.

In this way, our backend base layer is enabling improved app performance, which drives engagement and improves unit costs, which allows us to reinvest in our product, which is a virtuous cycle for our business. For example, through the recent rewrite of our Communications platform, we reduced the median latency of sending Snaps by over 20 percent, which supports our efforts in being one of the fastest ways to communicate. That efficiency not only benefited Snapchatters, but also reduced our messaging unit costs by at least 25 percent. This is part of our ongoing program of making our

products better for Snapchatters while also driving down infrastructure unit costs for our business, which results in more resources to invest back in our products.

From here, let's talk about the technology platforms we've built on top of this Backend Baselayer starting with the services our Snapchatter community use every day.

Our team has spent extensive time and effort separating out and modularizing the code within our application in order to allow the development teams that manage each of these codebases to innovate faster and independently. The backend base layer empowered this independence by allowing each team to easily access core back end technologies and services while minimizing the need to coordinate across teams, or manage connections to the Cloud, as they work on individual platforms. For example, this allows our Maps platform team to operate independently from our Communications platform, while easily accessing common tools such as user identity or the friend graph, which improves our ability to experiment quickly and deliver new features and functionality quickly, which increases the pace of innovation at Snap.

Ultimately, we believe our agility in product development is one of our most important differentiators. You may have noticed, or learned from Evan and Jacob's presentations earlier today, that the pace of innovation and new product releases has accelerated over the last couple of years. This is not a coincidence. The infrastructure we have built has empowered a whole new pace of development for products and features as our teams have been able to take advantage of our Backend Base Layer and Modularization. Spotlight is a great example of an entirely new platform that was built and launched under this new approach. We were able to bring Spotlight to our community sooner, and with richer functionality, precisely because of the ability to build upon our backend base layer and to operate it as a separate modularized codebase.

Our forward thinking technology stack, and modular approach to empower platform development, has also expanded our ability to innovate on behalf of our partners and I'd like to turn to that next.

One of the most exciting aspects of our development roadmap is the work we are doing to build scalable self-serve platforms that allow our partners to build business and develop products using our tools to reach and engage our large and growing Snapchatter community. We have leveraged our back end base layer and modular approach to building platforms to build several partner platforms that are powering our growth and helping our partners find success on Snap. The first and perhaps most mature among these is our self serve monetization platform that powers our auction and our advertising partners access through Snap Ads Manager. This full featured platform has nearly reached feature parity with the best and most mature ads platforms in the world and now powers nearly all of our fastest growing advertising business. We have since followed with our Games platform, our Minis Platform, and the Snap Kit platform, each of which give third party developers access to elements of our Backend Baselayer in a privacy safe manner so that they can develop engagement experiences

for our community that are powered by our technology and tools and assets such as Bitmoji, Chat, the Camera.

In the last three years our focus has been to build a modern architecture that has enabled us to significantly improve what the average Snapchatter experiences. By focusing on modularization on the client (both iOS and Android) we have not only created engagement enhancing performance boosts, but significantly improved the pace of feature innovation. By modernizing the backend to internal web service architecture, we have, and will continue to, create engagement enhancing performance improvements in existing markets, but also bring enormous improvements to our most important international markets by localizing key parts of the Snap base-layer. All this while simultaneously using negotiating leverage that comes by having multi-cloud and constant unit cost engineering improvements that drive unit costs lower across the entire stack. So faster, higher quality, and lower costs.

All this is designed to enable us to cost effectively scale rapidly. But it's also designed to enable our self service partners to scale quickly too. Highly performant, low cost platforms not only help us grow quickly, but it helps our partners from advertising to games easily connect into our platform and find scalable success, providing more vectors for virtuous growth.

Now I'd like to turn it over to Derek who will talk more about our financial progress.