



Welcome to the New World of Content Delivery Networks

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The way information is exchanged and consumed is changing rapidly. We take a look at how CDNs are enabling high definition (HD) live broadcast TV over the Internet and HD video-on-demand as well as super large file delivery for gaming applications. In addition, we explore how watermarking and fingerprinting technologies can be used to address the thorny issue of security and digital rights management (DRM) for content delivered over CDNs.

What I will do today is I will talk about content delivery network and why it is so important in the new world. It is not like what we had in the old days. The content changed a lot, and also the way they're presented to the users also changed a lot. And that will also mean you need to have a new content delivery network to accommodate for the medias, and also accommodate for the end users requirement.

Before I go into the slide, I would like to show you some of our reference customers, what they are doing. They're streaming 7x24 live, free channels. This is NDTV, one of the largest India TV channels. We help them to stream three of their channels, including Hindi channels, popular channels, as well as the 7x24 channels. And this solution is end to end solutions we develop for them. It's not only for CDN.

This is the end to end solutions. We help them downlink their TV channels from the satellite teleport in Chennai, and then inject those video feeds into the CDN network and deliver globally. And, amazingly, this is not only viewed in India. You can view anywhere in the world. And we are delivering at least 40% of the topics across the globe. And 60% is India; but at least 40% of the streaming is around the globe.

And we go back to the slide. I think I will skip a little bit on the Tata's financial stability etc because I have limited time. What I will only focus is on the CDN delivery.

What we are talking about is, in the content delivery space most of the content provider they are utilizing their own content delivery network, or they subscribe for the existing content delivery network. But what they need to focus is on the content strategies. And what they need is a next generation's content delivery provider to help them to deliver the content in the way that the end users expect today.

As we talk about, the world has changed. Today we see there's a lot of content which is not only in terms of plain video or small objects. A lot of the content today they're doing is in terms of like live broadcast or high definitions, like video on demand to the end users. And also the file size we see that it's changing, not talking about kilobyte or megabyte, but even in

a gigabyte size. We have one customer they have a game applications is in 1 gigabyte previously. Now they even go beyond 1 gigabyte, to 4 to 5 gigabytes.

Previously what the end user required to download for that 1 gigabyte file in Singapore, we're talking about same last mile broadband end user, need 10 hours, which is almost forever for the gamers. But for using our CDN solutions they could just download within 45 to 30 minutes, which is the same last mile. When I tried to download it in Hong Kong using even higher broadband speed, which is around only 10 to 15 minutes. So the gaming, entertainment and the media industry changed a lot.

So the content providers have the challenge, as I mentioned. What they need is a high performance delivery network which can change the user experience. So today, as I mentioned, high definitions and also the video and the gaming application is booming, explosively booming. That will also be the triggering point, that why we need to think about a next generation CDN network is required. Which is also we're thinking about not only delivery, but also the rights on the protections.

So when we're looking into different video channels or different media, you're thinking about the rights that they own; how to protect them in terms of different technologies, in terms of tokenised URL as well as geo-blocking. That would be also important; it's not a plain CDN network can do. More importantly, we are also exploring the mobile experience. We are also expanding these CDN capability into the mobile delivery into different handsets. We are undergoing the verbal concept in multiple type of mobile handsets; not only in India, but globally today. So we are trying to expand that experience to millions or even billions of mobile customers anywhere in the world.

As I mentioned that not only for the content provider. Which is that means the business model they have changed. And the Web applications and the new opportunities for the retail service provider, even if you think about today, we have the customers they are broadcasting educations like seminars, like the legal degree examination seminars, accounting degree examination seminars in our CDNs. Which is they could like a video on demand, or even doing a live broadcast to the end users, which is the student.

So the student can subscribe that package and pay the package in terms of not only for the examinations, like a package for the papers, but also they have the access to a high speed and also high quality video on demand, or even live broadcast like seminars, or even lectures to their home. So they could have a more flexible and also high quality interactions with these lectures. So that will be, in return, our solutions can not only helping the media company, but also different service provider even including education sectors.

As I mentioned, the underlying of the content changed a lot.

Which means is the contents delivery network earlier on is take on the small file size and also banners and small file objects. Moving on, a lot of like movie, like introductions. But also the quality of the movie is not as good as what you see in terms of when you relay in your home videos, and also different media like the DVDs. Not talking about the BD, the Blue Ray, but even the DVDs quality, it's not as good as that. And, moving on, a lot of high quality requirement, as well as the online broadcasting requirements, just like what we are doing today. We broadcast the live events from here all the way to the rest of the world.

And also we have the applications, we can interactively receive questions. We have the demonstration in our office yesterday with the press. And we asked the questions on the spots, and then we get the feedback on the spots, we do it like Marie is having the questions to the accounts security, to the speakers. And immediately we receive the questions on the NetEvents in Four Seasons, and then responds live back to the audience globally. That means we don't need to have a barrier. If not every person can attend an event, you can have the live video broadcasting as well.

Moving on, it's not only the live broadcasting but also HD live broadcast, which is high quality over the Internet for the viewers, as well as multi view. We've done another applications in another forum which is Internet Governance Forum last year. We've done 14 streams of the live broadcasts. Eight of them is the parallel session in different rooms, and six of them is different languages. Similarly, I will show the NetEvents live broadcast page to you as well. What we do is we have multiple languages and the presentations, and also the live broadcast camera as well.

So what we are doing is we're not traditional type of the POPs [ecas] CDN. How we enable that high quality, fast response CDN it depends on what we call the origins network which is powered by our strategic partners BitGravity who are based in San Francisco. What our application do is we do not POPs [ecas] the content. But we distribute the contents in different origins in the region, globally. So when the end users access the content, it will access directly the content in the origins in the regions. And because also we are not using the traditional DNS lookup to locate the closest content delivery network server to you, we are using the TCP [ENICAS] to deliver or to locate the closest server to you. So the customer will get an experience that is the first byte arrival their PC. And also the start time is much quicker.

As well as these CDN network is built on top of our global IP networks, which is 10 gig level and multiple 10 gig network across the world. And the connectivity for that CDN server to the IP network as well as the throughput is also 10 gig level. That means we don't have the limitation of thousand or tens of thousand small POPs [ecas server] around the world with tiny uplink bandwidth and small capacity. What we do is reduce the first byte of arrival time, and also enlarge the pipe, to make the user experience on the video, or the quality of the video, or the file downtime is much quicker and much comfortable way.

So, as I mentioned, that we uniquely architecture these solutions, not only on the CDN technologies, but also on top of the IP network. So that means the user, when they access the content, they only need 1 DNS lookup. They don't need to have the multiple DNS lookup. As well as when they need to download the file, it will be located easily, the closest in terms of the IP routing to you. Or even if we're talking about any CDN nodes have issues in the failure, for example, touch wood, the IP routing could easily direct to the closest node. We don't need to have another multiple DNS lookup to locate the content, or even go back to the origin of the content, to download it. So that will enhance a lot the user experience.

I think that will be the illustration of how that multiple DNS lookup works and how the delay, in terms of the file, will get back to the origins and download it back to the end user. I won't go there into detail. I think you can have the slides to look into that. So what that means, you will get faster first byte of arrival and bigger bandwidth delivery throughput. That means the customer can have a sustainable online live broadcast as well as a high quality online video. With doing that, we can have multiple views of the angles.

We just also doing different live broadcast including blizzcons. If you're a gamer you know the World of Warcraft they do the live broadcast of their [new sports] gaming into the US and Europe mainly for the communities. What they do is they do the live broadcast of their multiple different gamers playing the game. So you can see there also which viewers — you are the editor of your TV channels. You are not limited to only one TV screen. So, using these technologies, the user experience and the way of media delivery to the end users change a lot. And more important is carrier grade. Obviously we host all these CDN servers in our first class, carrier grade data centres. And also is a standard (inaudible) base of streaming, so the user don't need to download any applications. They could easily just click in and then they could view the video right away.

And also, even for the live broadcast, what we are doing here — if you have a chance you can just look into the back of the production house — we just use a MacBook and then the encounter is in the MacBook. We just plug in the video feeds and then output the live broadcast feed over the Internet to our CDN cloud. So that's the live streaming already done.

So right now we're streaming around 250K of the live broadcast to the end users, which is because we accommodate on the end users experience, if some of the location don't have very good broadband. But we also support HD broadcast which is 720P, around 1.5 to 2 megs of the stream. I cannot name the TV channel because it's not authorized yet, but that TV channel is a US based TV channel. On the platform we are providing live on the platform to the rest of the world for the HD quality broadcasting.

I think that's some reference customers on our platform already. And at the end we want to see what we are broadcasting now. We have around five to seven second delay in terms of the broadcastings. What we are showing here, we have the live broadcast screen, like what we are taking here, and then we have the presentations. At the bottom you can see there's multiple language selections; English, Japanese, Korean and Chinese.

As well as you can see that we have a presentation download over here. So this is the video feed broadcasting, and the languages we support is over these live broadcast platform to the end users. So we believe the way that we are doing here in terms of the CDN delivery will help the media industries and also help a lot of applications, especially next generation applications, for fast delivery, high throughput requirement in the world that could change the media as well as the user experience in a large way. Thank you.

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(Courtesy: NetEvents)