# IGF 2016 Workshop Report Template

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| Session Title | WS47 - Content delivery alternatives: intertwining of IXPs and CDNs |
| Date | 08/12/2016 |
| Time | 9:00 – 10:30 |
| Session Organizer | Hartmut Richard Glaser, CGI.br, BR |
| Chair/Moderator | Jane Coffin, ISOC, US |
| Rapporteur/Notetaker | Juliano Cappi, CGI.br, BR |
| List of Speakers and their institutional affiliations | Henrique Faulhaber, CGI.br, BR<br>Antônio Moreiras, NIC.br, BR<br>Bastiaan Goslings, AMS-IX, NL<br>Jane Coffin, ISOC, US<br>Martin Levy, Cloud Flare, US<br>Alejandro Guzman, Google, CO |
| Key Issues raised (1 sentence per issue): | 1) Challenges to create a common interest base in an ISP community to develop IXPs and the importance of content in this process.<br><br>2) Criteria for implementing CDNs in the perspective of a content provider (Google)<br><br>3) Importance of implementing CDNs to the enhancement of bandwidth management and the development of small and medium ISPs.<br><br>4) Implementation of Open CDN initiative in Brazil. |
| If there were presentations during the session, please provide a 1-paragraph summary for each Presentation | JANE COFFIN has introduced the debate presenting different aspects of the challenge in attracting content delivery networks to regions with lower economic capacity, which are less attractive to large ISPs. She has considered that the key thing about any Internet exchange point is the community. It's the people who interact and help to develop and champion IXPs. She concluded saying that content cached locally is one of the critical aspects for the development of these communities that benefits from IXP.<br><br>BASTIAAN GOSLINGS shared his experiences on implementing CDNs with 'popular' content in the context of the Caribbean IXP project. The local community in the Caribbean felt that an IXP could add value to the network and they decided to implement it. He told it was a challenge to get the local IXPs to work since that potential participants were already getting all the content from Miami. However, they decided to implement a CDN and in 2010, Google and other content providers cached their content at the CDNs servers.<br>He concluded presentede some of the most important challenges in his experience: a) creating trust, 2) have a solid financial transparent model 3) recognize the entire ecosystem and give everyone sufficient attention by engaging all of them. To achieve it, the content cached played an important role in setting a common interest base in the community.<br><br>ALEJANDRO GUZMAN explained that Google CDNs initiatives are concerned with the users behind Internet service providers. His challenge is to work every day to get connected to the ISPs and ensure that the content is being delivered in good quality to users. Alejandro presented a few cases and what is the kind of solution that Google |

implement according to the context of each case. The main cases are:
1) In a place where the market is highly concentrated in the hands of one or two big ISPs, with big ports and handling a large amount traffic. Connecting them through an IXP is not the right solution. Google implement servers in the ISPs network to store the content.
2) When the IXP has policies that are not open. The IXP was created just for some of the ISPs in the country and they block other players to connect. In this case, he explained they prefer to help everybody else.
3) When the IXP is not a cost effective solution. In this case he said they try to help to develop the environment. In Brazil, where the market accounts to 3 thousand ISP, Internet Exchange Points play a very important role even considering that some of them are not cost effective.

MARTIN LEVY defended that Content in the content delivery network is always somebody else's content, and distribute it around the globe is to make it more efficient, faster and safer. However, he expressed concern about the particular requirements on content flow, which demands quite a bit of engineering to work fine. In many places he found out that local providers are not peering amongst themselves. He said it is fine for them if the local providers all want to peer with them and their competitors, as this solves many problems. He argued that a little bit of peering could move on to a lot of peering. According to Martin, an enormous amount of bits on the internet is delivered by content delivery networks or very large sources of data, normally on behalf of somebody else. And this trend is not going to change. He states that Cloud Flare want to work in every single part and place that they can. Their mission is to deliver the content as close as possible to the eyeballs (Internet users) and in most cases, Internet exchanges are the best model for doing this.

ANTONIO MOREIRAS focused on the Open CDN initiative that is being developed by NIC.br/CGI.br in Brazil. According to Antonio NIC.br is creating an alternative system to support hosting services near a group of medium and small ISPs. The idea is to create a stimulus to participants of a local IXP to share the costs of connecting and hosting a CDN, which is open for sharing content among ISPs. According to Antonio, NIC.br is trying to convince the CDNs and Content Providers to participate and share the costs. The idea is quite simple, where the caches could be shared among a lot of ISPs. And the costs also could be shared between ISPs and IXPs. Antonio mentioned an example of local IXP built by an association of ISPs, called ANID. They started a similar project, with caches with capacity for systems bigger than the one NIC.br is setting up in Salvador and they shared this cache inside their IXP initiative. Antonio presented a graph showing how the traffic has grown and reached now more than 15 Gigabits per second.
Antônio presented the model for the internet development that in first place considers the tier 1 which is the core with the ISPs connected in it. After that, there is the donut internet concept where the ISPs start working with each other with the help of IXPs. He proposed that it's important to ask the CDNs to go to the model of the donut internet. The CDNs must be closer to the ISPs and to the end users, because the main contents and the CDNs are responsible for approximately 50 to 80% of the traffic that ISP have to bring to the users.

| Please describe the Discussions that took place during the workshop session: (3 paragraphs) | The debate was focused on the challenges about bandwidth management in a context of increasing demand for content considering that video streaming is one of the main drivers of the fast increasing bandwidth demand. Nowadays, several policy initiatives aim at stimulating and supporting inter-locations transport services done by IXPs' participants, allowing the traffic to stay in the location. One of those initiatives has become widely accepted among the Internet Service Providers (ISPs) community. The main idea of this initiative is to enhance the Content Delivery Network (CDN) chain, implementing CDN servers within the large and medium ISPs' infrastructure, which are closer to the end users. This could leverage Internet providers operation multiplying their capacity to provide Internet access with high quality standards. The debate explored advantages and disadvantages of implementing autonomous systems connected to existing Internet Exchange Points to provide an alternative content source for medium and small ISPs, in regions with lower economic capacity, which are less attractive to large ISPs. |
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| Please describe any Participant suggestions regarding the way forward/ potential next steps /key takeaways: (3 paragraphs) | There has been a suggestion to include one new perspective to the debate. The model of a big central server sending tons of data to networks is great. Bringing data closer to the users is critical, but that move implies architectural changes to the network. This brings into question the need for a better comprehension of the impact of such changes for net neutrality discussions and the controversies around regulating the so called OTTs. |