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**A Shapley-value Mechanism for Bandwidth On Demand between Datacenters**

**Abstract:**

Recent studies in cloud resource allocation and pricing have focused on computing and storage resources but not network bandwidth. Cloud users nowadays customarily deploy services across multiple geo-distributed datacenters, with significant interdatacenter traffic generated, paid by cloud providers to ISPs. An effective bandwidth allocation and charging mechanism is needed between the cloud provider and the cloud users. Existing volume based static charging schemes lack market efficiency. This work presents the first dynamic pricing mechanism for inter-datacenter on-demand bandwidth, via a Shapley value based auction. Our auction is expressive enough to accept bids as a flat bandwidth rate plus a time duration, or a data volume with a transfer deadline. We start with an offline auction, design an optimal end-to-end traffic scheduling approach, and exploit the Shapley value in computing payments. Our auction is truthful, individual rational, budget balanced and approximately efficient in social welfare. An online version of the auction follows, where decisions are made instantly upon the arrival of each user’s realtime transmission demand. We propose an efficient online traffic scheduling algorithm, and approximate the offline Shapley value based payments on the fly. We validate our mechanism design with solid theoretical analysis, as well as trace-driven simulation studies.

**Existing System:**

Existing studies have substantially investigated allocation and pricing mechanisms for cloud resources like computation and storage, but see a lack of proposals for bandwidth pricing in cloud computing. The current common practice is to charge a fixed flat rate on data volume, e.g., per GB by Amazon EC2. Such a flat charging model inherently lacks of market efficiency to adapt to realtime demand/supply changes, jeopardizing efficient bandwidth utilization as well as social welfare of the cloud provider and cloud users.**Proposed System:**

We propose an efficient traffic scheduling algorithm, and approximate the offline Shapley value based admission control and payments on the fly. In particular, we compute an online Shapley value based on requests that have arrived, scale it according to the passed time, the total time span, the ISP charge due to the existing traffic and estimated total ISP charge.