

# 15-744: Project Proposal

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## 1 Problem

The current control plane for the Wide Area Network was developed with the goals of reachability and scalability, among others, in mind. Over the past few decades, due to the growth in the topology of the network, introduction of new technologies and applications, and change in the patterns of traffic have resulted in some goals becoming more relevant than others in the Wide Area. While reachability is no longer a major challenge, best effort delivery service model is no longer enough to fulfill the requirements of many stakeholders in the internet. Recent research from Google [1] and Facebook [2] suggests that a reevaluation of the current service model is required to meet the needs of the evolving internet.

More specifically, despite the growing diversity of applications and their network requirements, the dominant Wide Area Protocol, BGP, essentially treats all traffic between two given hosts equally. However, some applications, such as VR Streaming, Tele-surgery have distinctly different network needs compared to a routine nightly backup service. Ideally, we would want the application to be able to influence the routing choices made in the Wide Area in order to not only enable future applications, but to also utilize the network efficiently.

We believe two key changes in the landscape are vital to our approach

1. The proliferation of SDN technologies such as OpenFlow has allowed pragmatic, dynamic management of the control plane
2. The shift in internet traffic patterns has resulted in most traffic flowing between end customers and a few large service/content providers

## 2 Approach

We suggest adding a new logical entity to the Wide Area topology called the Broker. The job of the Broker is to provide a centralized interface for Content/Service Providers to acquire routes from their edge egress routers to the end customer with strict Quality of Service (QoS) properties. There are two aspects of our approach that differ from previous work

1. The Broker controls the egress traffic from a Content/Service provider, allowing better utilization of resources
2. Instead of arbitrary end points, we consider the case of delivering traffic from a Content/Service provider to end customers

### 3 Related Work

The past decade has seen several proposals for inter-domain routing brokers. RouteBazaar [3] and MiNT [6] suggest a free market/auction style approach to matching customers with the resources provided by customers. CXP [4] deal with the issue of where and how to exert control over the wide area by suggesting IXPs as nodes in the topology of an overlay network. RaaS [5] most closely follows the approach we suggest, but it merely defines the higher level approach and does not delve into the process of applying this approach in the Wide Area.

### 4 Key Milestones

The milestones are as follows

1. Get AS topology data and define interfaces and communication protocols between the different parts of the network [50% goal]
2. Implement a simple broker system consisting of permanently allocated slices of the network offered by ASes and two types of QoS services offered by the Broker to customers [75% goal]
3. Simulate customer requests to the broker and report experimental results of measurements of metrics such as average network utilization, applications QoS maintained compared to standard BGP route selection [100% goal]

### 5 Risk/Stretch Goals

#### Risks

We believe the key risk involved is not being able to find detailed AS topology information for our purposes. The other risks are building the test simulation may turn out to be a very time consuming task.

#### Stretch Goals

The stretch goals are as follows:

- Allow links offered by ASes to be dynamic

- Move from two to arbitrarily many QoS levels offered by the Broker

## 6 Resources Needed

At this time, we do not believe we will require any extra resources.

## References

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