Traffic Engineering: Path Optimization Using Routing Protocol In Selected Network

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Abstract

In network design traffic engineering is important for operation task such as load balancing, routing protocol configuration .load balancing across multiple links to a neighboring autonomous system to a different neighbor .thus we focus on traffic estimation or traffic load. Adapting the routing of traffic to the network condition for path selection is another difficult task. We propose fundamental objectives for autonomous system traffic engineering with BGP /IGP routing protocol for achieving the successful path either changing route or fix routing.

Keywords: load balancing, BGP, IGP, routing protocol, traffic load

1.Introduction

we only focus on successfully transfer a packet from source to destination, and with the help of traffic matrix we distribute traffic load using traffic estimation whose main purpose is load balancing, using routing protocol like BGP for establishing path successfully either fix route /changing route.

1.1. Traffic load

our main purpose is to efficient data transfer from source to destination, then we use the **Traffic matrices**, the flow of traffic through a network is a crucial aspect of the network's workload. The amount of traffic following from each ingress point (origin) to each egress point (destination) is called the traffic matrix (TM). A common assumption made in traffic matrix modeling and estimation is independence of a packet's network ingress and egress. The fact that most traffic consists of two-way exchanges of packets means that traffic streams flowing in opposite directions at any point in the network are not independent.

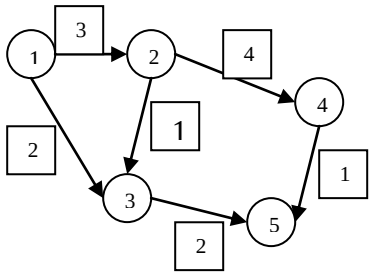


Figure 1. Load distribution within network

This figure shows the traffic load between each ingress an egress point and create an traffic matrix this traffic matrix help to chosen shortest path.traffic matrix as shown in table-1

Table-1. S-D traffic matrix

	2	3	4	5
1	3	2	-	-
2	-	1	4	-
3	-	-	-	2
4	-	-	-	1
5	-	-	-	-

This is a static distribution of traffic load, here node 1 is source node and 5 is the destination node and 2, 3, 4 are intermediate nodes.

In this figure-1, if we find out the shortest path, then shortest path from S-D is 1-3-5.but it is fixed path

selection is basically based on routing protocol like BGP, OSPF.

2. Comparing BGP and IGP

When discussing BGP, it is important to understand the difference between an Interior Gateway Protocol (IGP) and BGP (an example of an Exterior Gateway Protocol). An IGP is designed to provide reachability information within a single routing domain.
Three types of IGPs are commonly used in networks today:
• Distance vector protocols such as Routing Information Protocol(RIP) and Interior GatewayRoutingProtocol(IGRP)
• Link-state protocols such as Open Shortest Path First (OSPF) and Intermediate System-to-IntermediateSystem(IS-IS)
• Hybrid protocols such as Enhanced IGRP (EIGRP)
Although these protocols are designed with different goals and behave differently, the common goal is path optimization within a routing domain—that is, finding an optimal path to a given destination.

An IGP has some or all of the following characteristics:
•It performs topology discovery
•It strives to achieve fast convergence
•It requires periodic updates to ensure routing information accuracy
•It is under the same administrative control
•It assumes a common routing policy
•It provides limited policy control capability

Because of these characteristics, an IGP is not suitable to provide interdomain routing. For example, an interdomain routing protocol should be able to provide extensive policy control, because different domains often require different routing and administrative policies. As another example, periodic refresh of IGP routes is not scalable when the number of prefixes is at the Internet level.

From the start, BGP was designed to be an interdomain protocol. Two of the most important design goals were policy control capability and scalability. However, BGP typically is not suitable to replace an IGP because of its slower response to topology changes. When BGP is used to provide intradomain reachability, such as in an MPLS VPN, BGP tunings are often needed to reduce the convergence time.

Both IGP and BGP have their place. When designing networks, it is important to use both types of protocols appropriately. A more detailed comparison of BGP and IGP is provided.

3. Virtual private network

A **virtual private network** (VPN) is a private data network that makes use of the public telecommunication infrastructure, maintaining privacy through the use of a tunneling protocol and security procedures.

VPN is private network and provide security from one node to another node, to establish a secure path from source to destination and after communication path established node to node data delivery started from source to intermediate node and intermediate node to destination node. When a path established from node to node there are different cases like node failure, time delay and data lost and not necessary to deliver data from source to destination.

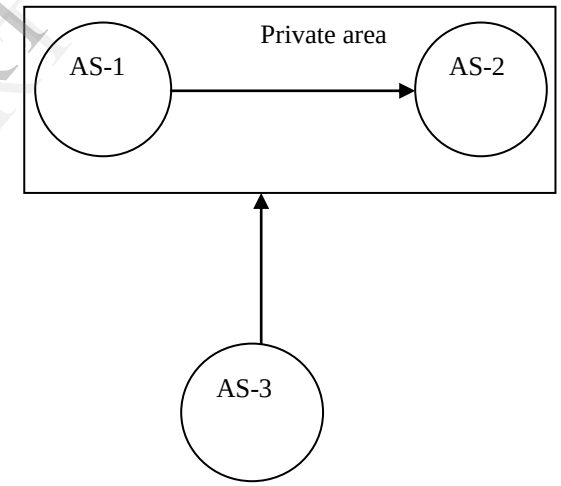
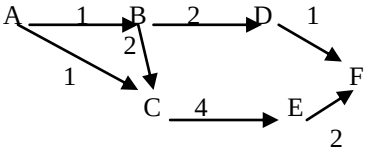


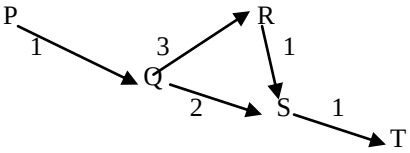
Figure 2. Autonomous system with in private network

In this fig,Autonomous system-1 and Autonomous system-2 communicate to each other and create a private network. Autonomous system-3 are not in private area, but these AS-1, AS-2 and AS-3 are in network.

Let suppose As-1 having 6 node A,B,C,D,E,F and AS-2 having 5 nodes P,Q,R,S,T as shown in fig-3



AS-1,Shortest path-A-B-D-E



AS-2 , Shortest path –P-Q-S-T

Figure 3. Shortest path in autonomous system 1 and 2

In fig-3, AS-1 node B failed then another path from S-D is A-C-E-F by using bgp routing protocol but here the weight is going on-7

Same in AS-2 if node Q failed then another path chosen by bgp protocol is P-R-S-T....But these are in private area within AS-1 and AS-2

4.Conclusion

We focus only successfully transfer packets from source node to destination node with in autonomous system and these autonomous system either in communicate in private network or without private network. using routing protocol like BGP select the shortest path from source to destination node. But in some cases when one node failure causes of these node our selected path not established then choose another path from another node but successfully reached at destination, so we can say we can consider transfer packet from source to destination either fix route or change route.

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