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Enhanced Detection and Mitigation of Denial of Service Attack: A Review

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Abstract

Distributed Denial of Service (DDoS) attacks is very recent and popular devastating attack in the field of cyber society. Flooding DDoS attacks produce adverse effects for critical infrastructure availability, integrity and confidentiality. Current defense approaches cannot efficiently detect and filter out the attack traffic in real time. Online analysis of real time attack traffic and their impact and degradation of host and network based performance metrics becomes very essential. So, online measurement of these network performance metrics itself acts as an Intrusion detection system. The anomalies are the inference for network security analyst to suspect whether the network is under attack or not. Based on the assumption that the attacker flows are very aggressive than the legitimate users the proposed work provides sufficient bandwidth to genuine users during flooding DDoS attack. The Interface Token Bucket Algorithm (TBA) proposed in this paper is used to mitigate the identified DDoS attacks. The implementation is carried out on an experimental test bed build up on Linux machines and Virtual routers. The experimental results show that there is considerable increase in the host and network based performance metrics for legitimate users even under DoS and DDoS attacks.

Keywords: Distributed denial of service attack, Token bucket algorithm, host and network based performance metrics

1. INTRODUCTION

The current internet users enjoy and encourage the advancement in technology which makes their job easy. Today there is abundant use of internet application such as Video conferencing and Voice over IP. But in reality the current internet is prone to attacks. Attackers exploit the existing network infrastructure and their benefits for illegal activities. DDoS attacks are characterized by surge of traffic without packet content signature from millions of zombies mostly with forged source address. Internet is a complex network due to changes in network traffic load, mix of traffic, mix of congestion control actions, on/off flows because of which the statistics of arriving traffic is not stationary. The available link bandwidth varies in accordance with the statistics of the input traffic. Various sophisticated DDoS attack tools are available in Internet so known attack pattern can be detected easily whereas the reasons for new attacks remain undiscovered. Collecting and analyzing huge amounts of traffic logs after attack can't help in detecting new attacks. DDoS attack is very complex since it is distributed in nature where a master owns millions of insecure machines called zombies who act according to the master command to overwhelm the victim (Internet servers) with huge volume of packets. So it needs immense effort to propose a solution that defends DDoS attack very effectively and efficiently. Defence mechanism is robust if and only if it has an efficient detection methodology. But the problem lies in the basic understanding of what attack traffic will look like. A need for DDoS impact metric arises which takes in account of several network performance metrics like packet loss, latency, link utilization and throughput. The online network monitoring detects network anomalies and finds the attack traffic according to the deviation from the measured parameters. These network performance metrics serve as an effective indicator that reflects anomalous changes very well. Most predominant attacks are flooding attacks which are a Distributed Denial of Service leading to resource damages. The garbage packets which follow UDP protocol affect the legitimate TCP packets and hence this unidirectional traffic accounts for

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aggregate traffic at the router . It is one of the most serious problems on the Internet. A master (attacker) recruits many machines (zombies) to send garbage of packets thus launching a DDoS attack. Huge volume of unwanted traffic is generated to consume the bottleneck link in the victim network. A DDoS attack will eventually shut down the Internet servers by exhausting resources thereby denying access to legitimate users.

An efficient defensive mechanism for DDoS attacks is essential to detect and defend as quickly as it could. To achieve this, researchers need a deep understanding of dynamics of the packets, traffic traces which can depict realistic data, characteristics of the attack traffic, statistics of data flow, a platform where they can run their experiments without any complications. DDoS defence evaluation can provide a large improvement in the state of the art for DDoS defence evaluation and a significant step towards a common evaluation methodology. The immediate task of DDoS defence is to provide enormous bandwidth to legitimate users when there is an attack. Unfortunately most current defence approaches cannot efficiently detect and filter out the attack traffic. The proposed approach discussed in this paper finds the network anomalies, deploy the system at distributed routers, identify the attack packets, and then filter them. Thus the legitimate traffic throughput is improved and attack traffic throughput is reduced. The proposed Token Bucket Algorithm (TBA) can perform well in mitigating DDoS attack traffic precisely and effectively.

2. RELATED WORK

To achieve the objective of this project, we have proposed technique called Token bucket Algorithm (TBA) for detection and mitigation of denial of services attack . The token bucket is an algorithm used in packet switched computer networks and telecommunications networks. It can be used to check that data transmissions, in the form of packets, conform to defined limits on bandwidth and burstiness (a measure of the unevenness or variations in the traffic flow). The token bucket can be used in either traffic shaping or traffic policing. In traffic policing, nonconforming packets may be discarded (dropped) or may be reduced in priority (for downstream traffic management functions to drop if there is congestion). In traffic shaping, packets are delayed until they conform. Traffic policing and traffic shaping are commonly used to protect the network against excess or excessively bursty traffic. We are showing our result with the help of the network simulator (NS2) with different parameter. Token Bucket:

- The Token Bucket Algorithm can apply at router for the congestion control.
- The Token Bucket Algorithm compare allow the output rate vary depending on the size of burst.
- In this algorithm the buckets holds token to transmit a packet, the host must capture and destroy one token.
- Tokens are generated by a clock at the rate of one token every Δt sec.
- Idle hosts can capture and save up tokens (up to the max. size of the bucket) in order to send larger bursts later.

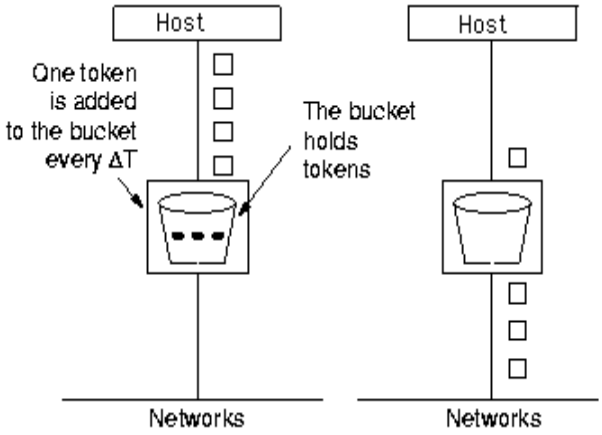

Fig 1.Working of Token Bucket Algorithm

The architecture consists of one server and many client. Different client will send the request through different router. The token bucket algorithm is applied at the router.

3. PROBLEM DEFINITION

[13]In the existing system there is used of IBRL(Interfaced Based Rate Limiting) Algorithm for the detection and mitigation of Ddos but there is fixed rate transmission of packet to check the detection of attack. Due to the used of fixed rate the packet drop increased at the router of legitimate user. Also DDoS attacks appeared as a serious threat to the Internet in the history and have since experienced a rapid development of techniques to prepare and perform the attack and to avoid detection. However, it is maturing to the point where even unsophisticated intruders could do serious damage.

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4. PROJECT OBJECTIVES

The objective of proposed techniques is
-To provide the available bandwidth to the user.
-To provide the system which efficiently detect and filter out the attack on architecture.
-To keep a server free from serving the unwanted request.
-To reduce processing time of request from the legitimate user.

5. INVESTIGATIONAL OUTCOME

To achieve the objective of this project, we have proposed following techniques;
-We are showing our result with the help of network simulator (NS2). We are showing simulation of different parameter like CPU usage, memory usage, packet loss i.e discarded packet at router, link utilization i.e network capacity and latency.
The above all parameter will show two scenario
1- Normal Architecture
2- Attack on Architecture.

6. CONCLUSION

This review paper proposes a technique to prevent the server from the distributed denial of service attack. In this paper we are showing client server architecture under the distributed denial of service attack. The complete elimination of dos attack is infeasible. This paper will show simulation of different affected parameter under Dos Attack..

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