CSE 322 PROJECT

FINAL REPORT

Submitted by: Iftekhar Hakim Kaowsar

ID: 1705045

**Task B:**

Implementation of RRED: Robust RED Algorithm to Counter  
Low-Rate Denial-of-Service Attacks. [Link](https://ieeexplore.ieee.org/document/5456075)

**Overview:**

LDoS exploits TCP’s retransmission timeout mechanism. RRED will deny attacking packets to enter RED queue. RRED is supposed to keep **throughput** better in presence of LDoS. It is implement over the DoEnqueue() method of the usual RED queue discipline.

Whenever a packet *p* tries to be enqueued in RED queue, RRED will check it first. If packet *p* belongs to flow *f* and *f.T1* is the arrival time of last dropped (by RRED) packet from flow *f* and *T2* is the arrival time of last dropped (by RED) packet of all flows, RRED will discard *p* given that its arrival time is less than *max(f.T1,T2)+10 ms.*

**Modifications in simulator:**

1. In **red-queue-disc.cc:**

* Checking of RRED on top of DoEnqueue() function
* Hash function of each incoming packet (based on flow, same hashvalue of same flow).
* Updated constructor for added member variables.

1. In **red\_queue-disc.h:**

* Including necessary member variables (T2, flow array), attributes (RRED enable, default value=false).

1. In **sB.cc:** Implemented a wired topology to check RRED and compare.

**Topology:**

Wired topology.

Diagram

Description automatically generated

**Direct observation: Throughput (Mbps)** [10 users, 10 attackers, 1 Mbps datarate]

|  |  |  |
| --- | --- | --- |
|  | With RRED | Without RRED |
| With Attack | **4.63268** | **0.197837** |
| Without Attack | 4.68096 | **4.64563** |

Without RRED and with LDoS attack, throughput gets devastated. With RRED it comes close to the throughput with out any LDoS attack.

**Graphs:**

Number of Users=10

Datarate=1Mbps

Attacking nodes count has been varied to calculate **TCP** throughput and drop ratio.

Table

Description automatically generated

**Summary:**

RRED almost restores TCP throughput in presence of LDoS attack. It completely outperforms usual RED. However, in absence of LDoS attack too, it seems to improve throughput.