Abstract

Denial-of-service (DoS) is an attack on the availability of critical services of the Internet. It overloads them with unwanted (disorderly) traffic and prevents them from serving legitimate clients.

We mitigate this problem by introducing a router, called RotorRouter, which identifies authorized data-flows and filters the malicious packets before they reach the end servers. RotorRouter also allows for dynamic restructuring of the network topology to defend against DoS attacks by using a software system called RapidNet.

Solution

- Verifying packets before routing
- Dropping malicious packets at hardware level
- Protecting nodes from attack traffic

RotorRouter can be used in various networks e.g. data centers, private networks, etc.

Results

<table>
<thead>
<tr>
<th>Resource</th>
<th>Area (LUTs)</th>
<th>BRAMs</th>
<th>Clock (MHz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crossbar</td>
<td>8249</td>
<td>8</td>
<td>300</td>
</tr>
<tr>
<td>Flow Table</td>
<td>501</td>
<td>5</td>
<td>350</td>
</tr>
<tr>
<td>Processor</td>
<td>26385</td>
<td>52</td>
<td>250</td>
</tr>
<tr>
<td>RotorRouter</td>
<td>43182</td>
<td>80</td>
<td>125</td>
</tr>
<tr>
<td>Typical Router</td>
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<td>35</td>
<td>150</td>
</tr>
</tbody>
</table>

The data in Figure 6 were collected in a setup shown in Figure 7. RotorRouter was able to achieve 5x throughput compared with normal routers under a DoS attack.

Acknowledgement

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Figure 1: Attacker overflowing a server (DoS)

Figure 2: RotorRouter

Figure 3: Platform and system blocks

Figure 4: Block diagram of the routing software

Figure 5: Flow chart of RotorRouter operation

Figure 6: Throughput of RotorRouter and typical router under DoS attack

Figure 7: Experimental setup