Firecycle
A scalable test bed for large-scale LTE security research

Motivation

- No available platform for LTE mobility network security research at a large scale
- No lab sufficiently large to study EPC security and M2M traffic scalability
- No current platform is scalable enough
- Most LTE simulations use traffic models that follow simple arbitrary probabilistic models

Use Cases

- Implement and test security attacks on LTE
- Deploy complex attacks
- Analyze and quantize the impact of attacks
- Compare security architectures
- Design security architectures for future next-generation mobility networks

Scalability

- Scale up the model over the cloud to create a full-scale LTE network
- Portions of the model are distributed over multiple VMs
- Perform rapid and efficient simulations of attacks against realistically large LTE networks

Results

- MME-HSS link utilization for M2M subcategory traffic
- MME-SGW link utilization for traffic causing frequent RRC state transitions

Scalability Results

<table>
<thead>
<tr>
<th></th>
<th>VM1: EUTRAN + EPC</th>
<th>VM1: EUTRAN - VM2: EPC</th>
<th>VM1/2: EUTRAN - VM3: EPC</th>
<th>VM1/2/3: EUTRAN - VM4: EPC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed [events/sec]</td>
<td>6950</td>
<td>18800 + 10494</td>
<td>84221 + 88473 + 10065</td>
<td>66682 + 64713 + 65530 + 9860</td>
</tr>
<tr>
<td>Memory [MB]</td>
<td>12174</td>
<td>18227 + 16970</td>
<td>3083 + 3022 + 931</td>
<td>2161 + 2022 + 1727 + 847</td>
</tr>
<tr>
<td>Duration</td>
<td>24h</td>
<td>10h</td>
<td>46m</td>
<td>30m</td>
</tr>
</tbody>
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