Lawful Interception For Mobile IP: A Mobile Agent based Approach

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Outline

• Generic LI model
• LI in mobile telephony – GSM
• Applying telephony model to MobileIP
• A Mobile Agent based approach
• Q?
LI in Australia

- Governed by Telecommunications (Interception) Act.
- AFP, State Police, Royal Commissions
- 2002-2003
  - ~3700 active interceptions
  - Avg. ~40 day intercept period
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LI in GSM – Interception Activation
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Comparison of Components

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>GSM (MSC)</th>
<th>Mobile IP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>Row of Racks - Room</td>
<td>Router, Switch</td>
</tr>
<tr>
<td>Capacity</td>
<td>2500 – 2 million subscribers</td>
<td>8 – 32 port ?</td>
</tr>
<tr>
<td>No. nodes for small city coverage</td>
<td>1-80</td>
<td>500-2000*</td>
</tr>
</tbody>
</table>

* Dependent on coverage area of each node
Simulation – topology

Simulation – results

<table>
<thead>
<tr>
<th>Value of n</th>
<th>Total leaf nodes</th>
<th>Activation time (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>8</td>
<td>0.48</td>
</tr>
<tr>
<td>3</td>
<td>27</td>
<td>1.62</td>
</tr>
<tr>
<td>4</td>
<td>64</td>
<td>3.85</td>
</tr>
<tr>
<td>5</td>
<td>125</td>
<td>7.51</td>
</tr>
<tr>
<td>6</td>
<td>216</td>
<td>12.98</td>
</tr>
<tr>
<td>7</td>
<td>343</td>
<td>20.62</td>
</tr>
<tr>
<td>8</td>
<td>512</td>
<td>30.78</td>
</tr>
<tr>
<td>9</td>
<td>729</td>
<td>43.82</td>
</tr>
<tr>
<td>10</td>
<td>1000</td>
<td>60.11</td>
</tr>
<tr>
<td>11</td>
<td>1331</td>
<td>80.11</td>
</tr>
<tr>
<td>12</td>
<td>1728</td>
<td>103.88</td>
</tr>
</tbody>
</table>
Simulation – movement example

- Node and it’s coverage area
- Target
- Target’s movement

Summary of Inefficiencies

- Bandwidth wasted in coverage areas of nodes where a target does not move to
- Host resources (CPU, IO operations) wasted due to sniffing effort
- Time to fully activate
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Mobile Agents - Definition

- “a self contained piece of software that moves within the network with it’s code, state and the ability to decide when to move to a new location”
- Movement
  - Reactive (L2, AAA)
  - Predictive (Liu & Maguire)
MA based approach – operation

LI focus (1)

- Specific LI application of a more generic case.
- Other opportunities to explore MIP & MA marriage
LI focus (2) – future work

• Potential for missing target’s traffic
  – Accuracy of prediction (predictive)
  – Speed of movement (reactive)
• Security !
  – MA is a virus
  – Potential for misuse could be disastrous
• How much CPU/Bandwidth is saved?

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Q time.