Evaluating

Measurement-based

Admission Control

Andrew Moore
Call Admission Control

- Model based
  - great for understood traffic sources
  - not great for different traffic sources
- Measurement based
  - works for any traffic sources
  - but which MBAC to use??

Objective: evaluate Measurement based admission control algorithms.
Example MBAC

Threshold

Below Threshold

Above Threshold

Activity (cells/unit time)

Time

Connection A

Connect()

Accept()

CAC

Connection B

Connect()

CAC

Reject()
Evaluating Admission Control

Traffic types:
  - Traffic Models
  - Real traffic

Connection patterns:
  - Connection Models
  - Real connection patterns

Measurements:
  - Line Utilisation / Line loss
  - Call use / Call loss
1. Connection generator sends parameters of new call to CAC
2. A particular admission policy, using measurements as needed
3. will return a result
4. the connection generator will activate a traffic generator with the corect connection characteristics
5. the traffic generator controller starts a traffic generator which in turn
6. generates a flow of traffic as appropriate
In operation

New connection accept/reject

accept
reject

Network traffic

Current Utilization
Threshold Value

New Connections accepted by CAC
Measurements below Threshold value

New Connections rejected by CAC
Measurements above Threshold value

Total number of connections in progress

Time (seconds)
Results

Comparison of one MBAC with different parameters - I.

Target CLR is $1 \times 10^{-3}$ for a 100 cell buffer

Traffic has 10Mbps PCR, 1Mbps SCR, 25 cell Mean burst length ON-OFF model

Link capacity is 100Mbps.

![CLR versus period of instantaneous utilisation measurement](image-url)
Results

Comparison of one MBAC with different parameters - II.

![Graph showing Mean connections in progress versus period of instantaneous utilisation measurement](image-url)

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MBAC Evaluation  
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Results

Comparison of one MBAC with different parameters - III.
Results

Comparison of different MBACs under similar conditions

Target CLR is $1 \times 10^{-3}$ for a 100 cell buffer

Traffic has 10Mbps PCR, 1Mbps SCR, 25 cell Mean burst length ON-OFF model

Link capacity is 100Mbps.

<table>
<thead>
<tr>
<th>Algorithm name</th>
<th>% calls with CLR &gt; $1 \times 10^{-3}$</th>
<th>Connection accept ratio</th>
<th>Mean connections in progress</th>
<th>Mean line utilisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak Rate Allocation</td>
<td>0%</td>
<td>0.100</td>
<td>9.9</td>
<td>0.09</td>
</tr>
<tr>
<td>Simple Threshold Measure</td>
<td>72%</td>
<td>0.526</td>
<td>52.0</td>
<td>0.409</td>
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<tr>
<td>Measure</td>
<td>58%</td>
<td>0.554</td>
<td>53.8</td>
<td>0.532</td>
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<tr>
<td>Hoeffding bounds</td>
<td>60%</td>
<td>0.637</td>
<td>63.0</td>
<td>0.630</td>
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</tbody>
</table>

Theoretical model estimations

<table>
<thead>
<tr>
<th>Algorithm</th>
<th>Mean connections in progress</th>
<th>Mean line utilisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guérin</td>
<td>36.92</td>
<td>–</td>
</tr>
<tr>
<td>Elwalid</td>
<td>42.98</td>
<td>–</td>
</tr>
<tr>
<td>Buffett &amp; Dufield</td>
<td>45.20</td>
<td>–</td>
</tr>
</tbody>
</table>
Conclusion

Evaluation Environment for Measurement Based Admission Control

Flexibility in

- Traffic sources
- Call types
- Admission Algorithm
- Measurement techniques

Leading to a rig for evaluation of measurement based admission control algorithms in REAL use, not just a simulation.
So what?

Well the world is largely IP so what is the relevance...

- MPLS
- MultiService-Forum

And perhaps...

Measurement Based Admission Control give an insight into calculating the amount of resource to manage as much as a method of management.