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Load Control Techniques in SIP Signaling Servers Using Multiple Thresholds

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- ⇒ **Introduction**
- ⇒ **Model**
- ⇒ **Results**
- ⇒ **Conclusions**
- ⇒ **Future works**

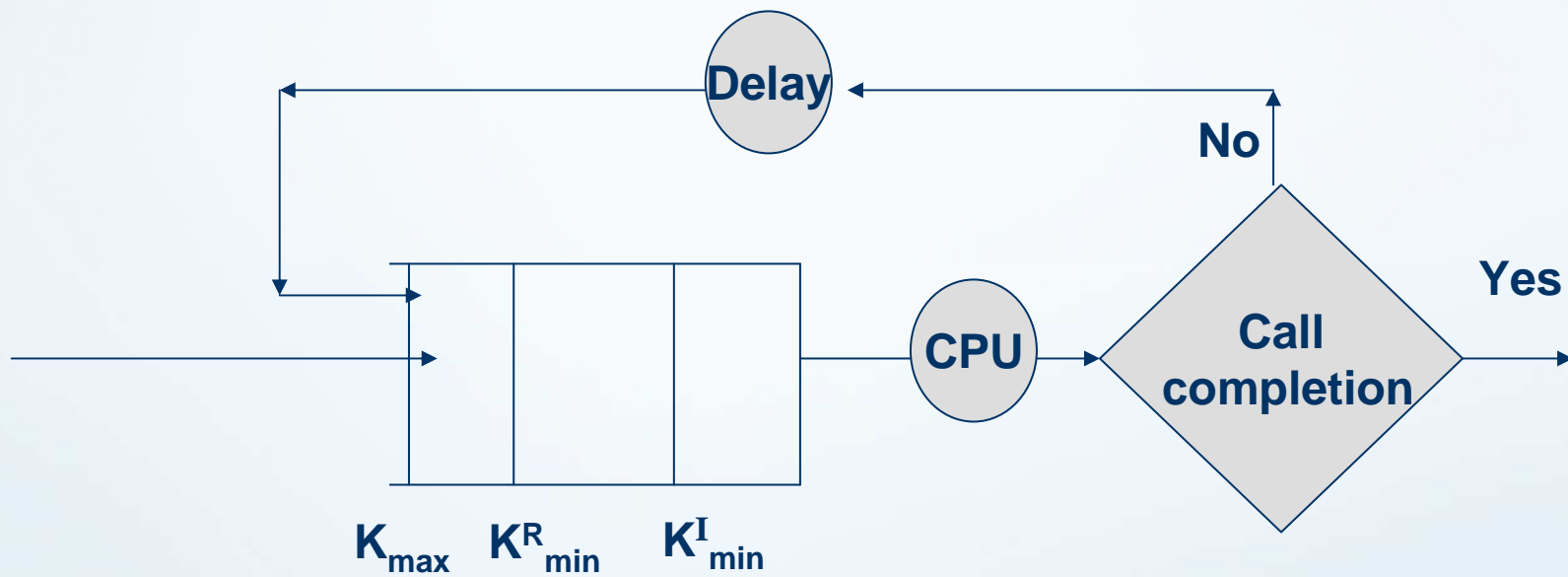
Background:

- VVoIP is spreading thanks to multiservice packet networks performance improvements
- Signaling plane effectiveness is an important enabler of such a process
- SIP protocol is gaining consensus and industry endorsement to be the #1



- ❖ **Goal of this work:** to compare the performances of an algorithm for the overload control in a server using different threshold values for each service class of traffic
- ❖ **Focus:** SIP protocol.
 - 1st case: an incoming SIP call is rejected but the procedure of retransmission of the message by the user is off;
 - 2nd case the retransmission procedure is on. In this case we will analyze two types of retransmission procedure, one for the INVITE option and another one for the other options.

Message handling scheme



Overload control through Thresholds (CTT)

Steps of the CTT algorithm :

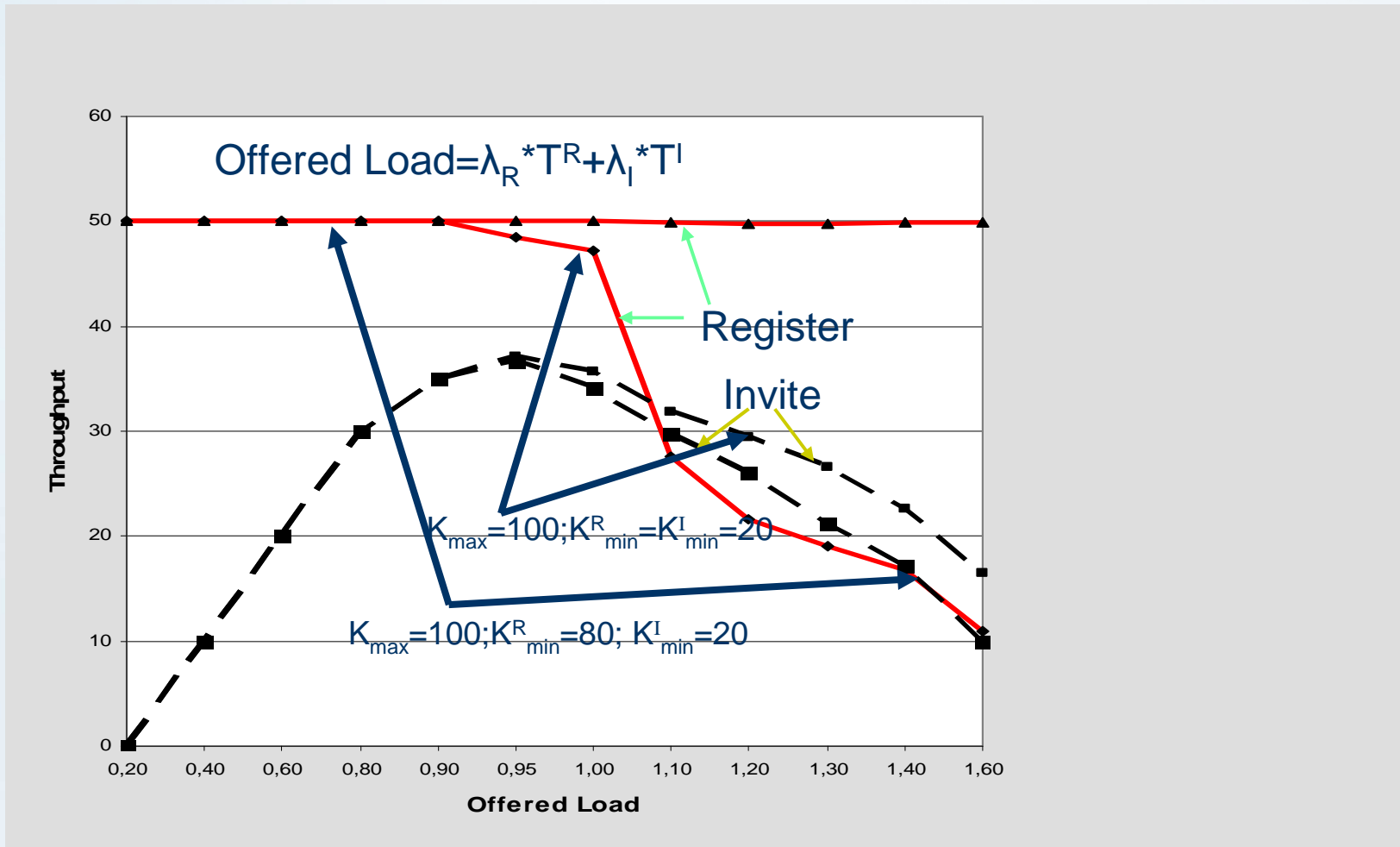
- Every time that a job comes out of the queue the algorithm checks the request method (e.g. INVITE, REGISTER, BYE,...)
- If the job is a new call then CTT checks the state of the buffer

Overload control through Thresholds (CTT)

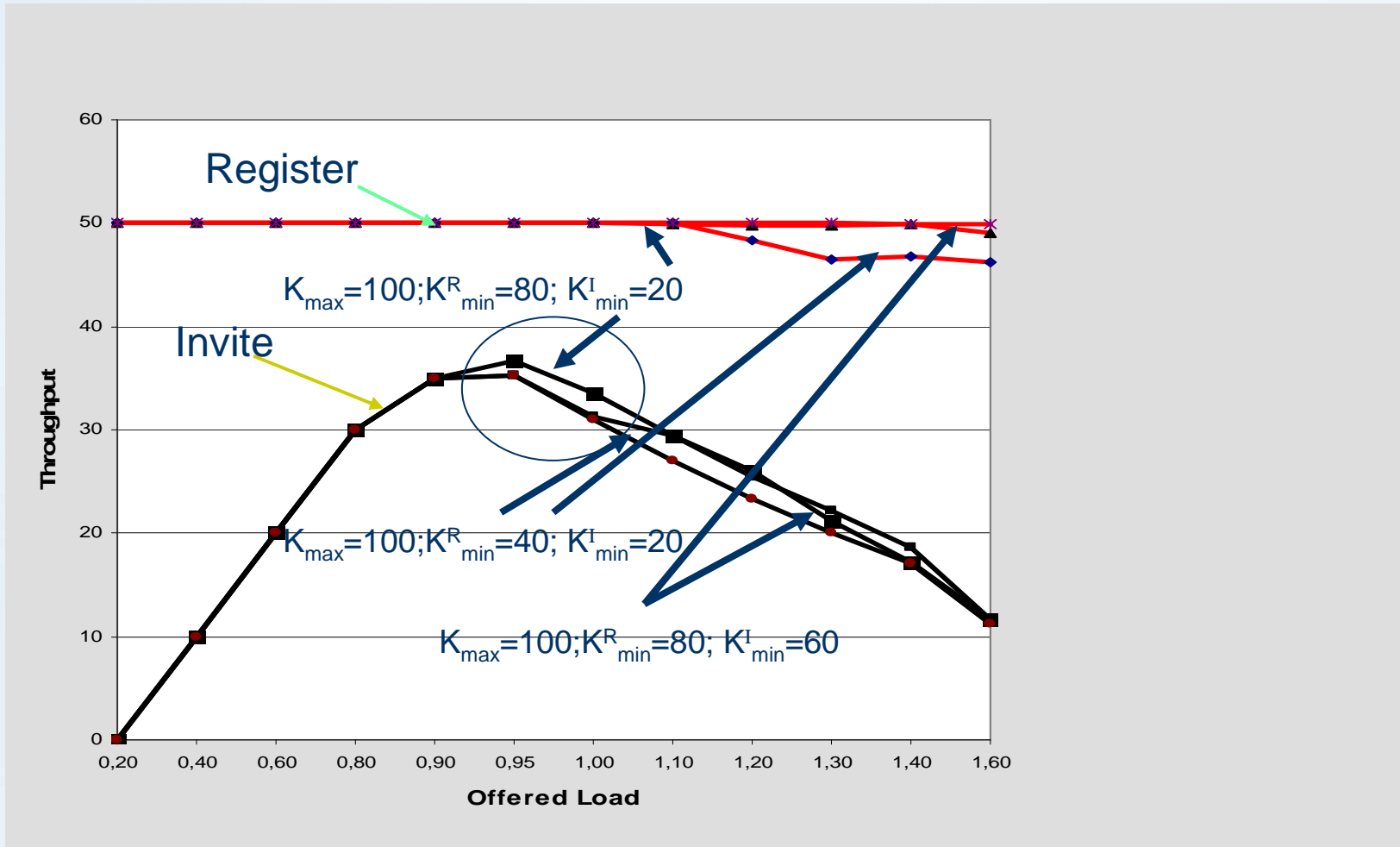
Four different conditions may happen:

- a) the value of the capacity buffer is greater than the value K_{\max} : the call is refused
- b) the value of the capacity buffer is less than K_{\min}^j : the call of the j-th class of traffic is accepted
- c) the value of the capacity buffer is included between the values K_{\min}^j and K_{\max} but the queue is growing: the call of the j-th class of traffic is accepted
- d) the value of the capacity buffer is included between the values K_{\min}^j and K_{\max} but the queue is decreasing: the call of the j-th class of traffic is refused

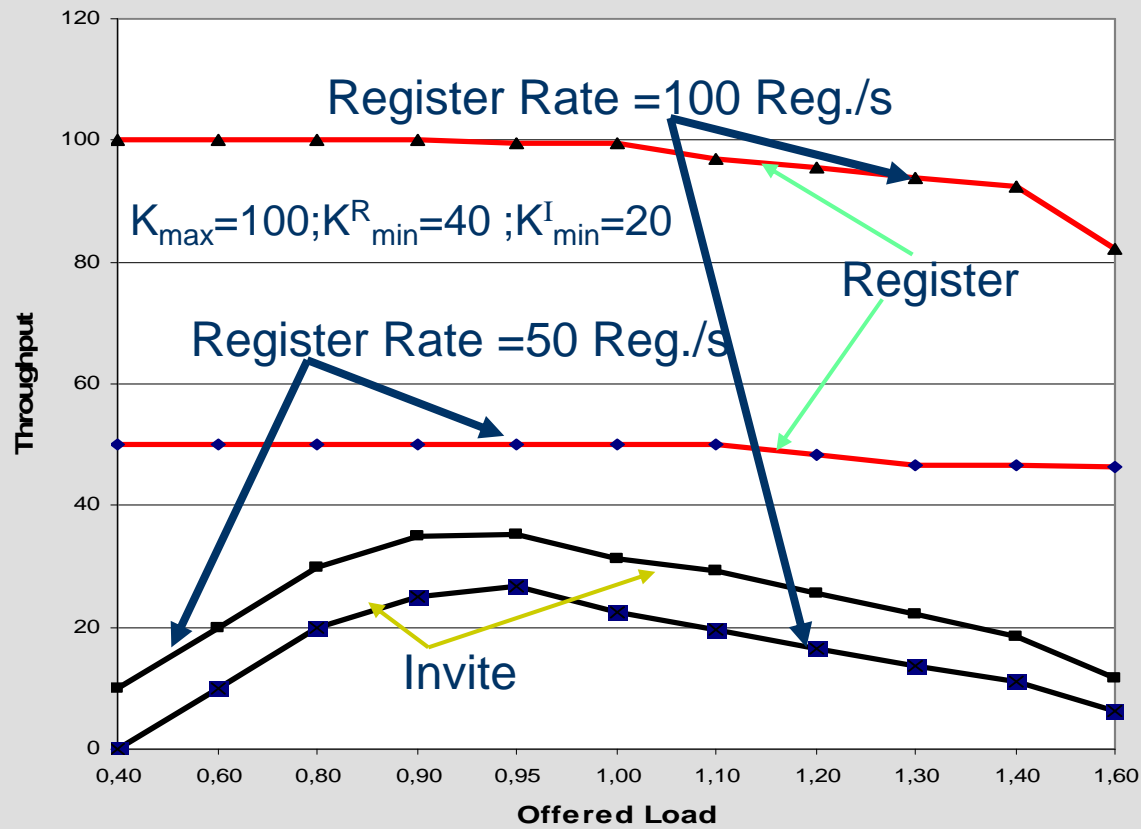
Throughput vs Offered Load



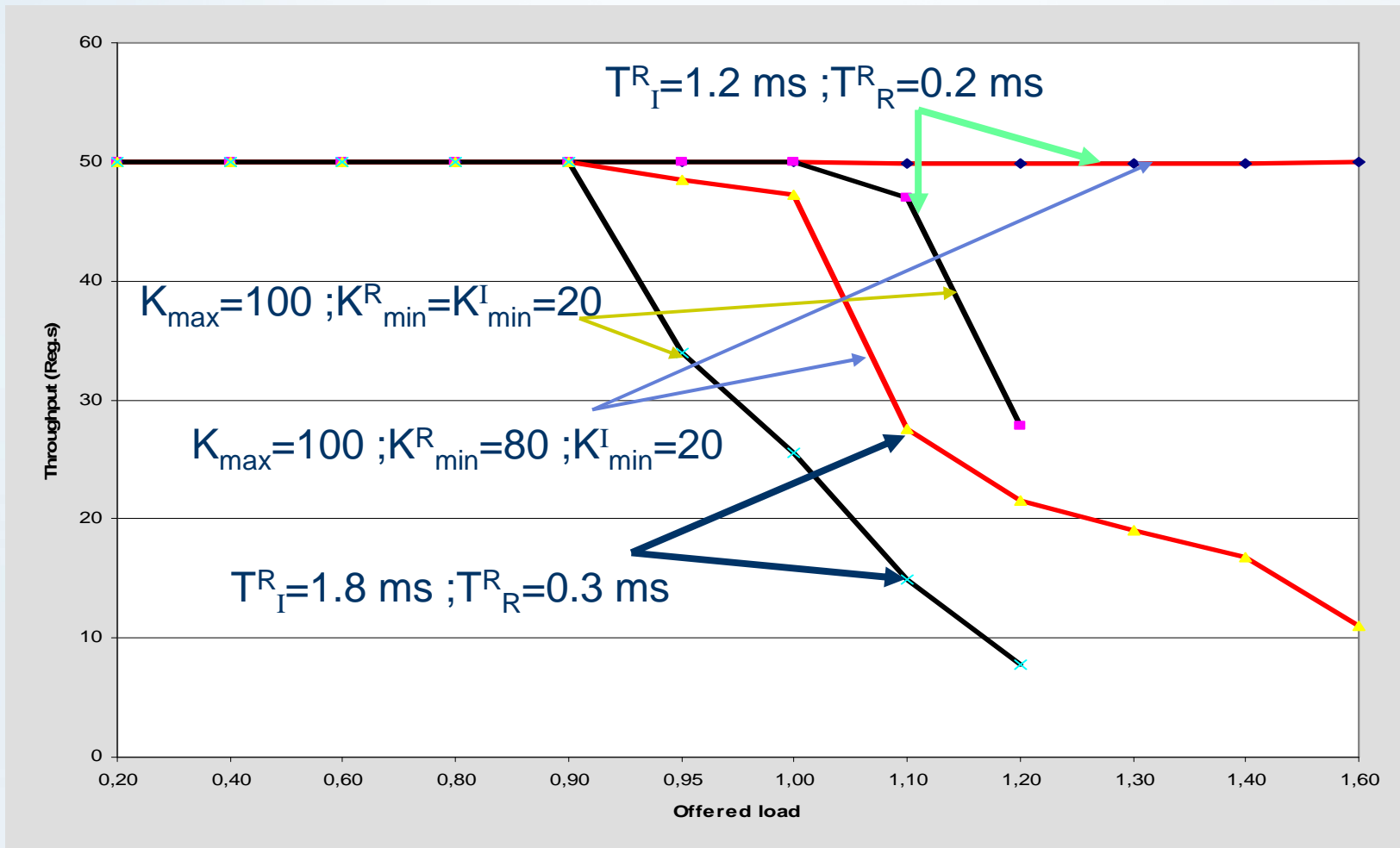
Throughput vs Offered Load



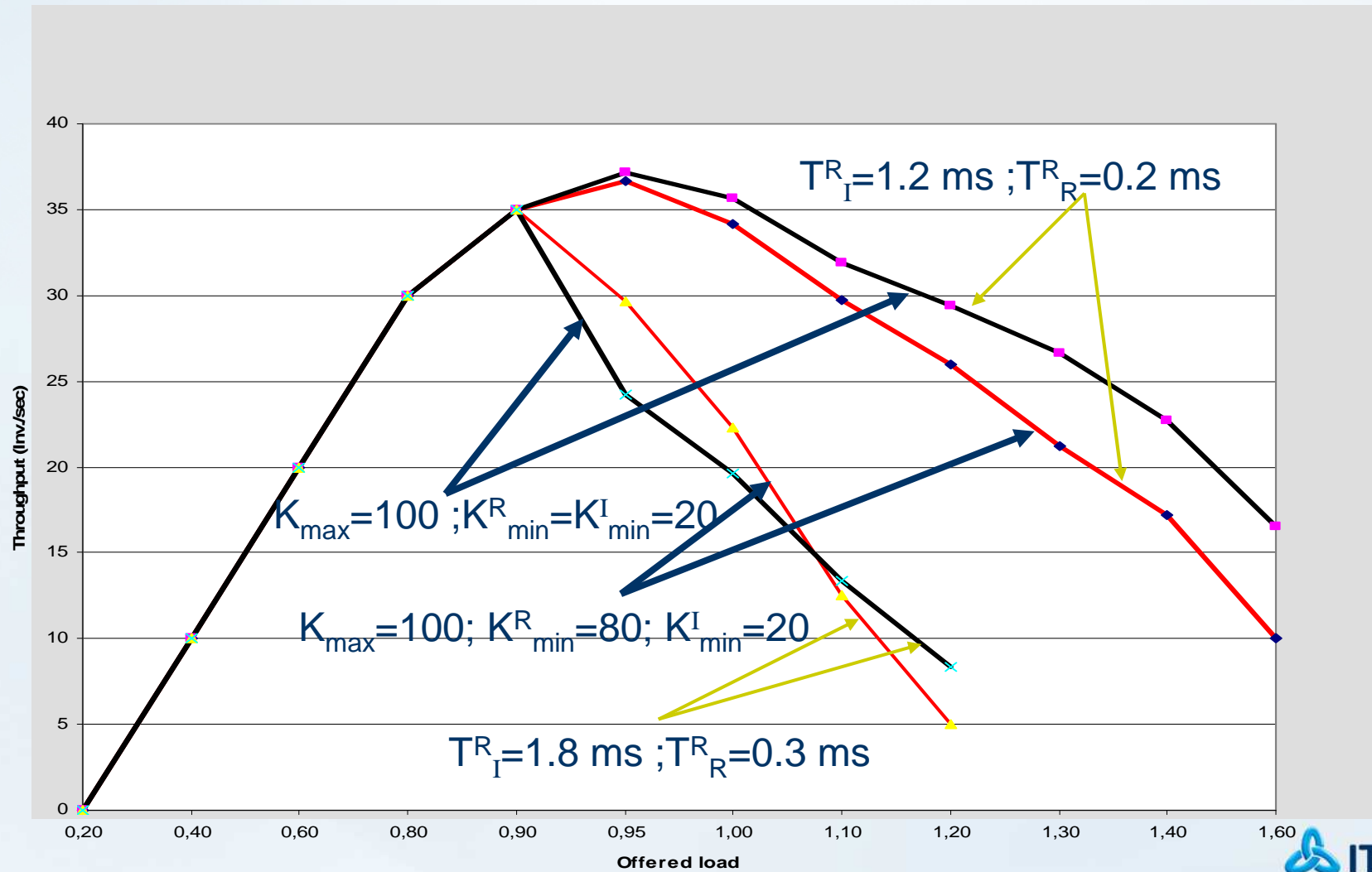
Throughput vs Offered Load



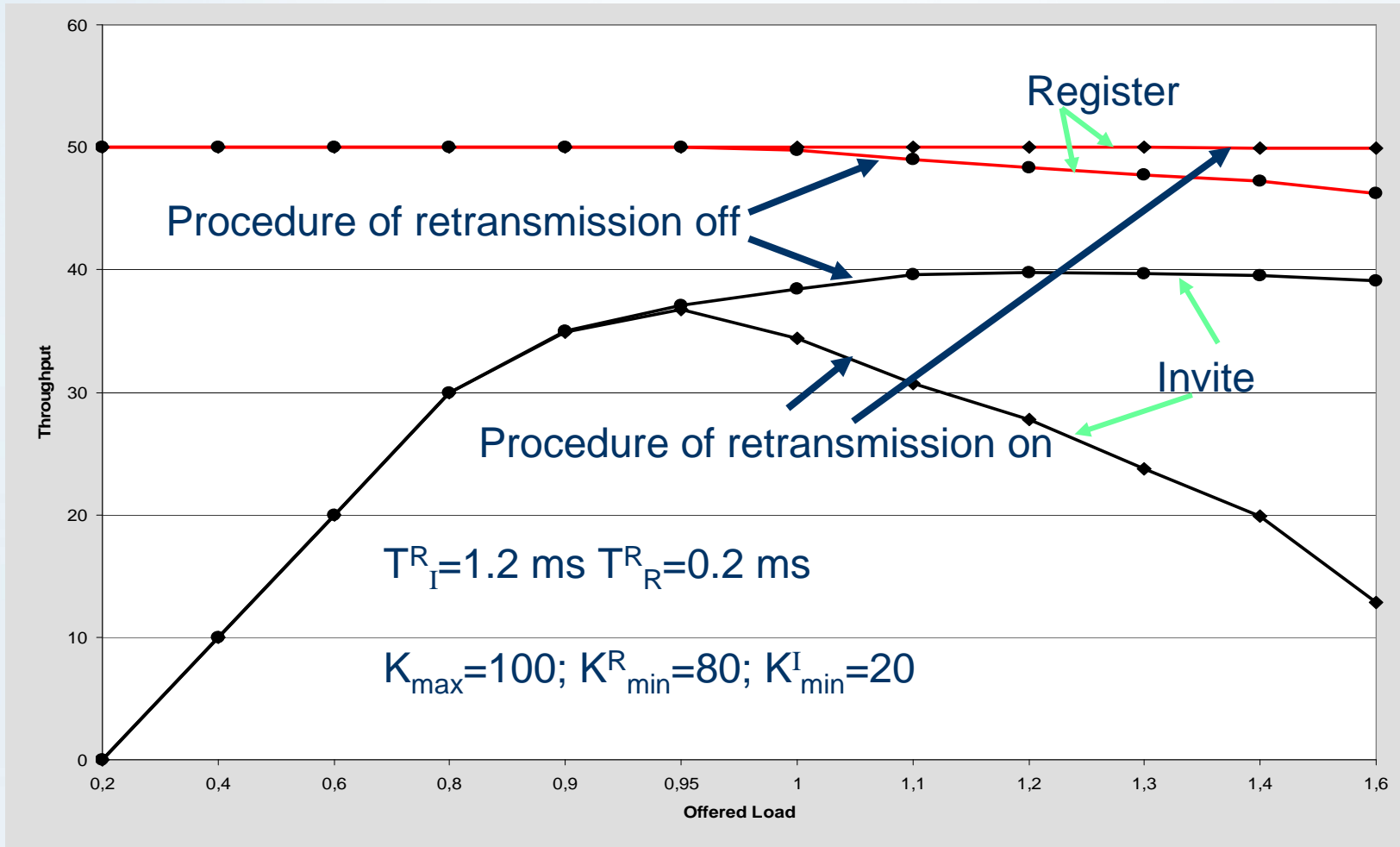
Throughput vs Offered Load



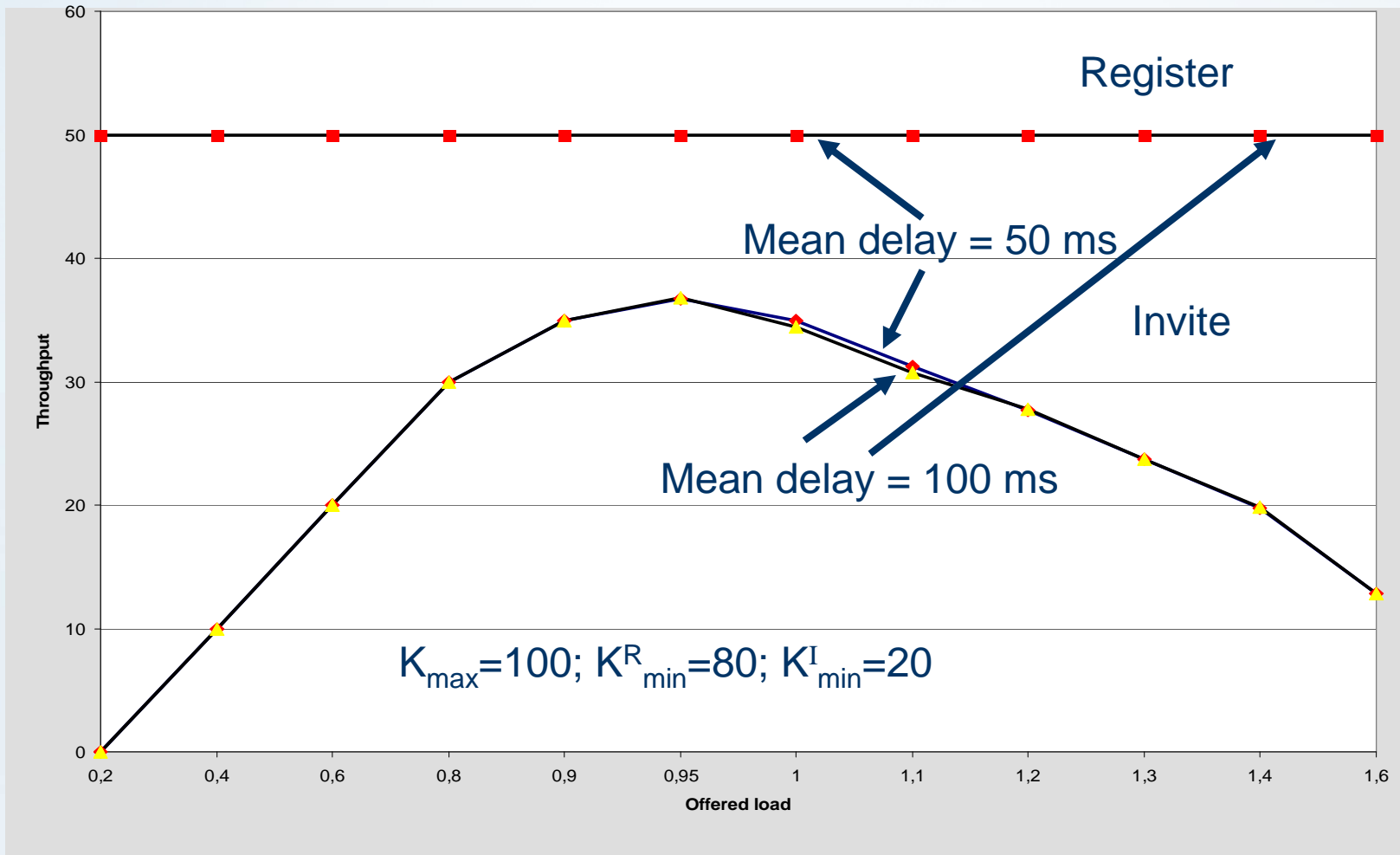
Throughput vs Offered Load



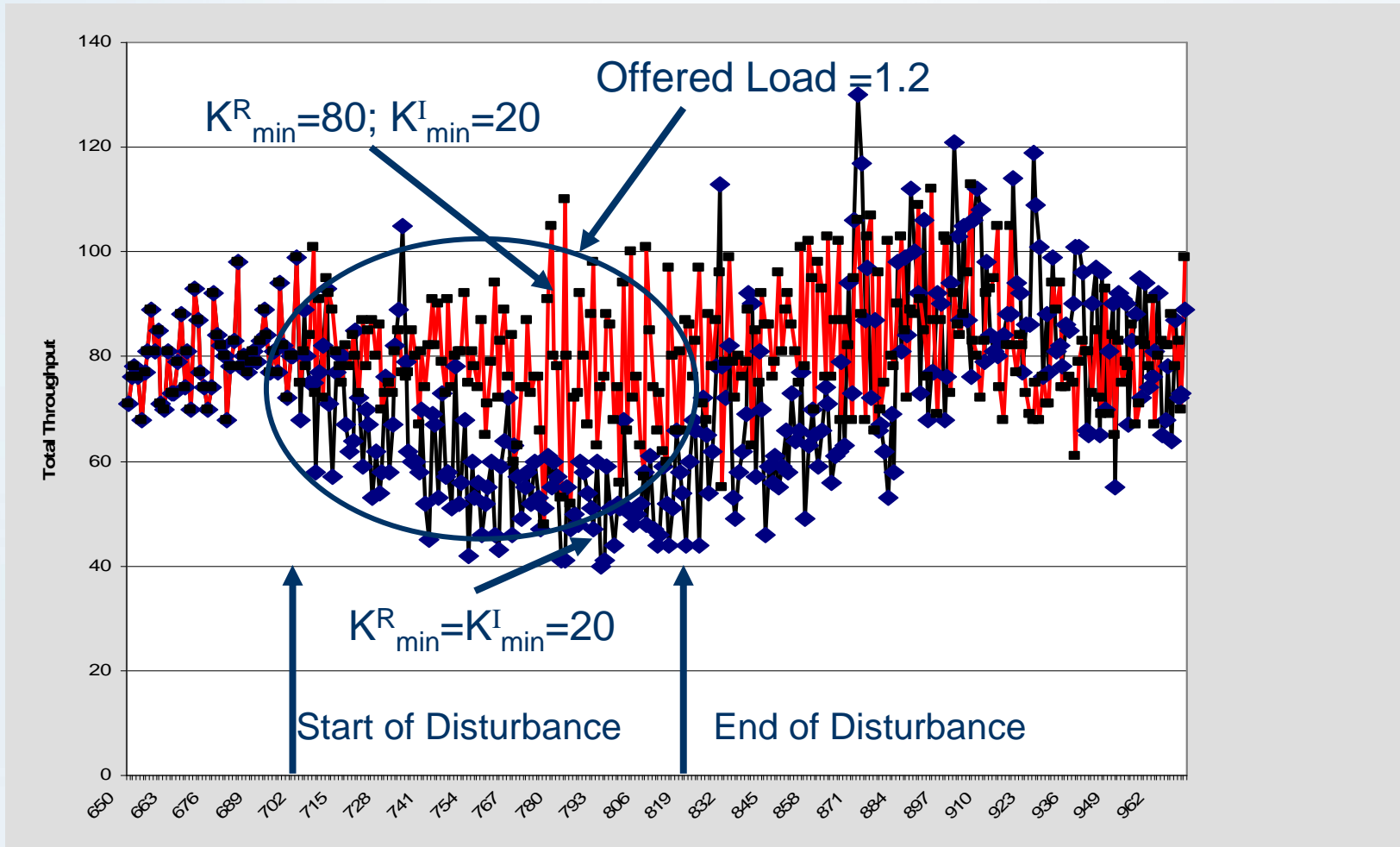
Throughput vs Offered Load



Throughput vs Offered Load



Throughput vs Offered Load



- We examined the performances of an algorithm for load control mechanism in a SIP server
- The mechanism uses different values of threshold to check the period of overload of the server
- Input traffic includes two different traffic class : Register option and Invite call
- The study showed that the algorithm reacts better performances when K_{\min}^I and K_{\min}^R are different
- The performances, measured by the throughput, are not heavily hampered by the choice of the threshold values K_{\min}^I and K_{\min}^R
- The throughput is limited from the cost to reject the calls. When these costs grow, the aggregate throughput reduces quickly at the increase of the offered load.

- To study the performances of the algorithm CTT when using dynamic thresholds
- To study the performances when, although the system is in overload region, the 503 Service Unavailable message is enabled according to probabilistic law
- To investigate possible performance optimization through the coexistence of two mechanisms of control of overload (threshold-based and CPU load-based).

Thank you!

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