ECE 423/544

Final Project
Description and Timeline

March 6th, 2020
Objective

• Design and implement a k-out-of-n packet datagram multicast network

• A message is sent from one sender to 1-3 recipients
  • Each packet will have n= 1, 2, or 3 destinations
  • Multicast message to “best k (=<n)” destinations
  • Routing protocol chooses the ‘best’ multicast path

• **Project Format:** Like an industry standards committee
  • Each group proposes a solution to the class
  • Class as a whole combines proposals for final draft
  • All groups implement code based on this draft
Problem Details

- Max number of destinations is 3 (n)
- Packet to be delivered to k out of n destinations
- No direct links between end-nodes
- Loss probability on each link = \( p \)
Proposal Requirements

• Proposal consists of a **protocol** and related **algorithms**

• Protocol includes:
  • **How to address different network elements?**
    • Fixed static address vs. Dynamic address allocation
    • Bit structure of address and how it is used
  • **How do nodes/routers discover each other?**
    • Periodic hello messages vs. hello with ACK
    • Provisioning or not for router/node failure?
  • **What is the baseline routing protocol?**
    • Link State vs. Distance Vector vs. Other variations such as on-demand routing or controlled flooding
  • **What ARQ scheme to use?**
Proposal Requirements

• Algorithmic component includes:
  • **How to multicast once you know the destination nodes?**
    • Whether to follow one of known multicast schemes?
    • Better, more efficient, simpler schemes?
    • Determining where to split and copy the packet?
    • What are the requirements from routing protocol?

• Follow the template available at:
Project Requirements

• Each group submits a proposal with specific details on both protocol and algorithms
• Class reaches a consensus on each item after 2-3 rounds of discussions
• Each group individually implements the agreed upon protocol through codes for nodes and routers
• Final demonstration involves inter-working between groups, e.g., node of group 1 with router of group 2
• Final report mentions implementation specific details from each group
Implementation Details

- Implementation on the Mininet platform
- Try to reuse components from the warm-up assignments (1-6)
- For routing protocol, aim to minimize total hops/path costs but keep implementation complexity in mind
- The design should clearly state advantages and disadvantages of the proposed solution
- Credits for **constructive** participation in the standards meetings
## Timeline

<table>
<thead>
<tr>
<th>Date</th>
<th>Item</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>03/20/2020</td>
<td>Send group member’s name to Sumit</td>
<td>Max. 3 students per group</td>
</tr>
<tr>
<td>03/26/2020</td>
<td>Submission of design slides by each group to Sumit</td>
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<tr>
<td>03/27/2020</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; Standards meeting</td>
<td>Presentations by each group followed by discussions</td>
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<tr>
<td>03/27/2020</td>
<td>All presentations uploaded to the mailing list</td>
<td>By Sumit</td>
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<tr>
<td>03/31 or 04/01</td>
<td>2&lt;sup&gt;nd&lt;/sup&gt; Standards meeting – discussion on remaining topics, voting for finalization</td>
<td>Note: additional session 11:00 AM -1:00 PM</td>
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<tr>
<td>04/03/2020</td>
<td>Circulation of formal standard document</td>
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<tr>
<td>04/03-04/24</td>
<td>Implementation</td>
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<td>04/24/2020</td>
<td>Code submission</td>
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<tr>
<td>04/27/2020</td>
<td>Project report due</td>
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<tr>
<td>04/27-05/01</td>
<td>Individual team domos</td>
<td>By appointment with the TA</td>
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1st Deadline: Draft Proposal

- PPT with details of your proposed solution covering all the requirements
- Follow the skeleton PPT provided on course site
- Add any aspects that you feel are interesting to the design of the system
- March 26th: Send Slides to Sumit (sumitm@winlab.rutgers.edu)
- March 27th: Each group presents their slides (15-20 min. each)
  - Discuss what’s the best way to do each task
  - Vote if can’t reach a consensus
Final Submission Info

• All implemented code (routers and clients)
• Guide/README: How to run your program
• Document for protocol implementation and performance evaluation
  • Highlight your system design
  • Being concise is suggested
  • Clearly state design goals and ways how things are accomplished. Use pictures to support the text.
• May include, but not limited to following topics:
  • Software design description of all components
  • Routing protocols and algorithm implementation details
  • Performance estimation/evaluation
Code Submission Info

• Code Due: April 24\textsuperscript{th}

• Submission Instructions:
  • Submit a single archive (zip or tar.gz) to sumitm@winlab.rutgers.edu with subject “ECE423/544 Final Project Group #”
  • Include all sources and configuration files created by you
Report General Info

• Report Due: April 27th

• Submission instructions:
  • Submit a single document (pdf) to sumitm@winlab.rutgers.edu with subject “ECE423/544 Final Project Report Group#”
  • The document should provide details on your design including (but not limited to)
    • Router and host design details
    • Description of implemented classes and methods
    • Collected performance results
  • Be concise. Focus on the core aspects that characterize your implementation.
Demo Instructions

• Demo Date: April 27\textsuperscript{th} – May 1\textsuperscript{st}
  • Each team should make an appointment with TA

• General Instructions:
  • \~20 minutes per group
  • Be ready to answer questions regarding your code design
  • The code should work on custom network topology (will be provided \~1 hour before the demo)
  • You should be able to showcase how routing tables are built, what are the protocols used and what is the performance
Grades

- Participation in standards meetings – 4% + 1% (UG)
- Final code & report – 8% + 2% (UG)
- Final demo and discussions – 8% + 2% (UG)