Checksum Calculations

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Class Location: ICT 121
Lectures: MWF 12:00 – 12:50


Slides are adapted from the companion web site of the book, as modified by Anirban Mahanti (and Carey Williamson).

IP Checksum Calculation

At the sender
- Set the value of the checksum field to 0.
- Divide the header into 16-bit words
  - Add all segments using one's complement arithmetic
- The final result is complemented to obtain the checksum

At the receiver
- Divide header into 16-bit words, adds them, and complements the results
- All zero's => accept datagram, else reject

Binary Checksum Example

<table>
<thead>
<tr>
<th>1</th>
<th>Carry from 16th column</th>
<th>1</th>
<th>Carry from 13th column</th>
<th>1</th>
<th>Carry from 12th column</th>
<th>1</th>
<th>Carry from 5th column</th>
<th>1</th>
<th>Carry from 4th column</th>
<th>1</th>
<th>Carry from 3rd column</th>
<th>1</th>
<th>Carry from 2nd column</th>
<th>1</th>
<th>Carry from 1st column</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000</td>
<td>1000</td>
<td>1000</td>
<td>1001</td>
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<td>1111</td>
<td>0001</td>
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<td>0010</td>
<td>0111</td>
<td>1011</td>
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<td>1101</td>
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<td>0100</td>
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</tr>
</tbody>
</table>
**UDP Checksum**

- The pseudo-header
  - Add pseudo-header
  - Fill checksum with 0's
  - Divide into 16-bit words (adding padding if required)
  - Add words using 1's complement arithmetic
  - Complement the result and put in checksum field
  - Drop pseudo-header and padding
  - Deliver UDP segment to IP

**Checksum calculation at Receiver**

- Add pseudo-header to the UDP segment
- Add padding, if needed
- Divide into 16-bit words and add words using 1's complement arithmetic
- Complement result
- If result is all 0's
  - Drop pseudo-header and padding (if any)
  - Accept segment
- Else
  - drop segment