UDP - Transport Layer

TCP/IP class

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intro

- UDP - user datagram protocol
- RFC 768
- UDP == “ip with ports”
- client/server both “bind” to a port and you send messages/recv them from a port
- port is 0..64k-1, unsigned short
- well-known ports associated with servers
intro, cont

- UDP provides unreliable connectionless delivery
- There is a checksum, but it is configured on/off per host - has been typically off in the past (that may be changing)
- Checksum is over IP pseudo header, UDP header, and data
- 0 put in checksum field in header to compute, if 0 is sent, means csum off

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**udp encapsulation**

<table>
<thead>
<tr>
<th>ethernet hdr</th>
<th>ip header</th>
<th>udp header</th>
<th>data</th>
</tr>
</thead>
</table>

8 bytes (no options)
### udp header

<table>
<thead>
<tr>
<th>Bit Position</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-15</td>
<td>src port #: 16 bits</td>
</tr>
<tr>
<td>16-15</td>
<td>dest port #: 16 bits</td>
</tr>
<tr>
<td>16</td>
<td>UDP length: 16 bits</td>
</tr>
<tr>
<td>31-16</td>
<td>checksum: 16 bits</td>
</tr>
<tr>
<td>31</td>
<td>data ...</td>
</tr>
</tbody>
</table>

Length includes header, minimum is 8
psuedo-header

- udp code must tack on ip pseudo-header and optionally perform checksum over it
  - 32 bit source ip address
  - 32 bit dest. ip address
  - 1 byte zero
  - 1 byte proto = 17 (UDP)
  - 2 bytes UDP length == 12 bytes in all

- idea is to include IP addresses (etc) into checksum in order to prove that dest is correct

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apps that use UDP

- statistically, broadcast oriented
  - routing daemons (rip and routed)
  - rwho

- multicast apps
  - need multicast, tcp can’t do that
  - need sequencing, timestamp, udp doesn’t do that

- message-oriented
  - snmp
  - dns

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apps, cont

- NFS - distributed file system - why?
  - one reason is that TCP needs too much kernel state (memory) for connections (virtual circuit problem #1)
study questions

- so if UDP over localhost OR on a local network works fine, why not just use it for a file transfer?
- how can you find out if UDP checksums are on, off on your host? Can you find a way to turn them on/off?