TCP/IP Suite Overview
Internet Standards Publications

- Internet-Drafts
- RFCs
  - Proposed, Draft or Internet Standard
  - Informational
  - Historical
  - Experimental
  - Best Common Practice (BCP)
  - For Your Information (FYI)
IPv4
IPv6

Version | DiffServ + ECN (traffic class) | Flow Label
---|---|---
Payload Length | Next Header | Hop Limit

Source Address

Destination Address
## ARP

<table>
<thead>
<tr>
<th>HARDWARE ADDRESS TYPE</th>
<th>PROTOCOL ADDRESS TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>HADDR LEN</td>
<td>PADDR LEN</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OPERATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>SENDER HADDR (first 4 octets)</td>
</tr>
<tr>
<td>SENDER HADDR (last 2 octets)</td>
</tr>
<tr>
<td>SENDER PADDR (last 2 octets)</td>
</tr>
<tr>
<td>TARGET HADDR (last 4 octets)</td>
</tr>
<tr>
<td>TARGET PADDR (all 4 octets)</td>
</tr>
</tbody>
</table>
DHCP
ICMP

• Primarily used for error and status messages
• All ICMP messages have 3 common fields: TYPE, CODE, CHECKSUM
• Otherwise ICMP messages can vary widely
• Common uses
  • ICMP ECHO Request (aka PING)
  • Destination unreachable (e.g. PMTU discovery)
UDP

| bit  | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 |
|------|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Source Port | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Destination Port | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Length | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Checksum | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Data | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ... | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
TCP

Source Port | Destination Port
---------|------------------
Sequence Number
Acknowledgment Number

<table>
<thead>
<tr>
<th>HLEN</th>
<th>rsrvd</th>
<th>C</th>
<th>E</th>
<th>U</th>
<th>A</th>
<th>P</th>
<th>R</th>
<th>S</th>
<th>F</th>
<th>Window Size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>C</td>
<td>W</td>
<td>R</td>
<td>E</td>
<td>G</td>
<td>K</td>
<td>H</td>
<td>T</td>
<td>N</td>
</tr>
</tbody>
</table>

Checksum | Urgent Pointer
---------|------------------
options (if any) | padding (if required)
Routing Protocols

- RIP
- OSPF
- IS-IS
- IGRP/EIGRP
- BGP
IP Multicast

• Senders address packets to a group address
  • i.e. 224.0.0.0/4 in IPv4
• Never a source from a multicast address
• IGMP to manage group membership in IPv4
  • MLD, subset of ICMPv6 in IPv6
• Routers forward to where there are group members
• IP multicast routers maintain significant “state”
DNS

2. Local Caching Server checks cache.
3. If not cached, asks root (.server)
4. Root (.server) asks education (edu.) server.
6. If not found, asks a depaul.edu server.
7. If not found, asks www.cdm.depaul.edu.
8. If not found, asks a cti.depaul.edu server.
10. Finally, asks cti.depaul.edu server (and authoritative for cdm.depaul.edu).
11. Result is returned to the user.
Applications, Management and Security

- SMTP, POP, IMAP
- TELNET, SSH
- TFTP, FTP, SCP, SFTP
- HTTP, HTTPS
- SSL/TLS
- syslog, SNMP, NetFlow, NETCONF
- NTP
- RADIUS / TACACS
...and many more

- For a sample, see:
  - Internet protocols (IP) /etc/protocols
  - Network applications (TCP/UDP) /etc/services