T2 Service Models, Application Layer: HTTP and Cookies

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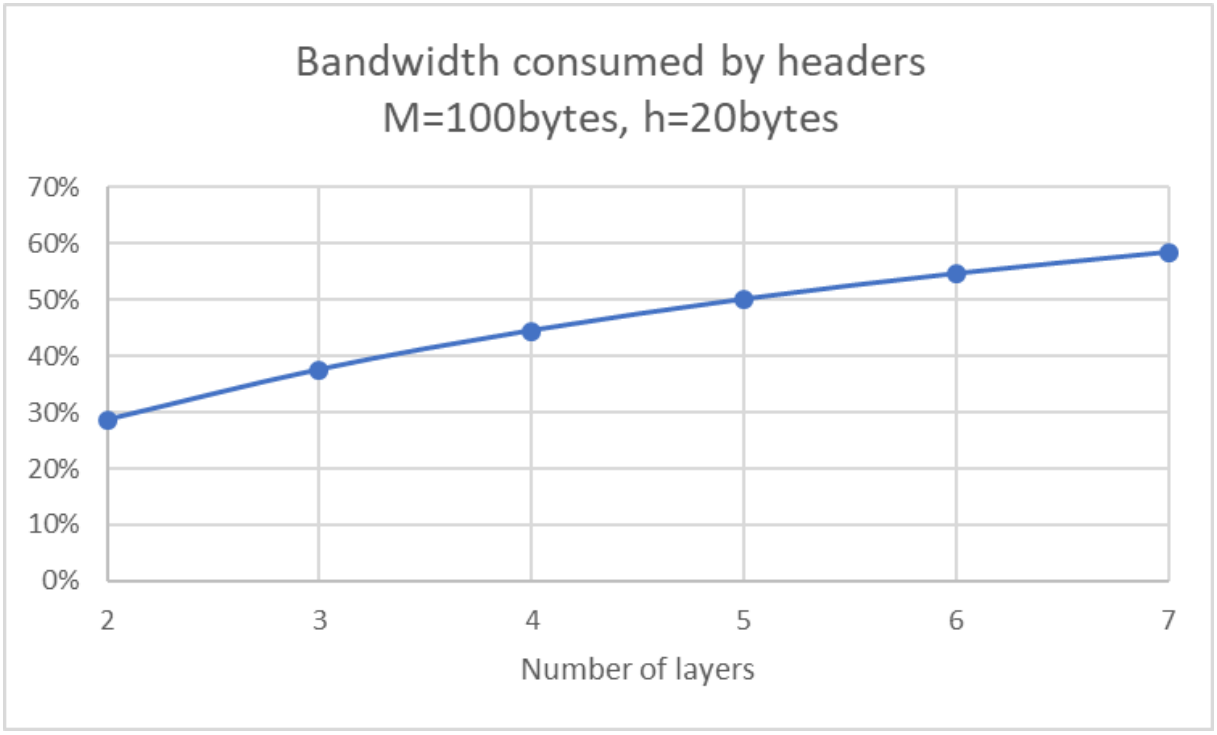
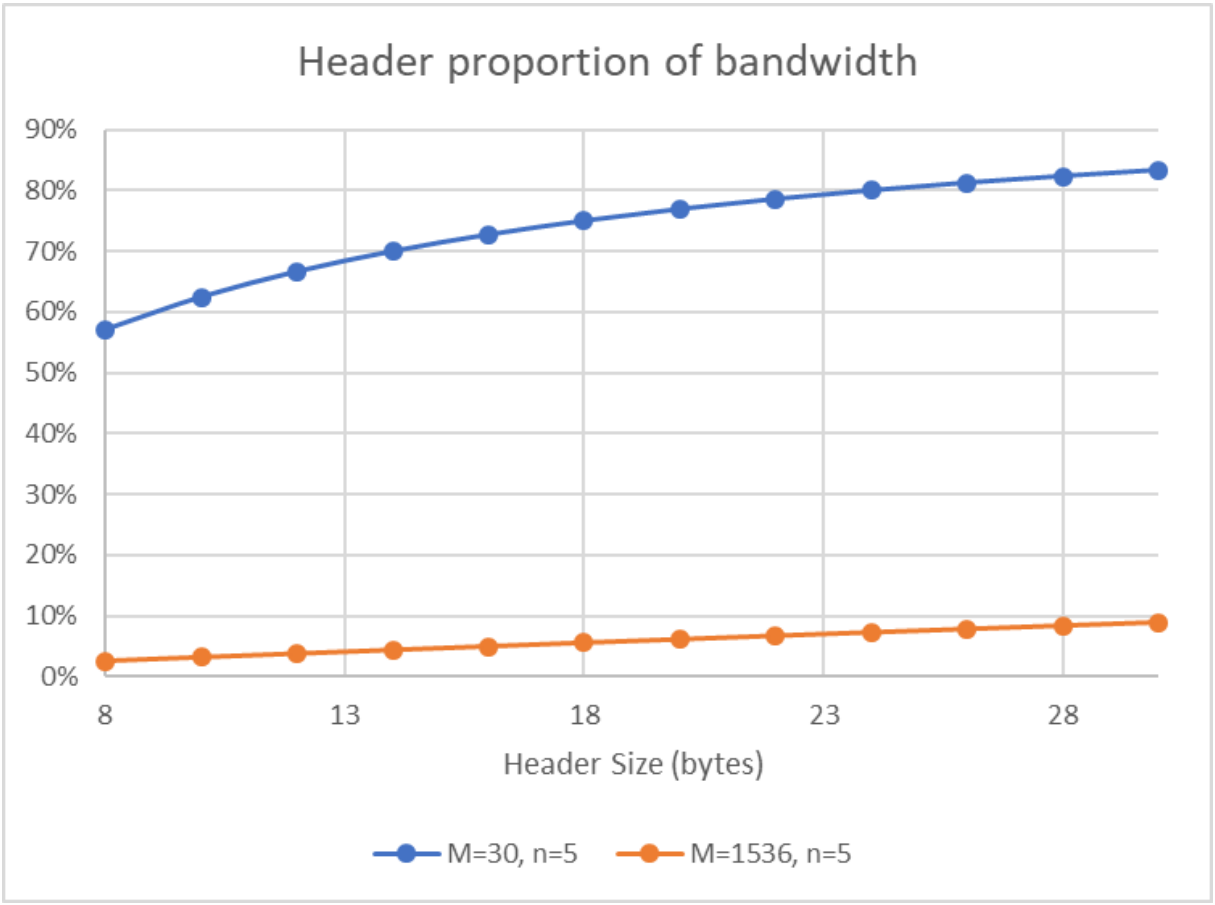
Service Models, Application Layer: HTTP and Cookies 1. List two advantages and two disadvantages of having international standards for network protocols. - Advantages: - you are able to produce a system with global interoperability, without being locked into proprietary systems - focus on interfaces - easier maintenance and installation - standards provide a framework that allows engineers to approach development with well defined boundaries about which layer of the stack they are interacting with - Disadvantages: - very slow to develop, and cumbersome bureaucracy, meaning that non-standardised solutions may appear and dominate prior to any standard being released - you may be locked into a system with inferior performance (per some metric) as a result of a) satisfying the needs of a large group rather than the specific needs of a particular project; or b) due to technology moving faster than the standards 2. Suppose the algorithms used to implement the operations at layer k are changed. Do the implementations of the operations at layers $k-1$ and $k+1$ need to change accordingly? - ideally, neither of the implementations would change assuming that the API on each interface does not change. However, if the implementation is not “pure” (i.e. it crosses multiple layers), then the crossed layers may also need modifications 3. Suppose there is a change in the service (set of operations) provided by layer k. How does this impact services at layers $k-1$ and $k+1$? - this will not affect layer $k-1$, since it is providing services to layer k, however it will affect layer $k+1$, since the services provided to it are changing 4. Suppose that an application generates a message of length M bytes and there are n lower layers each of which adds a h-byte header. What fraction of the network bandwidth is filled with headers? - $\frac{nh}{nh+M}$

Optional: To give yourself a feeling for the role of overheads, - plot this for M = 100, h = 20 and N ranging



from 2 to 7.

- Plot it again for M = 30, n = 5 and h ranging from 8 to 30. - Plot it again for M = 1536, n = 5 and h ranging



from 8 to 30.

5. List five non-proprietary Internet applications and the application-layer protocols that they use. (Search beyond the lecture notes.)

- File transfer e.g. FileZilla: FTP
- Any email client: SMTP
- Putty: SSH
- the web e.g. Firefox: HTTP
- time synchronisation: NTP (Network time protocol)
- network management; collating log files and modifying device behaviour: SNMP (Simple network management protocol)
- remote: telnet

6. Consider an e-commerce site that wants to keep a purchase record for each of its customers. Describe how this can be done with cookies.

- user makes HTTP GET request to website a.com
- a.com responds with HTTP response with Set-Cookie: field

7. Consider the following string of ASCII characters that were captured by Wireshark when the browser sent an HTTP GET message (i.e., this is the actual content of an HTTP GET message). The characters $\langle cr \rangle \langle lf \rangle$ are carriage return and line-feed characters Answer the following questions, indicating where in the HTTP GET message below you find the answer.

```
1  GET /people/index.html HTTP/1.1<cr><lf>
2  Host: cis.unimelb.edu.au<cr><lf>
3  Connection: keep-alive<cr><lf>
4  Cache-Control: max-age=0<cr><lf>
5  Upgrade-Insecure-Requests: 1<cr><lf>
6  User-Agent: Mozilla/5.0 (Windows NT 6.1; Win64; x64)
7  AppleWebKit/537.36 (KHTML, like Gecko) Chrome/64.0.3282.186 Safari
       /537.36<cr><lf>
8  Accept: text/html,application/xhtml+xml,application/xml;q=0.9,
9  image/webp,image/apng,*/*;q=0.8<cr><lf>
10 Accept-Encoding: gzip, deflate<cr><lf>
11 Accept-Language: en-AU,en;q=0.9<cr><lf>
12 <cr><lf>
```

- a. What is the URL of the document requested by the browser?
  - http://cis.unimelb.edu.au/people/index.html from lines 1 and 2
- b. What version of HTTP is the browser running?
  - HTTP 1.1 from line 1
- c. Does the browser request a non-persistent or a persistent connection?
  - persistent (keep-alive), line 3
- d. What is the IP address of the host on which the browser is running?
  - IP addresses not provided in response headers
  - Not listed, requires DNS resolution for cis.unimelb.edu.au
- e. What type of browser initiates this message? Why is the browser type needed in an HTTP request message?
  - chromium: implements for everything
  - they implement features differently so you may need to be served slightly different content for compatibility

8. True or false?

- a. A user requests a Web page that consists of some text and three images. For this page, the client will send one request message and receive four response messages.

  - False: four requests and four responses, but assuming on HTTP >= 1.1 then likely only one connection established

- Two distinct Web pages (for example, http://cis.unimelb.edu.au/research/ and http://cis.unimelb.edu.au/people can be sent over the same persistent connection.
  - True: they are on the same server.
- With non-persistent connections between browser and origin server, it is possible for a single TCP connection to carry two distinct HTTP request messages.
  - False: connection closes at the end of a request.
- The Date: header in the HTTP response message indicates when the object in the response was last modified.
  - False: indicates datetime message was sent
- HTTP response messages never have an empty message body.
  - False: e.g. Statuscode 204: no content; must not include a message body; also redirects