



THE UNIVERSITY OF
MELBOURNE

Workshop1

COMP90007 Internet Technology

Prepared by: Chenyang Lu (Luke)





Your Tutor

Chenyang Lu (Luke)

- Email: chenyang.lu@unimelb.edu.au
- Workshop Slides: <https://github.com/LuChenyang3842/Internet-technology-teaching-material>

Day	Time	Location
Tue	18:15	Bouverie st –B114
Wed	10:00	Elec Engineering -122
Wed	17:15	Bouverie-sr 132



Your Tutor

Chenyang Lu (Luke)

- Graduate from Monash University (First Class Honor, Dean Honor's List 2017)
- Current Master of IT Student in Melbourne University (Dean Honor's List 2018)
- Java Demonstrator (2019 Semester1)
- Currently a full-stack developer at a startup



Before the workshop

- You are expected to **finish all the lab exercise** before coming to the lab.
- The lab exercise will not be marked.
- The lab exercise is **Important**
- You are encouraged to interrupt me anytime when you have questions

Internet Technology is an important subject!



A quick survey



Teaching style

- In the first few weeks, I will try to speak slowly to make sure everyone can catch up
- The workshop will follow the lab questions but with supplementary of lecture content



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Lab Tasks (Wireshark)



Object

Get a basic sense of what's happening in network

- Examine IP (Internet Protocol) in detail
- Examine HTTP(HyperText Transfer Protocol) in detail
- Examine TCP(Transmission Control Protocol) in detail



Tool we will use in this workshop

Wireshark

- Capture the network packet and provide detail information
- Pre-installed in lab PC

Wget

- Download HTML file
- Pre-installed in lab PC

You are encouraged to use Lab PC. But if you prefer to use your own labtop, follow the instruction in lab material to download the software.



Task4: Step – by - step

1. Close all browsers and other applications
2. Open Wireshack (pre-installed in lab PC)
 - Capture → option (Menu bar)
 - Untick “Enable promiscuous mode on all interface”
 - Tick “wifi” or “Local Area connections”, Untick the rest
 - Click on Capture filter , type “tcp port http”
3. Open terminal or command prompt, type “wget www.google.com” (don’t press enter yet!)
4. Go back to wireshark , press start
5. Immediately Go back to CMD, press enter
6. Go back to wireshark, stop capturing the traffic



Lab questions

Some concepts

1. What is Ip address?

A numerical label assigned to each device connected to a computer network

3. What is TCP?

TCP is one of the main protocols in TCP/IP networks

Establish Connection between two hosts.

It manages flow control and handles retransmission.

2. What is HTTP used for?

HTTP is the underlying protocol used by the World Wide Web and this protocol defines how messages are formatted and transmitted



Question 5.1

- **What is the source IP address of your computer?**
- **What is the destination IP address of the web page you requested?**

To get IP address of your computer:

For windows:

- in cmd: type “ipconfig”

For macOS:

- In terminal: type: ‘ifconfig’
- alternatively: use spot, search network utilities



Question 5.5

- Are you able to identify other packets apart from the HTTP GET request and response packets in your capture?
- What might these packets be used for?
- SYN (synchronize)
- ACK (acknowledgement)
- FIN (Finish)



Question 5.2

- **How much traffic in bytes in total was received and transmitted in your request for the Unimelb web page?**
- **What is the percentage of traffic that originated from your computer, and what is the percentage of traffic that was sent by the remote host?**

Export csv and use excel to sum up the traffic



Question 5.3

- **How do these sizes compare with the file size of the web page you downloaded?**
- **Estimate the download protocol overhead, or percentage of the download bytes taken up by protocol overhead.**

Larger than file size for two reasons:

- Extra packets
- Protocol Overhead

Question 5.3

- How do these sizes compare with the file size of the web page you downloaded?
- Estimate the download protocol overhead, or percentage of the download bytes taken up by protocol overhead.

HTML file size: 11325 bytes

total traffic: 13177 bytes

$$\begin{aligned}\text{Percentage of protocol overheads} &= (\text{total traffic} - \text{HTML file size}) / \text{total traffic} \\ &= (13177 - 11325) / 13177 \\ &= 26.59\% \text{ (not accurate!!)}\end{aligned}$$

Question 5.4

- **What are the protocol overheads used for?**
- **Why are they useful? Aren't they a waste of space?**
- Protocol overhead allows each layer in the networking architecture perform their own particular service
- For example, networking layer header have source address ip and destination address ip. The header is encapsulated in networking layers to keep networking function separate from other layers
- Overhead can be reduced but it can not be avoid !

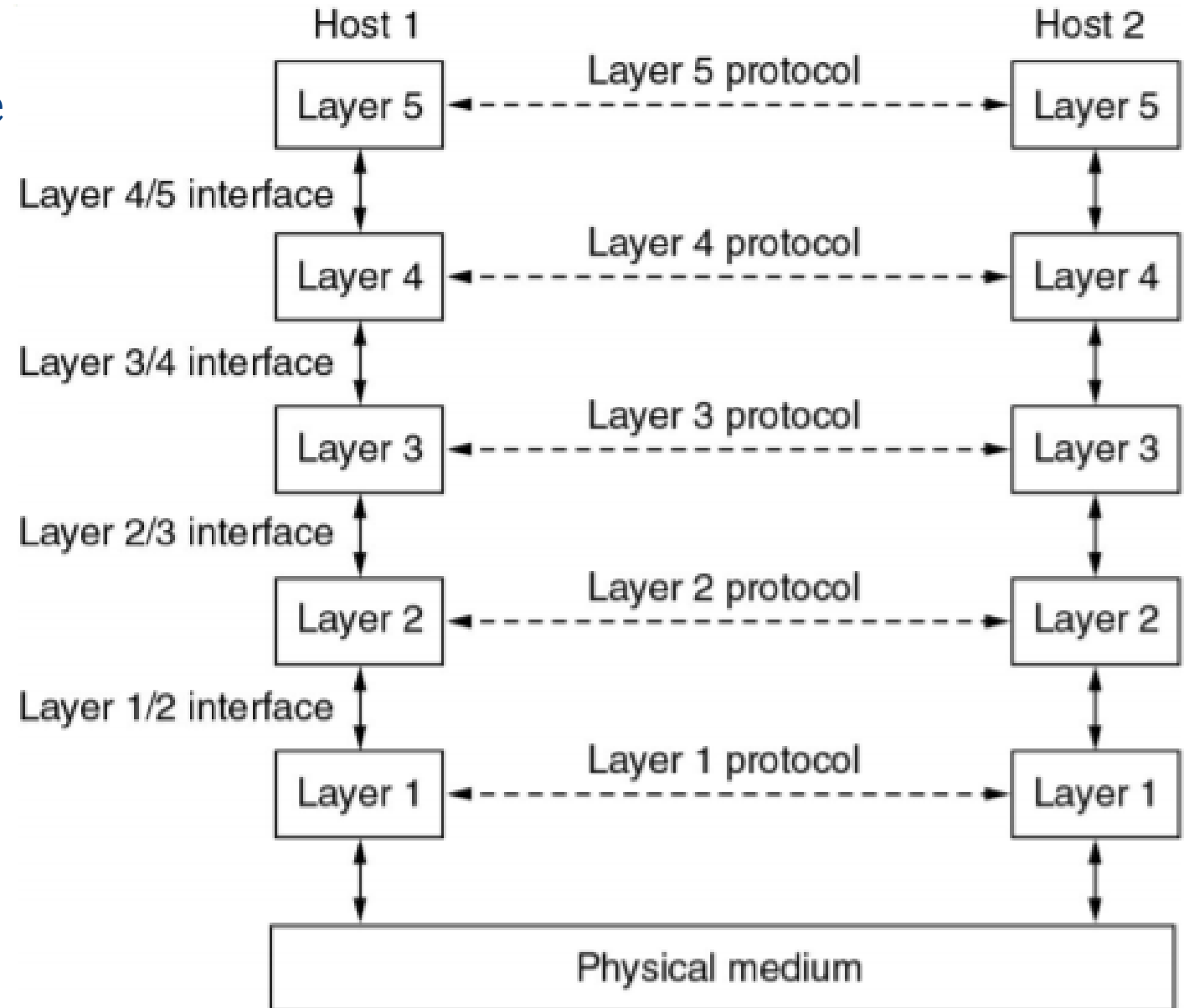


Question 5.6

- How does the protocol overheads relate to the networking layering architecture you have seen (or will see) in class?
- Is this architecture efficient?
- Advantage and disadvantage?

Layered Architecture

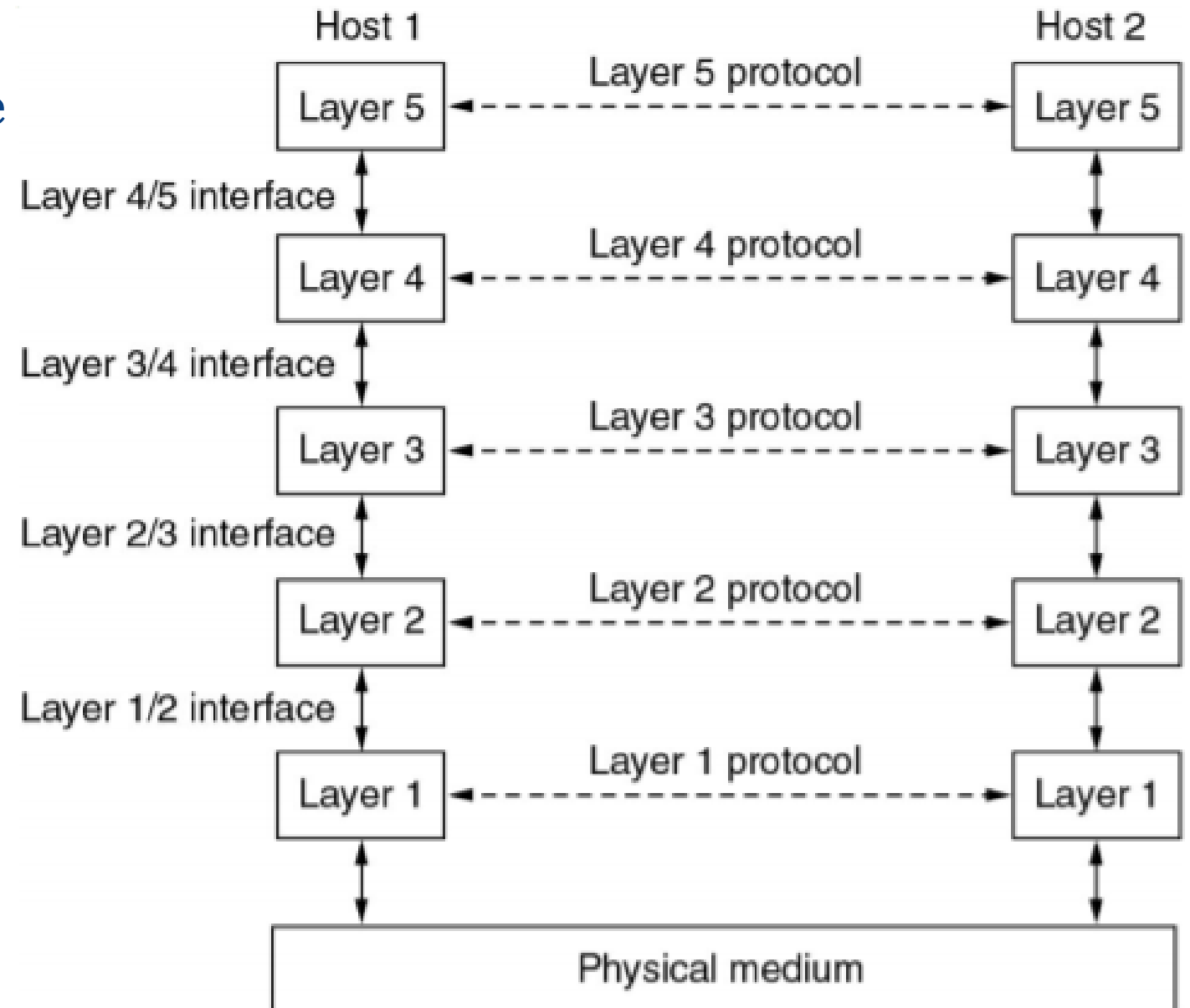
1. Machine at Same Layer are called peers
2. Inter-layer exchanges are conducted according to a protocol
3. Each layer offers service to layers above it (through interface)



Layered Architecture

Advantage?

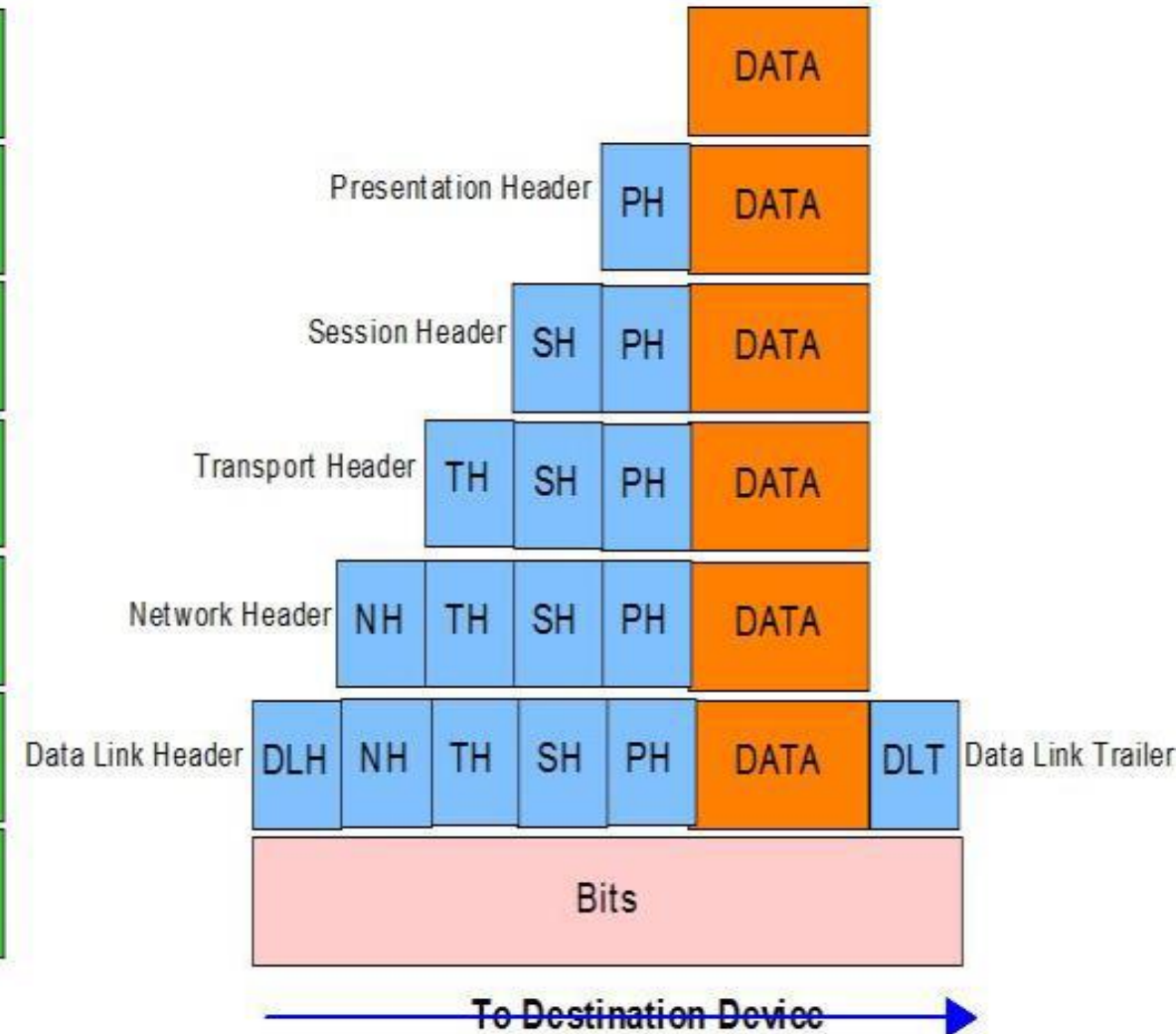
Disadvantage?



Overhead is associated with each protocol in each layer.



Encapsulation





Question 5.6

How does the protocol overheads relate to the networking layering architecture you have seen (or will see) in class? Is this architecture efficient? What are the advantages of this 'layered-cake' architecture? What are the disadvantages?

- Each layered are associated with its' own protocol overheads

Advantage:

- Information Hiding
- Flexibility
- Maintainability

Disadvantage:

- Less efficient
- Result in more overhead (information transferred needs to be split in many packets)



Question 5.7

- Calculate the inter-arrival times (IAT) of the packets, i.e. the time between each packet arrival.
- Plot the number of packets against the IAT. What sort of distribution do you observe?

Arrival time : Clock time of arrival (wireshark)

Inter-Arrival Time: time between successive arrivals

Question 5.7

- **Plot the number of packets against the IAT. What sort of distribution do you observe?**

For this question, you would have needed to plot a histogram, i.e. on the x-axis is a bin for a certain range of IATs, and on the y-axis the number of packets which fall into each particular bin. You should observe an exponential distribution. Feel free to use your favourite scientific computing/plotting package (Excel, MATLAB, Python, Mathematica, pen and paper, etc.).

Inter-arrival Time	Number of packets
0-1	2000
2-3	1800
3-4	500