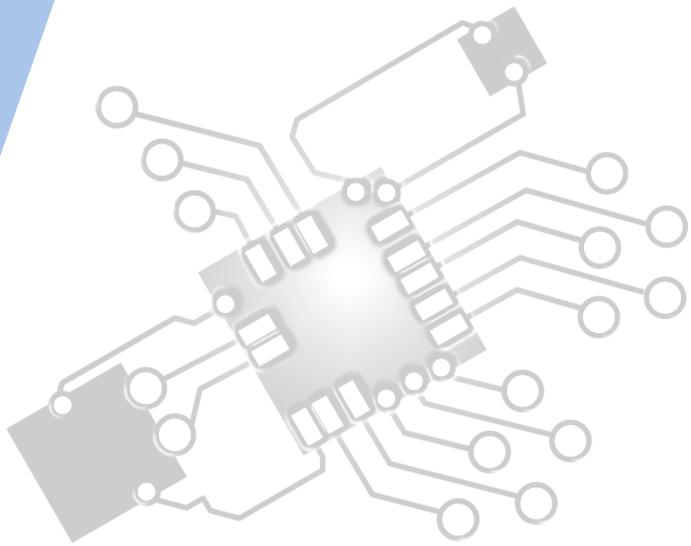
Data transmission

IB Computer Science



Content developed by
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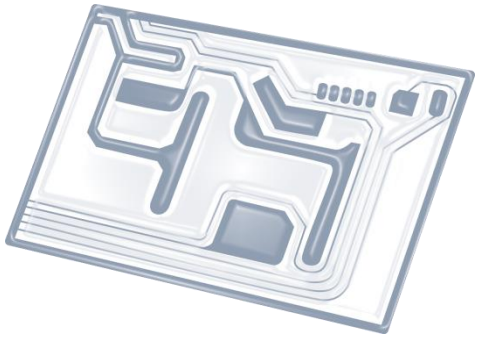
HL Topics 1-7, D1-4



1: System design

2: Computer Organisation

3: Networks

4: Computational thinking

5: Abstract data structures

6: Resource management

7: Control

D: OOP

HL & SL 3 Overview

Network fundamentals

3.1.1 Identify different types of networks

3.1.2 Outline the importance of standards in the construction of networks

3.1.3 Describe how communication over networks is broken down into different layers

3.1.4 Identify the technologies required to provide a VPN

3.1.5 Evaluate the use of a VPN

Data transmission

3.1.6 Define the terms: protocol, data packet

3.1.7 Explain why protocols are necessary

3.1.8 Explain why the speed of data transmission across a network can vary

3.1.9 Explain why compression of data is often necessary when transmitting across a network

3.1.10 Outline the characteristics of different transmission media

3.1.11 Explain how data is transmitted by packet switching

Wireless networking

3.1.12 Outline the advantages and disadvantages of wireless networks

3.1.13 Describe the hardware and software components of a wireless network

3.1.14 Describe the characteristics of wireless networks

3.1.15 Describe the different methods of network security

3.1.16 Evaluate the advantages and disadvantages of each method of network security

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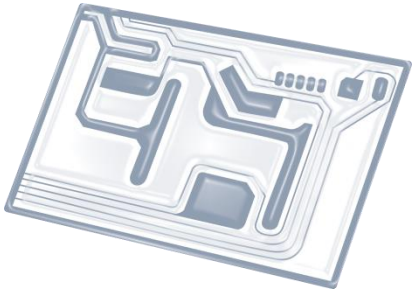


Topic 3.1.8

Explain **why** the **speed of data transmission** across a network can **vary**

Connection speed averages

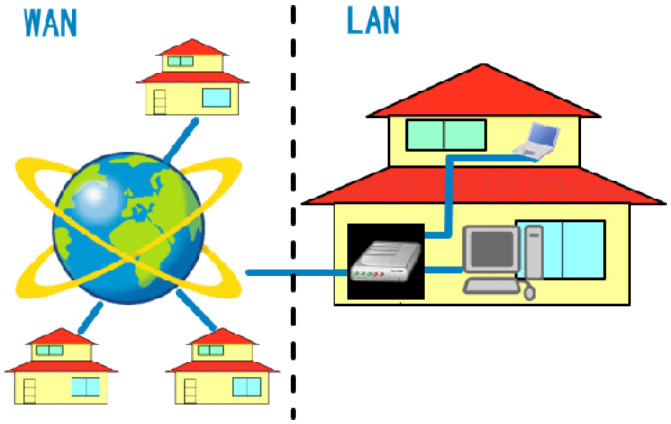
- **Dedicated LAN connections**
  - UTP Copper cable (100Mbps)
  - Fibre optic cable (5-100Gbps)
  - WiFi (10-150Mbps)
- **Broadband (WAN) connections**
  - DSL (2-16Mbps)
  - Fibre optic (20-100Mbps)
  - 3G (± 1 Mbps)
  - 4G (± 20 Mbps)

Warning! Network ≠ Internet

When talking about network speeds, we often only think of Internet connection speeds.

This curriculum point talks about **network transfers IN GENERAL**, not just those that measure Internet connectivity.

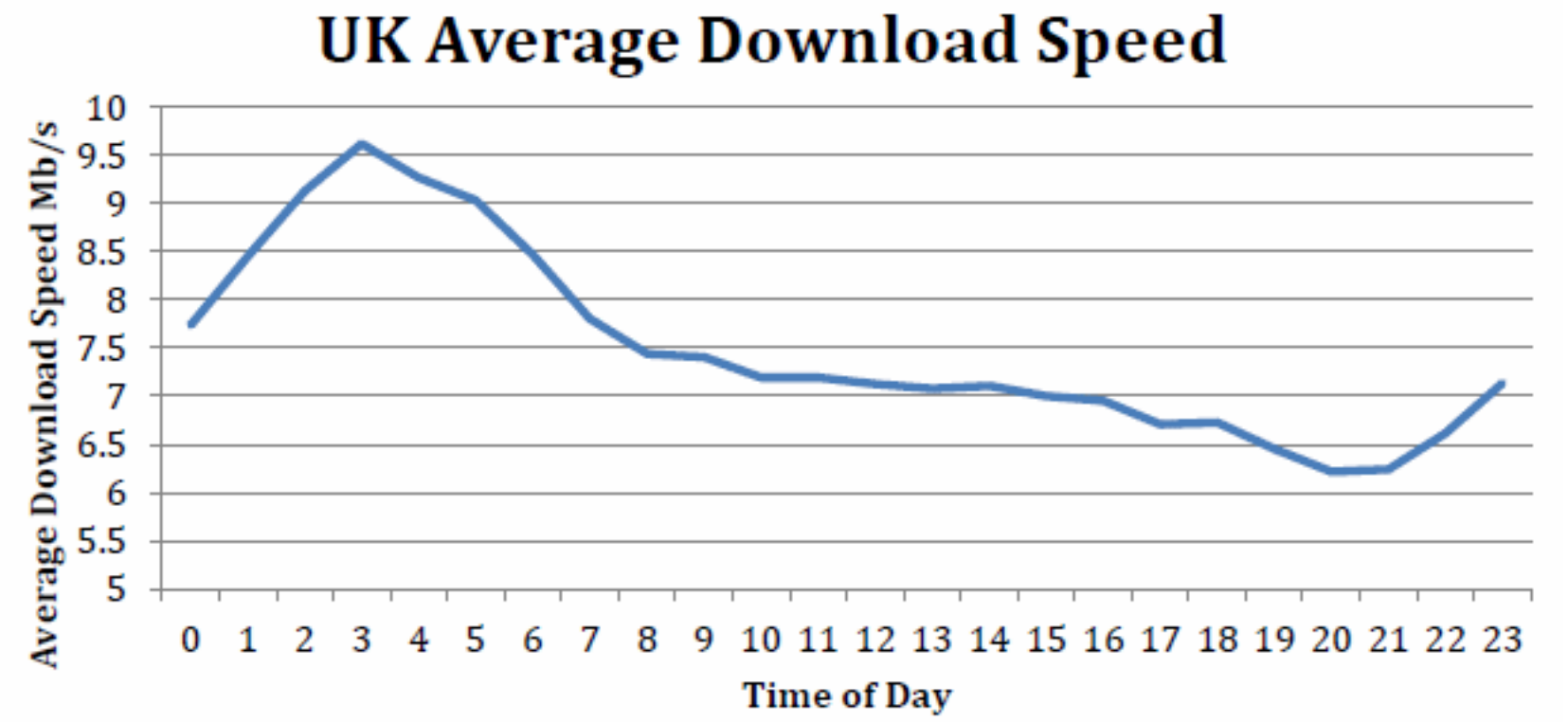
Remember to think of situations like **Wi-Fi networks in an office**, **school networks accessing a shared storage space**, etc.



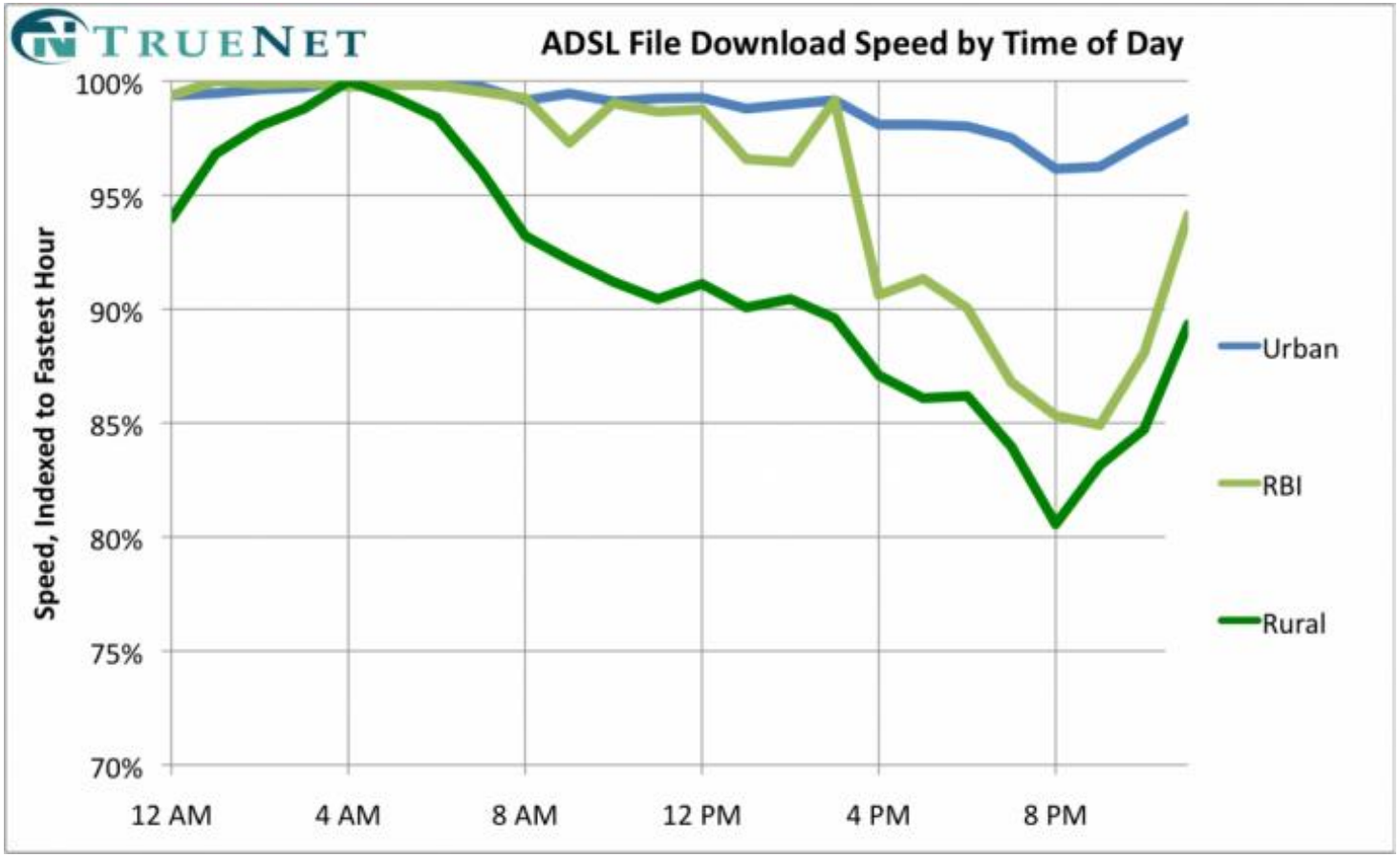
Primary concept: Traffic

- The primary concept is that speeds vary due to **traffic**.
- The **more network traffic**, the **slower the data transfer** on a particular connection will be.

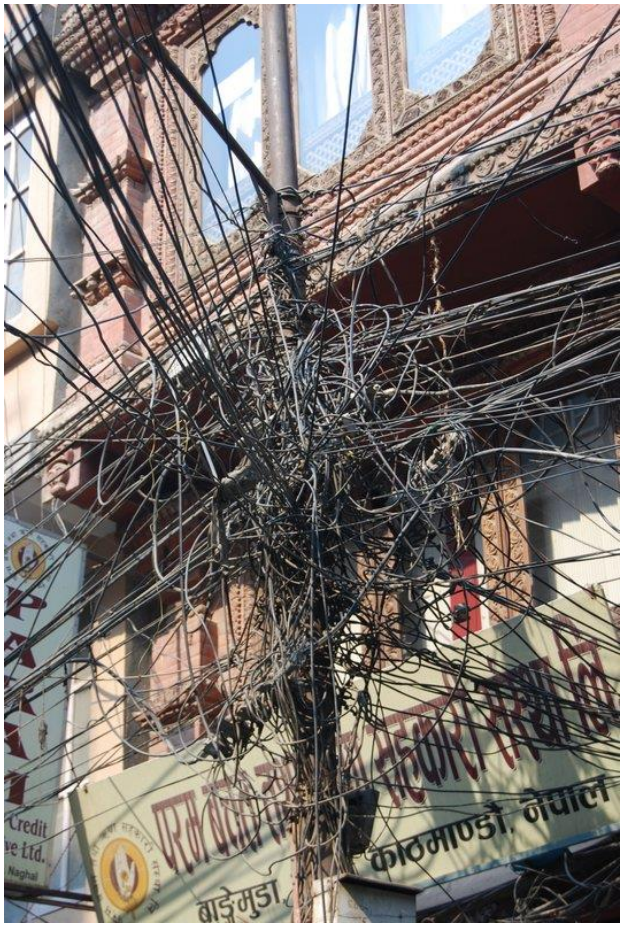
Secondary causes: Time of day

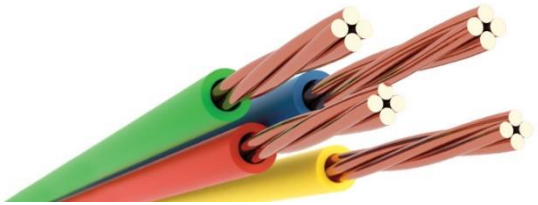


Secondary causes: Distance



Secondary causes: infrastructure





Tertiary causes of speed variance

- Environmental issues (like temperature, interference, etc.)
- Infrastructure limitations due to financial reasons (cheaper equipment, etc.)
- The type of data being transmitted (large files, streaming data, etc.)