



Planning & system installation

IB Computer Science



Content developed by
Dartford Grammar School
Computer Science Department



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 3.1.14

Describe the **characteristics** of **wireless networks**



Types of wireless networks





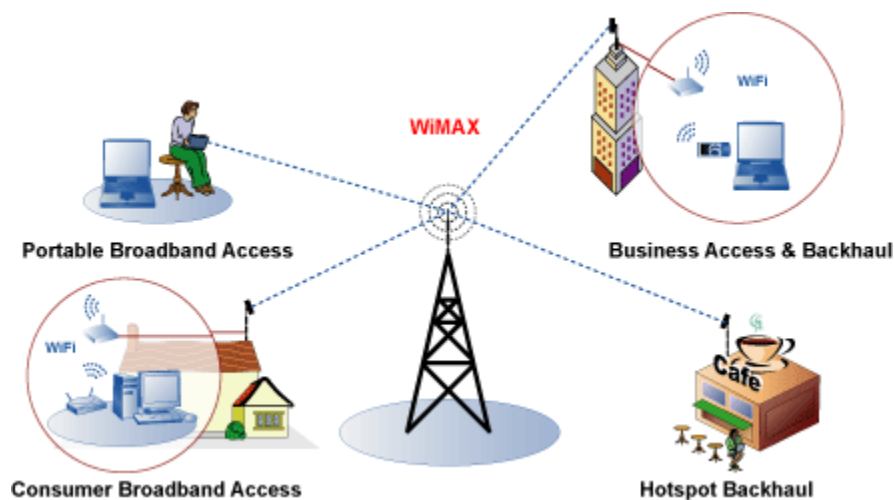
WiFi (Wireless Fidelity)

- Also called **Wireless LAN (WLAN)**
- Used in **laptops/mobile devices** to connect wirelessly to home network
- Most preferred network type to implement a home network
- Allows relatively slow to fast data transmissions (depending on the version)
- **Backwards compatible** with most older WiFi standards (a/b/g/n)
- **Small transmitting radius** makes it suited for homes, usually <20m

WiMAX



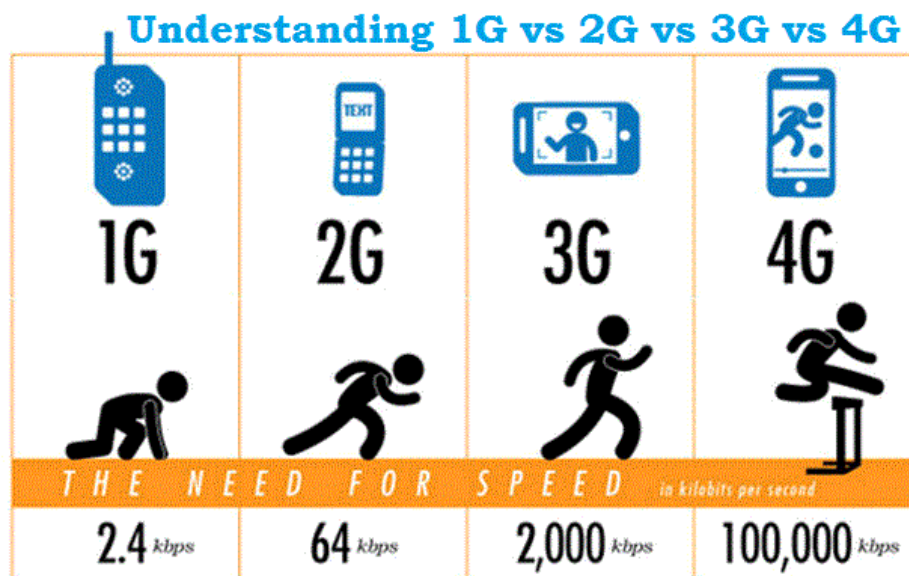
- **WiMAX = Worldwide Interoperability for Microwave Access**
- Designed for **large distance** high speed internet access
- Relatively cheap method of providing internet over a large area - suited for **poorer countries**
- Rivalled by **Long Term Evolution (LTE)** standard
- Can be used as a form of wireless variant of DSL phone transmission lines



3G (Third Generation)



- The primary way **mobile phones** access the internet today
- Allows the tunnelling of phone lines (mobiles don't have to switch back to phone network when receiving a call)
- Relatively fast



Generation	Speed	Technology	Features
2G	9.6/14.4 kbps	TDMA, CDMA	2G capabilities are achieved by allowing multiple users on a single channel via multiplexing. 2G enabled mobile phones can be used for data along with voice communication.
3G	3.1 Mbps (peak) 500-700 Kbps	CDMA 2000 (1XRTT, EVDO) UMTS, EDGE	3G provides amazing internet browsing speeds. Opens the door to a whole bag of opportunities with video calling, video streaming, etc. In 3G, universal access and portability across different device types are made possible. (Telephone & PDA's)
3.5G	14.4 Mbps (peak) 1-3 Mbps	HSPA	3.5G supports even higher speeds and enhances higher data needs.
4G	100-300 Mbps (peak) 3-5 Mbps	WiMAX LTE	Speeds for 4G are increased to lightning fast in order to keep up with data access demand used by various services. It also supports HD streaming. HD phones can be fully utilized on a 4G network.

3G vs 4G

HOW 3G COMPARES TO 4G ACROSS A RANGE OF EVERYDAY MOBILE ACTIVITIES

DOWNLOADING
A GAME (20MB)

4G

25 seconds



3 minutes

3G

STREAMING
MUSIC

4G

1 second buffer



10 second buffer
possible disruption
during playback

3G

STREAMING
SD VIDEO

4G

1 second buffer



20 second buffer
possible disruption
during playback

3G

STREAMING
HD VIDEO

4G

30 second buffer



1-5 minute buffer
disruption during
playback

3G

UPLOADING
AN IMAGE

4G

1 second



25 seconds

3G

