

Design and Technology M3 Midterm Exam Short

Networks

A **mobile network** is an important technological part of our life. It allows us to communicate with other people that are not close to us, send messages, make calls and it gives us access to the internet on the go. Mobile networks are divided into **Generations (G)**. Currently we have 4 generations and the 5th generation is coming soon.

First generation (1G) – Uses analog signal which has a poor signal and sound quality. Calls were not encrypted which means that other people could listen to our calls.

Second generation (2G) – Uses digital signal and calls are encrypted. We can send SMS and MMS. Internet was introduced to mobile phones with speed of 9.6kbit/s. By end of 2G era we got EDGE technology which improved the internet speed up to 500kbit/s

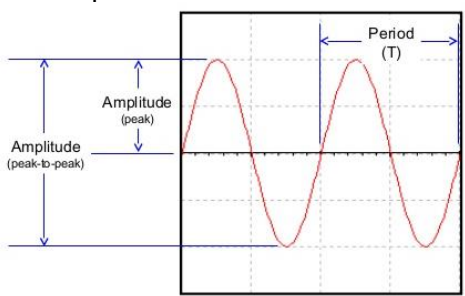
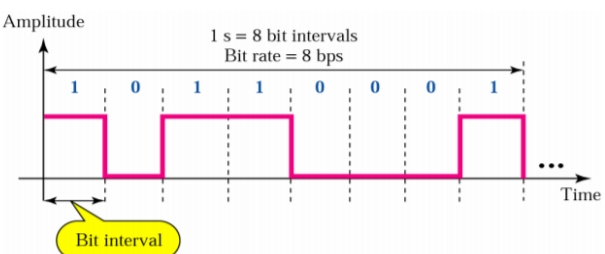
Third generation (3G) – Users can access the internet from any location in the world as the “data packets” were standardized. It allowed international roaming. Speeds as 4 times faster than on 2G. New technologies such as video conferencing, video streaming, VOIP...

Fourth Generation (4G) – Faster mobile internet, up to 1 gigabit/s, new mobile devices. Standard for mobile networks but not all areas are covered with it.

Fifth Generation (5G) – Focuses on Internet of Things (IoT). Phones will not be any more just a device for communication, but a device with sensors that will be connected to the network. It will solve the

Signals

A signal is an electromagnetic or electrical current that is used for carrying data from one system or network to another. In electronics and telecommunications, it refers to an electromagnetic wave which carries information.

Types of signals	
Analog	Digital
<ul style="list-style-type: none">- An analog signal is a continuous time-varying value represents another time-based variable- An analog signal is defined by 3 values<ul style="list-style-type: none">o Amplitude (A) – highest level (peak)o Period (T) – time that it takes to make a full cycleo Frequency (F) – How many periods per 1 sec  <p>Frequency: $F = \frac{1}{T} \text{ Hz}$</p>	<ul style="list-style-type: none">- A signal that is used to represent data as a sequence of separate values at any point in time.- A digital signal is defined by 3 values<ul style="list-style-type: none">o Amplitude (A) – highest level (peak)o Bit interval [sec]– time that it takes to send one bito Bit rate [bps]– How many bits are sent per one second 

For more information about the signals watch the video on E-learning. On the exam you will have to draw both analog and digital signals.

Effects of 5G

5G has been applied in a wide variety of fields such as automotive and home appliances. It will soon start to expand into other industries which will bring changes in our lives. Changes will be both positive and negative.

Impact on Economy	
Positive	Negative
<ul style="list-style-type: none">- Internet network is more stable with higher speeds- Brings more automatization and robots to industries for a higher productivity- Smaller businesses have more ways to distribute products and services- In agriculture it can increase the production (Smart farms)	<ul style="list-style-type: none">- People that are unable to adapt to technology will have a lower or no income- Some industries will have to be closed if they cannot adapt to new technology- Small farmers will not be able to compete with bigger farms- Agriculture product prices may increase as a result of new technology

Impact on Society	
Positive	Negative
<ul style="list-style-type: none">- Helps solve problem of remote surgery and healthcare- Faster data transfer which helps autonomous vehicle system to develop faster- Internet signal covers more areas and the increased speed eliminates the limit of some technologies	<ul style="list-style-type: none">- More robots will be used in the industry and the poor-quality workers won't be needed anymore- Easier to violate and break computer laws- Less people interact with others which causes problems in families- Online scams can happen easier

Impact on Environment	
Positive	Negative
<ul style="list-style-type: none">- Can be used for real-time and accurate air quality monitoring- Connection with smart farms to control and save resources- Speed and continuity of data transfer will make information technology more efficient	<ul style="list-style-type: none">- Old devices that can not support 5G will have to be replaced and they will become e-waste- E-waste will become a big problem in the future if we do not find a way to deal with it