

Willkommen im ZUMpad!

Auf diesem Pad wird der Text beim Schreiben gesichert und synchronisiert. Das erlaubt den Teilnehmern in Echtzeit (d.h. kollaborativ) zusammenzuarbeiten!

Arbeitsauftrag:

1. Phase (Stammgruppen): Schaut euch das Video in eurer Gruppe an und beantwortet gemeinsam die folgenden Fragen. Klärt untereinander offene Fragen. Jedes Gruppenmitglied sollte später dazu in der Lage sein, das Themengebiet den anderen Gruppen erklären zu können.

2. Phase (Expertengruppen): Nun teilt sich eure Gruppe auf, sodass in jeder neuen Gruppe immer mind. 1-2 Personen von jedem Themengebiet vertreten sind. Ihr erklärt euch nacheinander, was ihr gelernt habt und beantwortet gegebenenfalls Fragen. Macht euch Notizen, um danach in der Präsentationsphase **das Thema einer anderen Gruppe** erklären zu können.

3. Phase (Präsentationsphase): Im Plenum werden die Ergebnisse besprochen. Die Stammgruppen tragen jeweils **das Thema einer anderen Gruppe** vor. Alle Gruppen kontrollieren sich gegenseitig & ergänzen gegebenenfalls fehlende Informationen.

## Gruppe 1: Wires, Cables & Wifi

Video: <https://www.youtube.com/watch?v=ZhEf7e4kopM>

1. Explain:

Bits & how bits are sent: bit= a pair of opposites, in this case 1 (on) and 0 (off), binary information is sent via machines using electricity, light and radio waves

problem: how can you detect multiple ones or zeros? you introduce a clock/ timer

Bit rate: actual bits/second that are transmitted

Bandwidth: maximum number of bits per second allowed by the transmission medium

Latency: duration from sending a bit to the arrival of this bit

2. There are 3 methods to send information: Explain the pros (+) & cons (-).

Method	Pro	Con
Electricity	Cheap	Signal loss
Light (Glasfaser)	Really Fast No Signal Loss	Expensive Hard to work with
Radio	Totally Mobile	Short Range

3. How do we send information wirelessly?

We are connected to a Wireless-Router which emits a Radiosignal through which we can send Information to the Wireless-Router. From the Router the Information is sent per physical transformation-forms (Electricity and Light) over the earth.

## Gruppe 2: IP Addresses & DNS

Video: <https://www.youtube.com/watch?v=5o8CwafCxnU>

1. What invention led to the development of the internet? Who invented it?

Internetworking Protocol, invented in 1970s by Vint Cerf and Bob Kahn

2. Explain:

ISP: Internet Service Provider --> e.g. Telekom, provide you with an IP address, can connect you to other devices via networks

IP address: Internet Protocol Address --> address unique to each device, comparable to a home address

DNS (& how DNS servers are connected): Domain Name System --> associates domain names with their respective IP addresses, split up responsibility

DNS Spoofing: matching domain name with a wrong IP address --> redirecting to a wrong website

3. Choose a website which your group wants to visit (e.g. Facebook, Youtube, Google, etc.) and explain step-by-step how this process works.

(Use these terms: laptop, DNS, wifi router, internet, IP address, ISP)

The ISP provides you with an IP address.

Your laptop is connected to the internet through a wifi router.

You enter the domain name (e.g. google.com) into your browser.

The DNS associates the domain name with an IP address.

Now, you can connect to google.com.

### Gruppe 3: Packets, Routing & Reliability

Video: <https://www.youtube.com/watch?v=AYdF7b3nMto>

1. How is information transferred from one computer to another? Does it follow a fixed path? Yes or No? Explain.

No fixed path, but the path may change: information goes from one computer to another in so-called "packets" of information. These packets take different routes. Different kinds of (digital) information can be sent in these packets, even though there are limits. If there is too much information (in the form of bits), a packet can be split in several packets that each might take different ways to reach you. Each packet knows where it has to go because of the IP that it came from and the IP it is sent to.

2. Why are routers so important?

Routers are comparable to traffic managers, they move the packets through the networks. If one route is too full (congested), the packets will be diverted to another one. Without routers Data could not be transferred from one computer to another one that easily, since it is impossible (not practical) to transfer data directly from one computer to another one.

3. You want to send a selfie to your best friend. How does it work? Explain.

(Use these terms: IP, packets, routers, cheapest available path, at different times/out of order)

The selfie is sent from your phone and thereby has an IP address. As a packet of information, it is sent to your router. The router keeps track of the cheapest (= in regard to time, non-technical factors...maybe fastest) available path for each piece of data based on the destination IP address of the packet. It chooses a way for each individual packet. Because the packets might take different ways, they can arrive at different times and out of order.

4. Reliability is the key principle of the internet. How is it possible that all the data will be delivered? Give an example and explain.

Fault tolerance - if something goes wrong, other paths are available. There are many servers which allow an amount of different ways to get from one server to the destination. So if there are more servers on the way, the information packets can choose multiple ways if there's "much traffic" at one way. Thus the more servers there are the more opportunities the packets have and the more reliable the information will get to the destiny.

There's also an TCP (transmission control protocol) which controls whether all packages are there or not. So if you want to listen a song from spotify the song will get to your device in four or more packages. The TCP looks whether all packages arrived. If all packages are there it sends them to your device and you are able to listen to the song. If there are packages missed it stops the process and asks spotify to send the missing packages. Then there is a new monitoring. If then all packages are there you can listen to the song.