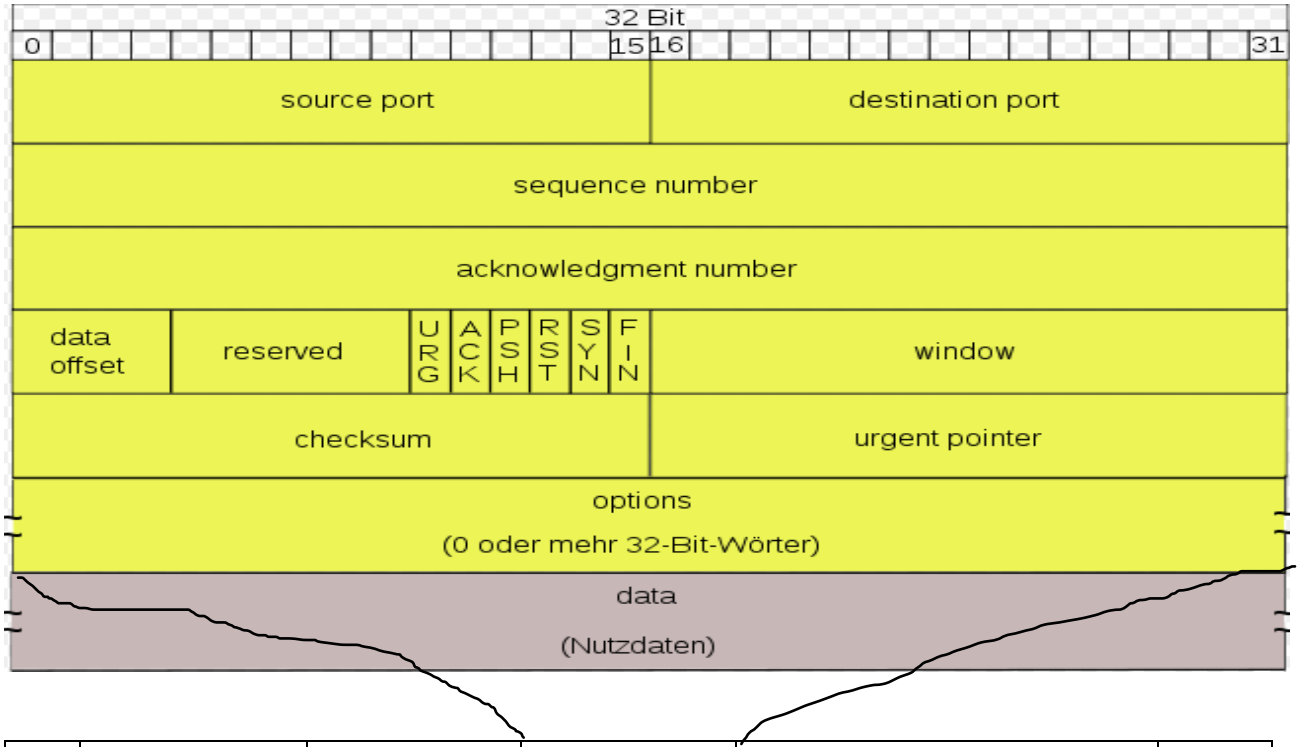
Der Transport – Layer unterscheidet zwei wesentliche Protokolle: TCP und UDP.

<u>Erarbeiten</u> Sie im Folgenden die wesentlichen Unterschiede zwischen beiden Protokollen.

Aufgabe 1: TCP

TCP-Header



PA	Frame-Header	IP-Header	**TCP-Header**	Nutzdaten	CRC

- Erläutern Sie den Begriff *verbindungsorientiert* (connection-oriented). Gehen Sie dabei auch speziell auf die Aufgaben *Reassembling Segments* und *Reliable Delivery* aus Lernsituation 6a ein

Bevor die Nutzdaten gesendet werden können muss erst eine Verbindung aufgebaut werden (3-Way-Handshake).

Durch Sequenznummer und Acknowledgementnummer können die Segmente in der richtigen Reihenfolge und vollständig zusammengesetzt werden.

verbindungsorient

- Was versteht man unter dem *Destination Port*?

Port der Ziel-Anwendung

Destination Port

- Was versteht man unter dem *Source Port*? (siehe auch Text Port-Adressierung)

Port der Quellanwendung

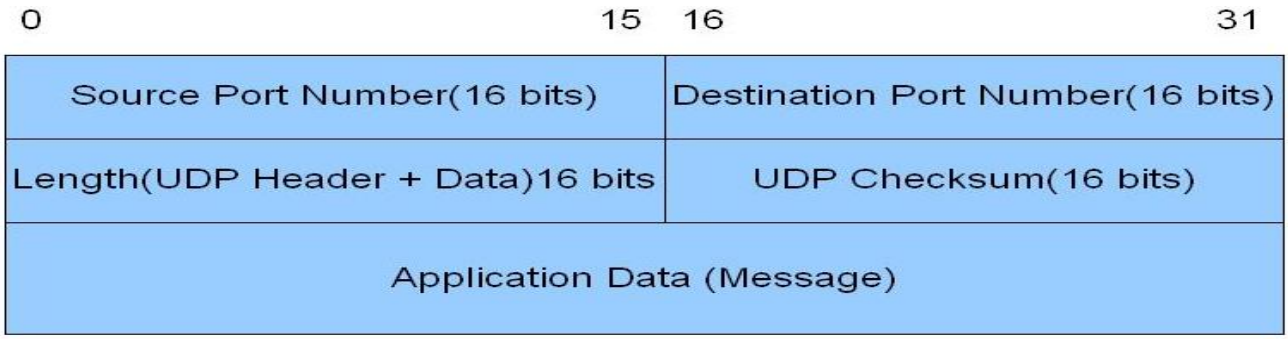
Source Port

- Nennen Sie Anwendungen, die TCP als Transportprotokoll benutzen.

Alle zuverlässigen Anwendungen wie: Mail, Webseiten, Dateien

Aufgabe 2: UDP – User Datagram Protocol

UDP – Header



PA	Frame-Header	IP-Header	**UDP-Header**	Nutzdaten	CRC

- Erläutern Sie den Begriff **verbindungslos** *(connection-less)*. Gehen Sie dabei auch speziell auf die Aufgaben *Reassembling Segments* und *Reliable Delivery* aus Lernsituation 6a ein.

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verbindungslos

- Nennen Sie Anwendungen, die UDP als Transportprotokoll benutzen.

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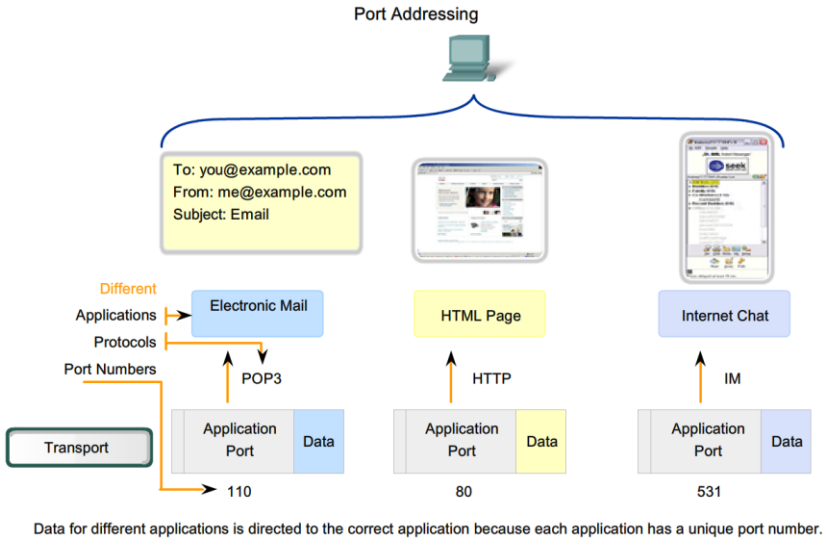
Aufgabe 3: Port-Adressierung



Data for different applications is directed to the correct application because each application has a unique port number.

Consider the earlier example of a computer simultaneously receiving and sending e-mail, instant messages, web pages, and a VoIP phone call.

The TCP and UDP based services keep track of the various applications that are communicating. To differentiate the segments for each application, both TCP and UDP have header fields that can uniquely identify these applications. These unique identifiers are the port numbers. In the header of each segment, there is a source and destination port. Server processes have static port numbers assigned to them, clients dynamically choose a port number for each conversation.

When a client application sends a request to a server application, the destination port contained in the header is the port number that is assigned to the service running on the remote host. The client software must know what port number is associated with the server process on the remote host. For example, when a web browser application makes a request to a web server, the browser uses TCP and port number 80 unless otherwise specified. This is because TCP port 80 is the default port assigned to web-serving applications. Many common applications have default port assignments.

⇨ **Zusammenfassung der wichtigsten Informationen auf Deutsch:**

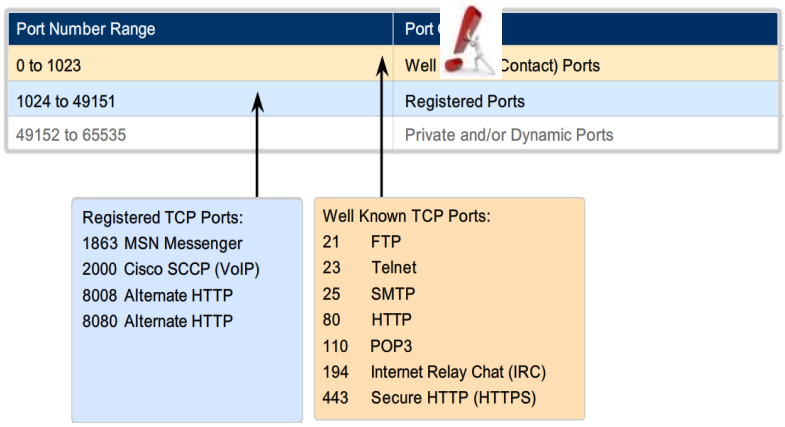
The source port in a segment header of a client request is randomly generated from port numbers greater than 1023. This port number acts like a return address for the requesting application. The Transport layer keeps track of this port and the application that initiated the request so that when a response is returned, it can be forwarded to the correct application. **The requesting application port number is used as the destination port number in the response coming back from the server.**

⇨ **Zusammenfassung der wichtigsten Informationen auf Deutsch:**

The combination of the transport layer port number and the Network layer IP address assigned is called a socket. A socket pair, consisting of the source and destination IP addresses and port numbers, is unique and identifies the conversation between the two hosts.

⇨ **Zusammenfassung der wichtigsten Informationen auf Deutsch:**

There are different types of port numbers:



Well Known Ports (Numbers 0 to 1023)

These numbers are reserved for services and applications. They are commonly used for applications such as HTTP (web server) POP3/SMTP (e-mail server) and Telnet. By defining these well-known ports for server applications, client applications can be programmed to request a connection to that specific port and its associated service.

Registered Ports (Numbers 1024 to 49151)

These port numbers are assigned to user processes or applications. These processes are primarily individual applications that a user has chosen to install rather than common applications that would receive a Well Known Port. When not used for a server resource, these ports may also be used dynamically selected by a client as its source port.

Dynamic or Private Ports (Numbers 49152 to 65535)

These port numbers are usually assigned dynamically to client applications when initiating a connection. It is not very common for a client to connect to a service using a Dynamic or Private Port.

⇨ **Zusammenfassung der wichtigsten Informationen auf Deutsch:**

Link:
A current **list of port numbers** can be found at **http://www.iana.org/assignments/port-numbers**.

Aufgabe 4: Erstellen Sie eine Liste der gängigsten Anwendungen und den entsprechenden Port-Nummern.

Anwendung	Port
•	•
•	•
•	•
•	•
•	•
•	•
…..	…..

Notizen: