Explain the role of the TCP/IP protocol and how it links to application layer protocols

A protocol is a way that two systems are able to transmit data to each other. Protocols come with a set of rules when it comes to transmitting data between other computers. There are many protocols used for being able to communicate between other computer systems, for example the most common protocols used are:

* Transmission Control Protocol (TCP)
* Internet Protocol (IP)
* Domain Name System (DNS)
* Hypertext Transfer Protocol (HTTP)
* File Transfer Protocol (FTP)
* Internet Message Access Protocol (IMAP)
* Point-to-Point Protocol (PPP)

These all have different sets of rules for being able to transmit data to and from computer systems using the internet.

The protocol that I will be explaining is the TCP/IP protocol. This protocol makes sure that when transferring data from one computer system to another, it will reach the precise address that you are sending the data to. For example if you are submitting personal data into a website using the internet, once you click submit, the TCP/IP protocol will make sure that the data you have submitted will reach the correct place to where the data is held, so in this case the company’s database.

Although the TCP/IP protocol is used together, it is made up of separate protocols. TCP being made to allow computer systems to communicate and transfer data to networks, and checks packets (segments of data such as its size and what type of data it is, and other information that is able to get the packet to its destination) if they have any errors they could have, and IP being able to manage how packets are sent over networks. For example the IP protocol allows computers to be able to send the packets through to other computers using their packet-addressing methods, making the process easier for being able to transfer data over networks.

The TCP/IP protocol is made up of four layers: the link layer, which deals with hardware as it navigates through numerous routers, servers and other components to get to its destination. The Internet layer, which focuses on targeting the IP address. The transport layer establishes communications between hosts and moves the package towards its destination, and the application layer.

The application layer includes other types of protocols such as HTTP and HTTPS and SMTP.   
HTTP (Hypertext Transfer Protocol) allows connection between the users’ computer and the webserver, for example, before the user accesses the internet, the HTTP protocol is needed in order for users to be able to send and receive data across networks. HTTP is mainly used on the WWW (World Wide Web) on a webpage in the address bar; you would see this protocol which would be used for accessing information on the World Wide Web.

The HTTPS stands for Hypertext Transfer Protocol Secure, which is similar to the HTTP protocol, but includes SSL (Secure Sockets Layer). This protocol is used to transfer encrypted data across the web, and secures communication over a network. For example, ecommerce websites would use this protocol as it would secure users’ information when they are entering their personal details (e.g. name, address, bank details etc.) into their websites, so by using this protocol it will secure the information, and make sure that it goes directly into their databases, and not accessed by others. It does this by encrypting the given data, making sure that if a hacker were to try and steal this information, they would have a hard time decrypting it.

Simple mail transfer protocol (SMTP) is used for transferring e-mail over the internet (using port 25), therefore it only handles outgoing messages, for example, email client programs such as Microsoft outlook would use SMTP for users to send emails, and send the emails to the mail server which would then dispatch those emails to the receiving mail server. SMTP uses the TCP port 25 so that it can use standard communication.

Overall the application layer in the TCP/IP protocol consists of communication protocols (for example commands used for transferring data over the internet) used for communicating over the internet.