

Data Transmission Protocols

A protocol is a set of rules that defines a method for transmitting data between different devices over a network.

Email

SMTP	POP3	IMAP
The Simple Mail Transfer Protocol is used to transmit data from your email client to your outgoing mail server. It is also used to transmit the data between email servers so that it can move from your outgoing mail server to the recipient's mail server.	The Post Office Protocol is used to download emails from your mail server to your email client. The "3" in POP3 is because this is the third version of it. With POP3 a connection is established between the recipient's email client and their mail server. Then emails are downloaded to the email client and removed from the mail server.	The Internet Message Access Protocol is an alternative to POP3 for retrieving emails from your mail server. It works much the same way as POP3 but with the key difference that instead of downloading your emails, they are synced between your client and your server.

Voice & Video Calls over the Internet

SIP	RTP	RTCP
The Session Initiation Protocol is a signalling protocol that establishes the connection between sender & receiver. We use SIP to establish the location (IP addresses) of the people taking part in the conversation & to agree on the CODECS used for encoding and decoding the voice & video to be transmitted.	The Real-Time Transport Protocol works alongside SIP. While SIP is used to establish the connection, RTP will actually transmit the data packets along that connection.	The RTP Control Protocol is a sister protocol to the Real-Time Transmission Protocol. The RTCPs primary function is to send control packets that provide feedback on the quality of the data delivery.

Web Pages

HTTP	HTTPS	FTP
The HyperText Transfer Protocol establishes a connection between the client and server and then transfers web pages to the client so they can be rendered by the browser. It also allows the transfer of additional related files, such as images embedded within the page.	The HyperText Transfer Protocol Secure is a version of HTTP that transmits data in a secure encrypted format using either TLS or SSL technologies.	The File Transfer Protocol is the protocol used when transferring files between computers over the internet. This isn't specific to web pages, however, it is the common protocol used when uploading web pages to a web server so they can be accessed by users browsing the web.

Secure Payment Systems

SET	3D Secure
With SET, when a purchase process is started only the purchase order is sent to the merchant website, the card details instead go to the merchant's bank. This will then authorise the payment with the purchaser's bank and the authorisation is returned to the merchant website to complete the transaction.	During a purchase process, when a user submits their card details for payment, the merchant website will establish if the card is enrolled on 3D secure. If so, the buyer will be directed to a 3D secure page for their own bank to authenticate the buyer. This successful authentication is forwarded to the merchant website who can then send the buyer's card details and the 3D secure authentication to their own bank to authorise the payment.

Data Transmission Security Issues

When transmitting data over a network you are vulnerable to eavesdroppers.

Sniffing	Uses packet sniffers to inspect data not meant for your computer in order to gain unauthorised
Spoofing	Where a computer pretends to be another computer in order to gain unauthorised access and

Bandwidth, Latency & Compression

	Description	Example
Bandwidth	The amount of data that can be transferred from one computer to another in a given period of time.	Online streaming requires a large bandwidth due to the amount of data that is transferred, however it doesn't need a low latency.
Latency	A measure of the time it takes for a data packet to transfer over a network.	Online gaming requires a low latency due to the quick response time needed, however it doesn't need a large bandwidth.

Compression is used to reduce the size of files. This is helpful in networking as it means we need less bandwidth to transfer a file.

Lossy	Lossy compression permanently deletes certain bits of data to reduce file size. It is commonly used in video, audio & image compression.	Lossy compression reduces the quality of a file and cannot be decompressed back to its original quality
Lossless	Lossless compression uses algorithms to pack the data into less space. It is commonly used in document compression.	Lossless compression cannot reduce the file size as much as lossy.

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B3 Issues relating to transmission of data

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