**UDP - Establishing a TCP session (Three way handshake) - Name to address translation-**

UDP (User Datagram Protocol) and TCP (Transmission Control Protocol) are two different transport layer protocols in computer networking, and they have distinct characteristics and functionalities. Let's address each topic separately: 

1. UDP (User Datagram Protocol):
* UDP is a connectionless protocol that operates at the transport layer of the network stack.
* It provides a simple and lightweight mechanism for sending datagrams (packets) between hosts.
* UDP does not establish a persistent connection or perform extensive error-checking and retransmission of lost packets.
* It is often used for applications that prioritize low latency and where some packet loss is acceptable, such as real-time streaming, VoIP (Voice over IP), and online gaming.
1. Establishing a TCP Session (Three-Way Handshake):
* TCP, unlike UDP, is a connection-oriented protocol that provides reliable and ordered delivery of data.
* The three-way handshake is a process used by TCP to establish a connection between two devices before data transmission.
* The three steps of the TCP three-way handshake are:
	+ Step 1: SYN (Synchronize): The initiating device (client) sends a TCP segment with the SYN (synchronize) flag set to the receiving device (server). This segment includes an initial sequence number (ISN) to start the sequence numbering for data exchange.
	+ Step 2: SYN-ACK (Synchronize-Acknowledge): The receiving device responds with a TCP segment that has both the SYN and ACK (acknowledge) flags set. It includes its own ISN and acknowledges the client's ISN by incrementing it by one. This establishes the server's sequence numbering.
	+ Step 3: ACK (Acknowledge): The initiating device acknowledges the server's response by sending a TCP segment with the ACK flag set. It includes the server's ISN incremented by one, confirming the reception of the server's SYN-ACK segment.
* After the three-way handshake, the TCP session is established, and both devices can start exchanging data reliably.
1. Name to Address Translation:
* Name to address translation, also known as DNS (Domain Name System) resolution, is the process of converting human-readable domain names (e.g., [www.example.com](http://www.example.com/)) into IP addresses (e.g., 192.0.2.1) that can be understood by network devices.
* DNS performs this translation using a distributed database system, where various DNS servers work together to resolve domain names.
* When a device needs to resolve a domain name, it sends a DNS query to a DNS resolver or DNS server, which then recursively queries other DNS servers until it finds the IP address associated with the domain name.
* The resolved IP address is then used for establishing network connections with the desired host.

UDP and TCP have different characteristics and are used for different purposes, with TCP providing a reliable connection-oriented transport, while UDP offers a lightweight, connectionless alternative. DNS is responsible for translating domain names into IP addresses, enabling seamless communication across the internet.