Certainly! Let's break down the process of what happens when a user types "https://www.google.com" into their browser and presses Enter. This involves several steps, including DNS (Domain Name System) resolution.

1. \*\*User's PC DNS Resolver:\*\*

- When the user enters the URL in their browser, the first step is the DNS resolution process. The browser first checks its local cache to see if it already knows the IP address associated with the domain "www.google.com." This cache could have been populated from previous visits to the same site, saving time in the resolution process.

- If the IP address is not found in the cache, the browser sends a DNS resolution request to the user's PC DNS resolver.

2. \*\*Local DNS Resolver:\*\*

- The user's PC DNS resolver is typically provided by the Internet Service Provider (ISP) or configured manually. This resolver maintains its own cache. It first checks its cache to see if it has the IP address for "www.google.com."

- If the resolver doesn't have the information, it will forward the request to the root name servers.

3. \*\*Root Name Servers:\*\*

- The root name servers are a crucial part of the DNS hierarchy. There are 13 sets of root name servers distributed globally. These servers contain information about the Top-Level Domains (TLDs) and their associated authoritative name servers.

- The local DNS resolver sends a request to one of the root name servers, asking for the IP address associated with "www.google.com."

4. \*\*TLD Servers:\*\*

- The root name server responds to the local DNS resolver with information about the Top-Level Domain (TLD) for ".com." The TLD servers maintain information about the authoritative name servers for each domain within that TLD.

- The local DNS resolver now queries the TLD servers for ".com" to find the authoritative name servers for "www.google.com."

5. \*\*Authoritative Name Servers:\*\*

- The TLD servers respond with the IP addresses of the authoritative name servers for "google.com." These are servers specifically responsible for knowing the IP addresses associated with the domain.

- The local DNS resolver sends a final query to one of the authoritative name servers for "google.com," asking for the IP address of "www.google.com."

6. \*\*IP Address Resolution:\*\*

- The authoritative name server responds to the local DNS resolver with the IP address of "www.google.com."

- The resolver then stores this information in its cache for future use and sends the IP address to the user's browser.

7. \*\*Establishing Connection:\*\*

- Now armed with the IP address, the browser can establish a connection to the web server hosting "www.google.com" using the HTTPS protocol (secure version of HTTP).

8. \*\*Loading the Website:\*\*

- With the established connection, the browser sends an HTTP GET request to the web server. The server responds by sending the necessary files (HTML, CSS, JavaScript, etc.) to the browser, which renders the webpage.

In summary, the process involves a series of DNS queries starting from the user's PC DNS resolver, progressing through the root name servers, TLD servers, and finally reaching the authoritative name servers to obtain the IP address necessary to establish a connection with the desired website.