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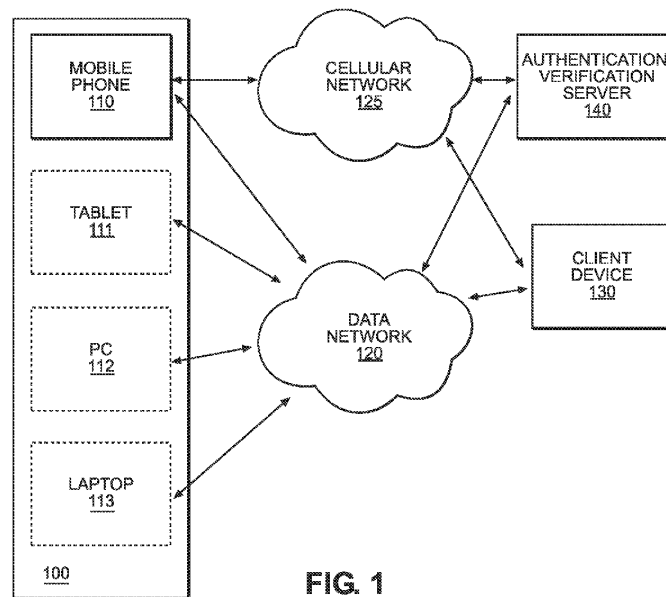
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(54) Title: METHOD, APPARATUS, SYSTEM, AND NON-TRANSITORY COMPUTER READABLE MEDIUM FOR USER
VERIFICATION AND AUTHENTICATION



(57) Abstract: A method, apparatus, system, and non-transitory computer readable medium for performing user verification and authentication may include receiving a network request from a client device associated with an online service in response to a user access attempt of the online service associated with a user, the network request including message recipient information for a mobile-terminated (MT) short message service (SMS) message and a unique one-time password or pin (OTP) code associated with the user, calculating at least one first signature based on the network request and a shared secret key, the shared secret key shared with the client device, the at least one first signature associated with the user, transmitting a network response to the client device, the network response causing the client device to transmit a call-to-action (CTA) message to at least one user device associated with the user, and determining a

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