

(12) **United States Patent**
Cambou

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(54) **GENERATION OF KEYS OF VARIABLE LENGTH FROM CRYPTOGRAPHIC TABLES**

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See application file for complete search history.

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(56) **References Cited**

U.S. PATENT DOCUMENTS

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 341 days.

4,218,582 A * 8/1980 Hellman *H04L 9/30*
380/30
9,648,011 B1 * 5/2017 Mattsson *H04L 9/3226*
(Continued)

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(57) **ABSTRACT**

A cryptographic infrastructure, which provides a method for generating private keys of variable length from a cryptographic table and a public key. This infrastructure provides an approximation of the one-time pad scheme. The cryptographic table is shared between a message sender and a message recipient by a secure transfer. After sharing the cryptographic table, no new private keys need to be sent—the private keys are independently generated by each party from the data contained within the shared cryptographic tables, using the public key. After public keys are exchanged, private keys may be generated and used to encrypt and decrypt messages and perform authentication cycles, establishing a secure communication environment between the sender and the recipient.

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