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Aes private key

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Standard for electronic data encryption Advanced Encryption Standard (Rijndael)See round function AESGeneralDesignersVincent Rijmen, Joan DaemenFirst published1998 Derivated by SharkSuccessorsAnubis, Grand Cru, KalynaCertificationAES winner, CRYPTREC, NESSIE, NSACipher detail Key sizes128, 192 or 256 bit[nota The attacks were published that are computationally faster than a brute force attack, although no one since 2013 is computationally feasible. [1] For AES-128, the key can be recovered with a computational complexity of 2126.1 using the biblical attack. The computational complexities of 2189.7 and 2254.4 are applied respectively for bi-clitical attacks against AES-192 and AES-256, respectively. Related key attacks can break AES-256 and AES-192 with complexity 299.5 and 2176 in time and data, respectively. [2] The Advanced Encryption Standard (AES), also known by its original name Rijndael (Dutch pronunciation: ['rindaːl]),[3] is a specific for the encryption of electronic data established by the National Institute of Standards and Technology of the United States (NIST) in 2001. [4] AES is a selection of the Rijndael block code[3] developed by two Belgian cryptographers, Vincent Rijmen [6] Rijndael is a family of ciphers with different key dimensions and blocks. For AES, NIST has selected three members of the Rijndael family, each with a 128-bit block size, but three different key lengths: 128, 192 and 256 bits. AES was adopted by the United States Government. Replaces the Data Encryption Standard (DES),[7] which was published in 1977. The algorithm described by AES is a symmetric-key algorithm, which means that the same key is used for both encryption and data decryption. In the United States, AES was announced by NIST as U.S. FIPS PUB 197 (FIPS 197) on November 26, 2001. [4] This announcement followed a five-year standardization process in which fifteen competing projects were presented and evaluated before Rijndael was selected as the most suitable (see Advanced Encryption Standard for more details). AES is included in the ISO/IEC 18033-3 standard. AES has become effective as the US Federal Government standard on 26 May 2002, after approval by the US Secretary of Commerce. AES is available in many different encryption packages, and is the first publicly accessible cipher approved by the U.S. National Security Agency (NSA) for top secret information when used in a cryptographic moduleby the NSA (see AES Security, below). Definitive Standards The Advanced Encryption Standard (AES) is defined in each of: FIPS PUB 197: Advanced Encryption Standard (AES) [4] ISO/IEC 18 033-3: Block ciphers[8] The description of AES ciphers is based on a design principle known as a substitution-permutation, substitution-permutation network, It is efficient in both software and hardware. [9] Unlike its predecessor des, AES does not use a Feistel network. AES is a variant of Rijndael, with a fixed block size of 128 bits and a basic size of 128, 192 or 256 bits. On the contrary, Rijndael itself is specified with block sizes and keys that can be a multiple of 32 bits, with a minimum of 128 bits and a maximum of 256 bits. AES works on an array of orders of 4 Ã£-4-column bytes, defined the state. [Note 3] Most AES calculations are performed in a particular finite field. For example, 16 bytes, B 0, B 1 ,. . . , B 15 {\ DisplayStyle B_ {0}, B_ {1}, ..., B_ {15}} are represented as this two-dimensional matrix: [B 0 B 4 B 8 B 12 B 1 B 5 B 9 B 13 B 2 B 6 B 10 B 14 B 3 B 3 B 7 B 11 B 15] {\ Display Style {\ Begin {Bmatrix} B_ {0} & B_ {4} & B_ {8} & B_ {12}}} B_ {1} & B_ {5} & B_ {9} & B_ {13}} {6} & B_ {10} & B_ {14}} \\ B_ {3} and B_ {3} 7} & B_ {11} & B_ {15} \ End { BMatrix}} The key size used for an AES code specifies the number of transformation rounds converting the input, called plain text, into the final output, called ciphertext. The number of rounds is as follows: 10 rounds for 128-bit keys. 12 rounds for 192 bit keys. 14 rounds for 256-bit keys. Each round consists of several processing steps, including one that depends on the encryption key itself. A set of reverse gears is applied to turn the cipher return into the original clear text using the same encryption key. High Level Description of the KeyExpansion Algorithm The round keys are derived â from the encryption key using the AES key program. AES requires a separate 128-bit round key block for each round plus one. Adding initial round key: addroundkey ã¨¬ “Each byte of the state is combined with one byte of the round key using xor bits. 9, 11 or 13 rounds: Subbytes is a nonlinear substitution phase in which each byte is replaced with another according to a search table. ShifrowsÃ¨ “A transposition step in which the last three lines of the state are moved cyclically a number of steps. MIXCOLUMNSÃ¨ “A linear mixing operation that works on the columns of the state, combining the four bytes in each column. Addroundkey Final Round (completion of 10, 12 or 14 rounds in total): Subbytes Shifrows Addroundkey THE Subbytes Step Main article: Rijndael S-box In the subbytes phase, each byte in the state is replaced with its entry in a fixed 8-bit table search, s; Bij = S (AIJ). In the subbytes phase, each byte ai, j {\ displaystyle a_ {i, j}} in the state array is replaced with a Subbyte S (AI, J) {\ DisplayStyle S (A_ {I, J}) } using an 8-bit replacement box. Note that before round 0, the status array is simply plain text/input. This one Provides non-linearity in the cipher. The S-Box used is derived from the reversal multiplicative compared to the GF (28), known to have good non-linearity properties. To avoid attacks based on simple algebraic properties, the S-Box is built by combining the reverse function with an invertible aged transformation. Even the S-Box is chosen choice Avoid any fixed point (and so is a disorder,) ie, s (ai, j) âž ai, j {displaystyle s (a_ {i, j}) q a_ {i,}, and also Any opposite fixed point, IE, S (AI, J) accumulation AI, J ÂŽ F 16 {DisplayStyle S (A_ {I, PlusJ} During decryption execution, the InvsUbbytes step is used (the Inverse of Subbytes), which requires before taking the reverse of the affine transformation and then find the reverse multiplicative. The Shiftrows step in the Shiftrows phase, the bytes in each row of the state are moved cyclically to the left. The number of places each byte It is moved incrementally differs to each row. The Shiftrows step operates on the status files; move bytes in each row from a certain offset. For AES, the first row has remained unchanged. Each byte of the second row is Moving one to the left. Similarly, the third and fourth line are moved respectively by offset of two and three. 4] In this way, each column of The output status of the Shiftrows passage is composed of byte from each column of the input status. The importance of this step is to prevent the columns from being encrypted independently, in this case AES degenerate into four independent blocks of block. Pass MixColumns Main article: Rijndael MixColumns In the MixColumns phase, each state column is multiplied with a fixed polynomial C (X) {DisplayStyle C (X)}. In the MixColumns phase, the four bytes of each state column are combined using a invertible linear transformation. The MIXCOLUMNS function takes four bytes such as four byte input and output, where each input byte affects all four output bytes. Together with Shiftrows, MixColumns provides the dissemination in the cipher. During the operation, each column is transformed with a fixed matrix (MATRIX LEFT-MULTIPLIED by column DÃ New column value in the state :) [B 0, JB 1, JB 2, J, J] = [2 1 1 2 3 1 2 3 1 2 1 2] 0 \\\\

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