



# ALBANESE LAB

## SOFTWARE ENGINEERING

## GOST Toolkit

### GOST Security Suite written in Go

Multi purpose cross-platform cryptography tool for symmetric encryption, cipher-based message authentication code (CMAC), recursive hash digest, hash-based message authentication code (HMAC), digital signature, shared key agreement (VKO) and PBKDF2 function for embedded systems.

**GOST refers to a set of technical standards maintained by the Euro-Asian Council for Standardization, Metrology and Certification (EASC), a regional standards organization operating under the auspices of the Commonwealth of Independent States (CIS).**

**GOST is GOvernment STandard of Russian Federation (and Soviet Union):**

- GOST 28147-89 64-bit block cipher (RFC 5830)
- GOST R 34.11-94 hash function 256-bit (RFC 5831)
- GOST R 50739-95 data sanitization method (non-cryptographic)
- GOST R 34.10-2001 public key signature function (RFC 5832)
- VKO GOST R 34.10-2001 key agreement function (RFC 4357)
- GOST R 34.10-2012 public key signature function (RFC 7091)
- VKO GOST R 34.10-2012 key agreement function (RFC 7836)
- GOST R 34.11-2012 Streebog hash function 256/512-bit (RFC 6986)
- GOST R 34.12-2015 128-bit block cipher Kuznechik (RFC 7801)
- GOST R 34.12-2015 64-bit block cipher Magma

## Algorithms

### Asymmetric:

- Public key Algorithms:
  - GOST R 34.10-2001 CryptoPro 256-bit
  - GOST R 34.10-2012 256/512-bit (default)
- Supported ParamSets:
  - GOST R 34.10-2001 256-bit: A, B, C, XA, XB
  - GOST R 34.10-2012 256-bit: A, B, C, D
  - GOST R 34.10-2012 512-bit: A, B, C

## Symmetric:

- Block Ciphers:
  - GOST 28147-89 CryptoPro
  - GOST R 34.12-2015 Magma (default)
  - GOST R 34.12-2015 Kuznechik (Grasshopper)
- Modes of Operation:
  - MGM: Multilinear Galois Mode (AEAD)
  - CTR: Counter Mode
  - OFB: Output Feedback Mode
- Message Digest Algorithms:
  - GOST R 34.11-94 CryptoPro 256-bit
  - GOST R 34.11-2012 Streebog 256/512-bit (default)

## Features

- Cryptographic Functions:
  - Symmetric Encryption/Decryption
  - Digital Signature (ECDSA equivalent)
  - VKO shared key negotiation (ECDH equivalent)
  - Recursive Hash Digest + Check
  - CMAC (Cipher-based message authentication code)
  - HMAC (Hash-based message authentication code)
  - PBKDF2 (Password-based key derivation function 2)
  - TLS (Transport Layer Security)
- Non-Cryptographic Functions:
  - GOST R 50739-95 data sanitization method
  - Bin to Hex/Hex to Bin string conversion
  - Random Art Public key Fingerprint (ssh-keygen equivalent)

## Usage

```
usage of gosttk:
-128          Block size: 64 or 128. (for symmetric encryption only) (default 64)
-512          Bit length: 256 or 512. (default 256)
-check string Check hashsum file. (- for STDIN)
-cmac         Compute cipher-based message authentication code.
-crypt string Encrypt/Decrypt with symmetric ciphers.
-derive       Derive shared secret key (VKO).
-digest string File/Wildcard to generate hashsum list. (- for STDIN)
```

-hex string  
Encode binary string to hex format and vice-versa.

-hmac  
Compute hash-based message authentication code.

-iter int  
Iterations. (for SHRED and PBKDF2 only) (default 1)

-key string  
Private/Public key, password or HMAC key, depending on operation.

-keygen  
Generate asymmetric keypair.

-mode string  
Mode of operation: MGM, CTR or OFB. (default "MGM")

-old  
Use old roll of algorithms.

-paramset string  
Elliptic curve ParamSet: A, B, C, D, XA, XB. (default "A")

-pbkdf2  
Password-based key derivation function 2.

-pub string  
Remote's side public key/remote's side public IP/PEM BLOCK.

-rand int  
Generate random cryptographic key: 128, 256 or 512 bit-length.

-recursive  
Process directories recursively. (for DIGEST command only)

-salt string  
Salt. (for PBKDF2 only)

-shred string  
Files/Path/Wildcard to apply data sanitization method.

-sign  
Sign with private key.

-signature string  
Input signature. (verification only)

-tcp string  
TCP/IP Transfer Protocol.

-verbose  
Verbose mode. (for CHECK command only)

-verify  
Verify with public key.

-version  
Print version information.

## Examples

### Asymmetric GOST R 34.10-2001 256-bit keypair generation (INI format):

```
./gosttk -keygen -old [-paramset A|B|C|XA|XB]
```

### Asymmetric GOST R 34.10-2012 256/512-bit keypair generation (default):

```
./gosttk -keygen [-paramset A|B|C|D] [-512 -paramset A|B|C]
```

### **Signature (ECDSA equivalent):**

```
./gosttk -sign [-512|-old] -key $prvkey < file.ext > sign.txt  
sign=$(cat sign.txt)  
./gosttk -verify [-512|-old] -key $pubkey -signature $sign < file.ext
```

### **VKO: Shared key negotiation (ECDH equivalent):**

```
/gosttk -derive [-512|-old] -key $prvkey -pub $pubkey
```

### **Encryption/decryption with Magma (GOST R 34.12-2015) symmetric cipher (default):**

```
./gosttk -crypt enc -key $shared < plaintext.ext > ciphertext.ext  
./gosttk -crypt dec -key $shared < ciphertext.ext > plaintext.ext
```

### **Encryption/decryption with Kuznyechik (GOST R 34.12-2015) symmetric cipher:**

```
./gosttk -crypt enc -128 -key $shared < plaintext.ext > ciphertext.ext  
./gosttk -crypt dec -128 -key $shared < ciphertext.ext > plaintext.ext
```

### **Encryption/decryption with GOST 28147-89 CryptoPro symmetric cipher:**

```
./gosttk -crypt enc -old -key $shared < plaintext.ext > ciphertext.ext  
./gosttk -crypt dec -old -key $shared < ciphertext.ext > plaintext.ext
```

### **CMAC-Kuznechik (cipher-based message authentication code):**

```
./gosttk -cmac -128 -key $128bitkey < file.ext
```

### **CMAC-Magma (cipher-based message authentication code):**

```
./gosttk -cmac [-old] -key $128bitkey < file.ext
```

### **GOST94-CryptoPro hashsum (list):**

```
./gosttk -digest "*. *" -old [-recursive]
```

### **GOST94-CryptoPro hashsum (single):**

```
./gosttk -digest - -old < file.ext
```

### **HMAC-GOST94-CryptoPro (hash-based message authentication code):**

```
./gosttk -hmac -old -key $256bitkey < file.ext
```

### **Streebog256/512 hashsum:**

```
./gosttk -digest - [-512] < file.ext
```

### **HMAC-Streebog256/512:**

```
./gosttk -hmac [-512] -key $256bitkey < file.ext
```

### **PBKDF2 (password-based key derivation function 2):**

```
./gosttk -pbkdf2 [-512|-old] -key "pass" -iter 10000 -salt "salt"
```

### **Note:**

PBKDF2 function can be combined with the CRYPT, HMAC commands:

```
./gosttk -crypt enc -128 -pbkdf2 -512 -key "pass" < plaintext.ext > ciphertext.ext  
./gosttk -hmac [-512] -pbkdf2 -key "pass" -salt "salt" -iter 10000 < file.ext
```

### **Shred (GOST R 50739-95 data sanitization method, 25 iterations):**

```
./gosttk -shred keypair.ini -iter 25
```

### **Bin to Hex/Hex to Bin:**

```
echo somestring|./gosttk -hex enc  
echo hexstring|./gosttk -hex dec
```

### **TCP/IP Dump/Send:**

```
./gosttk -tcp dump [-pub "8081"] > Pubkey.txt  
./gosttk -tcp send [-pub "127.0.0.1:8081"] < Pubkey.txt
```

### **TLS Layer TCP/IP Dump/Send:**

```
./gostls -tcp dump [-pub "8081"] > Pubkey.txt  
./gostls -tcp send [-pub "127.0.0.1:8081"] < Pubkey.txt
```

### **Random Art (Public Key Fingerprint):**

```
./gosttk -key $pubkey
```

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Source: <https://github.com/pedroalbanese/gosttk>

Download: <https://sourceforge.net/projects/gosttk>