Modern Key Management with GPG

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Versions

- GnuPG 2.2 released a few weeks ago.
- 2.1 has been around for nearly 3 years.
- New features
  - Easy key discovery for any mail address.
  - Full separation between private key and gpg
  - Curve25519 support
  - Better CLI support
  - ...
- End of life for 2.0 in 3 months.
- We keep 1.4 for its PGP-2 support and portability to pre-POSIX systems.
What’s next

► RFC-4880bis work in 2.3
  ◆ AEAD mode
  ◆ SHA-256 fingerprint
  ◆ New default algos

► “Moving up the stack”:  
  ◆ Help integrating new features
  ◆ Checking existing use

► Make GnuK easier available

► Write more than reference manuals.
Outline

Where we are

Modern algos

The Quick commands

Keyservers and such

Hints on integrating gpg

Wrapping Up
Why ECC (1)

- ECC algorithms are very well researched.
- Instead of key sizes we speak of different curves
- For RSA et al. one implementation fits all sizes.
- For ECC each curve needs to be implemented separately.
  - A large class of curves can be implemented using a table of parameters.
Why ECC (2)

- Certain curves have a bad repudiation.
- In particular the NIST curves as required for Suite B.
- European Brainpool curves might be better . . .
  . . . still are too similar to the NIST curves.

So let’s move on.

The new de-facto standard (RFC-7748) is:

- Curve25519
- Curve448-Goldilocks
- Variants for use with EdDSA
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Example rsa4096

commit 72339165aeedec035b821c89453236e2c6949bb6
tree 92c63895b041aa198518a25b87f8e8bb727dc4743
parent 2b60d1fe650683ab4fa5690fa2f8c41605fb6e0e
author Werner Koch <wk@gnupg.org> 1505892912 +0200
committer Werner Koch <wk@gnupg.org> 1505892912 +0200
gpgsig -----BEGIN PGP SIGNATURE-----

iQIZBAABCAAdFiEEssy2g4MyXWG6xQ+fzSGoCsjFWUFAlnCGjAACgkQzSGoCsjfJWVm/g//coolvycftJSh9Fuy9pmXjDxjudheeQ6UaAWYuM1BYTVsyjddknM4Iw
f92HKmlieJpxc1KS89nd/iJRXYFL307hFsBPuohG1gUaIF0oqyb8T0xQ7INbg
wTpDvbPMk0yZHNA8feHC1v+R2rRQbsUfQwmNtw9FpcvRohZ7Lp+5jpLTU6th3zpIDz3R1o26kJ7aMxtH8xjIlnXnevL/GPc4zFpN0WhjJhASeDjpEUid6WgwaasWfjKLOo
U0bM43yk1FXdroKyo0dM0aqJNT49jlpND1xFtVB3/wivoFngwBgrczLRHccJFGS6
HZJoIF0yQoVjpm9zSCrRwdQL60ybOCwWr1hIeEcY7XFwivtsVkr/H+ttXtyOAnFz
vX18deJa0E6L+k5E4C3WvhDpV/CGWdd+owrr52nUZIIZTgLv7Qosd3WCD6iya
CqIB1EtEaVK7kX/2qhg4pn3/EQ6m2y+2fAcNGW6JAQk1Kui+Buhe09zSYhUjy1
F72n0mM4Im7ndM+44Ctc+jTw/NbYDRGRhomGnMYYLL0KJ+RY1VLE+esFTvfbTm
uiFOb427d5UPNhNm/NY8hKAvcvbd1t335rJr4+Wjo7suQAuP0z182dHwXrCQ3T
3hk60K0oiJ6nKhhk0ERAfK/B/XhnUJGqNXPIrYtu0PwX2eQhQkBvA=
=Gvqf
-----END PGP SIGNATURE-----
Example ed25519

commit 2b60d1fe650683ab4fa5690fa2f8c41605fb6e0e
tree 7494139e7560bf6f6a0b9e8ebee74dbbb01b6bcb
parent 4ee52a72377b4279ba81a3a1c2324a66cfd2c619
author Werner Koch <wk@gnupg.org> 1505892819 +0200
committer Werner Koch <wk@gnupg.org> 1505892819 +0200
gpgsig -----BEGIN PGP SIGNATURE-----

iHUEABYIAB0WIQTBO0tpIZ5K7sC6HCHj/f8hjkW3KwUCWcIZ1AAKCRDj/f8hjkW3K6PzAP0T/keoxJGIWRGiXpiKQQbX2utH/cnR+sM/Y07q4bL1LgEAktfdJ2Z1ZxJm4K/rozUhx80rvIuw5YPOQcJAem83dgA=
=XNb3
-----END PGP SIGNATURE-----
Performance

Zeitcontrol and Gnuke tokens:

(mILLISECONDS MEASURED INSIDE GPG ON AN X220)

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- RSA is always fast as lightning for **verification**.
- Our Ed25519 verification code is a bit slow.
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Gpg and its prompts

- Written as replacement for PGP-2.
- Direct the user into the right direction
- LibGPGME for common tasks
- Hard to automate (requires FSM)

Better API?

- Too many options and uncertainty which are really needed.
- Meanwhile we know the common use patterns . . .

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Key generation

$ gpg --quick-generate-key USER_ID [ALGO [USAGE [EXPIRE]]]

Try "future-default" for ALGO.
If you don’t want a passphrase, do this

$ gpg --passphrase ’’ --batch --quick-generate-key USER_ID
Changing the expiration date

- The default is to create keys which expire in two years.
- OpenPGP allows to prolong the expiration date.

To set the expiration to 2 years from now:

```
$ gpg --quick-set-expire FINGERPRINT -
```
Adding a subkey

Subkeys are very useful for key management. Adding more subkeys is easy:

```
$ gpg --quick-add-key FINGERPRINT [ALGO [USAGE [EXPIRE]]]
```
Adding/Revoking a user id

Got a new mail address?

$ gpg --quick-add-uid FINGERPRINT NEW_USER_ID

Lost that address?

$ gpg --quick-revoke-uid FINGERPRINT USER_ID

Tell others which user id to see:

$ gpg --quick-set-primary-uid FINGERPRINT USER_ID
Key signing

Key signing party:

$ gpg --quick-sign-key FINGERPRINT [NAMES]

Mark a key locally as verified:

$ gpg --quick-lsign-key FINGERPRINT [NAMES]
Encryption w/o a keyring

Instead of importing a key and using its fingerprint, the -f option can be used:

```bash
$ gpg -f FILE_WITH_KEY -e DATA
```

The new export filters can be used to create a key file.
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- Only the mail provider can do that.
- Mail addresses are not under the user’s authority like their keys are.
- Mail provider provides the key (web key directory).
- Keyservers are decentralized; this is a Good Thing™.

- Verifying keyservers harm the PGP ecosystem.
  - They need to be under a single authority.
  - The return of the X.500 dilemma.
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  - Hard to explain.
  - Global social graph.
  - It does not scale.

- The Trust On First Use (TOFU) paradigm is better.
  - Easy to explain. ✓
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Wrapping Up
The two interfaces — human

- This is plainly for human consumption
- Translated.
- Uses the native charset
- Strings may change with each release

Never use it for scripting!
The two interfaces — machine

- This is mainly for scripting
- Fixed strings
- Always UTF-8
- Only compatible changes since 1.0

Enable this interface using

```
--batch --with-colons --status-fd=2
```

When using the interactor (`--command-fd`) leave out `--batch`. "awk -F:" is your friend. See doc/DETAILS for a full description.
Import and export filter

Remove funny signatures. My gpg.conf:

```
import-filter drop-sig= sig_created_d=2015-12-24
import-filter drop-sig=|| sig_created_d=2016-03-16
```

Show keys in a file

```
$ gpg --import-options show-only --import FILE
```

Export only the userids with a given mail address

```
$ gpg -a --export-options=export-minimal \ 
   --export-filter keep-uid=mbox=wk@gnupg.org \ 
   --export FINGERPRINT
```
Ssh-agent

It is more than 10 years old:

```
$ ssh-add
```

transfers existing keys into GnuPG’s key store and makes them permanent.

- Works nicely with smartcards
- Use a subkey for ssh
- ssh-add still works

- You can’t live without it.
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- Auto key discovery when a mail address is given.
  - We need to talk to providers.

- Take care:
  - Debian has 2.1.18 plus some changes.
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Thanks for listening. Questions?

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