Pass the SALT 2018

Second factor authentication in LemonLDAP::NG

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Worteks
make IT work, make IT free

MFA / 2FA / OTP / U2F ?

Multi Factor Authentication

Multi-factor authentication (MFA) is a method of confirming a user's claimed identity in which a user is granted access only after successfully presenting 2 or more pieces of evidence (or factors) to an authentication mechanism:

- knowledge (something they and only they know)
- possession (something they and only they have)
- inherence (something they and only they are)

Definition from Wikipedia

Why you need it

- Passwords are still the main security token used to authenticate
- With GPU and rainbow tables it is more and more easy to crack a password
- A password base can be stolen
- Second factor authentication is hype (see Twitter, Github, LinkedIn…)

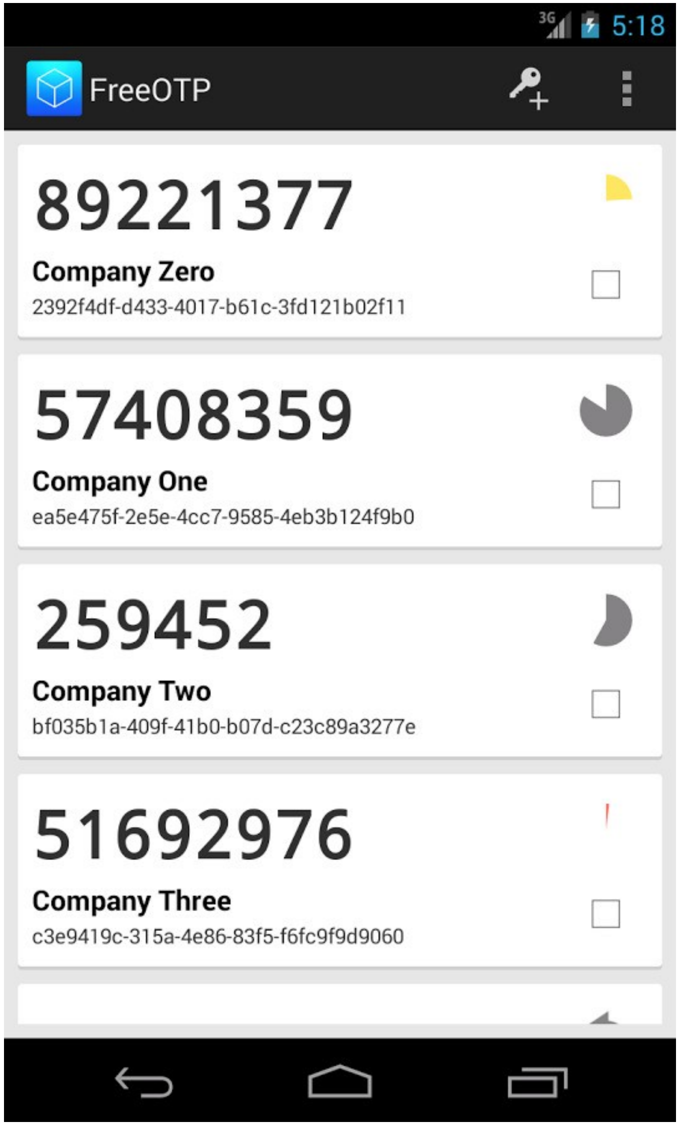
One-Time Password

- One-Time Password (OTP) is a password that is valid for only one login session or transaction
- Two standards:
  - HOTP (RFC 4226): HMAC-Based One-Time Password
  - TOTP (RFC 6238): Time-Based One-Time Password
- Rely on a secret shared between user and server

TOTP

- Shared secret key K
- T0: start time
- TI: time interval
- Time Counter TC = floor((unixtime(now) – unixtime(T0)) / TI)
- TOTP = Truncate(SHA1(K ⊕ 0x5c5c… ‖ SHA1(K ⊕ 0x3636… ‖ TC))) & 0x7FFFFFFF
- TOTP Value = TOTP mod 10d, where d is the desired number of digits of the one-time password

Using a TOTP



89221377

Company Zero

2392f4df-d433-4017-b61c-3fd121b02f11

□

57408359

Company One

ea5e475f-2e5e-4cc7-9585-4eb3b124f9b0

□

259452

Company Two

bf035b1a-409f-41b0-b07d-c23c89a3277e

□

51692976

Company Three

c3e9419c-315a-4e86-83f5-f6fc9f9d9060

□

- Registration on client: shared key can be registered manually or using a QR code
- Server associates shared secret to user
- At next authentication, TOTP value is computed by client and server

Universal Second Factor

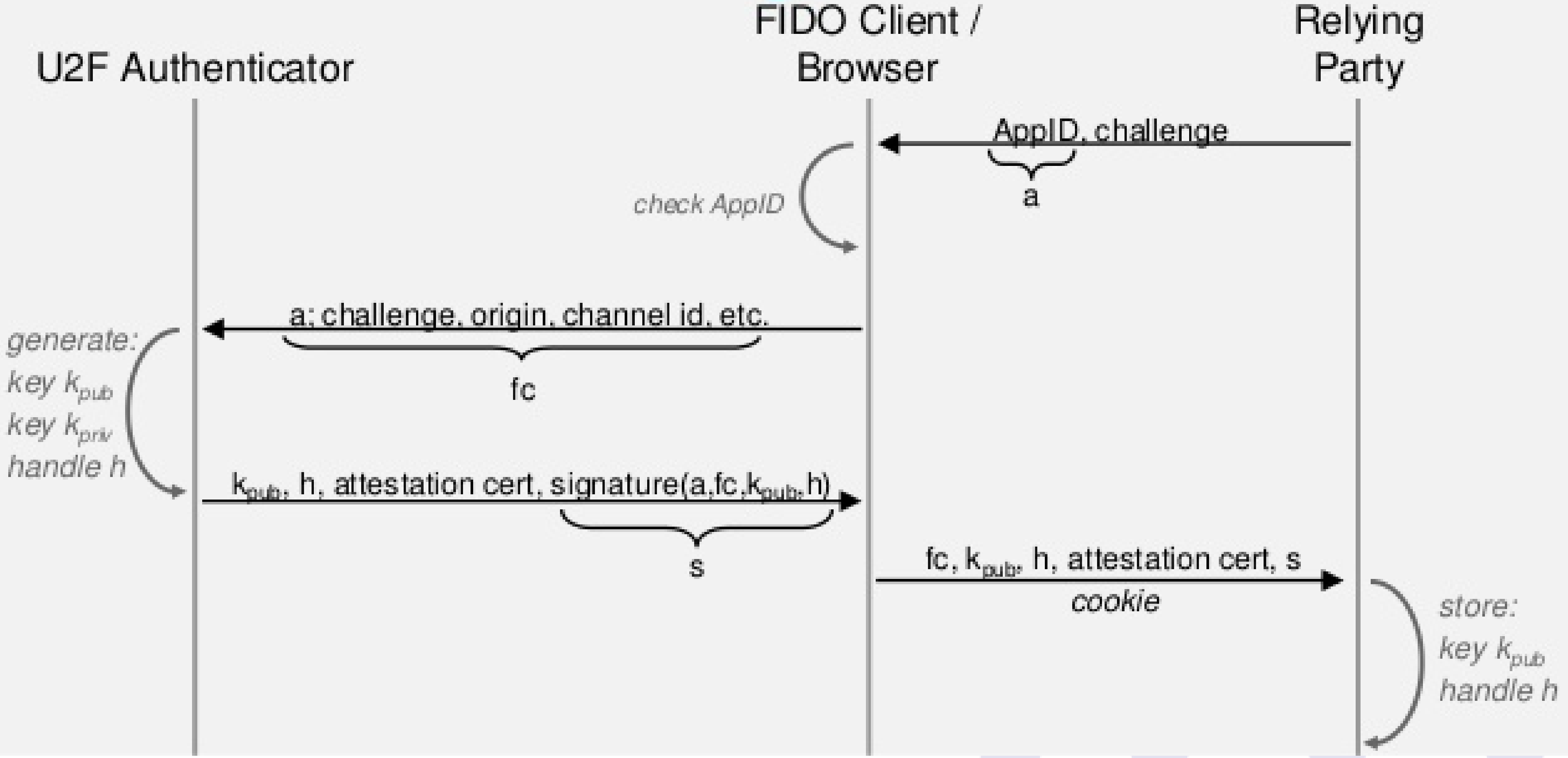
- Universal 2nd Factor (U2F) is an open authentication standard that strengthens and simplifies two-factor authentication using specialized USB or NFC devices.
- Managed by FIDO Alliance https://fidoalliance.org/
- Support in modern browsers:
  - Chrome/Chromium ≥ 38
  - Firefox:
    - 38 to 56 with U2F Support Add-on
    - 57 to 59, with “security.webauth.u2f” set to “true” in “about:config”
    - probably enabled by default for versions ≥ 60
  - Opera ≥ 40

Using U2F

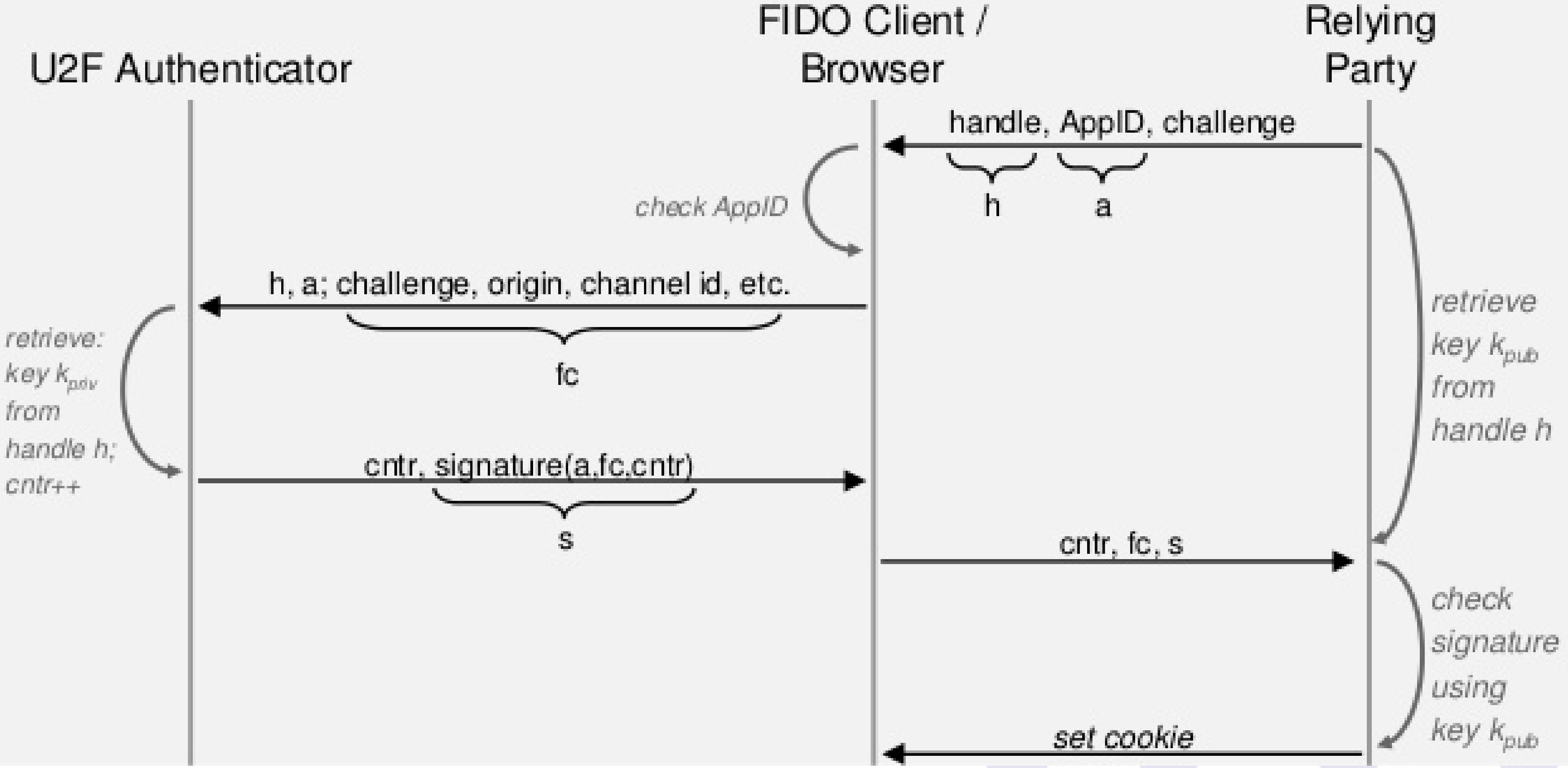
fido ALLIANCE

- Registration: Token generates private/public keys and a handle and send public key and handle to server
- The server associates the public key and the handle to user
- At next authentication, server sends the handle and a crypto challenge and the U2F token signs the challenge and sends it back

U2F Registration



U2F Authentication


U2F Authenticator
FIDO Client / Browser
Relying Party
handle, AppID, challenge
h
a
check AppID
h, a; challenge, origin, channel id, etc.
fc
retrieve: key k_{priv} from handle h; cntr++
cntr, signature(a,fc,cntr)
s
retrieve key k_{pub} from handle h
cntr, fc, s
check signature using key k_{pub}
set cookie

Implementation in LemonLDAP::NG

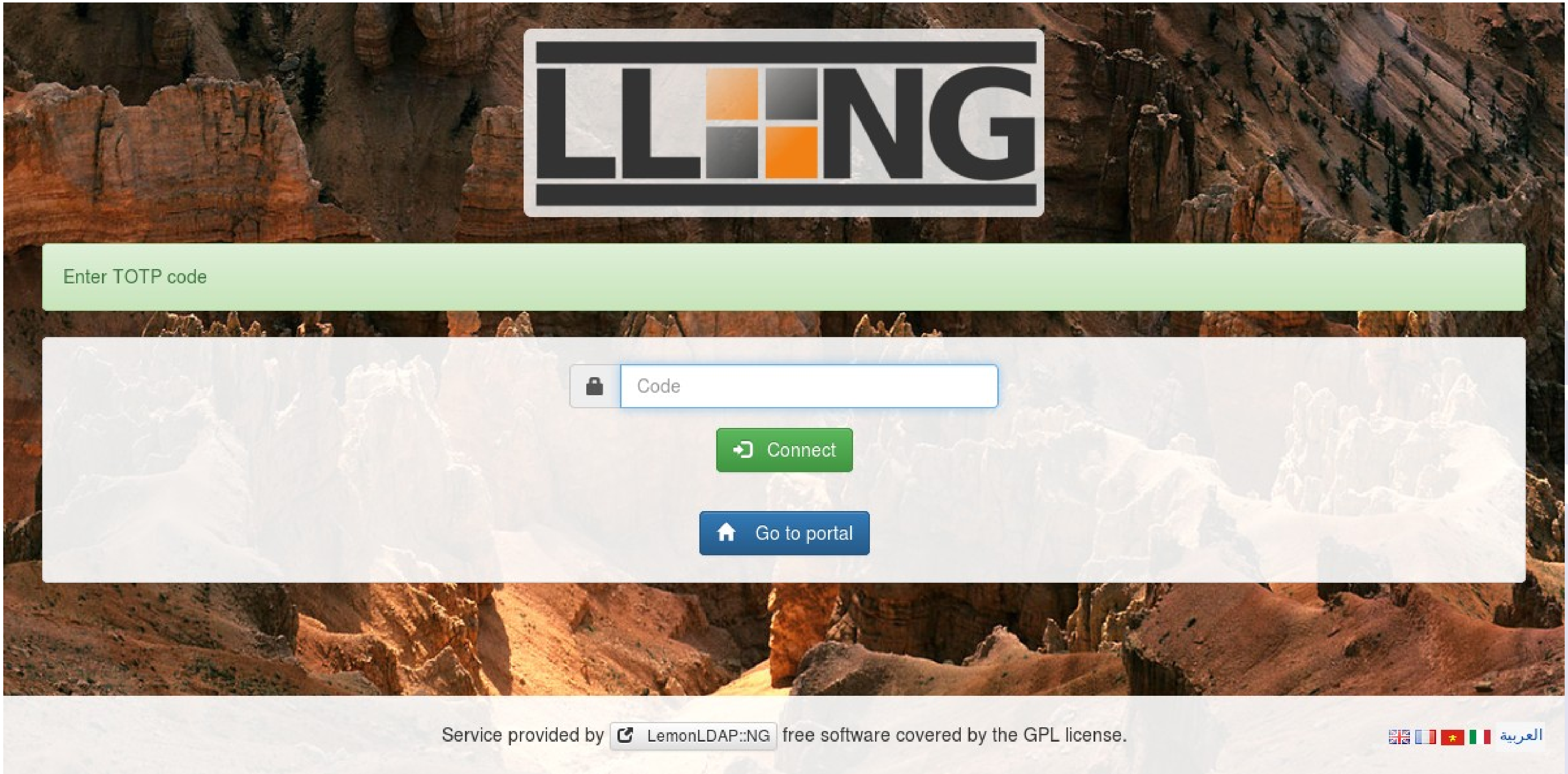
LemonLDAP::NG

- WebSSO, Access Control and Identity Provider
- Apache, Nginx, Node.js, Plack support
- Default protection by Handler, identity forwarded trough HTTP headers
- Standard protocols: CAS, SAML and OpenID Connect
- Self services (password change, password lost, account registration)
- GPL License
- https://lemonldap-ng.org

2FA implementation

- New feature for 2.0 major version
- Possibility to add a second authentication step to any current authentication method
- A lot of possibilities to ask a second factor:
  - U2F tokens
  - TOTP (to use with FreeOTP, Google-Authenticator,…)
  - U2F-or-TOTP (enable both U2F and TOTP)
  - Yubikey tokens provide by Yubico
  - REST (Remote REST app)
  - External 2F (to call an external command)

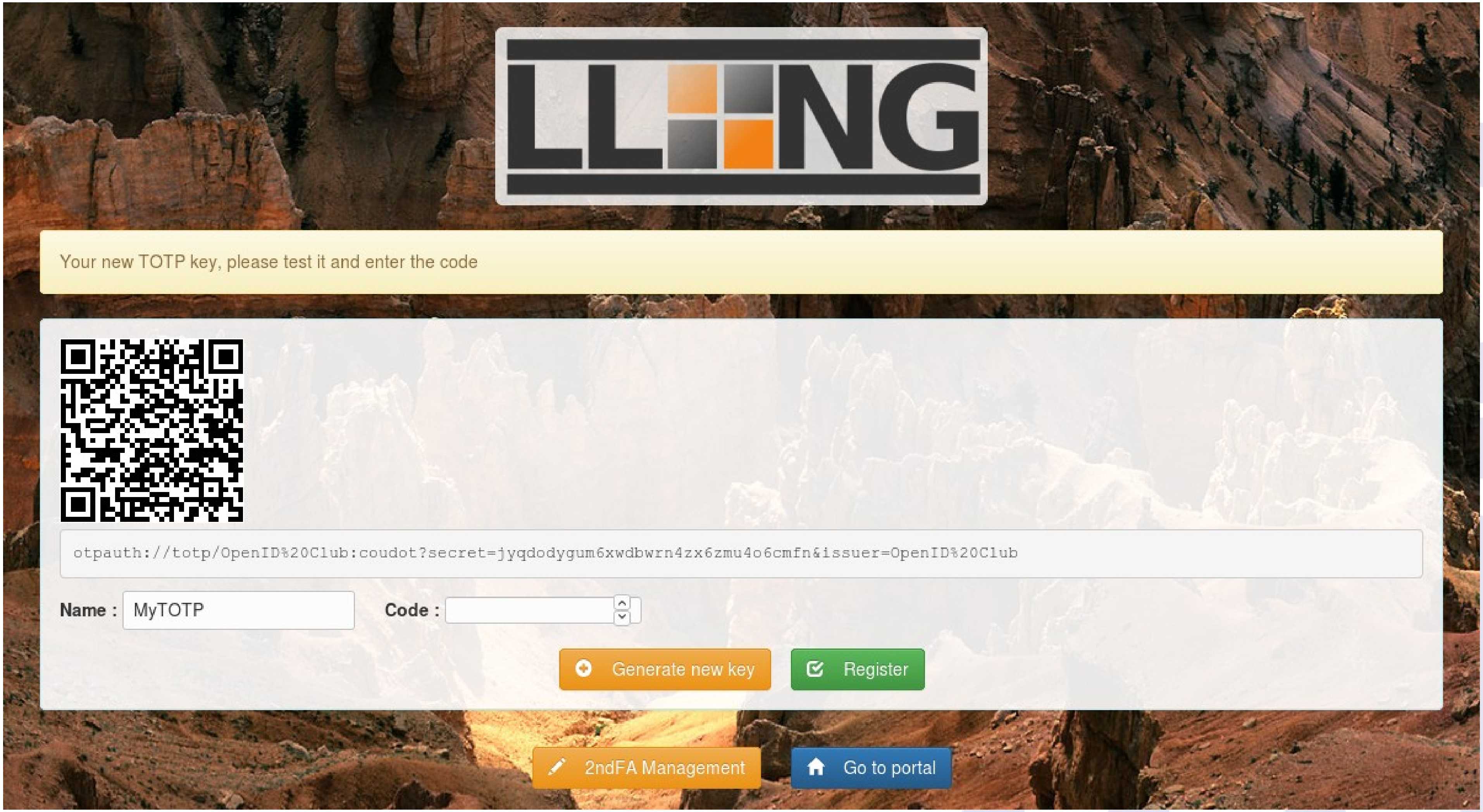
Ask for second factor



Enter TOTP code

Service provided by LemonLDAP::NG free software covered by the GPL license.

User self registration

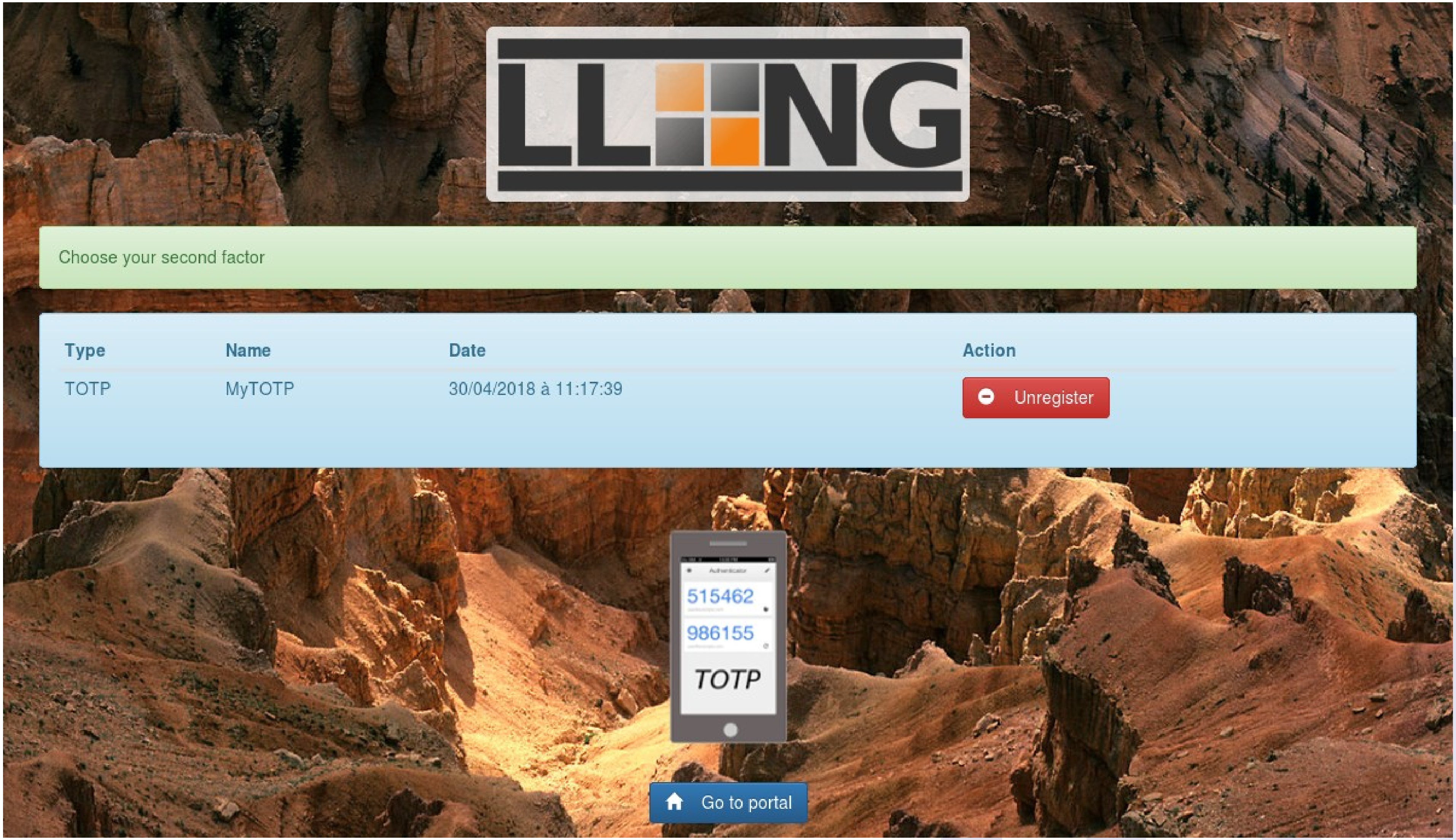


Your new TOTP key, please test it and enter the code

```
otpauth://totp/OpenID%20Club:coudot?secret=jyqdodygum6xwdbwrn4zx6zmu4o6cmfn&issuer=OpenID%20Club
```

Name : MyTOTP **Code :**

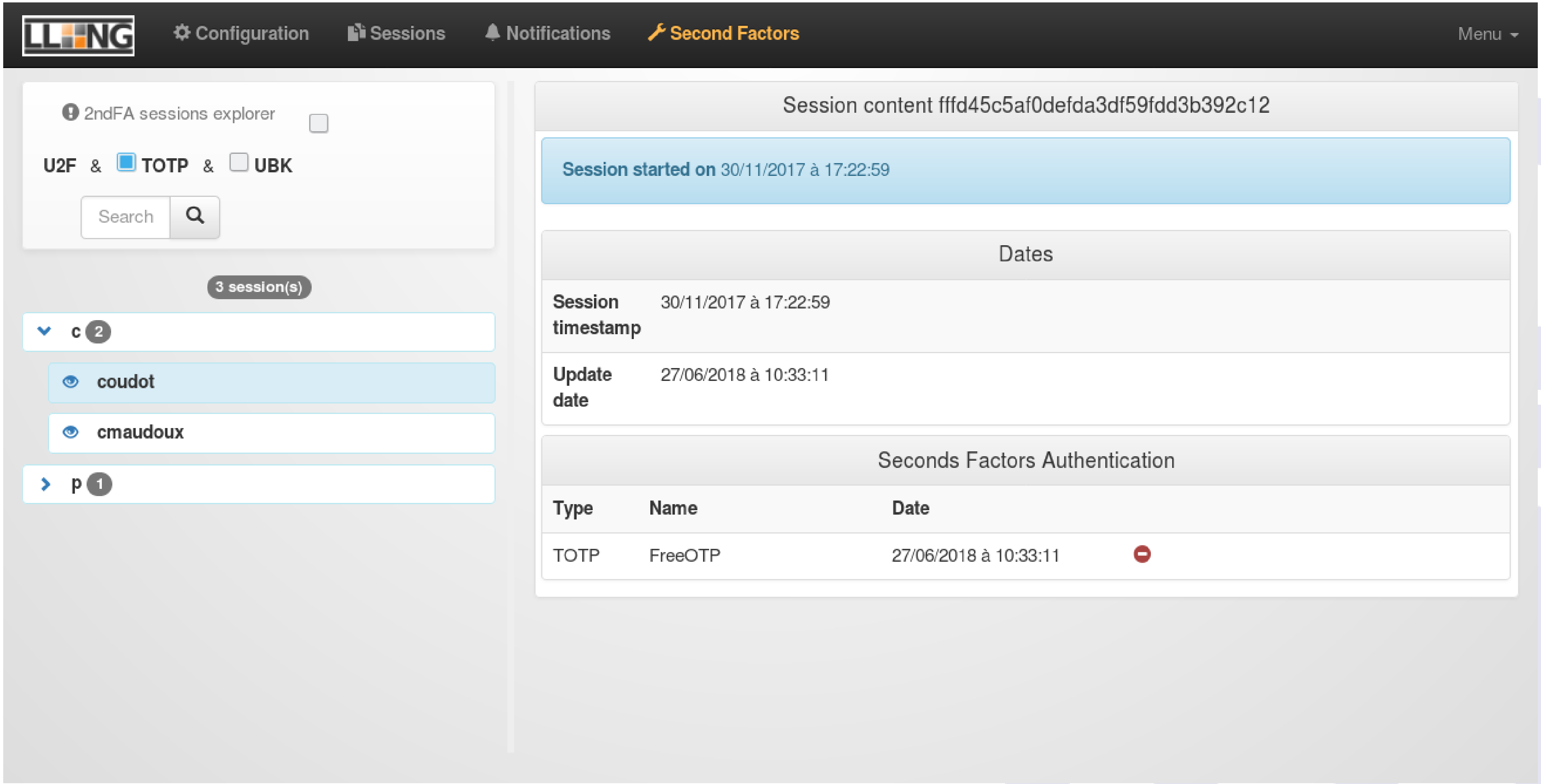
User self management



Choose your second factor

Type	Name	Date	Action
TOTP	MyTOTP	30/04/2018 à 11:17:39	Unregister

2FA sessions explorer



2ndFA sessions explorer □

U2F & ☑ TOTP & □ UBK

Session content fffd45c5af0defda3df59fdd3b392c12

Session started on 30/11/2017 à 17:22:59

Dates

Session timestamp	30/11/2017 à 17:22:59
Update date	27/06/2018 à 10:33:11

Seconds Factors Authentication

Type	Name	Date	
TOTP	FreeOTP	27/06/2018 à 10:33:11	⛔

USION
TAM