Technical Guide Voter Role

ICC Eastern Cardano Council

Constitutional Guardians
Bridging Cultures

Contact Mark Byers (Head of Security) for any questions (mark.byers@selfdriven.foundation) or if not available, contact Phil Lewis.

1 Zones

Online Drive (Hot)

ECC shared google drive

- ha-nguyen-WWSI
- jo-allum-N8U726
- mark-byers-TPMT
- oscar-hong-Z36C
- phil-lewis-MIE17V
- yuki-oishi-KXM4V

Z1

Internet

Online Computer (Hot)

Computer is connected to the Internet

It only holds data that can be shared.

All witnessed/signed transactions should be shared by using your member folder on the ECC shared google drive @ /technical/operations/members/x509

Z2

USB-T

Transfer Transactions for Signing

USB-S

Secret Key Back Up (2 off)

Offline Computer (Cold)

Computer has not and will never connected to any network.

All network services disabled.

Transactions signed on this computer.

Z3

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Are shown to help conceptualise that they are different computers - but they can be any type of computer.

2 Protection

2A/ Risks

Information security risks are identified and recorded into the ECC Risk Register.
Each risk is then graded as “Negligible”, “Low”, “Medium”, “High”, “Critical”.
And then controls are put in place to ensure they are at the minimum level set by the member’s role.

2B/ Risk Levels based Roles

Voter: Minimum is Low
Membership/Orchestrator: Minimum is Negligible

2C/ Voter Role

This role technical has the lowest level of information security related to it.
Given the keys can easily be reset, are one of many and proxied via the Orchestrator (Head of Security) before use on-chain – mitigating many of the risks.

3 Hardware (Voter)

3A/ Computer connected to the internet (Existing)

Used to access ECC Google Drive /technical/operations folder

Z2

3B/ Computer never connected to the internet

Used to sign transactions

Z3

3C/ Three(3) USB Drives, Well Known Brand*, 16GB +

One(1) used to transfer files between computers

Z2 Z3

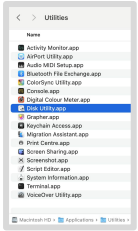
x2

Two(2) used to hold secret keys

Z3

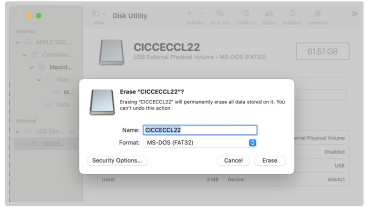
* Sandisk / Samsung / Kingston / Verbatim / Lexar

Preparing USBs



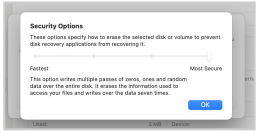
1/ Put the USB into your **offline (cold)** computer

2/ On MacOS > Applications > Utilities > **Open Disk Utility**



3/ Click on the USB > Click **Erase ..** button

4/ Click **Security Options** > Slide to Most Secure > Click OK



5/ Rename the USB Drive to say "CICCECC" & Select ExFat > Click **Erase**

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You can get a safe for the storage of your USBs, but if you are a Voter only, this is not critical as your Identity (X509) keys can be reset.

4 Software (Voter)

Z3

The follow software is in the ECC Google Drive @ /technical/operations/members/util

4A/ OpenSSL (Ed25519)

This is a terminal tool that can be used to generate your X509 identity. You only need to do this once – and also encrypting your secret keys.

4B/ Cardano-cli

Used to sign the transaction (it does not need a Cardano Node).

4C/ Google Drive (CICC-ECC Shared Folder)

Used to transfer X509 requests/certificates, transactions to be signed, signed transactions.

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There is a more intuitive graphic UI coming, but these are the text based commands that can be used now.

i

You can make it easier to access the MacOS terminal using these instructions.

i

Instructions for member to generate X509 Certificate.

5 Identity & Roles

5A/ X509 Standard for Identity

X509 used by the internet to establish the identity of things (e.g. websites) and people.
It creates a set of keys linked to you. One key is public and one is private.
The private key needs to be kept secret and never leave the offline (code) "Z3" code.
You keep an encrypted copy of the private key on your "USB-S" drives.

[Instructions for member to generate X509 Certificate]

5B/ Roles / Voter Role

There a number of technical roles; Membership / Delegator / Voter.
This guide is focused on the Voter role.
This role technical has the lowest level of information security related to it.
Given the keys can easily be reset, are one of many and proxied via the Orchestrator (Head of Security) before use on-chain.

6 Voting

A/ Orchestrator (Head of Security) creates the transaction for the gov action id and sets the the vote to be as agreed by the ECC as per its governance document. (Voting Sheet)

B/ Transaction put into each of the members Google Drive folder

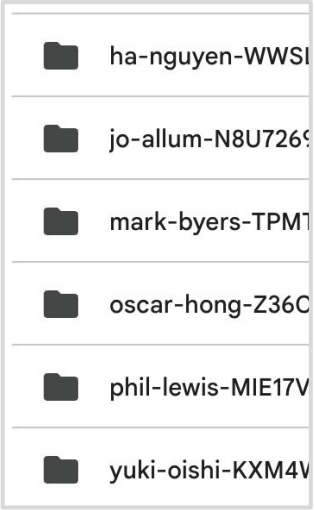
C/ Each member then copies the transaction file to their Transfer USB (USB-T)

D/ Member then puts the USB-T drive into their offline (cold) computer (Z3) and copies the transaction file to the Computer hard drive.

E/ The USB-T drive is then removed from the computer.

F/ One of the USB-S drives is plugged into offline (cold) computer (Z3).

G/ *Software voting instructions ...*



7 Instructions (Step by Step)

7A/ Prepare USBs

7B/ Prepare Offline-Cold Computer

7C/ Copy Software to Offline-Cold Computer

7D/ Create Your ECC Member Identity (X509 Keys)

7E/ (#1) Converting, (#2) Protecting & Storing Your Identity Keys

7F/ Voting on a Governance Action

7A Prepare USBs

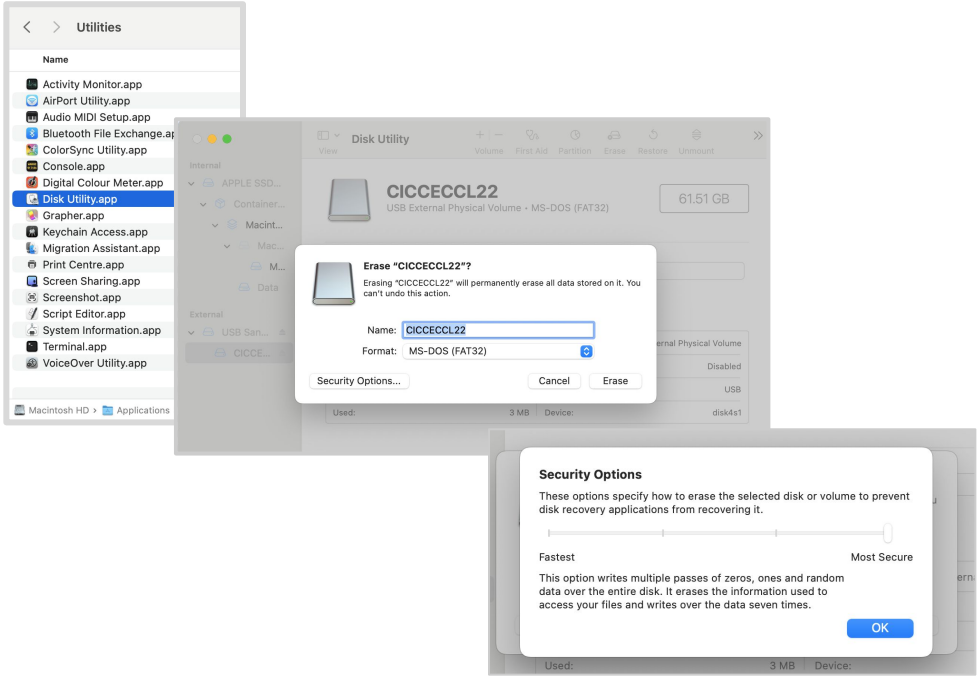
1/ Put the USB into your **offline (cold)** computer

2/ On MacOS > Applications > Utilities > **Open Disk Utility**

3/ Click on the USB > Click **Erase ..** button

4/ Click **Security Options** > Slide to Most Secure > Click OK

5/ Rename the USB Drive to say “CICCECC” & Select ExFat > Click **Erase**



i

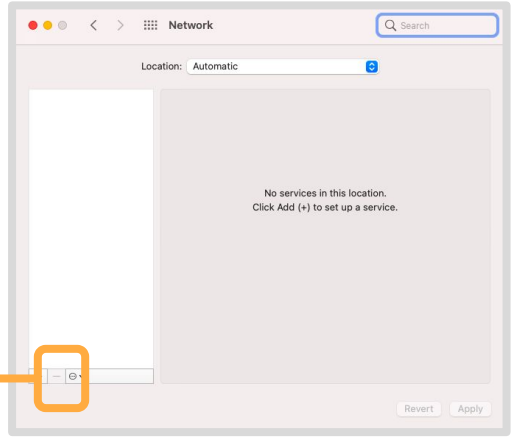
You can get a safe for the storage of your USBs, but if you are a Voter only, this is not critical as your Identity (X509) keys can be reset.

7B Prepare Offline-Cold Computer

1/ On MacOS > (Apple Logo) > **System Preferences ...**

2/ Click the **Network** icon

3/ Click the **(-) button** until all the "Wifi, LAN" options are removed.



> **i** If using the latest version of MacOS this is slightly different process, but it is the same intent of removing all network access.

4/ Using MacOS Finder, create folders:

- /ciccecc
  - /util
  - /keys
  - /voting

7C #1 Copy Software to Offline-Cold Computer

USB-T  Z2

USB-T  Z3

1/ Insert the "USB-T" transfer USB driven into the online/hot computer

2/ Copy the **technical/operations/members/util** (zip) folder to the USB drive.

3/ Eject the USB from the online-hot computer and insert into your offline-cold computer.

4/ Copy the **/util** folder from the USB to your offline-cold computer, then:

Using MacOS Finder:
- In your home user folder create folders /ciccecc/util
- Copy the files in the /util folder on your USB-T to the /ciccecc/util folder you just created.

Note: If you downloaded the zip file, then you will need to unzip it it first, by right clicking on the ciccecc-util.zip and selecting Open With ... Archive Utility,app ...

5/ If using later model Mac with Silicon chip, you need to mark the files as safe:

Using MacOS Terminal run the following:

```
xattr -d com.apple.quarantine ~/ciccecc/util/*
```

6/ Make files findable, so can be run by MacOS from any folder

Using MacOS Terminal run the following:

```
export PATH="$HOME/ciccecc/util/openssl/bin:$PATH"
```

Continued ...

i **"~" & "$HOME" are shorthand for your user directory on your computer**

i **Using the MacOS Terminal you can check your current location by typing** `pwd`. **Your** `ciccecc` **folder should be:** `/Users/[username]/ciccecc`

i **You can make it easier to access the MacOS terminal using these instructions.**

i **Using the MacOS Terminal you can type** `echo $PATH` **to check the PATH setting.**

7C #2 Set up Software on Offline-Cold Computer

Z3

8/ Set up openSSL by copying the files to a specific folder on your MacOS

If you using Mac with a Silicon chip (e.g. M1, M2, M3, M4) then replace util/openssl with /util/openssl-silicon

```
cd ~/ciccecc
```

```
sudo mkdir -p /usr/local/Cellar/openssl@3/3.3.1
```

```
sudo cp -r util/openssl/ /usr/local/Cellar/openssl@3/3.3.1
```

9/ Test that files copied and are set up OK, using MacOS Terminal, run:

```
openssl version
```

You should see:
"OpenSSL 3.3.1 4 Jun 2024 (Library: OpenSSL 3.3.1 4 Jun 2024)"

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To work out if you have a Silicon chip - click the **Apple icon** top-left and **About This Mac**. If you see **Chip: Apple M1 M2, M3 or M4** then you have a Silicon chip and need to use the /openssl-silicon folder.

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"sudo" is short for super user do. It will prompt you for your computer logon password.

7D Create Your ECC Member Identity (X509 Keys)

Z3

1/ This will use software that you have copied to your offline computer to the **/util** folder.

2/ Each member has a unique code allocated by the ECC Head of Security (e.g. Mark).
You can get your code from the list @ **Instructions for member to generate X509 Certificate**.

3/ Open the MacOS Terminal and navigate to the **/keys** folder and run:

```
cd ~/ciccecc/keys
```

```
openssl genpkey -algorithm ed25519 \
-out member-[firstname]-[surname]-[code].pem
```

```
openssl req -new \
-key member-[firstname]-[surname]-[code].pem \
-out member-[firstname]-[surname]-[code].csr
```

Example answers, leave all other questions blank.

```
C = [your country code]
ST = [your state]
L = [your location/city]
O = Eastern Cardano Council
OU = Operations
CN = [firstname].[surname].[code].council.eastern.cardano
```

i **You can make it easier to access the MacOS terminal for a particular folder using these instructions.**

i **Text file with the MacOS terminal commands**

! **The .pem file is your private key, you must keep this secret!**

4/ Copy only the .csr file to your folder on the CICC-ECC shared google drive - then let Head of Security (e.g. Mark) know.

7E #1 Converting Your Keys

Z3

1/ You need to convert your .pem file to a Cardano formatted key, so it can be used to witness voting transactions.

2/ Open the MacOS Terminal and navigate to the **/keys** folder and run:

```
cp member-[firstname]-[surname]-[code].pem member.pem
```

```
node convert-pem-to-skey.js
```

```
rm member.pem
```

```
cp member-cardano.skey member-[firstname]-[surname]-[code].skey
```

```
rm member-cardano.skey
```

3/ Follow commands in the next slide to **encrypt the /keys folder** and then **copy to the "USB-S" USB drives** as a back up.

i Text file with the MacOS terminal commands

! **The .pem & .skey files are your private key - you must keep them secret!**

7E #2 Protecting & Storing Your Keys

Z3

USB-S

1/ **Your keys need to be encrypted with a password before storing on your "USB-S" USB drives.**

2/ **Encrypting using the MacOS Terminal in your /keys folder**

```
zip -r skeys.zip skeys/
```

```
openssl enc -aes-256-cbc -salt -in skeys.zip -out skeys.zip.enc -k
[password]
```

```
dd if=/dev/urandom of=skeys.zip bs=512 count=10
```

```
rm skeys.zip
```

Copy zkeys.zip.enc to your "USB-S" USB drives

3/ **Decrypt using the MacOS Terminal in your /keys folder**

Copy zkeys.zip.enc from your "USB-S" USB drive to /keys folder

```
openssl enc -aes-256-cbc -d -in skeys.zip.enc -out skeys.zip -k [password]
```

```
unzip skeys.zip -d /skeys
```

i

Text file with the MacOS terminal commands

!

The .pem & .skey files are your private key - you must keep them secret!

7F Voting on a Governance Action

Z3

1/ **Copy the transaction-(govactionid).json file** from the members voting folder on the CICC-ECC shared drive to your **/ciccecc/voting** folder, as instructed by the ECC Voting Orchestrator.

2/ Open the MacOS Terminal and navigate to the **/voting** folder and run:

```
cardano-cli transaction witness \
    --tx-body-file transaction-[govactionid].json \
    --signing-key-file ../keys/member-[firstname]-[lastname]-[code].skey \
    --mainnet \
    --out-file transaction-[govactionid]-witness-[firstname]-[lastname]-[code].json
```

i **Text file with the MacOS terminal commands**

3/ **Copy transaction-(govactionid)-(firstname)-(lastname)-(code)-witness.json** to your member folder on the ECC Shared Members Folder