Reconsideration of public key fingerprints

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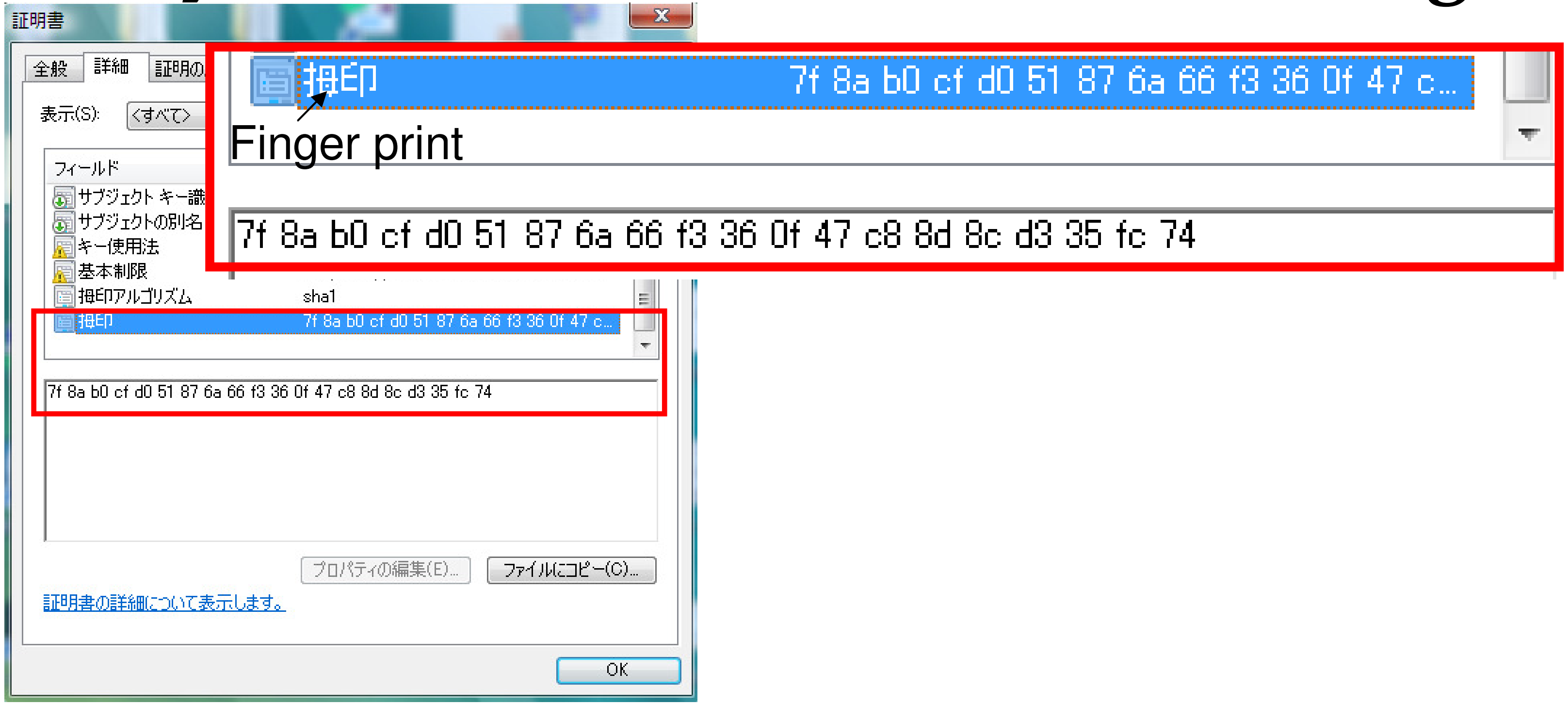
Fingerprint of an X.509 PKC

- A short sequence of bytes used to authenticate a public key.

- Created by applying a cryptographic hash function to a public key.
  - Commonly used today are based on (MD5 or) SHA-1.

Fingerprint of X.509 PKC

- **Install an X.509 self-signed certificate with <u>human inspection</u>.**
- **Usually encoded into hexadecimal strings.**



サブジェクト キー識
サブジェクトの別名
キー使用法
基本制限
拇印アルゴリズム sha1
拇印 7f 8a b0 cf d0 51 87 6a 66 f3 36 0f 47 c...

7f 8a b0 cf d0 51 87 6a 66 f3 36 0f 47 c8 8d 8c d3 35 fc 74

Human inspection

- Get a fingerprint via non-Internet channel.
  - Such as newspaper, official gazette.

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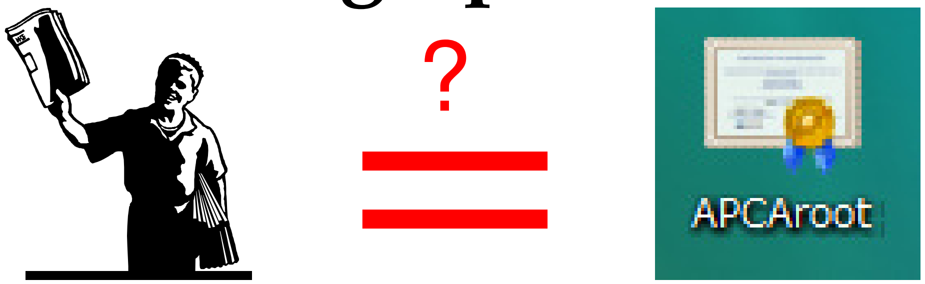
- Download an X.509 cert via the Internet.
  - Usually self-signed CA certificate.

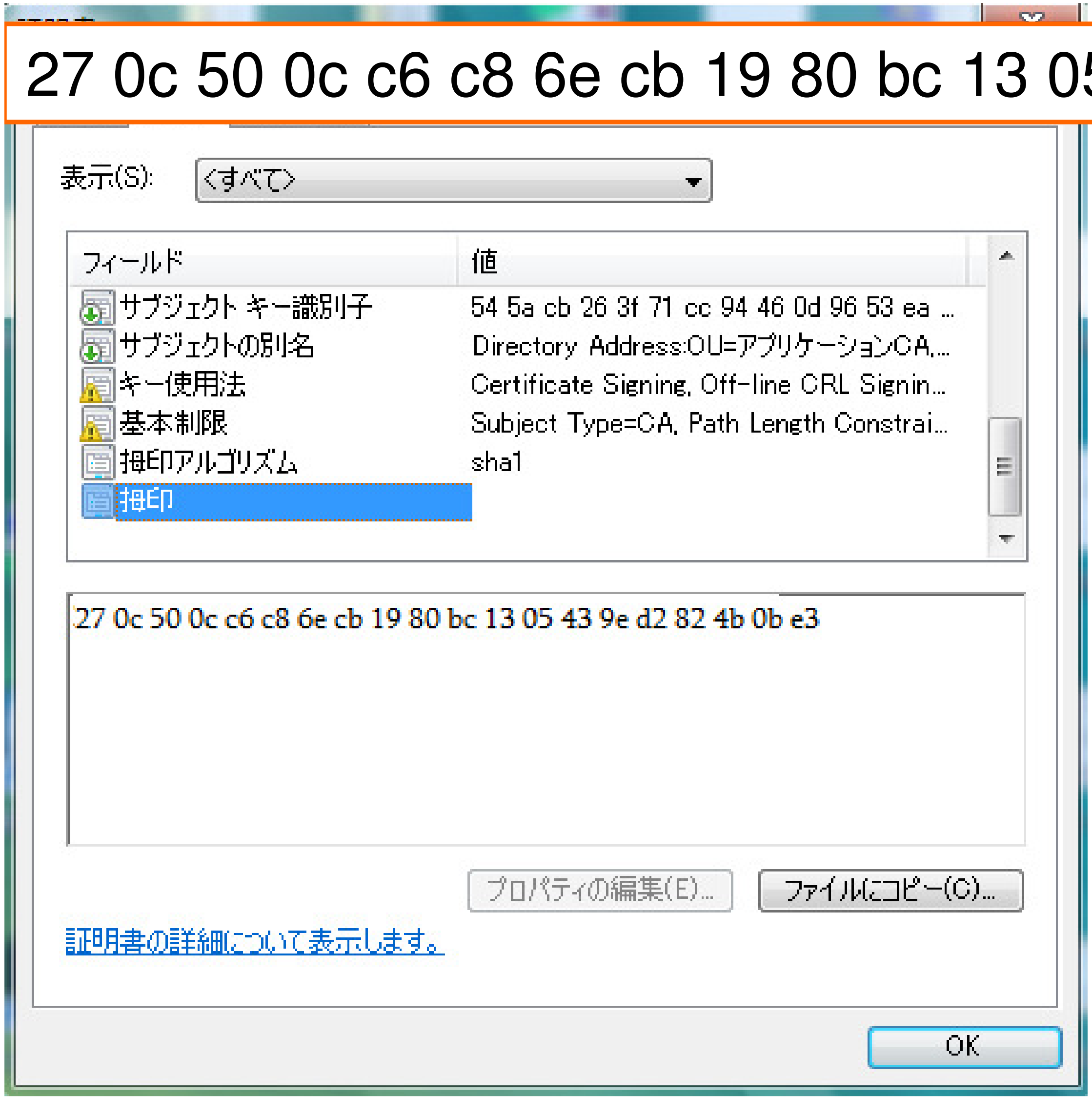
Human inspection

- Get a fingerprint via non-Internet channel.
  - Such as newspaper, official gazette.
- Download an X.509 cert via the Internet.
  - Usually self-signed CA certificate.
- Check these fingerprints.



Let’s try !!

27 0c 50 0c c6 c8 6e cb 19 80 bc 13 05 43 9e d2 82 4b 0b e3



表示(S): <すべて>

フィールド	値
サブジェクト キー識別子	54 5a cb 26 3f 71 cc 94 46 0d 96 53 ea ...
サブジェクトの別名	Directory Address:OU=アプリケーションCA,...
キー使用法	Certificate Signing, Off-line CRL Signin...
基本制限	Subject Type=CA, Path Length Constrai...
拇印アルゴリズム	sha1
拇印	

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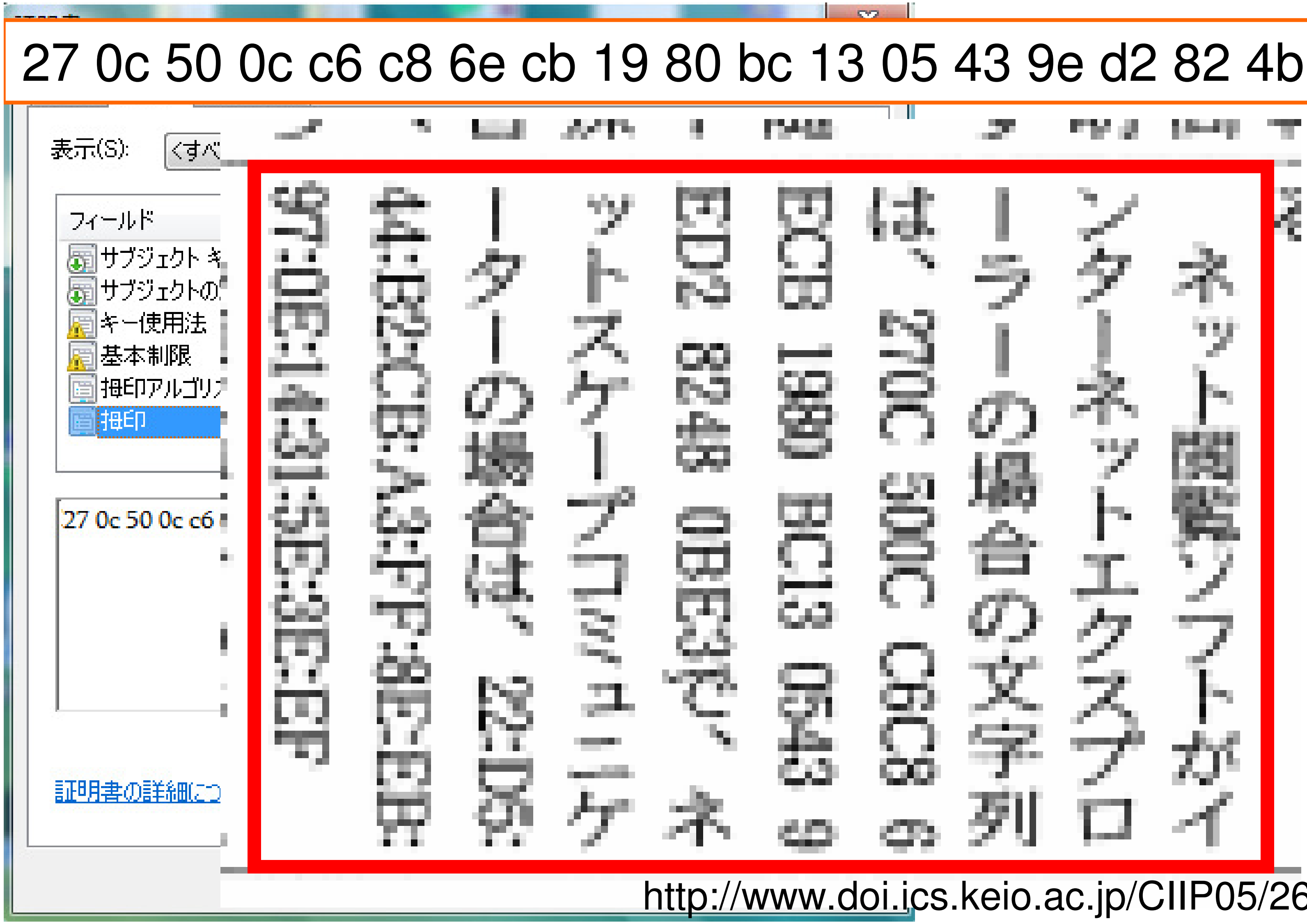


27 0c 50 0c c6

ネット関係ソフトがインターネットエクスプローラーの場合の文字列は、270C 500C C6C8 6ECB 1980 BC13 0543 9ED2 824B 0BE3で、ネットスケープコミュニケーターの場合は、22:D8:44:B2:CB:A3:FF:3E:EB:97:0E:14:31:5E:3E:EF

http://www.doi.ics.keio.ac.jp/CIIP05/26/12-Takagi.pdf

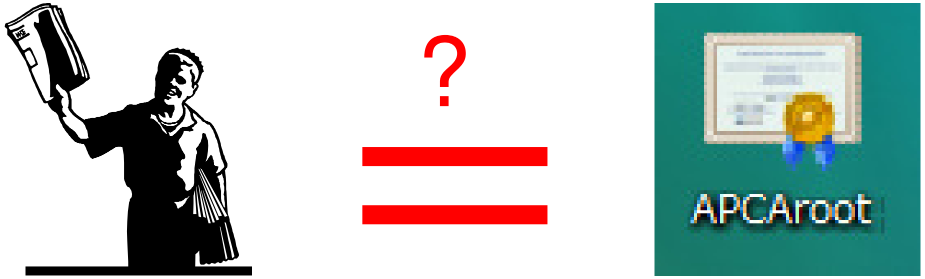
What’s wrong ?

- It is difficult for us to check it :
  - Case-sensitive problem
  - Different from separation of blocks
  - (Vertically problem)

- Trigger human errors…

Human inspection

- Get a fingerprint via non-Internet channel.
  - Such as newspaper, official gazette.
- Download an X.509 cert via the Internet.
  - Usually self-signed CA certificate.
- Check these fingerprints.



Human inspection

- G
  -
- Download an X.509 cert v
  - Usually self-signed CA cer
- Check these fingerprints.

Only display a fingerprint ...

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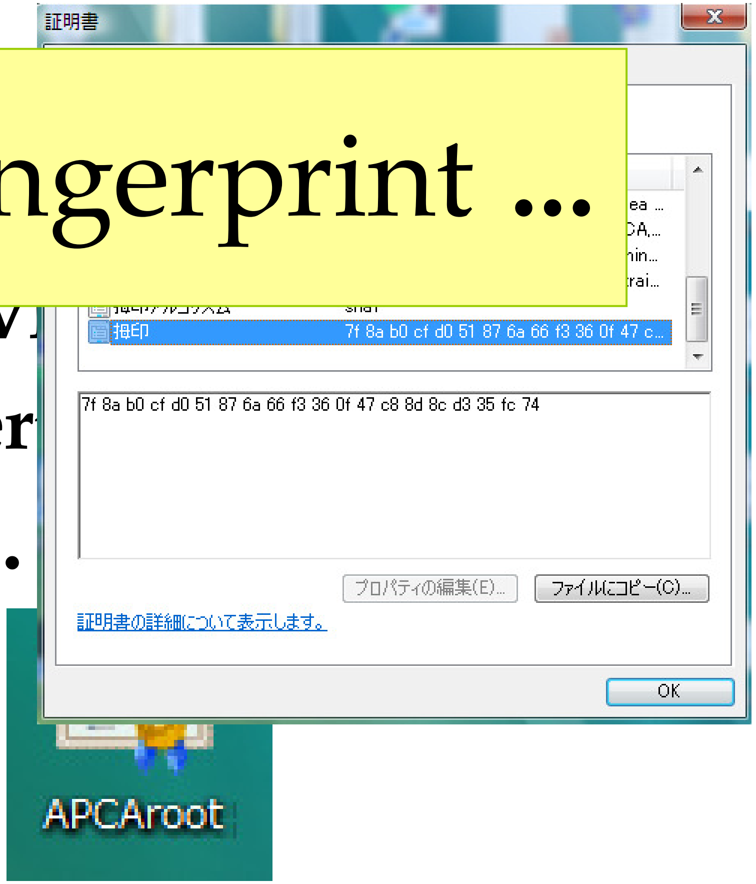

	ea ...
	CA,...
	hin...
	rai...
拇印アルゴリズム	sha1
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We can do interaction Human ~~inspection~~

- G
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Only display a fingerprint ...

- Download an X.509 cert vi
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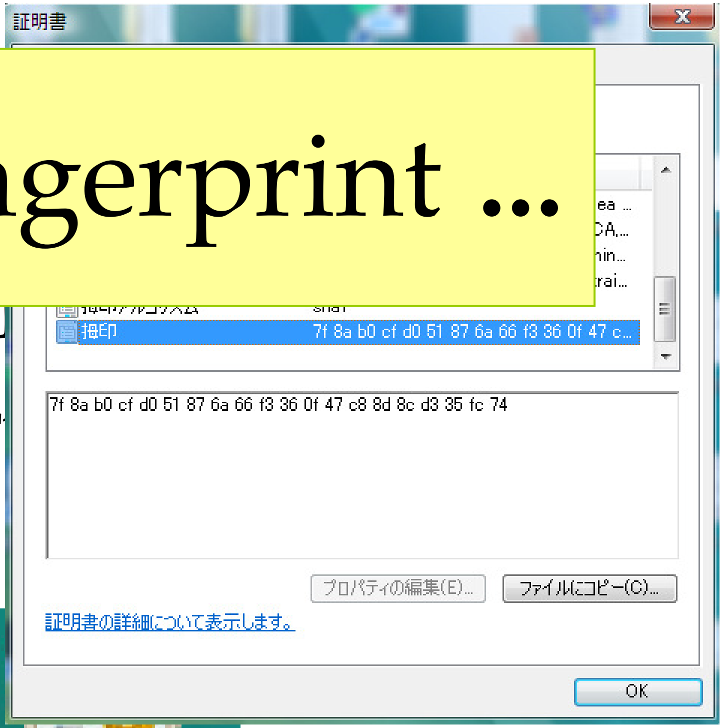

証明書

拇印アルゴリズム sha1

拇印 7f 8a b0 cf d0 51 87 6a 66 f3 36 0f 47 c...

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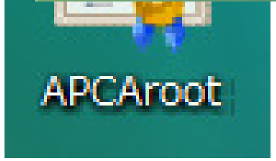
$\overset{?}{=}$

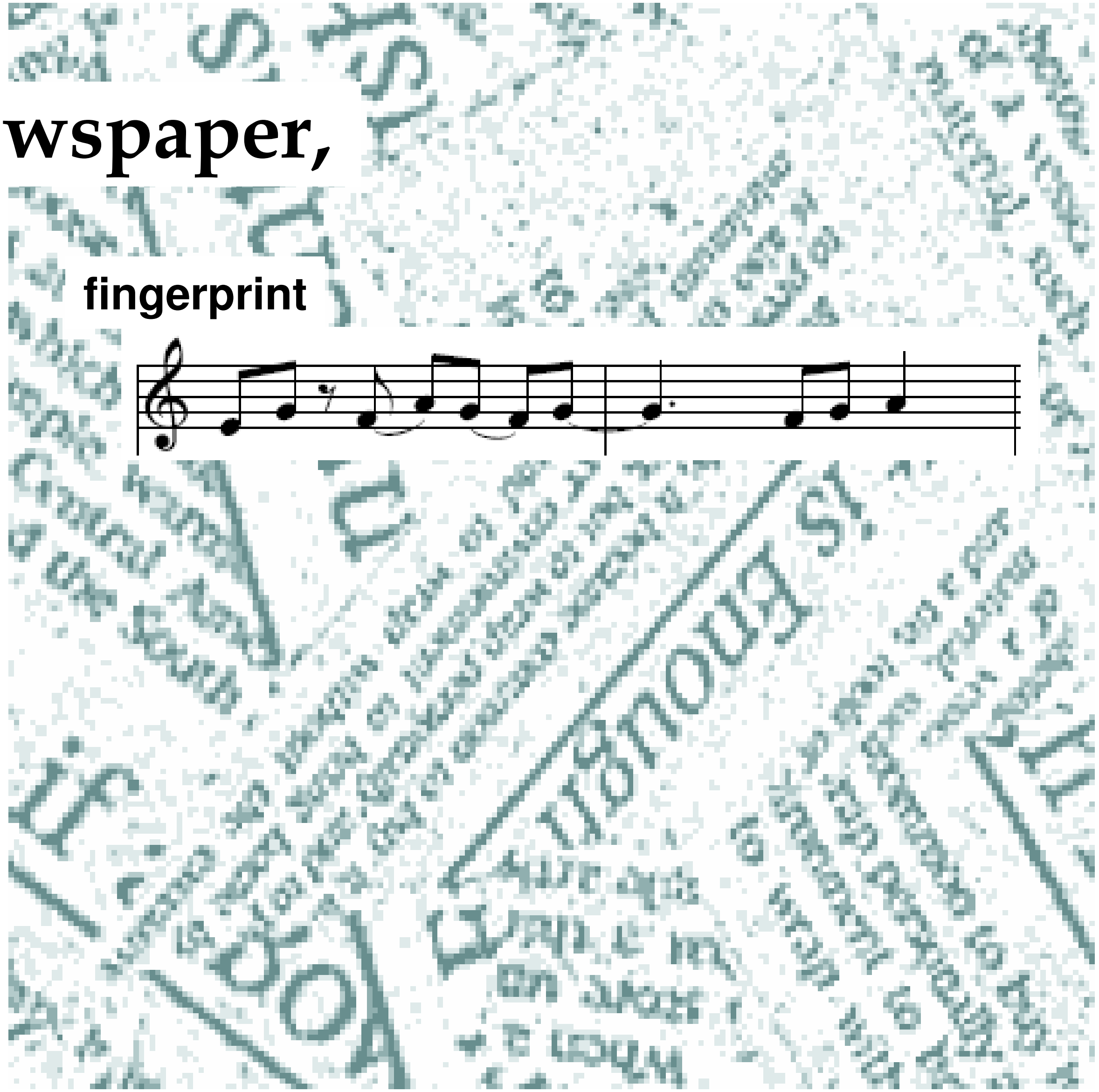


My proposal is simple

- **Users can do something**
  - **Passive mode**
    - **Basically check something.**
    - **Not only (boring) hex strings.**
  - **Active mode**
    - **Interactive to PCs.**

Example: Music scores

- **In a newspaper,**



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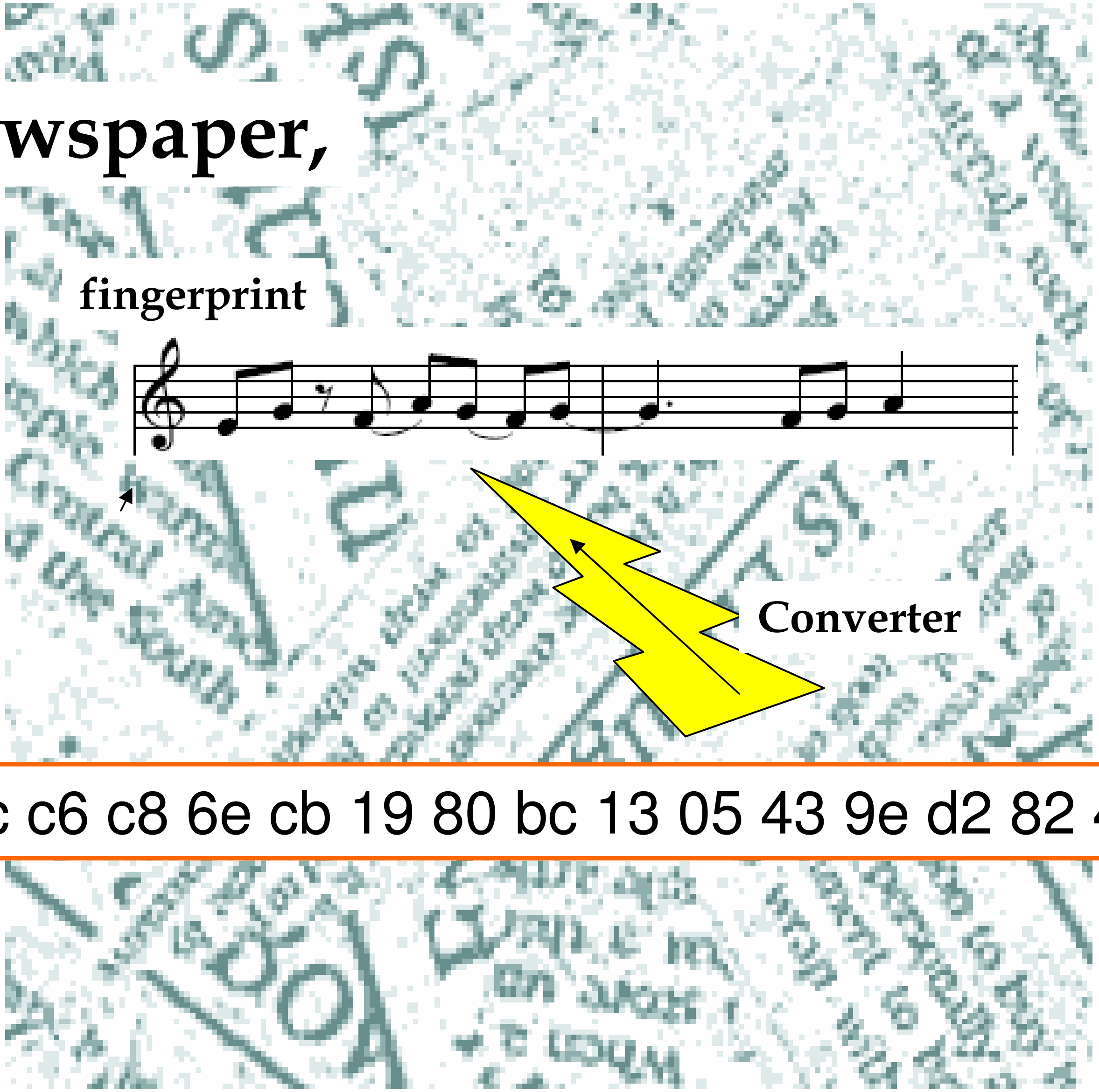

27 0c 50 0c c6 c8 6e cb 19 80 bc 13 05 43 9e d2 82 4b 0b e3

APCAroot

Example: Music scores

- Check these fingerprints.

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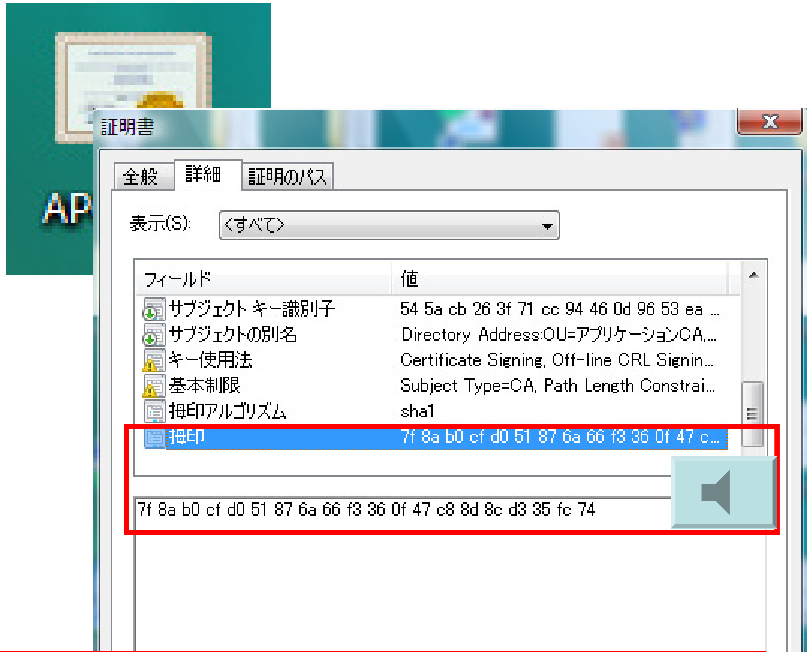

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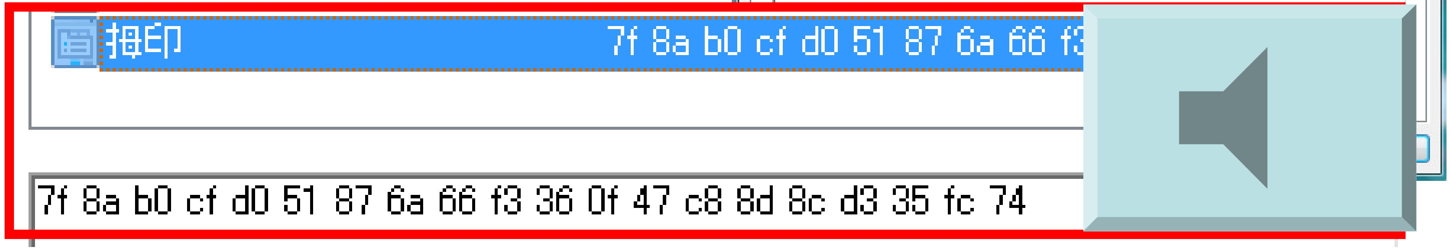

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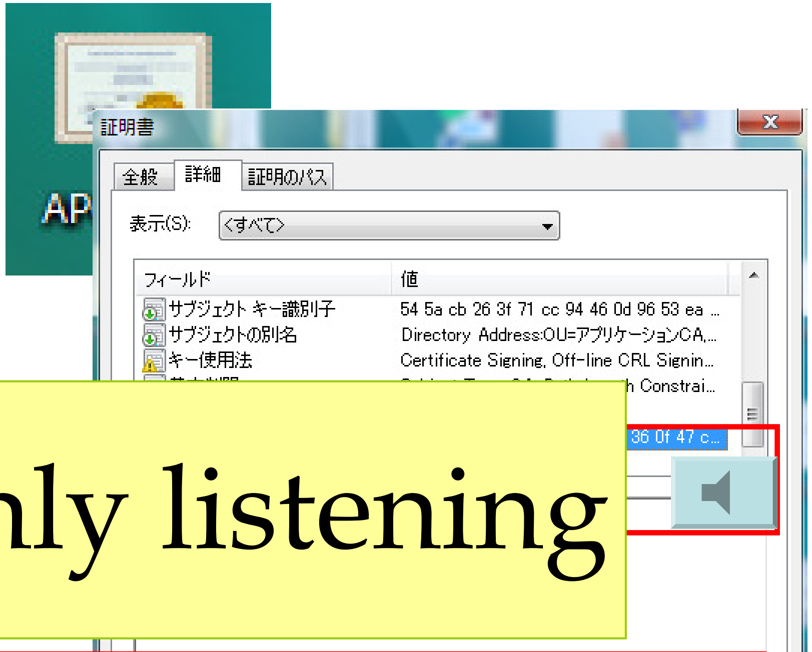

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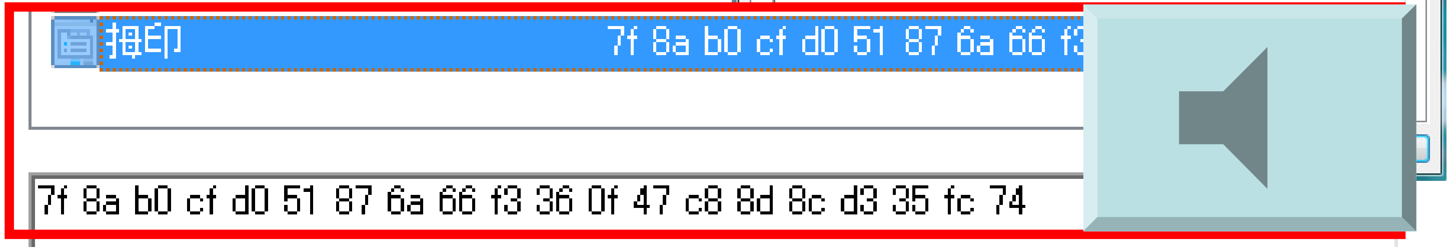
キー使用法	Certificate Signing, Off-line CRL Signin...

Passive mode: Only listening



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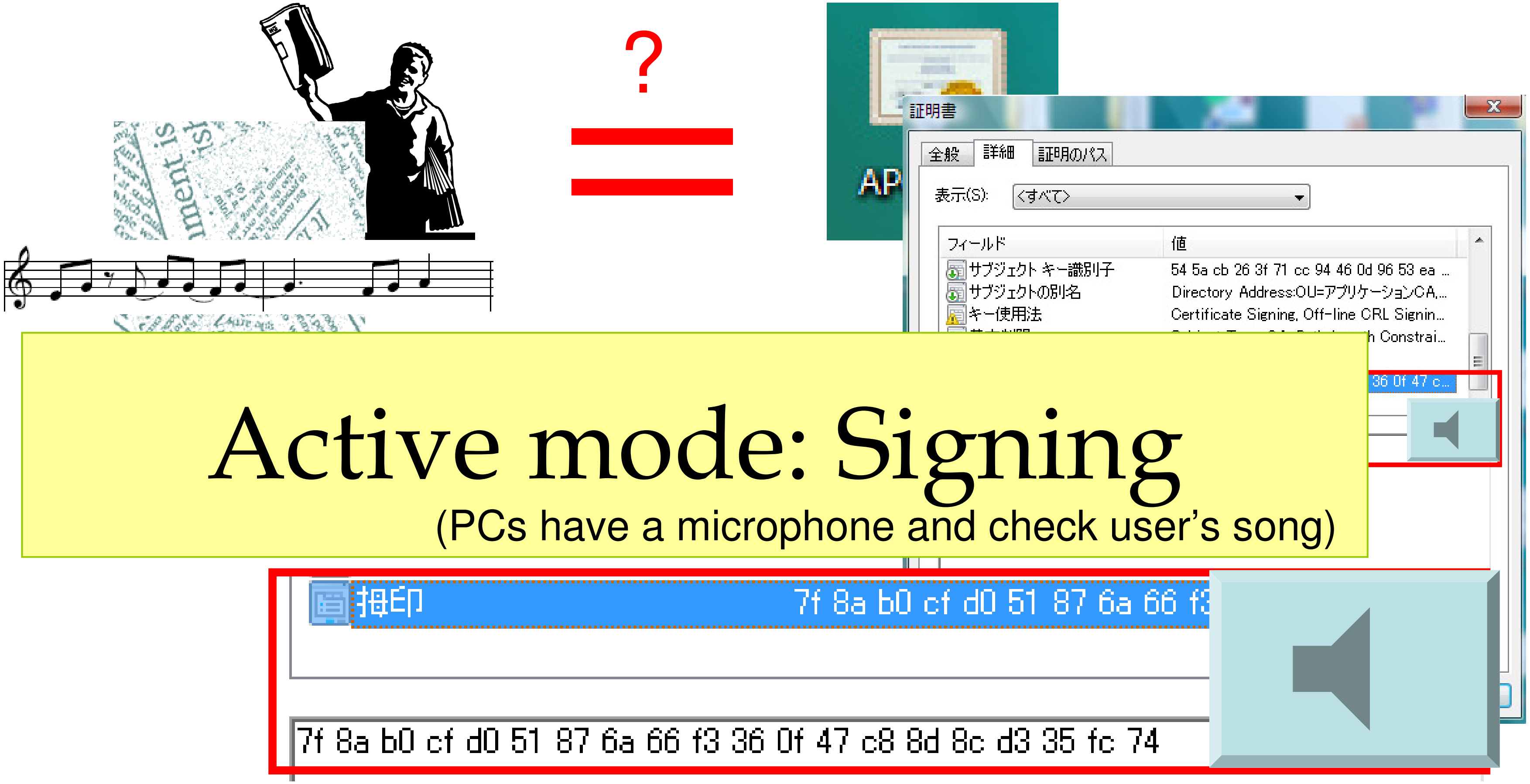
Example: Music scores

- **Check these fingerprints.**



証明書

全般 詳細 証明のパス

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```
7f 8a b0 cf d0 51 87 6a 66 f3 36 0f 47 c8 8d 8c d3 35 fc 74
```

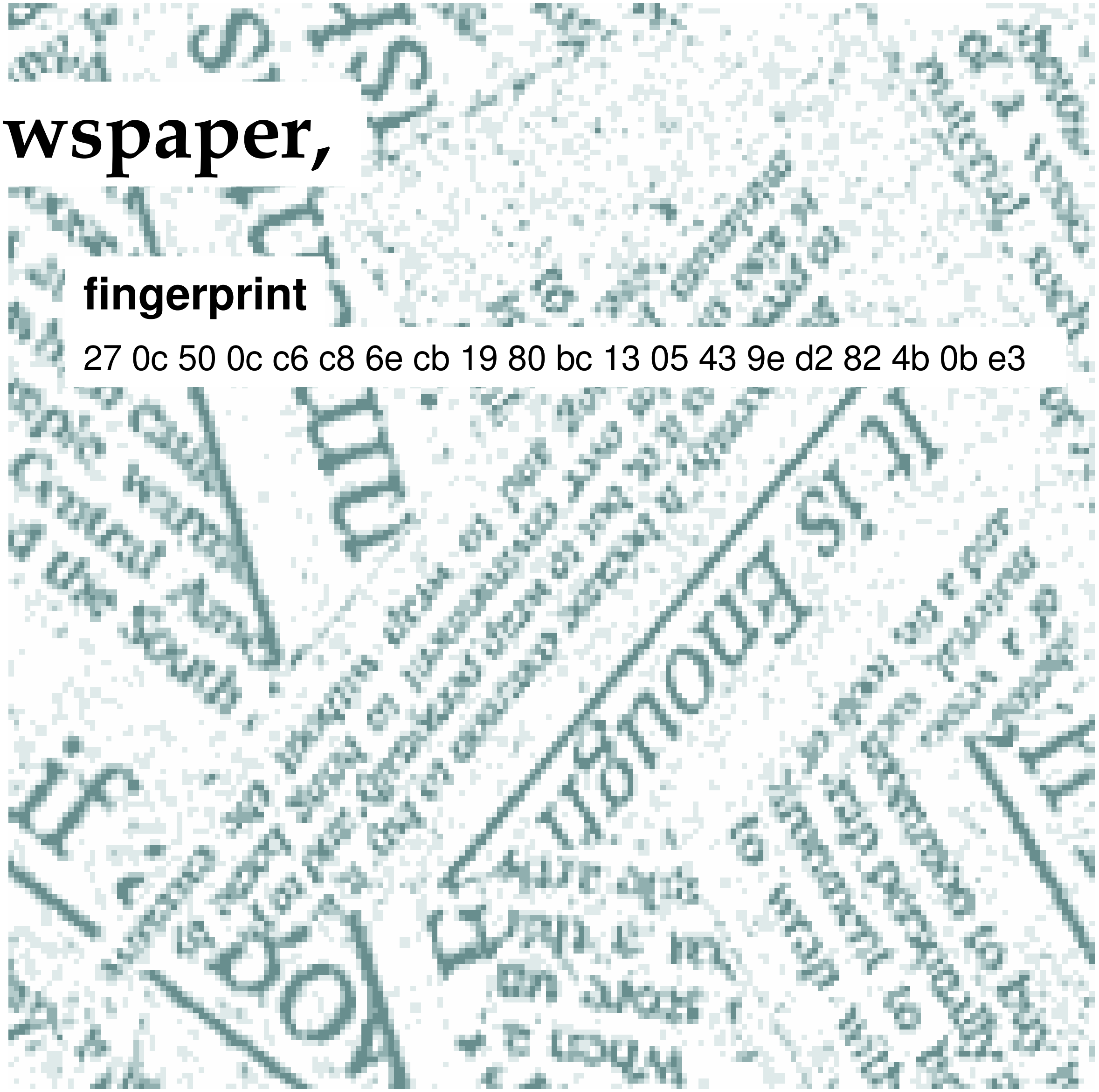
Active mode: Signing

(PCs have a microphone and check user's song)

Is it more complicated ?

Simple example: Input fingerprint

- **In a newspaper,**



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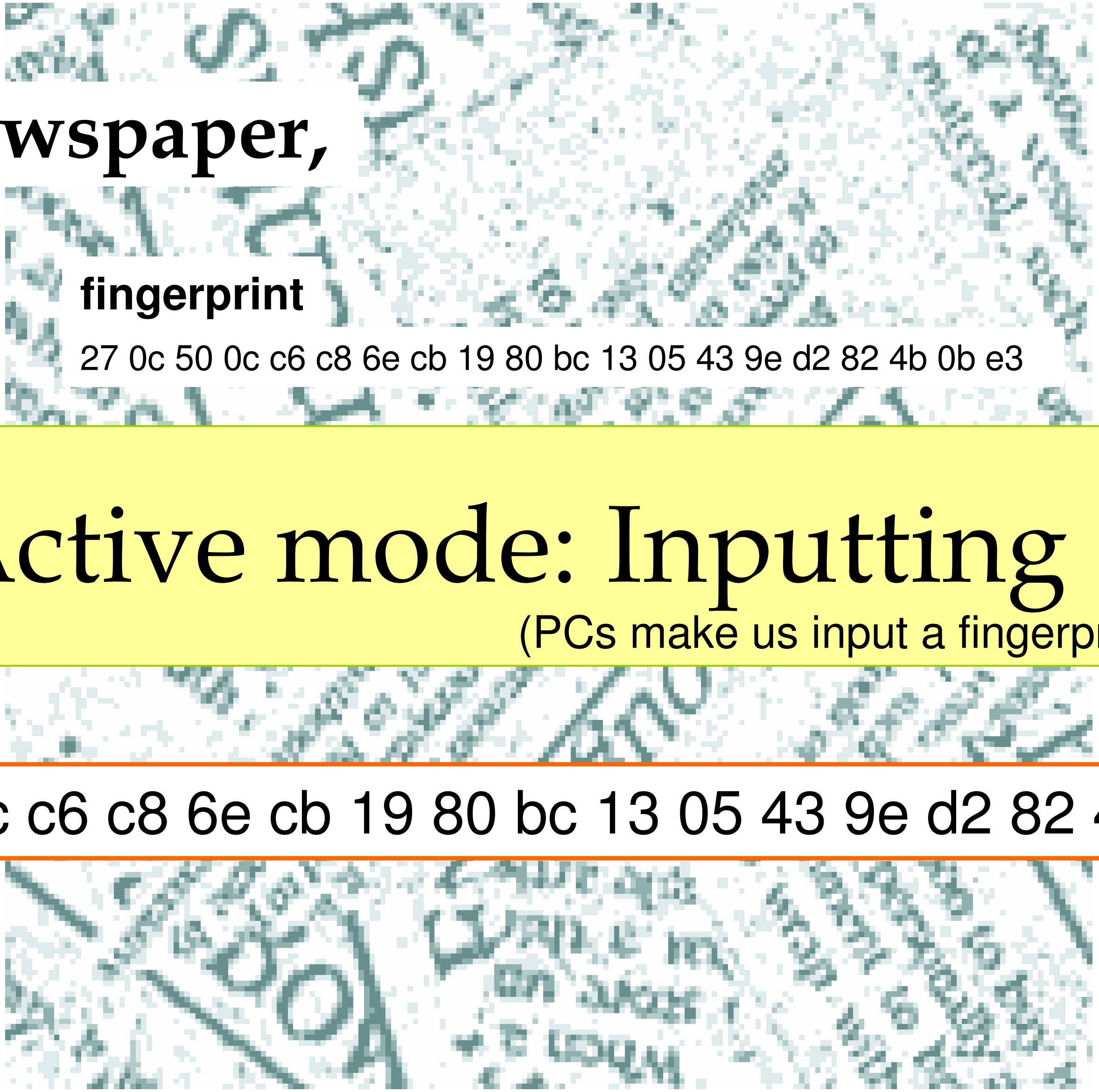

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Active mode: Inputting

(PCs make us input a fingerprint)

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APCAroot

Is it a boring task ?

We need something incentive

Active mode: Inputting

(PCs make us input a fingerprint)

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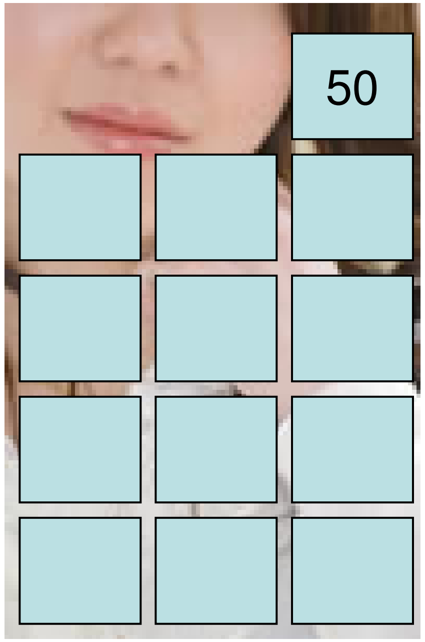

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