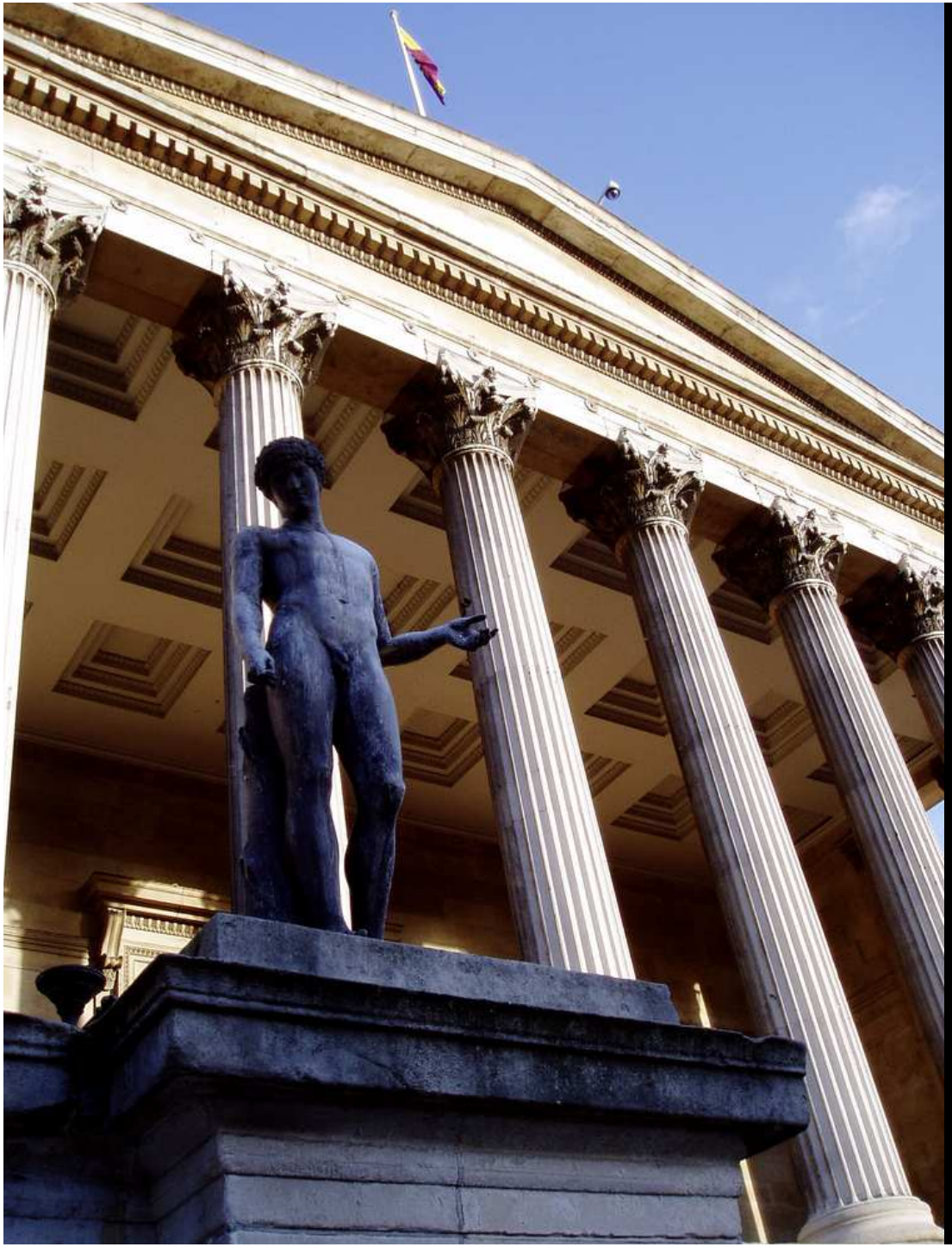
?

(daniele quercia)

I’m doing my PhD @



University College London

<My Research>

Ratings on ...

SONY
Ratings on phones
© Nathan Berry/E.C.A. Photography 2006

MobiRate:

how mobiles collect & store ratings

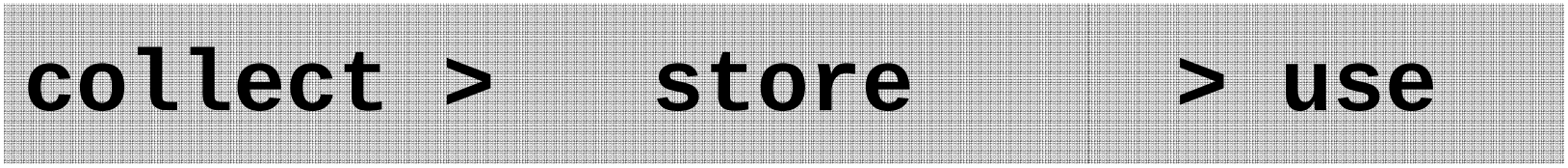
Why ratings on mobiles?

Situation: People exchange digital content

drowning user
(content overload)
help!
who will come to the rescue?

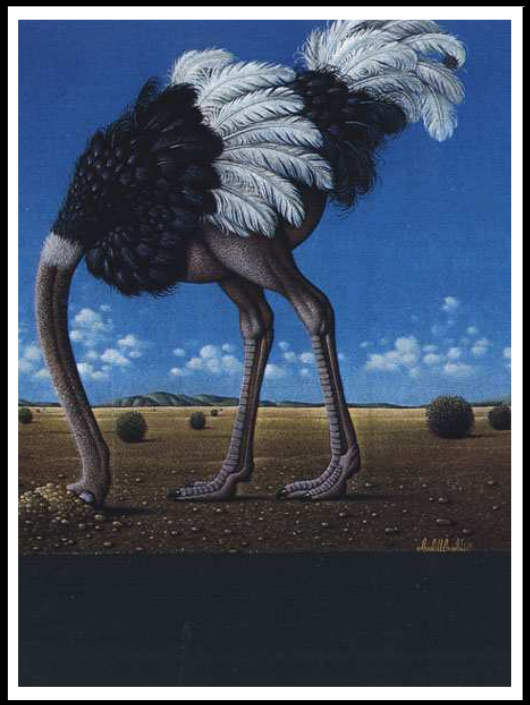
Proposal: Accept content only from reputable people

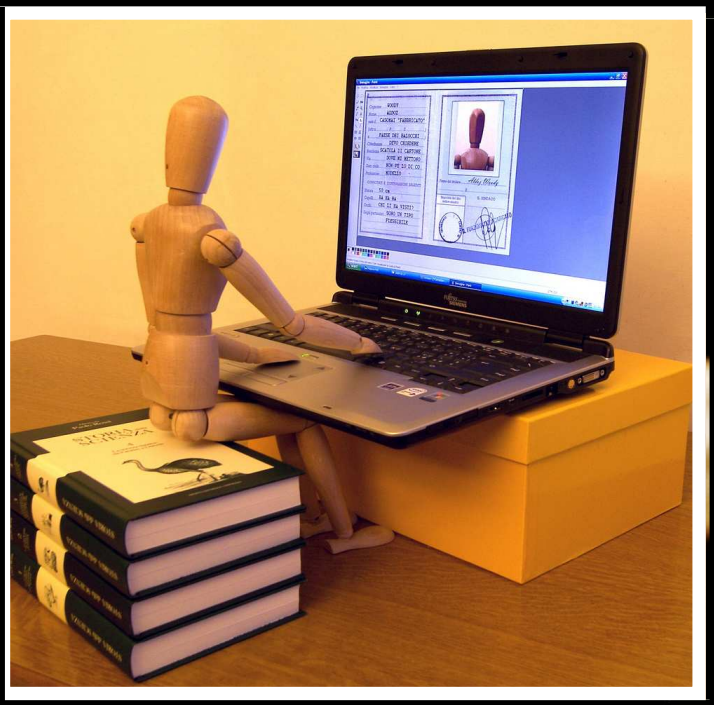
how mobiles collect & store ratings


collect > store > use

collect > store > use

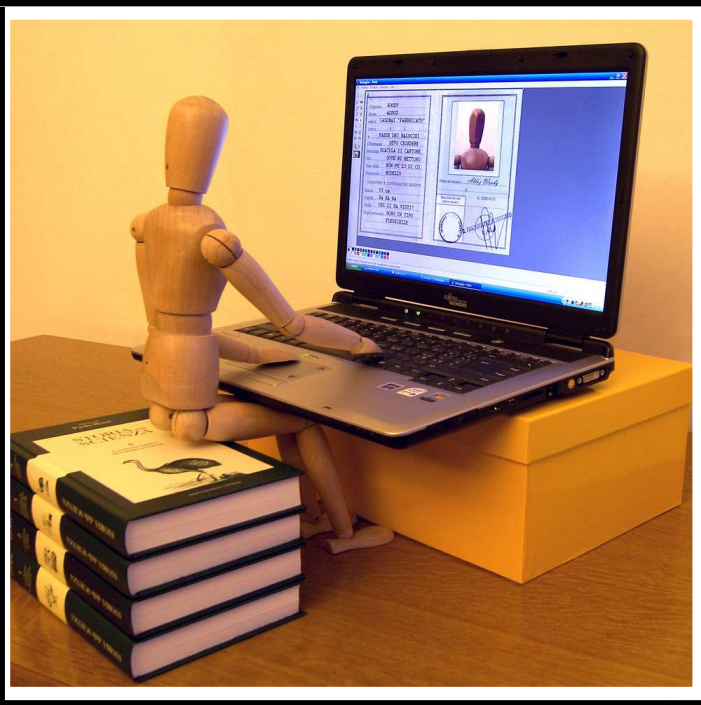
Ignorant **Forgers** **Liars**





Ignorant

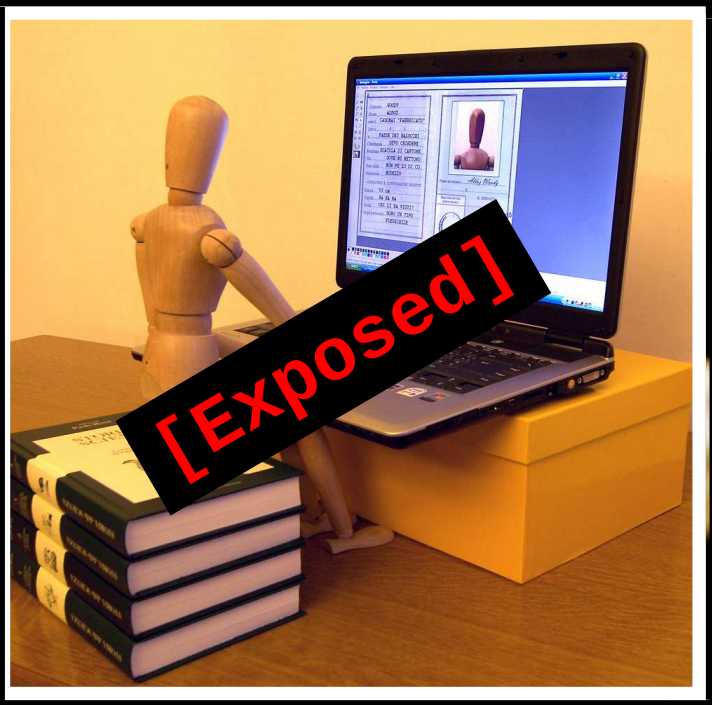
Forgers



Liars

Ignorant

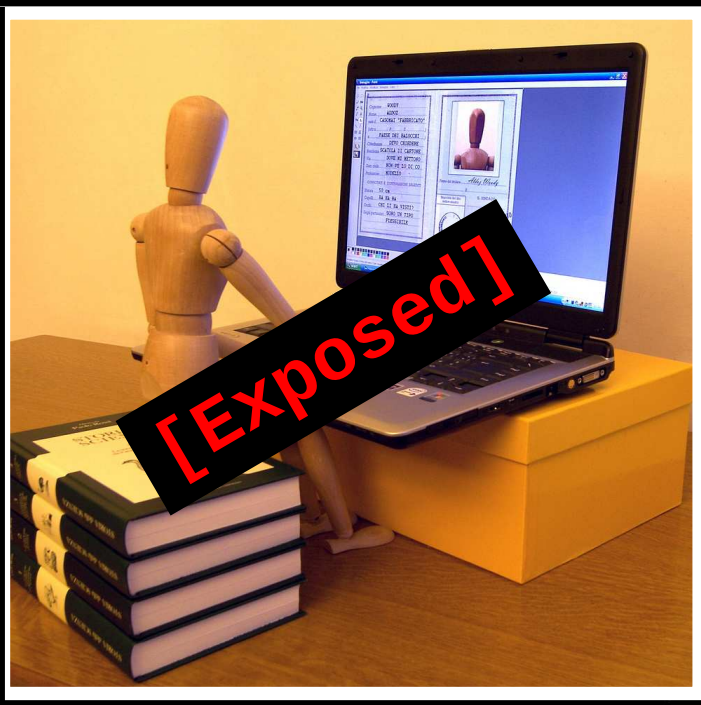
Forgers



Liars

Ignorant

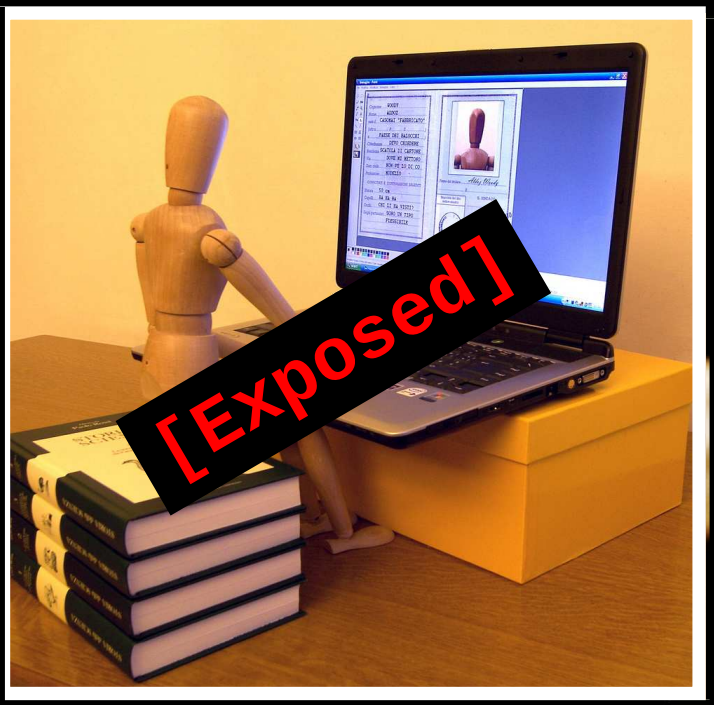
Forgers



Liars

Ignorant

Forgers



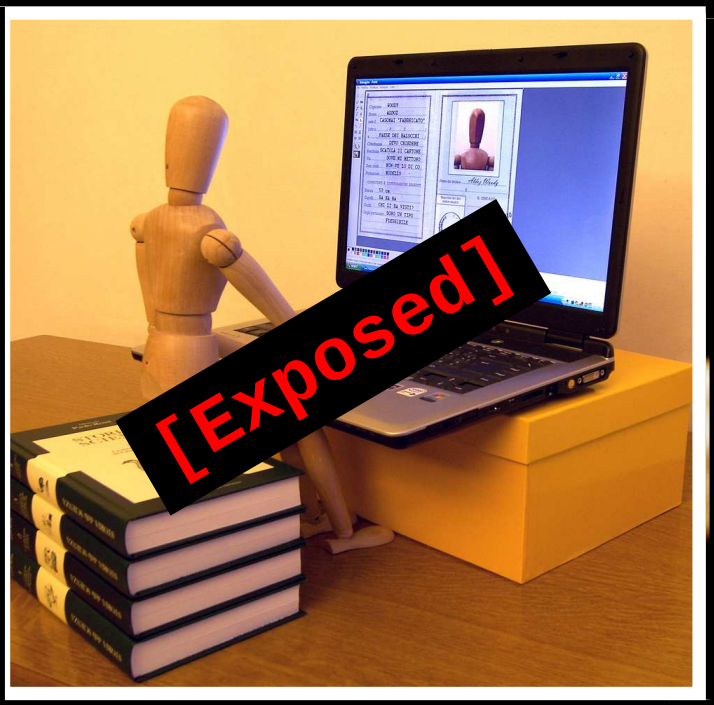
Liars

Work done:
AAAI, KDD,
ICDM, ...

Ignorant

~Ø

Forgers



~Ø

Liars

Work done:
AAAI, KDD,
ICDM, ...

collect > store

Ignorant Forgers Liars

MobiRate

Work done:
AAAI, KDD,
ICDM, ...

How to collect & store ratings?

1.Log
(credentials)

2. Gossip
(to check each credential)

1.Log
(credentials)

2. Gossip
(to check each ☹ credential)

☹ →Impractical

Idea behind MobiRate

Let’s make it practical...

1.Sealed Log
(of credentials)

2. Gossip
(to check seals only)

1.Sealed Log
(of credentials)

2. Gossip
(to check seals ☺ only)

☺ →Practical

Assumption

ID is a unique public key

Gossiping: To whom?

To witnesses

What witnesses do

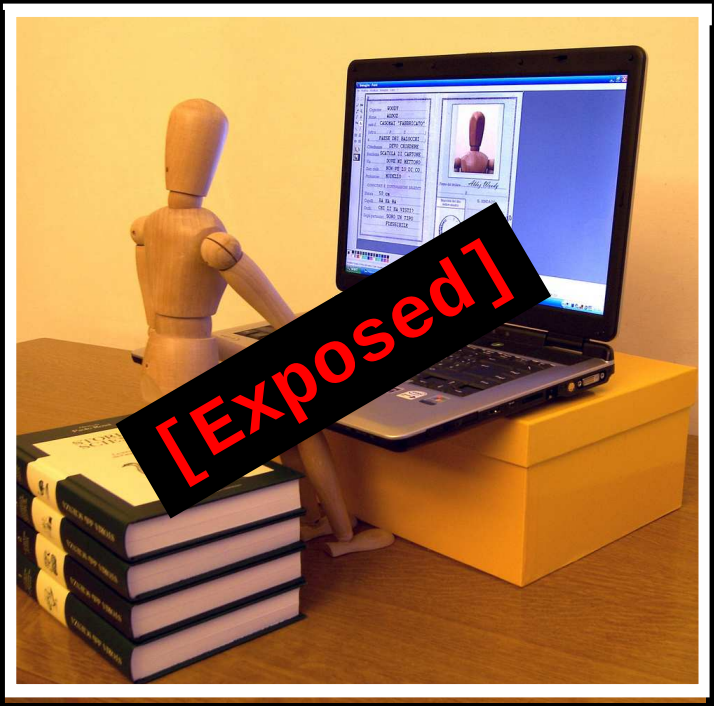
Audit!

What witnesses do

Audit!

Why?

If one is ignorant If one is a forger



Who are my witnesses

Those who will share
content with me

Who are my witnesses

Like-minded
familiar strangers

.

1.Sealed Log
(of credentials)

2. Gossip
(to check seals ☺ only)

☺ →Practical

Does MobiRate work?

Mobility Traces AND Social Networks

Reality Mining

Does MobiRate work?

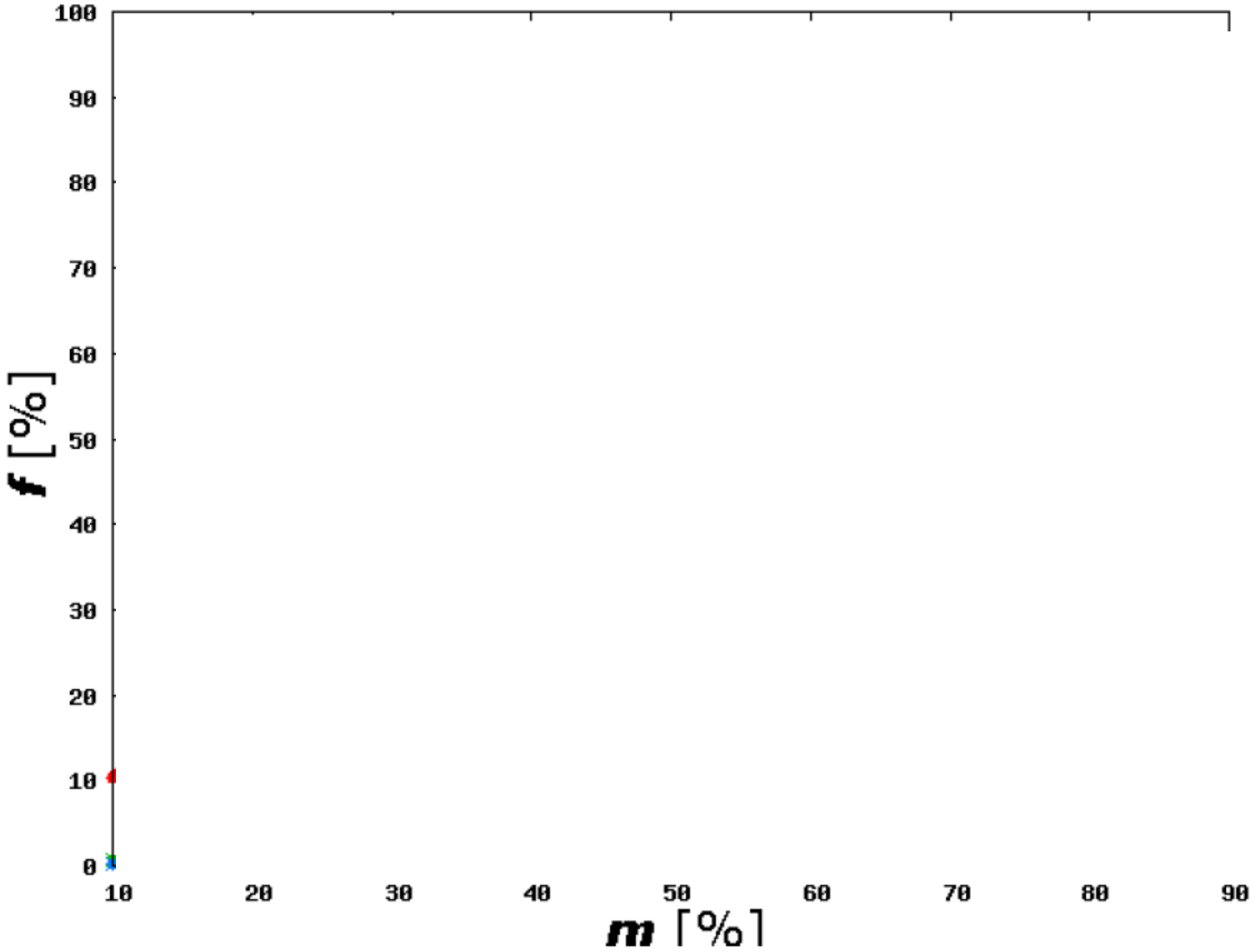
Does MobiRate work?

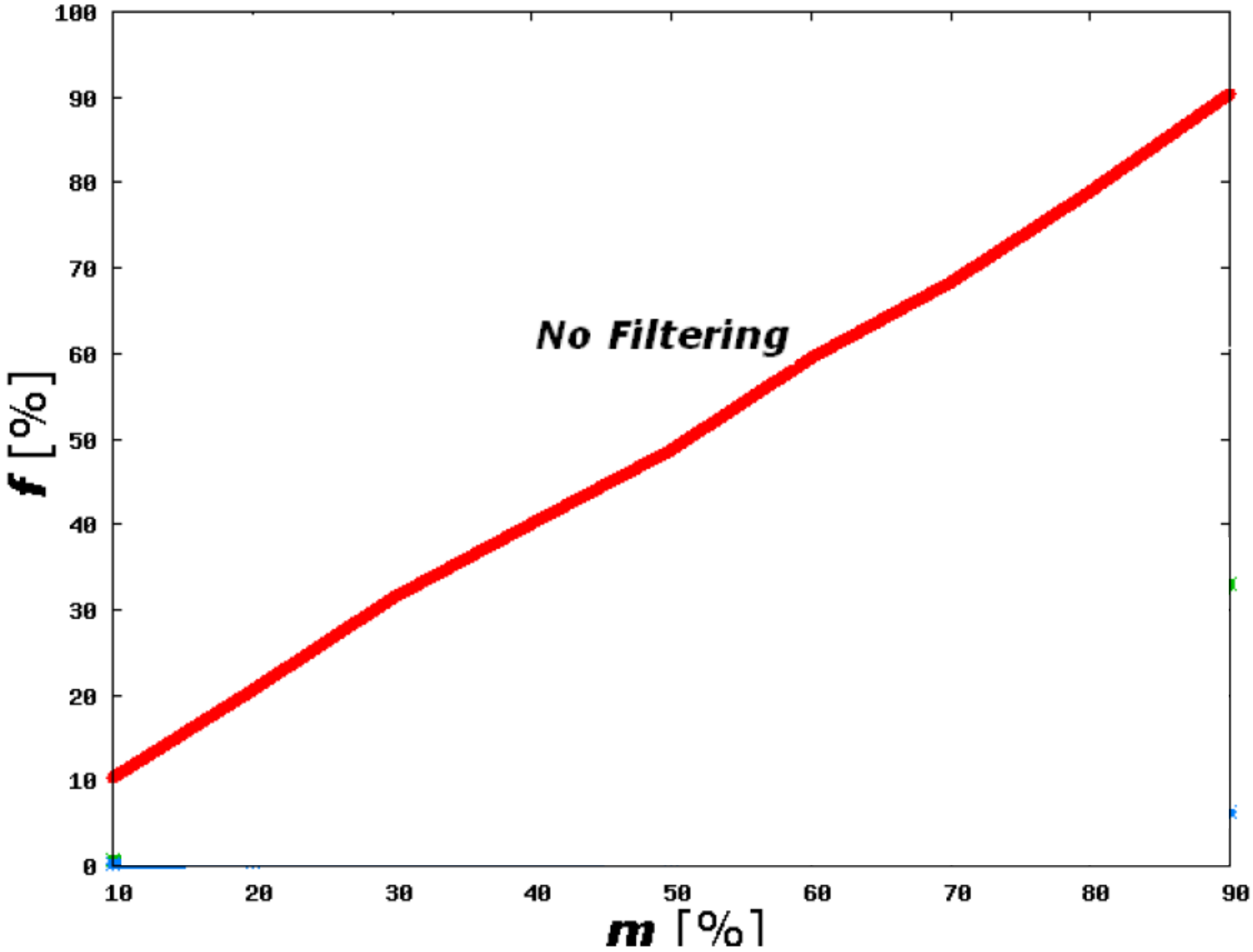
<1> Is it robust to malicious individuals?

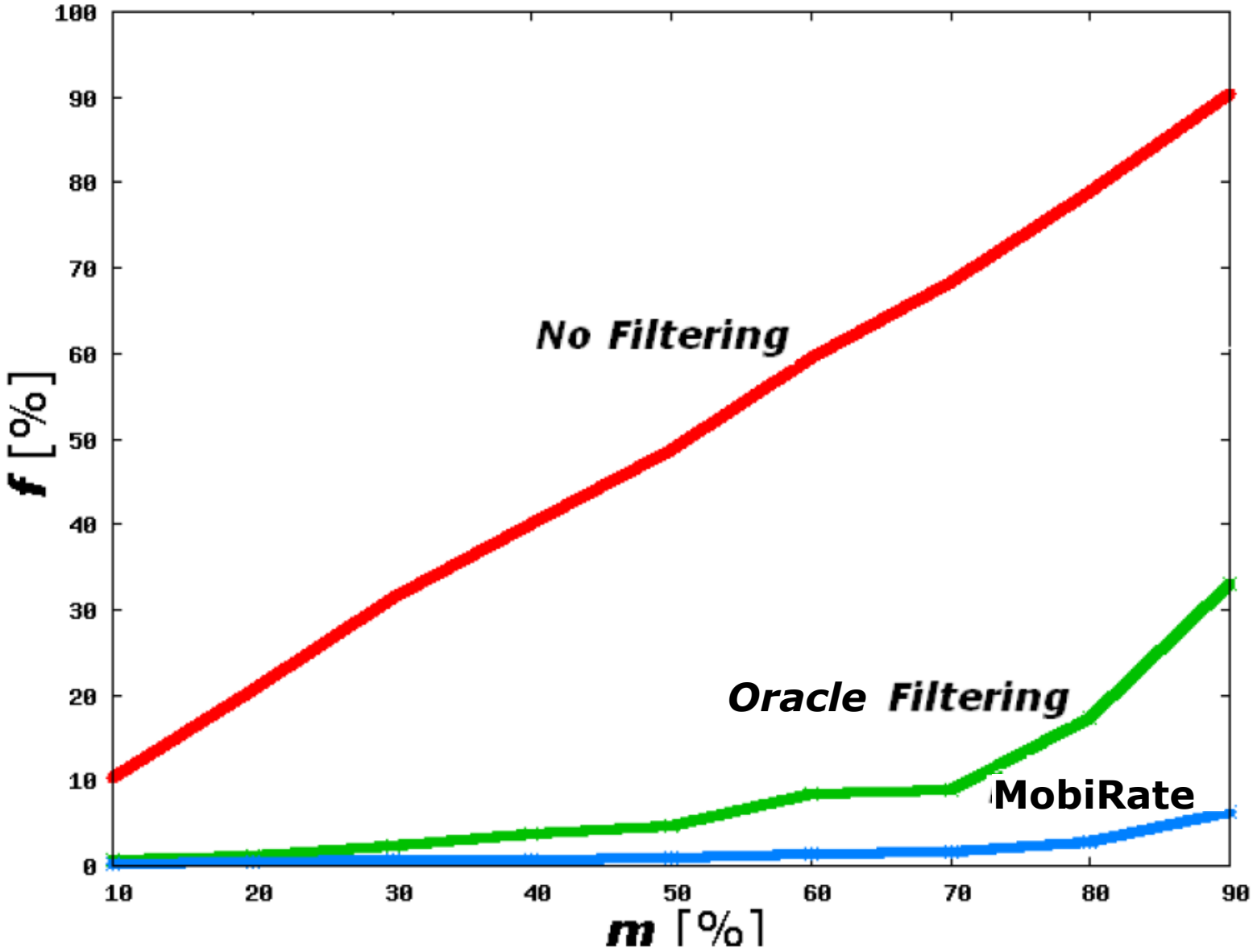
<2> Does it run on phones?

<1> robust

The f factor


100
90
80
70
60
50
40
30
20
10
0
f [%]
10
20
30
40
50
60
70
80
90
m [%]

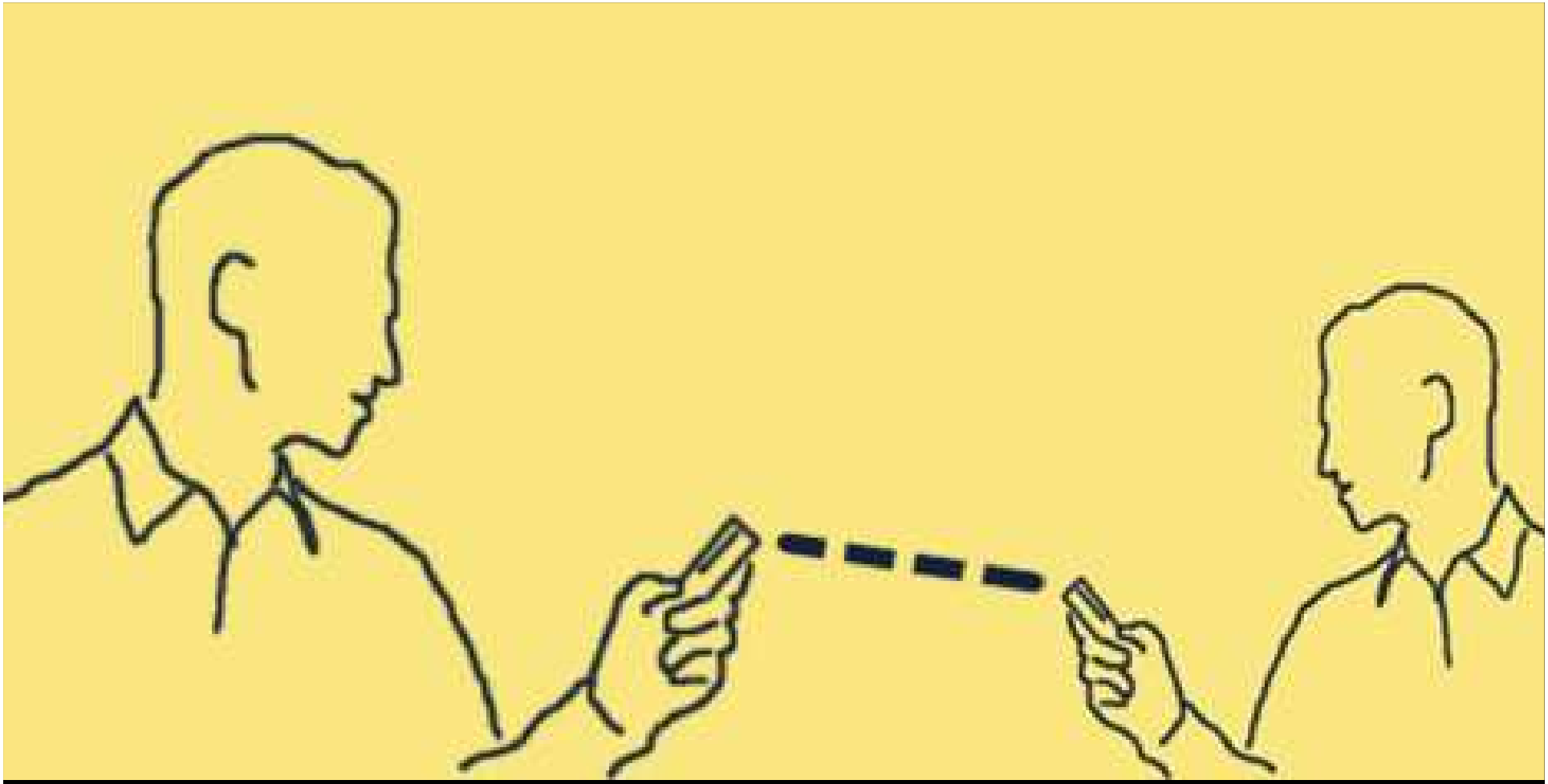

No Filtering
f [%]
m [%]
0
10
20
30
40
50
60
70
80
90
100
10
20
30
40
50
60
70
80
90


100
90
80
70
60
50
40
30
20
10
0
f [%]
No Filtering
Oracle Filtering
MobiRate
10
20
30
40
50
60
70
80
90
m [%]

MobiRate reduces f!!!

<2> run

“heaviest” protocol runs < 2sec

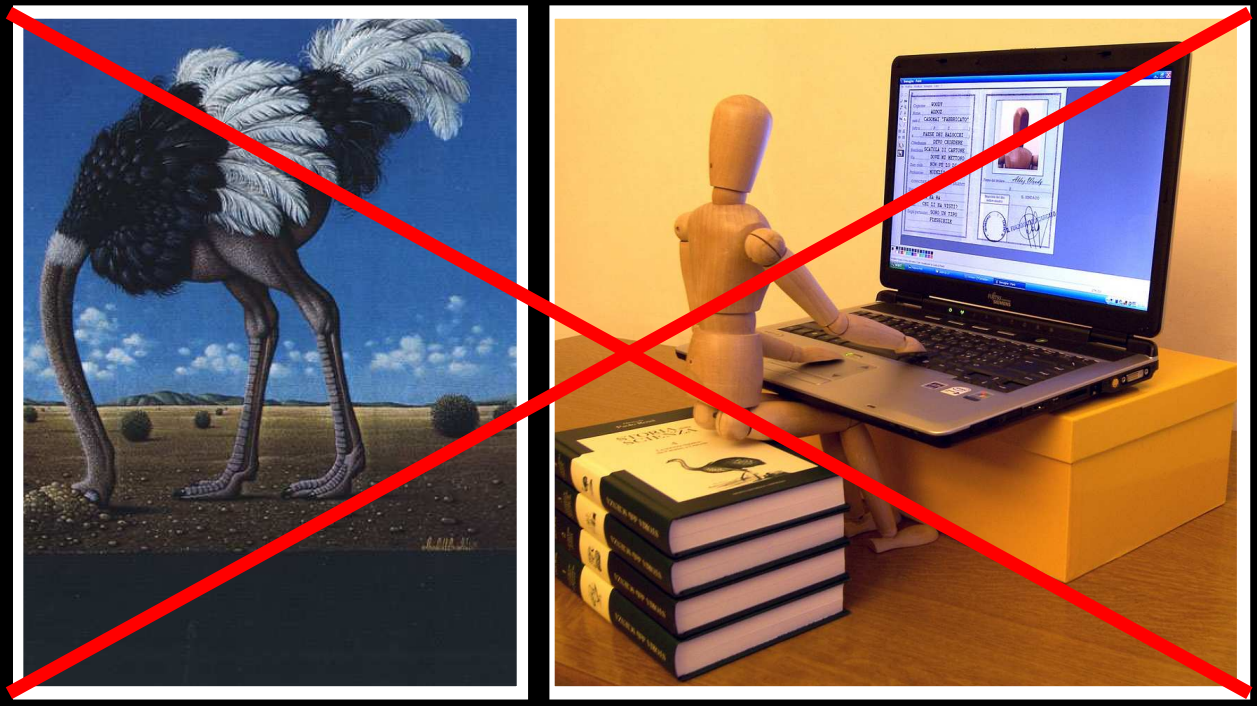


“longest” protocol completed in 2.5ms (if Bluetooth 100kb/s)

MobiRate works

- √ robust
- √ runs on phones

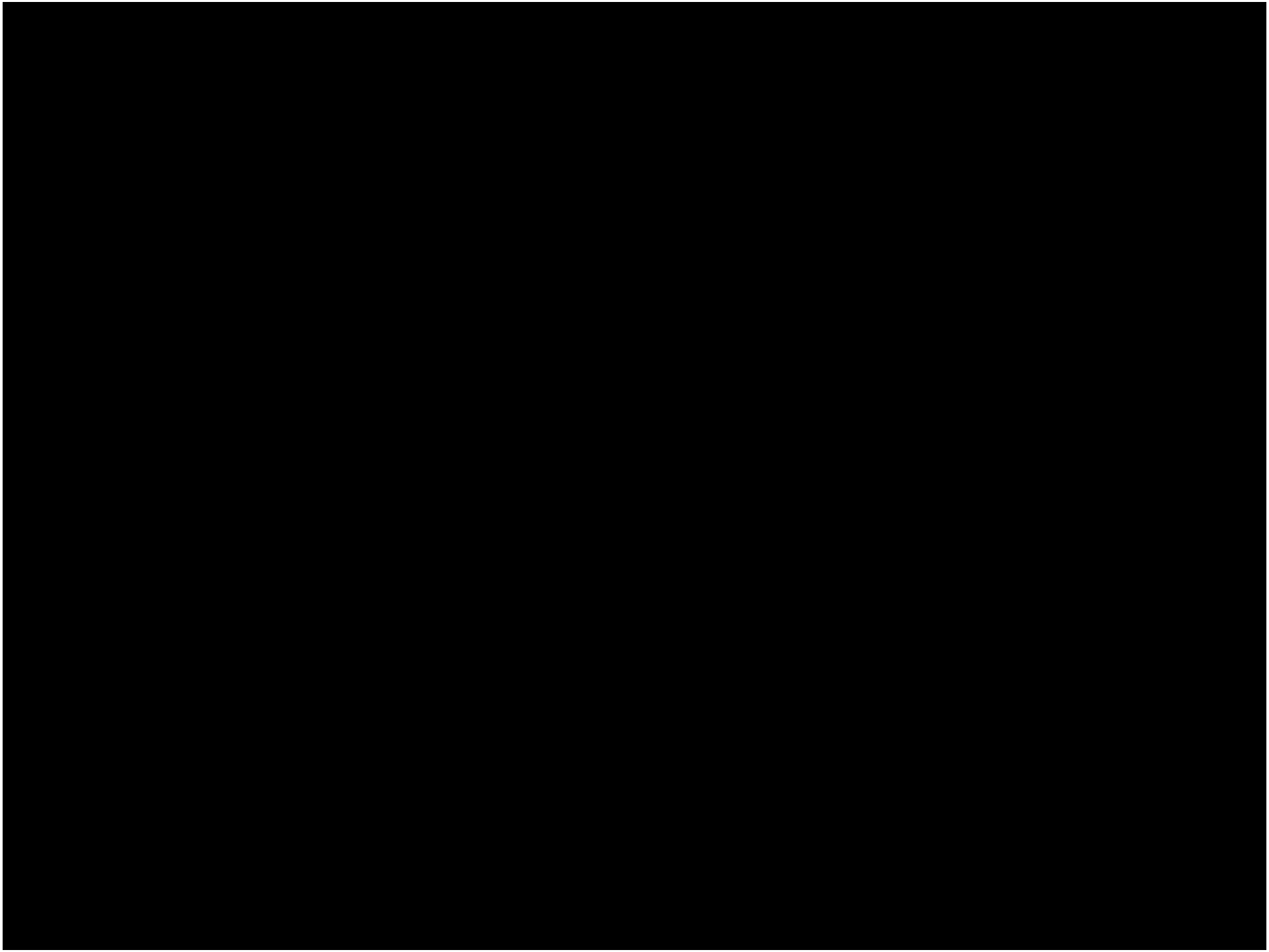
Ignorant Forgers



is a step towards...

… rescuing drowning user

All this on …



Assumption

ID is unique public key

If not unique → Sybil attacks!

collect > store > use

Ignorant Forgers Liars
(eg, Sybils)

MobiRate

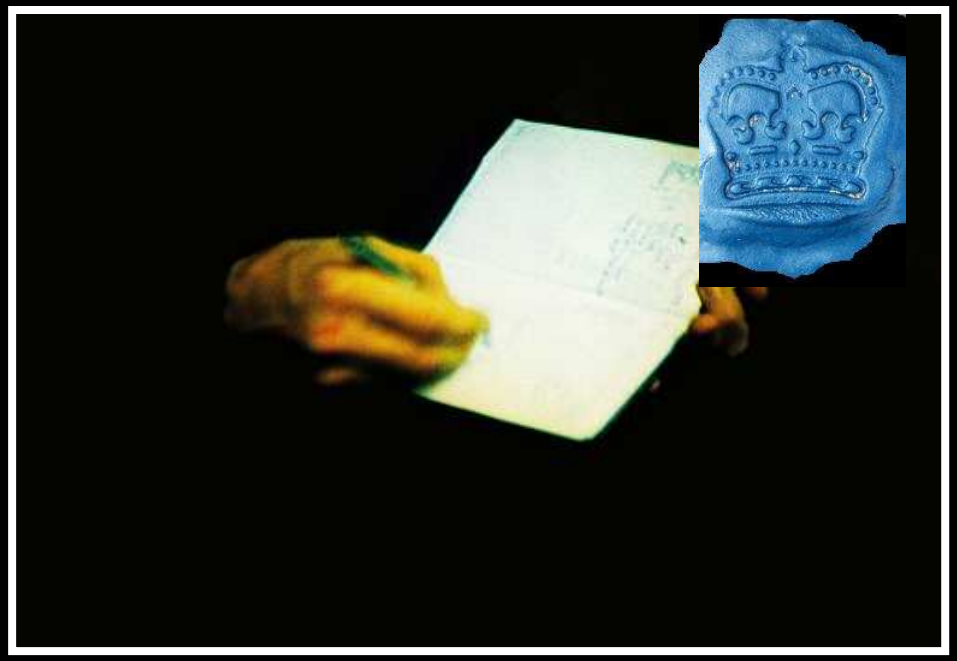
collect > store > use

Ignorant Forgers Liars
(eg, Sybils)

MobiRate

[ICDM07] Lightweight Distributed Trust Propagation

1.Sealed Log
(of credentials)



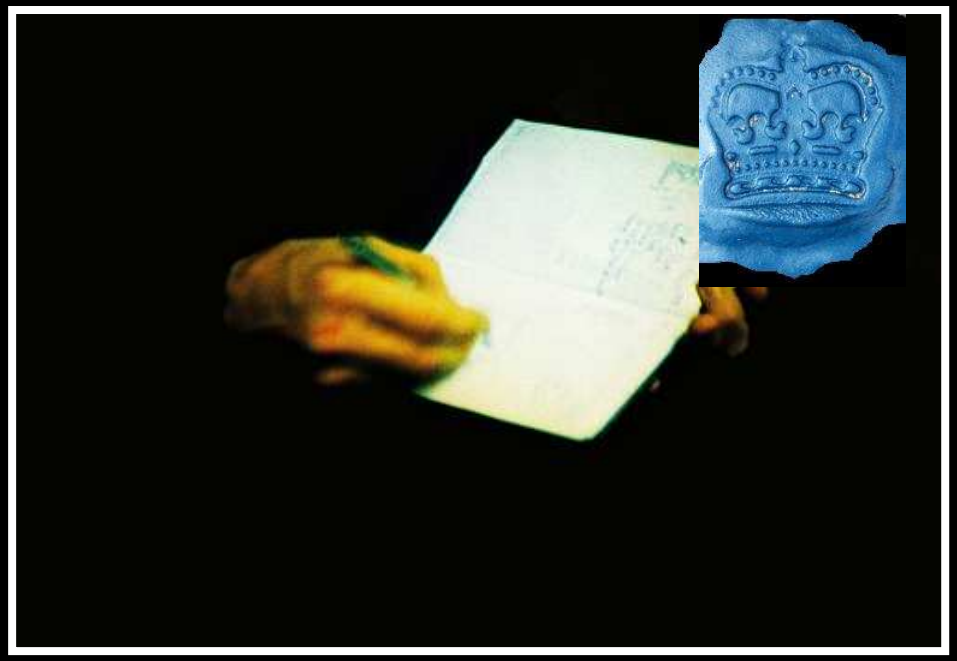
B's Rating Table

e_{k-1}	h_{k-1}	a^{B}_{k-1}	…
e_k	h_k	a^{B}_k	a^{A}_l
e_{k+1}	h_{k+1}	a^{B}_{k+1}	…

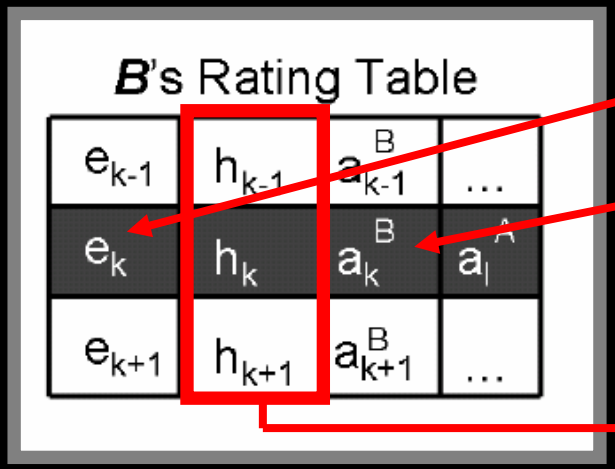
entry (rating)

“seal” (for the entry)

1.Sealed Log
(of credentials)



[need to exch seals]

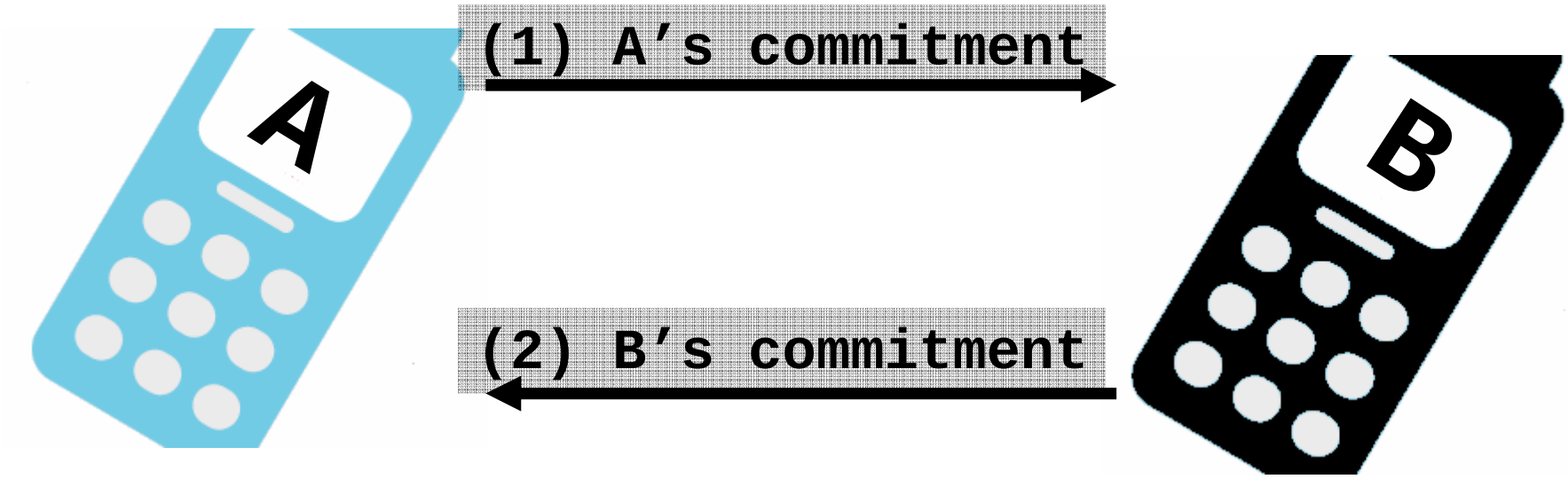


entry (rating)

"seal" (for the entry)

"hash chain" binding whole table

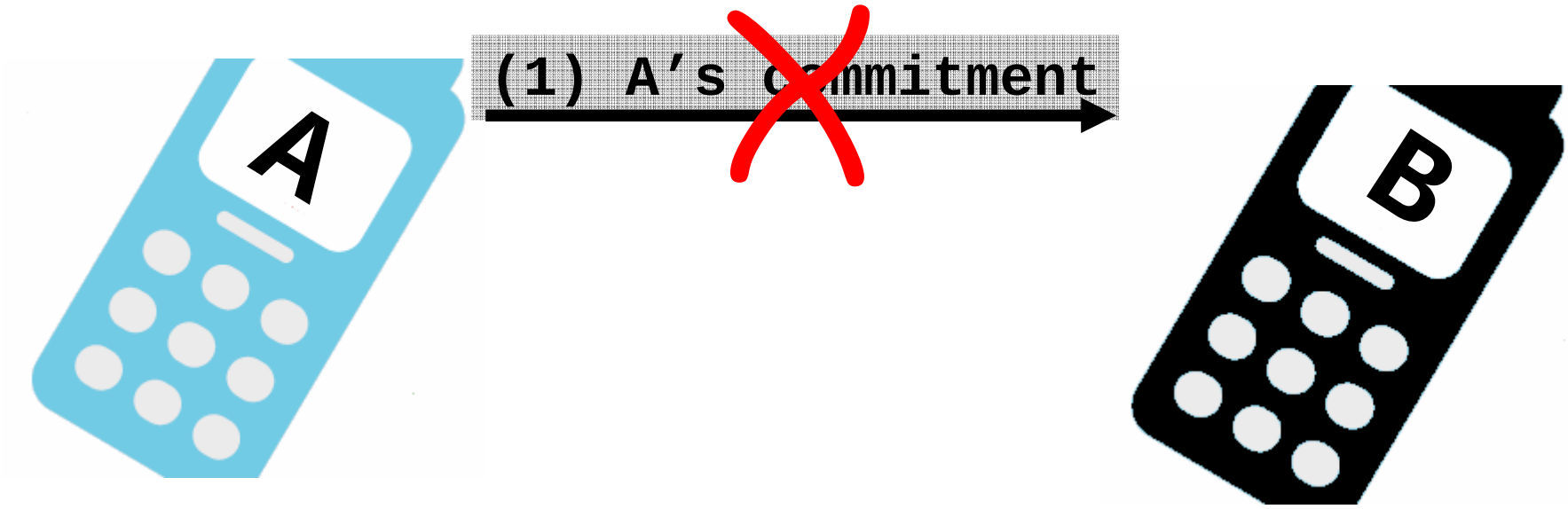
Exchange of seals

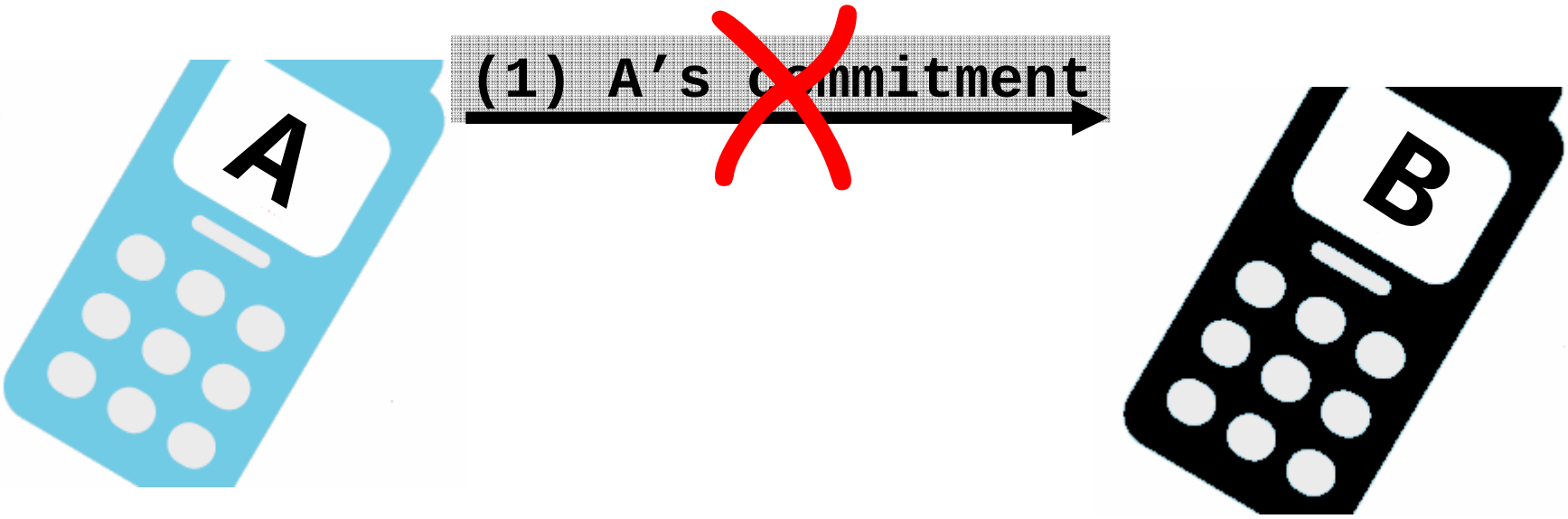


[asymmetric interaction]

What can go wrong?

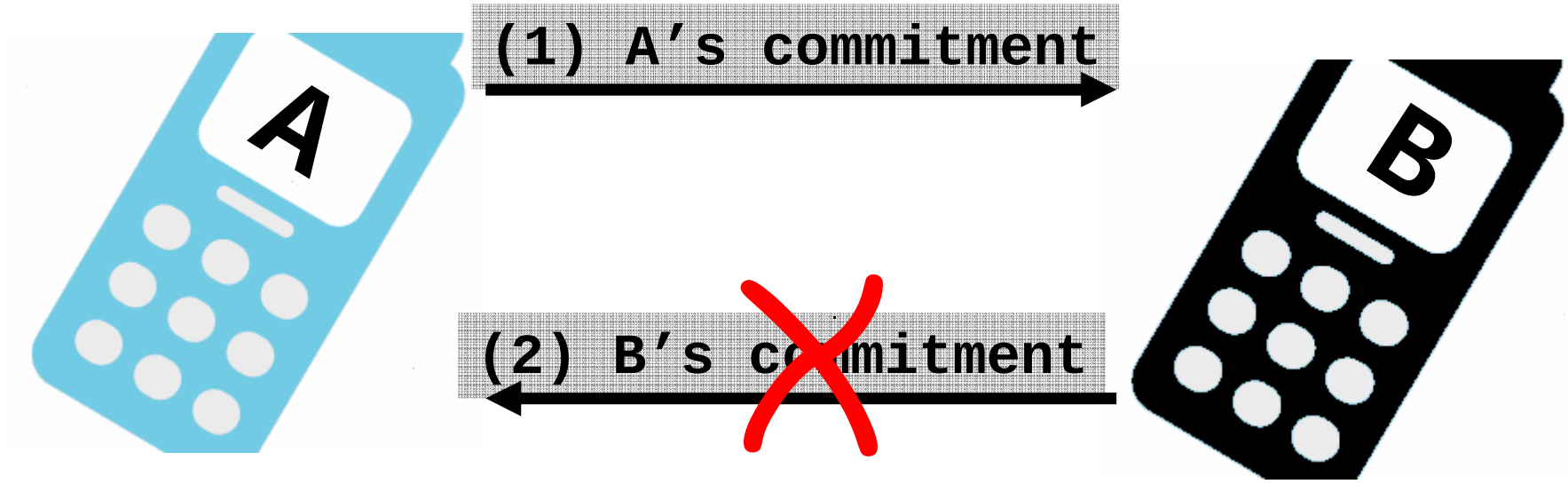
(that’s where gossiping comes in)


A
(1) A's commitment
B

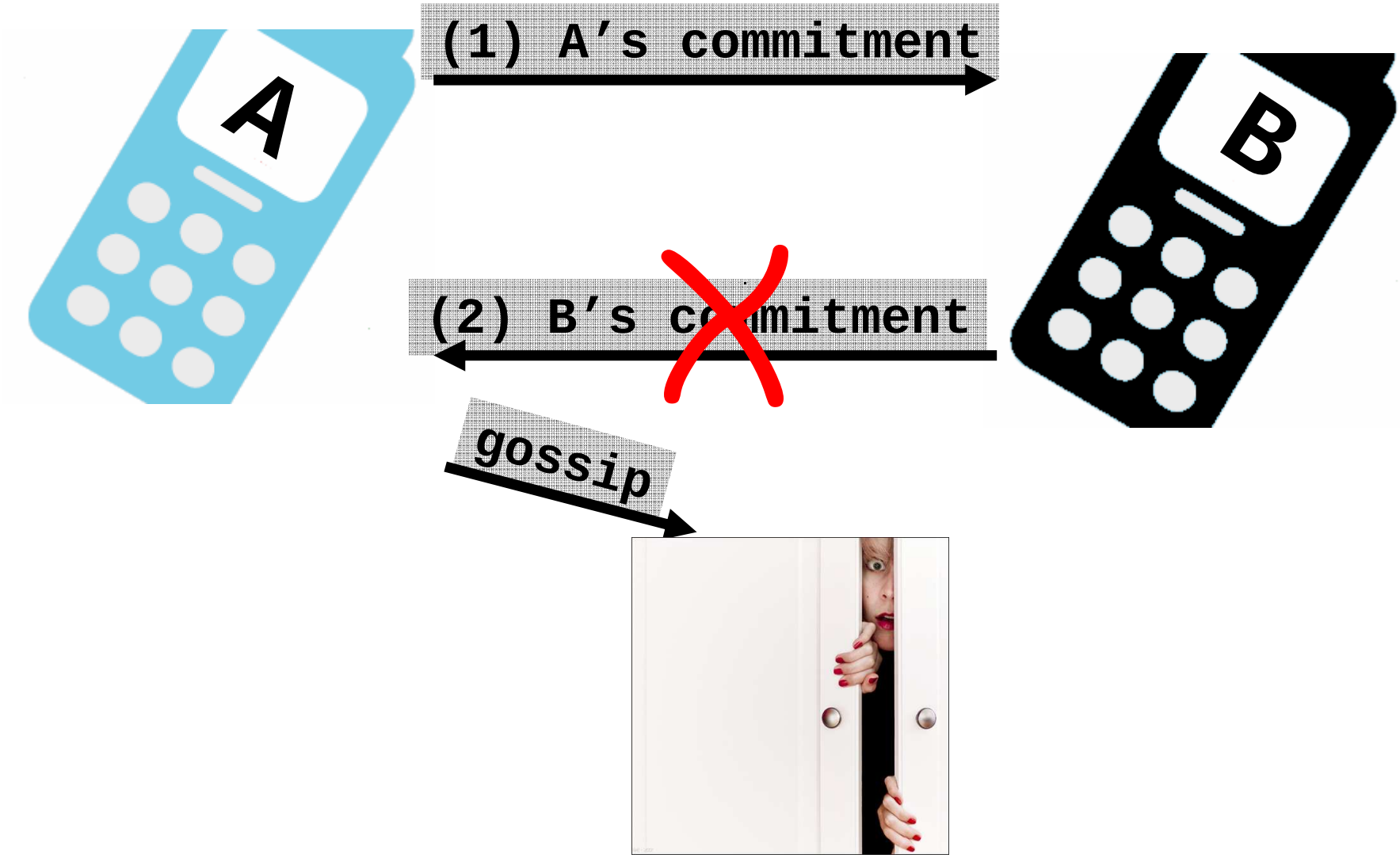


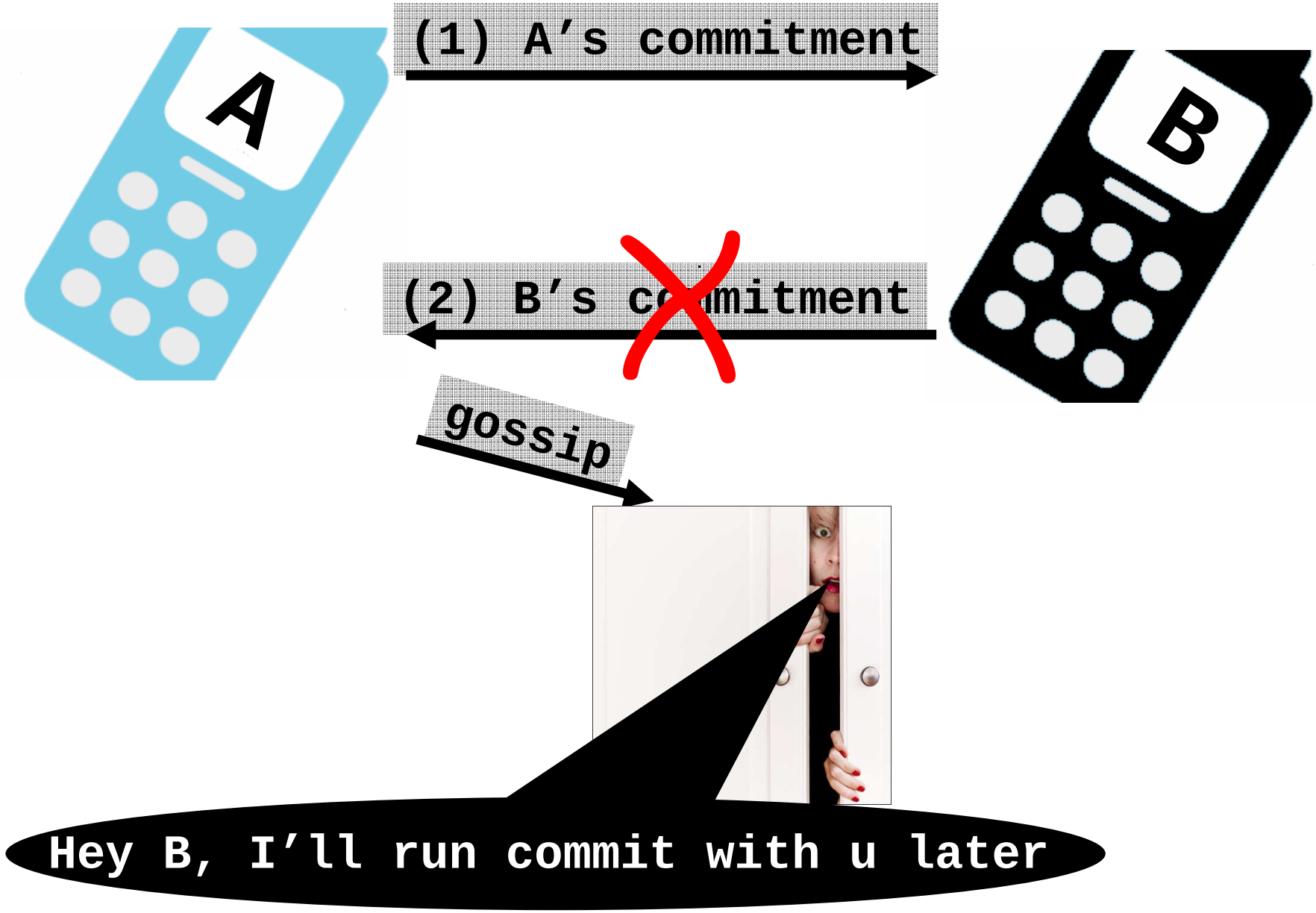
Fair enough!

A *decides* whether to rate B

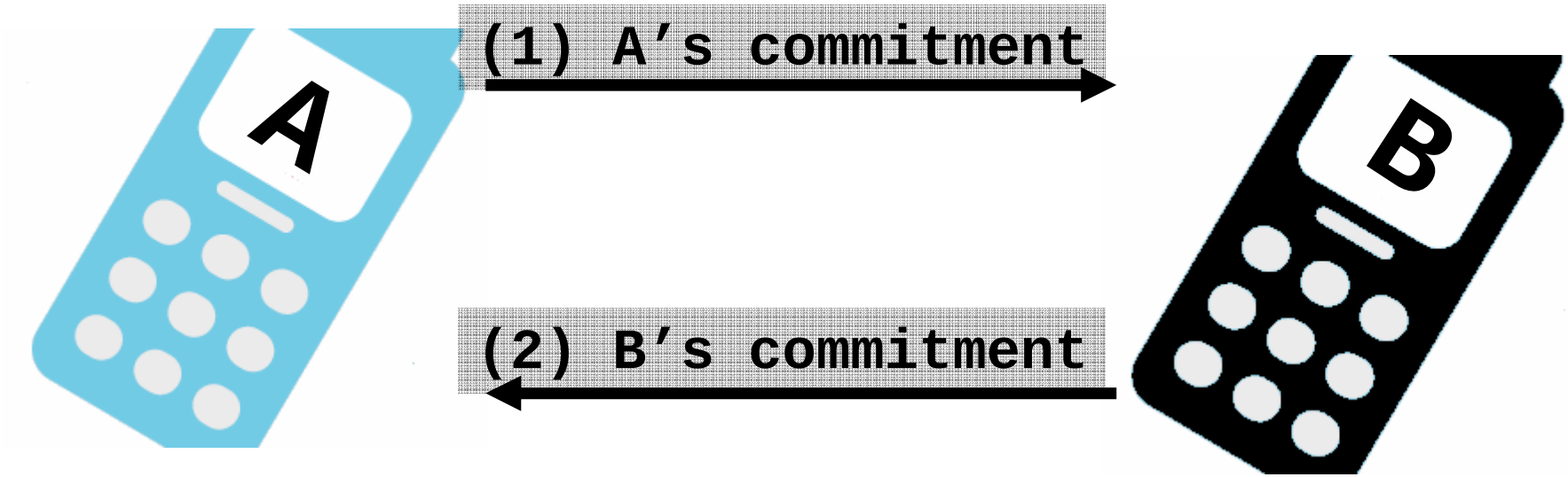


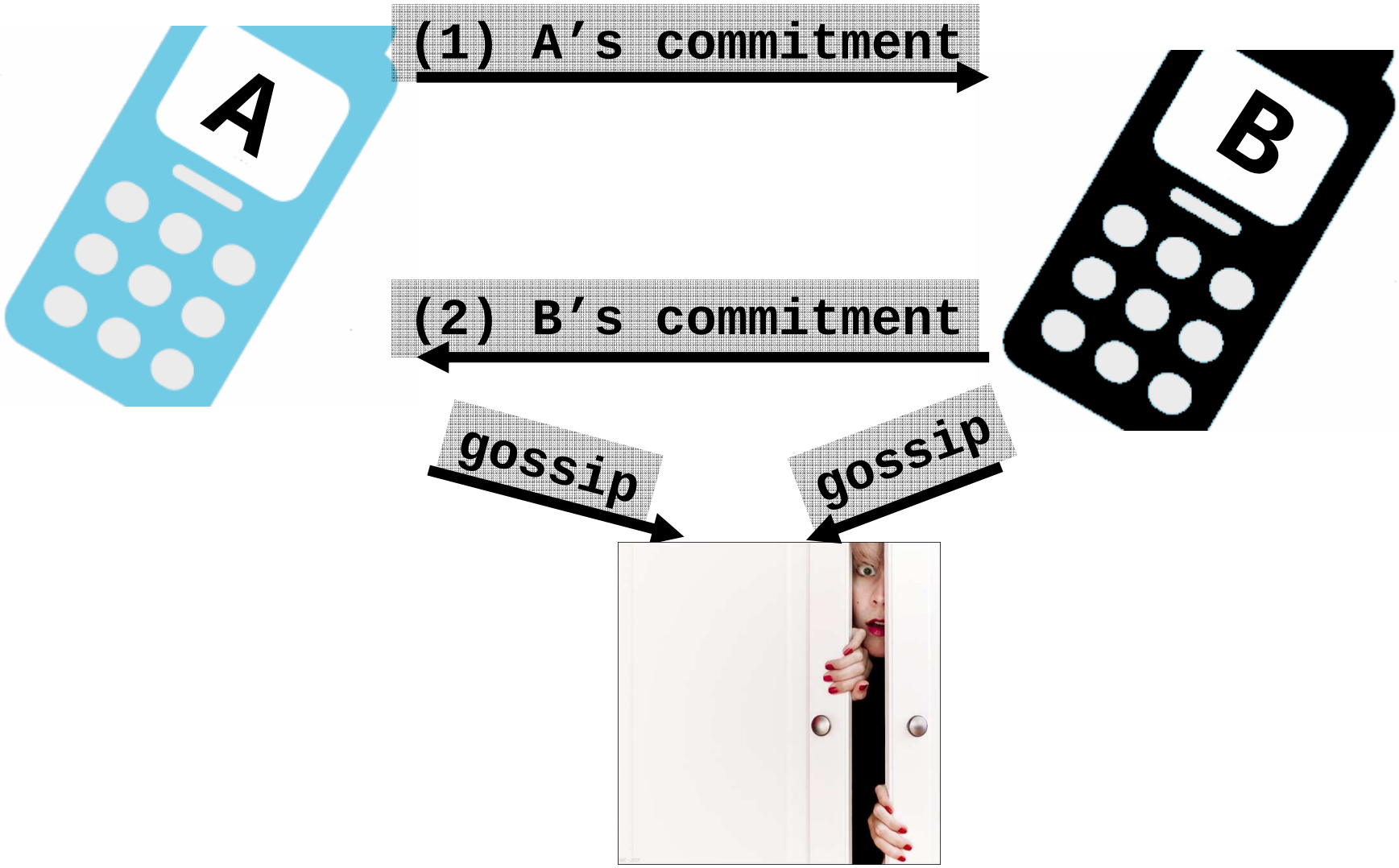
[B is forced to store it. Otherwise its chain is broken]

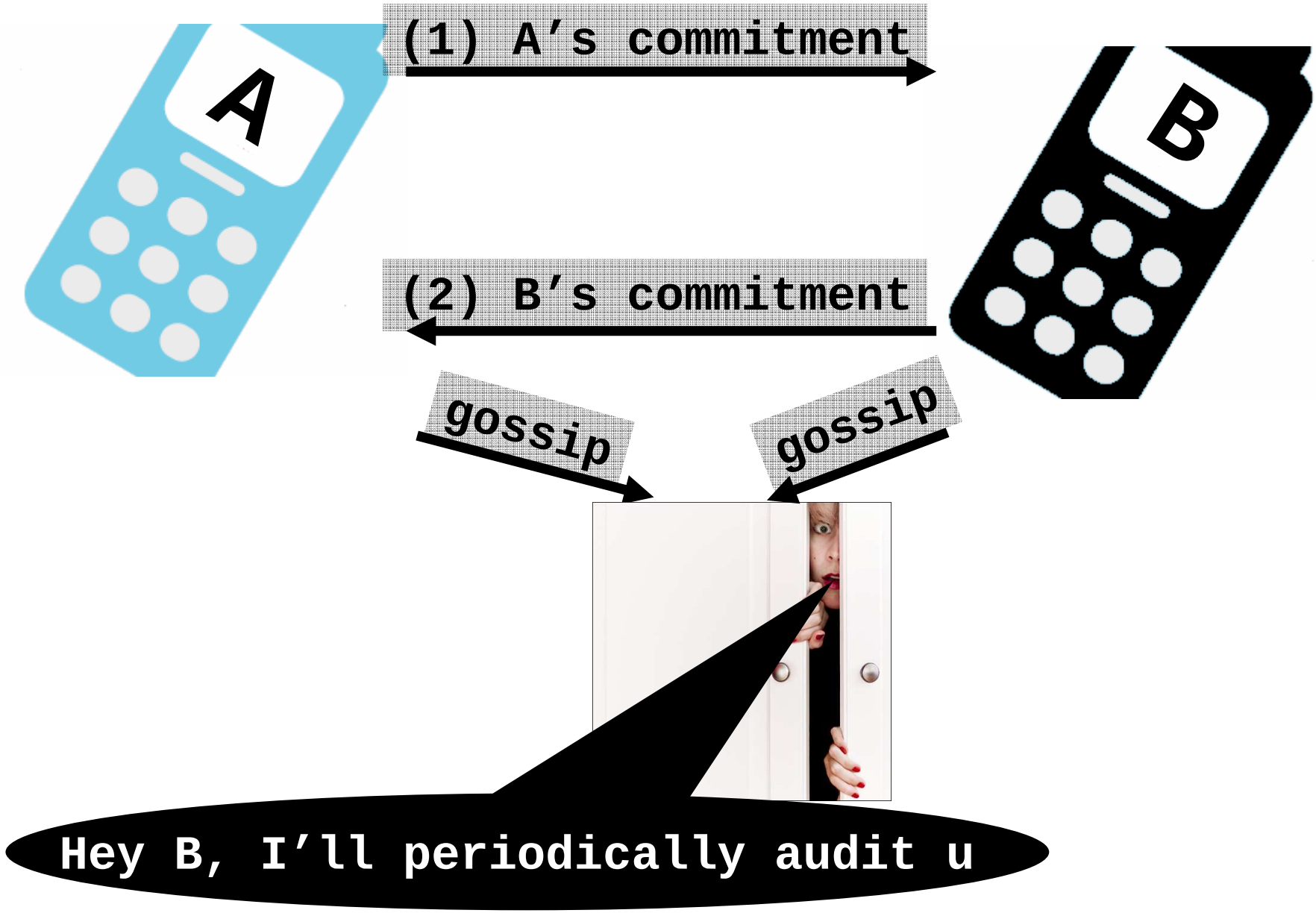

A
(1) A's commitment
B
(2) B's commitment
gossip

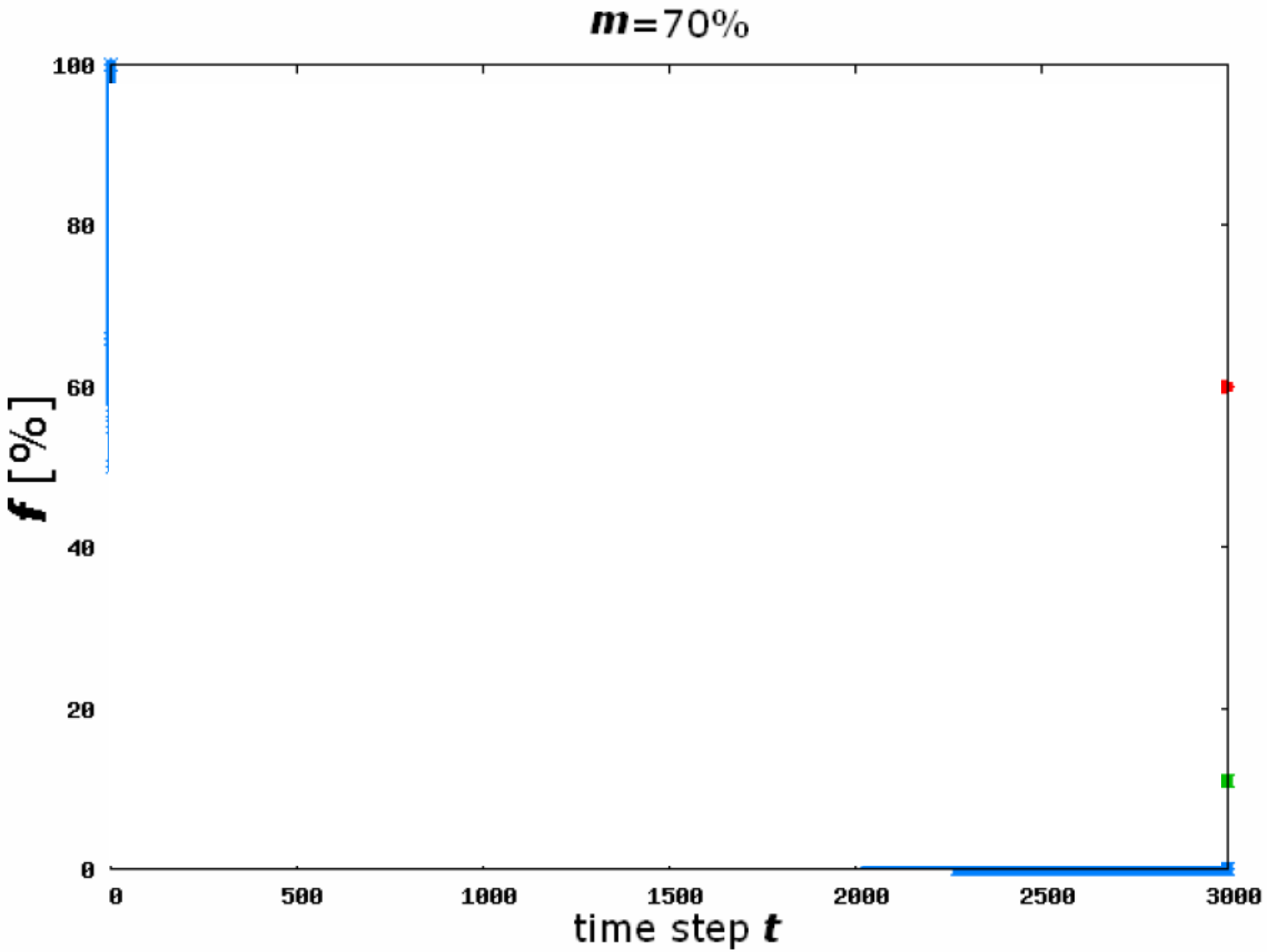

A
(1) A's commitment
B
(2) B's commitment
gossip
Hey B, I'll run commit with u later

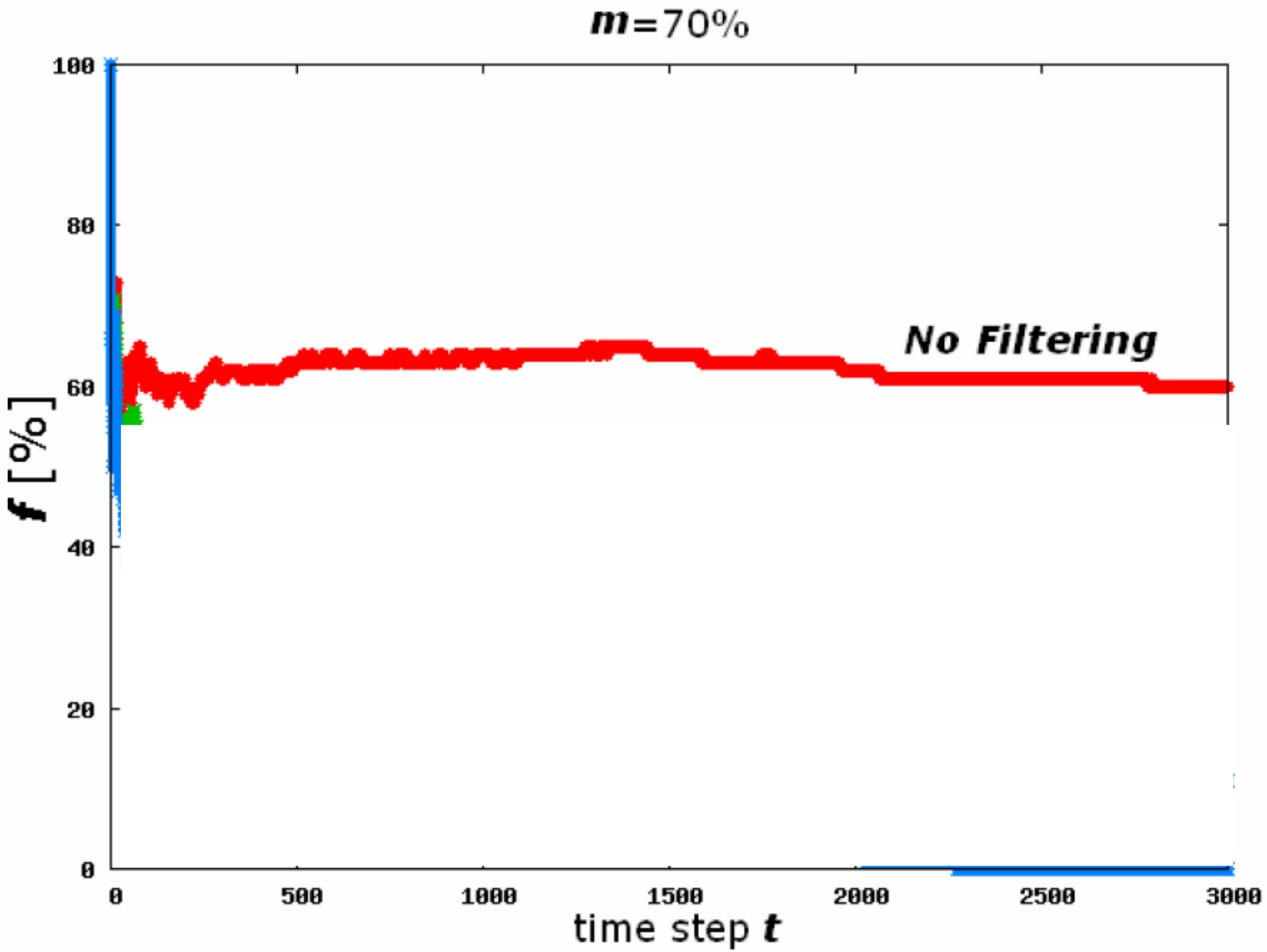
Finally, …

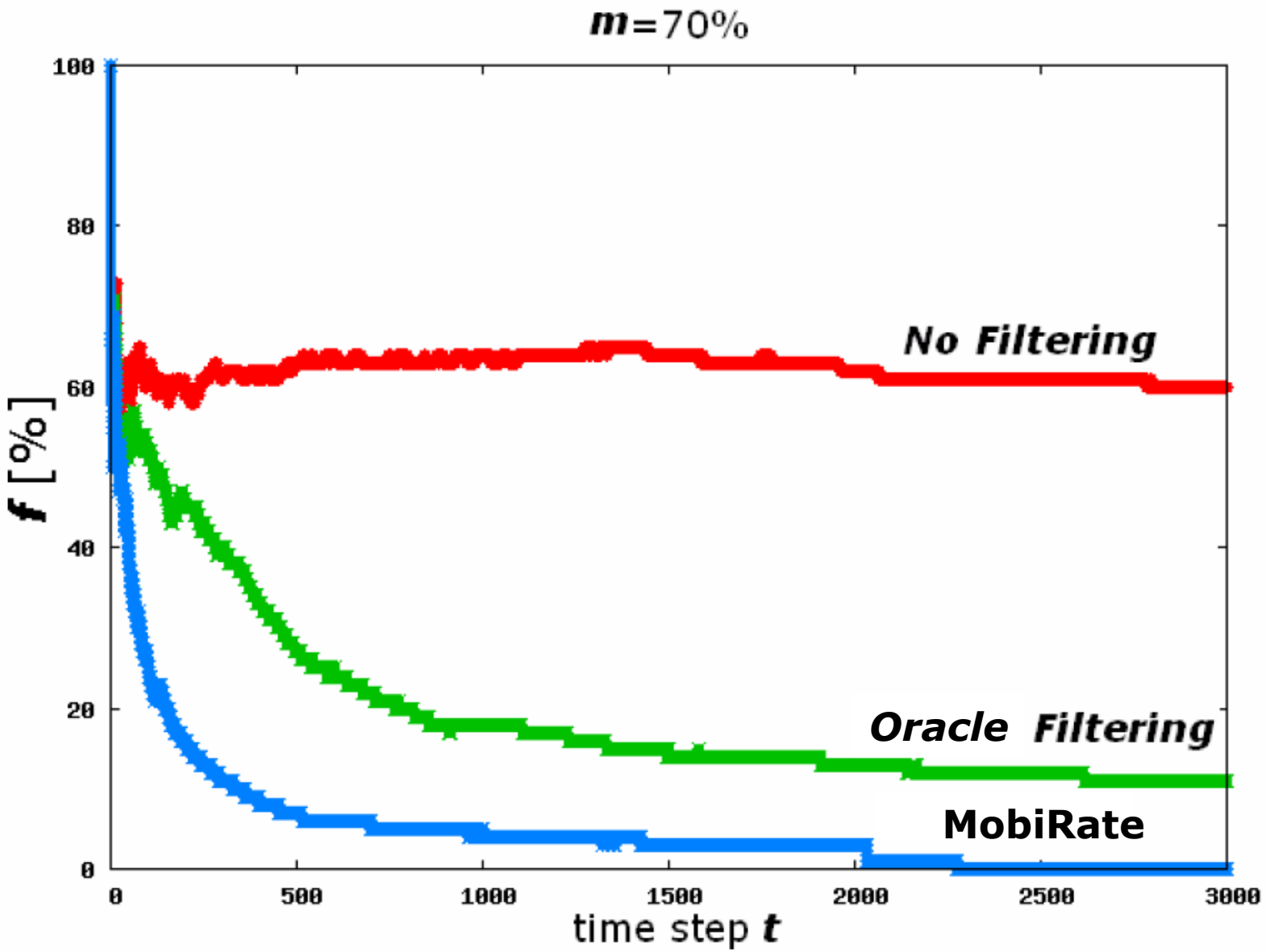

A
(1) A's commitment
(2) B's commitment
B


A
(1) A's commitment
B
(2) B's commitment
gossip
gossip


A
(1) A's commitment
B
(2) B's commitment
gossip
gossip
Hey B, I'll periodically audit u


m=70%
100
80
60
40
20
0
f [%]
0
500
1000
1500
2000
2500
3000
time step t


m=70%
100
80
60
40
20
0
f [%]
No Filtering
0
500
1000
1500
2000
2500
3000
time step t


m=70%
100
80
60
40
20
0
f [%]
0
500
1000
1500
2000
2500
3000
time step t
No Filtering
Oracle Filtering
MobiRate

Does MobiRate work?

- √ It's robust to malicious individuals!
  Does it run on phones?