Fully Secure Attribute Based Encryption from Multilinear Maps

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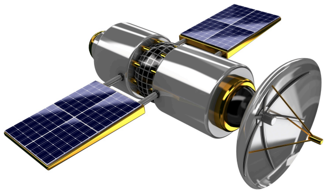
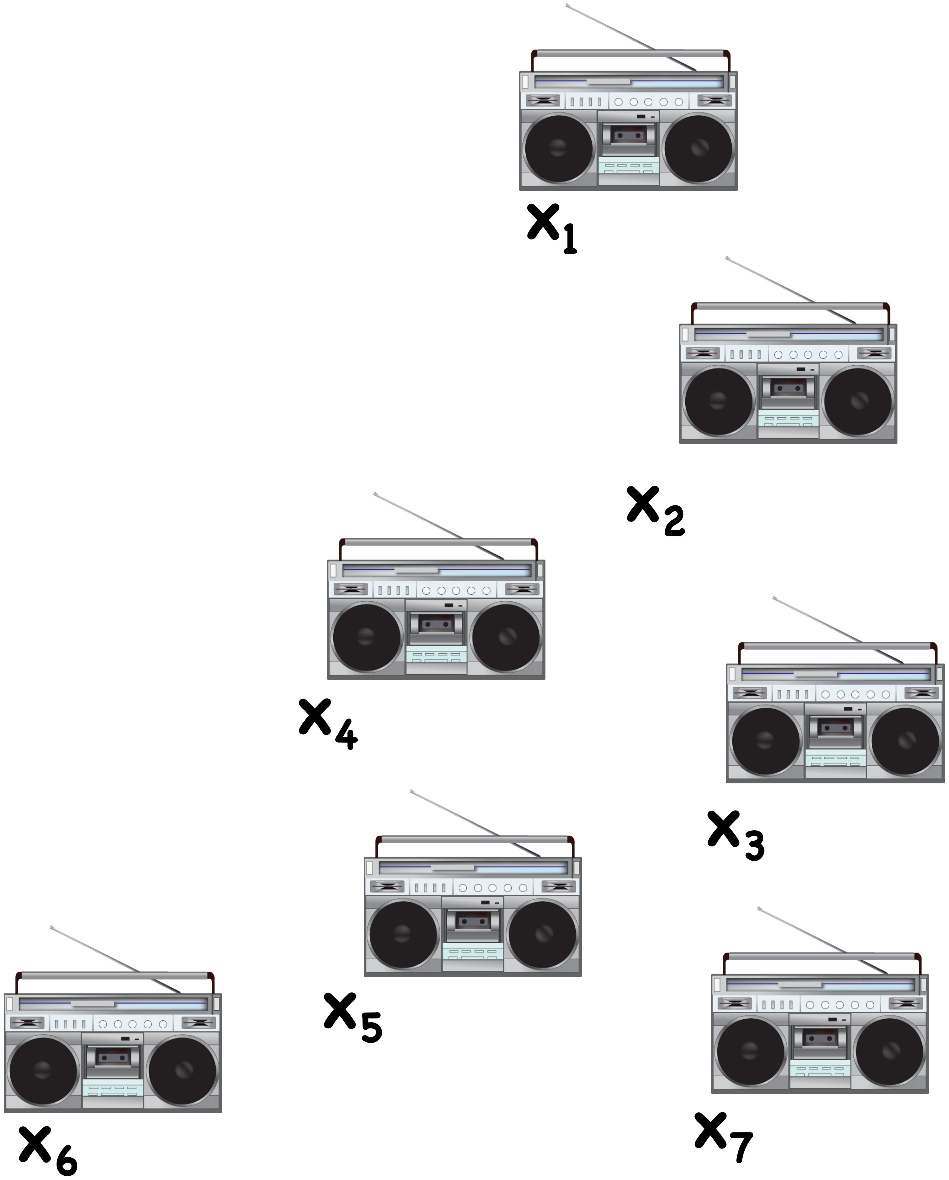
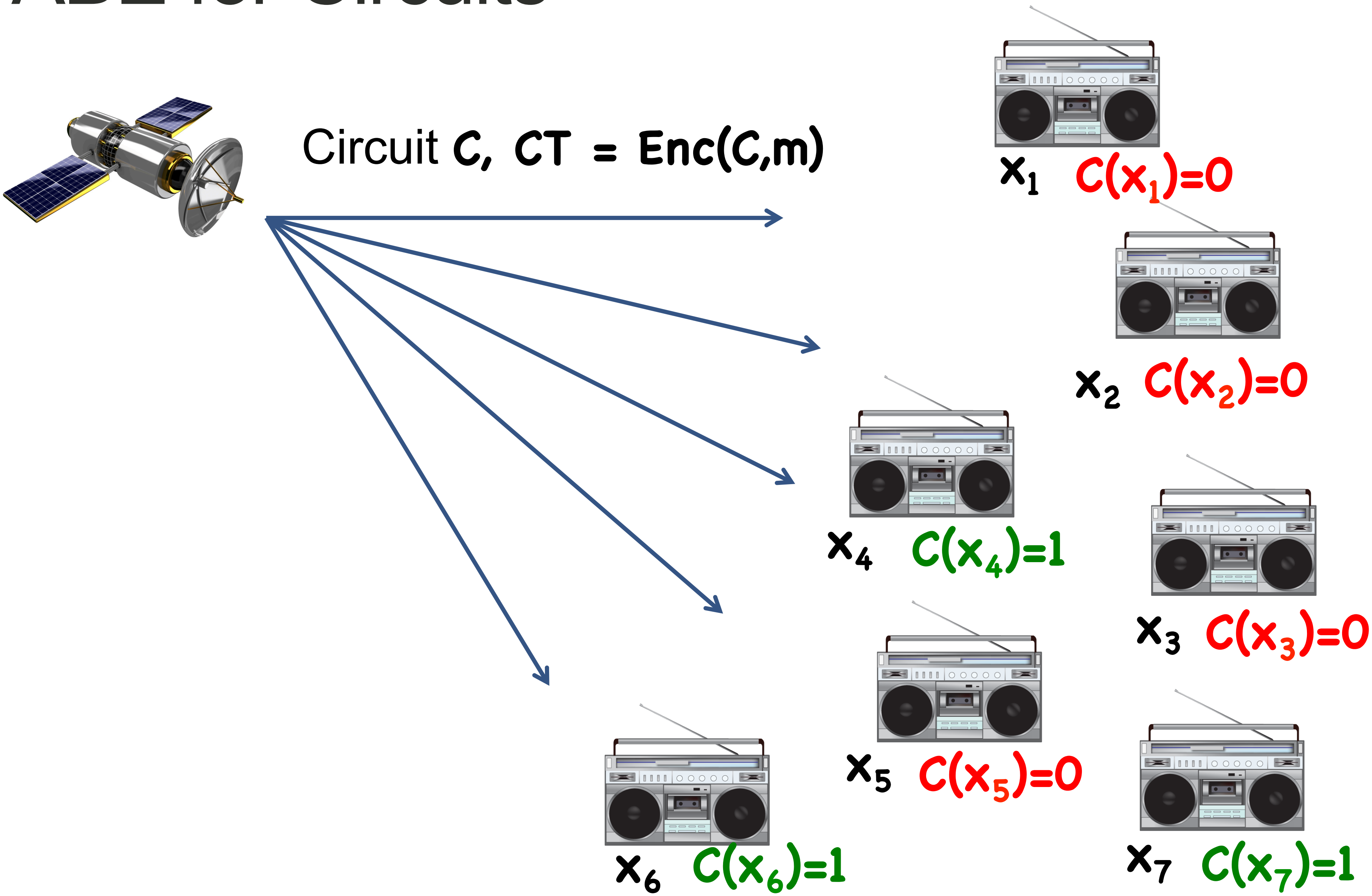
ABE for Circuits





ABE for Circuits



Circuit C, CT = $Enc(C,m)$

x_1 $C(x_1)=0$

x_2 $C(x_2)=0$

x_4 $C(x_4)=1$

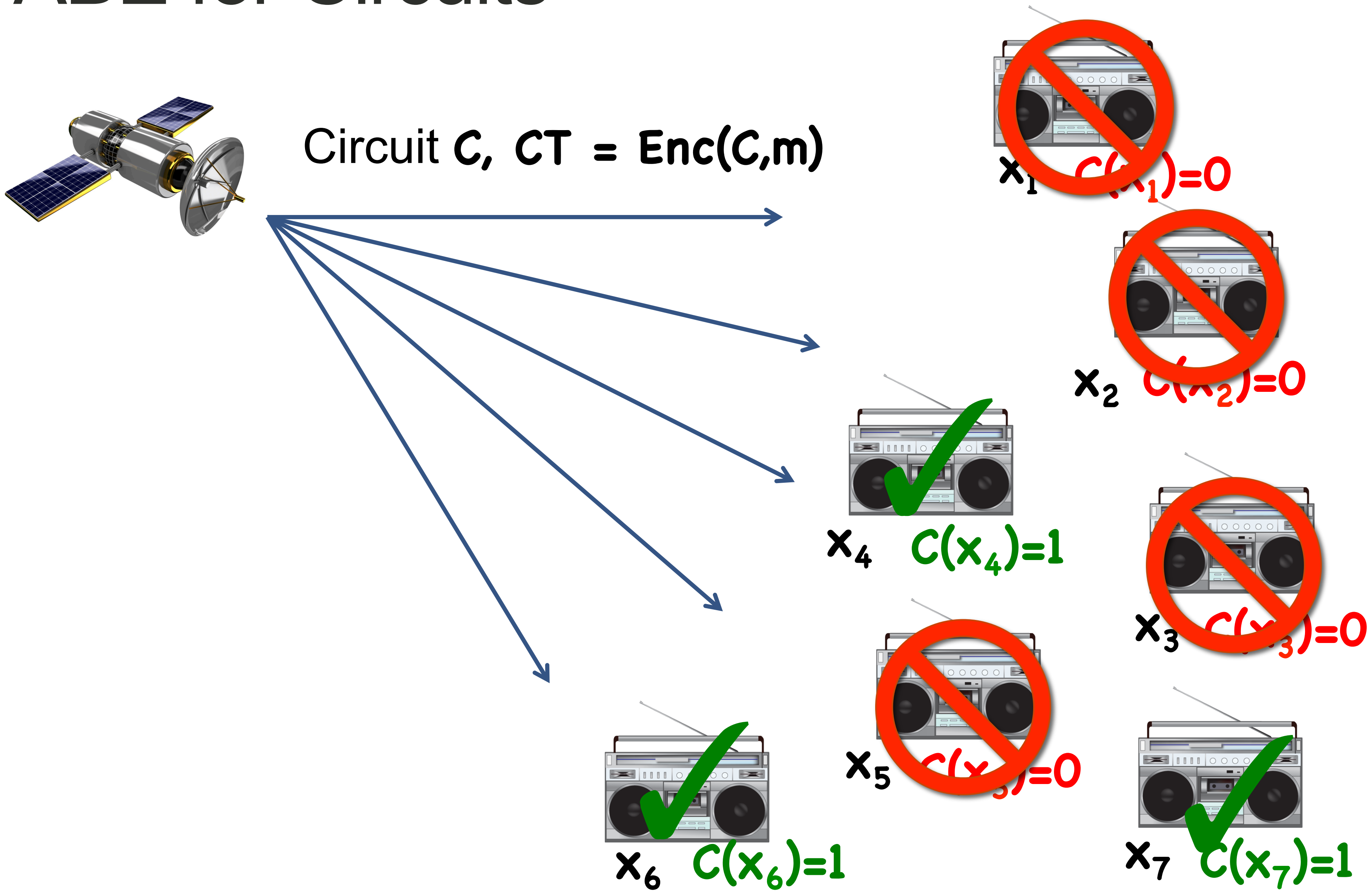
x_3 $C(x_3)=0$

x_5 $C(x_5)=0$

x_6 $C(x_6)=1$

x_7 $C(x_7)=1$

ABE for Circuits



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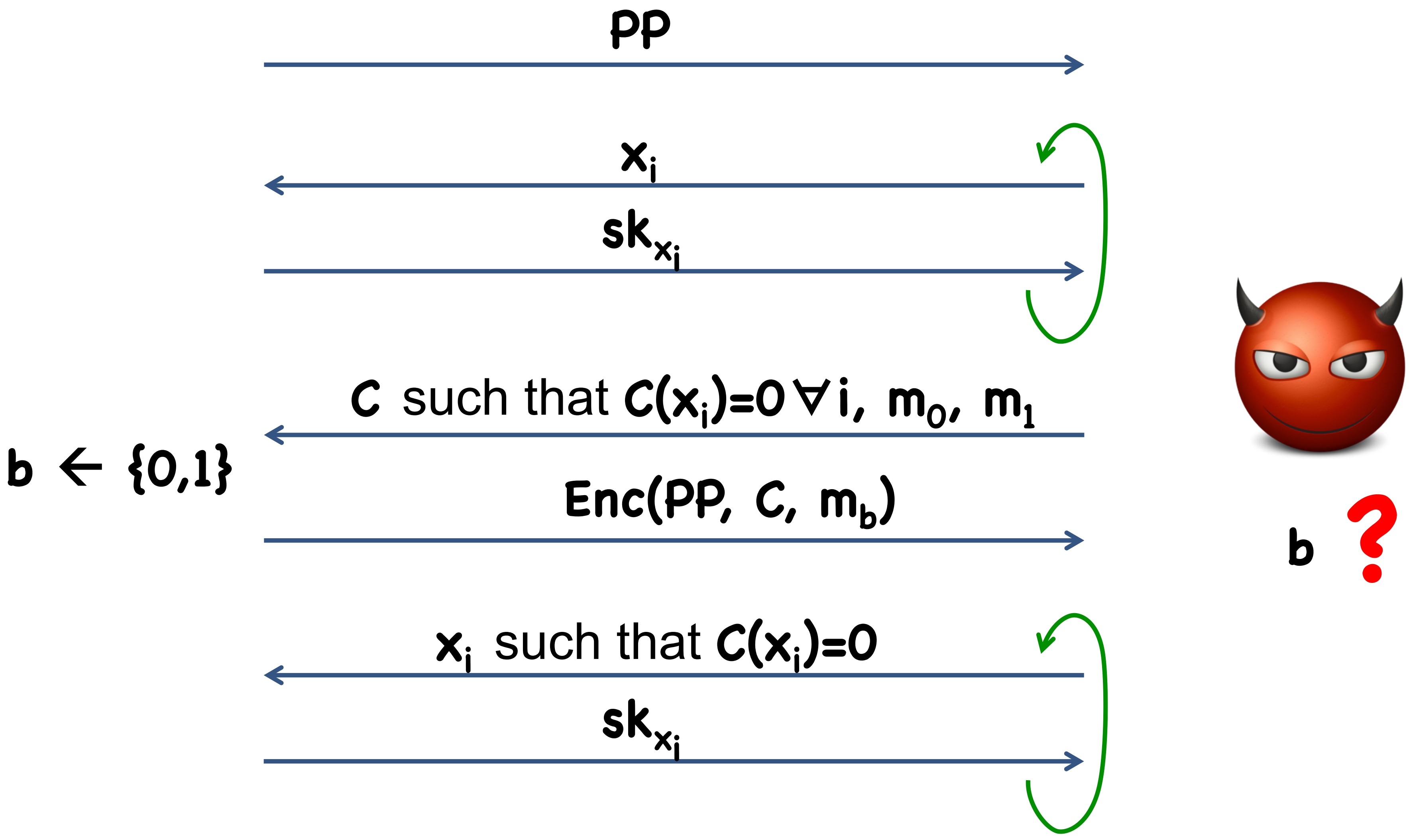
Desired Security Model: Adaptive Security



PP

x_i

sk_{x_i}

C such that $C(x_i)=0 \; \forall i$, m_0, m_1

$b \leftarrow \{0,1\}$

Enc(PP, C, m_b)

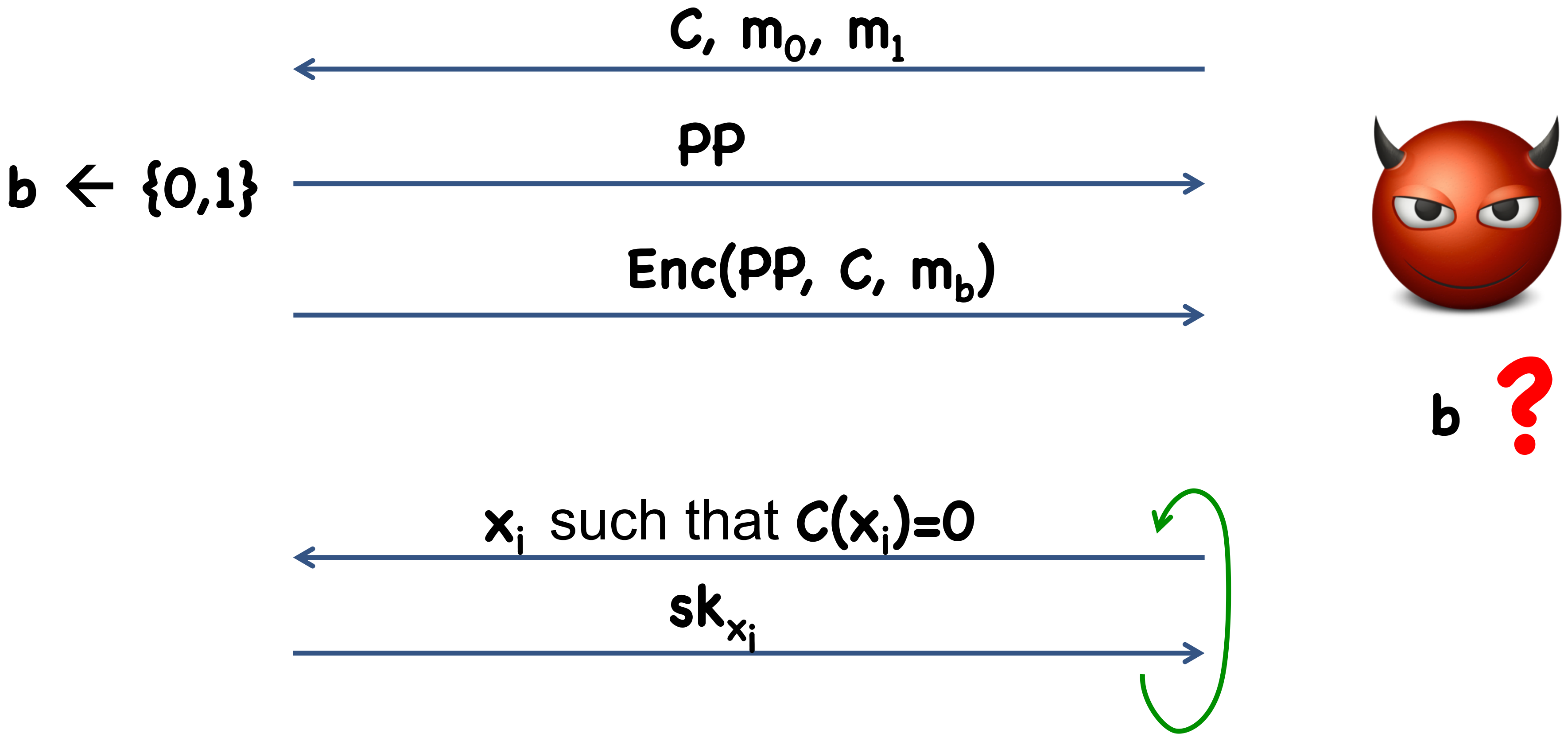
b ?

x_i such that $C(x_i)=0$

sk_{x_i}

Previous Constructions: Selective Security*

[GVW'13, GGHSW'13, …]



C, m_0, m_1

PP

$b \leftarrow \{0,1\}$

$\mathrm{Enc}(PP, C, m_b)$

b ?

x_i such that $C(x_i)=0$

sk_{x_i}

* Independent and concurrent work: [Wat'14] adaptively secure FE from iO

Our Contribution

Adaptively secure ABE

- Based on dual system framework
- Composite order asymmetric m-maps
- (Relatively) simple assumptions
  - Related to common dual system assumptions
  - Circuit independent
- New garbling technique
- No complexity leveraging

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