Introduction to TumbleBit

BC2 Bootcamp

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One-Way Payment Hubs in a Nutshell

手短に：片道のペイメントハブ

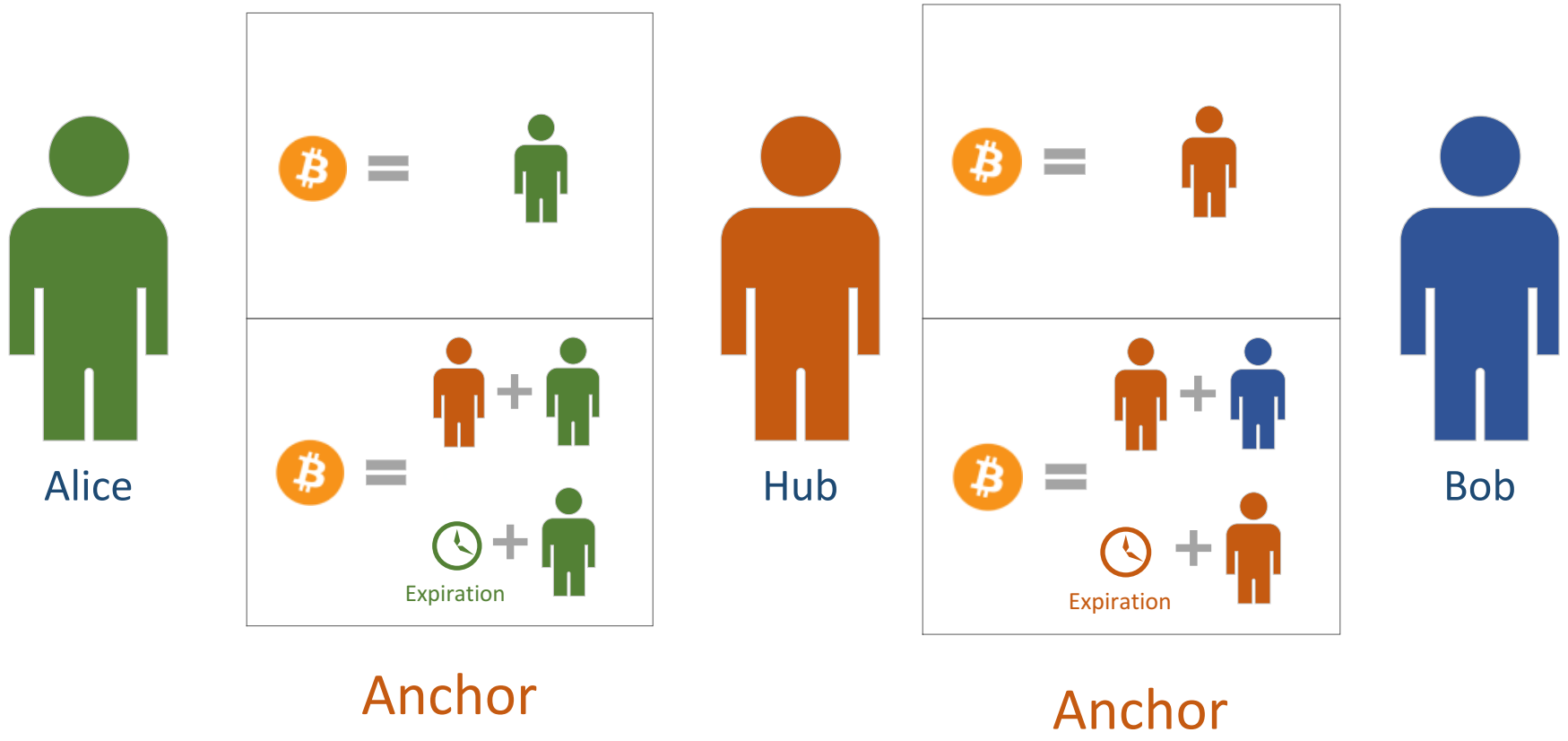
Alice

Hub

Bob

One-Way Payment Hubs in a Nutshell (Channel Setup)

手短に：片道のペイメントハブ（チャネルの設立）



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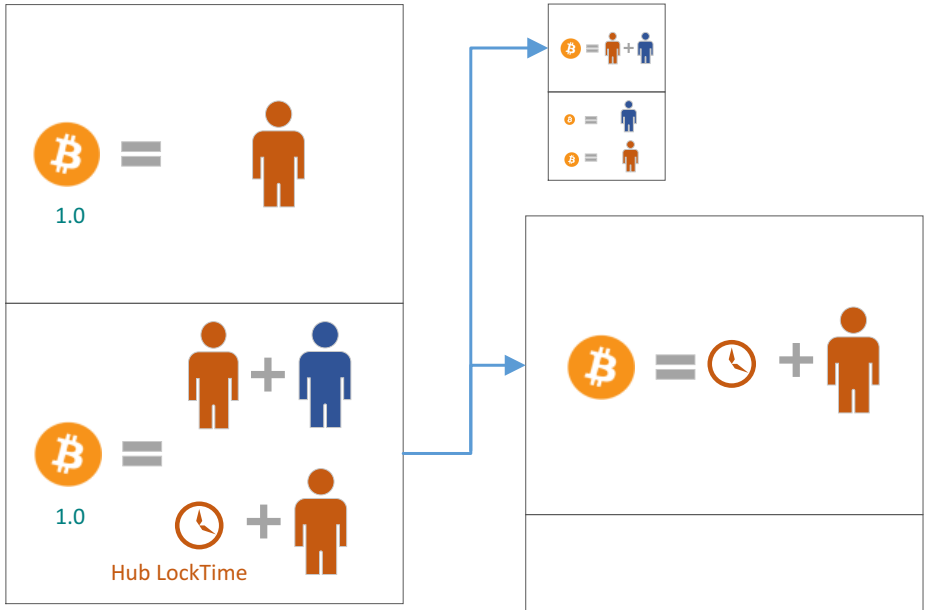
Bob becomes unresponsive: redeem at timeout
Bobから反応がない：タイムでリディーム



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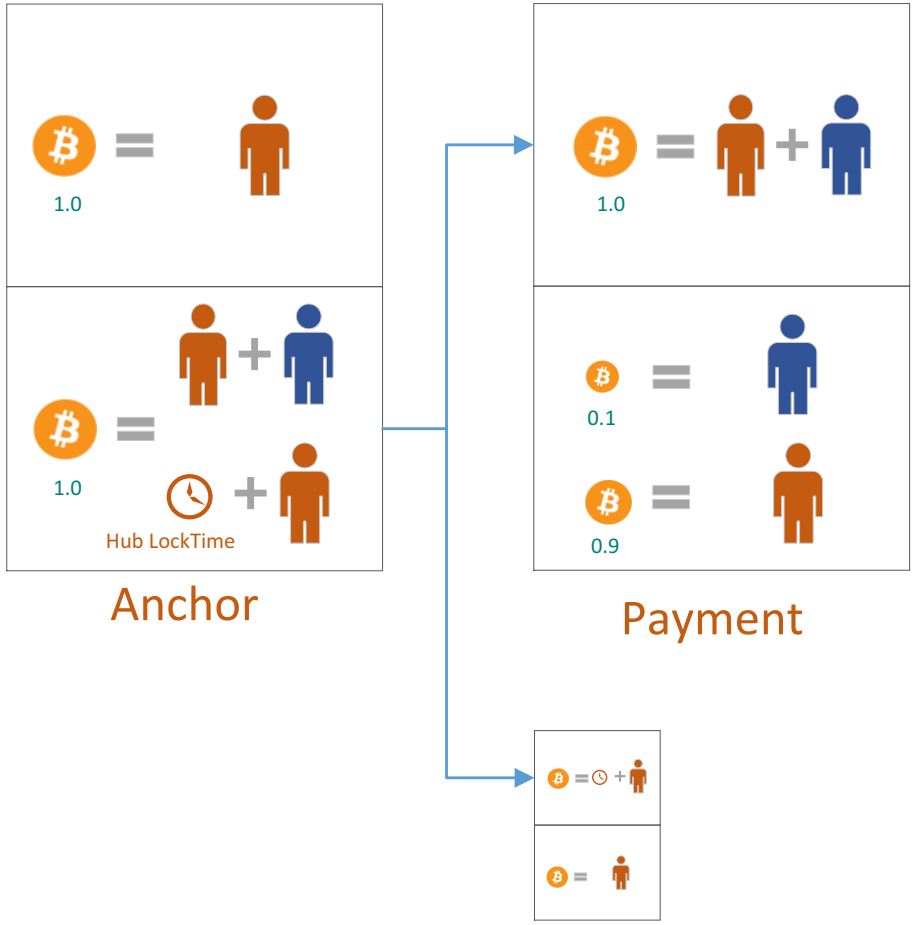
Hub sends money to Bob



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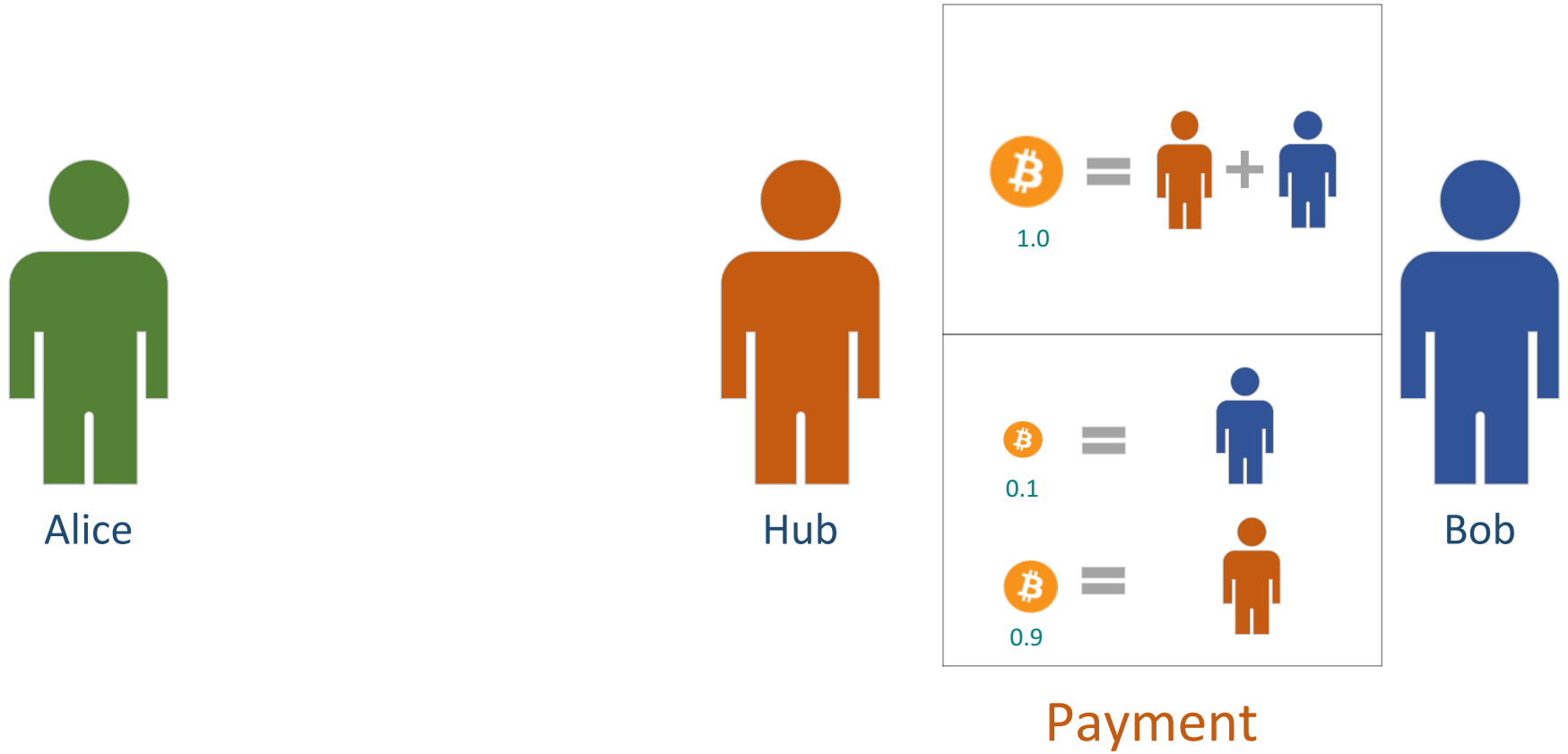
One-Way Payment Hubs in a Nutshell

手短に：片道のペイメントハブ



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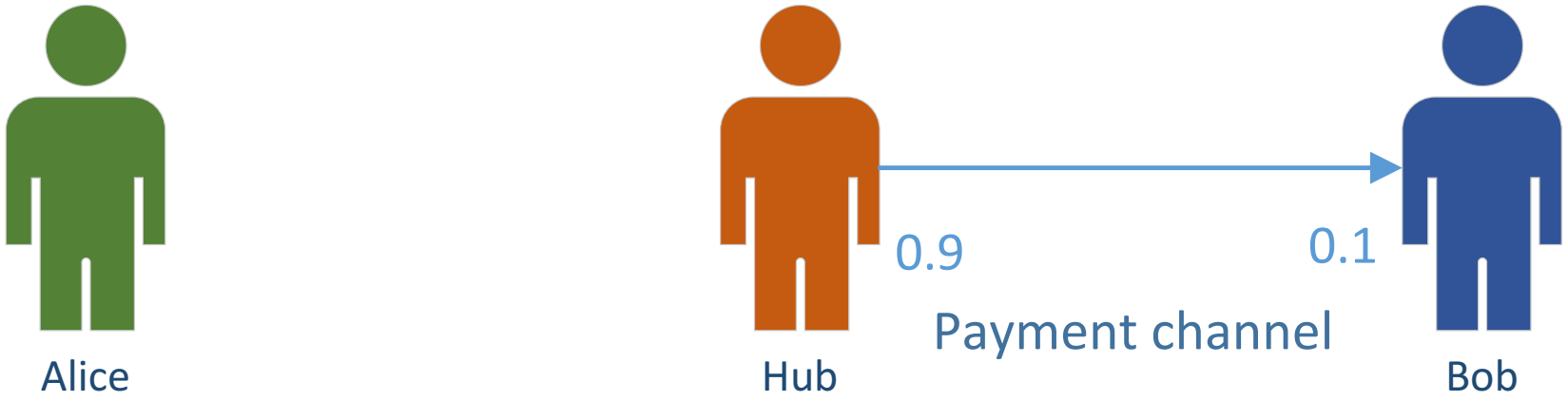
One-Way Payment Hubs in a Nutshell

手短に：片道のペイメントハブ



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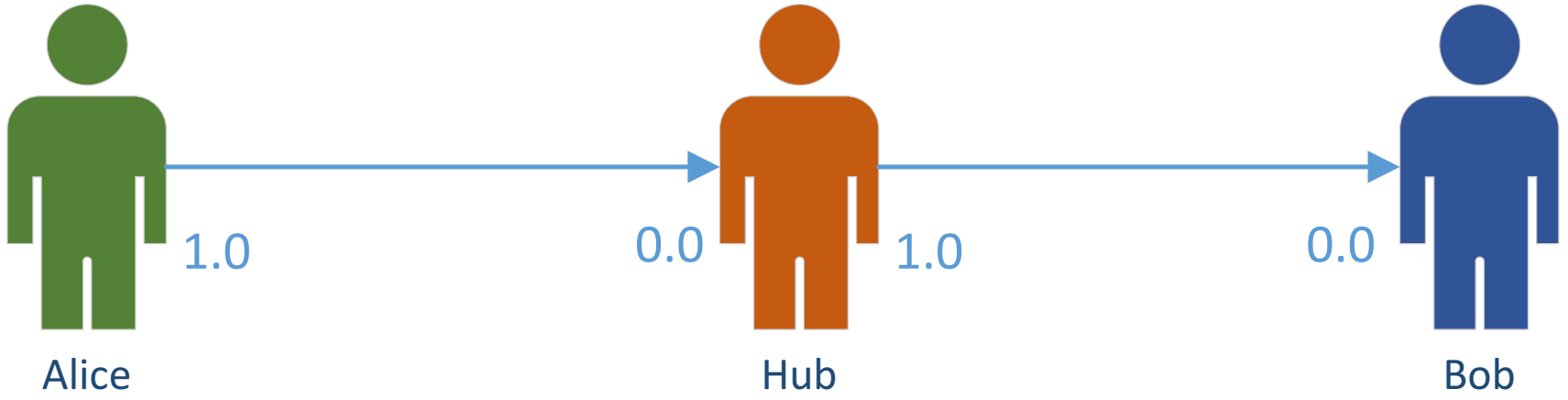
1. Setup of channel
1. チャネルの設立



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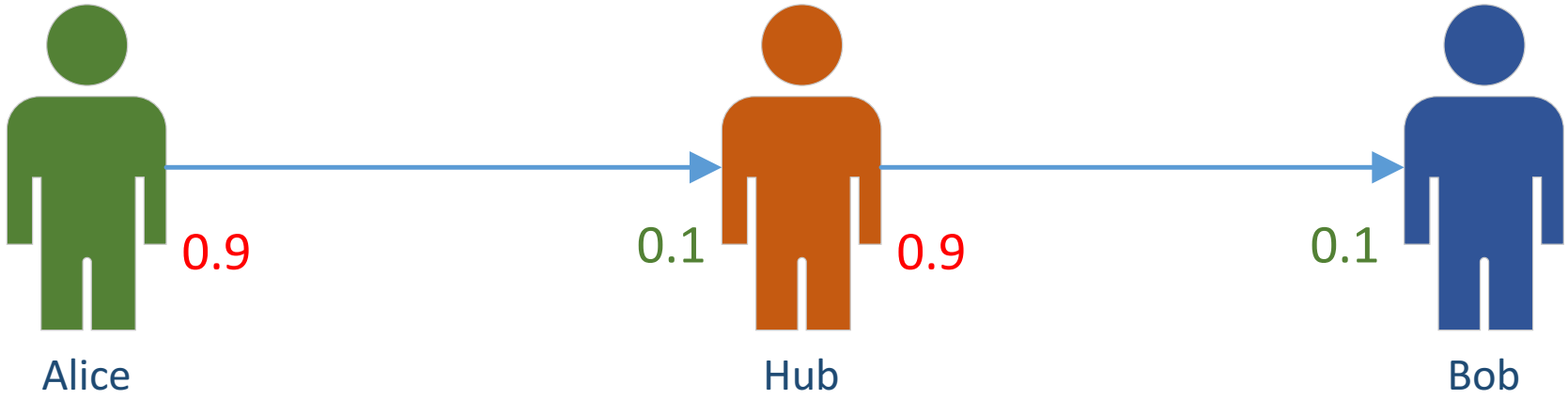
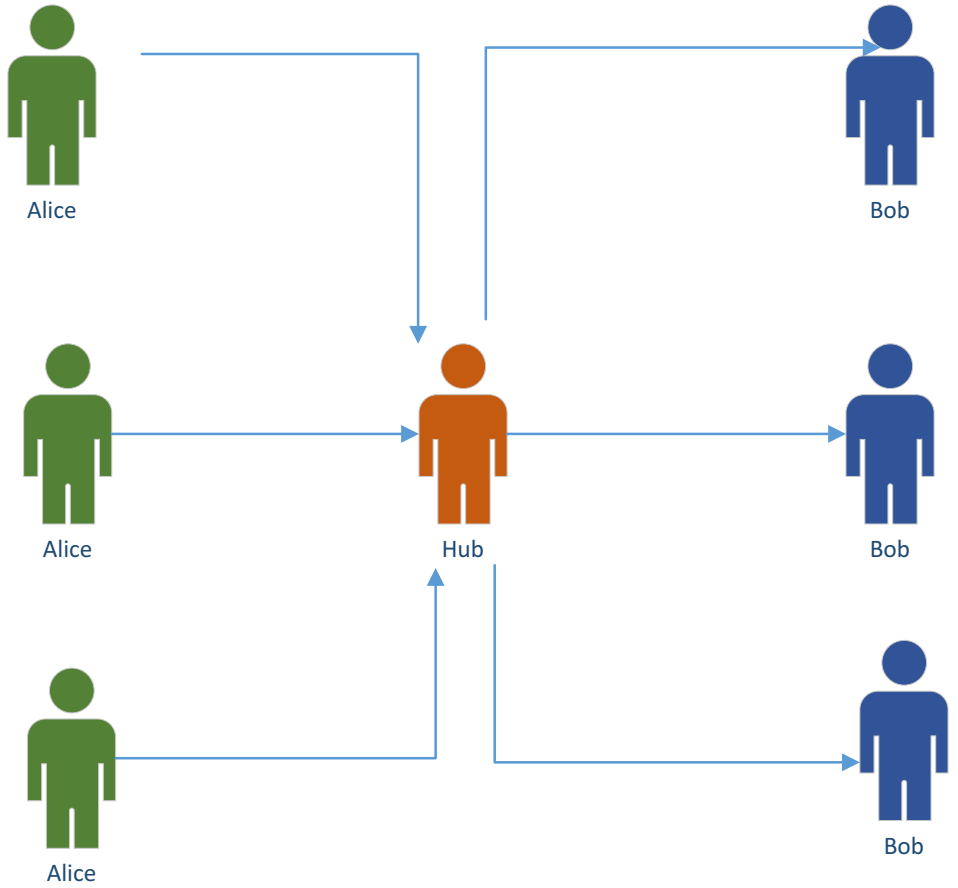
2. Alice sends to Hub, Hub sends to Bob



All Alices can send money to all the Bobs
全てのAliceが全てのBobに送信出来る



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Problems

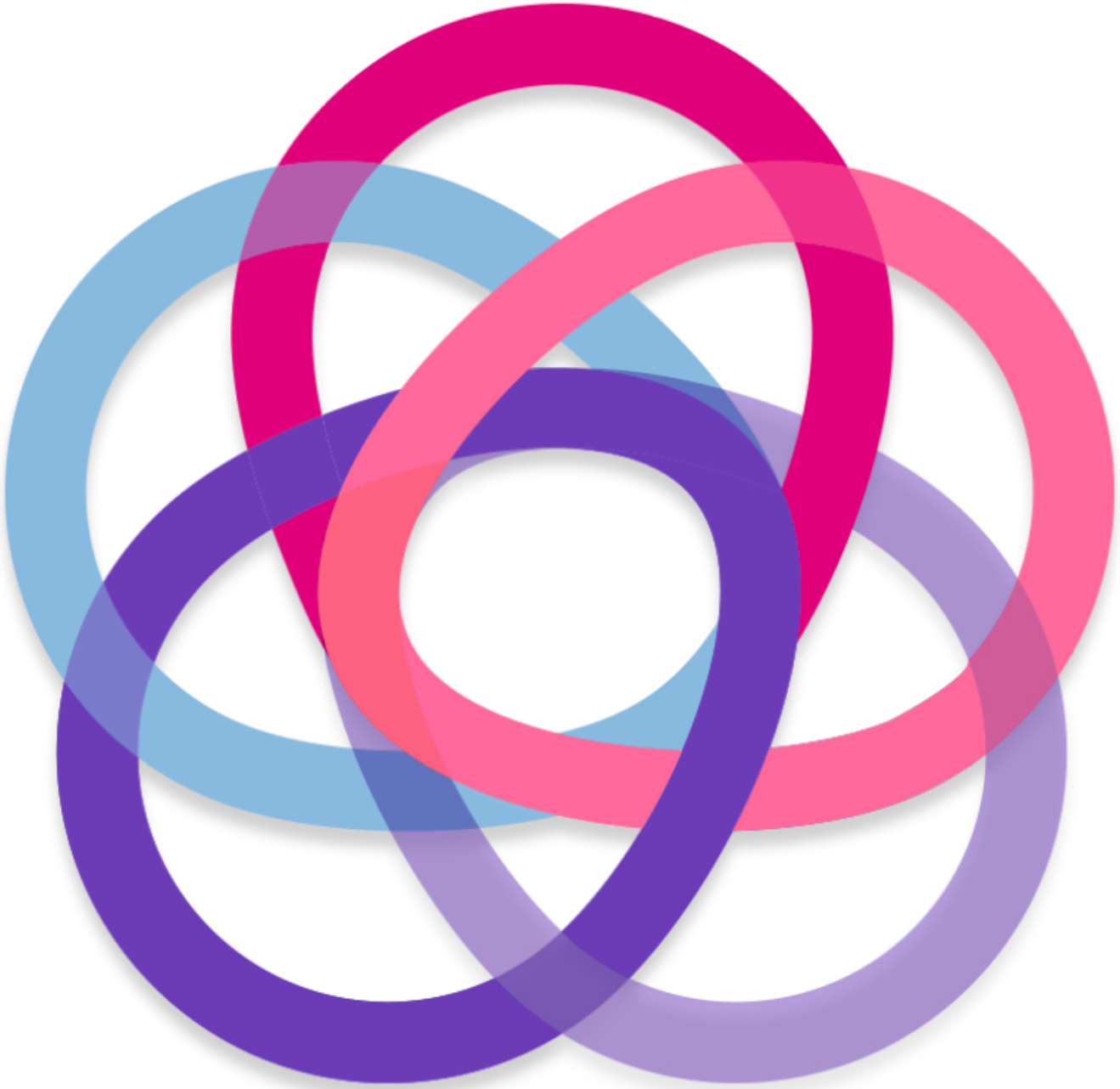
Issues

- Hub can steal money
- Hub knows who sends to who
- Nothing prevents an attacker from creating lots of Bobs so the Tumbler locks all its funds into channels

問題

- ハブがお金を盗める
- ハブは誰が誰に送ったか分かる
- 攻撃者がBobを大量に付けてハブのお金をロック出来る

TumbleBit



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TumbleBit

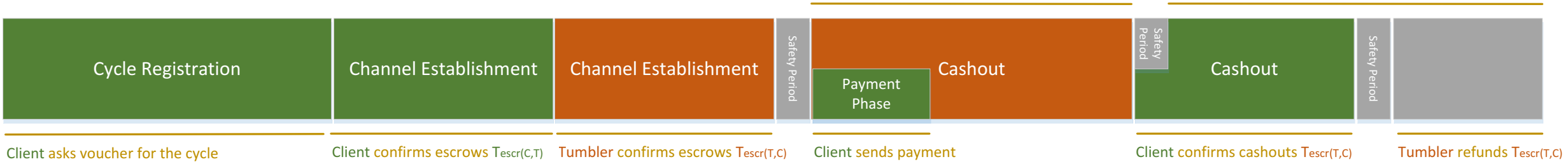
Two modes

- One payment (ie Tumbler Mode)
- Multiple payment (ie Payment Hub Mode)

モードは二つある

- シングルペイメント（タンブラーモード）
- マルチペイメント（ペイメントハブモード）

A Tumbler mode Cycle



Phases

- Each phase lasts a precise number of blocks.
- Green parts are using the Alice-Tumbler channel
- Orange parts are using the Tumbler-Bob channel

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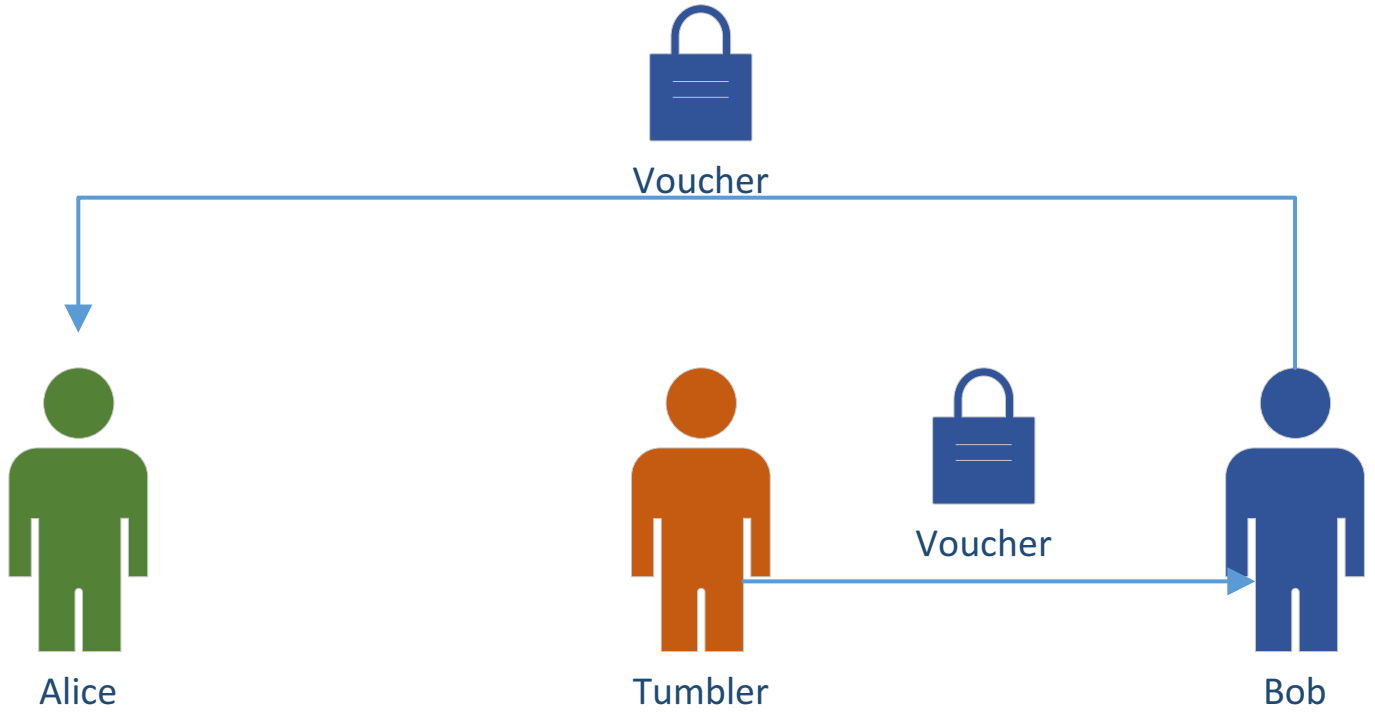
The Registration Phase



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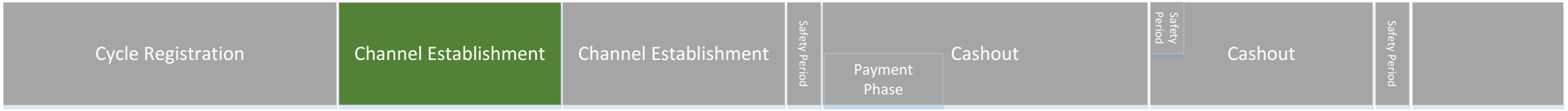
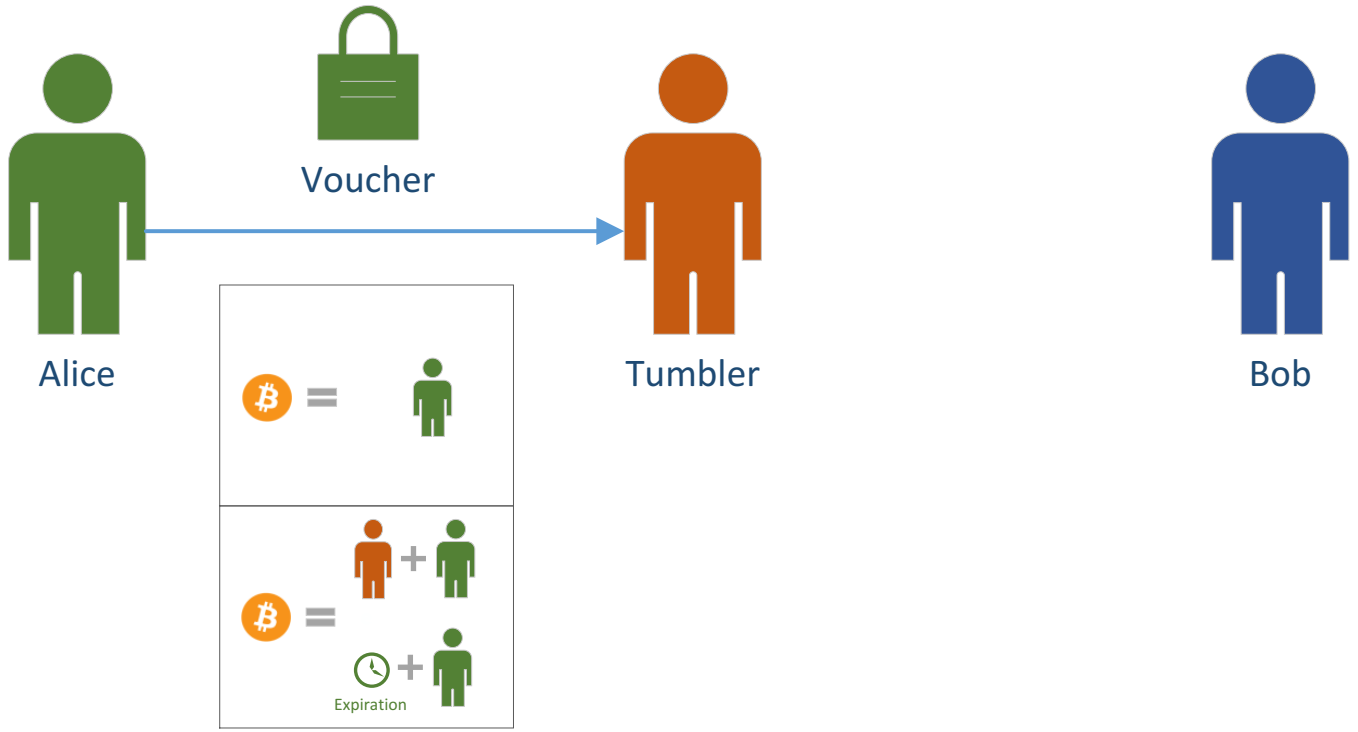
Alice opens channel





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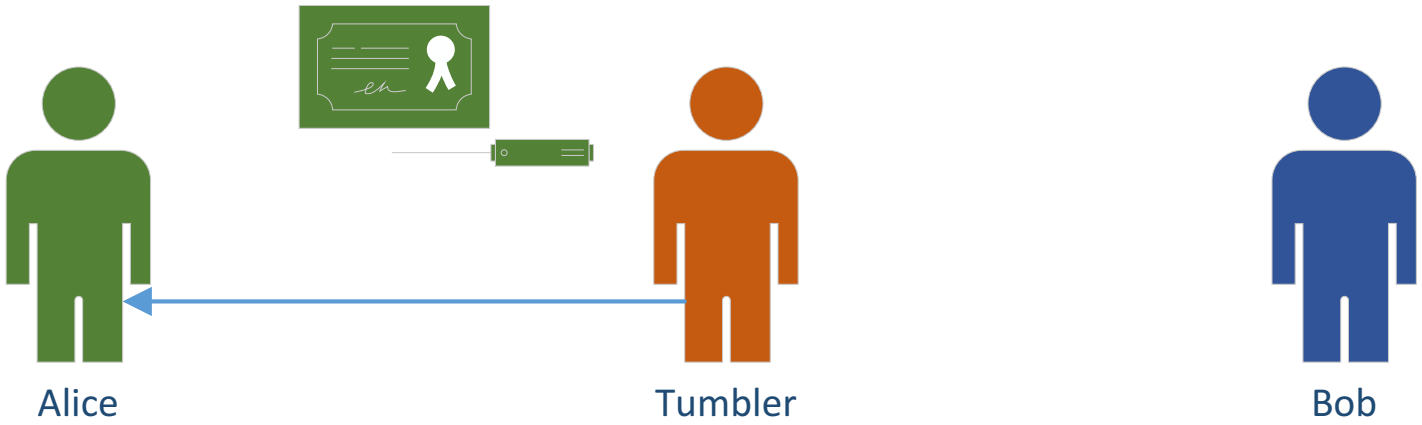
Alice opens channel



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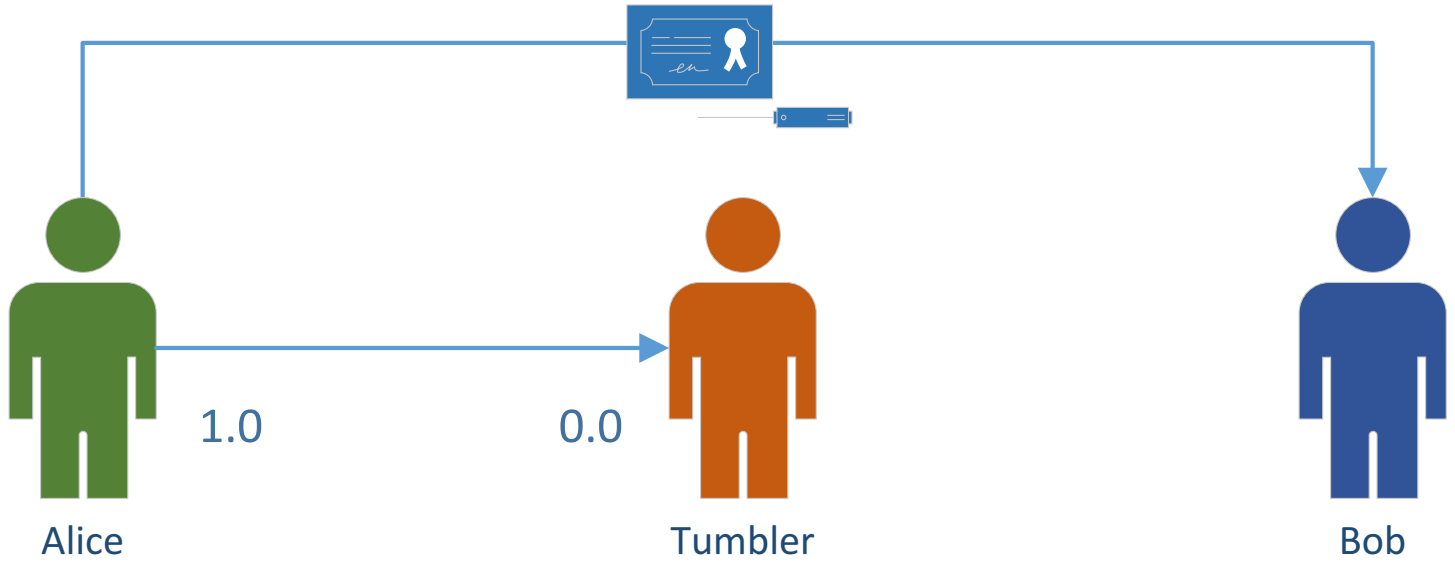
Alice opens channel

Cycle Registration	Channel Establishment	Channel Establishment	Safety Period	Payment Phase	Cashout	Safety Period	Cashout	Safety Period	



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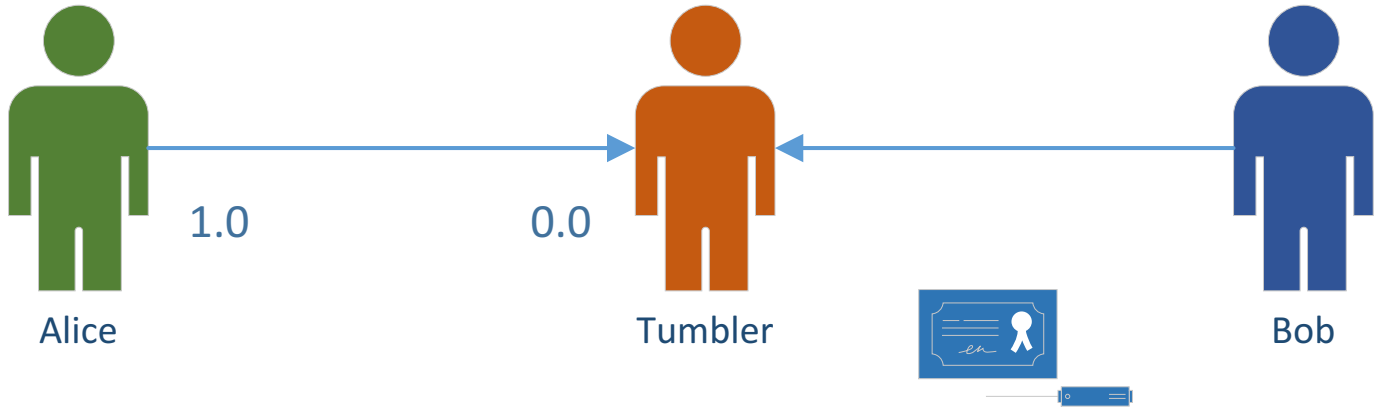
Tumbler opens channel



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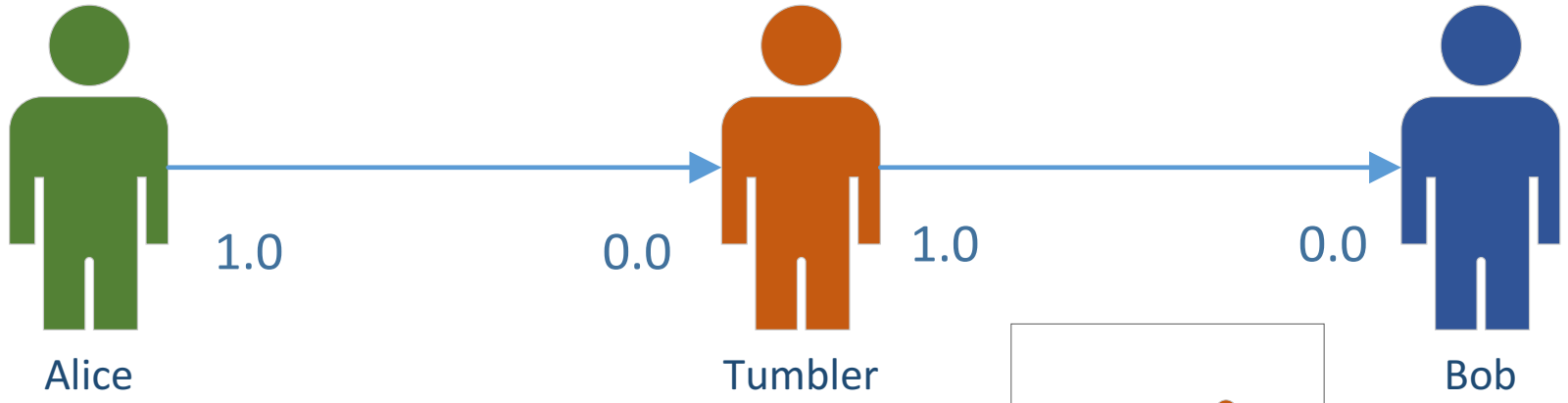
Tumbler opens channel



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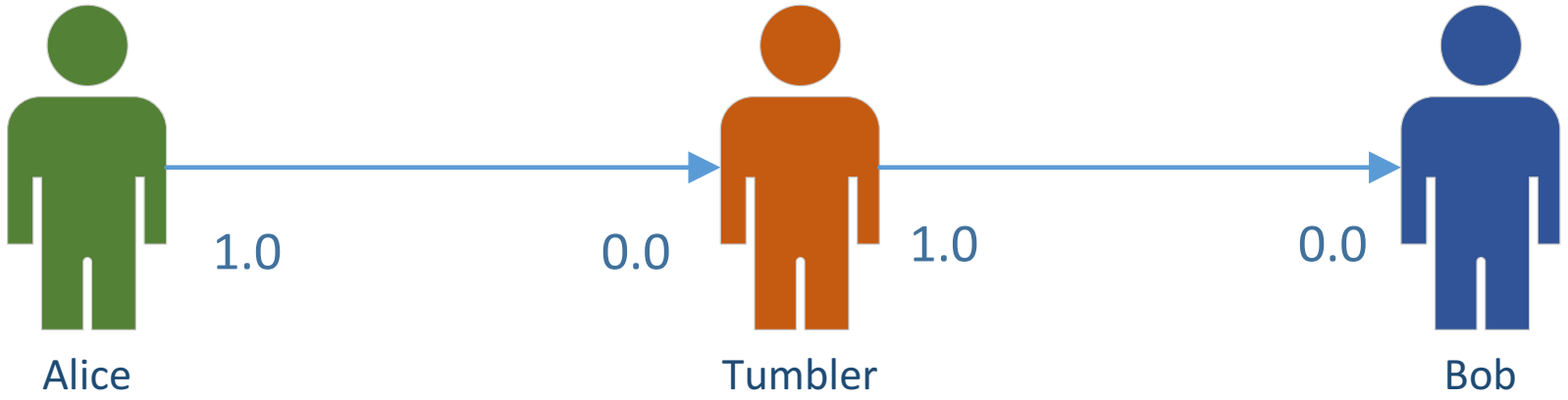
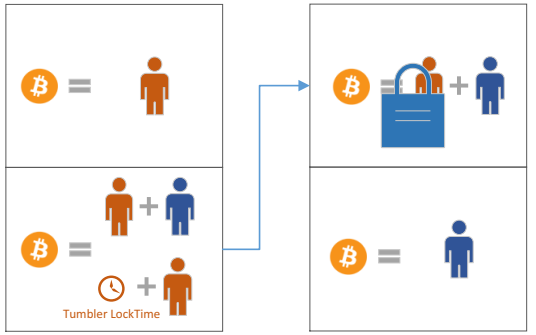
Tumbler opens channel





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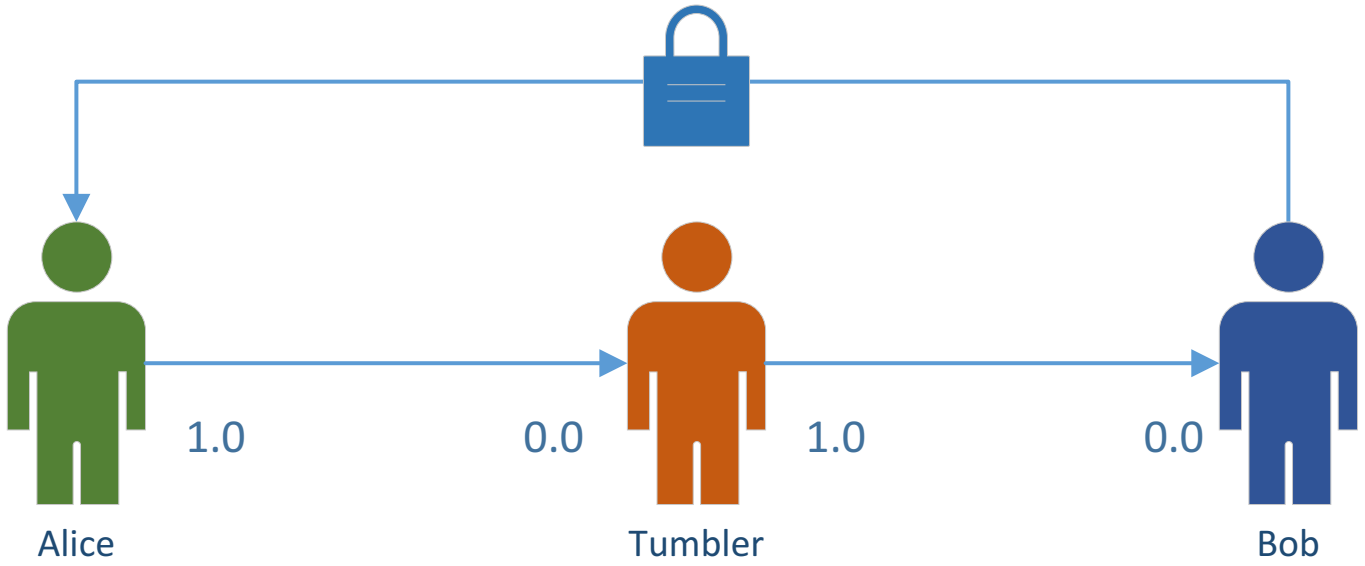
Tumbler opens channel



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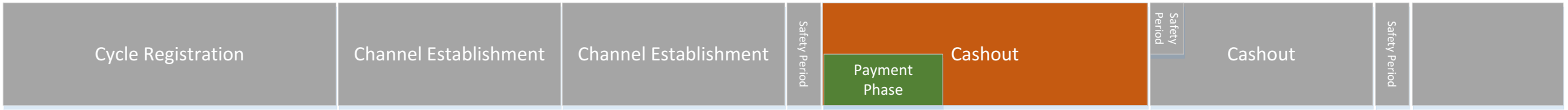
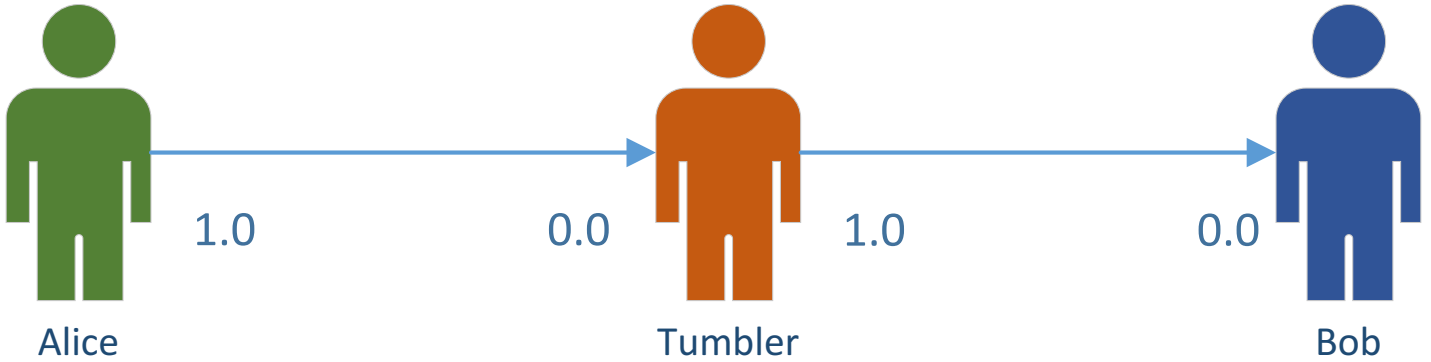
Alice asks payment against the blinded key





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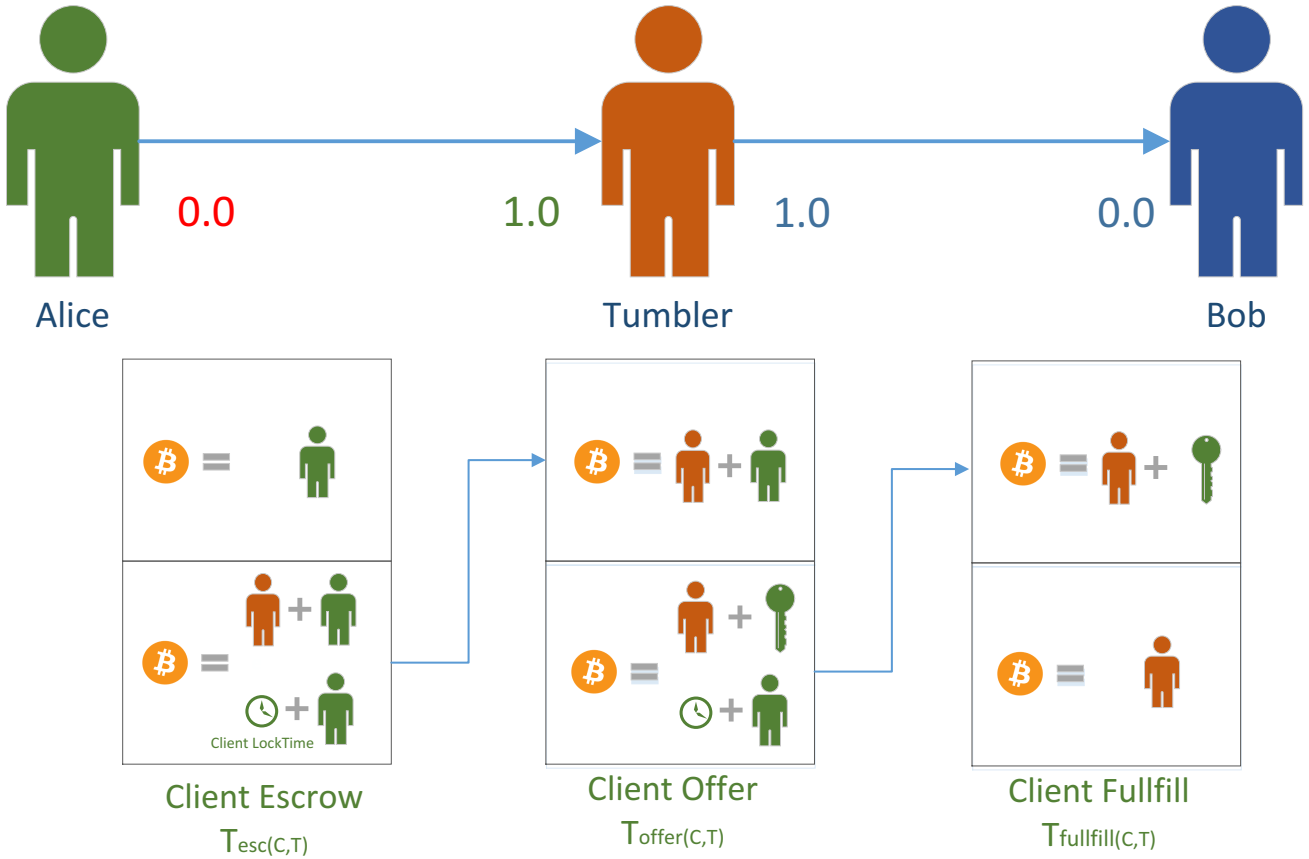
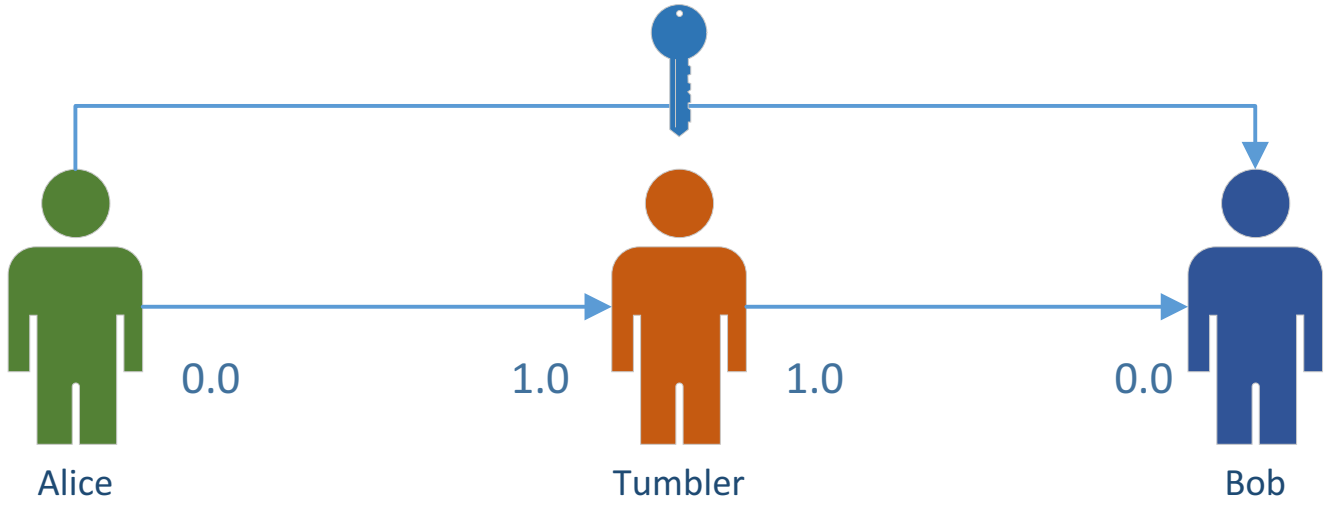


METACO

Alice asks payment against the blinded key



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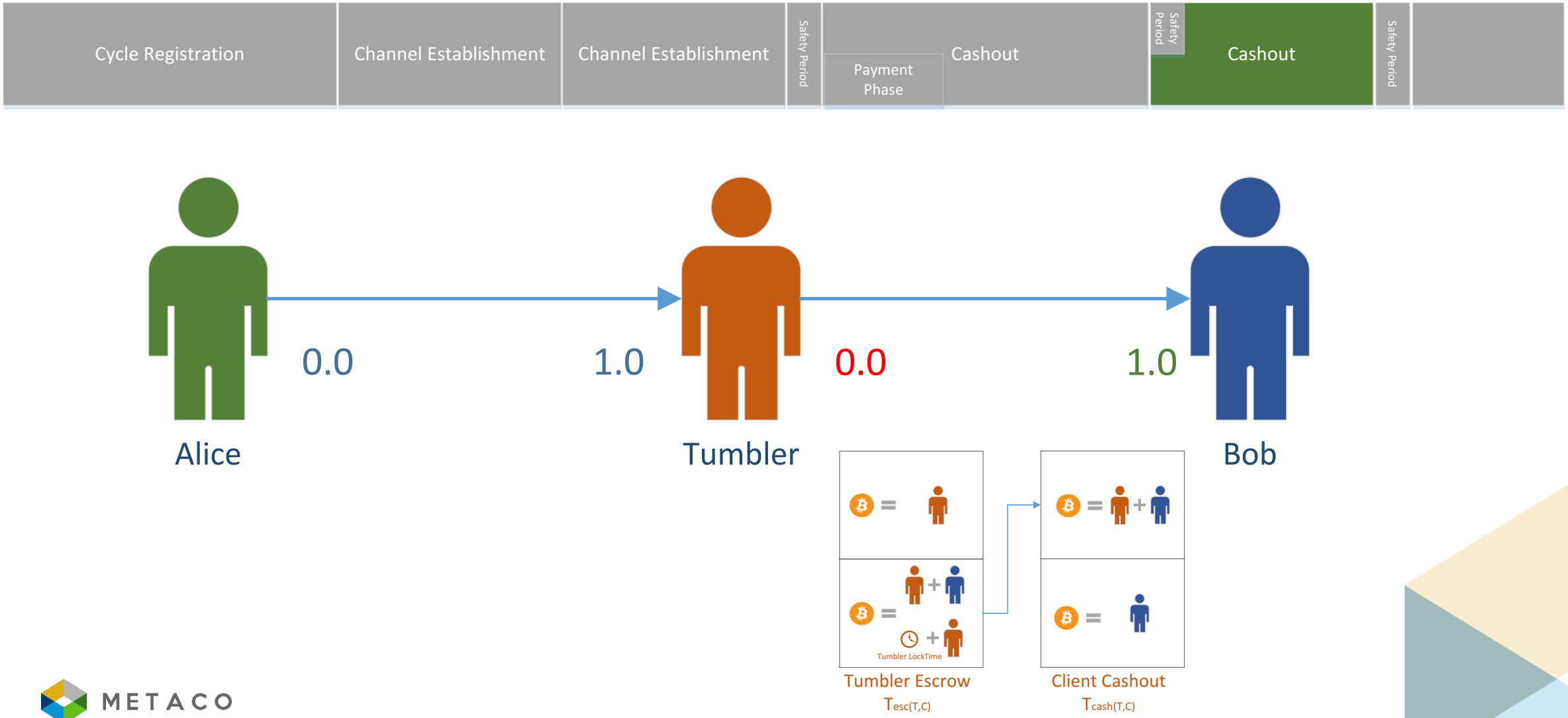
Bob unlocks the signature with the solution



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TumbleBit

Mystery

- How can Bob be sure that opening the lock will give him access to the Bitcoins?
- How can Alice be sure that the Key she will receive will open the lock?

謎

- Bobがロックを外したらＢＴＣを貰えるということをどうやって確かめる？
- Aliceが貰う鍵でロックを外せるということをどうやって確かめる？

Links

- White paper: https://eprint.iacr.org/2016/575.pdf
- TumbleBit original POC implementation: https://github.com/BUSEC/TumbleBit
- NTumbleBit implementation: https://github.com/NTumbleBit/NTumbleBit
- Blockchain Programming in C#: (also in Japanese) https://www.gitbook.com/@programmingblockchain