TIGRESS Introduction Channel Security

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Introduction Channel

Sender → Relay Server → Receiver

Store message 1

Send invitation message

Retrieve message_1

message_1

Send message_2

Retrieve message_2

message_2

Send message_3

...
Relay Channel

Sender

Store message_1

Retrieve message_2

Send message_3

Relay Server

Retrieve message_1

...
Secret Invitations

- Invitations identify Relay Channel
  - And are high entropy
- Correct invitation is needed to access the appropriate Relay Channel
- As long as Invitation remains secret, only the Receiver can access the Relay Channel
At-most-once semantics

- Both protocols are designed to provide at-most-once semantics
- The first agents to initiate a connection to the Relay Channel can access it
- Subsequent agents get denied access to the channel
Public Invitations

- If the attacker learns the invitation, then there is a race with the receiver
- The winner of the race gets the credential
- The attacker is often going to win this race
Second Factor

● What if you have a second factor?
  ○ Delivered over a secure channel

● Examples
  ○ A cryptographic key
  ○ A PIN
  ○ An identity check*

● This controls credential issuance but not the channel

● Result: the attacker can access the channel but not get the credential

* Strictly speaking that’s not delivered
Denial of Service

Sender

Store message_1
Send invitation message

Relay Server

<- Retrieve message_1
message_1

Attacker

<- Send message_2

Receiver

NOPE

Retrieve message_2

[Second factor check fails]

Error

Error
Properties of Introduction Channel

- Lots of different channels
  - e-mail, SMS, iMessage, WhatsApp, NFC
- Widely varying security properties
- In practice we tend to treat these all as “secure” for other applications...
  - Password reset
  - 2FA
  - WebPKI certificate issuance
Options

1. Assume that the Introduction Channel is secure and move forward to protocol selection.
2. Assume that the Introduction Channel is insecure and ask what the properties of the “second factor” are and what needs to be done to bind it to the Relay Channel. This should happen prior to protocol selection.
Questions?