# Connection Pooling

for request/response style applications

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TAPS

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# Connection Pooling

- Alternate API interaction scheme for request/response style applications.
- Combine several underlying transport connections into one pooled connection.
- Automated initiation and teardown of additional underlying connections.
- Match request and responses through (local) message references.

# API for QUIC

## form draft-pauly-quic-interface-00

**https://datatracker.ietf.org/meeting/103/materials/slides-103-taps-3a-taps-api-mappings-for-quic-00**

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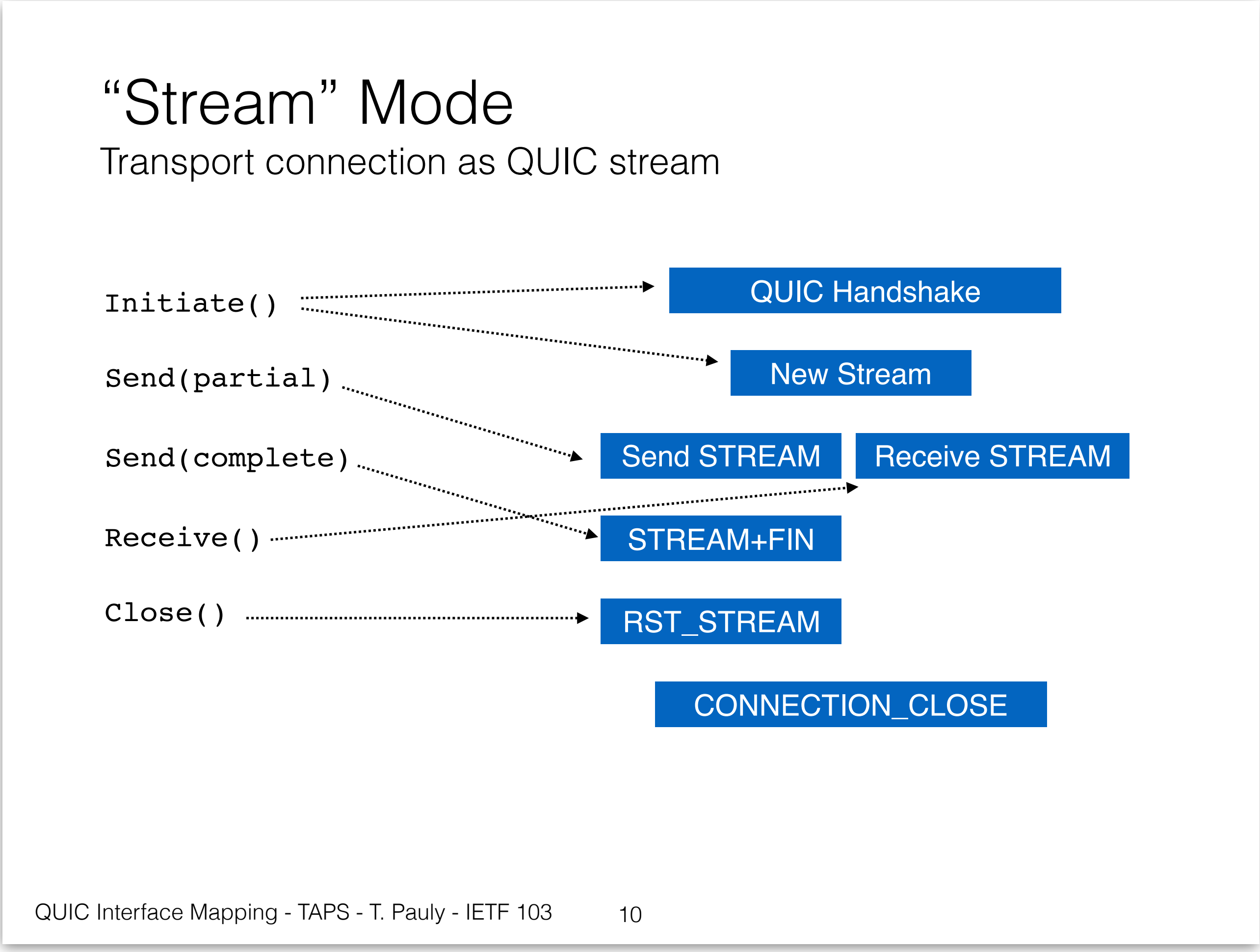

### “Stream” Mode

Transport connection as QUIC stream

```
Initiate()
Send(partial)
Send(complete)
Receive()
Close()
```

QUIC Handshake

New Stream

Send STREAM

Receive STREAM

STREAM+FIN

RST_STREAM

CONNECTION_CLOSE

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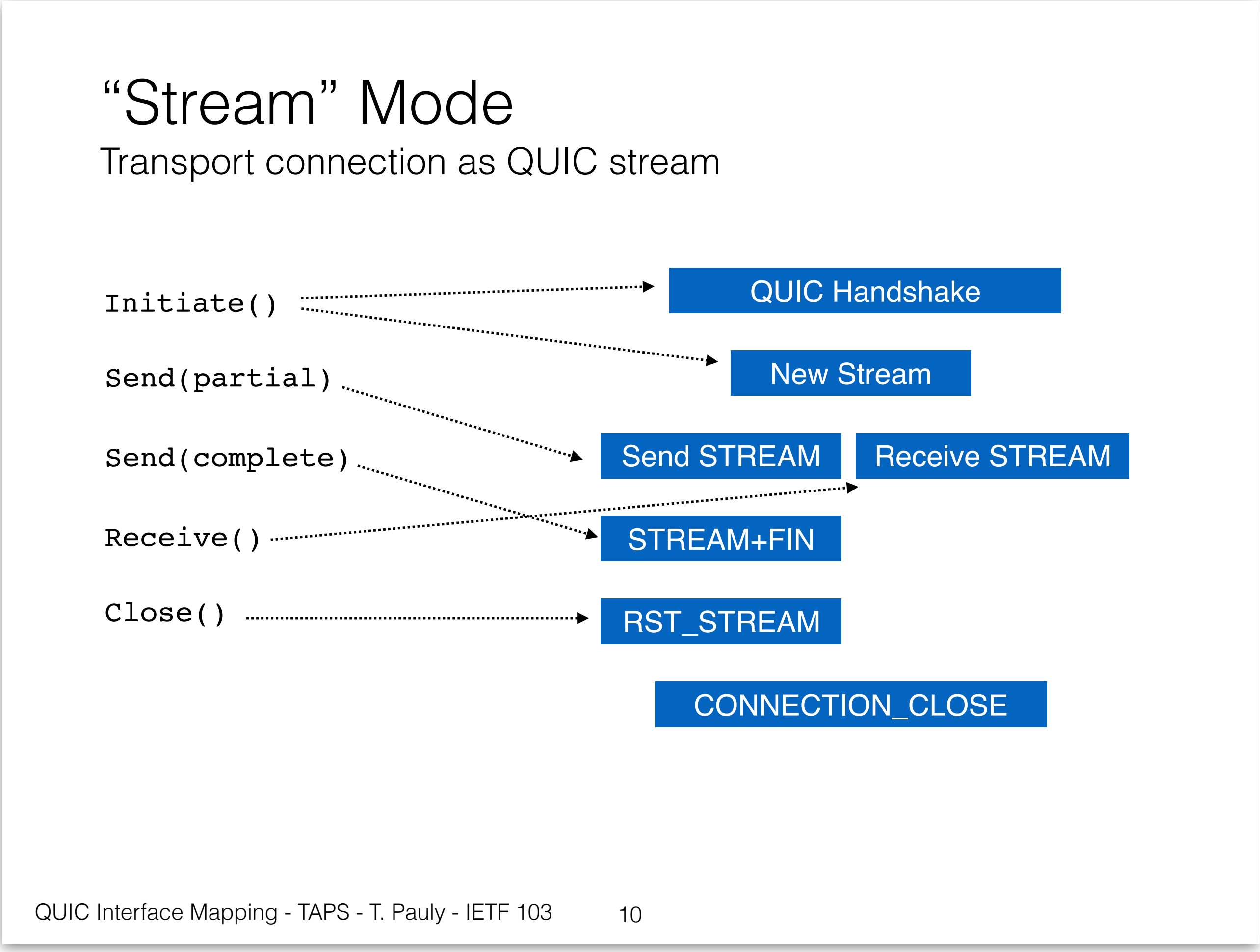

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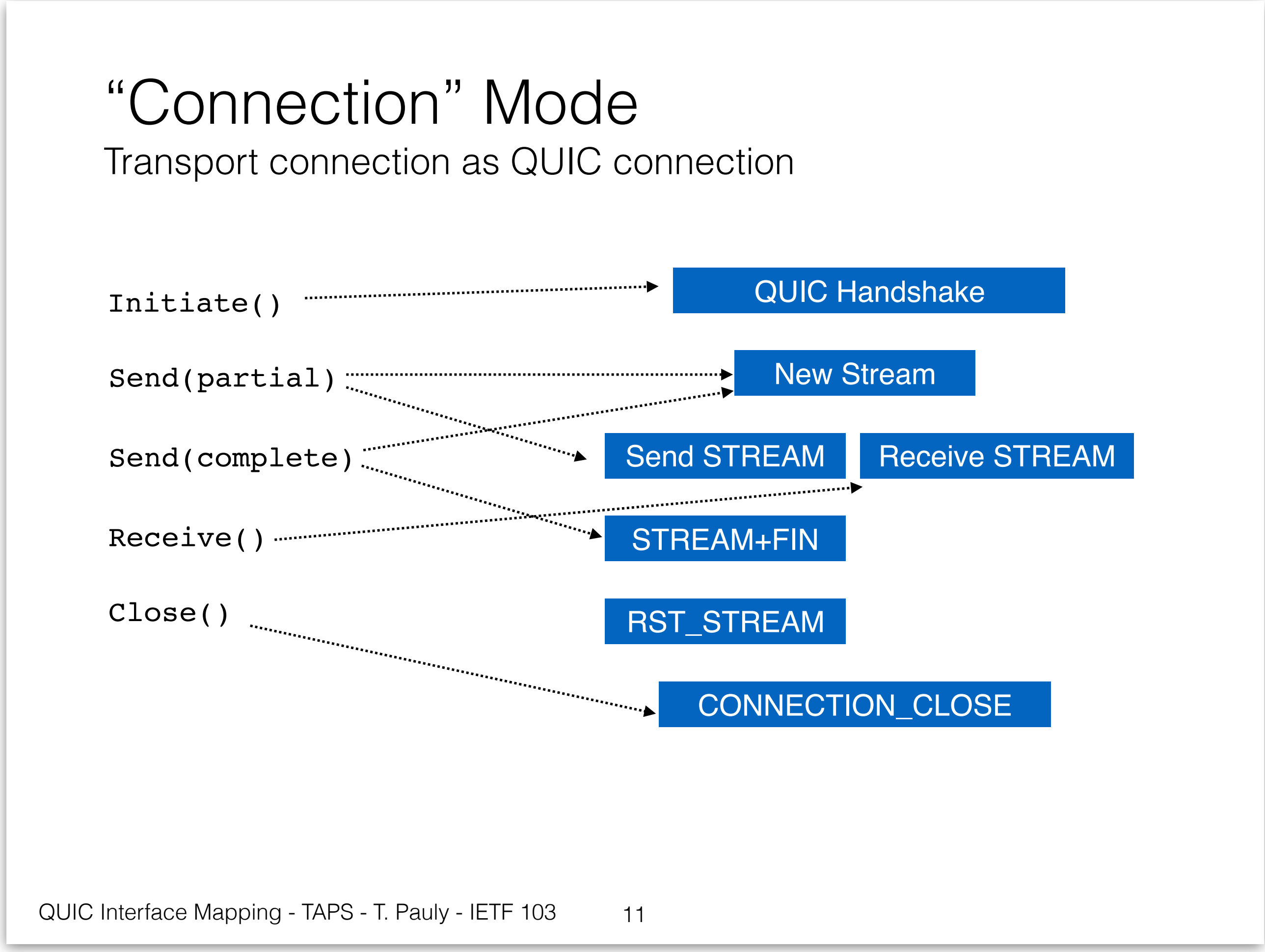

### “Connection” Mode

Transport connection as QUIC connection

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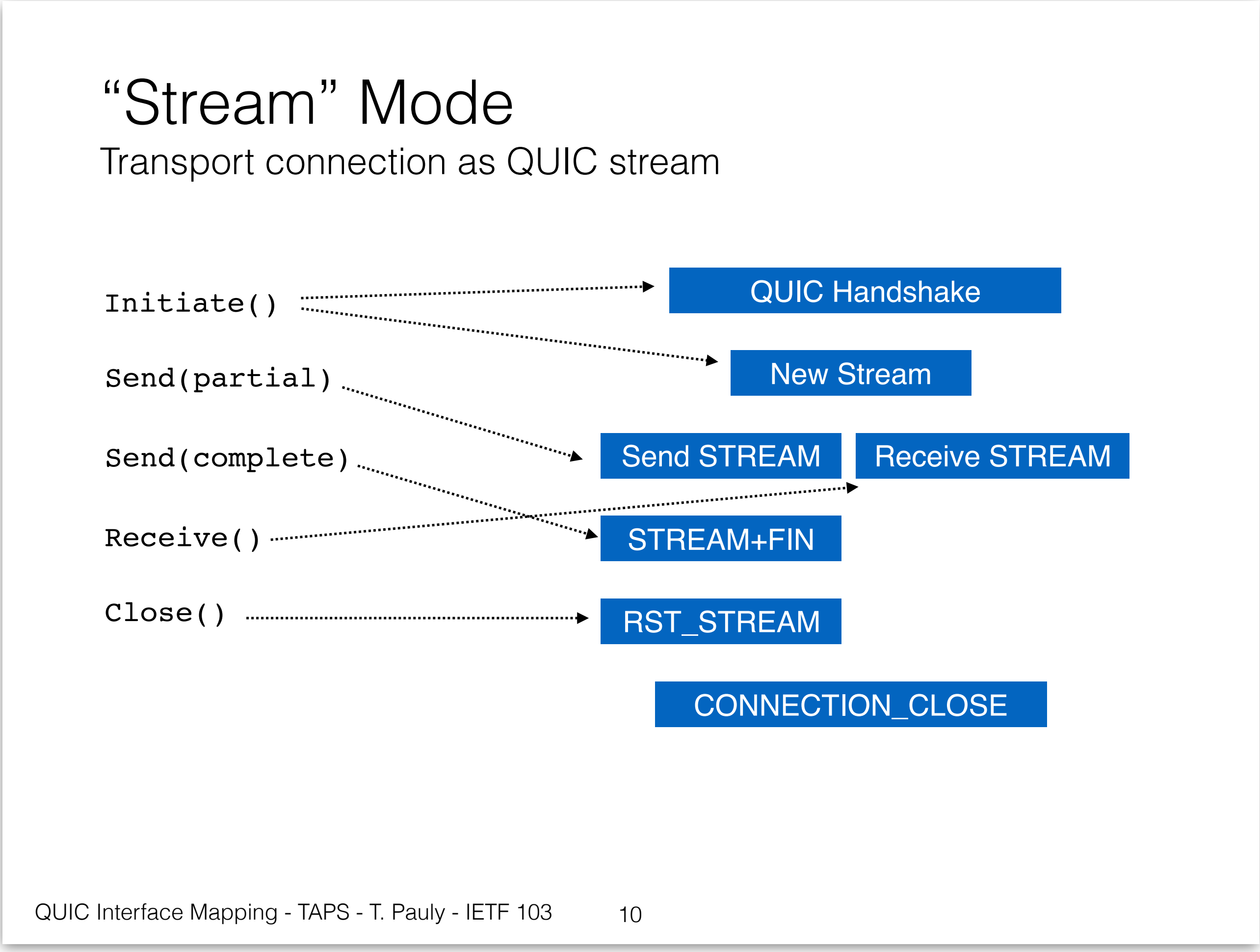

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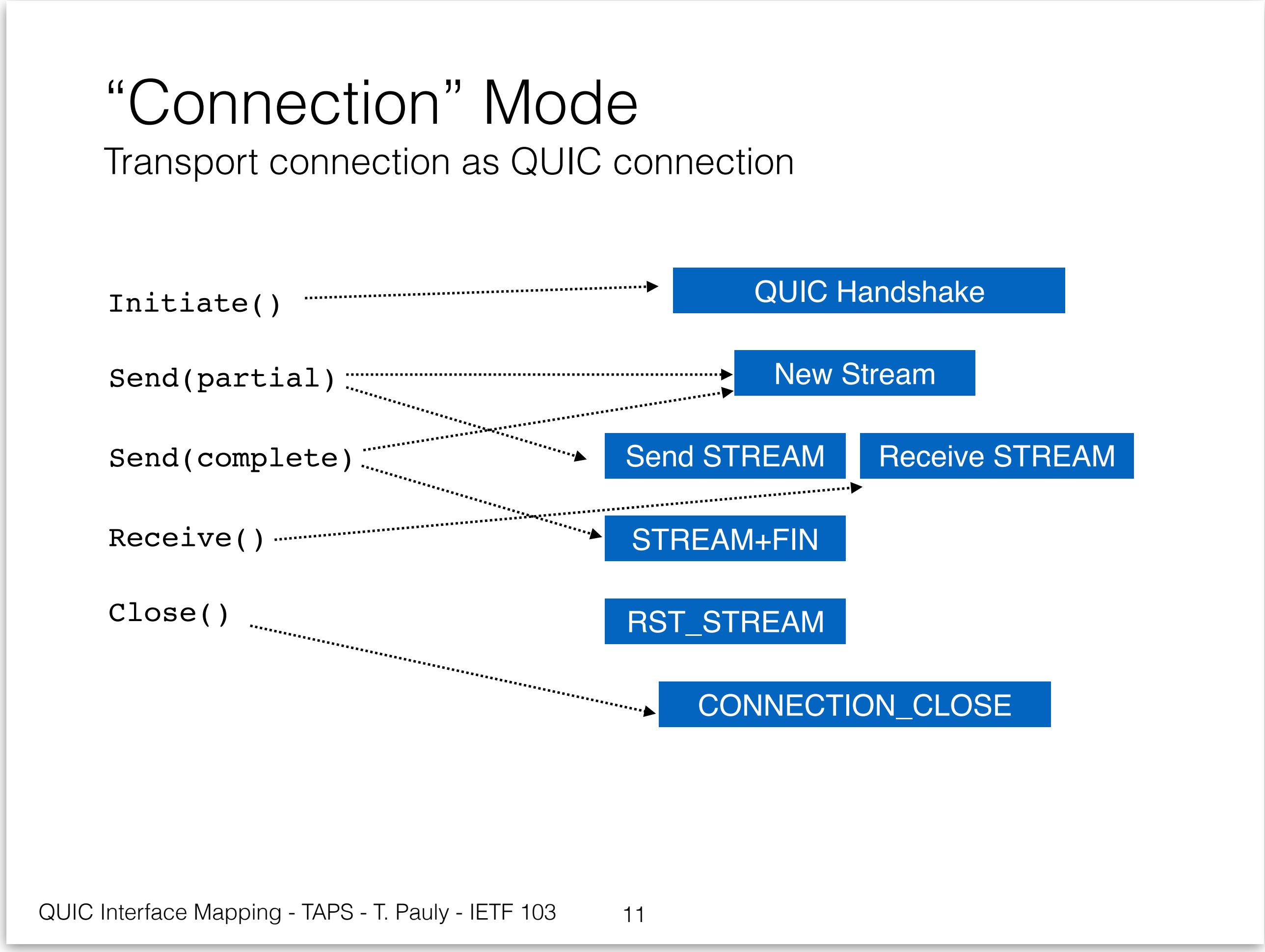
**Regular Connection**



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Transport connection as QUIC connection

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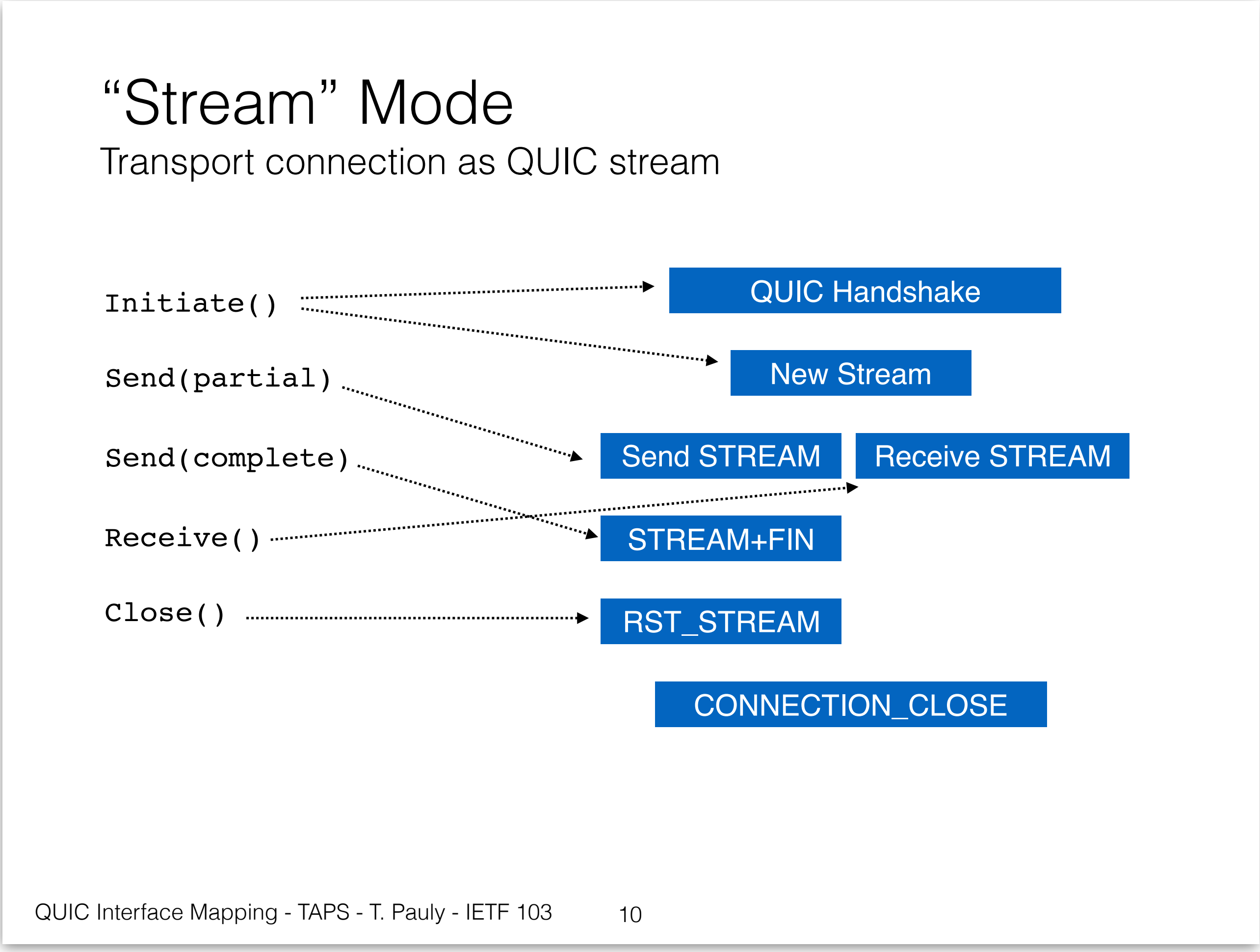

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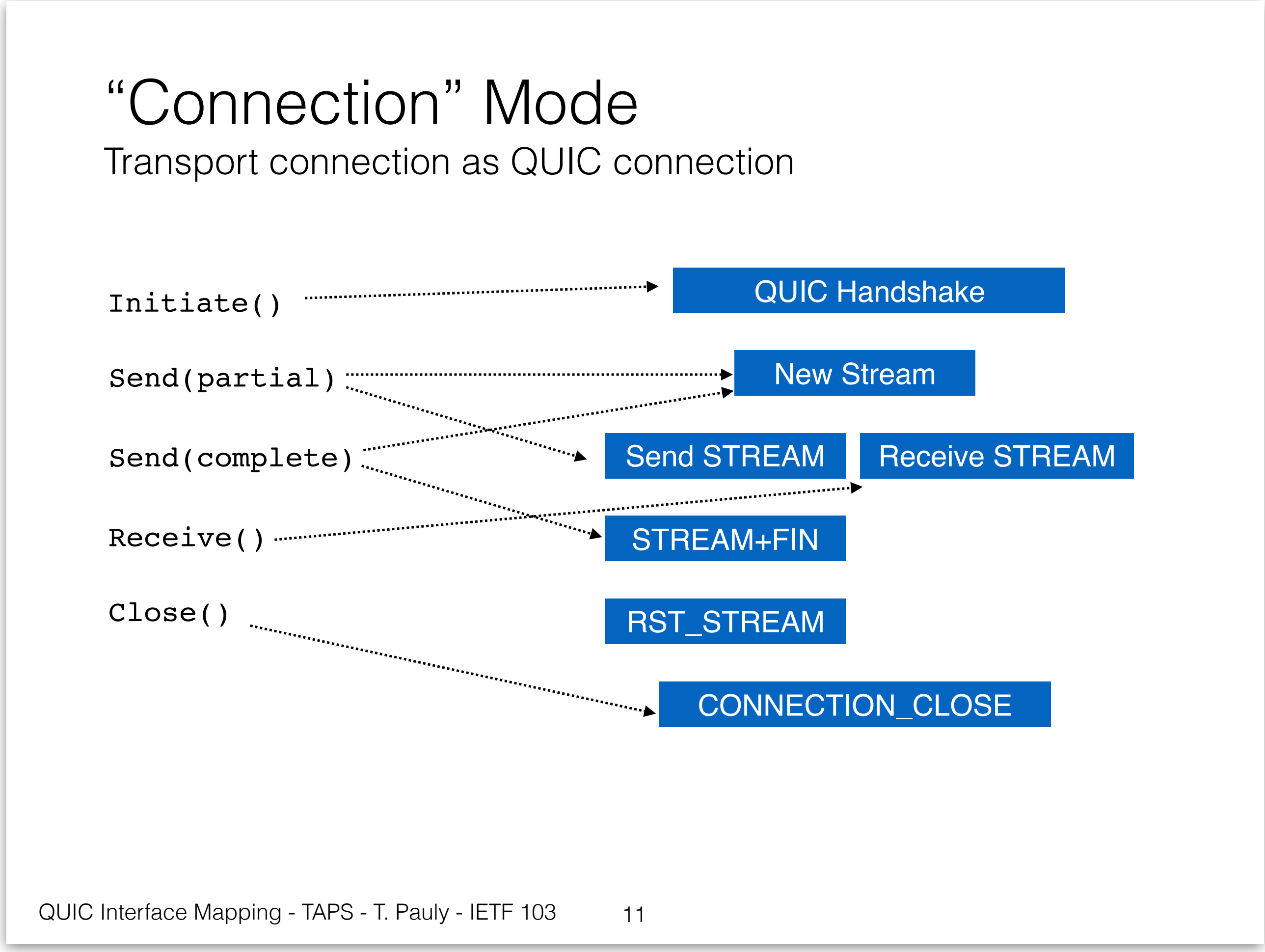

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**Pooled Connection**

# Connection Pooling Functionality

- Same API for HTTP/1.1, HTTP/2, and HTTP/3, allows mixing them transparently.
- Automatic management of QUIC Streams for HTTP/3.
- Replacement for unbound UDP sockets.
- Replacement for the “one-to-many” interface of SCTP.
- Enable transparent connection migration.
- Enable per-message path selection.

# Connection Pooling Variants

- Add Connection Pool Object – PR #295
  - Separate Connection Pool object.
  - A TAPS Connections always represents one underlaying transport connection.
- Add Pooled Connections – PR #298
  - Selection Property enables Pooled Connections.
  - A TAPS connection can represent multiple underlaying transport connections.

# Connection Pool Example

```
RemoteSpecifier := NewRemoteEndpoint()
RemoteSpecifier.WithHostname("example.com")
RemoteSpecifier.WithService("https")
TransportProperties := NewTransportProperties()
TransportProperties.Require(preserve-msg-boundaries)
TransportProperties.Ignore(preserve-order)
// Security Parameters left out for brevity

Preconnection := NewPreconnection(None, RemoteSpecifier, TransportPreperties, SecurityParameters)
RequestorPool := Preconnection.RequestorPool()

// no ready event
reqRef := RequestorPool.Send(messageData: Request, reqRef: None)

RequestorPool.Receive()
RequestorPool -> Received(messageDataResponse, messageContext, requestRef)

RequestorPool.Stop()
```

# Pooled Connection Example

```
RemoteSpecifier := NewRemoteEndpoint()
RemoteSpecifier.WithHostname("example.com")
RemoteSpecifier.WithService("https")
TransportProperties := NewTransportProperties()
TransportProperties.Require(preserve-msg-boundaries)
TransportProperties.Ignore(preserve-order)
TransportProperties.Prefer(pool-connections)
// Security Parameters left out for brevity

Preconnection := NewPreconnection(None, RemoteSpecifier, TransportPreperties, SecurityParameters)
Connection := Preconnection.Initiate()

Connection -> Ready<>
reqRef := Connection.Send(messageData: Request, reqRef: None)

Connection.Receive()
Connection -> Received(messageDataResponse, messageContext, reqRef)

Connection.Close()
```