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Coordination and WS-CDL:

Reliable foundation for Business Protocols

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Proposed changes to WS-CDL:

- Coordinating a single-level choreography:
  - Add “coordination” attribute to choreography.
  - Add <throw/> or <raise/> activity to trigger exception block.
- Coordinating inner choreographies:
  - Allow multiple finalizers, distinguished by attribute “case”.
  - Add <finalize /> activity to identify when to fire which finalizer.
  - Add attribute to <perform /> to label inner choreography instance.
- Composing or “overlaying” coordination:
  - Add to the composition mechanism (perform) the ability to “overlay” choreographies.

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Why to add these features to CDL:

So that CDL can become the language
for expressing
interoperable business protocols
like TWIST.

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Interoperable Business Protocols

- TWIST implementations will need to interoperate.
- Plus, TWIST will need to interoperate with other B2B specs like FIX and SWIFT.
- Are any of them specified consistently enough for implementations to reliably interoperate?
  - No, interop is accomplished by trial-and-error…
- WS-CDL could help define a new generation of reliable business protocol specs.
- But WS-CDL would need business transactions.

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Multiple finalizer cases:

- For example, “confirm” and “cancel”, or “draw down” and “replenish”.
- Because TWIST can’t use compensation
- …and the same will be true for most business protocols.

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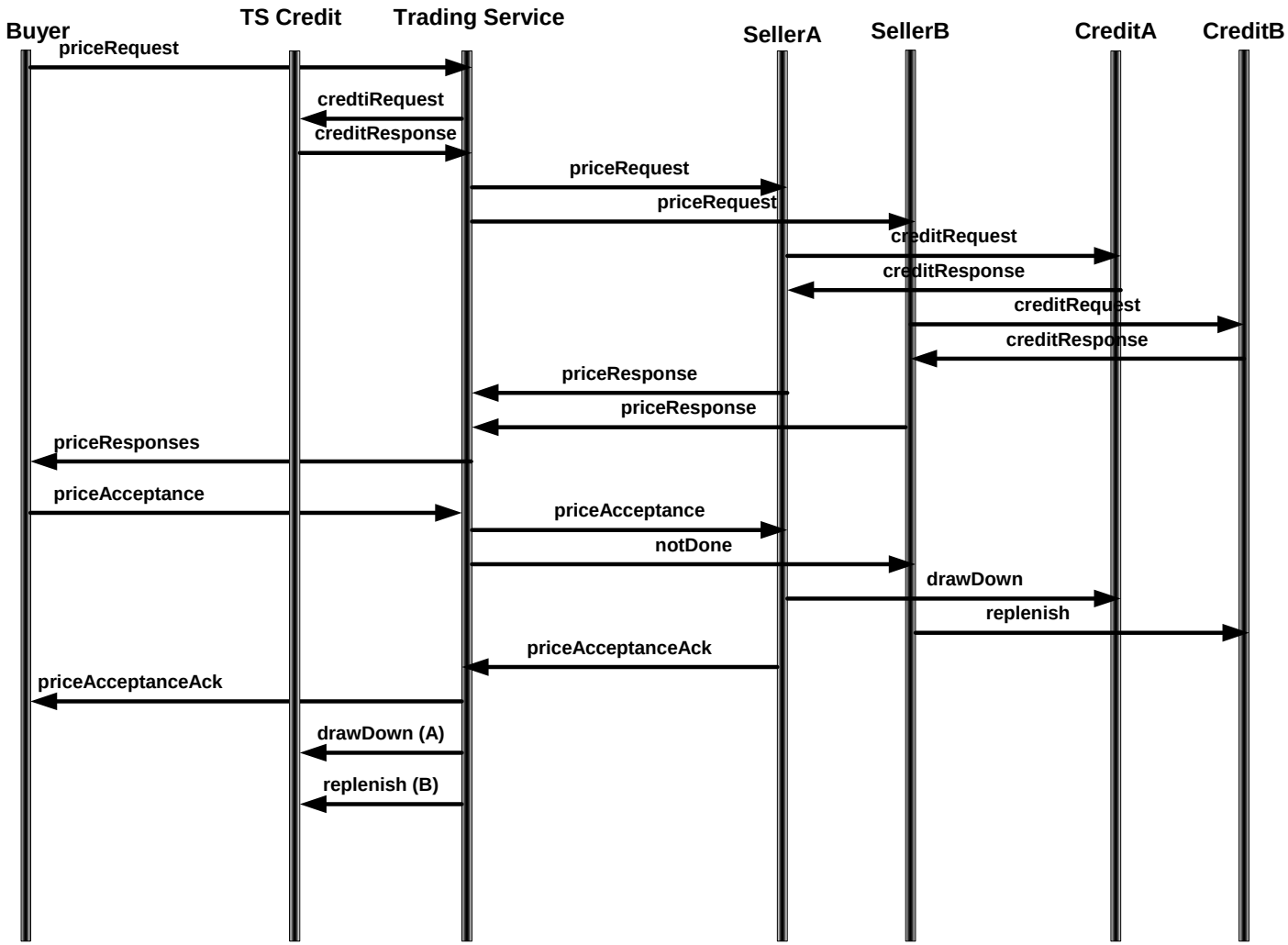
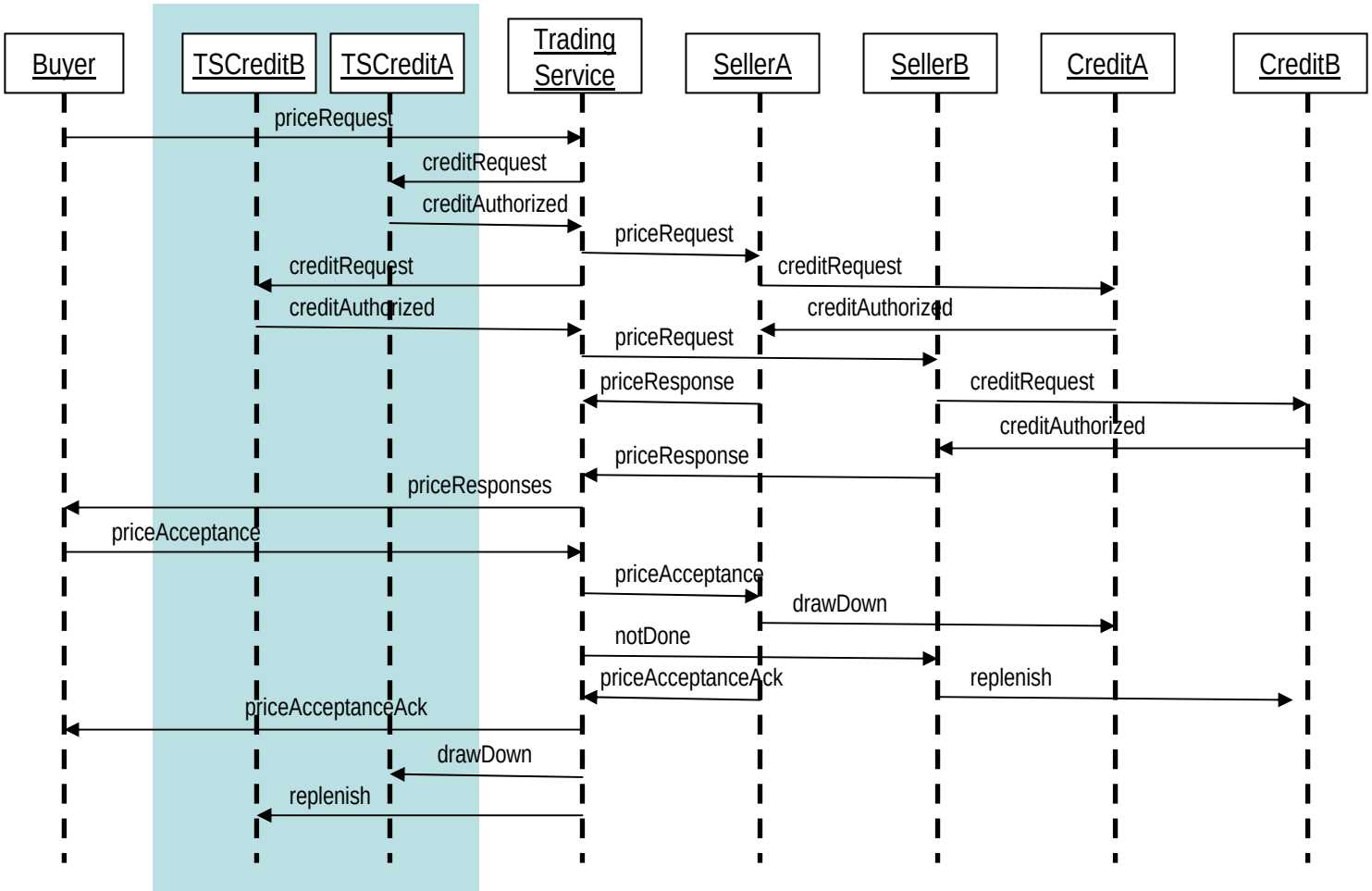
You don’t need to use all of these features together…

…but TWIST could.

Original TWIST scenario 7.2.7



Adding two TSCredit roles, for Sellers A and B



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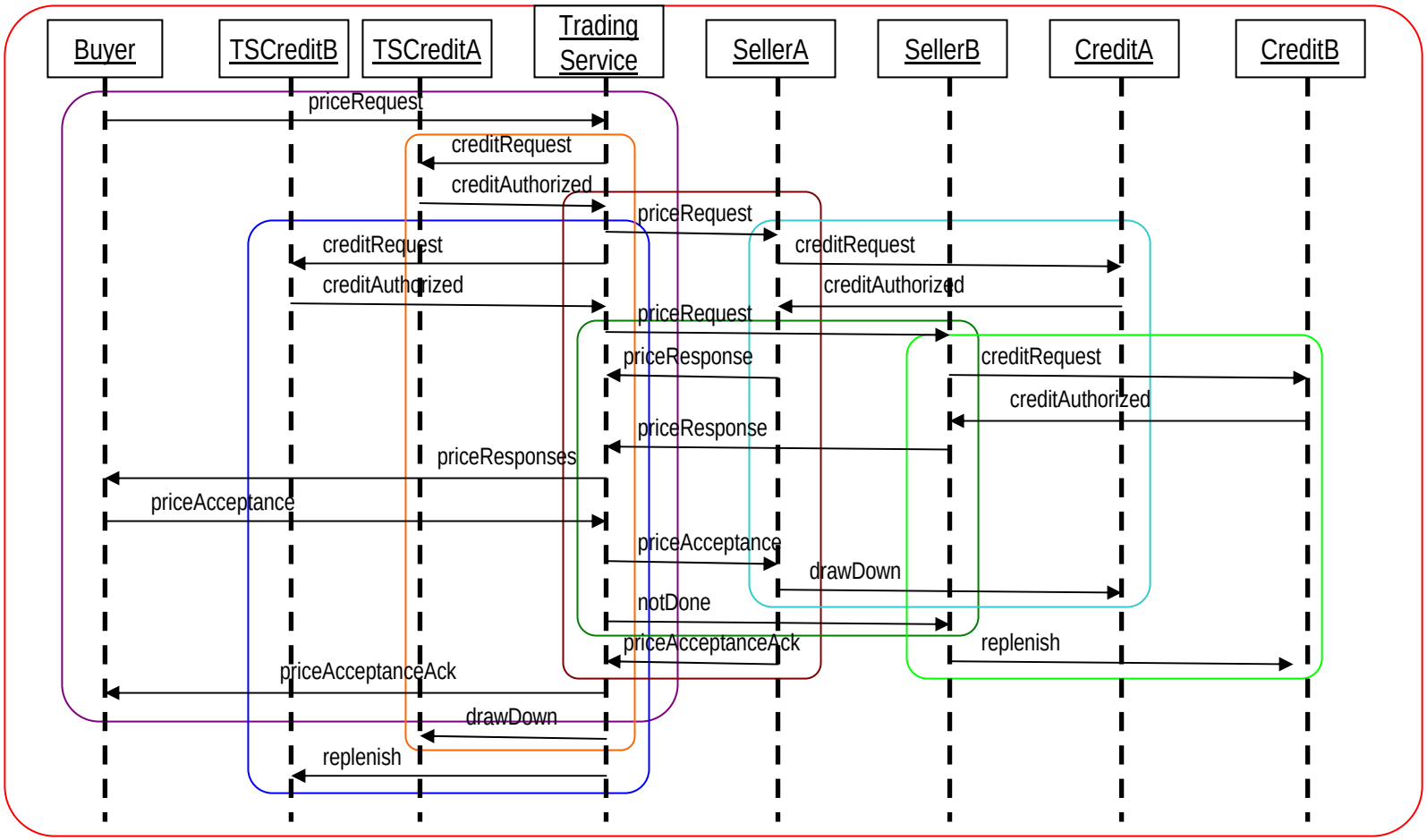
With transaction boundaries



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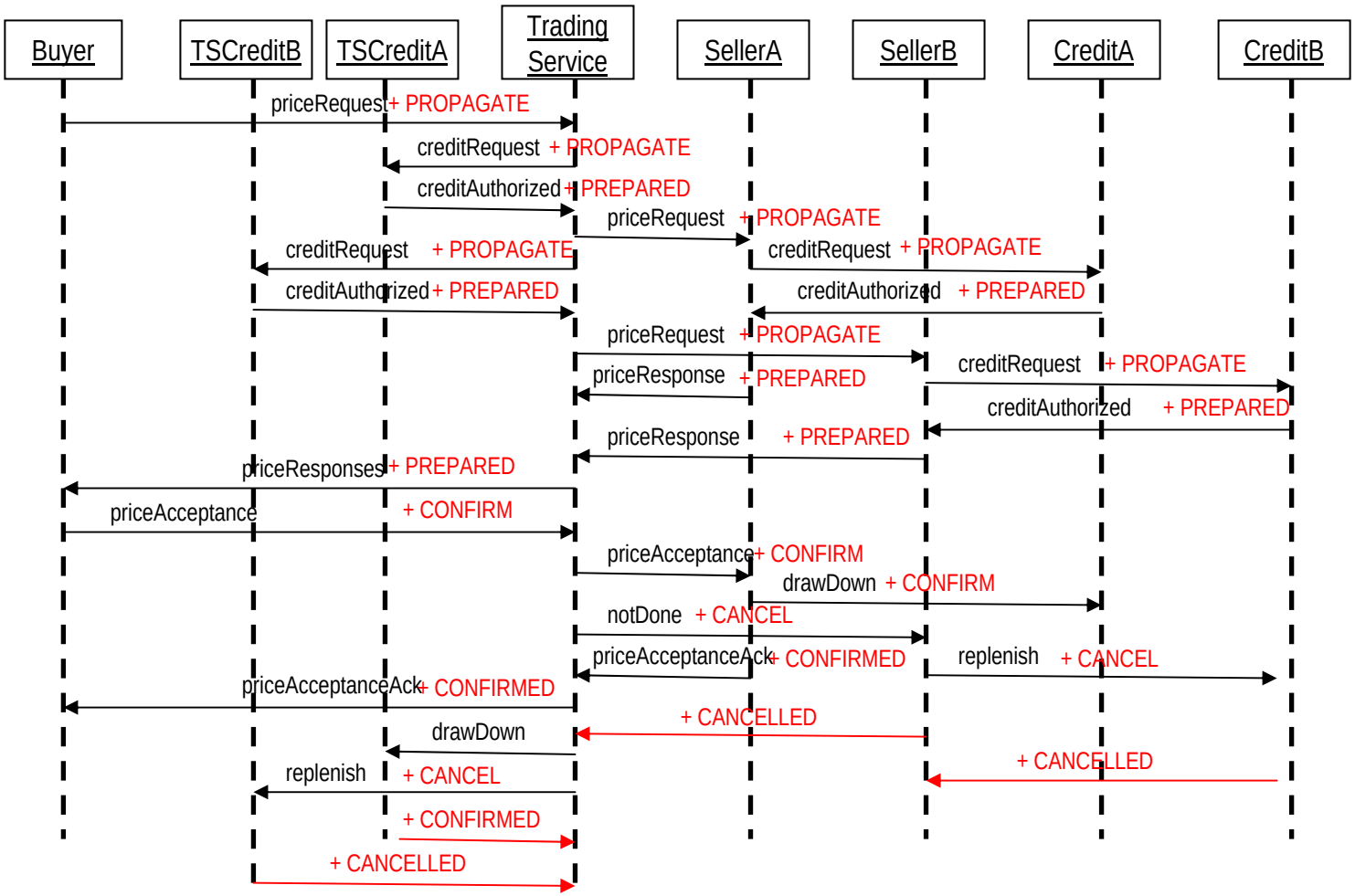
With transaction signals



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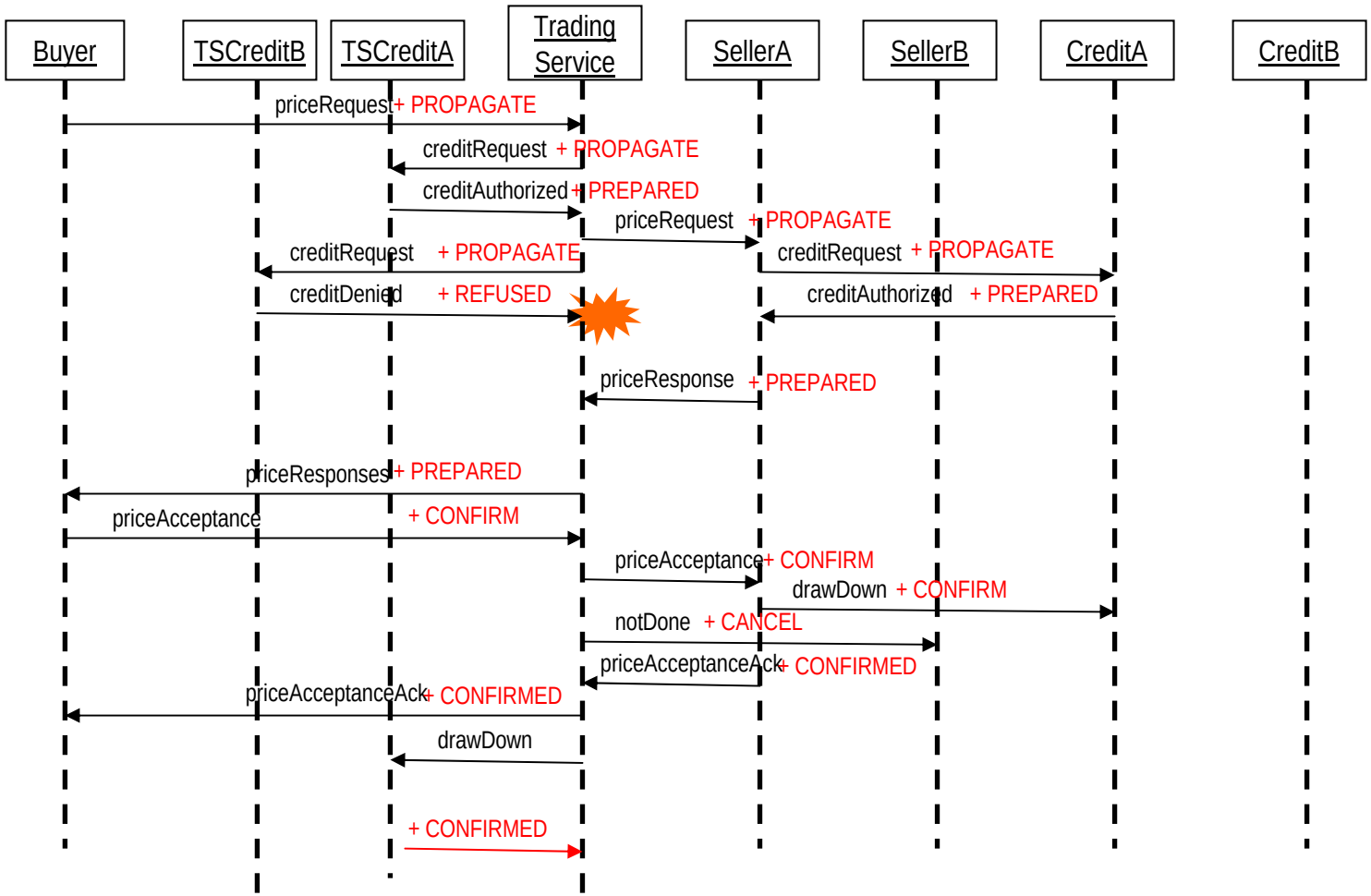
Each transaction follows the same pattern:

- App Request + PROPAGATE transaction context
  - In TWIST, that's a "Conversation".
- App Provisional Response + PREPARED
- App Conclusion + CONFIRM or CANCEL the provisional response
- (optional App Ack) + CONFIRMED or CANCELLED

Something goes wrong: creditDenied for SellerB



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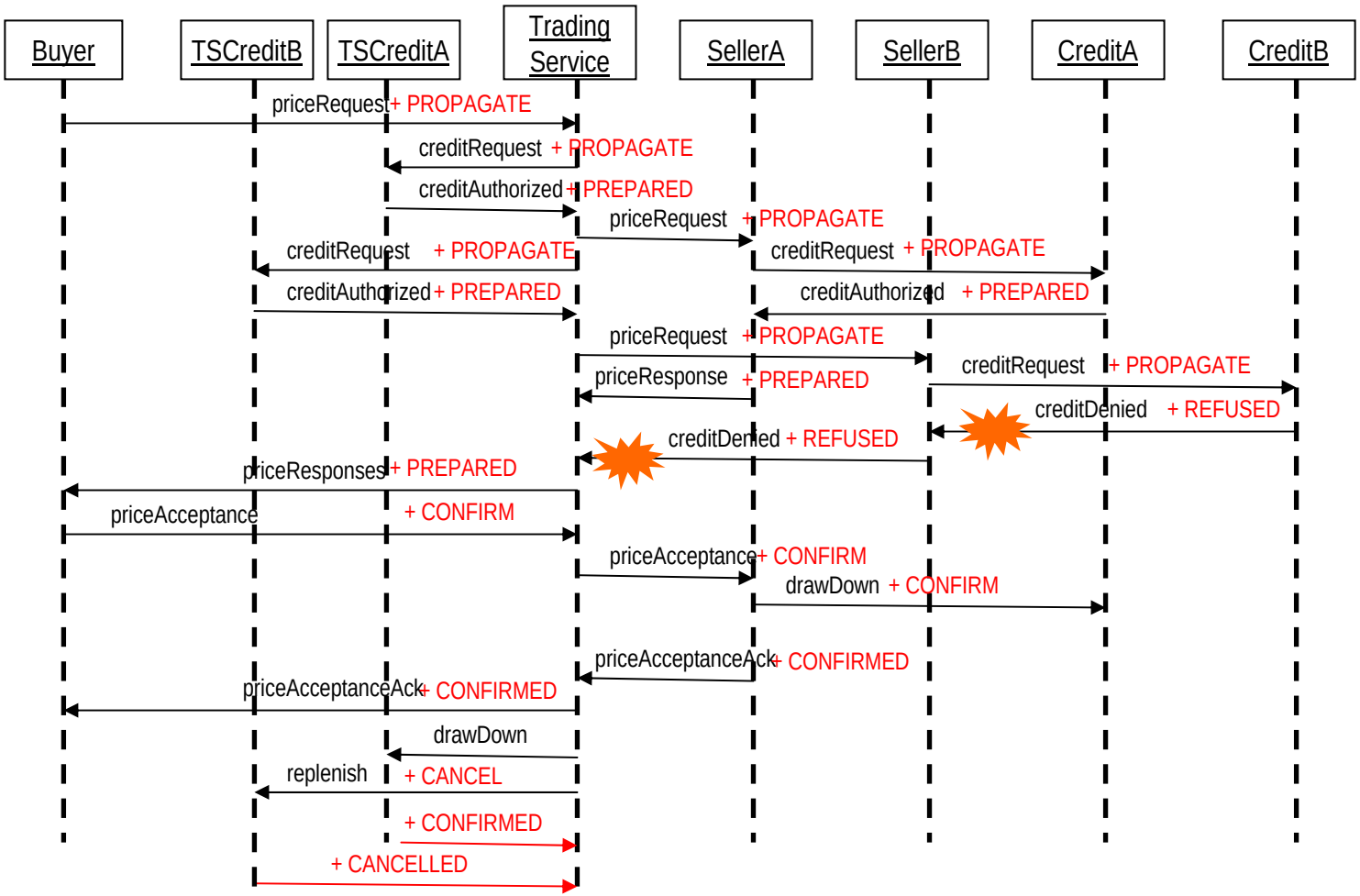
Something else goes wrong: CreditB denies credit to Buyer



Business Transaction Management Software for Application Coordination

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Revised pattern:

- App Request + PROPAGATE transaction context
- Choice:
  - App refuses request + REFUSED
  - Sequence:
    - App Provisional Response + PREPARED
    - App Conclusion + CONFIRM or CANCEL the provisional response
    - (optional App Ack) + CONFIRMED or CANCELLED

*Note: the above is **not** the CDL for the pattern.*

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How to implement the pattern in CDL:

- Separate the coordination protocol and application messages into different choreographies.
- The same coordination protocol choreography overlays each of the application choreographies.
- *We use a simplified generic protocol that fits TWIST in these examples, but you could substitute any applicable business transaction protocol*.

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Coordination Choreography

```
<choreography name="Coordination" root="false" coordinated="true">
  <sequence>
    <interaction channelVariable="tns:coordination" operation="propagate"
    initiateChoreography="true">
    </interaction>
    <choice>
      <sequence>
          <interaction channelVariable="tns:coordination" operation="prepared“>
          </interaction>
      </sequence>
      <throwException name=“refused" />
    </choice>
  </sequence>
  <exception>
     <interaction channelVariable="tns:coordination" operation="refused“>
     </interaction>
  </exception>
  <finalizer case="confirm">
     <interaction channelVariable="tns:coordination" operation="confirm“>
     </interaction>
  </finalizer>
  <finalizer case="cancel">
     <interaction channelVariable="tns:coordination" operation="cancel“>
     </interaction>
  </finalizer>
</choreography>
```

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Credit Check Choreography

```
<choreography name="CreditCheck" root="false" coordinated="true">
 <sequence>
  <interaction channelVariable="tns:CreditRequestor" operation="creditRequest" initiateChoreography="true">
  </interaction>
  <choice>
   <sequence>
    <interaction channelVariable="tns:CreditResponder" operation="creditAuthorized"
    initiateChoreography="false">
    </interaction>
   </sequence>
   <throwException name="creditDenied" />
  </choice>
 </sequence>
 <exception>
  <interaction channelVariable="tns:CreditResponder" operation="creditDenied" initiateChoreography="false">
  </interaction>
 </exception>
 <finalizer case="confirm">
  <interaction channelVariable="tns:CreditRequestor" operation="drawDown" initiateChoreography="false">
  </interaction>
 </finalizer
 <finalizer case="cancel">
  <interaction channelVariable="tns:CreditRequestor" operation="replenish" initiateChoreography="false">
  </interaction>
 </finalizer>
</choreography>
```

Coordinated Credit Check Choreography

```
<choreography name="CoordinatedCreditCheck" root="false">
  <!-- declare roles, messages and variables     -->
  <parallel>

      <perform choreographyName="Coordination">
            <bind>
               <!-- bind the roles     -->
               <!-- bind the operations     -->
               <!-- bind the variables     -->
            </bind>
      </perform>

      <perform choreographyName="CreditCheck">
            <bind>
               <!-- bind the roles     -->
               <!-- bind the operations     -->
               <!-- bind the variables     -->
            </bind>
      </perform>

  </parallel>
</choreography>
```

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Enclosing Choreography

```
<choreography name="Enclosing" root="true"> <!-- only a snippet shown -->
 <sequence> <!-- other stuff here -->
  <parallel>
   <perform name="checkCreditForA" choreographyName="CoordinatedCreditCheck">
   </perform>
   <perform name="checkCreditForB" choreographyName="CoordinatedCreditCheck">
   </perform>
  </parallel> <!-- other stuff here -->
  <choice>
   <parallel> <!– A was chosen -->
    <finalize name="checkCreditForA" case="confirm" />
    <finalize name="checkCreditForB" case="cancel" />
   </parallel>
   <parallel> <!– B was chosen -->
    <finalize name="checkCreditForA" case="cancel" />
    <finalize name="checkCreditForB" case="confirm" />
   </parallel>
   <parallel> <!– Neither was chosen -->
    <finalize name="checkCreditForA" case="cancel" />
    <finalize name="checkCreditForB" case="cancel" />
   </parallel>
  </choice>
 </sequence>
</choreography>
```

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What does the pattern buy you? Part 1

- The pattern helps to design choreographies that work.
- The coordination choreography includes required protocol signals.
- The application choreographies supply the business messages.
- By means of the protocol signals, the application choreographies can now be managed by business transaction management software.

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What does the pattern buy you? Part 2: exception handling

- Business analysts hate to (often refuse to) handle exceptions.
  - Witness the TWIST scenarios…
- Exceptions in business coordination scenarios multiply like rabbits.
- A good business transaction protocol will handle many exceptions, eg:
  - Recover and realign regardless of end-system or comms failures.
  - Resolve collisions in a defined manner.
  - Handle timeouts.
  - Handle either side deciding to give up (i.e. app triggered exception) at any time.
- Good business transaction management software will handle all protocol exceptions.
- Most of those exceptions can safely be ignored by the business analysts.

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Conclusion

- We think this proposal is more conceptually compatible with CDL than the previous transaction proposal.
  - No surprise, CDL has evolved a lot, and we've thought about it a lot more.
- Not many changes to CDL, and most of them forced moves: they'll need to be done anyway.
- Useful in simple single-level choreographies;
- more useful as the choreographies get more complex.